



LEVEL 1 STRATEGIC FLOOD RISK ASSESSMENT

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Glossary

Term	Definition
AEP	Annual Exceedance Probability
B&NESC	Bath and North East Somerset Council
BGS	British Geological Survey
FDGiA	Flood Defence Grant in Aid
FRAs	Flood Risk Assessments
LFRMS	Local Flood Risk Management Strategy
LLFAs	Lead Local Flood Authorities
LPAs	Local Planning Authorities
MTP	Medium-Term Plan
NPPF	National Planning Policy Framework
PLR	Property Level Resilience
PPG	Planning Practice Guidance
RMA	Risk Management Authority
SFRA	Strategic Flood Risk Assessment
SHLAA	Strategic Housing Land Availability Assessment
SoP	Standard of Protection
SuDS	Sustainable Drainage Systems
RoFSW	Risk of Flooding from Surface Water
UKCP18	UK Climate Projection 2018
WCS	Water Cycle Study
WFD	Water Framework Directive

Executive Summary

This Level 1 Strategic Flood Risk Assessment (SFRA) is required to inform the new Local Plan for Bath and North East Somerset Council (B&NESC). This Level 1 SFRA provides an overview of the planning context in relation to flood risk and development within Bath and North East Somerset. SFRAs are considered live documents and should be revised periodically when updated information becomes available, following policy changes or when it is required to inform Local Plans.

The information assessed within this SFRA identifies that the main source of flood risk in the borough is fluvial (river flooding) although areas are also at risk from surface water or groundwater flooding.

Initial proposed housing and employment allocations were provided for consultation in October and November 2025. A total of 69 potential sites have been assessed in relation to flood risk. Of these, 56 are potential housing sites, 6 for employment and 7 for mixed development. The results of this assessment have identified that 51 of the potential sites are at low risk of flooding and therefore considered sequentially acceptable in relation to flood risk. The additional 18 sites may be suitable for development subject to a sequential risk based approach to the layout of the site or the application of the Exception Test. B&NESC planners are required to take into account this determined flood risk as part of the Sequential Test, which is one of many factors taken into consideration when allocating potential sites for development in the Local Plan. Not all sites assessed in this SFRA will be allocated in the Local Plan. Sites not assessed within this SFRA could still be considered for development, although they would be treated as windfall applications. This SFRA provides a windfall site review flow chart to be used by planners in determining the appropriateness of individual windfall applications in relation to the Sequential Test.

As well as assessing flood risk at potential development sites and guidance for reviewing windfall sites, this SFRA also provides guidance on surface water management for new development. This is owing to surface water flood risk becoming more of a focus in the assessment of planning applications due to the increased knowledge and understanding associated with this source of risk, and specifically the potential flood risk impacts of insufficient surface water management.

Given this SFRA is to inform the emerging Local Plan for B&NESC, the recommendations of this report should be considered when setting the Local Plan Policies. The recommendations for the Local Plan Policies are:

- The flood risk to, and impact of, new development should be promoted through careful planning and where possible locating new development in the lowest flood risk areas, from all sources;
- Where development cannot be proposed in the lowest flood risk area, but where development would provide benefits that outweigh flood risk, suitable mitigation must be provided. This will ensure an acceptable level of risk to the new development whilst not increasing risk elsewhere. This would normally be demonstrated through the application of the Exception Test and must be agreed with relevant statutory consultees;
- There is an increased focus on surface water management and new development must ensure the drainage system serves to reduce runoff to agreed standards over the lifetime of the development. It is also necessary that the design of new surface water drainage systems follow the Sustainable Drainage Systems (SuDS) hierarchy and National Standards for sustainable drainage systems¹. The runoff rate is normally the pre-development rate for greenfield sites or as recommended in the West of England SuDS guidance. Where possible a strategic approach to surface water management should also be considered; and

¹ [National standards for sustainable drainage systems \(SuDS\) - GOV.UK](#)

- Where possible, redundant watercourse crossings and culverted reaches are removed to provide flood risk and ecological benefits. However, the downstream impacts should be carefully considered to prevent an increased flood risk elsewhere.

The other recommendations from this SFRA are that:

- This SFRA should support the completion of site-specific Flood Risk Assessments (FRAs). FRAs are required for all proposed development that goes through the planning system located within areas at risk from fluvial flooding and those covering sites greater than 1 hectare or are at risk from other sources of flooding in accordance with government guidance²;
- The Sequential Test should be carried out for all proposed windfall development and the flow chart provided in this SFRA should be used to aid planners with this process. It is recommended that the flow chart is updated, if necessary, following its use in assessing proposed development and following changes in policy or flood risk information; and
- It is recommended that this SFRA is considered as a live document, which is based on current understanding and available data. As further flooding occurs, as policy changes and as there are advances in flood risk studies this SFRA should be reviewed and updated as appropriate.

² [Flood risk assessments: applying for planning permission - GOV.UK](https://www.gov.uk/government/publications/flood-risk-assessments-applying-for-planning-permission)

1. Introduction

1.1 Overview

B&NESC is a unitary authority area comprising the north-east part of Somerset including the city of Bath and covers an area of 136 square miles (352 km²). Bath and North East Somerset is a largely rural area with population concentrated in the principal settlements of Bath and Keynsham and a number of villages including Midsomer Norton, Radstock and Saltford. Flooding is one of the most widespread and frequently occurring of natural hazards and, therefore flood risk is one of the main factors that influences the spatial planning process. All forms of flooding and their impact on the natural and built environment are material planning considerations.

B&NESC lies wholly within the catchment of the River Avon except for the far western part near Blagdon Lake which drains into the River Yeo. The south of the area drains northwards through Wellow Brook, Cam Brook and Newton Brook to the River Avon at Bath or via the River Chew to Keynsham.

B&NESC is situated immediately upstream of Bristol which the River Avon flows into. South Gloucestershire and Wiltshire are both upstream of B&NESC and catchments flow into Bath and North East Somerset. There are a large number of properties within the urban area of Bristol that are susceptible to flooding from the River Avon and future development within Bath and North East Somerset must be carefully managed to ensure that this risk of flooding is not exacerbated.

Under existing planning law, most applications for proposed development should be assessed in accordance with the development plan. B&NESC are currently in the process of updating their Local Plan to inform future development within this area, and this Local Plan will take into account the National Planning Policy Framework³ (NPPF). The NPPF states that *'inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere'*. The NPPF also requires that the Local Plan is supported by a SFRA. This SFRA has made use of recent updates to flood mapping, guidance, and modelling information to correctly inform the draft Local Plan.

1.2 Future development within Bath and North East Somerset

B&NESC are currently preparing a new Local Plan for Bath and North East Somerset that will set out the locations at which development should take place up to and beyond 2042. The Local Plan will guide future development and will look at various issues such as housing and economic needs, as well as measures to protect the environment and the effects of climate change.

This SFRA will be used to inform the Local Plan and will form part of the evidence base. This SFRA has only included sites for the application of the Sequential Test which B&NESC are considering allocating, all other sites would need to be treated as windfall.

³ <https://www.gov.uk/guidance/national-planning-policy-framework>

1.3 Objectives

The objectives of this SFRA are:

- To provide sufficient data and information to enable B&NESC to apply the Sequential Test for potential land allocations and identify where the Exception Test is required. The SFRA has only included sites which B&NESC are considering allocating, all other sites would need to be treated as windfall;
- To identify any land allocations requiring a Level 2 SFRA;
- To enable B&NESC to prepare appropriate policies for the management of flood risk within the Local Plan;
- To identify the level of detail required for site specific FRAs; and
- Enable B&NESC to determine whether the flood risk is acceptable in relation to emergency planning capability.

1.4 Scope of this document

This SFRA report has been prepared in accordance with the NPPF to summarise the findings of the data collection phase and to provide a basis for the application of the Sequential Test in respect to potential development areas/sites identified so far through the planning process.

This report provides an overview of the planning context in relation to flood risk and development within Bath and North East Somerset (Section 2). A summary of the data collected, and a review of this data is provided (Section 3) which then forms a basis for the assessment of flood risk in Bath and North East Somerset (Section 4). The Sequential Test is outlined for the potential sites for development (Section 5). Sustainable flood risk management is discussed for future development in Bath and North East Somerset (Section 6) and an assessment of potential mitigation has been provided (Section 7).



2. Sequential and Exception Tests

This section provides an overview of the planning context in relation to flood risk and development within Bath and North East Somerset and the application of the sequential and exceptions tests for both planners and developers.

2.1 National planning policy

National planning policy plays a key role in shaping the direction in which Local Planning Authorities (LPAs) prepare their Local Plans for development. The Government requires LPAs to apply a risk-based approach to the preparation of development plans and their decisions on development control. The NPPF encourages LPAs to steer development away from areas affected by flood risk and recommends the application of a 'Sequential Test'. NPPF is the key guidance for planners managing flood risk as it clearly defines the appropriateness of the development type for each of the defined flood risk zones.

The NPPF and Planning Practice Guidance (PPG)⁴ have both been updated since the last Local Plan and supporting SFRA in 2018, as outlined below. It should be noted that both documents are classed as live documents and therefore the most relevant and up to date versions can be found on the relevant websites.

- In 2021, updates were made to the NPPF to update a number of environment related sections, including amendments on flood risk, and also climate change.
- In 2022, the PPG was updated. Key changes were made to reflect alterations in functional floodplain (Flood Zone 3b), vulnerability classifications, design flood level for developments, and surface water management requirements, amongst other changes.
- In December 2024, updates were made to the NPPF. Additional context for the Sequential Test is included in Section 173 for application of a sequential risk-based approach to individual applications. Section 175 states that the Sequential Test does not need to be applied to a site if proposed development is outside of flood risk areas from all sources of flooding. An update to Planning Practice Guidance paragraph 27 in September 2025 confirms that *'In applying paragraph 175 a proportionate approach should be taken. Where a site-specific flood risk assessment demonstrates clearly that the proposed layout, design, and mitigation measures would ensure that occupiers and users would remain safe from current and future surface water flood risk for the lifetime of the development (therefore addressing the risks identified e.g. by Environment Agency flood risk mapping), without increasing flood risk elsewhere, then the sequential test need not be applied.'* This SFRA considers the sequential testing of proposed development allocations for employment and housing and also considers whether a sequential approach could be applied to the site based on flood risk from various sources. For windfall sites not considered as part of this SFRA, Section 175 could be applied to a proposed development such that the Sequential Test would not need to be applied. Additional context on the application of SuDs has been included in Section 182 considering multifunctional benefits of SuDS (facilitating improvements in water quality and biodiversity, as well as benefits for amenity).

2.2 The Sequential Test

The aims of the NPPF are to ensure that flood risk is considered at all stages in the planning process to avoid inappropriate development in areas at risk from flooding and to direct development away from areas at highest risk. By exception, where new development is necessary in high-risk areas, policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall.

⁴ [Planning practice guidance - GOV.UK](https://www.gov.uk/guidance/planning-practice-guidance)

Planning needs to be at the forefront of managing flood risk in a sustainable manner by steering development away from areas that are susceptible to flooding. The NPPF advocates a sequential approach that will guide the planning decision making process (i.e., the allocation of sites). The aim of the Sequential Test is to:

“Steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding.”

