AECOM

Hastings Borough Council Level 1 Strategic Flood Risk Assessment

Hastings Borough Council

Project number: 60690218

October 2024

Delivering a better world

Quality information

Prepared by	Checked by	Approved by
[redacted]	[redacted]	[redacted]
Ben Giles Engineer	Heather Wells Senior Consultant	Galo Pinto Business Lead

Revision History

Revision	Revision date	Details	Authorized	Name	Position
001	15/01/2024	DRAFT ISSUE	Yes	Galo Pinto	Business Lead
002	28/06/2024	Addressing Stakeholder Comments	Yes	Galo Pinto	Business Lead
003	31/10/2024	FINAL ISSUE	Yes	Heather Wells	Project Manager

Distribution List

# Hard Copies	PDF Required	Association / Company Name
N/A	1	Hastings Borough Council

Prepared for:

Hastings Borough Council
Muriel Matters House
2 Breeds Place
Hastings
TN34 3AA

Prepared by:

Ben Giles
Engineer
T: 020 8639 3500
E: ben.giles@aecom.com

AECOM Limited
Sunley House
4 Bedford Park, Surrey
Croydon CRO 2AP
United Kingdom

T: +44 20 8639 3500
aecom.com

Table of Contents

Figures

Tables

Executive Summary

As the Local Planning Authority (LPA), Hastings Borough Council are responsible for the publication of a Strategic Flood Risk Assessment (SFRA) in accordance with the National Planning Policy Framework (NPPF). The SFRA provides a strategic overview of flood risk to enable effective risk-based strategic planning for the future and supports development of the Hastings Borough Council Local Plan.

The SFRA fulfils the expectation of the NPPF and associated Planning Practice Guidance (PPG). It is a source of information that can be used to inform planning and development within the Borough and presents information to be used for undertaking the Sequential Test. The SFRA is informed by multiple sources of information, including stakeholder data and empirical evidence, to build a comprehensive overview of all sources of flood risk.

There are a number of prevalent flood risk sources within Hastings including the sea, rivers and surface water. Low lying areas along the coast including Bulverhythe, St Leonards and the Old Town along the seafront are vulnerable to overtopping sea defences. There are fluvial flood extents associated with the Combe Haven and Hollington Stream Main Rivers in addition to the Old Roar Gill and Bourne Stream (Ordinary Watercourses). Several surface water flooding hotspots were highlighted within the Hastings Surface Water Management Plan and these include Hastings Town Centre, Old Town and Hollington.

DG5 records from Southern Water show that there have been several incidents of sewer flooding throughout the Borough in the past 10 years, specifically within postcode areas TN37 7 and TN34 9 where over 50 sewer incidents have been recorded.

The Susceptibility to Groundwater Flooding dataset highlights that most of the Borough lies outside of the area with potential for groundwater flooding. However, there are some areas local to St Helens Wood and Old Roar Gill watercourse within the centre of the Borough, in addition to the coastline such as the Old Town and West Marina where there is potential for groundwater flooding to occur at the surface. In addition to the risk of groundwater flooding at the surface, groundwater can also impact the feasibility of drainage.

Section 36 of the Town and Country Planning Act 1990 and Section 3 of the NPPF sets out the requirements for preparing a Local Plan where each LPA is expected to prepare and review at least once every five years. This SFRA provides evidence for Hastings Borough Council to consider as part of the Local Plan development, on the basis of key flood risks and opportunities for development within the Borough. It also provides guidance for site-specific Flood Risk Assessments (FRA) to be undertaken by, or on behalf of, a developer. The SFRA feeds into Regulation 18 (evidence gathering and early stage consultation) where the evidence presented in the SFRA informs the development of new policies to help shape the future of the Borough in a sustainable manner, whilst fulfilling the expectations of the PPG.

Hastings Borough Council has commissioned AECOM to review and update the Level 1 SFRA for Hastings administrative area. This report comprises the updated Level 1 SFRA Report and replaces the earlier version of the SFRA (2019) which will support Regulation 19 for Publication of the Local Plan

Abbreviations and Glossary of Terms

Abbreviations

Acronym	Definition
AEP	Annual Exceedance Probability
AIMS	Asset Information Management System
BGI	Blue and Green Infrastructure
BGS	British Geological Survey
CFMP	Catchment Flood Management Plan
DEFRA	Department for Environment, Flood and Rural Affairs
ESCC	East Sussex County Council
FCERM	Flood and Coastal Erosion Risk Management
FRA	Flood Risk Assessment
FWMA	Flood and Water Management Act
GIS	Geographical Information System
HBC	Hastings Borough Council
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
NPPF	National Planning Policy Framework
PPG	Planning Practice Guidance
RMA	Risk Management Authority
RoFfSW	Risk of Flooding from Surface Water
PCWLMB	Pevensey & Cuckmere Water Level Management Board
SA	Sustainability Appraisal
SAB	SuDS Approval Body
SFRA	Strategic Flood Risk Assessment
SMP	Shoreline Management Plan
SPD	Supplementary Planning Document
SPZ	Source Protection Zone
SuDS	Sustainable Drainage Systems

Glossary of Terms

Term	Description
Annual exceedance probability (AEP)	Annual exceedance probability of occurrence in any one year, expressed as a percentage. For example, a 1 in 200 annual exceedance probability event has a 0.5% AEP of occurring in any year.
Aquifer	A source of groundwater comprising water bearing rock, sand, or gravel capable of yielding significant quantities of water.
Attenuation	The storing of water to reduce peak discharge of water.
Catchment Flood Management Plan	A high-level planning strategy through which the Environment Agency works with their key decision makers within a river catchment to identify and agree policies to secure the long-term sustainable management of flood risk.
Climate Change	Long term variations in global temperature and weather patterns caused by natural and human action. For rainfall events, a 40% increase is applied for a 1% Annual Exceedance Probability Event in the upper allowance scenarios in 2070s. These climate change values are based upon guidance published by the Environment Agency in Section 3.6.
Culvert	A channel or pipe that carries water below the level of the ground.
Exception Test	The exception test should be applied following the application of the Sequential Test. Conditions need to be met before the Exception Test can be satisfied.
Flood Defence	Infrastructure used to protect an area against floods which may include floodwalls and embankments; they are designed to a specific standard of protection (design standard).
Flood Resilience	Measures that minimise water ingress and promotes fast drying and easy cleaning, to prevent any permanent damage.
Flood Resistant	Measures to prevent flood water entering a building or damaging its fabric. This has the same meaning as flood proof.
Flood Risk	The level of flood risk is the product of the frequency or likelihood of the flood events and their consequences (such as loss, damage, harm, distress, and disruption).
Flood Risk Area	An area determined as having a significant risk of flooding is defined by the Environment Agency, for flood risk areas from Main Rivers and Sea, and the Lead Local Flood Authority for surface water food risk.
Flood Zone	Flood Zones show the probability of flooding, ignoring the presence of existing defences.
Freeboard	Height of flood defence crest level (or building level) above designed water level.
Functional Floodplain	Land where water has to flow or be stored in times of flood. As per the Planning Practice Guidance, this is defined as the 1 in 30 year event (3.3% Annual Exceedance Probability).
Lead Local Flood Authority (LLFA)	As defined by the Flood and Water Management Act 2010, in relation to an area in England, this means the unitary authority or where there is no unitary authority, the county council for the area, in this case the Borough of Hastings.
Local Planning Authority (LPA)	Body that is responsible for controlling planning and development through the planning system.
Main River	Watercourse defined on a 'Main River Map' designated by DEFRA. The Environment Agency has permissive powers to carry out flood defence works, maintenance, and operational activities for Main Rivers only.
Major Development	A planning application involving new dwellings is a major application if: - The number of dwellings to be constructed is 10 or more; or - If the number of dwellings is not provided in the application, the site area is 0.5 hectares or more. For all other uses an application constitutes major development if: - The floorspace to be built is 1000 square metres or more, or where the site area is 1 hectare or more.
Minor Development	In relation to flood risk, a minor development includes: - minor non-residential extensions (industrial/commercial/leisure etc): extensions with a floorspace not in excess of 250 square metres. - alterations: development that does not increase the size of buildings, e.g. alterations to external appearance. - householder development: for example, sheds, garages, games rooms etc. within the curtilage of the existing dwelling, in addition to physical extensions to the existing dwelling itself. This definition excludes any proposed development that would create a separate dwelling within the curtilage of the existing dwelling (e.g. subdivision of houses into flats) or any other development with a purpose not incidental to the enjoyment of the dwelling.

Term	Description
Mitigation Measure	An element of development design which may be used to manage flood risk or avoid an increase in flood risk elsewhere
National Landscape	A National Landscape is one of 46 areas within England, Wales and Northern Ireland safeguarded in the national interest for its distinctive character and beauty. The legal designation is 'Area of Outstanding Natural Beauty'.
Non-Major Development	A planning application is a minor development if it involves: - Residential development of between one and nine dwellings - Development where the floorspace is less than 1,000 sq m - Development on sites less than one hectare - Gypsy and traveller sites – up to nine pitches
Residual Flood Risk	The remaining flood risk after risk reduction measures have been taken into account.
Return Period	The average time period between rainfall or flood events with the same intensity and effect.
Risk	Risk is a factor of the probability or likelihood of an event occurring multiplied by consequence: Risk = Probability x Consequence. It is also referred to in this report in a more general sense.
Sequential Test	Aims to steer vulnerable development to areas of lowest flood risk from all sources.
Source Protection Zone (SPZ)	Defined areas in which certain types of development are restricted to ensure that groundwater sources remain free from contaminants.
Sustainable Drainage Systems (SuDS)	Methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional techniques.
Topographic Survey	A survey of ground levels.
Watercourse	All rivers, streams, drainage ditches (i.e., ditches with outfalls and capacity to convey flow), drains, cuts, culverts, and dykes that carry water. The Lead Local Flood Authority manage Ordinary Watercourses which are not identified as a Main River.

1 Introduction

1.1 Background

1.1.1 The National Planning Policy Framework[1] (NPPF) and associated Planning Practice Guidance (PPG) for Flood Risk and Coastal Change[2] emphasise the active role Local Planning Authorities (LPA) should take to ensure that flood risk is understood and managed effectively and sustainably throughout all stages of the planning process. The NPPF outlines that Local Plans should be supported by a Strategic Flood Risk Assessment (SFRA) and the LPA should use the findings to inform strategic land use planning.

1.1.2 The following changes have occurred since the previous SFRA (2019) was issued:

- The NPPF was updated in December 2023[1].
- The Environment Agency published an updated guide on how to prepare an SFRA[3] in March 2022. This included updates in several areas including the governance arrangements for preparing SFRAs and further detail on the Sequential Test, among other advice.
- Guidance on how climate change allowances (for peak river flows, peak rainfall, and sea level rise) should be applied to flood risk assessments was last updated in May 2022[4].
- In August 2022, significant changes were made to the to the PPG for Flood Risk and Coastal Change.

1.1.3 As a result of these changes, Hastings Borough Council (HBC) has commissioned AECOM to review and update the Level 1 SFRA for Hastings administrative area. This report comprises the updated Level 1 SFRA Report and replaces the earlier version of the SFRA (2019).

1.2 Aims and Objectives

1.2.1 The aims of the SFRA are to:

- Provide a strategic overview of flood risk with HBC's administrative region, to enable effective risk-based strategic planning for the future. This includes but is not limited to the preparation of the Local Plan;
- Provide a source of information which can be used by HBC to inform knowledge of flooding and flood risk from all sources, throughout the Borough; and
- Introduce an approach for applying the Sequential Test for HBC, which can be applied to all future development within the Borough.

1.2.2 The objectives of the SFRA are to:

- Review national and local legislation, policy documentation and planning guidance that is relevant to managing flood risk within HBC,
- Review and capture up to date information from Risk Management Authorities (RMAs), stakeholder groups and open datasets, to inform the evidence base,
- Use data sources to assess the risk of flooding from all sources, including fluvial, surface water, groundwater, sewer, and artificial sources of flooding, such as reservoir and canal,
- Provide tailored guidance for site specific flood risk assessments, and

[1] Department for Levelling Up, Housing and Communities. Updated December 2023. *National Planning Policy Framework*. https://www.gov.uk/government/publications/national-planning-policy-framework--2
[2] Department for Communities and Local Government and Ministry of Housing, Communities and Local Government. Updated August 2022. *Planning Practice Guidance: Flood Risk and Coastal Change.* http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/
[3] Environment Agency. Updated March 2022. *How to prepare a strategic flood risk assessment.* https://www.gov.uk/guidance/local-planning-authorities-strategic-flood-risk-assessment#full-publication-update-history
[4] Environment Agency. *Flood risk assessments: climate change allowances*. Updated May 2022. Flood risk assessments: climate change allowances - GOV.UK (www.gov.uk)

- Provide relevant information to HBC which can be used to inform development of local policies, and decision making about proposals for development.

1.3 Approach to Flood Risk Management

1.3.1 The overall approach is designed to direct development away from areas at highest risk of flooding, whether existing or in the future. This section outlines the process to be followed by HBC to protect people and property from flooding. The approach for the consideration of flood risk set out in the NPPF and paragraphs 3 and 4 of the PPG is summarised as in Figure 1-1.

Figure 1-1: Flood Risk Approach

Assess Flood Risk

1.3.2 The NPPF outlines that Local Plans should be supported by a SFRA and LPAs should use the findings to inform strategic land use planning. **Figure 1-2** illustrates how flood risk should be taken into account in the preparation of the Local Plan by HBC.

1.3.3 Where appropriate, for sites in areas at risk of flooding, developers must undertake a site-specific Flood Risk Assessment (FRA) to accompany planning applications (or prior approval for certain types of permitted development, or Technical Details Consent).

1.3.4 Assessments of flood risk should identify sources of uncertainty and how these are accounted for in a mitigation strategy.

Avoid Flood Risk

1.3.5 Where an assessment indicates flood risk is a consideration for a plan or development proposal, the PPG instructs the following action to be undertaken by the LPA:

- *"In plan-making, a sequential approach should be employed. This involves applying the 'Sequential Test' and, if needed, the 'Exception Test';*
- *In decision-making, where necessary, planning authorities also apply the Sequential Test and, if needed, the Exception Test, to ensure that flood risk is minimised and appropriately addressed;*
- *Where the Sequential and the Exception tests have been applied as necessary and not met, development should not be allowed;*
- *Substitute lower vulnerability uses for higher vulnerability uses; and*
- *Within sites, using site layout to locate the most vulnerable aspects of development in areas of lowest flood risk, unless there are overriding reasons to prefer a different location. In addition, measures to avoid flood risk vertically can then be taken, by locating the most vulnerable uses on upper storeys, and by raising finished floor and/or ground levels, where appropriate and that such techniques are suitably designed. Such measures should also account for residual flood risks from flood risk management infrastructure."*

Control Flood Risk

1.3.6 HBC and developers can investigate measures to control the risk of flooding affecting the site. Early discussions with relevant flood risk management (RMA) authorities, and reference to this SFRA and programmes of Flood and Coastal Erosion Risk Management (FCERM) schemes will help to identify such opportunities.

1.3.7 In the case of HBC, the relevant RMAs include East Sussex County Council (who act as Lead Local Flood Authority (LLFA)), Environment Agency, Southern Water and National Highways.

1.3.8 HBC and developers should seek flood risk management opportunities (e.g. safeguarding land), and to reduce the causes and impacts of flooding (e.g. through the use of Sustainable Drainage Systems).

Mitigate Flood Risk

1.3.9 The PPG states that flood resistance and resilience measures should be used to address any residual flood risk which remains following the implementation of avoidance and control measures. The flood resistance and resilience measures cannot be used to justify development in inappropriate locations.

1.3.10 Passive measures should be prioritised over active measures, as passive measures are more likely to be effective and reliable during a flood event. This is because passive measures do not require manual activation and typically do not require a high level of maintenance, whereas active measures require deployment.

1.3.11 Passive measures include but are not limited to resilient building materials, full length flood doors and automatic airbrick covers. Active measures include door guards, window guards and sandbags.

1.3.12 Passive and active measures typically target the threshold of a building, where flood waters could infiltrate the property. Common flood resistant materials include concrete and steel yet may also comprise masonry which has been produced with an impervious layer, such as water resistant render or asphalt. Cavity walls may be filled with water resistant insultation below the flood level.

Manage Flood Risk

1.3.13 Further flood risk management measures to address any residual risk should be reviewed and implemented, as appropriate, after avoidance, control and mitigation measures have been utilised. As defined within the PPG, residual risk is present in two forms, including residual risk from flood risk management infrastructure and to a development once any site-specific flood mitigations are taken into account.

1.3.14 Considerations for safe access, egress routes and adequate flood warnings should be made, to ensure people are not exposed to hazardous flooding. This approach should be considered early in the design process. The LPA should be able to demonstrate with satisfaction that the development will be safe for its lifetime, accounting for the vulnerability of its users.

1.3.15 If an impact cannot be wholly mitigated, developers are required to cover the full cost of any additional emergency services provision needed. It is recommended that this is confirmed during the planning process as opposed to post-occupation.

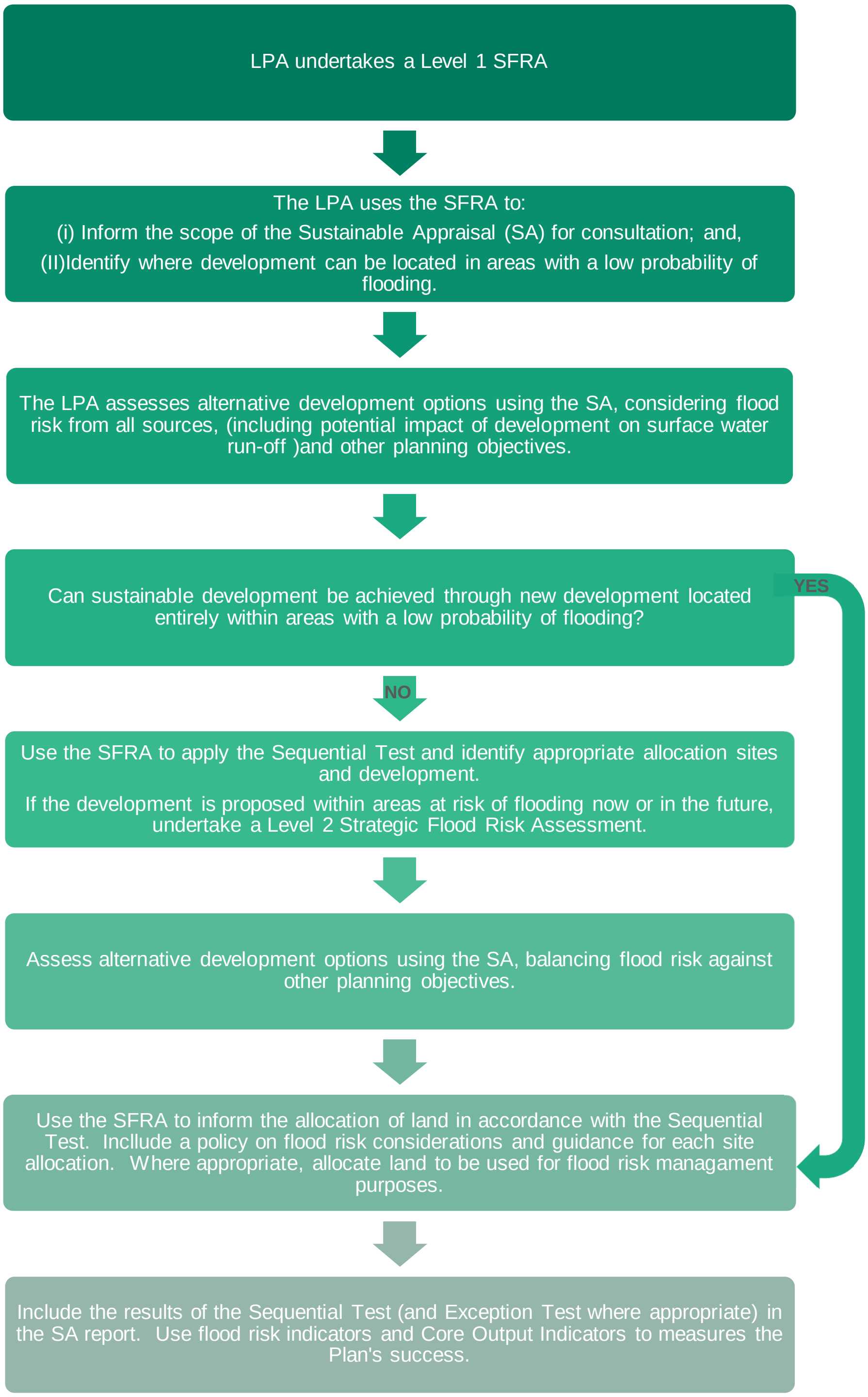

Figure 1-2 Taking flood risk into account in the preparation of strategic policies (PPG for Flood Risk and Coastal Change Diagram 1)

1.4 Partner Organisations

1.4.1 Several organisations are involved in the development and flood risk management across the study area. The role of stakeholders involved in the development of the SFRA is described below.

1.4.2 **Hastings Borough Council** is the LPA for the study area, responsible for long term strategic planning of future development through the preparation of Local Plans, as well as for determining planning applications within the Borough. HBC should work with the LLFA to secure Local Plan policies compatible with the local flood risk management strategy. HBC is also the Land Drainage Authority for the study area. HBC have certain permissive powers to undertake flood defence works and powers of enforcement under the Land Drainage Act[5] 1991 on Ordinary Watercourses which have not been designated as Main Rivers. The LPA is responsible for informing strategic land use planning including the application of the Sequential Test which seeks to steer development towards areas of lowest flood risk prior to consideration of areas of greater risk.

1.4.3 **East Sussex County Council** is designated as the LLFA under the FWMA and has a duty to lead and coordinate the management of local flood risk, which includes flood risk from surface water, groundwater, and Ordinary Watercourses. ESCC is also a statutory consultee to the planning system under the General Development Management Procedure Order[6] (2015) for major planning applications and have regulatory powers in respect of Ordinary Watercourses, which can include any natural or man-made feature that carries water (other than the public sewer or designated Main Rivers). ESCC also acts as the Highways authority for the Borough and maintains the local road network which are highway maintainable at public expense which includes provision of highway drainage and several roadside ditches. The ESCC Highways Authority also has permissive powers under the Highway Act 1980 to manage flooding of the highway. The Highways Authority must ensure that road projects do not increase flood risk.

1.4.4 **Environment Agency** has a strategic overview role for flood risk management associated with Main Rivers and Sea in the Borough and is a statutory consultee for any development proposed within Flood Zone 2 and 3 associated with these watercourses or the sea. The Environment Agency is continually improving and updating their flood map for Main Rivers and systematic modelling for the mapping of surface water flood risk whilst having permissive powers to carry out flood defence works, maintenance and operational activities for these Main Rivers. However, overall responsibility for maintenance lies with the riparian owner. The Environment Agency also has regulatory powers over Main Rivers. A Flood Risk Activity Permit may be needed from the Environment Agency for riparian owners to undertake works on or near Main Rivers, or within their floodplains.

1.4.5 **Southern Water** has the duty as a statutory body to provide wastewater services to almost all of the study area and is responsible for the management, maintenance, and operation of flood control structures. Water Companies are defined as an RMA within the FWMA and are responsible for flood risk management functions in accordance with the Water Resources Act 1991 and the Land Drainage Act 1991. Southern Water is responsible for the management of the sewer system across most of the study area. This includes managing the risk of flooding from surface water, foul and combined sewer systems. In addition, private individuals may be responsible for drainage systems that operate prior to discharge either into a watercourse or into a public sewer.

1.4.6 **Independent Water Networks** provide water and wastewater services to localised areas of the Borough. These generally include newly built developments which often connect into existing Southern Water assets

1.4.7 **National Highways** has responsibilities (under the Highways Act 1980) for the effectual drainage of surface water from motorways and major A roads, including the slip roads to and from trunk roads, insofar as ensuring that drains, including kerbs, road gullies, ditches and the pipe network which connect to the sewers are maintained.

1.4.8 **Pevensey & Cuckmere Water Level Management Board (PCWLMB)** is an internal drainage board (IDB) which has responsibilities for the management of water levels within the Combe Haven. IDBs undertake works to reduce flood risk to people and property, and manage water levels for agricultural and environmental needs within their district.

1.5 Level 1 SFRA Approach

1.5.1 The Level 1 SFRA is a desk-based study, using readily available existing information and datasets to enable the application of the Sequential Test by the LPA and to identify where the Exception Test may be required. The methodology for preparing the Level 1 SFRA are described below.

[5] Land Drainage Act, 1991. https://www.legislation.gov.uk/ukpga/1991/59/contents
[6] The Town and Country Planning (Development Management Procedure) (England) Order 2015; http://www.legislation.gov.uk/uksi/2015/595/contents/made

Gathering Data and Analysing it for Suitability

1.5.2 Under Section 14 of the NPPF, the risk of flooding from all sources must be considered as part of a Level 1 SFRA, including flooding from tidal sources, rivers (fluvial), land (overland flow and surface water), groundwater, sewers, and artificial sources.