The flood zones (see Section 3.3) are the starting point for this sequential approach. Therefore, in the first instance development should be located within Flood Zone 1. In circumstances when there are no reasonable sites available within Flood Zone 1 the development may be permitted within Flood Zone 2 depending on the land use vulnerability classification and applying the Exception Test if required. Only in circumstances when there are no suitable sites within Flood Zone 1 or 2 should development within Flood Zone 3 be considered.

Whilst the overall aim of the Sequential Test is to steer new development to the lowest area at risk there are likely to be instances where development cannot be located in the lowest risk area and the vulnerability of development is not compatible with a particular Flood Zone so the Exception Test would be required to determine the suitability of that vulnerability of development to the Flood Zone (e.g. Essential Infrastructure, Highly Vulnerable and More Vulnerable development classifications as shown in Appendix A).

Where a site is located within a range of different Flood Zones, a sequential approach should be applied within the site boundary. This would help ensure that the most vulnerable areas of the development are located within the lowest areas of risk as possible.

In addition, the risk of flooding from other sources and the impact of climate change must be considered when considering which sites are suitable to allocate. Since July 2021, the approach has adjusted the requirement for the Sequential Test (as defined in Paragraph 172 of the NPPF) so that all sources of flood risk are to be included in the consideration.

The September 2025 update to the PPG states in Paragraph 23 of the Flood Risk and Coastal Change guidance: *“Other forms of flooding need to be treated consistently with river and tidal flooding in mapping probability and assessing vulnerability, so that the sequential approach can be applied across all areas of flood risk”*.

2.3 The Exception Test

It will not always be possible for all new development to be located on land that is not at risk from flooding. Table 2 of the PPG set out in Appendix A2. sets out the requirements for the Exception Test based on flood risk from rivers and the sea. There is no guidance on how to consider other sources of flood risk. While the Exception Test is not explicitly required for sites at risk from other sources of flooding, the Local Planning Authority should follow a similar principle where sites are proposed that are at risk from other sources of flooding, weighing up the wider benefits of development against the risk.

The Exception Test is split into two separate parts required to be satisfied before allowing development to be allocated as outlined in paragraph 164 of NPPF.

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



3. Data Collection and Review

3.1 Introduction

The purpose of the data collection and review phase of the SFRA is to identify and obtain information regarding flood risk. It is during this phase that existing knowledge is collated with regards to the sources and extent of flood risk; existing flood management measures; and the land use and development opportunities within the Bath and North East Somerset area.

Consultation has been undertaken with B&NESC, the Environment Agency and Wessex Water. The information gathered during this phase has been used to assess the potential extent and frequency of flood risk, the implications of this flood risk for development opportunities and the opportunities for flood management practices which may help mitigate or reduce future flood risk.

3.2 Overview of Bath and North East Somerset area

Bath and North East Somerset covers an area of approximately 352 km² and is situated predominantly within the River Avon catchment. The Lower Avon valley in the north-eastern most part of Bath and North East Somerset is the lowest lying area of land and slopes gently in a westward direction towards the Severn Estuary. The remaining area is fairly steep and generally slopes in a north easterly direction through Wellow Brook, Cam Brook and Newton Brook to the River Avon at Bath or via the River Chew to Keynsham. Appendix B provides an overview of the topography of Bath and North East Somerset.

Within any catchment the hydrology is intrinsically linked to the geology and topography. Geology has a very strong influence on a catchment's response to rainfall. The degree to which water can percolate through rock, (described as permeability), influences the extent of overland flow and therefore the response of a watercourse to a rainfall event. The Lower Avon valley in the north-eastern most part of Bath and North East Somerset is the lowest lying area of land and slopes gently in a westward direction towards the Severn Estuary. The remaining area is fairly steep and generally slopes in a north easterly direction to meet the Lower Avon.

The soils and geology around the City of Bath are dominated by limestone and clay formations, particularly Great Oolite, Inferior Oolite, and Lias groups. These create mainly lime-rich loamy soils over clay with slightly impeded drainage, and in higher areas, freely draining shallow lime-rich soils. The semi-permeable rocks and steep slopes lead to springs, including Bath's famous hot springs, which can contribute to local flooding. In the river valleys, Lower Lias Clays and alluvium combine with low-lying land and poor drainage to increase the risk of surface water flooding.

The low-lying northern areas of Bath and North East Somerset around Keynsham sit on Triassic mudstones and Upper Westphalian limestone with coal beds. Along the Chew Valley, the presence of naturally or seasonally wet acid loamy and clayey soils with high groundwater levels increases the risk of both groundwater and surface water flooding for the town and surrounding areas.

The Cam and Wellow Brook catchments lie in high-ground areas underlain mainly by Triassic Mudstones, with a band of Inferior Oolite between the two streams. Midsomer Norton sits near the source of Wellow Brook at the top of the Cam Valley. The catchment's soils are predominantly acid loamy and clayey with slow permeability and impeded drainage in the upper and middle reaches, shifting to seasonally wet but more freely draining soils downstream. Springs in the upper reaches suggest a potential groundwater-flooding risk, while the mid-catchment is more vulnerable to surface water flooding due to impermeable geology and poorly draining soils.

Chew Valley Lake sits in a low-lying area underlain by Triassic mudstone and surrounded by limestone hills of the Mendips and a ridge of Inferior Oolite. The land around the lake has slightly acid loamy and clayey soils with slightly



impeded drainage and is vulnerable to surface water flooding. In contrast, the limestone ridge of the Mendips have freely draining, base-rich or lime-rich soils, and due to both their elevation and good drainage, these areas have a low risk of flooding.

Appendix C and D provides an overview of the bedrock and superficial geology of Bath and North East Somerset and Appendix E provides an overview of the watercourses. Watercourses are either classified as Main River or Ordinary Watercourses. Not all ordinary watercourses are shown in Appendix E, only those that are defined as significant features on Ordnance Survey Mapping.

3.3 Flood Zone definition

3.3.1 The NPPF Flood Zones

The NPPF makes use of four separate Flood Zones that should be considered when determining if proposed development is at an acceptable level of flood risk through the Sequential Test based on the land use vulnerability classification (see Appendix A). These Flood Zones represent flooding without flood defences in place and are defined as follows:

- **Flood Zone 1** is defined as having a 'Low Probability' of flooding and incorporates areas where the annual probability of flooding is lower than 1 in 1,000 (0.1%). The NPPF imposes no constraints upon the type of development within this Flood Zone.
- **Flood Zone 2** is defined as having a 'Medium Probability' with an annual probability of flooding between 1 in 1,000 and 1 in 100 (0.1% and 1%) for fluvial flooding and between 1 in 1,000 and 1 in 200 (0.1% and 0.5%) for tidal flooding. The NPPF recommends that this area is acceptable for most types of development with the exception of Highly Vulnerable land uses, as listed within Table 2: 'Flood risk vulnerability and flood zone compatibility' taken from the NPPF flood risk planning practice guidance and included within Appendix A of this SFRA.
- **Flood Zone 3a** is defined as having a 'High Probability' of flooding and incorporates areas with an annual probability of flooding of 1 in 100 (1%) or more frequent for fluvial flooding or 1 in 200 (0.5%) or more frequent for tidal flooding. There are greater constraints associated with development in these areas, as described in Appendix A of this SFRA.
- **Flood Zone 3b** is defined as the functional floodplain. This is the area where water has to be stored during times of flooding and is defined as land with an annual probability of flooding of 1 in 30 (3.3%) or more frequent, or land that is designed to flood. The NPPF identifies that local planning authorities should identify in their SFRAs areas of functional floodplain and its boundaries. Only water compatible development is allowed in this area.

3.3.2 The Environment Agency flood maps

The Environment Agency's Flood Map for Planning based on the new national flood risk assessment NaFRA⁵, December 2024 was used to identify the Flood Zones for this study. The Flood Map for Planning is the Environment Agency's best estimate of the areas at risk from fluvial flooding (not taking into account the presence of flood defences) for the 1 in 100 annual probability (1%) and 1 in 1,000 annual probability (0.1%) events. The flood map is updated on a quarterly basis as the Environment Agency's knowledge of flooding is improved through detailed modelling studies, recent flood events and data from river level and flow monitoring stations.

The Environment Agency's flood map outlines are based on a combination of specific detailed hydraulic modelling and river modelling and mapping method carried out nationally, to provide an indication of flood risk. Local modelling of flood risk captures important local features and the new national model is a significant improvement on previous

⁵ [New national flood and coastal erosion risk information - GOV.UK](#)

national modelling and is applied to areas where no local high quality modelling is available. The new NaFRA flood maps provide greater consistency between local and national flood risk information; provide additional risk information including flood depth; and provide a finer spatial resolution for flood risk from rivers. Flood risk outputs from new NaFRA include for new flood zone data, risk of flooding from rivers and sea data and risk of flooding from surface water data.

The Flood Zone outlines are not definitive and do not include all minor watercourse floodplains and they should not be assumed to be correct where a minor watercourse (ditch, brook, drain, dyke, etc.) is shown with no flood outlines, within or adjacent to a site.

Whilst the new NaFRA flood map outputs provide an improved understanding of risk, they have a varying degree of accuracy dependent on the quality of the inputs and, in particular, the availability of local detailed hydraulic modelling. More detailed hydraulic modelling may be required as part of a site-specific Flood Risk Assessment to provide further refinement of the available flood mapping.

The Flood Map for Planning presents flood risk in accordance with the NPPF Flood Zones 1, 2 and 3 (see Section 4.1.1). Whilst this Flood Map should be used as a starting point for allocating land for development, any sites that contain watercourses, or where a watercourse is adjacent to the site boundary, require further detailed assessment by the applicant to confirm flood risk.

3.4 Hydraulic modelling

The Environment Agency provided a number of hydraulic models covering Bath and North East Somerset.

- 2018 Bath to Bristol model of the River Avon provides undefended outlines
- 2019 Bristol City Council SFRA model of the River Avon which extends as far upstream as Keynsham
- 2023 Bristol Avon Flood Strategy model of the River Avon provides defended outlines
- 2021 Midford Brook Study includes Midford Brook and its tributaries Cam Brook and Wellow Brook
- 2015 River Chew and Winford Brook

The extent of the models is provided in Figure A-1. Various return period scenarios are provided as model outputs including climate change scenarios.

As part of the new NaFRA outputs an indicative climate change scenario is provided for a combined Flood Zone 2 and 3 extent for the peak river flow 'central' allowance, based on the 50th percentile for the 2080s epoch (2070 to 2125). A comparison was undertaken between the modelled outlines and the new NaFRA Flood Zone climate change outputs and showed good similarity for the Midford Brook catchments, however parts of the River Avon is noted as having "climate change data unavailable". A comparison was undertaken between the modelled outlines and the climate change outputs for the Risk of Flooding from Rivers and showed good similarity. Therefore, the climate change outlines from the new NaFRA outputs have been used to delineate future flood risk from rivers for the purposes of this Level 1 SFRA and is discussed further in Section 4.21.

To provide outlines representative of functional floodplain, defined as 3.3% (1 in 30) AEP modelled data was requested from the Environment Agency. Only the 2018 Bath to Bristol model and the 2021 Midford Brook model, had 3.3% (1 in 30) AEP extents. A comparison was undertaken between the modelled outlines and the new NaFRA Risk of flooding from Rivers and Sea "High Risk" dataset and showed good similarity demonstrating that the new NaFRA datasets had incorporated outputs from the detailed hydraulic models within Bath and North East Somerset. As the NaFRA datasets provide more extensive coverage of watercourses, the "High Risk" areas from the new NaFRA



outputs have been used to delineate Functional Floodplain, Flood Zone 3b across Bath and North East Somerset and is discussed further in Section 4.1.1.