1.5.3 An extensive set of datasets was requested from several organisations, including HBC, ESCC (as the LLFA and Highways Authority), the Environment Agency, and Southern Water.

1.5.4 Datasets and information gathered as part of the preparation of the first and second iteration of the SFRA in 2014 and 2019 have been retained where appropriate. The datasets are described further in **Section 3**, including detail regarding appropriate uses and limitations, and how they have been used within the Level 1 SFRA.

Producing Strategic Flood Risk Maps, GIS Deliverables and Reporting

1.5.5 18 No. GIS maps have been produced using the data gathered during the study. The mapped deliverables are summarised in **Table 1-1** and presented in **Appendix A**. These should be referred to in conjunction of **Section 3 'Assessing Flood Risk'**.

Table 1-1 Strategic Flood Risk Maps

Figure No.	Figure Title and Content
Figure 01	Study Area
Figure 02	Topography
Figure 03	Superficial Geology
Figure 04	Bedrock Geology
Figure 05	Historic Flood Records
Figure 06	Sewer Flooding
Figure 07	Flooding from Rivers and Sea (Environment Agency Flood Zone Map)
Figure 08	Detailed Defended Tidal Hydraulic Model Outputs
Figure 09	Flood Risk Management Infrastructure
Figure 10	Hydraulic Modelling Coverage
Figure 11	Detailed Defended Fluvial Hydraulic Model Outputs
Figure 12	Flood Warning Areas
Figure 13	Map of Risk of Flooding from Surface Water (RoFfSW)
Figure 14	Susceptibility to Groundwater Flooding
Figure 15	Artificial Sources
Figure 16	Flood Zone 3b Delineation

1.6 Strategic Flood Risk Assessment Structure

1.6.1 The SFRA report is structured as follows:

- Section 2: Provides a summary of the planning policy context.
- Section 3: 'Assessing Flood Risk' and the supporting mapping deliverables (**Appendix A**) provide a description of the risk of flooding across the Borough.
- Section 4: Provides guidance on 'Avoiding Flood Risk' through the appropriate application of the Sequential Test by HBC when allocating future development sites as part of the plan-making process, as well as by developers proposing development on windfall sites.
- Sections 5: Provides guidance on measures to 'Control and Mitigate Flood Risk' on future development sites.
- Section 6: Provides guidance on the application of SuDS.
- Section 7: Provides guidance on the preparation of site-specific FRAs.

- Section 8: Outlines several flood risk management objectives and policy recommendations for consideration by HBC throughout the development of their strategic planning documents.
- Section 9: Summarises the next steps for HBC.

2 Legislative and Planning Policy Context

2.1 Introduction

2.1.1 This Section provides an overview of the legislative, national, and local planning policy context specific to the Level 1 SFRA for HBC. The information presented in the SFRA should be used by HBC to establish robust policies in relation to flood risk as part of their emerging local plan.

2.2 National Planning Policy Framework

2.2.1 The NPPF[1] sets out the governments planning policies for England, policy implementation and requirements for the planning system. It provides a framework within which councils and local people can produce local and neighbourhood plans that reflect the needs and priorities of their communities. It was first published in 2012 and last updated in December 2023.

2.2.2 The overall approach to flood risk is broadly summarised in the NPPF (2023) Paragraph 173:

"When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

a. *within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;*

b. *the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;*

c. *it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;*

d. *any residual risk can be safely managed; and*

e. *safe access and escape routes are included where appropriate, as part of an agreed emergency plan"*

As described under Paragraph 167 of the NPPF (2023), all proposals for development should account for all sources of flood risk and the current and future impacts of climate change. This can be achieved through:

a. *"Applying the sequential test and then, if necessary, the exception test;*

b. *safeguarding land from development that is required, or likely to be required, for current or future flood management;*

c. *using opportunities provided by new development and improvements in green and other infrastructure to reduce the causes and impacts of flooding, (making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management); and*

d. *where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocate development, including housing, to more sustainable locations."*

NPPF Guidance SuDS Policy (April 2015)

2.2.3 SuDS are an approach to managing rainwater and surface water that replicates natural drainage; the key objectives being to manage flow rate and volume of runoff to reduce the risk of flooding and/or water pollution. LPAs such as HBC are required to ensure that SuDS are implemented for all major developments[7] where appropriate, and that by using planning conditions or planning obligations there are clear arrangements in place for ongoing maintenance over the lifetime of the development.

2.2.4 As the LLFA, ESCC is a statutory consultee for SuDS applications. ESCC will need to be consulted on the drainage elements of planning applications for major development to ensure they conform to necessary national[8] and local SuDS standards.

2.2.5 The most up to date and comprehensive information on planning, designing, constructing, and maintaining SuDS can be found in CIRIA Report C753 – The Suds Manual[9].

Planning Practice Guidance

2.2.6 The PPG was first published by the UK Government in March 2014 and most recently updated in August 2022. The PPG acts as a catalogue of information, providing further context to the NPPF. Its primary purpose is for use in planning and decision-making and it is typically used by Local Authorities. However, it is a publicly available resource that can be used by community groups and other stakeholders. The guidance is separated into categories, the most relevant categories to the SFRA including 'Flood Risk and Coastal Change' and 'Climate Change'. Key information is detailed below.

Flood Risk and Coastal Change

2.2.7 The PPG advises how to take account of and address the risks associated with flooding and coastal change in the planning process.

2.2.8 Flood risk is defined as the combination of the probability and potential consequences of flooding. Areas at risk of flooding are those at risk from any source, now or in the future. Where flood risk is present, a Sequential Test should be applied in plan and decision-making. The LPA is responsible for determining whether a planning application passes the Sequential Test.

2.2.9 Where suitable sites at lower risk of flooding are not available following the application of the Sequential Test, an Exception Test is required. This must be undertaken if the development is:

- Highly vulnerable and in Flood Zone 2;
- Essential Infrastructure in Flood Zone 3a or 3b; or
- More vulnerable in Flood Zone 3a.

2.2.10 The Exception Test should only be applied if the Sequential Test has shown there are no reasonable available, lower risk sites, suitable for the proposed development, and the development meets the criteria above. Developments subject to the Exception Test need to reduce flood risk overall, where possible. Further detail is provided within **Section 4.4.** The Exception Test is used to demonstrate that:

"The development that has to be in a flood risk area will provide wider sustainability benefits to the community that outweigh flood risk; and

The development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall."

2.2.11 The PPG defines Sustainable Drainage Systems (SuDS) as measures designed to control surface water runoff close to where it falls, combining a mixture of built and nature-based techniques to mimic natural drainage as closely as possible. It accounts for the predicted impacts of climate change and may provide benefit to the environment and water quality.

2.2.12 Consideration of SuDS early in the design process can lead to improved integration of measures and multi-functional benefits. The LPA must consult the LLFA on the proposed drainage arrangements. In this instance, the LLFA is ESCC. Long term maintenance of the SuDS should be included within the proposal for development. This could be arranged by, but not limited to the LLFA, utilities company, community trust and private management company.

[7] A major development is any application that involves: Mineral extraction; Waste development; Residential development of between 10 or more dwellings; Residential development on a site area of 0.5 ha or more and the number of dwellings is unknown; Development of floorspace of 1,000 sq m or more; Development on sites over 1 ha or more; Change of use over 1,000 sq or more.

[8] Defra. March 2015. *Sustainable drainage systems: non-statutory technical standards.* https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards

[9] The SuDS Manual, CIRIA C753, 2015.

Climate Change

2.2.13 Guidance on climate change is included within the PPG to enable identification of suitable mitigation and adaptation measures in the planning process to address impacts of climate change. A SFRA forms part of the evidence base for the Local Plan, therefore information on climate change risks included within the SFRA is important to support local planning and decision-making.

2.2.14 The guidance considers future climate risks when allocating development sites, in addition to the impact and promotion of design responses to flood risk for the lifetime of the development. The document refers to Section 19 (1A) of the Planning and Compulsory Purchase Act 2004, whereby development plan documents must include policies that are designed to secure the development and use of land which contribute to the mitigation of, and adaptation to, climate change.

2.3 Water Legislation

Flood and Water Management Act (2010)

2.3.1 The FWMA[10], enacted by Government in response to the Pitt Review[11], designated unitary authorities, such as ESCC, as LLFAs. As such, ESCC is encouraged to bring together relevant bodies and stakeholders to manage local flood risk which may include county, city, district, borough councils, internal drainage boards, highway authorities, water companies and the EA. Local flood risk is defined as the risk of flooding from surface water runoff, groundwater and small ditches and watercourses (collectively known as Ordinary Watercourses).

2.3.2 The FWMA also formalises the flood risk management roles and responsibilities for other organisations including the Environment Agency, district councils, water companies and highway authorities. The responsibility to lead and co-ordinate the management of tidal and fluvial risk remains that of the Environment Agency.

2.3.3 The Act gives LLFAs the role of Sustainable Drainage Systems (SuDS) Approval Body (SAB) where the LLFA is responsible for adopting and maintaining SuDS. This means that planning applications which have drainage implications will need to be approved by the SAB before work can commence. The LLFA are a statutory consultee on major planning applications in relation to surface water drainage. However, at the time of writing, legislation that places the LLFA as a SAB had not yet been implemented. It is anticipated that this will be introduced in Winter 2024 where the LLFA will have more authority to evaluate and approve drainage applications including inspecting and enforcing Statutory SuDS Standards.

National Strategy for Flood and Coastal Erosion Risk Management

2.3.4 In accordance with the FWMA, the Environment Agency has developed a FCERM Strategy for England[12]. This strategy provides a framework for the work of all flood and coastal erosion risk management authorities.

2.3.5 The strategy sets the context for, and informs the production of, local flood risk management strategies by LLFAs, which will in turn provide the framework to deliver local improvements needed to help communities manage local flood risk. It has a long-term vision for: **a nation ready for, and resilient to, flooding and coastal change – today, tomorrow and to the year 2100** and has 3 long-term ambitions, underpinned by evidence about future risk and investment needs. They are:

- **Climate resilient places:** working with partners to bolster resilience to flooding and coastal change across the nation, both now and in the face of climate change.
- **Today's growth and infrastructure resilient in tomorrow's climate:** making the right investment and planning decisions to secure sustainable growth and environmental improvements, as well as infrastructure resilient to flooding and coastal change.

---

[10] Flood and Water Management Act 2010. https://www.legislation.gov.uk/ukpga/2010/29/contents
[11] Cabinet Office (2008) Sir Michael Pitt Report 'Learning lessons learned from the 2007 floods'. https://webarchive.nationalarchives.gov.uk/ukgwa/20100702215619/http://archive.cabinetoffice.gov.uk/pittreview/thepittreview/final_report.html
[12] Environment Agency. *The National Flood and Coastal Erosion Risk Management Strategy for England*. Updated June 2022. https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england--2#full-publication-update-history

- **A nation ready to respond and adapt to flooding and coastal change:** ensuring local people understand their risk to flooding and coastal change, know their responsibilities and how to take action.

2.3.6 The Environment Agency's 'Flood risk assessments: climate change allowances'[13] guidance is a supporting note for the National FCERM Strategy. The document reflects an assessment completed by the Environment Agency using UKCP18 data to produce more representative climate change allowances for river flood flows and extreme rainfall for each of the river basin districts in England. It is essential that land use planning decisions consider the impact of a changing climate where appropriate.

2.4 Flood Risk Regulations, 2009

2.4.1 The Flood Risk Regulations came into force in December 2009 which set out duties for the Environment Agency and LLFA's in the preparation of a range of reports and mapping outputs. The regulations transposed the EU Floods Directive (2007/60/EC) which required LLFA's to complete PFRAs. The Flood Risk Regulations were withdrawn in 2016.

2.5 Regional Flood Risk Policy

2.5.1 This Section provides an overview of the regional policies relevant but not limited to Hasting Borough Council boundary.

Cuckmere and Sussex Havens Catchment Flood Management Plan

2.5.2 The Cuckmere and Sussex Havens Catchment Flood Management Plan[14] (CFMP) was published by the Environment Agency in September 2009, and is the overarching flood risk management policy for the Cuckmere and Sussex Havens catchment. It provides an overview of flood risk within the catchment and presents the EA's key strategic policy for sustainable flood risk management over the next 50 to 100 years.

2.5.3 Under the CFMP, Hastings falls under sub-area 7 which also comprises Bexhill. The report identifies surface water flooding as the main flooding risk in the sub-area. This risk is expected to worsen with climate change.

2.5.4 This area is covered by Policy 4, as an "area of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change". Several actions are proposed to implement this proposed approach, as outlined below.

- Complete System Asset Management Plans (SAMPs) to determine how existing flood defences will be managed;
- Work with Rother District Council and the water companies to develop a Surface Water Management Plan (SWMP) for Bexhill and Hastings;
- Work with Rother District, HBC and ESCC and the Highways Agency to identify local restrictions to flows and ensure adequate channel capacity;
- Work with Rother District and HBC to influence spatial planning, providing advice on methods to reduce run-off and implementation of SuDS in all new developments;
- Complete flood mapping study for high risk watercourses in Bexhill and Hastings;
- Appraise and review how climate change will alter the effectiveness of the sea outfall at Egerton Park;
- Look at the feasibility and seek implementation of local improvements or schemes to better manage flood risk north of the A259; and
- Appraise and review the capacity of Combe Haven sea outfall to adapt to the effects of climate change.

2.5.5 Several of these actions have already been implemented or are in progress.

[13] Environment Agency. *Flood risk assessments: climate change allowances*. Updated May 2022. Flood risk assessments: climate change allowances - GOV.UK (www.gov.uk)
[14] Environment Agency (2009) *Cuckmere and Sussex Havens CFMP.* https://www.gov.uk/government/publications/cuckmere-and-sussex-havens-catchment-flood-management-plan

South East River Basin District Flood Risk Management Plan

2.5.6 Under the UK Flood Risk Regulations, the Environment Agency is required to prepare Flood Risk Management Plans (FRMPs) for all of England covering flooding from Main Rivers, the sea, and reservoirs. The updated South East River Basin District FRMP[15] was published by the Environment Agency in March 2016 and updated in April 2023, setting out the proposed measures to manage flood risk within the District from 2021 to 2027 and beyond. The measures in the South East River Basin District FRMP have been formulated in line with agreed social, economic and environmental objectives and are grouped under 4 categories stated below:

- Preventing flooding;
- Protecting against flooding;
- Preparing for flooding; and
- Preparing for flooding recovery and review following flooding.

South East River Basin District Management Plan

2.5.7 The South East River Basin District Management Plan[16] was updated in December 2022, and has been prepared under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. The aim of the plan is to "*to enhance nature and the natural water assets that are the foundation of everyone's wealth, health and wellbeing, and the things people value, including culture and wildlife.*"

2.5.8 The plan highlights several water management issues across the basin, including physical river modification, pollution from various sources, invasion of non-native species and changes to water levels and flows. These issues result in loss of habitat and potential threat to bathing and drinking water in the basin. The plan identifies a series of actions to assist in improving water body status by addressing the water management issues highlighted.

South Foreland to Beachy Head Shore Management Plan

2.5.9 The Shoreline Management Plan[17] (SMP) was produced in 2006 and approved again in 2019 with Hastings Borough not identified as an area where changes to the SMP are required. The SMP provides a large-scale assessment of the risks associated with coastal evolution and presents a policy framework to address these risks to people and the developed, historic, and natural environment in a sustainable manner. The SMP predicts future coastal change during the next 100 years and outlines how the shoreline should be managed in the future.

2.5.10 Hastings is covered under the western, Cliff End to Beachy Head, section of the SMP. The SMP is further broken down into areas of interest, each with their own action plan for the immediate, mid- and long-term timescales. In some cases, the policy for a certain area may evolve over time to suit the long term economic and environmental needs of the area. The policy each location adopts will depend on the vulnerability and future needs of the surrounding area. Policies are allocated for each of three epochs: 2025, 2026 to 2055 and 2056 to 2105.

- Areas covered by the *No Active Intervention* will have no investment in coastal defences or operations.
- Areas covered by *Advance the Line* require investment into new defences built further out in the sea in an attempt to reduce the stress on current defences with possible extension to the coastline.
- Areas covered by *Hold the Line* defences are maintained and upgraded or replaced in their current position where funding permits.
- Areas covered by *Managed Realignment* allow an area that was not previously exposed to flooding by the sea to become flooded by removing coastal protection.

2.5.11 The relevant policies for the areas within Hastings are provided in **Table 2-1** below.

[15] Environment Agency. Updated April 2023. *South East River Basin District FRMP.* https://www.gov.uk/government/publications/south-east-river-basin-district-flood-risk-management-plan
[16] Environment Agency, 2022. *South East River Basin District River Basin Management Plan.* https://www.gov.uk/guidance/south-east-river-basin-district-river-basin-management-plan-updated-2022
[17] South East Costal Group, 2006. *South Foreland to Beachy Head SMP.* https://se-coastalgroup.org.uk/shoreline-management-plans/south-foreland-to-beachy-head/

Table 2-1 – SMP Policies in Hastings

Policy Unit	Policy	Management Activities
Fairlight Cove West to Hastings	• *Short term*: No active intervention • *Medium term*: No active intervention • *Long term:* No active intervention	• *To 2025*: Cliff erosion will continue, providing nominal feed (fines) to the shoreline system. • *2026 – 2055*: Cliff erosion will continue, providing nominal feed (fines) to the shoreline system. • *2056 – 2105:* Cliff erosion will continue, providing nominal feed (fines) to the shoreline system.
Hastings (including harbour)	• *Short term*: hold the line • *Medium term*: hold the line • *Long term:* hold the line	• *To 2025*: Continue with current Practices. • *2026 – 2055*: Significantly increase hard defences in the long term, as beaches narrow and sea level rises. • *2056 – 2105:* Significantly increase hard defences in the long term, as beaches narrow and sea level rises.
Bulverhythe and Glyne Gap	• *Short term:* hold the line • *Medium term:* hold the line • *Long term:* hold the line	• *To 2025:* New defence scheme due to be constructed in near future, to provide 100 year SOP defence. Will require ongoing maintenance. • *2026 – 2055*: New defence scheme due to be constructed in near future, to provide 100 year SOP defence. Will require ongoing maintenance. • *2056 – 2105:* New defence scheme due to be constructed in near future, to provide 100 year SOP defence. Will require ongoing maintenance.

2.5.12 As Table 2-1 states, the short term objectives of the SMP are reaching the end of cycle. An updated SMP is being produced and given the SFRA is a living document, once published, the SFRA should highlight any new policies within the SMP. Until then, in functional terms, the medium term objectives should be considered.

2.6 Local Planning Policy and Flood Risk Strategies

2.6.1 As part of Regulation 18, a new Local Plan[18] for Hastings is currently in draft which comprises three main sections – Development Strategy, Development Focus Areas, and Development Policies. The new Local Plan which will be used up to 2040 is anticipated to be adopted in 2026 and will include site allocations as a chapter within the plan.

2.6.2 Within Section 3: Development Strategy, Strategy Policy 7 (SP7) relates to managing coastal erosion and flood risk. The policy states that:

1. "The Council will support the development and improvement of flood defence infrastructure and drainage assets in Hastings. Proposals for sea defences will be supported, subject to the submission of a coastal erosion vulnerability assessment, that demonstrates the sea defence will not be to the detriment of adjacent or downshore sections of coastline.
2. In line with Policy SP1, major growth and change will be directed away from areas with the highest flood risk, and in areas of lower flood risk, development will only be permitted where flood risk can be mitigated or suitable adaptations provided, taking into account all sources of flooding.
3. A Coastal Change Management Area is proposed between Rock a Nore and Glyne Gap. Within the Coastal Change Management Area, the Council will prevent development that may accelerate coastal change and require development, where permitted, to demonstrate mitigation strategies to manage risk associated with costal change.

[18] Hastings Borough Council. *Draft New Local Plan* https://www.hastings.gov.uk/planning/policy/new-local-plan/introduction/

4. Measures that help reduce flooding across the Borough will be supported and specific measures to address surface water flooding particularly encouraged in areas identified as being at particular risk comprising:

    a. *Hastings Town Centre*

    b. *Hastings Old Town*

    c. *Hollington Stream and*

    d. *Warrior Square.*

5. The Council will work with partners, including the Lead Local Flood Authority, to review levels of flood risk over the life of the Local Plan including the need for flood storage capacity."

2.6.3 Within Section 5: Development Policies, Development Policy 4 (DP4) relates to flood risk and water quality. The policy states that:

1. "A Flood Risk Assessment will be required as part of a planning application for development in Flood Risk Zones 2 and 3. Sequential and Exception Tests may also be required.

2. A Flood Risk Assessment will be required as part of a planning application for development in flood risk zone 1 that is:

    a. *More than 1 hectare; or*

    b. *a change to a more vulnerable use (for example, commercial to residential) where it could be affected by other sources of flooding (for example surface water); or*

    c. *Identified as having critical drainage problems.*

3. All development should incorporate sustainable urban drainage systems (SuDS) and manage surface water run off to ensure flood risk is not increased elsewhere and incorporate water drainage through infiltration. Where not feasible, this should be discharged to:

    d. *Open water bodies or if this cannot be achieved; and*

    e. *To the public sewer system, subject to checks with infrastructure providers.*

4. Development adjacent to flood and/or sea defences will be required to protect the integrity of existing defences, contribute to new defences where appropriate and be set back from the banks of watercourses and their defences to allow their management, maintenance and upgrading.

5. Development in the Coastal Change Management Area which has the potential to be negatively impacted by or hasten the effects of coastal change will need to demonstrate clear mitigation strategies to manage any risks.

6. Measures to discharge directly into the ground will only be acceptable in areas that are not identified as containing a high groundwater table. Sites identified as containing a high groundwater table should be subject to appropriate hydrological monitoring before drainage designs are submitted."

East Sussex Local Flood Risk Management Strategy, 2016

2.6.4 The East Sussex Local Flood Risk Management Strategy (LFRMS) provides a framework for the management of local flood risk in the county for the period of 2016 – 2026. The report focuses on the management of flood risk from surface water, groundwater, and Ordinary Watercourses. The long term aim of the strategy is to provide a co-ordinated approach to managing local forms of flood risk in East Sussex.

2.6.5 The LRFMS identifies four different drainage characteristics across the county, based on ground characteristics, and uses this information to establish new standing advice on drainage issues. Hastings is identified within the study as having amongst the highest risk of flooding within the region. This includes flooding from rivers and the sea in addition to susceptibility to flooding from groundwater and surface water.

2.6.6 Given the complex nature of the topography, surface water flow paths, geology, and a tidal influence within Hastings, specific recommendations have been proposed for surface water drainage, as summarised below.

- Due to the existing levels of urbanisation, impermeable areas should be kept to a minimum and the use of permeable paving is strongly recommended;
- In the coastal strip, where groundwater levels may be tidally-influenced, infiltration tests and groundwater monitoring should be undertaken at a both low and high tide, and SuDS should be designed to accommodate these fluctuations.
- In the upper reaches of the Hollington Stream catchment, surface water should be controlled as close to the source as possible. Restriction of the volume and velocity of surface water leaving the site to greenfield runoff rates is particularly important.
- Drainage strategies for developments in the lower reaches of the Hollington Stream catchment will need to account for restrictions in the capacity of existing culverts.
- SuDS features should accommodate existing surface water flow paths, and avoid obstruction to flows, particularly in heavily urbanised areas.
- Construction of basements and conversion of existing basements for habitation is not recommended in areas of high groundwater, or which are at a 1 in 30 year surface water flood risk.
- Property threshold levels should be kept higher than the surrounding area, to prevent surface water from being channelled directly into buildings.

2.6.7 The LFRMS and associated guidance (as summarised in **Sections 2.6.8 to 2.6.13**) should be treated as a material consideration with respect to planning. This is underpinned by the FWMA (2010), which states that risk management authorities must have regard to national and local strategies and guidance, when exercising functions that effect flood risk.

Preliminary Flood Risk Assessment

2.6.8 A Preliminary Flood Risk Assessment (PFRA) report is a high-level screening exercise to identify areas of significant risks as 'Indicative Flood Risk Areas' across England where 30,000 people or more are at risk from flooding.

2.6.9 A PFRA was prepared for ESCC in 2011[19]. A subsequent addendum was published on December 2019[20]. The PFRA provides a high-level overview of flood risk from local flood sources and includes flooding from surface water (i.e., rainfall resulting overland runoff), groundwater, Ordinary Watercourses (smaller watercourses and ditches) and canals. It excludes flood risk from Main Rivers, the sea, and reservoirs as these are assessed nationally by the Environment Agency. The PFRA report looks at past flooding and where future flooding might occur across the area and the consequences it might have to people, properties, and the environment.

2.6.10 The PFRA states that whilst Hastings is not within a Flood Risk Area, Hastings was identified as having surface water flooding issues which have occurred in the urbanised areas whilst there has been Main River flooding associated with the Combe Haven and Hollington Stream.

Guide to Sustainable Drainage in East Sussex

2.6.11 The guide to SuDS in East Sussex[21] was produced in June 2015 by ESCC. The document outlines the applicability of SuDS with respect to local conditions, and provides detailed guidance on the process of design, delivery, and adoption of SuDS in East Sussex.

SuDS Decision Support Tool for Small Scale Development

2.6.12 ESCC has also developed an online Decision Support Tool[22], designed to assist planning authorities and developers in assessing the suitability of SuDS provision within small scale development proposals. This tool is used by HBC as part of the validation requirements for minor planning applications to ensure that

[19] East Sussex County Council (2011) *Preliminary Flood Risk Assessment*. https://webarchive.nationalarchives.gov.uk/ukgwa/20140328131734mp_/http://www.environment-agency.gov.uk/static/documents/Research/Final_PFRA_Report_with_appendices_-_small.pdf
[20] East Sussex County Council (2017) *Preliminary Flood Risk Assessment Addendum*. https://www.eastsussex.gov.uk/media/3mlbsetm/pfra_east_sussex_county_council_2017.pdf
[21] ESCC, 2015. *Guide to SuDS in East Sussex.* https://eastsussexgovuk.blob.core.windows.net/media/1995/guide-to-sustainable-drainage-systems-in-east-sussex2.pdf
[22] ESCC, *SuDS Decision Support Tool for Small Scale Development*. http://eastsussex.suds-tool.co.uk/

the flood risk requirements for SuDS are met by development proposals. ESCC should ensure that the SuDS tool remains up to date in line with up-to-date legislation.

Water, People, Places – A Guide for Master Planning Sustainable Drainage into Developments

2.6.13 This guidance[23] was produced by ESCC in 2013, in partnership with other LLFAs in South East England to provide a consistent approach for integrating SuDS into the master planning of large and small developments. The guidance is intended to be used by developers, planners, and other practitioners as part of the initial planning and design process for all types of residential, commercial and industrial development.

2.7 Other Local Studies

Hastings Surface Water Management Plan

2.7.1 The Hastings SWMP[24] was produced in October 2011 in partnership with ESCC, Southern Water, the Environment Agency, and Rother District Council. The aim of the SWMP was to prepare a robust plan to reduce the number of properties at risk of surface water flooding in Hastings through the implementation of cost-effective local solutions.

2.7.2 An asset register was produced as a part of the SWMP to identify all flood risk and drainage management assets across the Borough, through consultation with the aforementioned partners. The study identified 16 medium to large flood hotspots across the Borough, which were subsequently refined to four hotspots identified as being at greatest risk, including:

- Town Centre;
- Old Town;
- Hollington Stream; and
- Warrior Square.

2.7.3 Prioritised actions were then suggested, and subsequently implemented for the area. These included:

- Retrofit SuDS at Hollington Primary School;
- Installation of property level flood resilience measures at pilot locations (dependent on available funding);
- Restore functionality of penstocks on the Upper Hollington Stream and review maintenance arrangements; and
- Review maintenance for all assets in accordance with their criticality.

2.7.4 The age of the SWMP means that the guidance provided should be reviewed by the user to ensure that it is still appropriate for the proposed use. This report is currently in the early stages of being updated. Further information in relation to the management of surface water can be found in section 6.

[23] AECOM, 2013. *Water, People, Places*. https://www.eastsussex.gov.uk/media/m5ngi31e/se7-suds-masterplanning_low_res_reduced.pdf
[24] AECOM, 2011. *Hastings SWMP*. https://www.eastsussex.gov.uk/media/kkupuebn/hastings-swmp-report-rev03.pdf

3 Assessing Flood Risk

3.1 Introduction

3.1.1 This Section provides a strategic assessment of flood risk across the Hastings study area from each of the sources of flooding outlined in the NPPF. For each source of flooding, details of any historic incidents are provided, and where appropriate, the impact of climate change on the source of flooding is described. This Section should be read with reference to the maps presented in **Appendix A**.

3.2 Study Area

Location and River Network

3.2.1 The study area is defined by the administrative boundary of HBC. The Borough, which is a part of East Sussex County, covers an area of approximately 30 km^2 and is located along the English Channel coastline. As of 2021, the Borough's population was 90,995[25].

3.2.2 Hastings has approximately 12 km of coastline, much of which is formed of low cliffs of a gentle slope, with the exception of the Combe Haven valley at Bulverhythe.

3.2.3 There are several rivers/streams that are found in Hastings. Combe Haven (Main River) runs along the south-eastern boundary of the Borough and drains into the sea at Bulverhythe, while Hollington Stream (Main River) runs from the north to south-west. Towards the east of these rivers, Bourne Stream (Ordinary Watercourse) runs across the Old Town. There are additionally several prominent unnamed Ordinary Watercourses.

3.2.4 The study area falls into the South East River Basin District and is located within the Environment Agency's Kent, South London and East Sussex Region. The water utility provider is Southern Water Services Ltd and Independent Water Networks.

3.2.5 The study area, including the river network, is illustrated in **Figure 01, Appendix A**.

Land Use

3.2.6 Most areas within the Borough are urbanised, albeit to varying degrees. A greater degree of urbanisation is observed in the central southern areas of the Borough, with the majority of the population concentrated within the coastal zone. The shoreline in this area is largely characterised by human intervention and coastal defences, in an attempt to provide protection from flooding and slow the impacts of erosion.

3.2.7 Areas to the northwest and southeast are more rural and form part of the High Weald National Landscape. Further residential development is proposed within Hastings including within the Town Centre focus area.

Topography and Geology

3.2.8 Hastings is characterised by a complex combination of geology and topography, which varies significantly over short distances.

3.2.9 The topography of Hastings generally slopes in a south-westerly direction, from the High Wealds National Landscape towards the English Channel. In places such as St Leonards, Bohemia and the Old Town, local topography varies significantly over short distances, which results in high levels of flood risk in certain locations. The general topography of the Borough is illustrated in **Figure 02, Appendix A**.

3.2.10 Hastings is underlain by the Wealden Group bedrock formation. The northern areas predominantly consist of a combination of mudstone, siltstone, and sandstone whereas the southern areas mostly comprise interbedded layers of sandstone and siltstone. Alluvial deposits are found in the Southwestern tip of the Borough. The geology in the Borough is heavily folded and faulted, allowing isolated areas of different geologies to exist in close proximity. These geological conditions are illustrated in **Figure 03 and Figure 04, Appendix A.**

[25]Office for National Statistics, *2021 Census Area Profile*. https://www.nomisweb.co.uk/sources/census_2021/report?compare=E07000062

3.3 Historic Flooding

3.3.1 Information on the flood history within HBC has been compiled from different sources including ESCC and the Environment Agency and is presented in **Figure 05, Appendix A**. It should be noted that some of these historical events might have been as a result of issues which have now been addressed and therefore an indication of historical flooding affecting a particular location does not necessarily mean that it remains prone to flooding. Equally, it is worth noting that the data underpinning the mapping have varying degrees of reliability. A site specific FRA will be required to confirm whether any historical issues have been addressed and development in previously flooded sites can take place.

3.3.2 Many parts of the Hastings coastline, including Bulverhythe, St Leonards and Old Town, have historically been impacted by tidal overtopping and flooding. In considering tidal flood risk, it should be noted that flood alleviation works undertaken by the Environment Agency in the Bulverhythe area of Hastings have significantly reduced the risk of tidal flooding in this area. However, additional measures may need to be included over time to maintain the same standard of protection.

3.3.3 Historic flood outlines can also be seen as associated with the Combe Haven and tributaries, which have previously caused extensive flooding to land near Glyne Gap, Bulverhythe and through St Leonards. However, this has generally occurred infrequently and is primarily confined to unoccupied floodplain areas. One past flooding incident has been recorded at Bourne Stream.

3.3.4 A significant number of localised flooding incidents have additionally occurred which date back as far as 1989, scattered throughout the study area although with obvious clusters noted towards the coast in along the A259 between Robertson Street and Warrior Square and also Old Town. The majority of these are recorded as surface water flooding incidents; however, groundwater flooding incidents have also been noted.

3.3.5 In 2023, significant flooding was seen within Hasting town centre in January and October. This incident resulted in residential properties as well as commercial spaces (including the shopping centre) being flooded internally. The Section 19 report[26] states that the flooding was caused by surface water flooding and combined sewer flooding.

3.3.6 All water companies responsible for operating sewerage systems in England and Wales, are required to record all instances of internal flooding to properties. It should be noted that the records only appear on the flooding register where they have been reported to Southern Water, and as such they may not include all instances of sewer flooding. Southern Water has provided an extract from their flooding register for the study area. Due to data protection requirements the data has not been provided at individual property level; rather the register comprises the number of properties within 4-digit postcode areas that have experienced flooding either internally or externally within the last 10 years **(Appendix A Figure 06)**. Southern Water target areas which have experienced flooding for maintenance and improvements, as such, areas that have experienced flooding in the past may no longer be at the greatest risk.

3.3.7 Southern Water are working on the next Asset Management Plan 2025 (AMP) which includes designing and building a permanent solution for mitigating flood risk associated from the surcharge of Pelham Outfall as a result of blockages by beach sediments. This will involve engagement with key stakeholders such as the Environment Agency and Natural England to ensure the necessary discharge licensing and Habitats Regulations Assessment are submitted, with the objective to extend the pipe further out to the sea. In 2023, Southern Water carried out weekly inspections to check for blockages and monitor the changing beach profile.

3.3.8 It is worth noting that the information displayed on **Appendix A Figure 5** is based on flooding incidents that have been reported to ESCC by homeowners and therefore incidents of flooding that have not been reported will not be shown.

3.4 Summary of Flood Sources

3.4.1 **Table** 3-1 summarises the range of potential flood sources and pathways in the study area. Where relevant, each source is discussed in further detail below.

[26] Section 19 Investigations, ESCC. https://www.eastsussex.gov.uk/environment/flooding/section-19-investigations

Table 3-1 Potential flood sources and pathways

Flood Source	Source	Pathway	Consider further
Sea (Tidal)	English Channel	Wave overtopping and high tides	Yes
Rivers (Fluvial)	Combe Haven, Hollington Stream, Old Roar Gill, Bourne Stream	Floodplain ponding / conveyance / breach and overtopping	Yes
Surface Water (Pluvial)	Greenfield runoff Urban runoff	Flow paths merging from surrounding fields	Yes
Sewers	Urban runoff	Surcharged sewers or burst water mains (failure of infrastructure)	Yes
Groundwater	Perched within alluvial deposits	Rising water level	Yes
Artificial Sources	Reservoir	Flow paths should a reservoir fail	Yes

3.5 Flooding from Tidal Sources

3.5.1 The southern boundary of Hastings is formed by coastline and, as such, many low lying areas are susceptible to tidal flooding. The tidal influences on coastal water level include:

- Daily tidal fluctuation, occurring when freshwater from the rivers is met by the incoming tide from the English Channel; and
- Surge tides, which occur due to climatic conditions creating bands of low pressure in the Atlantic Ocean and North Sea. This causes a surge of water to move across the Atlantic, travelling southwards into the North Sea and becoming compressed as it travels towards and through the narrow English Channel, between Great Britain and mainland Europe. This causes a rapid rise in sea levels, which can be exacerbated by strong south-westerly winds.

3.5.2 When sea levels reach critical level, flood defences become vulnerable to breach or overtopping. These events are likely to have the greatest consequence as defences often protect areas of development which become rapidly vulnerable once flood waters inundate. A tidal breach or overtopping can have particularly significant consequences as the source of water is far greater than that of a fluvial source and will only cease once tide levels recede.

3.5.3 Overtopping of existing sea defences is a recurring problem for some low lying areas such as Bulverhythe and portions of St Leonards, along the A259 between Robertson Street and Warrior Square and Old Town along the seafront as the level of protection along the coastline varies. Tidal flood risk has lessened significantly in the Bulverhythe area of Hastings following the construction of the Bulverhythe Flood Alleviation Scheme, which was designed to provide protection from events with an annual probability of 0.5% (1 in 200 year return period).

3.5.4 The developed 5 km frontage of Hastings and St Leonards is protected by a system of seawalls and groynes which help to retain the shingle beaches. To the east, defence is provided in the form of natural sandstone and clay cliffs. Formal flood defences are present along the 2 km of low lying land to the west at Bulverhythe, maintained by the Environment Agency.

3.5.5 As the rivers within Hastings discharge along the coastline, these tidal conditions can additionally interact with fluvial mechanisms, caused by prolonged rainfall within the upper reaches of the river catchments due to 'tidal locking'. Fluvial flow can only discharge effectively when tides are low. However, if high fluvial flows coincide with high spring tides, then flood risk is increased. The risk of this is likely to increase in future when taking into account climate change. Climate change is likely to lead to higher tides for longer time periods which in turn will cause fluvial flow to be restricted for longer periods. Such issues are becoming significant (and have been seen fairly frequently) at the bottom of the Combe Haven catchment in Bulverhythe over the last couple of years. The tidal levels additionally influence groundwater and have an influence on surface water and sewer discharge.

Hydraulic Modelling

3.5.6 The primary tidal flood risk information for this area is the Environment Agency Combe Haven Coastal Model, developed in 2010 and updated in 2011. This is a TUFLOW 2D model (including a single ESTRY

1D element). The modelled outputs include water levels and flood hazard for a range of return periods and climate change scenarios (associated with the 1 in 200 year return period tidal event). It should be noted that the modelled climate change scenarios were in line with the DEFRA climate change allowances published in 2006; however, have been superseded by the latest EA guidelines (issued May 2022). Updated climate change modelling is therefore not currently available for the Combe Haven Coastal Model.

Tidal Flood Zones

3.5.7 The tidal Flood Zones within Hastings have been combined with the fluvial Flood Zones (as discussed below) and mapped in **Figure 07, Appendix A**. This map delineates the probability of flooding into Zones of increasing flood risk, as defined by the Environment Agency.

3.5.8 Following previous discussions with the Environment Agency regarding the nature of the tidal modelling which was undertaken to inform the flood risk from tidal sources, it was agreed that this modelling was not suitable for use to inform Flood Zone 3b (the Functional Floodplain) definition. The tidal modelling included allowance for wave overtopping of the flood defences which includes a level of risk above the Annual Exceedance Probability (AEP) of the tide level. The definition of Flood Zone 3b is land which is required for water to be stored or flow through during a flood event and as such tidal flood water from wave overtopping does not satisfy this requirement. This SFRA therefore illustrates that the majority of the coastline is formed of areas of tidal Flood Zone 3.

3.5.9 It was additionally previously agreed that use of the 5% AEP tidal event with an allowance for wave overtopping would designate large areas of previously developed land within the seafront area as functional floodplain. Whilst guidance has since changed regarding the definition of the functional floodplain (now 3.3% AEP), updated mapping has not been produced and therefore the use of the 5% AEP tidal event is the most appropriate data at this stage. The use of the 5% AEP tidal event to determine the functional floodplain could blight redevelopment and future development of the area. It is also noted that all development within this area would be located within Flood Zone 3 so would need to comply with Sequential and Exception testing to ensure that it is safe for its lifetime and does not increase risk elsewhere. To achieve this, development within these areas would be required to undertake a site specific flood risk assessment (potentially including hydraulic modelling) and consider the potential impact of wave overtopping.

Climate Change

3.5.10 The impact of climate change on tidal flood risk in the area was assessed as part of the hydraulic modelling work undertaken during development of the 2010/2011 Combe Haven Coastal Model. The modelled tidal allowances including climate change are mapped in **Figure 08, Appendix A**.

3.5.11 However, the modelled climate change scenarios were in line with the DEFRA climate change allowances published in 2006, which have now been superseded by the latest Environment Agency guidelines referenced above. Additionally, increased climate change allowances for offshore wind speeds and wave heights were also not included in the study, as are now recommended.

3.5.12 **Table 3-2** shows the current allowances for sea level rise, whilst a summary of the difference in the applied climate change allowance in the current modelling and the updated Environment Agency recommendations is provided in **Table 3-3** below.

Table 3-2 Sea level allowances for South East District for each epoch in mm for each year (based on a 1981 to 2000 baseline) – the total sea level rise for each epoch is in brackets

	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (metres)
Higher Central	5.7 (200)	8.7 (261)	11.6 (348)	13.1 (393)	1.20
Upper End	6.9 (242)	11.3 (339)	15.8 (474)	18.2 (546)	1.60

Table 3-3 Comparison between applied and currently recommended climate change allowances for tidal modelling.

Criteria	Climate Change Allowance Applied to Existing Modelling for the Area	Updated Environment Agency Guidance on Climate Change Allowance
Sea Level Rise	1.205 m (2115)	Higher Central - 1.20 m (2125) Upper End – 1.60 m (2125)
Offshore Wind Speed	Not applied	+ 5% (2000 to 2055) +10% (2056 to 2125)
Extreme Wave Height	Not applied	+ 5% (2000 to 2055) +10% (2056 to 2125)

3.5.13 Therefore, this is likely to result in an underestimated tidal flood extent in the modelled climate change scenarios. There are plans for the Environment Agency's 2012 East Sussex Coastal Model to be updated. However, this update has not yet been undertaken and therefore it is highly recommended that the outputs of this exercise are incorporated into the updated SFRA when the modelling becomes available.

3.6 Flooding from Rivers

Sources

3.6.1 Hydraulically, HBC forms part of the Cuckmere and Sussex Havens Catchment. However, the main fluvial catchment draining HBC is the Combe Haven.

3.6.2 The Main Rivers identified within HBC include Combe Haven, Pebsham Stream, Hollington Stream and Bexhill Road Sewer. The Combe Haven lies to the north-east of Bexhill and to the west of Hastings. Its catchment is predominantly rural in nature and covers an area of 5,150 ha extending over Rother District and Hastings Borough. The Combe Haven catchment comprises 10 sub-catchments including its tributaries. However, only a few of them drain Hastings Borough. All the streams within the Combe Haven catchment are Main Rivers and are therefore subject to the direct jurisdiction of the Environment Agency.

3.6.3 The Combe Haven and associated streams also have the potential to cause extensive flooding to locations within the Borough, predominantly in areas including Hollington, Dogkennel Wood, Filsham and Bulverhythe. However, this is less frequent and mostly confined to unoccupied areas (floodplains). As a consequence of the relatively minor effect on people and property, no formal river defences have been built within Hastings Borough.

3.6.4 The Hollington Stream passes beneath White Bridge before its confluence with Combe Haven. This steep, fast-response catchment is particularly sensitive to flooding and the A259 at White Bridge, together with adjacent roads and properties, floods regularly. To reduce the effect of flows from Hollington Stream, HBC constructed a throttle on the stream limiting flows into the Combe Haven to 1.13 m^3/s. However, development in this area also requires careful management of water throughout the upper catchment.

3.6.5 A series of notable Ordinary Watercourses run through various parts of the Borough. These are not classified as Main Rivers and are linked and associated with the surface water sewer system in places. Several of the watercourses within Hastings are tidally influenced and can be impacted by tidal locking. In particular, the Combe Haven is tidally-influenced between Bulverhythe and Filsham.

Structures

3.6.6 Throughout the river network there are hydraulic structures such as weirs, mills, bridges, and culverts. These may elevate water levels and hence exacerbate flood risk in the associated areas. Structures can promote debris dam formation which may reduce the capacity of the watercourse. Moreover, the existence of structures is likely to reduce watercourse capacity. The locations of some of these structures, as per the Environment Agency Asset Information Management System (AIMS) database, are shown in **Appendix A Figure 09**.

3.6.7 The ownership of culverts and other related structures along Main Rivers is spread across the Environment Agency, Local Authorities, and private companies/individuals who in turn are responsible for maintaining the assets. The asset owners should undertake regular inspection of their assets to identify their condition and need for maintenance and/or repair. This responsibility includes landowners with Main Rivers running within the boundary of their property.

Existing Hydraulic models

3.6.8 Detailed fluvial flood risk modelling has been undertaken by the Environment Agency, and outputs obtained, for the Combe Haven and Hollington Stream, the two Main Rivers within Hastings. This model was completed in 2010 as an ISIS-TUFLOW 1D/2D hydraulic model.

3.6.9 A range of return periods were assessed during this study, including the 1 in 20 year return period or 5% AEP (previous defined as the functional floodplain), 1 in 100 year (1% AEP) and 1 in 1,000 year (0.1% AEP) events, considering both defended and undefended scenarios. The 1% AEP event has been modelled with a 20% allowance for climate change. This allowance has now been superseded by the latest guidance, as further summarised in **Paragraphs 3.6.29 - 3.6.38**. The Environment Agency have provided updated model results from this model for the Combe Haven which include the updated climate change allowances.

3.6.10 In addition, there are several significant Ordinary Watercourses present within the study area. ESCC recently undertook detailed hydraulic modelling of the Ordinary Watercourse which runs north to south through the centre of Hastings. The only name for this watercourse identified on Environment Agency mapping is Old Roar Gill but this is believed to only relate to a section of the watercourse in its upper catchment. This is shown on **Figure 01 in Appendix A** and throughout this report this Ordinary Watercourse is referred to as 'Old Roar Gill and its associated tributaries'.

3.6.11 The hydraulic modelling of the Old Roar Gill and its associated tributaries is a coupled 1D-2D detailed model in XP Storm software. The Environment Agency has reviewed the outputs of this modelling and have deemed them suitable to update the flood zone mapping within Hastings. The hydraulic modelling assessed the following return period events: 1 in 20 year, 1 in 100 year and 1 in 1,000 year to update the flood zones. In addition to this, modelling was completed for the 1 in 100 year event with the updated allowances for climate change (i.e. 35%, 45% and 105%).

3.6.12 The modelling has been used to define the extent of Flood Zones 3b, 3a and 2 on **Figure 07 Appendix A. Figure 10, Appendix A** outlines the extent of this detailed modelling and the fluvial outlines including the latest allowances for climate change are shown on **Figure 11 in Appendix A**.

3.6.13 The remaining Ordinary Watercourses in the east of Hastings, including the Bourne Stream, have been modelled using the Combe Haven broad-scale fluvial catchment model, constructed using J-Flow. The extent of the J-Flow modelling is illustrated in **Figure 10, Appendix A**.

3.6.14 It is understood that these models assessed the 5% AEP, 1% AEP and 0.1% AEP events, both with and without the impact of climate change. These outputs, while useful, cannot be considered to be entirely reliable, given the simplistic and broad-scale nature of the J-Flow model. J-Flow is known to have certain limitations, particularly when considering the impact of culverts and other hydraulic structures. Furthermore, the J-Flow model is understood to have utilised a 20% allowance for climate change, which has now been superseded by the latest guidance, as further summarised in **Section 3.5.** Therefore, there is currently a limited understanding of both the current and likely future flood risk associated with the Ordinary Watercourses within the Borough. It is recommended that a similar level of hydraulic modelling is undertaken for these watercourses as for the Old Roar Gill and its associated tributaries to provide a consistent assessment of present day and future fluvial flood risk across the Borough.

NPPF Flood Zones

3.6.15 The risk of flooding is a function of the probability that a flood will occur and the consequence to the community or receptor as a direct result of flooding. The Planning Practice Guidance categorises areas within the fluvial floodplain into zones based on the probability of flooding from rivers, as defined in **Table 3-4**.

3.6.16 The 'Flood Map for Planning (Rivers and Sea)'[27] is the main reference for planning purposes as it contains Flood Zones 1, 2 and 3a, as defined in the PPG and presented in **Table 3-4**[28]. The 'Flood Map for Planning (Rivers and the Sea)' provides information on the areas that would flood if there were no flood defences or buildings in the "natural" floodplain.

3.6.17 The 'Flood Map for Planning (Rivers and Sea)' was first developed in 2004 using national generalised modelling (J-Flow) and is now routinely updated on a quarterly basis and revised using the results from the Environment Agency's programme of catchment studies, entailing topographic surveys and hydrological and/or hydraulic modelling as well as previous flood events.

3.6.18 Substantial areas of fluvial flood risk are located along the routes of the Combe Haven, Hollington Stream, Old Roar Gill and its associated tributaries and Bourne Stream.

3.6.19 Flood Zones 2 and 3a, as included in **Appendix A Figure 05**, have been defined based on the results from J-Flow and detailed hydraulic modelling. These outlines do not take into account the presence of flood defences and therefore represent the 'undefended scenario'. The designation of land as Flood Zone 3b (Functional Floodplain) has been based on the best available data for the Borough to indicate areas prone to frequent flooding. The latest Environment Agency guidance is to consider the functional floodplain as the 3.3% AEP storm event. However, this dataset is not available throughout the Borough and therefore Flood Zone 3b has been based on the outline of the 2% AEP event with the presence of defences considered for the Combe Haven modelled extent. The undefended 5% AEP extents were used in Bulverhythe (2% AEP undefended model results were unavailable) based on discussions with the Environment Agency. Based on the data available, it was agreed that the defended 2% AEP scenario and undefended 5% AEP scenario should be used as the Environment Agency indicated that the land shown by the modelling to be defended is actually prone to frequent flooding and the modelling definition may therefore not be accurate.