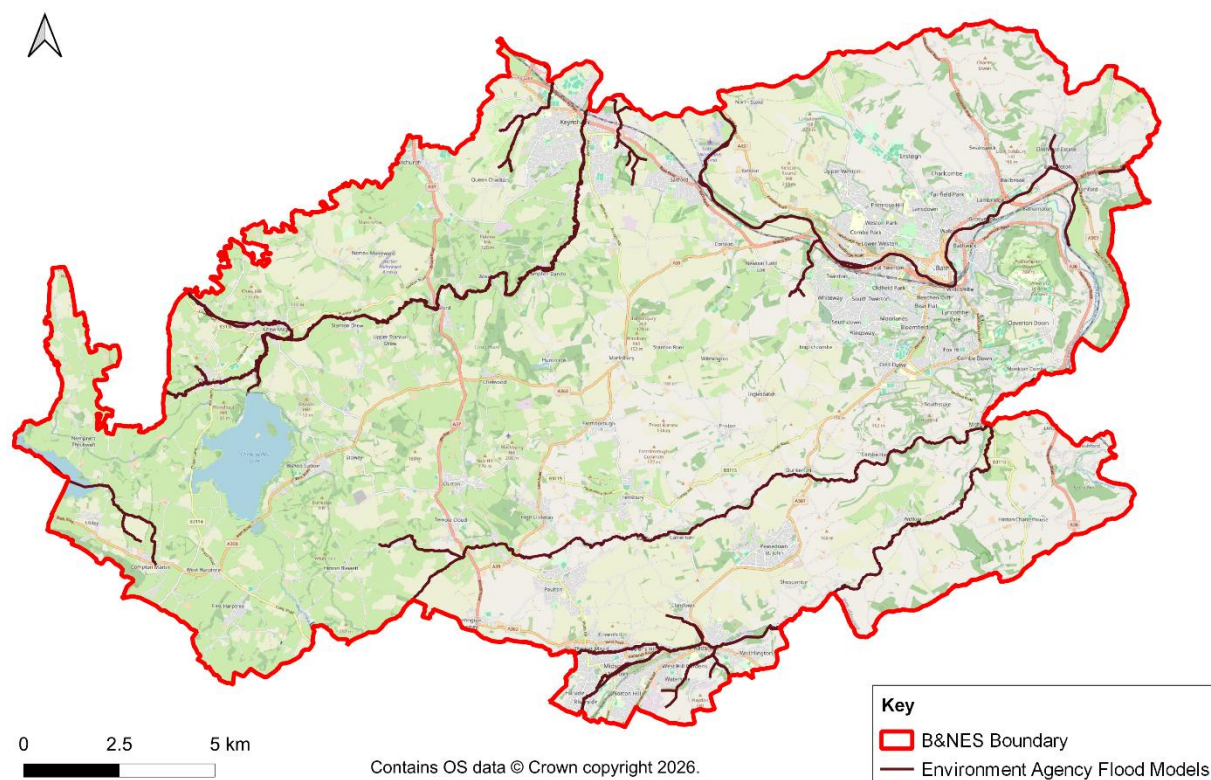


Figure A-1 – Hydraulic Model Extents

3.5 Historical flood events

Information on historical flood events can supplement the understanding of flooding mechanisms and flood extents determined through hydraulic modelling. The Environment Agency holds a publicly available data source of historical flood extents. This has been mapped as shown in Figure A-1 (see Appendix F for larger scale).

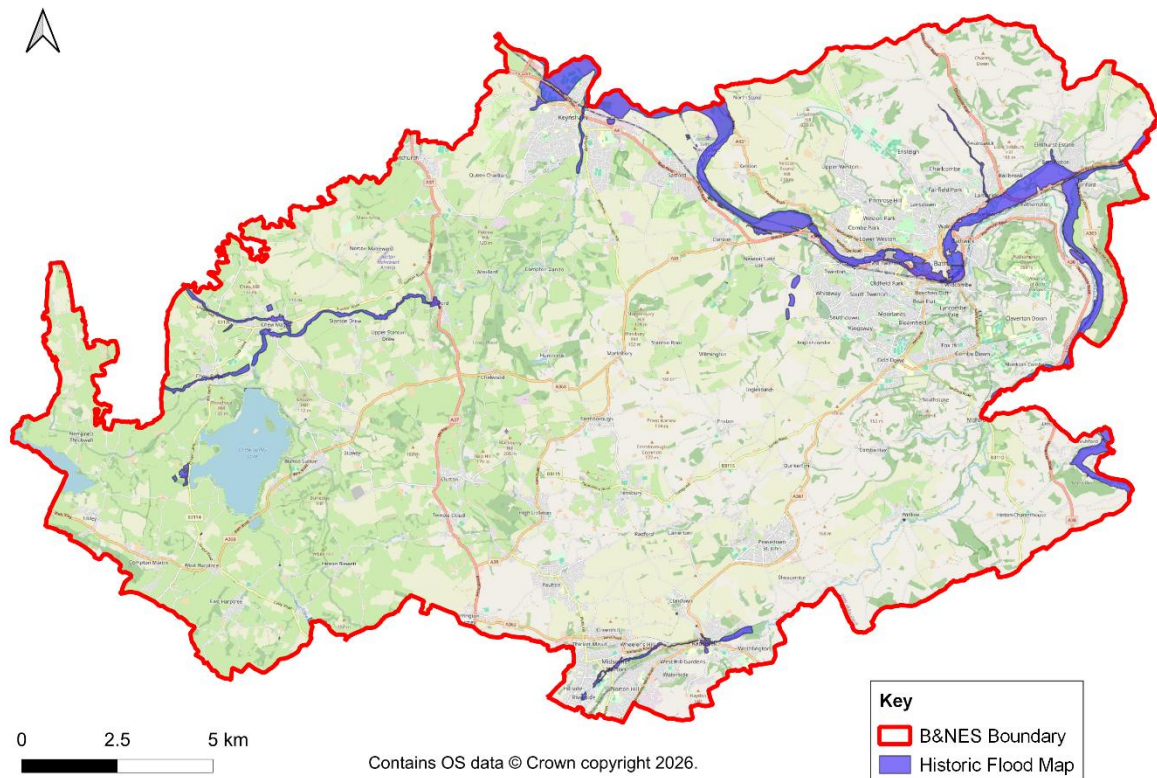


Figure A-1 - Historic flood events in Bath and North East Somerset

3.5.1 Fluvial flood history

Significant flood events affecting the whole of the River Avon basin occurred in 1925, 1932, 1960, 1968, 1979, 1982, 1985, 1986, 1999, 2000, 2009, 2012, 2013, 2014 and 2016 affecting areas of Bath, Keynsham and Saltford.

Midford and Monkton Coombe has experienced flooding from Midford Brook in 1960 and 2000.

Freshford has experienced flooding from the River Frome in combination with the River Avon in 1960, 1965, 1968, 1979, 1986 and 2013.

Significant flood events on the River Chew and its tributaries, Winford Brook and Babylon Brook affected part of Chew Stoke, Chew Magna and Pensford in 1960, 1968, 1979, 1981, 1999, 2008 and 2012.

Significant flood events on Wellow Brook and its tributaries, River Somer, Clandown Bottom and Snail's Bottom Brook affected part of Midsomer Norton and Radstock in 1954, 1960, 1963, 1965, 1968, 1972, 1974, 1975, 1979, 2000 and 2012.

Individual catchments have also experienced severe flooding at other times.

Table A-1 provides a summary of locations of fluvial flooding history and flooding mechanisms.

Table A-1 - Key Fluvial Flood Events based on Environment Agency Recorded Flood Outlines

Location	Date	Flooding Mechanism
Bailbrook, Bath	04-05/12/1960 16/03/1982 24-26/12/1985 28-29/01/1986 19/01/1999 10/02/2009 24/12/2013	Channel capacity of the River Avon exceeded
Batheaston, Bath	04-05/12/1960 16/03/1982 24-26/12/1985 28-29/01/1986 19/01/1999 10/02/2009 24/12/2013	Channel capacity of the River Avon exceeded
Bathford, Bath	01/01/1925 03/05-31/05/1932 04-05/12/1960 28-29/01/1986 19/01/1999 30/10/2000 10/02/2009 24/12/2013	Channel capacity of the River Avon and By Brook exceeded
Bathwick, Bath	12-14/11/1894 04-05/12/1960 30/10/2000 10/02/2009	Channel capacity of the River Avon exceeded
Grosvenor, Bath	04-05/12/1960 16/03/1982 24-26/12/1985 28-29/01/1986 19/01/1999 10/02/2009	Channel capacity of the River Avon exceeded
Kingsmead, Bath	12-14/11/1894 04-05/12/1960 10/02/2009 24-29/12/2013	Channel capacity of the River Avon exceeded
Lamsbridge, Bath	04-05/12/1960	Channel capacity of the River Avon exceeded
Locksbrook, Bath	12-14/11/1894 04-05/12/1960 10/02/2009	Channel capacity of the River Avon exceeded
Newbridge, Bath	12-14/11/1894 04-05/12/1960 19-22/01/1999 10/02/2009	Channel capacity of the River Avon exceeded
Twerton, Bath	12-14/11/1894 04-05/12/1960 10/02/2009	Channel capacity of the River Avon exceeded

Location	Date	Flooding Mechanism
Walcot, Bath	12-14/11/1894 04-05/12/1960 30/10/2000	Channel capacity of the River Avon exceeded
Widcombe, Bath	12-14/11/1894 04-05/12/1960 30/10/2000 10/02/2009	Channel capacity of the River Avon exceeded
Bishop Sutton	21/11/2012	Channel capacity of Lyde Brook exceeded
Chew Magna	10/07/1968 30-31/05/1979 30/12/1981 19-20/01/1999 15-16/01/2008 24-25/09/2012 21-23/11/2012	Channel capacity of River Chew and Winford Brook exceeded
Chew Stoke	10-11/07/1968 21/11/2012	Channel capacity of Babylon Brook exceeded
East Harptree	21/11/2012	Channel capacity of ordinary watercourse exceeded
Freshford	01-31/01/1925 01/05/1932 05/12/1960 18-19/12/1965 10/07/1968 27-28/12/1979 28-29/01/1986 19-22/01/1999 01/11/2000 24/12/2013	Channel capacity of River Frome exceeded
Keynsham	04-05/12/1960 16/03/1982 24-26/12/1985 28-29/01/1986 19/01/1999 30-31/10/2000 10/02/2009 24/12/2013 09/01-27/02/2014	Channel capacity of the River Avon exceeded
Midford	05/12/1960 30/12/2000	Channel capacity of Midford Brook exceeded
Midsomer Norton	26/11/1954 04-05/12/1960 18-20/11/1963 09/12/1965 10-15/07/1968 02-09/12/1972 11/02/1974 28-29/01/1975 30-31/05/1979 17-18/06/2016	Channel capacity of the River Somer exceeded

Location	Date	Flooding Mechanism
Monkton Coome	04-05/12/1960 19-22/01/1999 30/10/2000	Channel capacity of Midford Brook exceeded
Pensford	10/07/1968 30-31/05/1979	Channel capacity of River Chew and Salters Brook exceeded
Radford	26/11/1954 27/10/1960 04-05/12/1960 18-20/11/1963 09/12/1965 10-15/07/1968 02-09/12/1972 21/11/2012	Channel capacity of Wellow Brook exceeded
Saltford	01-31/05/1932 04-05/12/1960 16/03/1982 23-26/12/1985 19-22/01/1999 30-31/10/2000 10/02/2009 24/12/2014	Channel capacity of the River Avon exceeded
Stanton Drew	30-31/05/1979	Channel capacity of the River Chew exceeded
Wellow	30/10/2000	Channel capacity of Wellow Brook exceeded
West Harptree	21/11/2012	Channel capacity of ordinary watercourse exceeded

3.5.2 Surface Water flood history

A number of flooding incidents have occurred throughout Bath and North East Somerset from surface water. Table A-1 provides a summary of locations of historical surface water flooding along with flooding mechanisms.