3.6.20 In interpreting this data, the limitations of the J-Flow hydraulic modelling for the Bourne Stream should be noted. As noted above, the extent of the currently mapped Flood Zone in this area could be considered as indicative rather than accurate, given the culverted nature of the downstream watercourse extent and known limitations of the J-Flow model.

Table 3-4 Fluvial Flood Zones (PPG Table 1)

Flood Zone	Fluvial Flood Zone Definition	Probability of Flooding
Flood Zone 1	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)	Low
Flood Zone 2	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)	Medium
Flood Zone 3a	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)	High
Flood Zone 3b	Land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise of: • Land having an annual probability of 1 in 30 (greater than 3.3% AEP) of flooding, with existing flood risk management features and structures operating effectively, • Land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding). LPAs should define Flood Zone 3b within their SFRA in agreement with the Environment Agency. It is not separately distinguished from Flood Zone 3a on the Flood Map for Planning (Rivers and Sea).	Functional Floodplain

[27] Environment Agency. *Flood Map for Planning (Rivers and Sea).* https://flood-map-for-planning.service.gov.uk/ Accessed November 2023.
[28] Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government. Updated August 2022. *Planning Practice Guidance: Flood Risk and Coastal Change Table 1 Flood Zones* https://www.gov.uk/guidance/flood-risk-and-coastal-change#Table-1-Flood-Zones

3.6.21 It should be noted that the scope of modelling studies typically covers flooding associated with Main Rivers and watercourses with a catchment of greater than 3km². In Hastings Borough, Ordinary Watercourses that form tributaries to the Main Rivers have not been included in the model. Modelling of Ordinary Watercourses available on the 'Flood Map for Planning (Rivers and Sea)' within Hastings Borough, are the result of the national generalised modelling carried out by the Environment Agency and needs to be refined when determining the probability of flooding for an individual site and preparing a site-specific FRA. Further detail regarding the scope of site specific FRAs is provided in **Section 7.**

3.6.22 It is noted that a separate map is available on the Environment Agency website which is referred to as 'Risk of Flooding from Rivers and Sea'[29]. This map considers the presence of flood defences and so describes the actual risk of flooding, rather than the residual risk if there were no defences present. This mapping has been made available by the Environment Agency as the primary method of communicating flood risk to members of the public; however, for planning purposes the 'Flood Map for Planning (Rivers and the Sea)' and associated Flood Zones remains the primary source of information.

Residual Risk

3.6.23 It is important to recognise that the risk of flooding from the rivers and sea across the Borough can never be fully mitigated, and there will always be a residual risk of flooding that will remain after measures have been implemented to protect an area or a particular site from flooding. This residual risk is associated with several potential risk factors including (but not limited to):

- A flooding event that exceeds that for which the flood risk management measures have been designed e.g., flood levels above the designed finished floor levels,
- The structural deterioration of flood defence structures (including informal structures acting as a flood defence) over time, and/or,
- General uncertainties inherent in the prediction of flooding.

3.6.24 The modelling of flood flows and flood levels is based on a number of assumptions; therefore, there are inherent uncertainties in the prediction of flood levels used in the assessment of flood risk. Whilst the Flood Zones provide a relatively robust depiction of flood risk for specific conditions; all modelling requires the making of core assumptions and the use of empirical estimations relating to (for example) rainfall distribution and catchment response.

3.6.25 Steps should be taken to manage these residual risks using flood warning and evacuation procedures, as described in **Section 5.14**.

Functional Floodplain Flood Zone 3b

3.6.26 The Functional Floodplain is defined in the NPPF as 'land where water has to flow or be stored in times of flood'. The Functional Floodplain (also referred to as Flood Zone 3b), is not separately distinguished from Flood Zone 3a on the Flood Map for Planning (Rivers and Sea). Rather the SFRA is the place where LPAs should identify areas of Functional Floodplain in discussion with the Environment Agency.

3.6.27 The PPG states that the identification of Functional Floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. However, it should include the normal form of the river channel and land that would flood with an annual probability of 1 in 30 (greater than 3.3% AEP), with existing flood risk management features and structures operating effectively. Flood Zone 3b is also defined in the PPG as land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding).

3.6.28 Specific to Hastings, it was agreed with the Environment Agency in 2023 to use the 2% AEP defended flood extents and 5% AEP undefended flood extents as provided by the 2010 Environment Agency hydraulic modelling study of the Combe Haven catchment. This is discussed in **Section 3.6.9**. The 5% AEP J-Flow flood extents have been used determine Flood Zone 3b outside of the Combe Haven catchment and this can be seen in more detail in **Appendix A Figure 16**. Further guidance on the Functional Floodplain Flood Zone 3b is provided in **Section 8.3.1**.

[29] Environment Agency. *Long Term Flood Risk Map 'Risk of Flooding from Rivers and Sea'*. https://www.gov.uk/check-long-term-flood-risk Accessed November 2023.

Climate Change

3.6.29 A considerable amount of research is being carried out worldwide in an endeavour to quantify the impacts that climate change is likely to have on flooding in future years. The Intergovernmental Panel on Climate Change (IPCC) reports are showing that climate change is resulting in increased peak rainfall intensity and river flow, which would result in more frequent and severe flood events. Climate change is perceived to represent an increasing risk to low lying areas of England, and it is anticipated that the frequency and severity of flooding will change measurably within our lifetime.

3.6.30 In 2022 the Environment Agency published revised guidance on climate change allowances based upon UKCP18 data[30]. The 'peak river flow climate change allowances by management catchment' table and map within the guidance identify the appropriate climate change allowances to use based upon the management catchment. Hastings Borough falls within the Cuckmere and Pevensey Levels management catchment and the Rother management catchment as seen in **Figure 3-1** and the recommended climate change values are set out in Table 3-5 and **Table 3-6**.

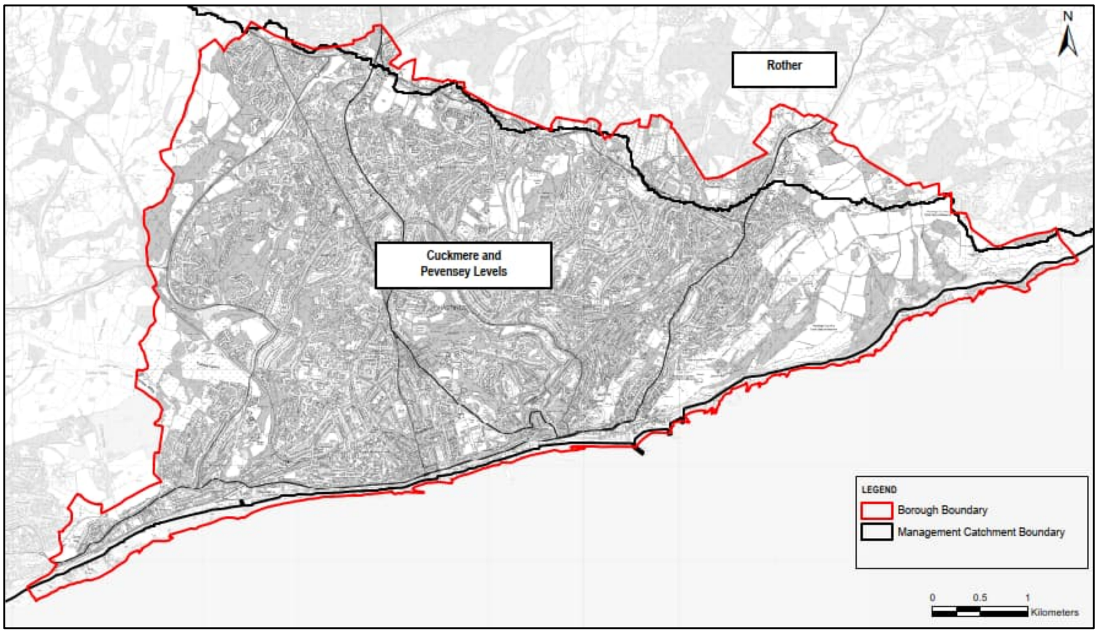

Figure 3-1 River Management Catchments

Table 3-5 Peak River flow climate change allowances for the Cuckmere and Pevensey Levels Management Catchment

	Central	Higher	Upper
Total potential change anticipated for '2020s' (2015-39)	18%	24%	35%
Total potential change anticipated for '2050s' (2040-2069)	19%	26%	44%
Total potential change anticipated for the '2080s' (2070-2115)	32%	43%	76%

Table 3-6 Peak River flow climate change allowances for the Rother Management Catchment

	Central	Higher	Upper
Total potential change anticipated for '2020s' (2015-39)	15%	19%	29%
Total potential change anticipated for '2050s' (2040-2069)	16%	23%	38%
Total potential change anticipated for the '2080s' (2070-2115)	28%	38%	66%

[30] Environment Agency. *Flood risk assessments: climate change allowances*. Updated May 2022. Flood risk assessments: climate change allowances - GOV.UK (www.gov.uk)

Applying Peak River Flow Climate Change Allowances

3.6.31 To understand if a land use allocation is appropriate in the context of likely future flood risk, the climate change allowance guidance[30] states that **Table 3-7** should be used to determine the appropriate allowance according to current flood zone and flood risk vulnerability.

Table 3-7 Peak River flow allowances for flood risk assessments

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	**Highly vulnerable**	**More vulnerable**	**Less vulnerable**	**Water compatible**
Zone 2	Higher central	Central	Central	Central	Central
Zone 3a	Higher Central	X	Central	Central	Central
Zone 3b	Higher Central	X	X	X	Central
X – development should not be permitted					

3.6.32 For the allowances identified in Table 3-5, the site should be assessed as to whether it will move from Flood Zone 1 to Flood Zone 2 or Flood Zone 2 to Flood Zone 3. If the Flood Zone changes, the site should be checked once more against the flood risk vulnerability and flood zone compatibility table (PPG Tables 2 and 3) to establish if the development is still appropriate, or if the Exception Test is required.

3.6.33 If the development is still appropriate in Flood Zones 2 and/or 3, assessment of future flood risk will be needed for planning applications for the type of development allocated in site specific policies. This will be done through a suitable site specific flood risk assessment (FRA).

3.6.34 If the Exception Test is required, it is expected that site specific policies will advise the development and development proposals will include a detailed FRA using the appropriate climate change allowances. However, it may be that once the climate change allowances have been applied, a particular development may now not be suitable in a particular area, and accordingly the land allocations may need to be re-considered.

3.6.35 Where sites are only partially within Flood Zone 3a, a nuanced approach to flood risk may be appropriate. For these sites, it may be simpler to demonstrate satisfaction of the Exception Test and the risk of flooding may in fact be lower than other sites where a greater proportion is within Flood Zone 3a.

Existing Hydraulic Models and the Impact of Climate Change

3.6.36 The Combe Haven modelling study (2010) predated the latest climate change guidance and did not include the revised climate change allowance values.

3.6.37 In the 2010 model, the 1:100 year return period scenario was run with flows increased by 35%, 45% and 105% and these have been presented in **Appendix A Figure 11**.

3.6.38 Whilst the allowances used in the modelling study differ from the 2023 allowances, these have been represented as the best results available. Updated climate change allowances need to be estimated by way of detailed hydraulic / hydrological analysis as part of strategic hydraulic modelling by the Environment Agency or site-specific FRAs for future development proposals.

Flood Defences

3.6.39 Flood risk management measures can consist of bunds, walls and other structures that manage flow in times of flooding and therefore reduce the risk of water from entering property. They generally fall into one of two categories: 'formal' or 'informal'.

3.6.40 A 'formal' flood risk management asset has been specifically built to control floodwater. It is maintained by its owner or statutory undertaker so that it remains in the necessary condition to function. In accordance with the FWMA, the Environment Agency has discretionary powers to construct and maintain defences to help protect against flooding.

3.6.41 An 'informal' flood risk management asset has not necessarily been built to control floodwater and is not maintained for this purpose. This includes road and rail embankments and other linear infrastructure (buildings and boundary walls) which may act as water retaining structures or create enclosures to form flood storage areas in addition to their primary function.

3.6.42 A study of informal flood risk management assets has not been made as part of this assessment. Should any changes be planned in the vicinity of road or railway crossings over rivers in the study area it would be necessary to assess the potential impact on flood risk to ensure that flooding is not made worse either upstream or downstream. Smaller scale informal flood defences should be identified as part of site specific FRAs and the residual risk of their failure assessed.

3.6.43 In accordance with the scope of a Level 1 SFRA, a high-level review of formal flood defences has been carried out using data from the Environment Agency AIMS dataset. This dataset contains details of flood defence assets associated with Main Rivers and provides a good starting point for identifying significant local defences and potential areas benefiting from defences, but the quantity and quality of information provided differs considerably between structures. The AIMS is intended to provide a reasonable indication of the condition of an asset and should not be considered to contain consistently detailed and accurate data (this would need to be undertaken as part of a site specific FRA where the need arises). Flood defences in the study area are presented in **Appendix A Figure 09.**

3.6.44 The main flood defences in the Borough comprises culverts, weirs, and natural banks. These can be seen along all the Main Rivers as indicated through information provided by the Environment Agency. Furthermore, the Flood Storage Reservoir along Radlett Brook provides an additional, more sophisticated flood defence measure.

3.6.45 Flood defence structures which are maintained by the Environment Agency require ongoing funding to ensure they are maintained appropriately. It is possible the Environment Agency would look for contributions from partners to undertake any projects to improve these structures if deemed viable and necessary.

3.6.46 Any works in, over, under or within 8 metres of a designated Main River (or 16 metres if it is tidally influenced) or within 8 metres of a flood defence (or 16 metres if it is a sea defence structure) requires a Flood Risk Activity Permit, prior to the works commencing, from the Environment Agency under the Environmental Permitting Regulations.

3.6.47 Any works that could affect the flow of an Ordinary Watercourse (i.e. not designated as a Main River) require consent from the LLFA (ESCC in the study area) prior to the commencement of works. This includes culverting, diverting, and can include outfalls and bridges depending on the likely affect to the flow of the watercourse.

Flood Warning Areas

3.6.48 The Environment Agency provides a free Flood Warning Service[31] for many areas at risk of flooding from rivers and the sea. In some parts of England, the Environment Agency may be able to provide warnings when flooding from groundwater is possible. The Environment Agency has provided a GIS layer of Flood Warning Areas in the study area which are presented in **Appendix A Figure 12.** There are five Environment Agency Flood Warning Areas in the Borough, namely:

1. Combe Haven at Bulverhythe;
2. St Helen’s Wood Stream at Thanet Way, Pegwell Close and Queens Road;
3. English Channel at Bulverhythe Seafront;
4. Hollington Stream from Hollington Old Lane to Harley Shute; and
5. English Channel at Hastings Seafront.

3.7 Flooding from Surface Water

3.7.1 Overland flow and surface water flooding typically arise following periods of intense rainfall, often of short duration, that is unable to soak into the ground or enter drainage systems. Overland flow of this nature has a short response time and results in localised flooding, particularly in urban areas. This has the potential to occur in Hastings as it is a largely urban catchment. The NPPF states that an SFRA should

[31] Environment Agency, *Flood Warning Service*. https://check-for-flooding.service.gov.uk/

identify areas at risk from surface water flooding and drainage issues, taking account of the surface water flood risk published by the Environment Agency as well other available information.

3.7.2 For practical purposes, flooding from drains and ditches has been considered in the same category as surface water flooding. Where Ordinary Watercourses are culverted, trash screens and culverts have the potential to become blocked by items such as plant debris and rubbish. Blockages can restrict the natural flow of water, increasing the chance of water flowing out of bank and causing local flooding due to the reduced conveyance potential of the associated watercourse.

3.7.3 The pathways of surface water will be defined by the local topography. Natural or unnatural features may influence the route that floodwater will take. In urban areas roads form a common pathway for surface water, helping dictate the area that will be affected by flooding. This is further exemplified where there are steep gradients in the hillslopes. On a site specific scale, the risk from this flood source should be identified in an FRA.

3.7.4 Development of new sites could increase the risk of flooding from surface water if the runoff from rainfall is not controlled both during and post construction[32]. This might also occur from developments outside the boundaries of HBC where the development catchment drains into the Borough.

3.7.5 The Hastings SWMP (2011) identified several 'hotspots' across the Borough, known to be prone to surface water flooding. These flooding hotspots are listed below in **Table 3-8**.

Table 3-8 Surface Water Flooding Hotspots (from Hastings SWMP)

Surface Water Flooding Hotspots	
Town Centre	Park View
Old Town	Mildenhall Drive
Hollington	Broomsgrove
Warrior Square	Ore Station
Clive Vale	Fern Road
Blacklands	Ore Highstreet
Tilekiln	Fairlight Road
Conquest Hospital	Baldslow

3.7.6 The areas deemed at risk of flooding from surface water can be found in **Figure 13, Appendix A**. The flood risk areas shown are predominately associated with areas of locally low topography, including the valley lines of the watercourse network. This map is based on surface water flood risk data provided by the Environment Agency, which is understood to have been developed based on the J-Flow modelling undertaken in 2010 (as referenced above).

3.7.7 An investigation into surface water flooding and alleviation options within Hastings was undertaken by ESCC, focused on the Central Hastings and Warrior Square areas. This investigation concluded that the only scheme that was practical at this time was the replacement of the outfall at Denmark Place which has subsequently been picked up by Southern Water.

[32] *During construction developers must manage their site in such a way as to not increase flood risk elsewhere. They must also utilise measures to protect the water environment, including drains and sewers from contamination, siltation or blockage. Details of these measures should be set out within a construction management plan. The scale of the plan should reflect the scale of development.*

3.7.8 Further details of the assessment of surface water flood risk can be found in the Hastings SWMP[33]. However, it should be noted that this document no longer contains the most up to date information and interventions should be considered on a site by site basis. There is currently a new surface water model which covers Hastings which is being produced by Southern Water. Whilst there is no confirmation on when this will be issued, this is likely to inform any update to the SWMP.

Risk of Flooding from Surface Water

3.7.9 The Environment Agency along with ESCC LLFA undertake modelling of surface water flood risk at a national and local scale and produced mapping to identify those areas at risk of surface water flooding during three annual probability events: 1 in 30 year (3.33% annual probability), 1 in 100 year (1% annual probability) and 1 in 1,000 year (0.1% annual probability). The latest version of the mapping is referred to as the 'map of Risk of Flooding from Surface Water' (RoFfSW) and the extents have been made available for the Level 1 SFRA as GIS layers. This dataset is also available on the Environment Agency website and is referred to as 'Risk of Flooding from Surface Water'.

3.7.10 The RoFfSW provides all relevant stakeholders, such as the Environment Agency, LPAs, and the public, access to information on surface water flood risk which is consistent across England and Wales[34]. The modelling helps the Environment Agency take a strategic overview of flooding and assists LLFAs in their duties relating to management of surface water flood risk. For the purposes of this SFRA, the mapping allows an improved understanding of areas within the study area which may have a surface water flood risk. However, it should be noted that this national mapping has the following limitations:

- Use of a single drainage rate for all urban areas,
- It does not show the susceptibility of individual properties to surface water flooding,
- The mapping has significant limitations for use in flat catchments,
- No explicit modelling of the interaction between the surface water network, the sewer systems, and watercourses,
- In several areas, modelling has not been validated due to a lack of surface water flood records, and
- As with all models, the RoFfSW is affected by a lack of, or inaccuracies in, available data.

3.7.11 The RoFfSW shows that surface water flooding largely follows the fluvial pathways, yet is much more extensive, often originating upstream of the tributaries. There are also multiple localised surface water flood areas that follow some of the main streets of Hastings from north to south. The RoFfSW for the study area is presented in **Appendix A Figure 13**.

Climate Change

3.7.12 Climate change is predicted to result in wetter winters and increased summer storm intensity in the future. This will lead to an increased volume of water entering land and urban drainage systems, consequently resulting in surface water flooding.

3.7.13 The RoFfSW does not include a specific scenario to determine the impact of climate change on the risk of surface water flooding. Therefore, as an indicative dataset the 0.1% AEP is a reasonable proxy for 1% AEP plus climate change.

3.7.14 If additional surface water modelling is to be undertaken, then climate change allowances for rainfall should be applied as show in **Table 3-9** and **Table 3-10**. Depending on the design life of the development an allowance for climate change of between 20% and 40% on top of 1% AEP of surface water flooding would be expected. Further guidance on the application of the climate change requirements can be on GOV.UK[30].

[33] AECOM, 2011. *Hastings Surface Water Management Plan* https://www.eastsussex.gov.uk/media/kkupuebn/hastings-swmp-report-rev03.pdf
[34] Environment Agency, 2019. *What is the 'Risk of Flooding from Surface Water' Map?*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/842485/What-is-the-Risk-of-Flooding-from-Surface-Water-Map.pdf

Table 3-9 Cuckmere and Pevensey Levels Management Catchment peak rainfall allowances[30]

3.3% annual exceedance rainfall event		
Epoch	**Central allowance**	**Upper end allowance**
2050s	20%	40%
2070s	20%	40%
1% annual exceedance rainfall event		
Epoch	**Central allowance**	**Upper end allowance**
2050s	20%	45%
2070s	25%	45%

Table 3-10 Rother Catchment peak rainfall allowances[30]

3.3% annual exceedance rainfall event		
Epoch	**Central allowance**	**Upper end allowance**
2050s	20%	40%
2070s	20%	40%
1% annual exceedance rainfall event		
Epoch	**Central allowance**	**Upper end allowance**
2050s	20%	45%
2070s	20%	45%

3.8 Flooding from Groundwater

3.8.1 Groundwater flooding usually occurs in low lying areas underlain by permeable rock and aquifers that allow groundwater to rise to the surface through the permeable subsoil following long periods of wet weather. Low lying areas may be more susceptible to groundwater flooding because the water table is usually at a much shallower depth and groundwater paths tend to travel from high to low ground.

Susceptibility to Groundwater Flooding

3.8.2 Within Hastings, high groundwater levels and resultant spring flows are recognised as a source of flooding along the coastal strip. This high water table in the gravel beds can be raised further by the tide, resulting in complex and difficult to predict flooding where no obvious watercourse or source is identified. This is the case in low lying parts of St Leonards and Bulverhythe.

3.8.3 The British Geological Survey (BGS) 'Susceptibility to Groundwater Flooding' dataset is a strategic scale map that can be used to identify areas where geological conditions could enable groundwater flooding to occur and where groundwater may come close to the ground surface based on geological and hydrogeological conditions. This dataset is presented in **Appendix A Figure 14** comprises three classes as follows:

- A: Limited potential for groundwater flooding to occur
- B: Potential for groundwater flooding of property situated below ground level
- C: Potential for groundwater flooding to occur at surface

3.8.4 The remaining areas are not considered to be prone to groundwater flooding. The 'Susceptibility to Groundwater Flooding' should be used, in conjunction with other relevant information (e.g. BGS Depth to groundwater dataset), to establish the relative risk of groundwater flooding, and is most suitable for informing land-use planning decisions at the strategic scale. Please note, this mapping is not exhaustive; the dataset should not be employed in isolation to inform land-use planning decisions at any scale and should not be utilised for this purpose at the site scale. Groundwater may be present elsewhere in the

Borough and may impact the sites drainage, even where groundwater flooding does not occur. Due to the limitations of the datasets, groundwater vulnerability should be considered on a site by site basis with groundwater monitoring or other ground investigation being undertaken where appropriate.

3.8.5 The dataset highlights that most of the Borough lies outside of the area with potential for groundwater flooding. However, there are some areas local to St Helens Wood and Old Roar Gill watercourse within the centre of the Borough, in addition to the coastline such as the Old Town and West Marina where there is potential for groundwater flooding to occur at the surface.

3.9 Flooding from Sewers

3.9.1 Southern Water and Independent Water Networks are responsible for management of sewage infrastructure within the study area. This is a system containing public surface water, combined and foul water sewage networks. Some surface water runoff will inevitably find its way into foul sewers during heavy rainfall. Though the volume of this runoff will be small, it should also be regarded as a possible source of flooding along the route of the sewer network.

3.9.2 During heavy rainfall, flooding from the sewer system may occur if:

(1) The rainfall event exceeds the capacity of the sewer system/drainage system:

New sewer systems are typically designed and constructed to accommodate rainfall events with a 3.3% AEP or less. Therefore, rainfall events with a return period of frequency greater than 3.3% AEP would be expected to result in surcharging of some of the sewer system. While the potential impact of extreme rainfall events is recognised, it is not cost beneficial to construct sewers that could accommodate every extreme rainfall event. However, many of the sewer systems in England date back to Victorian times, where the capacity could be significantly less than the 1:30 year. This could result in sewer flooding occurring much more frequently in these older systems.

(2) The system becomes blocked by debris or sediment:

Over time there is potential that road gullies and drains become blocked from fallen leaves, build-up of sediment and debris (e.g. litter).

(3) The system surcharges due to high water levels in receiving watercourses:

3.9.3 Within the study area there is potential for surface water outlets to become submerged due to high river levels e.g. Pelham Outfall. However, further investigation should be undertaken regarding the potential vulnerabilities of Pelham outfall. When high river levels occur, water is unable to pass downstream. Once storage capacity within the sewer system itself is exceeded, the water will overflow into streets and potentially into houses. Where the local area is served by ‘combined’ sewers (i.e. containing both foul and storm water), if rainfall entering the sewer exceeds the capacity of the combined sewer and storm overflows are blocked by high water levels in receiving watercourses, surcharging and surface flooding may again occur but in this instance, floodwaters will contain untreated sewage.

3.9.4 This flooding mechanism is likely to become more common in the future due to climate change and an increase in the number and intensity of convective storms. It is now a widely accepted phenomenon that one of the main effects of climate change in the southeast of England will be higher intensity rainfall events and more frequent winter storms, all of which will increase the risk of flooding from all sources.

3.9.5 Additionally surface water drains can be affected when high tides or river levels at discharge outlets prevent them from draining water effectively. This is known to be an issue in Hastings Town Centre and Bulverhythe.

3.9.6 Making sure sewer networks and culverts are effective is a key factor in managing flood risk. Over time, road gullies and drains can become blocked due to fallen leaves, build-up of sediment and debris (e.g. litter), requiring regular maintenance. The local CFMP highlights this as an issue in the area.

3.9.7 The Hastings SWMP took into consideration the sewer network when identifying flooding hotspots and therefore the conclusions reached as part of this assessment are relevant to sewer flood risk.

3.10 Reservoirs, Canals, and Other Artificial Sources

3.10.1 Reservoirs, water retention ponds and canals have a potential flood risk associated with them. Under normal circumstances, the flood risk posed by them is low but if a breach occurs, extensive flooding could be experienced. HBC has confirmed that canals are not present within the Borough and therefore they can be discounted as a potential source of flooding in Hastings.

3.10.2 Prior to developing a site, an assessment of flood risk posed by artificial sources will have to be made at a site specific level (i.e. as part of a FRA).

3.10.3 Reservoirs pose the main threat in terms of artificial sources of flooding to Hastings. There are seven recognised reservoirs within the Borough:

- Buckshole (~ 59,000 m^3)
- Ecclesbourne (~36,000 m^3)
- Shornden (~40,500 m^3)
- Wishing Tree (~37,000 m^3)
- Harmers (~9,000 m^3)
- Clive Vale – Upper (~3,600 m^3)
- Clive Vale – Lower (~9,000 m^3)

3.10.4 The Environment Agency 'Risk of Flooding from Reservoirs' dataset identifies areas that could be flooded if a large reservoir were to fail and release the water it holds. This data is mapped in **Figure 15, Appendix A**, and indicates that some areas of the Borough would be at risk if a breach was to occur at the reservoirs currently in operation. This predominantly includes localised areas around Filsham, Blacklands and Ecclesbourne Glen.

3.10.5 The 'Risk of Flooding from Reservoir' dataset only includes modelling of large reservoirs (over 20,000m^3) and therefore Harmers reservoir and the Clive Vale reservoirs have not been included. However, this does not mean that there is no risk of flooding in the event of a reservoir failure, and this should be considered as part of a site specific Flood Risk Assessment.

3.10.6 It should be noted that reservoirs in the UK have a good safety record. The Environment Agency is the enforcement authority for the Reservoir's Act 1975 in England and Wales. All large reservoirs must be inspected and supervised by reservoir panel engineers. It is assumed that these reservoirs are regularly inspected, and essential safety work is carried out. These reservoirs therefore present a minimal residual risk.

4 Avoiding Flood Risk – Applying the Sequential Test

4.1 Sequential Approach

4.1.1 This Section guides the application of the Sequential Test and, if required, the Exception Test in the Plan-making and planning application processes. Not all development will be required to undergo the Exception Test but may still be required to undertake a site-specific FRA, guidance about which is included in **Section 7**.

4.1.2 The sequential approach is a decision-making tool designed to select sites so that development is, as far as reasonably possible, located where the risk of flooding from all sources is lowest, taking account of climate change and the vulnerability of future users to flood risk. This will help avoid the development of sites that are inappropriate on flood risk grounds. The subsequent application of the Exception Test, where required, will ensure that new development in areas of flood risk will only occur where flood risk is clearly outweighed by other sustainability benefits and the development can be made safe without increasing flood risk elsewhere and where possible reducing the level of flood risk overall.

4.1.3 The sequential approach can be applied at **all levels and scales** of the planning process, both between and within Flood Zones. All opportunities to locate new developments in reasonably available areas of little or no flood risk should be explored, prior to any decision to locate them in areas of higher risk.

4.2 Applying the Sequential Test – Plan-Making

4.2.1 **Figure 4-1** illustrates the approach for applying the Sequential Test that HBC should adopt in the allocation of sites as part of the preparation of the Local Plan. The Sequential Test should be undertaken by HBC and accurately documented to ensure decision processes are consistent and transparent.

4.2.2 The Sequential Test needs to be applied to potential development sites across the whole LPA area to increase the possibilities of delivering development not exposed to flood risk, both now and in the future. When preparing a Local Plan, the LPA should demonstrate that a range of site allocations have been considered, using the SFRA to apply the Sequential and Exception Tests where necessary.

4.2.3 When considering the risk of flooding to each site, it is important to assess **the proportion of the site at risk of flooding and the intended location of development within the site**. For example, a large strategic site may have a small area of high risk of flooding, but when considered as a whole, it offers a large area at low risk of flooding.

4.2.4 It is also important to assess **the risk of flooding along the access/escape routes to the site**. This should include an assessment of fluvial flood zones, flood hazard maps and surface water flow paths. Access to a dry safe place should be considered as well as access routes for emergency services. There are occasions when development sites at low risk of flooding are located on ‘dry islands’ surrounded by areas at greater risk of flooding. A review of the topography should therefore be considered and this should be captured within the site assessments and used to inform the sequential testing of sites by HBC.

4.2.5 Where it is not possible to locate development in low-risk areas, the Sequential Test should go on to compare sites within medium risk areas and only where there are no sites in low and medium risk areas, within high-risk areas.

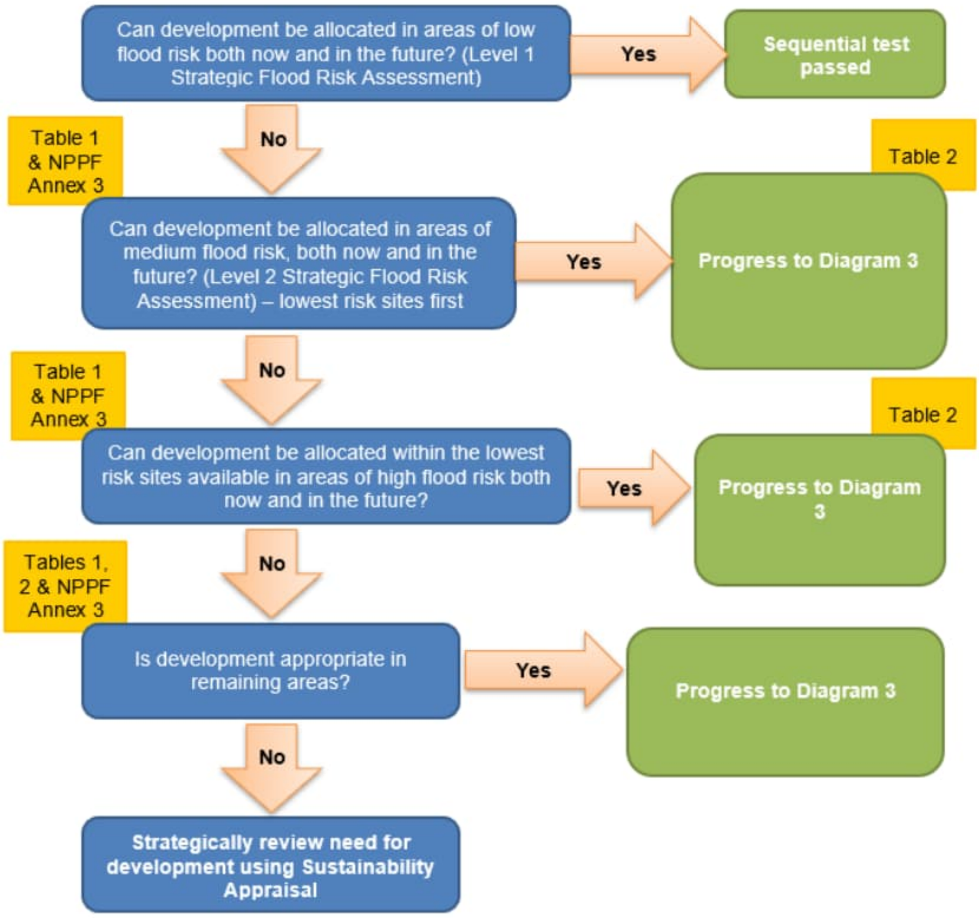

Figure 4-1 Applying the sequential test in the preparation of a Local Plan (PPG Diagram 2)

4.2.6 The Sequential Test requires an understanding of the risk of flooding from **all sources** in the study area and the vulnerability classification of the proposed developments. Flood Zone definitions are provided in **Table 3-4** and mapped in the figures presented in **Appendix A** (and the Flood Map for Planning (Rivers and Sea) on the Environment Agency website). Flood risk vulnerability classifications, as defined in the PPG are presented in **Table 4-1**.

4.2.7 The NPPF acknowledges that some areas will (also) be at risk of flooding from sources other than fluvial. All sources must be considered when planning for new development including flooding from land or surface water runoff; groundwater; sewers; and artificial sources.

4.2.8 If a location is recorded as having experienced repeated flooding from the same source this should be acknowledged within the Sequential Test.

Table 4-1 Flood Risk Vulnerability Classification (NPPF Annex 3)

Vulnerability Classification	Development Uses
Essential Infrastructure	Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including infrastructure for electricity supply including generation, storage and distribution systems; including electricity generating power stations, grid and primary substations storage; and water treatment works that need to remain operational in times of flood. Wind turbines. Solar farms.
Highly Vulnerable	Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding. Emergency dispersal points. Basement dwellings. Caravans, mobile homes and park homes intended for permanent residential use. Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as “essential infrastructure”).
More Vulnerable	Hospitals. Residential institutions such as residential care homes, children’s homes, social services homes, prisons and hostels. Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. Non–residential uses for health services, nurseries and educational establishments. Landfill and sites used for waste management facilities for hazardous waste. Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	Police, ambulance and fire stations which are not required to be operational during flooding. Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non–residential institutions not included in “more vulnerable”, and assembly and leisure. Land and buildings used for agriculture and forestry. Waste treatment (except landfill and hazardous waste facilities). Minerals working and processing (except for sand and gravel working). Water treatment works which do not need to remain operational during times of flood. Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place). Car parks.
Water-Compatible Development	Flood control infrastructure. Water transmission infrastructure and pumping stations. Sewage transmission infrastructure and pumping stations. Sand and gravel working. Docks, marinas and wharves. Navigation facilities. MOD defence installations. Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. Water-based recreation (excluding sleeping accommodation). Lifeguard and coastguard stations. Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

4.2.9 The NPPF indicates suitability of a development based on its vulnerability and location within a fluvial and tidal flood zone as set out in **Table 4-2**. However, the vulnerability classification of types of development is still relevant in considering flood risk from other sources. For example, a basement dwelling will be more vulnerable to any source of flooding than an office development. Therefore, the same approach should be followed to all sources of flood risk as set out in **Table 4-2** or the development will not be supported.

Table 4-2 Flood Risk Vulnerability and Flood Zone 'Incompatibility' (PPG Table 2)

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	**1**	✓	✓	✓	✓	✓
	2	✓	✓	Exception Test Required	✓	✓
	3a †	Exception Test Required †	✓	×	Exception Test Required	✓
	3b *	Exception Test Required *	✓*	×	×	×

✓ – Exception Test is not required × – Development should not be permitted

† – In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

* – In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood
- result in no net loss of floodplain storage
- not impede water flows and not increase flood risk elsewhere

Recommended Stages for LPA Application of the Sequential Test

4.2.10 The recommended steps in undertaking the Sequential Test are detailed below. The information required to address many of these steps is provided in the accompanying maps presented in **Appendix A**. When preparing a Local Plan, a database of the potential allocation sites across Hastings should be generated and information for each site populated using the GIS layers presented in the maps. This database can be used by HBC when applying the steps below.

1. Identify all potential development sites across the Local Plan area.
2. Assign a unique site reference to each site.
3. Identify the range of potential uses that could be considered on each site and the associated Vulnerability Classifications.
4. Identify the design life of the development with respect to climate change:
   - 100 years of residential developments: and
   - 75 years for commercial / industrial developments, or other time horizon specific to the non-residential use proposed.
5. Use the flood risk datasets and information in the Level 1 SFRA (or more up to date information) to analyse the flood risk to the sites from all sources of flooding, now and in the future. For example, analysis could include:
   - Site area (ha)
   - % of site within Flood Zones 1, 2, 3a and 3b.
   - % of site within modelled 1% AEP plus climate change flood extents
   - Presence of a watercourse (Main River or Ordinary Watercourse) within the site boundary, or within 20m of the site boundary.
   - % of site within 'Risk of Flooding from Surface Water' Modelled Extents for the 3.3% AEP, 1% AEP and 0.1% AEP scenarios.
   - Recorded flooding incidents or investigations within 500 m of the site.
   - Within areas of notable surface water flood risk as identified by the Lead Local Flood Authority.
   - Susceptibility to Groundwater Flooding of the area local to the site, based on the BGS 'Susceptibility to Groundwater' Flooding dataset.

- % of site within ‘Risk of Flooding from Reservoirs’ flood extents.

6. Based on the results of the analysis undertaken in Step 5, develop a matrix to rank the sites from least to greatest risk of flooding considering all sources of flooding. Further guidance on this can be found in A Good Practice Guide[35].This will enable the Council to take account of the size of the site, the scale and type of development and the scale of any risks. (For example, a large site with a small area of Flood Zone 3a may be considered preferable to a small site entirely at risk of surface water flooding).
7. Use a sequential approach to allocate those sites with greater vulnerability (e.g., Highly Vulnerable) towards those areas at lowest risk of flooding. If these cannot be delivered in lowest flood risk areas, because the identified sites are unsuitable or there are insufficient sites in low flood risk areas, sites in areas of greater flood risk may need to be identified to accommodate development or opportunities sought to locate the development outside the Borough.
8. Follow the same approach with More Vulnerable and then Less Vulnerable uses, steering development towards lowest flood risk sites first. Should additional sites still be required to meet the identified need, consider those sites at slightly greater risk and so on. This will demonstrate that sites are only selected where there are ‘no reasonably available alternative sites at lower risk of flooding’.
9. Water Compatible development has the least constraints with respect to flood risk and it is considered appropriate to allocate these sites last. The sequential approach should still be followed in the selection of sites; however, it is appreciated that Water Compatible development by nature often relies on access and proximity to water bodies. In Flood Zone 3b Water Compatible infrastructure should be designed and constructed to remain operational and safe for users in times of flood, result in no net loss of floodplain storage and not impede water flows and not increase flood risk elsewhere.
10. HBC should record this decision-making process within a Sequential Test Statement, or similar document, which will form part of the Local Plan evidence base.
11. Consideration may need to be given to the flood risks posed to a site in more detail in a Level 2 SFRA. This more detailed study should consider the detailed nature of flood hazard to allow a sequential approach to site allocation. Consideration of flood hazard would include:
    - Flood risk management measures,
    - The rate of flooding,
    - Flood water depth,
    - Flood water velocity.

4.2.11 A Flood Risk Assessment and Sequential Test will be required for all proposed development located on sites with flood risk from any source. The assessment should be proportionate to the scale of development and the scale of flood risk.

Windfall Sites

4.2.12 Windfall sites are those which have not been specifically identified as available in the Local Plan process. In cases where development cannot be fully met through the provision of site allocations, LPAs are expected to make a realistic allowance for windfall development, based on past trends and expected future trends. It is recommended that the acceptability of windfall applications in flood risk areas should be considered at the strategic level through a policy setting out broad locations and quantities of windfall development that would be acceptable or not in Sequential Test terms.

4.2.13 Windfall sites which include a change of use should be carefully considered to determine whether there is suitable capacity within the combined sewers for the new proposal, subject to capacity checks. This is particularly relevant where a commercial property (e.g. Office) is changed to a residential property resulting in a significant increase in grey/black water discharge.

[35] AECOM, 2021. *Strategic flood risk assessments – A Good Practice Guide*. https://www.adeptnet.org.uk/strategic-flood-risk-assessment-good-practice-guide

4.3 Applying the Sequential Test for Planning Applications

4.3.1 The Sequential Test should be completed by the applicant and applied to all development proposed in areas at risk of flooding. The Environment Agency publication 'Demonstrating the flood risk Sequential Test for Planning Applications[36]' sets out the procedure for applying the sequential test to individual applications as follows:

- Identify the geographical area of search over which the test is to be applied; this could be the Borough area (or beyond the borough area if the site is near a borough boundary), or a specific catchment if this is appropriate and justification is provided (e.g. school catchment area or the need for affordable housing within a specific area). For individual planning applications subject to the Sequential Test, the area to apply the test will be defined by local circumstances relating to the catchment area for the type of development proposed. For nationally or regionally important infrastructure the area of search to which the Sequential Test could be applied will be wider than the local planning authority boundary.
- Identify the source of 'reasonably available' alternative sites; usually drawn from evidence base / background documents produced to inform the Local Plan. The definition of 'reasonably available sites' is included within the PPG as sites in a suitable location for the type of development with a reasonable prospect that the site is available to be developed at the point in time envisaged for the development.
- State the method used for comparing flood risk between sites; for example, the Flood Map for Planning (Rivers and Sea), the SFRA mapping for all sources of flooding, site-specific FRAs if appropriate, other mapping of flood sources. Default preferred source is the Flood Map for Planning and the Long Term Flood Risk Mapping[37], the latest version of which is presented in **Appendix A Figure 07**. The online version needs to be checked for updates regularly. A site specific FRA will provide more detail at site level and any discrepancy with Environment Agency or SFRA maps will have to be explained in the FRA.
- Apply the Sequential Test; systematically consider each of the available sites, indicate whether the flood risk is higher or lower than the application site, state whether the alternative option being considered is allocated in the Local Plan, identify the capacity of each alternative site, and detail any constraints to the delivery of the alternative site(s).
- Conclude whether there are any reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development or land use proposed.
- Where necessary, as indicated by **Table 4-2**, apply the Exception Test.
- Apply the Sequential approach to locating development within the site (as described in **Section 5.2**).

4.3.2 It should be noted that it is for LPAs, (and in the case of surface water management arrangements and local flood risk for major planning applications the LLFA), both taking advice from the Environment Agency as appropriate, to consider the extent to which Sequential Test considerations have been satisfied, considering the circumstances in any given case.

4.3.3 For windfall sites not already within the Local Plan or sites which have a boundary change / change of usage, it is the responsibility of the developer to submit a Sequential Test which should justify with evidence to the LPA and the LLFA, as appropriate, what area of search has been used when making the application. Ultimately HBC and ESCC (as LLFA), as appropriate, need to be satisfied in all cases that the proposed development would be safe and not lead to increased flood risk elsewhere.

4.3.4 **Recommendation:** It is recommended that HBC keep an up-to-date register of 'reasonably available' sites, clearly ranked in flood risk preference, and prepare guidance on the appropriate area of search for common development types.

[36] Environment Agency and Defra, February 2017. *Flood risk assessment: the sequential test for applicants.* https://www.gov.uk/guidance/flood-risk-assessment-the-sequential-test-for-applicants
[37] Check the long term flood risk for an area in England, https://www.gov.uk/check-long-term-flood-risk

Sequential Test Exemptions

4.3.5 It should be noted that the Sequential Test does not need to be applied in the following circumstances:

- The site has been allocated for development and subject to the test at the plan making stage (provided the proposed development is consistent with the use for which the site was allocated and provided there have been no significant changes to the known level of flood risk to the site, now or in the future which would have affected the outcome of the test).
- The site is in an area at low risk from all sources of flooding, unless the Strategic Flood Risk Assessment, or other information, indicates there may be a risk of flooding in the future.
- The application is for a development type that is exempt from the test, as specified in footnote 56 of the NPPF. This includes:
  - Householder development,
  - Small non-residential extensions (with a footprint of less than 250 m^2),
  - Changes of use; except for changes of use to a caravan, camping or chalet site, or to a mobile home or park home site, where the Sequential and Exception tests should be applied as appropriate.

4.4 Exception Test

4.4.1 Following the application of the Sequential Test it may be concluded that there are no reasonable available alternative sites in areas of lower risk, and in some cases the Exception Test may be required depending on the proposed vulnerability of the development and the Fluvial Flood Zones. **Figure 4-2** shows the decision making process and **Table 4-1** identifies when the Exception Test is required, based on the flood zone and the vulnerability classification of the proposed development. The Exception Test should only be applied as set out in **Figure 4-2** i.e., only if the Sequential Test has shown that there are no reasonably available, lower-risk sites, suitable for the proposed development, to which the development could be steered.

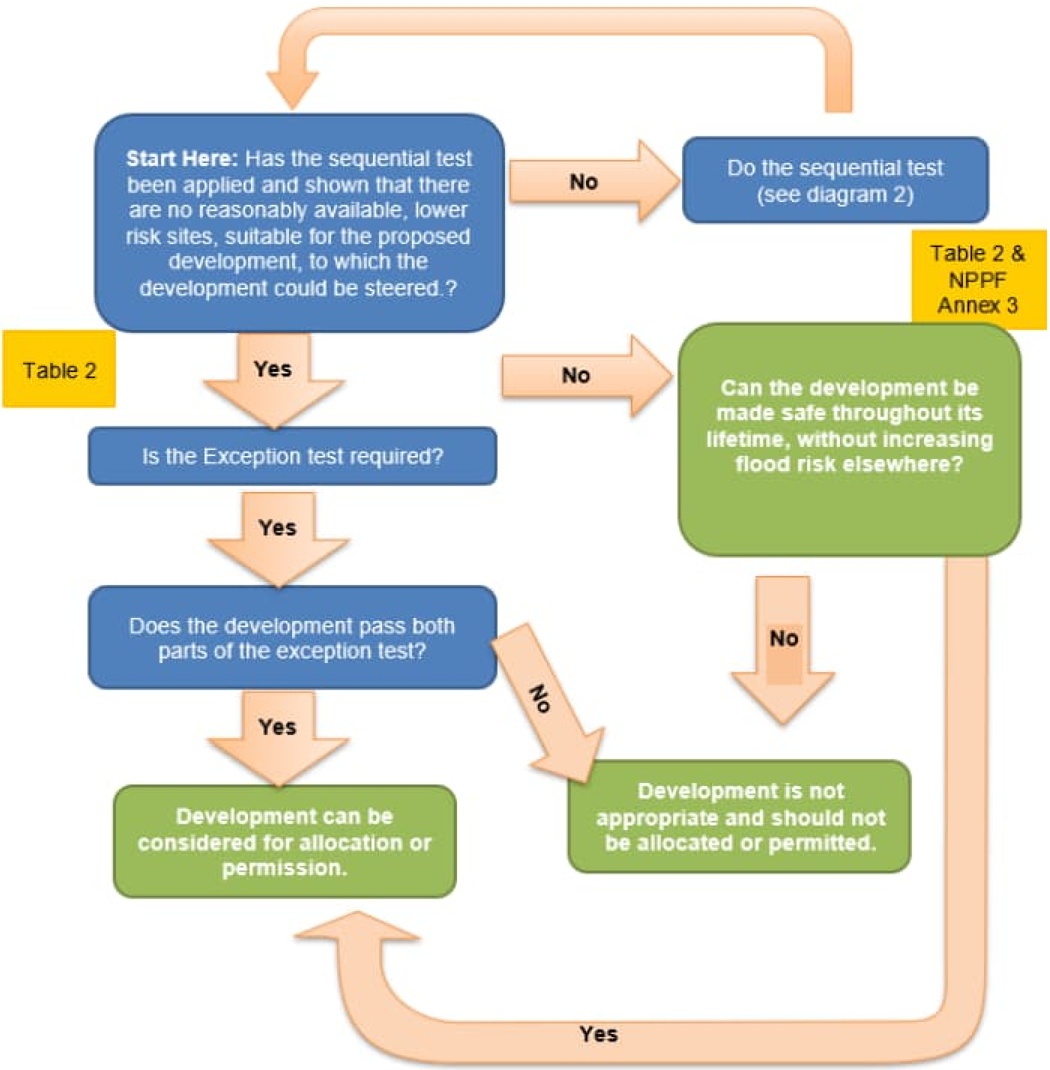

Figure 4-2 Application of the Exception Test in the preparation of a Local Plan (PPG Diagram 3)

4.4.2 For the Exception Test to be passed:

- Part 1 - It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by the SFRA where one has been prepared; and
- Part 2 - A site-specific Flood Risk Assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

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

4.4.4 To satisfy Part 1) of the Exception Test, the objectives of the Sustainability Appraisal (SA) can be used to assess each potential development site. The HBC SA[38] includes a series of sustainability objectives which enable an appraisal of the sustainable development of a potential development site.