Table A-1 - Key Surface Water Flood Events based on Environment Agency Recorded Flood Outlines

Location	Date	Flooding Mechanism
Whitchurch	15/11/1974	Local Drainage Capacity Exceeded
East Harptree	30/04/2012 to 02/05/2012	Local Drainage Capacity Exceeded
Stanton Drew	22/11/2012	Local Drainage Capacity Exceeded
Keynsham	22/11/2012	Local Drainage Capacity Exceeded
Compton Dando	22/11/2012 to 23/11/2012	Local Drainage Capacity Exceeded
Chew Stoke	21/11/2012	Local Drainage Capacity Exceeded
Bath	24/11/2012	Local Drainage Capacity Exceeded

3.5.3 Groundwater flood history

A number of flooding incidents have occurred throughout Bath and North East Somerset from elevated groundwater levels.

Table A-1 provides a summary of locations of historical groundwater flooding along with flooding mechanisms.

Table A-1 - Key Groundwater Flood Events based on Environment Agency Recorded Flood Outlines

Location	Date	Flooding Mechanism
Bath (Dorchester Street)	21/11/2012	Elevated Groundwater Level
Bath (Bathwick Street)	04/11/2012 to 22/11/2012	Elevated Groundwater Level
Bath (Newbridge Hill)	23/11/2012	Elevated Groundwater Level
Bath (James Street West)	25/11/2012	Elevated Groundwater Level

3.6 Flood risk studies

3.6.1 Bath and North East Somerset Local Flood Risk Management Strategy

Bath and North East Somerset Council has completed a Local Flood Risk Management Strategy (LFRMS) to fulfil their duties under the Flood and Water Management Act 2010. The LFRMS has been developed to understand and manage flood risk and focusses on the management of local flood risk from surface water, ground water and ordinary watercourses. An action plan has been developed to fulfil several objectives:

- 1) Improve understanding of local flood risk;
- 2) Promote community awareness and build capability for appropriate action;
- 3) Manage local flood risk through capital and maintenance investment;
- 4) Prevent inappropriate development that creates or increases flood risk;
- 5) Improve flood preparedness, warning and ability to recover.

3.6.2 Bath and North East Somerset Surface Water Management Plan

The Bath and North East Somerset Surface Water Management Plan (SWMP) was completed in 2015. The study identified urbanisation and climate change as major factors likely to increase surface water flood risk across the area. While existing development management policies were considered adequate to limit these impacts, the report emphasised the continued importance of applying these policies, particularly the requirement for SuDS-based surface water flood mitigation measures in new developments following Bath and North East Somerset SuDS policy. An interactive map of local flood incidents was developed which summarises recorded flood incidents and predicted surface water flood risk, using data from B&NESC and Wessex Water and an infiltration potential map which identifies areas suitable for SuDS infiltration. These map-based tools support better planning, risk assessment, and sustainable drainage design across Bath and North East Somerset.

3.6.3 Severn River Basin District Flood Risk Management Plan

In December 2022 the Environment Agency issued a second cycle Flood Risk Management Plan (FRMP) to manage significant flood risks in the Flood Risk Areas (FRAs) identified within the Severn River Basin District (RBD)⁶. This updated river basin management plan covers the period 2021 to 2027. Bath has been identified as a Flood Risk Area from rivers.

The aim of the FRMP is to “help deliver the requirements of the National Flood and Coastal Erosion Risk Management Strategy in England by setting out the measures to manage flood risk now and in the future”. The FRMP recognises that maintaining hard defences will become uneconomical in many cases and therefore not sustainable in the future. The approach outlined within the FRMP is a move towards systems that work with nature and through a catchment-based approach.

The plan outlines how development and land-use planning must account for key water-related issues, including sustainable drainage systems (SuDS), green and blue infrastructure, sewage treatment, water efficiency, and the strategic location of new infrastructure.

⁶ [Severn River Basin District Flood Risk Management Plan 2021 to 2027](#)

The FRMP outlines the current and proposed measures to manage risk in the River Avon catchment which includes catchment wide measures such as preparedness through flood forecasting and flood warning expansion projects to exploring opportunities to reconnect rivers and their floodplains and restore natural processes. Consideration is also given to seeking joint opportunities with Wessex Water regarding Drainage and Wastewater Management Plans with a property flood resilience programme.

3.7 Existing flood risk management

3.7.1 Definition of flood risk management

Information on existing flood risk management is required to indicate areas where there is protection from fluvial flood risk, the level of protection provided and predicted life of the flood risk management option. Flood risk management is normally in the form of either formalised flood defences or other approaches such as flood storage or flood resilience.

Flood defences

Flood defences are raised structures that prevent floodwater from flooding surrounding areas by altering the natural flood flow paths from a watercourse or retaining flood water. Flood defences are categorised as ‘formal’ defences or ‘informal’ defences. A ‘formal’ defence is a structure that was built separately to defend land or property from flooding and is maintained for this purpose by the Environment Agency, Local Authority or riparian landowner. An ‘informal’ defence is a structure that has not been specifically built to retain flood water and is not maintained for this specific purpose but may afford some protection against flooding. ‘Informal’ defences include boundary walls, industrial buildings and railway and road embankments.

The extent, condition and standard of protection of the defences owned and maintained by the Environment Agency are recorded within the Asset Information Management System (AIMS). To determine the standard of protection provided by the defence, the following information is essential:

- Location of the defence; and
- Defence crest level.

Where available the following information is also collated:

- Condition of the defence (based on the AIMS scale of 1 to 5, good to poor);
- Residual life; and
- Type of defence.

Other flood risk management

Other flood risk management solutions may involve schemes to increase flood water storage in upstream areas, with gradual release. This will reduce the chance of river channel overtopping and flooding in the downstream protected areas. This can be achieved either through the construction of formalised flood storage reservoirs or providing increased “natural” floodplain storage through reduced bank levels. Additional flood storage could be provided by de-culverting areas and creating new floodplain, especially where redevelopment is being proposed. This would have the potential added benefit of restoring the channel for amenity and wildlife as well as enhanced water quality fulfilling requirements of Water Framework Directive.

The removal of other in channel structures (such as watercourse crossings) may provide some additional flood risk benefit to upstream areas as it could improve flow conveyance. This may also improve ecology including fish and eel migration. However downstream flood risk impacts would need to be considered carefully for this type of flood risk management.



Sewer separation, i.e. separating surface water and foul water within sewer systems could also reduce flood risk, as well as limiting associated pollution incidents.

3.7.2 Location and description of flood defences

Following significant flooding along the River Avon in the 1960s, the Bath Flood Defence Scheme was completed in 1974 to reduce the risk of flooding to the city. Twerton and Pulteney gates form part of the 1974 Bath scheme. A scheme to replace Twerton Gate to manage the risk of failure and maintain river levels has been developed which is expected to better protect 1,186 properties from the risk of flooding by the end of 2025/26.

The Bath Quays Waterside Project incorporates flood mitigation and defence works to the north and south banks of the river between Churchill Bridge and Midland Bridge that address the negative impacts of climate change. The interventions reduce existing and future flood risk to the Lower Bristol Road and 60 properties on the South side of the river through the provision of new flood defences.

Large parts of Bath and Keynsham are defended from the River Avon through natural high ground which provides a 1 in 100 year to 1 in 150 year standard of protection. There are additional sections of embankment and engineered high ground around South Quays, Midland Bridge, Pulteney and South Parade in Bath.

Midsomer Norton is defended from the River Somer through natural high ground which provides a 1 in 100 year standard of protection.

Midsomer Norton is defended from Wellow Brook through natural high ground which provides a 1 in 100 year standard of protection.

Midsomer Norton is also protected from flooding through a 1.1 km bypass culvert which diverts the River Somer flows away from the town centre during flood conditions.

Natural high ground provides protection to local communities along Babylon Brook, Cam Brook, River Chew and Waterside with an approximate 1 in 10 year standard of protection.

Data from the Environment Agency AIMS asset database was used to identify the flood defences for this study. Table A-1 provides the details of the flood embankments and high ground including location and standard of protection and the distribution of the flood defences is provided in Figure A-1.

Table A-1 - Flood defence details

Watercourse	Location	Type of Raised Defence	Design Standard of Protection	Comments
Babylon Brook	Chew Stoke	Natural High Ground	10 year	Private asset
Babylon Brook	Chew Stoke	Engineered High Ground	unknown	Private asset
Cam Brook	Radford, Camerton, Dunkerton, Coombe Hay	Natural High Ground	10 year	Private asset
Midford Brook	Midford	Engineered High Ground	unknown	Currently inspected and maintained by the Environment Agency
River Avon	Bath, Keynsham	Natural High Ground	100 – 150 years	Currently inspected and maintained by the Environment Agency
River Avon	South Quays, Midland Bridge, Pulteney, Bath	Engineered High Ground	unknown	Currently inspected and maintained by the Environment Agency
River Avon	North Parade, Bath	Embankment	unknown	Currently inspected and maintained by the Environment Agency
River Chew	Chew Magna, Stanton Drew, Pensford, Woollard, Compton Dando	Natural High Ground	10 year	Currently inspected and maintained by the Environment Agency
River Somer	Midsomer Norton	Natural High Ground	100 year	Currently inspected and maintained by the Environment Agency
Waterside	Midsomer Norton	Natural High Ground	10 year	Waterside
Wellow Brook	Radstock	Natural High Ground	100 year	Currently inspected and maintained by the Environment Agency
Winford Brook	Chew Magna	Embankment	unknown	Private asset

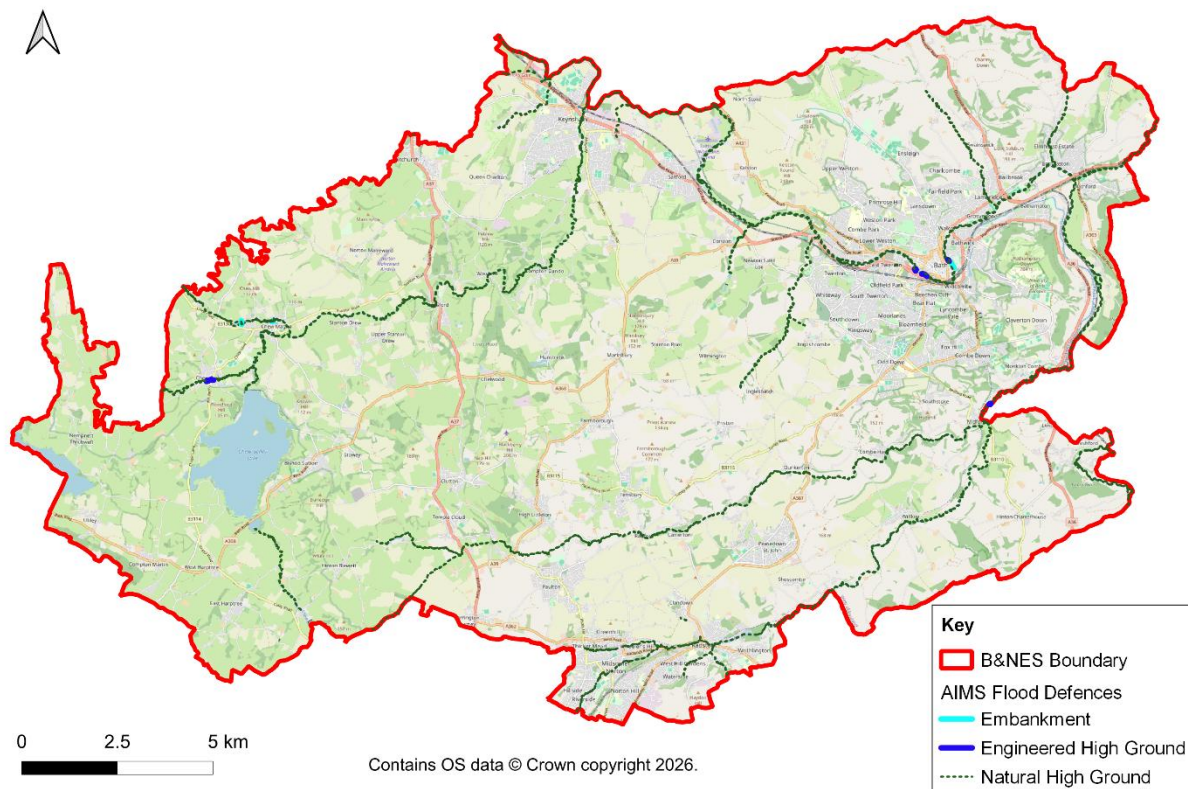
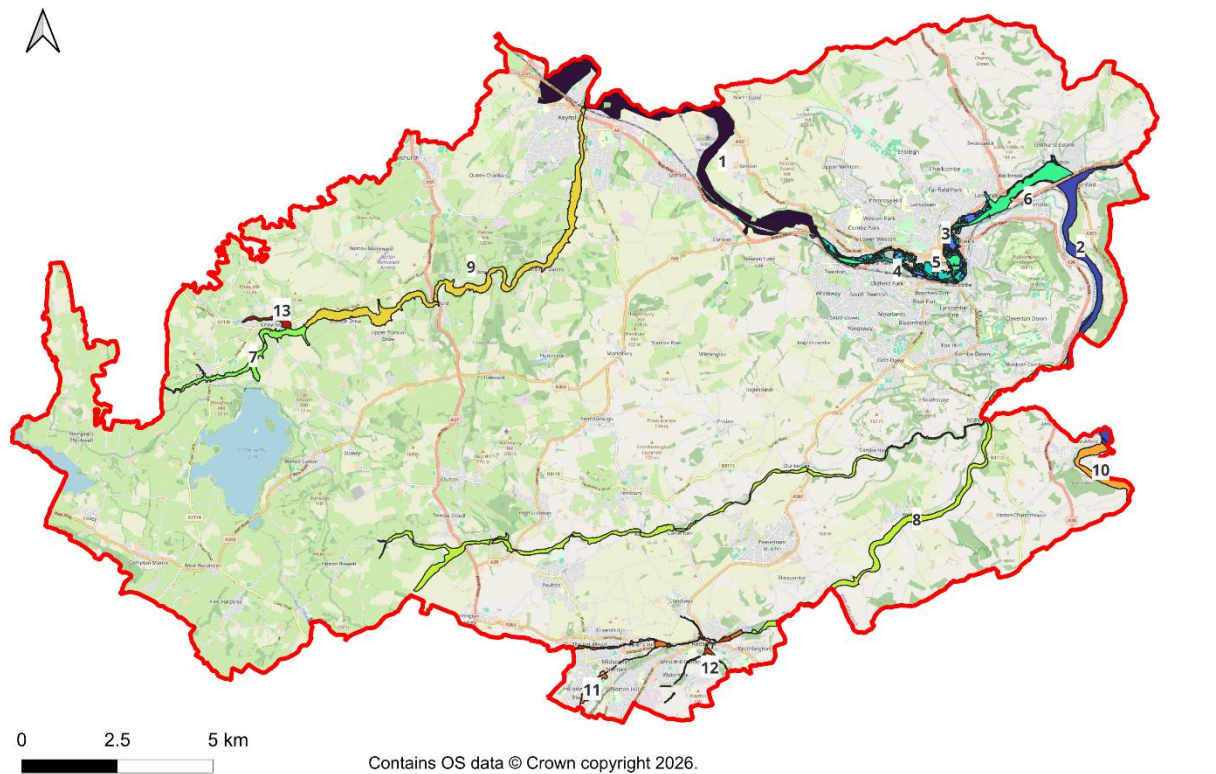


Figure A-1 - Flood Defences

3.8 Flood warning

In addition to flood defences to reduce the probability of flooding, flood warning has been in operation in the River Avon catchment for a number of years as a means of reducing the impacts of flooding. A range of systems have been in operation in various parts of the catchment operated by the Environment Agency. Although flooding in the upper parts of the catchment is difficult to predict because of the rapid response of the smaller urbanised catchments, the lower reaches of the River Avon benefit from relatively accurate forecasts with good lead-times based on upstream water levels.

Data from the Environment Agency (2026) has been used to identify the flood warning services currently provided for areas at risk of flooding within Bath and North East Somerset. The location of the flood warning services is shown in Figure A-1 (see Appendix M for larger scale).



Key

 B&NES Boundary

Flood Warning Area

- 1. Bristol Avon (lower) from Twerton to Bristol
- 2. Bristol Avon (middle) from Melksham to Bathford, not including Bradford on Avon
- 3. Bristol Avon at Bath, low lying properties set back from the river
- 4. Bristol Avon at Bath, other properties set back from the river
- 5. Bristol Avon at Bath, properties furthest from the river
- 6. Bristol Avon at Bath, riverside properties
- 7. Chew Stoke Stream and River Chew at Chew Stoke and Chew Magna
- 8. Midford Brook, Cam and Wellow Brooks
- 9. River Chew from Stanton Drew to the Bristol Avon at Keynsham
- 10. Somerset Frome from Frome to Freshford
- 11. Wellow Brook and River Somer at Midsomer Norton and Radstock, Riverside, Welton and Mill Road areas
- 12. Wellow Brook and River Somer at Midsomer Norton and Radstock, Thicketmead Bridge and Coombend areas
- 13. Winford Brook at Chew Magna

Figure A-1 - Flood warning services currently provided for areas at risk of flooding within Bath and North East Somerset

The above Flood Warning Areas are based on a combination of the Flood Zone 2 outline and the historic flood extent. This is because some known historic flooding has occurred outside of Flood Zone 2.

In addition to the above Flood Warning Areas, data from the Environment Agency (2026) highlights that Bath and North East Somerset is covered by general early alerts to possible flooding, known as Flood Alerts. The location of these alerts is shown in Figure A-2 (see Appendix M for larger scale):

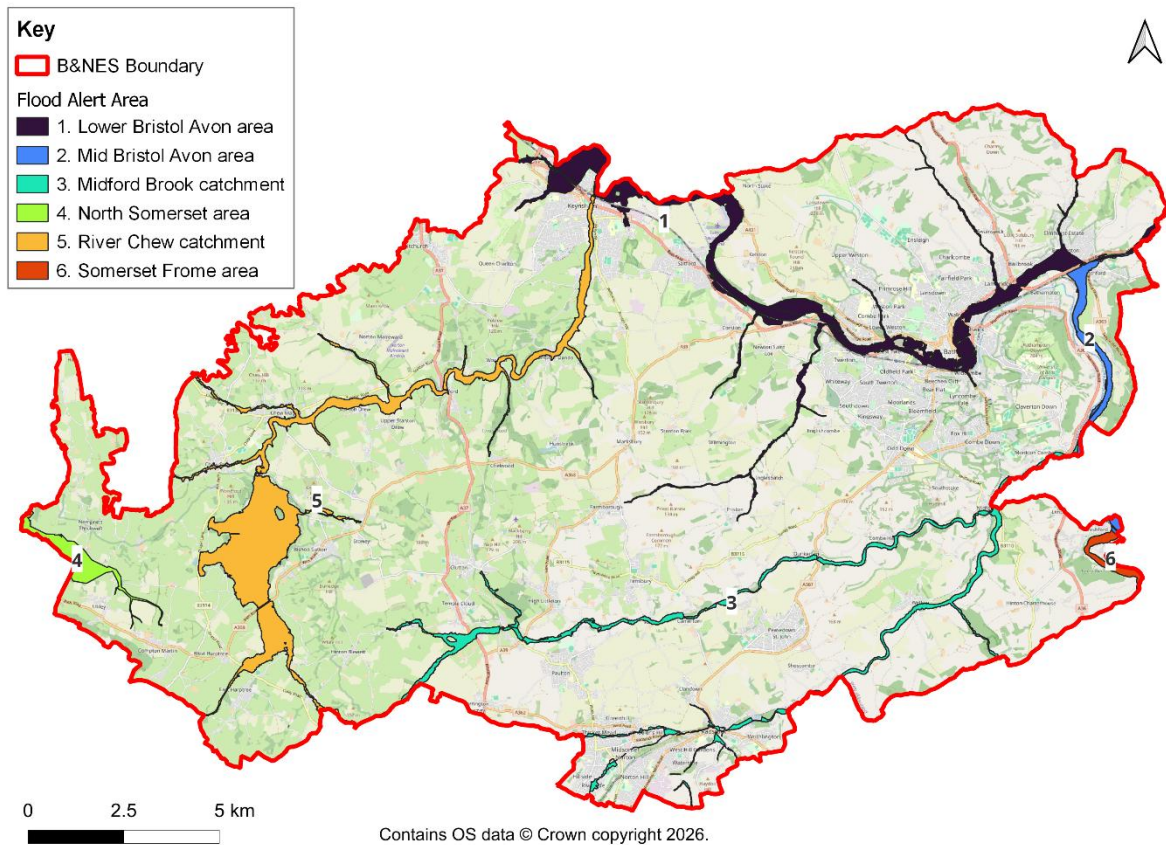


Figure A-2 - Flood alerts within Bath and North East Somerset

4. Flood risk in Bath and North East Somerset

4.1 Sources of flooding

4.1.1 Fluvial

Fluvial flooding occurs when the flow within a watercourse exceeds the channel capacity causing out of bank flow.

The primary source of flood risk in Bath and North East Somerset is fluvial flooding. The north of the authority is vulnerable from the River Avon. The south and west of the authority is at risk of fluvial flooding from River Chew, Newton Brook, Midford Brook, Cam Brook, River Somer and Wellow Brook.

The new NAFRA Environment Agency flood risk layers have been used to map flood risk to the district. This is shown for fluvial risk in Figure A-1 (see Appendix G for larger scale). Any area outside of areas of Flood Zone 2 and 3 are classed as within Flood Zone 1 as defined in Section 3.3.1.