4.4.5 As noted in the PPG (paragraph 036), examples of wider sustainability benefits to the community could include:

- The re-use of suitable brownfield land as part of a local regeneration scheme.
- An overall reduction in flood risk to the wider community through the provision of, or financial contribution to, flood risk management infrastructure.

[38] Hastings Borough Council, May 2012. *Hastings Planning Strategy – Sustainability Appraisal Report.* https://www.hastings.gov.uk/content/planning/planning_policy/local_plan/pdfs/planning_strategy_submission/sustainabilityreport

- The provision of multifunctional Sustainable Drainage Systems that integrate with green infrastructure, significantly exceeding National Planning Policy Framework policy requirements for Sustainable Drainage Systems.

4.4.6 Identified sustainability benefits need to be balanced against any associated flood risks, informed by the site-specific flood risk assessment. The impacts of flood risk on social, economic, and environmental factors should be considered. Where wider sustainability benefits are absent or where they are outweighed by flood risk, the Exception Test has not been satisfied and the site allocation in the plan should not be made or planning permission should be refused.

4.4.7 With respect to Part 2) of the Exception Test, there are several ways a new development can be made safe:

- Avoiding flood risk by not developing in areas at risk of flooding.
- Substituting higher vulnerability land uses for lower vulnerability uses in higher flood risk locations and locating higher vulnerability uses in areas of lower risk on a strategic scale, or on a site basis.
- Providing adequate flood risk management infrastructure which will be maintained for the lifetime of the development.
- Mitigating the potential impacts of flooding through design and resilient construction.
- Managing the remaining residual risk through flood warning and emergency planning measures.

4.4.8 Consideration must also be made to ensure that the risk of flooding elsewhere is not increased and where possible is reduced.

4.4.9 Further guidance on how development could satisfy Part 2) of the Exception Test is provided in **Sections 5 and 6.**

5 Measures to Control and Mitigate Flood Risk

5.1 Overview

5.1.1 The NPPF acknowledges that it may not always be possible to avoid locating development in areas at risk of flooding. This Section provides guidance and policy recommendations on the range of measures that could be considered to control and mitigate flood risk. These measures should be considered when preparing a site-specific FRA as described in **Section 7**.

5.1.2 As noted in **Section 3**, it is essential that the development management process influencing the design of future development within the Borough carefully mitigates the potential impact that climate change may have upon the risk of flooding. As a result, mitigation measures should be designed with an allowance for climate change over the lifetime of the proposed development as follows:

- 100 years for residential developments; and
- 75 years for commercial / industrial developments, or other time horizon specific to the non-residential use proposed.

5.2 Development Layout and Sequential Approach

Policy Recommendation 1 A sequential approach to site planning should be applied and inform the design of new development sites.

5.2.1 Flood risk should be considered at an early stage in deciding the layout and design of a site to provide an opportunity to reduce flood risk within the development. Most large development proposals include a variety of land uses of varying vulnerability to flooding. The sequential approach should be applied within development sites to locate the most vulnerable elements of a development in the lowest risk areas (considering all sources of flooding) e.g. residential (or other more vulnerable) elements should be restricted to areas at lower probability of flooding whereas parking, open space or proposed landscaped areas can be placed on lower ground with a higher probability of flooding. Table 2 in the PPG provides a compatibility matrix and determines which types of development are appropriate in areas of flood risk.

5.3 Riverside Development (Main Rivers and Ordinary Watercourses)

Policy Recommendation 2 Retain a 10 m wide undeveloped buffer strip alongside Main Rivers and uncovered reservoirs and explore opportunities for riverside restoration. New development within 8 m of a Main River will require a Flood Risk Activity Permit (FRAP) from the Environment Agency.

5.3.1 The Environment Agency is likely to seek a 10 m wide undeveloped buffer strip alongside main fluvial rivers for maintenance purposes and would also ask developers to explore opportunities for riverside restoration as part of any development. This buffer zone must be from the top of the riverbank/edge or defence/edge of the culvert. Whilst ESCC will work with developers to improve the functioning of Ordinary Watercourses where possible, there is no specific requirement for a buffer strip.

5.3.2 As of 6th April 2016, the Water Resources Act 1991 and associated land drainage byelaws have been amended and flood defence consents will now fall under the Environmental Permitting (England and Wales) Regulations 2016.

5.3.3 The Environmental Permitting (England and Wales) Regulations 2016 require a permit to be obtained for any activities which will take place:

- on or within 8 metres of a Main River;

- on or within 16m of a tidally influenced Main River;
- on or within 8 metres of a flood defence structure or culvert;
- involving quarrying or excavation within 16 metres of any Main River, flood defence (including a remote defence) or culvert;
- in a floodplain more than 8 metres from the riverbank, culvert or flood defence structure and you do not already have planning permission.

5.3.4 Further details and guidance are available on the GOV.UK website: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits. The Environment Agency can be consulted regarding permission to do work on or near a river, river or sea flood defence by contacting enquiries@environment-agency.gov.uk.

5.3.5 Alongside Environment Agency guidance, the PCWLMB byelaws[39] should also be considered. These include "*No works within 9 metres of the Edge of Drainage/Flood risk management infrastructure*."

5.3.6 ESCC, as the LLFA, and the Environment Agency, have a strong preference to avoid the culverting of watercourses due to the potential of proposed works increasing flood risk. Exceptions to this will only be considered if the applicant is able to demonstrate that, all alternative options have been explored and are proven to be unachievable and on the balance of probabilities, the proposed development would not increase flood risk. The Environment Agency strongly encourages deculverting of watercourses due to the associated benefits including lower flood risk, improved biodiversity, and landscape connectivity.

5.3.7 The Environment Agency also is unlikely to permit building on/in the proximity to a culvert due to concerns about the potential impacts on the structural integrity of the culvert, which can lead to an increase in flood risk. In addition, the Environment Agency encourages developers to seek options to open up existing culverts.

5.3.8 Where HBC and/or ESCC are made aware of breaches to legislation then they have a duty to make the relevant organisation (Environment Agency and Southern Water) aware of this.

5.4 Floodplain Compensation Storage

Policy Recommendation 3 All new development must not result in a net loss of flood storage capacity. Where possible, opportunities should be sought to achieve an increase in the provision of floodplain storage.

5.4.1 Where proposed development results in a change in building footprint, the developer must ensure that it does not impact upon the ability of the floodplain to store water and should seek opportunities to provide betterment with respect to floodplain storage. There may be opportunities for floodplain storage for sites on the edge of settlements.

5.4.2 Similarly, where ground levels are elevated to raise the development out of the floodplain, compensatory floodplain storage within areas that currently lie outside the floodplain must be provided to ensure that the total volume of the floodplain storage is not reduced.

5.4.3 As depicted in **Figure 5-1**, floodplain compensation must be provided on a level for level, volume for volume basis on land which does not already flood from any source and is within the site boundary. Where land is not within the site boundary, it should be in the immediate vicinity, in the applicant's ownership and linked to the site. Floodplain compensation must be considered in the context of the 1% annual probability (1 in 100 year) flood level including the appropriate allowance for climate change. When designing a scheme flood water must be able to flow in and out and must not pond. An FRA must demonstrate that there is no loss of flood storage capacity and include details of an appropriate maintenance regime to ensure mitigation continues to function for the life of the development. Guidance on how to address floodplain compensation is provided in Appendix A3 of the CIRIA Publication C624[40].

[39]Pevensey and Cuckmere Water Level Management Board, October 2016. *Development Control Byelaws*. https://www.wlma.org.uk/uploads/PCWLMB_Byelaws.pdf
[40] CIRIA, January 2004, *CIRIA Report 624: Development and Flood Risk - Guidance for the Construction Industry.*

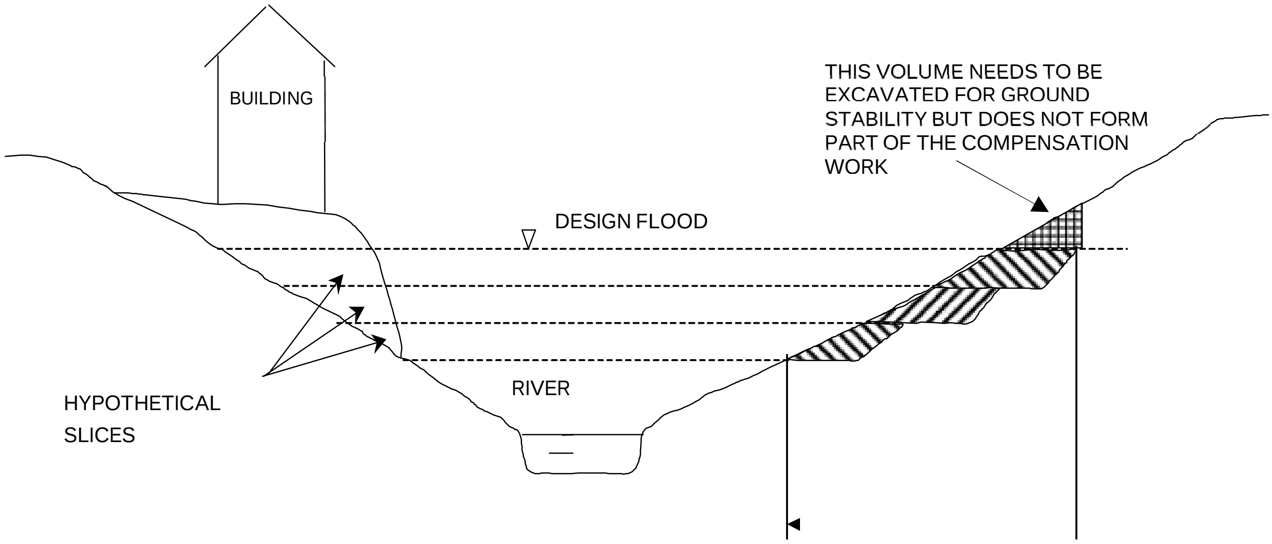

Figure 5-1 Example of Floodplain Compensation Storage (Environment Agency 2009)

5.4.4 The requirement for no loss of floodplain storage means that it is not possible to modify ground levels on sites which lie completely within the floodplain (when viewed in isolation), as there is no land available for lowering to bring it into the floodplain. It is possible to provide compensation within the local area e.g. on a neighbouring or adjacent site, or indirect compensation, by lowering land already within the floodplain, however, this would be subject to detailed investigations and agreement with the Environment Agency to demonstrate (using an appropriate flood model where necessary) that the proposals would improve and not worsen the existing flooding situation or could be used in combination with other measures to limit the impact on floodplain storage.

5.4.5 The Environment Agency recommends within the Flood Risk and Coastal Change guidance that stilts and voids below buildings is not an acceptable method of providing floodplain compensation. This is recommended as voids often do not allow water to pass freely through them due to silting up, trash screens being blocked, limited capacity and other materials ended up being stored within them.

5.5 Blue and Green Infrastructure

Policy Recommendation 4 Extend and enhance existing Blue and Green Infrastructure in the Borough. Where possible, surface water should be captured close to source through Blue and Green Infrastructure which includes urban greening. Land that is likely to be needed for natural flood management should be safeguarded. Consideration should also be given to any necessary access to that land, and any additional land which may be needed temporarily during construction.

5.5.1 Blue and Green Infrastructure (BGI) is a strategically planned and managed network of blue (water) and natural and semi-natural green (land) spaces that intersperse and connect urban centres, suburbs, and rural fringe, consisting of:

- Open spaces e.g. parks, woodland, nature reserves and lakes,
- Linkages e.g. river corridors, canals, pathways, cycle routes and greenways,
- Networks of ‘urban green’ e.g. private gardens, street trees, verges and green roofs.

5.5.2 The identification and planning of BGI is critical to sustainable growth and flood risk management. BGI can provide a wide range of ecosystem services, including climate mitigation and adaptation, and is central to climate change action. BGI also provides additional green spaces for storm flows, freeing up water storage capacity in existing infrastructure and reducing the risk of damage to urban property, particularly in city centres and vulnerable urban regeneration areas. Additionally, BGI can improve accessibility to waterways and water quality, supporting regeneration and improving opportunity for leisure, economic activity, and biodiversity.

5.5.3 The use of Natural Flood Management (NFM) has been considered throughout the Borough. The Working with Natural Processes (WWNP)[41] dataset was analysed as part of this SFRA study and suggests that there are limited opportunities through the Borough to include NFM techniques including working within floodplains and woodlands. However, developers are expected to consider each site on its merit and look to include NFM techniques and BGI where possible.

5.5.4 Measures to promote sustainability in the form of BGI could include:

- Enhancing the existing blue infrastructure network, restoring natural processes, where possible.
- Promoting new open bodies of water as part of new developments.
- Requiring developments to include innovative nature-based designs in response to flood risk, maximising the benefits of natural flood management.

5.6 Finished Floor Levels

Policy Recommendation 5 Where the proposed development usage is appropriate, More Vulnerable and Highly Vulnerable development should set Finished Floor Levels at a minimum of 600 mm above the design flood level, or ground level, whichever is higher.

5.6.1 Where developing in areas with flood risk is unavoidable, the recommended method of mitigating flood risk to people, particularly with More Vulnerable (residential) and Highly Vulnerable land uses, is to ensure internal floor levels are raised a freeboard level above the design flood level.

5.6.2 For fluvial and surface water flood risk, this is the modelled 1 in 100 annual probability (1% AEP) flood level including an allowance for climate change whilst for tidal flood risk, the 1 in 200 year annual probability (0.5% AEP) flood level including an allowance for climate change should be considered.

5.6.3 In certain situations (e.g., for proposed extensions to buildings with a lower floor level; conversion of existing historical structures with limited existing ceiling levels; or requirements for accessible and adaptable dwellings), it could prove impractical to raise the internal ground floor levels to sufficiently meet the general requirements. In these cases, the Environment Agency and/or HBC should be approached to discuss options for a reduction in the minimum internal ground floor levels provided flood resistance measures are implemented up to an agreed level. There are also circumstances where flood resilience measures should be considered first. These are described further below. For Less and More Vulnerable developments where internal access to higher floors is required, the associated plans showing the access routes and floor levels should be included within any site-specific FRA.

5.6.4 Defended scenarios should be considered as a minimum. However strong consideration should be given by developers to the scale of risk highlighted within undefended scenarios in all instances when suggesting appropriate mitigation measures and setting FFLs, as defences can fail or be overtopped at any time and may not be in place for the lifetime of the proposed development. New developments should be resistant / resilient on their own, and not reliant upon existing defence infrastructure. Flood Defence Grant in Aid funding to carry our maintenance to existing defences cannot be obtained against homes built after 2012 for this reason.

5.7 Flood Risk Management

Policy Recommendation 6 Where development or redevelopment is proposed in areas at risk of flooding from any source, flood resilience and resistant measures should be implemented.

5.7.1 'Property Flood Resilience' is an approach to building design which aims to reduce flood damage and speed recovery and reoccupation following a flood. It uses a combination of flood resistance and recovery

[41] Environment Agency and Flood and Coastal Risk Management R&D Programme, 2021. *Working with Natural Processes to Reduce Flood Risk.* https://www.gov.uk/flood-and-coastal-erosion-risk-management-research-reports/working-with-natural-processes-to-reduce-flood-risk?web=1&wdLOR=c56AD7DAC-BB7B-471B-94B4-B5C5B91DEEE4

measures and is described in the industry-developed CIRIA Property Flood Resilience Code of Practice[42], which provides advice for both new-build and retrofit. It includes specific guidance for local authority planners.

5.7.2 Resistance and recovery measures are unlikely to be suitable as the only mitigation measure to manage flood risk, but they may be suitable in some circumstances, such as:

- Water Compatible and Less Vulnerable uses where temporary disruption is acceptable, and the development remains safe.
- Where the use of an existing building is to be changed and it can be demonstrated that the avoidance measures are not practicable, and the development remains safe.
- As a measure to manage residual flood risk from flood risk management infrastructure when avoidance measures have been exhausted.

5.7.3 Flood resistance and recovery measures cannot be used to justify development in inappropriate locations.

5.7.4 Where historic buildings are involved, early consultation with Historic England should be undertaken and their guide[43] on flood resilience for historic properties provides additional information.

Flood Resistance 'Water Exclusion Strategy'

5.7.5 Flood resistant construction can prevent entry of water or minimise the amount that may enter a building where there is short duration flooding with water depth up to approximately 0.6 metres, depending on the building's characteristics. Where measures to exclude water in this way are proposed above this level, advice should be sought from a suitably qualified building surveyor, architect, or structural engineer.

5.7.6 There is a range of flood resistance and resilience construction techniques that can be implemented in new developments to mitigate potential flood damage. Flood resistance measures, or dry-proofing, stops water entering a building up to a safe structural limit. Resistance measures can be passive, such as flood doors which are normally closed; or active, such as air brick covers or removable flood barriers. Passive measures are to be prioritised over active measures.

5.7.7 This form of construction needs to be used with caution and accompanied by measures that will speed-up flood recovery, as effective flood resistance can be difficult to achieve. Hydrostatic pressures exerted by floodwater can cause long-term structural damage, undermine the foundations of a building or cause leakage through the walls, floor, or sub-floor, unless the building is specifically designed to withstand such stresses. In addition, temporary and demountable defences are not appropriate for new-build developments.

5.7.8 There is a range of property flood protection devices available on the market, designed specifically to resist the passage of floodwater. These include removable flood barriers and gates designed to fit openings, vent covers, and stoppers designed to fit WCs. These measures can be appropriate for preventing water entry associated with fluvial flooding as well as surface water and sewer flooding. The efficacy of such devices relies on their being deployed before a flood event occurs. It should also be borne in mind that devices such as air vent covers, if left in place by occupants as a precautionary measure, may compromise safe ventilation of the building in accordance with Building Regulations.

Flood Recovery 'Water Entry Strategy'

5.7.9 Flood recoverability measures (or wet-proofing), accept that water will enter the building, but through careful design and changes to the construction will minimise damage and allow faster cleaning, drying, repairing and re-occupancy of the building after a flood. Measures are preferably passive, such as the use of resilient building materials, or active such as moving sensitive equipment or belongings to upper floors when flooding is expected.

5.7.10 Materials should be used which allow the passage of water whilst retaining their structural integrity and they should also have good drying and cleaning properties. The use of sacrificial materials for internal and external finishes should only be considered as a last resort and where clear justification can be provided.

[42] Kelly, D, Barker, M, Lamond, J, McKeown, S, Blundell, E and Suttie, E (2020) *Guidance on the code of practice for property flood resilience*, C790B, CIRIA, London (ISBN: 978-0-86017-895-8) https://www.ciria.org/CIRIA/Resources/Free_publications/CoP_for_PFR_resource.aspx

[43] Historic England, April 2015, *Flooding and Historic Buildings*. https://historicengland.org.uk/images-books/publications/flooding-and-historic-buildings-2ednrev/

This is in line with the HBC's climate change commitments. An example of sacrificial material is the use of gypsum plasterboard which can be removed and replaced following a flood event. Flood resilient fittings should be used to at least 0.1m above the design flood level. Recovery measures are either an integral part of the building fabric or are features inside a building that will limit the damage caused by floodwaters.

5.7.11 A variety of flood recovery tools can be implemented, such as:

- Using materials with either, good drying and cleaning properties.
- Design for water to drain away after flooding.
- Design access to all spaces to permit drying and cleaning.
- Raise the level of electrical wiring, appliances, and utility metres.

5.7.12 Structures such as bus, bike shelters, park benches and refuse bins (and associated storage areas) located in areas with a high flood risk should be flood resilient and be firmly attached to the ground and designed in such a way as to prevent entrainment of debris which in turn could increase flood risk and/or breakaway posing a danger to life during high flows.

Policy Recommendation 7 The maintenance and preservation of flood recovery spaces or initiatives should be secured by legal agreement that will later form part of the covenant/ lease for buildings.

5.7.13 As part of any flood resilience or recovery strategy, a maintenance and management plan should be in place to ensure that each of the strategies are able to operate in the long term. Details of who is responsible for the maintenance should be outlined to ensure that future users understand their responsibilities.

5.8 Safe Access and Egress

Policy Recommendation 8 For developments located in areas at risk of flooding from all sources, safe access / egress must be provided for new development as follows in order of preference:

- Dry route for people and vehicles.
- Dry route for people.
- If a dry route for people is not possible, a route for people where the flood hazard (in terms of depth and velocity of flooding) is low and should not cause risk to people.
- If a dry route for vehicles is not possible, a route for vehicles where the flood hazard (in terms of depth and velocity of flooding) is low to permit access for emergency vehicles. However, the public should not drive vehicles in floodwater.

In all these cases, a 'dry' access/egress is a route located above the 1% annual probability flood level (1 in 100 year) including an allowance for climate change for all flood sources (0.5% annual probability flood level including climate change should be used for tidal flooding).

5.8.1 A safe access and egress route is required to enable the evacuation of people from the development, provide the emergency services with access to the development during times of flood and enable flood defence authorities to carry out any necessary duties during periods of flood.

5.8.2 A safe access/egress route should allow occupants to safely enter and exit the buildings and be able to reach land outside the flooded area (e.g. within Flood Zone 1 or areas of no surface water flooding) using public rights of way without the intervention of emergency services or others during design flood conditions, including climate change allowances. This is of particular importance when contemplating development on sites located on dry islands. Access considerations should include the voluntary and free movement of people during the design flood (1% AEP including climate change), as well as the potential for evacuation before a more extreme flood, considering the effects of climate change for the lifetime of the development.

5.8.3 Guidance prepared by the Environment Agency[44] uses a calculation of flood hazard to determine safety in relation to flood risk. Flood hazard is a function of the flood depth and flow velocity at a particular point in the floodplain along with a suitable debris factor to account for the hazard posed by any material entrained by the floodwater. The derivation of flood hazard is based on the methodology in Flood Risks to People FD2320, the use of which for the purpose of planning and development control is clarified in the abovementioned publication. The FD2320 document should be used by developers as it includes information for calculating flood hazard for access and egress planning.

5.8.4 With respect to other sources of flooding, consideration should be made of likely surface water ponding. As recommended in the CIRIA 635 Designing for Exceedance in Urban Drainage – Good Practice (Table 12.3), provision should be made to ensure that flood depths do not exceed 100mm to keep water within a kerb height and to reduce the likelihood of bow waves from vehicles driving through water affecting others, for example housing to the side of a car park.

Table 5-1 Hazard to People Rating (HR=d x (v +0.5) + DF) (Table 13.1 FD2320/TR2)

Flood Hazard	Hazard Rating	Description
Low	Less than 0.75	Very low hazard – Caution
Moderate	0.75 to 1.25	Dangerous for some – includes children, the elderly and the infirm
Significant	1.25 to 2.0	Dangerous for most – includes the general public
Extreme	More than 2.0	Dangerous for all – includes the emergency services

5.9 Place of safety

5.9.1 In exceptional circumstances, safe access above the 1% annual probability (1 in 100 year) flood level including climate change may not be achievable. In these circumstances the Environment Agency and HBC should be consulted to ensure that the safety of the site occupants can be satisfactorily managed. This will be informed by the type of development, the number of occupants and their vulnerability and the flood hazard along the proposed egress route. A suggested definition of a place of safety is a dry, habitable space, internally accessible and accessible at all times. For example, this may entail the designation of a place of safety on an upper floor of a building, from which the occupants can await the flood levels to subside or be rescued by emergency services.

5.9.2 It should be noted that sole reliance on a place of safety is a last resort, and all other possible means to evacuate the site should be considered first. Provision of a place of safety will not guarantee that an application will be granted.

5.10 Flood Warnings

5.10.1 As noted in section 3.6.48 flood warnings are in place for some areas of the Borough in relation to fluvial and tidal flooding. However, Environment Agency issued flood warnings only concern fluvial and tidal flooding. Therefore, users and residents in areas with increased surface water flood risk should be aware of weather warnings issued by the Met Office regarding heavy rainfall and suitable measures should be taken to ensure that they remain safe.

5.11 Car Parks

5.11.1 Where car parks are specified as areas for the temporary storage of surface water and fluvial floodwaters, flood depths should not exceed 300mm given that vehicles may be moved by water of greater depths. Where greater depths are expected, car parks should be designed to prevent the vehicles from floating out of the car park. Signs should be in place to notify drivers of the susceptibility of flooding and flood warning should be available to provide sufficient time for car owners to move their vehicles if necessary.

[44] Environment Agency (2008) *Supplementary note on Flood hazard ratings and thresholds for development planning and control purpose*. Clarification of Table 13.1 FD2320/TR2 and Figure 3.2 FD2321/TR1.

5.12Beach Huts and Kiosks

5.12.1 Where beach huts and kiosks are positioned within locations that could become inundated, measures should be taken to ensure that they do not cause a safety hazard during extreme storm events. Hazards may include the structures getting swept away. Signs should be in place to notify owners of the susceptibility of flooding and flood warning should be available to provide sufficient time for owners to get to a safe place.