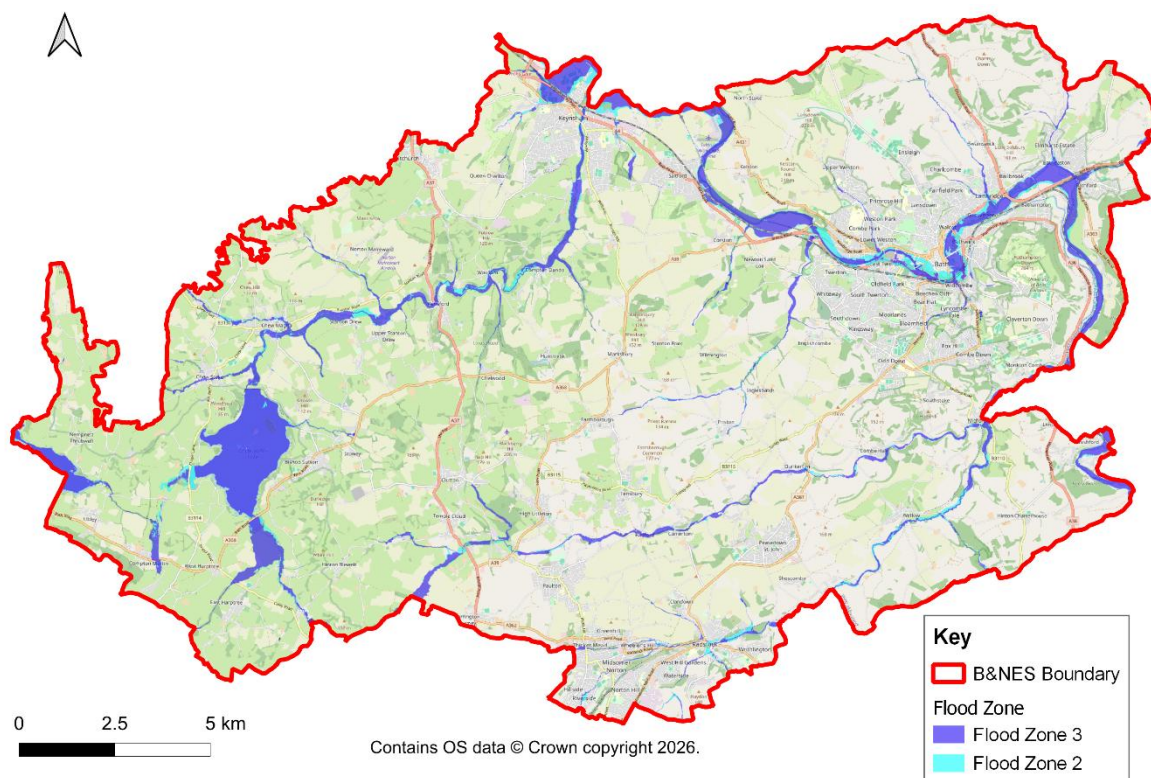


Figure A-1 - Fluvial flood risk in Bath and North East Somerset

Figure A-1 shows that the main urban areas at risk of flooding are:

- Bath from the River Avon
- Chew Magna from River Chew
- Chew Stoke from Babylon Brook
- Freshford from the River Frome
- Keynsham from the River Avon and River Chew
- Midford from Midford Brook
- Midsomer Norton from the River Somer
- Penford from the River Chew
- Radstock from Wellow Brook

As outlined within Section 3.3 areas at risk from fluvial flooding are categorised into Flood Zone 1 (low probability), Flood Zone 2 (medium probability), Flood Zone 3a (high probability) and Flood Zone 3b (functional floodplain). For the purposes of the SFRA, functional floodplain represents land where the flow of water is not prevented by flood defences and is subject to flooding during the 1 in 30 annual probability (3.33%) event. It also includes areas of land which are designed for flood storage, e.g. washlands. The new NAFRA risk of flooding from rivers outputs (February 2025) assigned as within an area of “High Risk” or 1 in 30 annual probability event (3.33%) have been used to delineate Flood Zone 3b (functional floodplain) and extents are provided in Figure A-2.

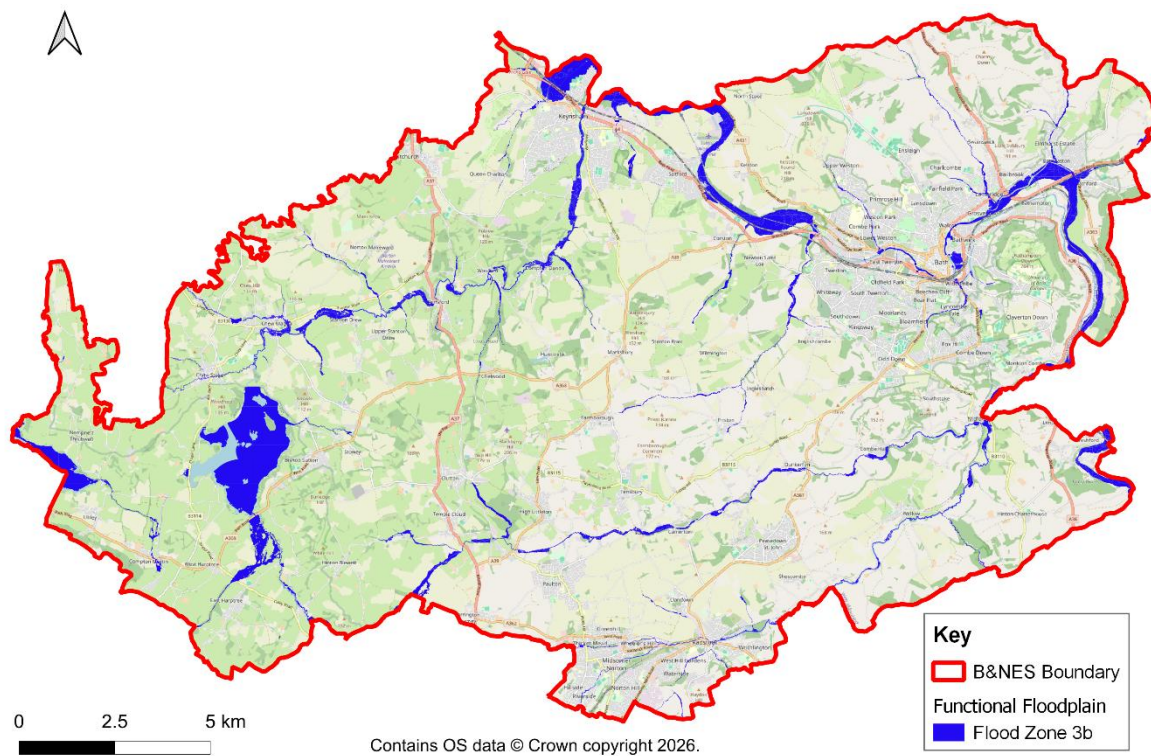


Figure A-2 – Functional Floodplain (Flood Zone 3b) in Bath and North East Somerset

4.1.2 Surface water

Surface water flooding occurs when rainfall intensities exceed the infiltration capacity such that water collects on the ground surface and has the potential to cause significant urban flood risk through rapid runoff rates. Developed land, specifically with large areas of impermeable surfacing, can be vulnerable to surface water flooding where an adequate drainage system is not present. Surface water flooding can also result from run-off associated with various agricultural practices. Certain arable farming practices in particular are likely to increase this risk of surface water flooding and excessive loss of topsoil; however, this is considered to only be a minor problem within across Bath and North East Somerset.

In recent years surface water flooding has become more problematic within Bath and North East Somerset. Flood investigation reports have identified high intensity rainfall has exceeded drainage system capacities causing surface water flooding in parts of Bath and Keynsham as well as localised flooding in a number of villages.

The information provided from the Environment Agency for this SFRA included the Risk of Flooding from Surface Water (RoFSW). These indicate areas at risk from surface water flooding during three annual exceedance events: the 1 in 30 annual probability (3.3%) (High Risk), the 1 in 100 annual probability (1%) (Medium Risk) and the 1 in 1000 annual probability (0.1%) (Low Risk) event. The most up to date NaFRA Environment Agency flood risk data (February 2025) has been used to map surface water flood risk, this is shown in Figure A-1 (see Appendix I for larger scale).

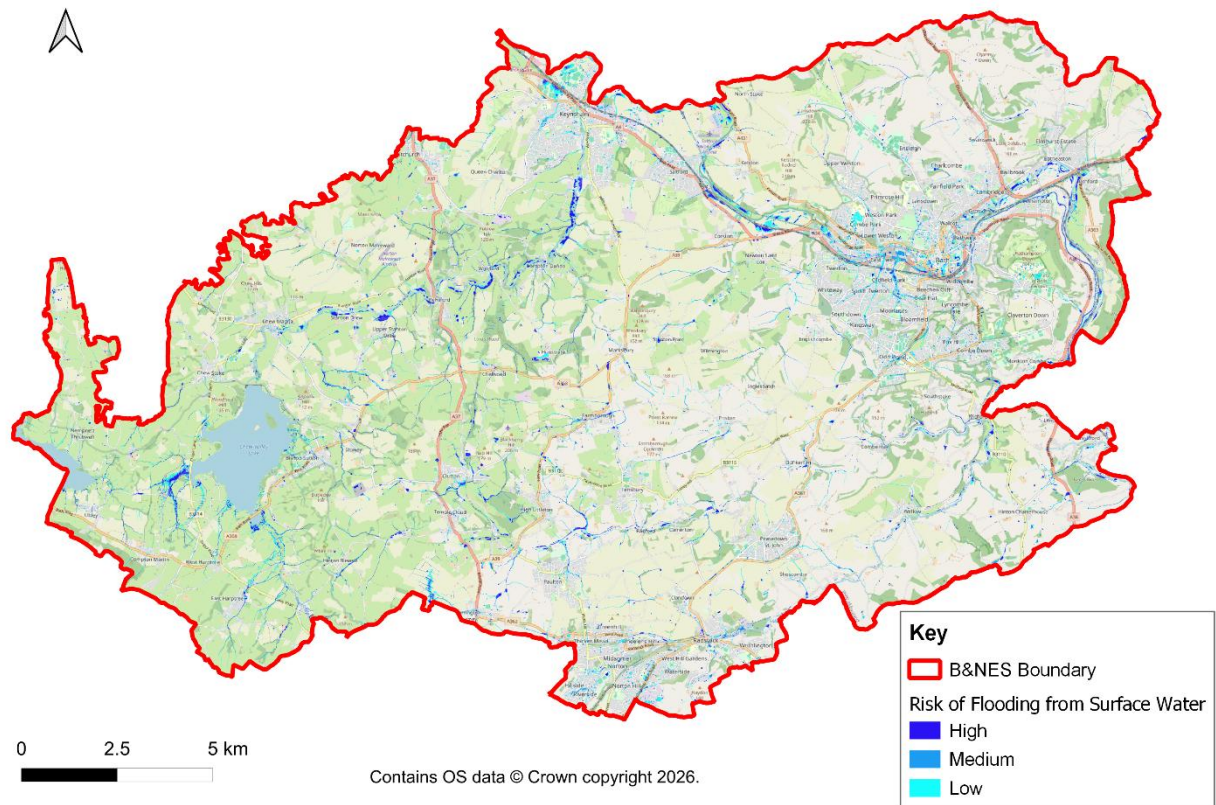


Figure A-1 - Surface water flood risk in Bath and North East Somerset

4.1.3 Groundwater

Groundwater flooding normally occurs where the water table meets the ground surface in low lying areas which are underlain by permeable rock known as aquifers. This tends to follow long periods of sustained rainfall but can also

be caused because of local obstructions to groundwater flow (e.g. following the placement of engineering structures or buildings with foundations) or by the rebound of groundwater levels after a decrease in abstraction or dewatering.

It is important to recognise that the risk of groundwater flooding is typically highly variable and heavily dependent on local geological, topographical and weather conditions. Groundwater flooding is hard to predict and challenging to mitigate.

The Areas Susceptible to Groundwater Flooding (AStGWf) dataset has been utilised to assess potential groundwater flood risk areas. The AStGWf dataset is a strategic, 1 km-grid map with each grid square indicating the proportion of land where geological and hydrogeological conditions suggest groundwater could emerge. If a square has no recorded value, it means no part of that area is considered susceptible to groundwater emergence. The AStGWf dataset does not indicate how likely groundwater flooding is, nor does it account for flooding caused by groundwater rebound from reduced abstraction. Although the mapping identifies broad areas where groundwater could emerge, only small, localised parts of these areas are expected to experience groundwater flooding.

The majority of Bath and North East Somerset has less than 25% of land identified as susceptible to groundwater emergence. Higher-susceptibility areas tend to follow river valleys, particularly along the River Avon and around the River Chew and Chew Valley Lake. Analysis of local geology and known spring locations indicates that the western area near Chew Valley is at higher risk due to permeable geology and lower-lying terrain. The remainder of Bath and North East Somerset is generally underlain by relatively impermeable geology, resulting in an overall low to medium risk of groundwater flooding across most of the study area.

The AStGWf map is provided in Figure A-1 and Appendix KFigure A-2.

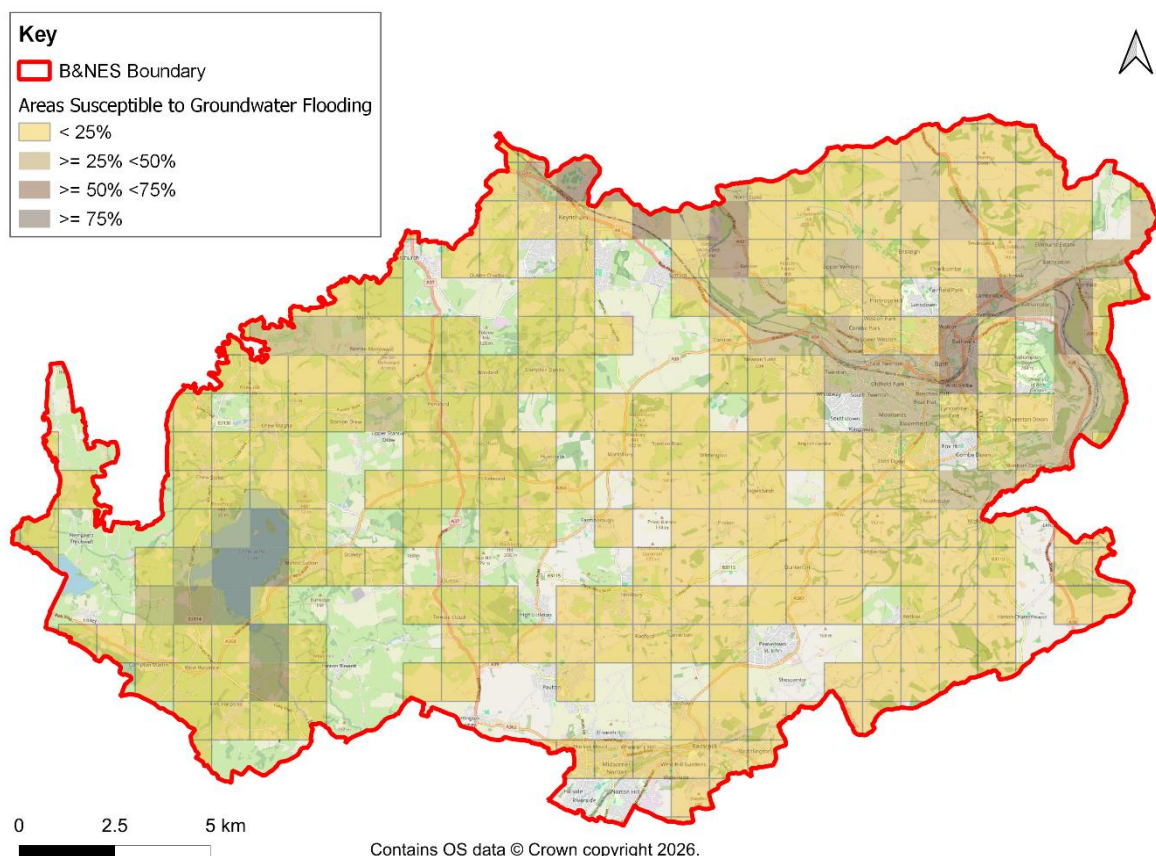


Figure A-1 – Areas Susceptible to Groundwater Flooding in Bath and North East Somerset

4.1.4 Sewers

Flooding from sewers can occur when the artificial drainage system is overwhelmed hydraulically, becomes blocked or suffers structural failure or pump failure. Blockage and structural failure incidents tend to be isolated and unpredictable. Wessex Water is responsible for the management of the urban drainage system throughout Bath and North East Somerset including surface water and foul sewerage. Wessex Water has procedures in place to respond to and rectify such incidents, which are also recorded on databases to inform maintenance and improvement plans.

A review of areas where the sewer system has been overwhelmed can potentially identify parts of the system that are under capacity. Wessex Water maintains an extensive database of flood events from sewers.

Wherever possible, Wessex Water seeks to promote the highest specified standard. However, this is dependent on the cost-benefit analysis of the improvement scheme. It is therefore not appropriate for the SFRA to recommend strategic options for managing sewer flooding where levels of protection to properties are inadequate as this is a fundamental part of Wessex Water's existing asset management procedures.

Drainage and Wastewater Management Plans (DWMPs) provide a consistent and integrated long-term approach to drainage and wastewater planning to reduce flood risk within Bath and North East Somerset.. DWMPs will enable effective planning for drainage and wastewater requirements generated by climate change, development, resilience, and the protection and enhancement of the environment.

It is essential to ensure that future development does not exacerbate known existing problems and conditions should be placed upon future development to ensure that these capacity issues are rectified before development is permitted. It is important, however, to consider that all hydraulic improvements to the systems, required due to new development, are subject to approval in line with the strategies and policies of Wessex Water. A surface water strategy for new developments must follow the SuDS hierarchy and SuDS National Standards¹. Wessex Water pursue a policy of reducing surface water flows to combined sewers and preventing surface water connections to sewers designed for foul flows only.

Pipe leakage is a common and widespread problem throughout the UK and can contribute to basement flooding and more widespread surface water flooding in some areas. Pipe leakage is managed by Wessex Water within Bath and Bristol Water for the remaining area of North East Somerset and is a fundamental part of their asset management procedures.

Pipe bursts tend to be isolated and unpredictable incidents. Wessex Water and Bristol Water have procedures in place to respond to and rectify such incidents.

4.1.5 Canal Infrastructure

Canals may pose a flood risk if they overtop or breach, but impacts will depend on the topography. The Kennet and Avon Canal is situated within Bath and North East Somerset and follows the Bristol to Avon natural course of the River Avon before it links to the River Kennet at Newbury. Canal and River Trust are responsible for ongoing maintenance of navigational structures for the canal.

4.1.6 Reservoirs

The Chew Valley Lake and Chew Magna Reservoir owned by Bristol Water Plc are two reservoirs located within Bath and North East Somerset and are potential sources of artificial reservoir flooding.

Flooding from reservoirs can occur when water retaining structures fail. All large reservoirs are covered by the Reservoirs Act and are subject, by law, to regular safety inspections. A very low residual risk of flooding from these



reservoirs remains if they were to fail unexpectedly. The Environment Agency provide a regulatory role for the operation of large reservoirs in relation to the Reservoirs Act 1975⁷.

The most up to date Environment Agency flood risk data has been used to map reservoir breach flood risk to Bath and North West Somerset, this is shown in Figure A-1 and Appendix L. The reservoir flood map shows where water may go in the unlikely event of a dam or reservoir failure. The outlines in the figure present failure from reservoirs including Lower Litton, Upper Litton, Chew Valley Lake (Stoke), Chew Magna, Monkswood, Huntstrete Lake, Newton Park Upper Lake, Orchardleigh. The 'dry-day' scenario predicts the flooding that would occur if the dam or reservoir failed when rivers are at normal levels. The 'wet day' scenario predicts how much worse the flooding might be if a river is already experiencing an extreme natural flood. Due to regular inspection, survey, and maintenance by the operating authorities - and extremely good safety record of no reservoir failure incidents resulting in the loss of life in the UK since 1925, it is very unlikely that a reservoir would fail.

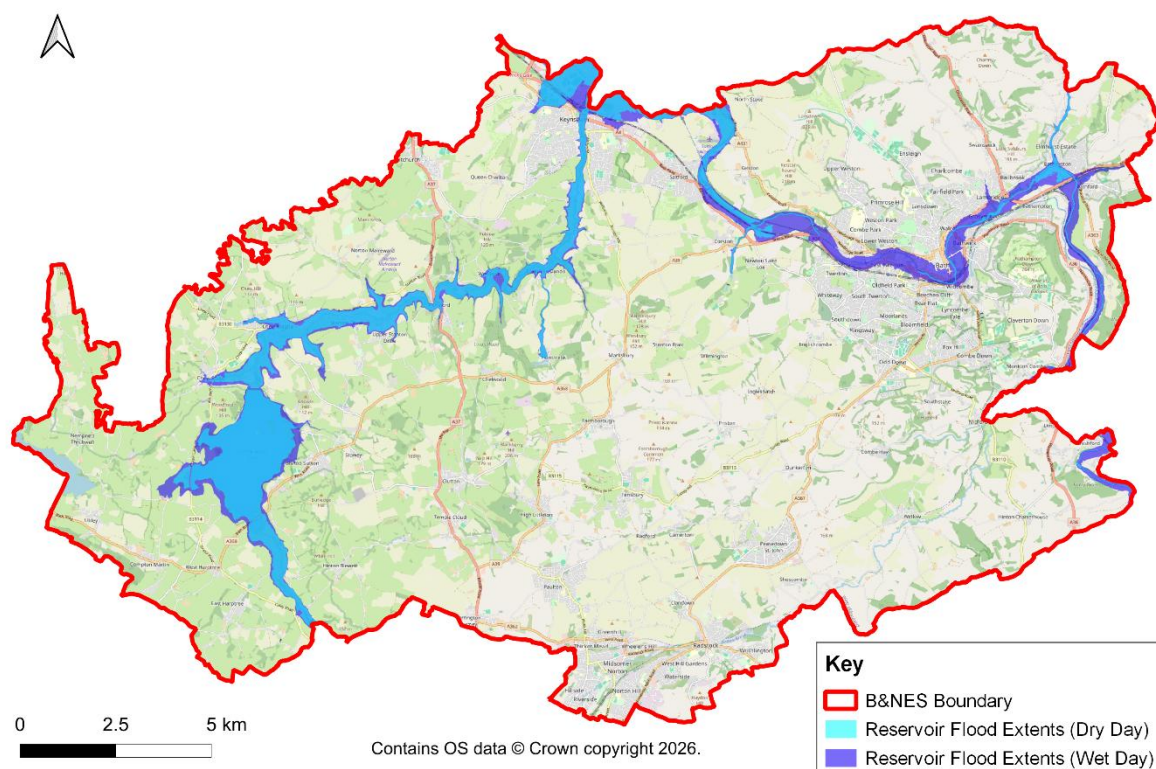


Figure A-1 - Reservoir breach flood risk in Bath and North East Somerset

4.1.7 Failure or blockage of critical assets

Flooding can result from the failure or blockage of critical assets, for example culverts or bridges. When trash screens become blocked due to the build-up of debris, or where blockages occur at the inlet to culverts, there is potential for localised flooding to result. The floodwater backs up and can flood nearby land or low-lying areas as it finds an alternative route around the culvert or structure.