5.13Flood Routing

Policy Recommendation 9 All new development at risk of any source of flooding, should not adversely affect flood routing and thereby increase flood risk elsewhere. Opportunities should be sought within the site design to make space for water and therefore reduced flood risk elsewhere, such as:

- Ensure development layout and levels are determined with existing flood flow pathways in mind, to ensure these do not become blocked or rerouted off site as part of the development.
- Removing boundary walls or replacing with other boundary treatments such as hedges or fencing with gaps (for example post-and-rail or hit-and-miss).
- Considering alternatives to solid wooden gates or ensuring that there is a gap beneath the gates to allow the passage of floodwater.
- Consider reducing ground floor footprint.
- Where proposals entail floodable garages or outbuildings, consider designing a proportion of the external walls to be committed to free flow of floodwater.

5.13.1 To demonstrate that 'flood risk is not increased elsewhere', development in areas at risk of flooding will need to prove that flood routing is not adversely affected by the development, for example giving rise to backwater affects or diverting floodwaters onto other properties.

5.13.2 Potential overland flow paths should be determined, and appropriate solutions proposed to minimise the impact of the development, for example by configuring road and building layouts to preserve existing flow paths and improve flood routing, whilst ensuring that flows are not diverted towards other properties elsewhere. Flow paths in green areas should be maintained. Where this is not the case, developers should assess the increased risk of flooding through the change in flow path, i.e. through the consideration of change in surface roughness resulting in increased velocity of floodwater and increase in the hazard rating associated with the potential flooded area.

5.13.3 Where possible, developers should look to reduce run-off rates from site. This is particularly relevant to sites at the top of escarpments, cliffs, valleys, ledges, ridges or other steep geological features (e.g. Retaining walls). Reducing run-off will help reduce the risk of changes to ground behaviours such as landslip, slide or shear.

5.13.4 Careful consideration should be given to the use of fences and landscaping walls to prevent causing obstruction to flow routes and increasing the risk of flooding to the site or neighbouring areas.

5.13.5 It will also be necessary to consider how these areas or features will be maintained over the lifetime of the development, which may require the removal of permitted development rights in certain locations.

5.14 Emergency plans

Policy Recommendation 10 For developments proposed in Flood Zone 2 or 3, a Flood Warning and Evacuation Plan should be prepared to demonstrate what actions site users will take before, during and after a flood event to ensure their safety, and to demonstrate their development will not impact on the ability of the local authority and the emergency services to safeguard the current population.

The Environment Agency has a tool on their website to create a Personal Flood Plan. The Plan comprises a checklist of things to do before, during and after a flood and a place to record important contact details. Where proposed development comprises non-residential extension <250m^2 and householder development (minor development), it is recommended that the use of this tool to create a Personal Flood Plan will be appropriate.

Flood Warning and Evacuation Plans should also be prepared for sites located next to surface water flow, or where there is another source of flood risk affecting the site.

5.14.1 **Evacuation** is where flood alerts and warnings, such as those provided by the Environment Agency associated with fluvial flooding, enable timely actions by residents or occupants to allow them to get to safety unaided, i.e. without the deployment of trained personnel to help people from their homes, businesses and other premises. **Rescue** by the emergency services is likely to be required where flooding has occurred, and prior evacuation has not been possible.

5.14.2 Emergency Plans should include:

How flood warning is to be provided, such as:

- availability of existing flood warning systems (refer **Appendix A Figure 12**);
- where available, rate of onset of flooding and available flood warning time; and
- how flood warning is given.

What will be done to protect the development and contents, such as:

- How easily damaged items (including parked cars) or valuable items (important documents) will be relocated;
- How services can be switched off (gas, electricity, water supplies);
- The use of flood protection products (e.g. flood boards, airbrick covers);
- The availability of staff/occupants/users to respond to a flood warning, including preparing for evacuation, deploying flood barriers across doors etc.; and
- The time taken to respond to a flood warning.

Ensuring safe occupancy and access to and from the development, such as:

- Occupant awareness of the likely frequency and duration of flood events, and the potential need to evacuate;
- Safe access route to and from the development;
- If necessary, the ability to maintain key services during an event;
- Vulnerability of occupants, and whether rescue by emergency services will be necessary and feasible; and
- Expected time taken to re-establish normal use following a flood event (clean-up times, time to re-establish services etc.)

5.14.3 There is no statutory requirement for the Environment Agency or the emergency services to approve emergency plans. HBC is accountable via planning condition or agreement to ensure that plans are suitable. This should be done in consultation with emergency planning staff to ensure that the development proposals include safe access and egress.

6 Guidance for the Application of Sustainable Drainage Systems (SuDS)

6.1 What are SuDS?

Policy Recommendation 11 SuDS should be incorporated into development designs at the earliest masterplan stages. Developers should aim to utilise drainage features which provide multiple benefits, such as water quality, amenity, or biodiversity. Use of rainwater harvesting and recycling techniques are also encouraged. Developers should engage with the LLFA and water authorities early in the scheme design process (through pre-application liaison) to ensure site or development specific considerations are determined early on.

This policy should be updated when Schedule 3 of the Flood and Water Management Act 2010 is implemented, at which point SuDS will become mandatory as part of new developments.

6.1.1 SuDS are surface water drainage solutions designed to manage surface water runoff and mitigate the adverse effects of urban storm water runoff by reducing flood risk and controlling pollution[45]. SuDS techniques allow surface water runoff from development to be controlled in ways that imitate natural drainage by controlling the rate of discharge to a receiving watercourse, surface water sewer or point of infiltration. Each site must make adequate consideration for groundwater, particularly where groundwater flooding does not occur and the impact on drainage. SuDS may also provide valuable habitat and amenity value when carefully planned for in development.

6.1.2 The SuDS Manual[46] states that SuDS design should be based on the following to maximise benefits:

- Use surface water runoff as a resource
- Manage rainwater close to where it falls (at source)
- Manage runoff on the surface (above ground)
- Allow rainwater to soak into the ground (infiltration)
- Promote evapotranspiration
- Slow and store runoff to mimic natural runoff rates and volumes
- Reduce contamination of runoff through pollution prevention and by controlling the runoff at source
- Treat runoff to reduce the risk of urban contaminants causing environmental pollution.

6.1.3 The SuDS Manual identifies six specific functions provided by SuDS components. These functions are not independent of each other, and a SuDS component can often be used to provide two or more functions. These processes include:

1. Rainwater harvesting systems – components that capture rainwater and facilitate its use within the building or local environment.
2. Pervious surfacing systems – structural surfaces that allow water to penetrate, thus reducing the proportion of runoff that is conveyed to the drainage system, e.g. green roofs, pervious paving. Many of these systems also include some subsurface storage and treatment.
3. Infiltration systems – components that facilitate the infiltration of water into the ground. These often include temporary storage zones to accommodate runoff volumes before slow release to the soil. Throughout Hastings, there are significant restraints to the use of infiltration due to the geology present. Therefore, the use of infiltration techniques should only be considered where the developer is able to provide significant and robust justification as to their appropriateness.

[46] Defra, Environment Agency. March 2015. *Cost Estimation for SuDS – Summary of Evidence*. https://assets.publishing.service.gov.uk/media/6034ee6c8fa8f54334a5a6a9/Cost_estimation_for_SUDS.pdf

Attention should be paid to forms of SuDS that attenuate water onsite and they should include a failsafe to ensure that infiltration is prevented when the capacity is exceeded.

4. Conveyance systems – components that convey flows to downstream storage systems. Where possible, these systems also provide flow and volume control and treatment, e.g. swales.
5. Storage systems – components that control the flows and, where possible, volumes of runoff being discharged from the site, by storing water and releasing it slowly (attenuation). These systems may also provide further treatment of the runoff, e.g. ponds, wetlands and detention basins.
6. Treatment systems – components that remove or facilitate the degradation of contaminants present in the runoff. These are of particular significance in carparks, near highways and at garages.

6.1.4 As part of any SuDS scheme, consideration should be given to the long-term maintenance of the SuDS to ensure that it remains functional for the lifetime of the development. **Table 6-1** has been reproduced from the SuDS Manual, CIRIA C753 and outlines typical SuDS techniques.

Table 6-1 Typical SuDS Components

Component type	Description
Rainwater harvesting systems	Rainwater is collected from the roof of a building or from other paved surfaces in an over-ground or underground tank for use on site. Depending on its intended use, the system may include treatment elements. The system should include specific storage provision if it is to be used to manage runoff to a design standard.
Green roofs	A planted soil layer is constructed on the roof of a building to create a living surface. Water is stored in the soil layer and absorbed by vegetation. Blue roofs store water at roof level, without the use of vegetation.
Infiltration systems	These systems collect and store runoff allowing it to infiltrate into the ground. Overlying vegetation and underlying unsaturated soils can offer protection to groundwater from pollution risks.
Proprietary treatment systems	These subsurface and surface structures are designed to provide treatment of water through the removal of contaminants.
Filter strips	Runoff from an impermeable area is allowed to flow across a grassed or otherwise densely planted area to promote sedimentation and filtration.
Filter drains	Runoff is temporarily stored below the surface in a shallow trench filled with stone/gravel, providing attenuation, conveyance, and treatment (via filtration).
Swales	A vegetated channel is used to convey and treat runoff (via filtration). These can be "wet", where water is designed to remain permanently at the base of the swale, or "dry" where water is only present in the channel after rainfall events. It can be lined, or unlined to allow infiltration.
Bioretention systems	A shallow landscaped depression allows runoff to pond temporarily on the surface before filtering through vegetation and underlying soils prior to collection or infiltration. In its simplest form it is often referred to as a rain garden. Engineered soils (gravel and sand layers) and enhanced vegetation can be used to improve treatment performance.
Trees	Trees can be planted within a range of infiltration SuDS components to improve their performance, as root growth and decomposition increase soil infiltration capacity. Alternatively, they can be used as standalone features within soil-filled tree pits, tree planters or structural soils, collecting and storing runoff and providing treatment (via filtration and phytoremediation).
Pervious pavements	Runoff is allowed to soak through structural paving. This can be paving blocks with gaps between solid blocks, or porous paving where water filters through the block itself. Water can be stored in the sub-base and potentially allowed to infiltrate into the ground
Attenuation storage tanks	Large, below-ground voided spaces can be used to temporarily store runoff before infiltration, controlled release, or use. The storage structure is often constructed using geocellular or other modular storage systems, concrete tanks, or oversized pipes.
Detention basins	During a rainfall event, runoff drains to a landscaped depression with an outlet that restricts flows, so that the basin fills and provides attenuation. Generally, basins are dry, except during and immediately following the rainfall event. If vegetated, runoff will be treated as it is conveyed and filtered across the base of the basin.
Ponds and wetlands	Features with a permanent pool of water can be used to provide both attenuation and treatment of runoff, where outflows are controlled, and water levels are allowed to increase following rainfall. They can support emergent and submerged vegetation along their shoreline and in shallow, marshy zones, which enhances treatment processes and biodiversity.

6.1.5 The application of SuDS is not limited to a single technique per site. Often a successful SuDS solution will utilise a combination of techniques, providing flood risk, pollution, amenity, and biodiversity benefits. In addition, SuDS can be employed on a strategic scale, for example with several sites contributing to large scale jointly funded and managed SuDS. It should be noted that each development site must offset its own increase in runoff and attenuation cannot be "traded" between developments. If off-site enhancements are sought, the developer should refer to the LPA in regards to a Section 106 application.

6.1.6 Other measures may also be required in relation to water and sewerage infrastructure that might include pipes and below ground storage required as part of a wider strategic scheme, to deal with surface water flood risk. Options may include:

- Increasing capacity in drainage systems.
- Separation of foul and surface water sewers.
- Improved drainage maintenance regimes.
- Managing overland flows.

6.1.7 Surface water management measures should also include the removal of oils and hydrocarbons in carparks, near highways and at garages.

6.1.8 Please note, the feasibility of SuDS or proposed drainage is dependent on the presence of groundwater which may impact drainage even where groundwater flooding is not predicted to occur.

6.2 Management Train

6.2.1 The concept used in the development of drainage systems is the surface water 'management train'[47] whereby different techniques can be used in series to change the flow and quality characteristics of runoff in stages that attempt to mimic natural drainage. The hierarchy of techniques that should be considered in developing the management train are:

1. **Prevention** – the use of good site design and site housekeeping measures to prevent runoff and pollution (e.g., sweeping to remove surface dust and detritus from car parks), and rain water reuse/harvesting. Prevention policies should generally be included within the site management plan.

12. **Source controls** – control of runoff at or very near its source (e.g., soakaways, other infiltration methods, green roofs, pervious pavements).

13. **Site controls** – management of water in a local area or site (e.g., routing water from building roofs and car parks to a large soakaway, infiltration, or detention basin.)

14. **Regional controls** – management of runoff from a site or several sites, typically in a balancing pond or wetland.

6.2.2 Generally, the aim should be to discharge surface water run-off as high up the following hierarchy of drainage options as reasonably practicable:

- Use rainwater as a resource through rainwater harvesting.
- Into the ground (shallow infiltration).
- To a surface water body.
- To a surface water sewer, highway drain, or another drainage system.
- To a combined sewer.

6.2.3 However, the use of infiltration techniques throughout the Borough has been particularly challenging and this is therefore something that ESCC would like to avoid where possible. If infiltration is to be proposed, ESCC would expect to see significant justification proposed as to its suitability.

6.2.4 Where possible, stormwater should be managed in small, cost-effective landscape features located within small sub-catchments rather than being conveyed to and managed in large systems at the bottom of

[47] Ciria, *SuDS Management Train.* https://www.susdrain.org/delivering-suds/using-suds/suds-principles/management-train.html Accessed November 2023.

drainage areas. The techniques that are higher in the hierarchy are preferred to those further down so that prevention and control of water at the source should always be considered before site or regional controls. However, where upstream control opportunities are restricted, several lower hierarchy options should be used in series. Water should only be conveyed elsewhere if it cannot be dealt with at the site.

6.2.5 The passage of water between stages of the management train should be considered through the use of natural conveyance systems (e.g., swales and filter trenches) wherever possible. Pipework and sub-surface proprietary produce may still be required, especially where space is limited. Pre-treatment (i.e. the removal of silt and sediment loads) and maintenance is vital to ensure the long-term effectiveness of SuDS. Overland flow routes will also be required to convey and control floodwaters safely and effectively during extreme flood events. Generally, the greater the number of techniques used in a series the better the performance is likely to be and the lower the risk of overall system failure.

6.2.6 The Simple Index Approach set out in the CIRIA SuDS Manual should be utilised to design a SuDS treatment train that is able to treat surface water runoff appropriately depending on the pollution hazard of various land uses.

6.2.7 SuDS can be applied in all development situations, although individual site constraints may limit the potential of some sites achieving full benefits for all functions. The variety of SuDS available allows planners and designers to make full potential of the local land and consider the needs of local people when implementing the drainage design. The wishes of all the relevant stakeholders needs to be balanced in addition to the risk associated with each design option.

6.3 Infiltration SuDS Specific to Hastings

6.3.1 Across Hastings, the nature of the soil, subsoil and underlying strata makes the disposal of runoff to groundwater by means of SuDS incorporating soil infiltration processes a very challenging proposition. Whilst the BGS infiltration SuDS suitability mapping suggests that some areas of the Borough may be suitable for bespoke infiltration techniques, this is countered by BGS Geohazard and Bedrock Geology mapping which suggests infiltration is not a viable option across the vast majority of the Borough.

6.3.2 Due to the impact of infiltration on slope stability and the risk of landslides, any discharge into the ground in areas at the top of escarpments, cliffs, valleys, ledges, ridges or other steep geological features should be avoided even if bespoke solutions may be possible. This includes limiting discharge within transportation corridors to protect surrounding infrastructure.

6.4 What is the role of ESCC?

6.4.1 ESCC is a statutory consultee for surface water drainage as part of their role as LLFA. All major development should include provision for SuDS and a Sustainable Drainage Strategy will need to be completed and signed by a competent drainage engineer to verify that the proposals conform to the Government's 'Sustainable Drainage Systems: Non-Statutory Technical Standards[48].'

6.4.2 The following sections provide an overview of the Technical Standards and items which applicants should include when preparing a Sustainable Drainage Strategy for submission to ESCC. Further information and guidance is available on the ESCC website:

https://www.eastsussex.gov.uk/environment/flooding/sustainable-drainage-systems#

What should a Sustainable Drainage Strategy include?

6.4.3 The following provides an indication of the type of information that would be required as part of a Sustainable Drainage Strategy. These requirements are not exhaustive and are subject to change. The requirements should be checked against the most up to date requirements as published by the LLFA[49].

- A plan of the existing site.
- A topographical level survey of the area to metres Above Ordnance Datum (m AOD).

[48] Defra, March 2015. *Sustainable Drainage Systems*. https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards
[49] *Guide to Sustainable Drainage Systems in East Sussex* https://www.eastsussex.gov.uk/media/1qgio4mx/guide-to-sustainable-drainage-systems-in-east-sussex2.pdf

- Demonstration of a clear understanding of how surface water flows across the site and surrounding area. This could use the topographic survey and the information presented on the 'Flood Map for Surface Water' on the Environment Agency website.
- Plans and drawings of the proposed site layout identifying the footprint of the area being drained (including all buildings, access roads and car parks).
- Calculations of:
  - Changes in permeable and impermeable coverage across the site.
  - The existing and proposed controlled discharge rate for a 1 in 1 year event, 1 in 30 year and a 1 in 100 year event (with an allowance for climate change).
  - Proposed storage volume (attenuation) including the water storage capacity of the proposed drainage features, with demonstration that they meet the requirements of the Technical Standards.
- Plans, drawings, and specification of proposed SuDS measures. This should include detail of hard construction, soft landscaping, and planting. A drainage design can incorporate a range of SuDS techniques.
- A design statement describing how the proposed measures manage surface water as close to its source as possible and follow the drainage hierarchy described in Section 6.2.
- Site specific geological information including borehole logs, groundwater monitoring and/or infiltration test results in accordance with BRE365 for shallow infiltration (where depths are less than 3m below ground level). Slope stability calculations may also need to be included in some situations. Where infiltration is proposed at a depth greater than 3m, falling head tests are required.
- Details of overland flow routes for exceedance events.
- Details of any offsite works required, together with necessary consents (where relevant). This consent may include an agreement in principle from Thames Water at the planning application stage to prove their discharge mechanism is viable.
- A management plan for future maintenance and adoption of drainage system for the lifetime of the development.

6.4.4 Applicants are encouraged to discuss their proposals with ESCC (LLFA) and the water company (Southern Water or Independent Water Networks) at the pre-application stage. Details on the charging schedule are presented on the relevant websites:

- ESCC: https://www.eastsussex.gov.uk/environment/flooding/planning-advice-and-data-tariff
- Southern Water: https://developerservices.southernwater.co.uk
- Independent Water Networks https://www.iwnl.co.uk/developers/

Removal of Permitted Development Rights

6.4.5 Permitted development rights allow the improvement or extension of homes without the need to apply for planning permission, where that would be out of proportion with the impact of the works carried out. Permitted development rights may be subject to prior approval by the Local Planning Authority due to the risk of flooding. Where prior approval is required, a site-specific Flood Risk Assessment must accompany the application in accordance with the NPPF and the Town and Country Planning (General Permitted Development) (England) Order 2015[50].

- Local Planning Authorities, such as Hastings, could remove these rights (e.g. To prevent the development of front gardens) where it is necessary to protect local amenity or the well-being of the area, based on robust evidence, and applied to the smallest geographical area possible.

[50] Town and County Planning (General Permitted Development) (England) Order 2015. https://www.legislation.gov.uk/uksi/2015/596/contents

7 Guidance for preparing site-specific FRAs

7.1 What is a Flood Risk Assessment?

7.1.1 A site-specific FRA is a report suitable for submission with a planning application which provides an assessment of flood risk to and from a proposed development. The FRA must demonstrate how the proposed development will be made safe, will not increase flood risk elsewhere and where possible will reduce flood risk overall in accordance with paragraph 173 of the NPPF and supporting PPG. The assessment should demonstrate to the decision-maker how flood risk will be managed now and over the development's lifetime, taking climate change into account, and with regard to the vulnerability of its users. An FRA must be prepared by a suitably qualified and experienced person and must contain all the information needed to allow HBC to satisfy itself that the requirements have been met.

7.2 When is a Flood Risk Assessment required?

The NPPF states that a site-specific FRA is required in the following circumstances:

- within flood zones 2, 3 or 3b
- within flood zone 1 with a site area of 1 hectare or more
- within areas with critical drainage problems
- within flood zone 1 where your SFRA shows it will be at increased risk of flooding during its lifetime
- that increases the vulnerability classification and may be subject to sources of flooding other than rivers or sea

7.2.1 In addition to the above it should be noted that when determining whether an FRA is required, HBC should be consulted to determine whether there are any specific criteria they wish to apply in the assessment. Surface water flood risk should be considered where appropriate with an FRA being required if there is any surface water flood risk to the site.

7.3 How detailed should an FRA be?

7.3.1 The PPG states that site-specific FRAs need to be credible, fit for purpose, and proportionate to the anticipated degree of flood risk. Site-specific FRAs need to make optimum use of information already available, including information in HBC's Strategic Flood Risk Assessment, and the Environment Agency's Flood Map and surface water flood risk information, although in some cases additional modelling or detailed calculations will need to be undertaken. Flood risk assessments need to include the information set out in the flood risk assessment checklist in the PPG as well as the Environment Agency's guidance on FRAs[51].

7.3.2 A flood risk assessment needs to be appropriate to the scale, nature and location of the development. For example, where the development is an extension to an existing house (for which planning permission is required) which would not significantly increase the number of people present in an area at risk of flooding, HBC would generally need a less detailed assessment to be able to reach an informed decision on the planning application. The Environment Agency standing advice for minor development[52] should be followed.

7.3.3 For a new development comprising a greater number of houses in a similar location, or one where the flood risk is greater HBC may require a more detailed assessment, for example, the preparation of site-

[51] Flood Risk Assessments: applying for planning permission, Environment Agency. https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications
[52] Preparing a flood risk assessment: standing advice, Environment Agency. https://www.gov.uk/guidance/flood-risk-assessment-standing-advice#advice-for-minor-extensions

specific hydraulic modelling to determine the flood risk to and from the site pre and post-development, and the effectiveness of any management and mitigation measures incorporated within the design.

7.3.4 As a result, the scope of each site-specific FRA will vary considerably. Sufficient information must be included to enable the Council and where appropriate, consultees, to determine that the proposal will be safe for its lifetime, not increase flood risk elsewhere and where possible, reduce flood risk overall. Failure to provide sufficient information will result in applications being refused.

7.3.5 The FRA should include commitments to implement relevant and specific flood resilience/resistance measures and should avoid a generic list of possibilities the developer could include. The site-specific FRA must choose the appropriate specific measures applicable to the development to show that it will be safe for its lifetime and not increase flood risk to others. Implementation of these can be secured via a planning condition from the Environment Agency, so they need to be specific and relevant to the development proposal.

Environment Agency Data Requests

7.3.6 The Environment Agency offers a series of 'products' for obtaining flood risk information suitable for informing the preparation of site-specific FRAs as described on their website https://www.gov.uk/planning-applications-assessing-flood-risk.

- **Products 1 – 4** contain maps of modelling outputs including flood level and flood depth information and the presence of flood defences local to the proposed development site.
- **Product 5** is the hydraulic modelling report.
- **Product 6** is the model output data, so the applicant can interrogate the data to inform the FRA.
- **Product 7** is the hydraulic model itself.

7.3.7 Hydraulic models of watercourses are regularly being produced and/or updated. Developers should therefore request the most up to date information from the Environment Agency prior to undertaking an assessment of fluvial flood risk.

7.3.8 This can be requested via either their National Customer Contact Centre via enquiries@environment-agency.gov.uk or the Solent & South Downs Area Customers and Engagement Team via SSDEnquiries@environment-agency.gov.uk.

Modelling of Ordinary Watercourses

7.3.9 It should be noted that the scope of modelling studies undertaken by the Environment Agency typically cover flooding associated with Main Rivers, and therefore Ordinary Watercourses that form tributaries to the Main Rivers may not always be included in the model. Where a proposed development site is near an Ordinary Watercourse and either no modelling exists, or the available modelling is considered to provide very conservative estimates of flood extents (due to the use of national generalised JFLOW modelling), applicants may need to prepare a hydraulic model to enable more accurate assessment of the probability of flooding associated with the watercourse and to inform the site-specific FRA. This should be carried out in line with industry standards and in agreement with the Environment Agency and ESCC (as the LLFA).

7.4 What needs to be addressed in a Flood Risk Assessment?

7.4.1 The PPG states that the objectives of a site-specific flood risk assessment are to establish:

- whether a proposed development is likely to be affected by current or future flooding from any source,
- whether it will increase flood risk elsewhere,
- whether the measures proposed to deal with these effects and risks are appropriate,
- the evidence for HBC to apply (if necessary) the Sequential Test, and

- whether the development will be safe and pass the Exception Test, if applicable.

7.5 Flood Risk Assessment Checklist

7.5.1 There is a checklist for Flood Risk Assessments within paragraph 80 of the PPG which should be followed: https://www.gov.uk/guidance/flood-risk-and-coastal-change#para80

7.6 Pre-application Advice

7.6.1 At all stages, HBC, and where necessary the Environment Agency, ESCC and/or the Statutory Water Undertaker may need to be consulted to ensure the FRA provides the necessary information to fulfil the requirements for planning applications.

7.6.2 The Environment Agency, ESCC, and HBC each offer pre-application advice services which should be used to discuss requirements for specific applications.

- **HBC** offer pre-application advice. Enquiries can be submitted by completing the relevant form available online at https://www.hastings.gov.uk/planning/advice/preapplication_advice/
- **Environment Agency** https://www.gov.uk/government/publications/planning-and-marine-licence-advice-standard-terms-for-our-charges The following government guidance sets out when LPAs should consult with the Environment Agency on planning applications https://www.gov.uk/flood-risk-assessment-local-planning-authorities
- **ESCC** offer pre-application advice to developers on a chargeable basis. Details on the charging schedule are presented in the pre-application guide and the ESCC LLFA webpage - https://www.eastsussex.gov.uk/environment/flooding/planning-advice-and-data-tariff

8 Flood Risk Management Policy Considerations

8.1 Overview

8.1.1 To encourage a holistic approach to flood risk management and ensure that flooding is considered at all stages of the planning process, this section builds on the findings of the SFRA to set out key recommendations for consideration by HBC in relation to flood risk planning policy and with respect to development management decisions on a day-to-day basis.

8.2 Policy Considerations

8.2.1 It is recommended that the following flood risk objectives are considered by HBC during the policy making process. Guidance on how these objectives can be met throughout the development management process for individual development sites is included within Section 5.

Seeking Flood Risk Reduction through Spatial Planning and Site Design

1. Use the Sequential Test to locate new development in areas of lowest risk, giving highest priority to areas within Flood Zone 1. Locating new development away from the most vulnerable flood risk areas would minimise the cost of installing and maintaining new flood defences and land drainage measures.
2. Use the sequential approach within development sites to inform site layout by locating the most vulnerable elements of a development in the lowest risk areas. For example, the use of low-lying ground in waterside areas for recreation, amenity and environmental purposes can provide an effective means of flood risk management as well as providing connected green spaces with consequent social and environmental benefits.
3. Avoid development immediately downstream of reservoirs which will be at high hazard areas in the event of failure.
4. Seek opportunities for new development to achieve reductions to wider flood risk issues where possible, e.g., larger developments may be able to make provisions for flow balancing within new attenuation SuDS features.
5. Identify long-term opportunities to remove development from the floodplain through land swapping.
6. Build resilience into the design of a site (e.g., flood resilient design, raised floor levels).
7. Safe access route to and from development.

Reducing Surface Water Runoff from New Developments

8. All development should seek to reduce surface water runoff from new developments to the greenfield runoff rate.
9. All sites require the following:
   - Use of SuDS (where possible use of strategic SuDS should be made).
   - Discharge rates should be restricted to greenfield runoff rates.
   - 1 in 100 year attenuation of surface water, including the appropriate allowance for climate change.
10. Rainwater should be seen as a resource within developments, with rainwater harvesting schemes included unless robust justification is provided as to why they are not feasible.
11. Space should be specifically set aside for SuDS and used to inform the overall layout of development sites.
12. SuDS with multiple benefits (water quantity, water quality, amenity, biodiversity) should be incorporated preferentially to SuDS with fewer benefits.

13. Developments should incorporate permeable surfaces where possible, minimising the inclusion of hard standing unless it can be demonstrated that these are unavoidable.

14. Surface water drainage proposals should have a clear plan for the long-term maintenance and adoption of the systems, prior to approval of any planning permission in line with national planning policy.

15. Large potential development areas with several new allocation sites will be required to develop a strategy for providing a joint SuDS scheme. This will need to be on an integrated and strategic scale and where necessary will require the collaboration of all developers involved in implementing a specific expansion area or site.

16. Careful assessment of the potential impact of surface water drainage from new developments will be necessary in areas with constrained drainage networks, particularly those networks that are dependent upon sewers and culverted watercourses with limited capacity. Consultation with the water company (Southern Water/Independent Water Networks) should be undertaken early, through pre-planning application advice and to also allow the water company to undertake capacity checks.

17. Further work is necessary to understand the full extent of risk from surface water flooding in Hastings, including the preparation of SWMPs.

18. Reducing the potential impacts of sewer flooding may require the installation of SuDS in both new and existing developments. The risk of foul sewer flooding that result from the misconnection of surface water drainage to the foul sewer network could be addressed if opportunities to disconnect surface water from foul sewers are taken.

19. Consideration may need to be given to further use of rural SuDS to reduce both the risk of flooding and the risk of rivers drying out (smoothing out the peaks and troughs of local rainfall).

Enhancing and Restoring the River Corridor (Main Rivers and Ordinary Watercourses)

20. An assessment of the condition of existing assets (e.g., bridges, culverts, river walls) should be made by developers in consultation with asset owners. Refurbishment and/or renewal of the asset should ensure that the design life is commensurate with the design life of the development. Developer contributions should be sought for this purpose.

21. Those proposing development should look for opportunities to undertake river restoration and enhancement as part of a development to make space for water. Enhancement opportunities should be sought when renewing assets (e.g., de-culverting, the use of bio-engineered river walls, raising bridge soffits to take into account climate change).

22. Avoid further culverting and building over culverts. Where practical, all new developments with culverts running through their site should seek to de-culvert Main Rivers and Ordinary Watercourses for flood risk management and biodiversity benefit. If de-culverting is not proposed, robust evidence should be provided demonstrating why this is not suitable (e.g. unable to include suitable access for maintenance or hydraulic modelling showing an increase in flood risk to the Site). Any culverting or works affecting the flow of a watercourse requires the prior written consent of either the Environment Agency (for Main Rivers), or ESCC (for Ordinary Watercourses) under the terms of the Land Drainage/Water Resources Act 1991 and Flood and Water Management Act 2010. These regulatory bodies seek to avoid culverting, and their consent for such works will not normally be granted except as a means of access.

23. Set development back from rivers, seeking a 10 metre wide undeveloped buffer strip for development from Main Rivers, and 9m from Ordinary Watercourses, including those where the Flood Zone or Surface Water flood extent does not exist. Under the terms of the Water Resources Act 1991 and the Land Drainage Byelaws, any works in, over, under or within 8 metres of a designated Main River or flood defence requires formal written consent from the Environment Agency prior to the works commencing. This includes the construction of any buildings, culverts, bridges, footways, and outfalls. In addition, any works that could affect the flow of an Ordinary Watercourse (i.e., not designated as a Main River) require consent from the LLFA (ESCC) prior to the commencement of works. This includes culverting, diverting, and can include outfalls and bridges depending on the likely affect to the flow of the watercourse.

Protecting and Promoting Areas for Future Flood Alleviation Schemes

24. Protect Greenfield functional floodplain from future development (our greatest flood risk management asset) and reinstate areas of functional floodplain which have been developed (e.g. reduce building footprints or relocate to lower flood risk zones).
25. Identify sites where developer contributions could be used to fund future flood risk management schemes or can reduce risk for surrounding areas.
26. Seek opportunities to make space for water to accommodate climate change.

Improving Flood Resilience and Emergency Planning

8.2.2 Due to the high level of flood risk affecting numerous properties it is recommended that funding is invested in flood mitigation infrastructure, especially those that reduce the risk of surface water flooding. Where funding is not viable for flood-related purposes, it is necessary to consider flood resilience measures, including:

- Seek to improve the emergency planning process using the outputs from the SFRA and through consultation with local emergency planners.
- Encourage all those within existing Flood Zone 3a and 3b (residential and commercial occupiers) to sign up to Flood Warning Service operated by the Environment Agency.
- Consider PFR schemes for existing properties at risk of flooding.
- Ensure robust emergency (evacuation) plans are implemented for new developments.

8.3 Development Management Considerations

Flood Zone 3b Functional Floodplain

8.3.1 The Functional Floodplain comprises undeveloped land within the 3.33% annual probability (1 in 30 year) flood extent. These areas should be safeguarded from any development. Where Water Compatible or Essential Infrastructure cannot be located elsewhere, it must:

- Remain operational and safe for users in times of flood,
- Result in no net loss of flood storage,
- Not impede water flows, and
- Not increase flood risk elsewhere.

8.3.2 Within the outline of the 3.3% annual probability (1 in 30 year) flood outline, there could be areas of existing development which are prevented from flooding by the presence of existing infrastructure or solid buildings. In these developed areas, existing building footprints, where it can be demonstrated that they exclude floodwater, will not be defined as Functional Floodplain and the planning requirements associated with Flood Zone 3b will not apply. For development within these areas, the development must be within the building footprint and must not lead to an increase in vulnerability. Where possible vulnerability should be reduced. The development must not increase flood risk to the user, examples include; if a the proposal is within the footprint of a building that does not flood due to the existing elevation but the proposed development will be of a lower level; or, where the existing structure is watertight but it is of a significantly less vulnerable use than the proposed (e.g. swapping a shipping container used for storage, which is watertight, for an office, which is not).

8.3.3 Opportunities should be sought to revert areas of the Site which previously withheld water to the functional floodplain where possible.

8.3.4 Where redevelopment is proposed in developed areas, schemes should not increase the vulnerability classification of the site. All schemes must result in a net reduction in flood risk and ensure that floodplain storage and flow routes are not affected. This can be achieved through a combination of on and off-site measures including, but not limited to:

- Reducing the development vulnerability.

- Increasing floodplain storage capacity and creating space for flooding to occur by restoring functional floodplain.
- Reducing impedance to floodwater flow and restoring flood flow paths.
- Incorporating flood resilient and/or resistance measures.
- Ensuring development remains safe for users in time of flood (this may refer to the timely evacuation of properties prior to the onset of flooding in accordance with an individual Emergency Plan for the site).

8.3.5 Proposals for the change of use or conversion to a use with a higher vulnerability classification will not be permitted.

8.3.6 Basement, basement extensions or conversions of basements to a higher vulnerability classification will not be permitted.

8.3.7 Where minor development is proposed, schemes should not affect floodplain storage or flow routes.

Approach to un-modelled Main Rivers and Ordinary Watercourses

8.3.8 Hydraulic modelling data (used to delineate Flood Zones) is not available from the Environment Agency for all Main Rivers and Ordinary Watercourses within the study area and in some cases the Environment Agency have modelling data, but only for the lower return periods and not for the 1 in 30 year (3.33% AEP) flood event. The extent of modelled Main Rivers and Ordinary Watercourses within Hastings are shown in **Appendix A Figure 10**.

8.3.9 *Main Rivers and Ordinary Watercourses where modelling data for the 3.33% (1 in 30 year) is not available* – Development within 20m of any un-modelled Main River and Ordinary Watercourses would be permissible if the developer is able to demonstrate, subject to the approval of HBC and meeting other Development Plan Document (DPD) policy considerations, that the proposed development lies outside the 1 in 30 year flood extents where the land is greenfield or complies with the requirements stated above where the land is in brownfield.

8.3.10 The prospective developer may need to develop a hydraulic model to enable more accurate assessment of the probability of flooding associated with the watercourse and to inform the site-specific FRA. This should be carried out in line with industry standards and in agreement with the HBC, Environment Agency, and ESCC (as the LLFA).

8.3.11 Schemes proposed in brownfield Flood Zone 3b sites will be subject to the completion of both the Sequential and Exception Tests as per Environment Agency and NPPF guidance.

8.3.12 The considerations related to Flood Zone 3b are summarised in **Figure 8-1**.

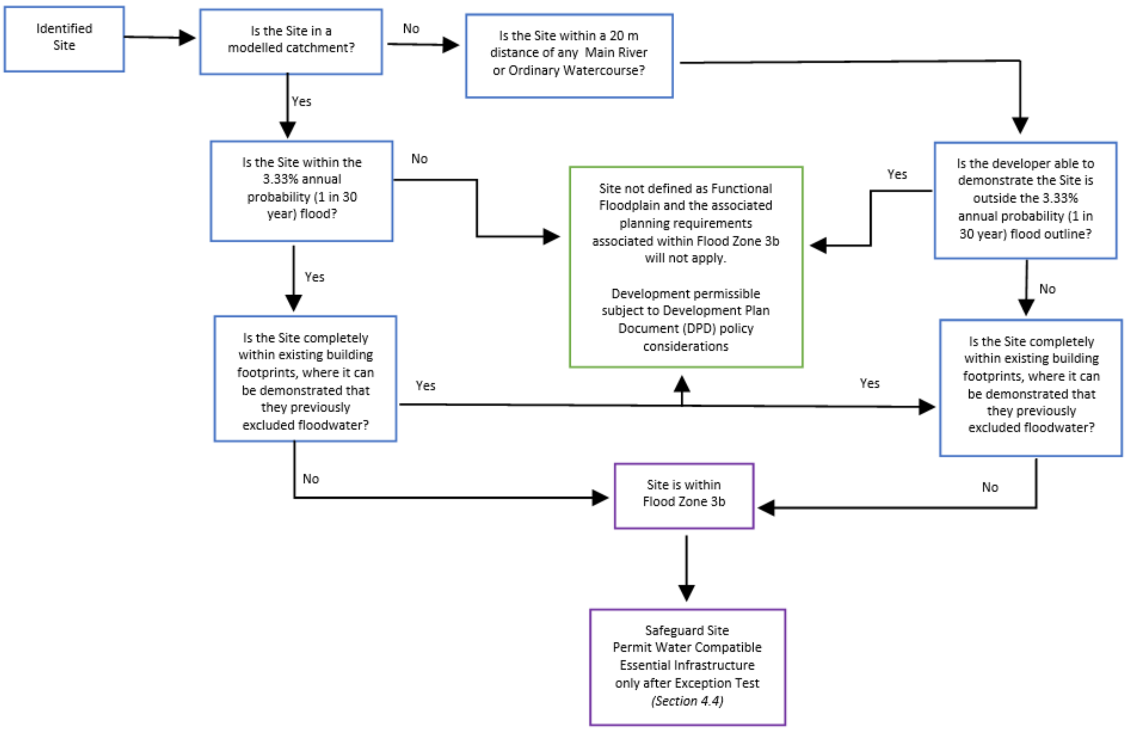

Figure 8-1 Development Management Considerations for Flood Zone 3b

Flood Zone 3a High Probability

8.3.13 Flood Zone 3a High Probability comprises land having a 1% (1 in 100 year) annual probability or greater risk of flooding from Main Rivers and Ordinary Watercourses or having a 0.5% (1 in 200 year) annual probability or greater risk of flooding from tidal sources. Water Compatible and Less Vulnerable developments are permitted in Flood Zone 3a; Essential Infrastructure and More Vulnerable developments require the Exception Test and Highly Vulnerable development is not permitted in this flood zone (see **Table 4-2**). Where development is proposed, opportunities should be sought to:

- Relocate existing development to land in zones with a lower probability of flooding,
- Reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage techniques,
- Ensure it remains safe for users in times of flood; and
- Create space for flooding to occur by restoring natural floodplain and flood flow paths and by identifying, allocating and safeguarding open space for flood storage.

8.3.14 Where the development is proposed to discharge runoff into a tidal estuary, the drainage infrastructure should be designed to accommodate surface water runoff when the outfall is tide-locked. Similarly, the outfall should have a flap valve to prevent surcharge of tidal flow.

Flood Zone 2 Medium Probability

8.3.15 Flood Zone 2 Medium Probability comprises land having between a 1% (1 in 100 year) and 0.1% (1 in 1000) annual probability of flooding from Main Rivers and Ordinary Watercourses or having between a 0.5% (1 in 200 year) and 0.1% (1 in 1,000) annual probability of flooding from tidal sources. Water Compatible, Essential Infrastructure, Less Vulnerable and More Vulnerable developments are permitted in the Flood Zone 2 and Highly Vulnerable development requires the Exception Test (see section 4.4). Where development is proposed in areas of Flood Zone 2, the planning policy approach is similar to Flood Zone 3a. Opportunities should be sought to:

- Relocate existing development to land in zones with a lower probability of flooding,

- Reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage techniques,
- Ensure it remains safe for users in times of flood, and
- Create space for flooding to occur by restoring natural floodplain and flood flow paths and by identifying, allocating and safeguarding open space for flood storage.

Flood Zone 1 Low Probability

8.3.16 Flood Zone 1 Low Probability comprises land having a less than 0.1% (1 in 1,000 year) annual probability of flooding from Main Rivers, Ordinary Watercourses and tidal sources. All development vulnerability classifications are permitted in Flood Zone 1. Where development over 1 ha is proposed or there is evidence of flooding from another localised source in areas of Flood Zone 1, opportunities should be sought to:

- Ensure that the management of surface water runoff from the site is considered early in the site planning and design process; and
- Ensure that proposals achieve an overall reduction in the level of flood risk to the surrounding area, through the appropriate application of sustainable drainage techniques.

Climate Change Consideration

8.3.17 As explained in **Section 3.4.12**, the existing Combe Haven model (2010) predates and therefore does not include the latest Environment Agency climate change guidance (2021). The recommended process for the Development Management or site allocation purposes is set out below.

1. Sites along ***Combe Haven, Hollington Stream*** or ***Old Roar Gill*** – The closest more conservative climate change event should be used as a proxy for relevant climate change scenario. Therefore, sites outside the flood map for this event (**Appendix A Figure 07**) can be allocated in the following way -
    - More Vulnerable or Highly Vulnerable non-residential properties – sites can be allocated with the condition that site-specific Sequential Test and FRA to be carried out to assess climate change impact for consideration during planning application.
    - other types of properties – no additional condition for climate change impact assessment – site-specific FRA may still be needed as per NPPF depending on type or size of the development (refer to **Section 7.2**)
2. For other locations, a site can be allocated in the Local Plan for future development if the following conditions are met:
    - it is defined as Less Vulnerable development.
    - it is not at risk of flooding during the 1 in 1,000 year flood event (**Appendix A Figure 07**).
    - it is at low risk of flooding from all sources.
    - it is 100m away from a Main River or Ordinary Watercourse.

    Site-specific FRA may still be needed as per NPPF depending on type or size of the development.
3. For sites not covered above, an SFRA Level 2 or site-specific FRA needs to be undertaken ***before*** site allocation.

Changes of Use

8.3.18 Where a development undergoes a change of use and the vulnerability classification of the development changes, there may be an increase in flood risk. For example, changing from industrial use to residential use will increase the vulnerability classification from Less to More Vulnerable (**Table 4-1**).

8.3.19 For change of use applications in Flood Zone 2 and 3, applicants must submit an FRA with their application. This should demonstrate how the flood risk to the development will be managed so that it remains safe through its lifetime including provision of safe access and escape and preparation of

Emergency Plans where necessary. This application should include a detailed surface water management plan to ensure that the site not only remains safe but does not risk flood risk off site.

8.3.20 As changes of use are not subject to the Sequential or Exception Tests, HBC could consider when formulating policy what changes of use will be acceptable, having regard to paragraph 48 of the NPPF and taking into account the findings of this SFRA. This is likely to depend on whether developments can be designed to be safe and that there is safe access and egress.

8.4 Summary of Policy Recommendations

Policy Recommendation	Description
Policy Recommendation 1	A sequential approach to site planning should be applied and inform the design of new development sites.
Policy Recommendation 2	Retain a 10 m wide undeveloped buffer strip alongside Main Rivers and uncovered reservoirs and explore opportunities for riverside restoration. New development within 8 m of a Main River will require a Flood Risk Activity Permit (FRAP) from the Environment Agency.
Policy Recommendation 3	All new development must not result in a net loss of flood storage capacity. Where possible, opportunities should be sought to achieve an increase in the provision of floodplain storage.
Policy Recommendation	Extend and enhance existing Blue and Green Infrastructure in the Borough. Where possible, surface water should be captured close to source through Blue and Green Infrastructure which includes urban greening. Land that is likely to be needed for natural flood management should be safeguarded. Consideration should also be given to any necessary access to that land, and any additional land which may be needed temporarily during construction.
Policy Recommendation 5	Where the proposed development usage is appropriate, More Vulnerable and Highly Vulnerable development should set Finished Floor Levels at a minimum of 600 mm above the design flood level, or ground level, whichever is higher.
Policy Recommendation 6	Where development or redevelopment is proposed in areas at risk of flooding from any source, flood resilience and resistant measures should be implemented.
Policy Recommendation 7	The maintenance and preservation of flood recovery spaces or initiatives should be secured by legal agreement that will later form part of the covenant/ lease for buildings.
Policy Recommendation 8	For developments located in areas at risk of flooding from all sources, safe access / egress must be provided for new development as follows in order of preference: • Dry route for people and vehicles. • Dry route for people. • If a dry route for people is not possible, a route for people where the flood hazard (in terms of depth and velocity of flooding) is low and should not cause risk to people. • If a dry route for vehicles is not possible, a route for vehicles where the flood hazard (in terms of depth and velocity of flooding) is low to permit access for emergency vehicles. However, the public should not drive vehicles in floodwater. In all these cases, a ‘dry’ access/egress is a route located above the 1% annual probability flood level (1 in 100 year) including an allowance for climate change for all flood sources (0.5% annual probability flood level including climate change should be used for tidal flooding).
Policy Recommendation 9	All new development at risk of any source of flooding, should not adversely affect flood routing and thereby increase flood risk elsewhere. Opportunities should be sought within the site design to make space for water and therefore reduced flood risk elsewhere, such as: • Ensure development layout and levels are determined with existing flood flow pathways in mind, to ensure these do not become blocked or rerouted off site as part of the development. • Removing boundary walls or replacing with other boundary treatments such as hedges or fencing with gaps (for example post-and-rail or hit-and-miss). • Considering alternatives to solid wooden gates or ensuring that there is a gap beneath the gates to allow the passage of floodwater. • Consider reducing ground floor footprint. • Where proposals entail floodable garages or outbuildings, consider designing a proportion of the external walls to be committed to free flow of floodwater.
Policy Recommendation 10	For developments proposed in Flood Zone 2 or 3, a Flood Warning and Evacuation Plan should be prepared to demonstrate what actions site users will take before, during and after a flood event to ensure their safety, and to demonstrate their development will not impact on the ability of the local authority and the emergency services to safeguard the current population. The Environment Agency has a tool on their website to create a Personal Flood Plan. The Plan comprises a checklist of things to do before, during and after a flood and a place to record important contact details. Where proposed development comprises non-residential extension <250m^2 and householder development (minor development), it is recommended that the use of this tool to create a Personal Flood Plan will be appropriate. Flood Warning and Evacuation Plans should also be prepared for sites located next to surface water flow, or where there is another source of flood risk affecting the site.

Policy Recommendation	Description
Policy Recommendation 11	SuDS should be incorporated into development designs at the earliest masterplan stages. Developers should aim to utilise drainage features which provide multiple benefits, such as water quality, amenity, or biodiversity. Use of rainwater harvesting and recycling techniques are also encouraged. Developers should engage with the LLFA and water authorities early in the scheme design process (through pre-application liaison) to ensure site or development specific considerations are determined early on. *This policy should be updated when Schedule 3 of the Flood and Water Management Act 2010 is implemented, at which point SuDS will become mandatory as part of new developments.*

9 Next Steps

9.1 Next steps

9.1.1 HBC should use this SFRA and associated mapping to:

- Develop their Local Plan and associated strategic policies,
- Safeguard land for flood risk management and green infrastructure,
- Carry out the sequential test for potential allocation sites and steer development towards those areas at lowest risk of flooding, before consideration of sites at greater risk,
- Support applicants to carry out the sequential test for individual planning applications,
- Make decisions about individual planning applications,
- Decide whether a development can be made safe without increasing flood risk elsewhere,
- Identify the need for local design guidance or codes,
- Aid discussions with emergency planning teams.

9.1.2 Where development must be allocated in areas at risk of flooding further assessment of the risk of flooding may be required, for example through the preparation of a Level 2 SFRA.

9.2 Future Updates to the SFRA

9.2.1 This SFRA has been updated building upon existing knowledge and newly available datasets with respect to flood risk within HBC, made available by partner organisations including ESCC, Southern Water, and the Environment Agency. In the future, new modelling studies or new information may influence future development management decisions within HBC. Therefore, it is important that the SFRA is adopted as a 'living' document and is reviewed regularly considering emerging policy directives, flood risk datasets and an improving understanding of flood risk within HBC.

Appendix A - Maps

Figure No.	Figures Title and Content
Figure 01	Study Area
Figure 02	Topography
Figure 03	Superficial Geology
Figure 04	Bedrock Geology
Figure 05	Historic Flood Records
Figure 06	Sewer Flooding
Figure 07	Flooding from Rivers and Sea (Flood Zone Map)
Figure 08	Detailed Defended Tidal Hydraulic Model Outputs
Figure 09	Flood Risk Management Infrastructure
Figure 10	Hydraulic Modelling Coverage
Figure 11	Detailed Defended Fluvial Hydraulic Model Outputs
Figure 12	Flood Warning Areas
Figure 13	Map of Risk of Flooding from Surface Water (RoFfSW)
Figure 14	Susceptibility to Groundwater Flooding
Figure 15	Artificial Sources
Figure 16	Delineation of Flood Zone 3b