⁷ [Reservoirs Act 1975](#)

The risk of failure or blockage of critical assets is associated with ineffective maintenance. Therefore, proposed development (specifically design and layout) should be planned to ensure the provision of necessary access to the watercourse for maintenance and hence to reduce the risk of flooding associated with failure or blockage of critical water assets.

4.2 Flood risk sensitivity

4.2.1 Flood sensitivity to climate change

Climate change is expected to have a major influence on future flood risk with the expectations that winter floods will happen more often and in urban areas flooding from thunderstorms will be more regular and more severe.

Whilst Section 3.4 outlines modelled climate change scenarios, these do not represent the peak river allowances for a range of climate change scenarios as outlined in Section 4.2.2. The sensitivity to climate change based on available data is discussed in the following sections.

Hydraulic modelling of the River Avon (see Section 3.4) has considered the potential impact of climate change over the next 100 years for 'central', 'higher central' and 'upper' allowances in the 1 in 100 annual probability (1%) flow and outlines are available from previous studies undertaken for the Environment Agency. NaFRA climate change outputs are available for peak river flow 'central' allowance, based on the 50th percentile for the 2080s epoch (2070 to 2125) and cover additional areas within Bath and North East Somerset to the available Environment Agency model outputs provided.

As there is a good similarity between the modelled outlines and the NaFRA climate change outputs, the climate change outlines from the NaFRA outputs have been used to delineate future flood risk from rivers and are shown in Figure A-1 representing the likely future extent of Flood Zone 3 and Flood Zone 2 combined (see Appendix H for larger scale).

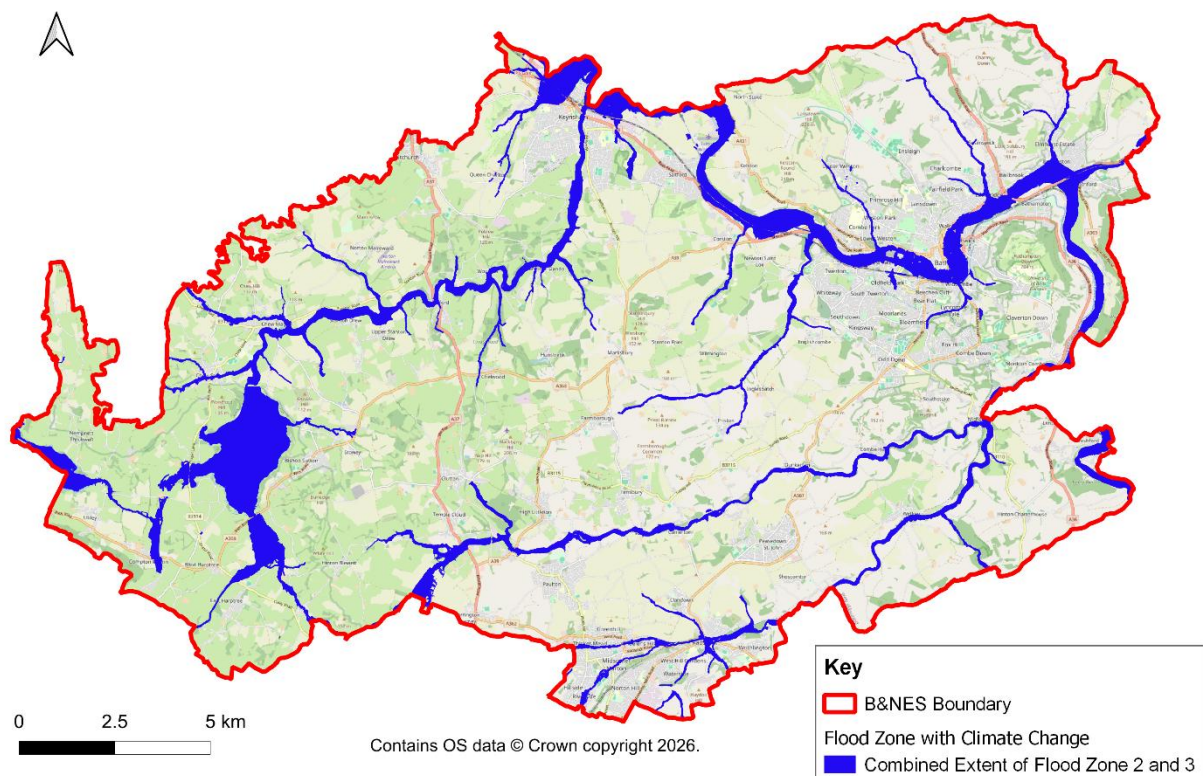


Figure A-1 – Flood Zone with Climate Change in Bath and North East Somerset

The impact of climate change for each of the main watercourses in Bath and North East Somerset are discussed further below.

River Avon

The effect of climate change on the River Avon is anticipated to increase the extent of flooding around the Widcome and Twerton areas of Bath. There is also an anticipated increase in flood extent from the River Avon to Bath Road in Saltford and around the wastewater treatment works and the northside of the Great Western Mainline railway in Keynsham.

By Brook

The effect of climate change on By Brook is anticipated to increase the extent of flooding along Box Road in Bathford.

River Chew

Climate change is not anticipated to increase the extent of flooding from the River Chew except for Bath Hill in Keynsham.

Cam Brook

The effect of climate change on Cam Brook is anticipated to increase the extent of flooding through the villages of Radford and Camerton.

River Somer

The effect of climate change on the River Somer is anticipated to increase the extent of flooding in the Riverside Area and town centre of Midsomer Norton as well as around Somersvale School and Midsomer Norton Cricket Club.

Wellow Brook

The effect of climate change on Wellow Brook is anticipated to increase the extent of flooding along Waterloo Road and the junction of Somervale Road and Wells Road in Radstock.

River Frome

Climate change is not anticipated to impact the River Frome at Freshford.

Summary

The anticipated changes in climate have the potential to not only increase the risk of fluvial flooding but also, by increasing the frequency and intensity of localised storms, increase the occurrence of flash flooding in small catchments. This may exacerbate localised drainage problems and so any site-based detailed Flood Risk Assessment and Sustainable Drainage Strategy prepared by a developer at the planning application stage should take due consideration of climate change. Areas at risk from surface water with the impact of climate change are provided in Appendix J.

4.2.2 Climate Change Allowance Guidance

Climate change allowances are predictions of anticipated change that should be considered for flood risk assessments to increase resilience to flooding. Peak river flow and peak rainfall intensity have been considered.

4.2.2.1 Peak river flow allowance

Peak river flow allowances show the anticipated changes to peak flow by management catchment. This is based on UK Climate Projection 2018 (UKCP18) data published by the Met Office.

The allowances are split by management catchment. Bath and North East Somerset is situated within the Avon Bristol and North Somerset Streams management catchment. The uplift allowances for the Central, Higher and Upper scenarios, for the 2020s, 2050s and 2080s epochs are outlined in Table A-1.

Table A-1 – Peak river allowances for the Central, Higher and Upper scenarios, for the 2020s, 2050s and 2080s epochs.

Scenario	Epoch 2020s	Epoch 2050s	Epoch 2080s
Central	10 %	12 %	26 %
Higher	15 %	19 %	39 %
Upper	27 %	38 %	71 %

The Flood risk assessments: climate change allowance guidance⁸ outlines which allowance should be used in a Flood Risk Assessment based on Flood Zone, and property vulnerability classification, and what should be used for floodplain storage compensation and off-site impacts.

The guidance also outlines how the allowances should be applied, as follows, and as shown in Figure A-1:

- Interpolate (adjust) the peak river flow allowance between the current year and 2030
- Apply the peak river flow allowance to the hydrological estimate for the 2050s and 2080s

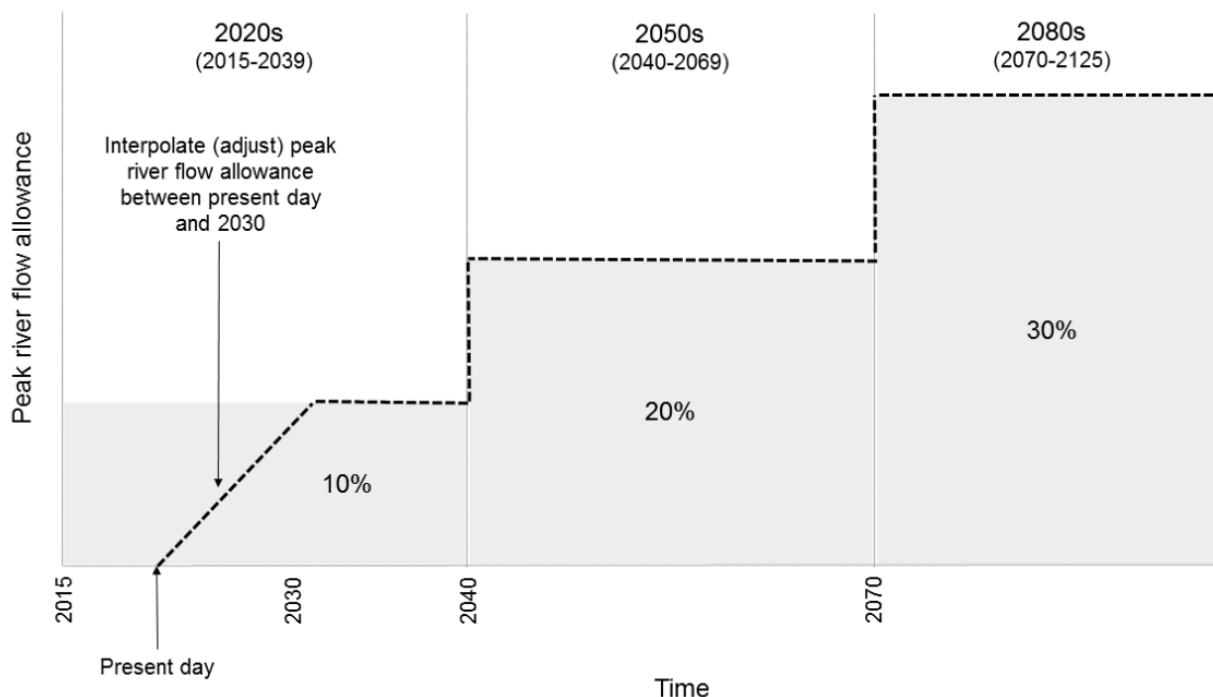


Figure A-1 – Application of peak river flow allowances (Environment Agency, 2026)

4.2.2.2 Peak rainfall intensity allowances

Peak rainfall intensity allowances anticipate the impact of increased rainfall on surface water flood risk. This is based on UKCP18 data.

The allowances are split by management catchment for the Central and Upper End scenarios, for the 2050s and 2080s epochs, and for both the 3.3% Annual Exceedance Probability (AEP) and the 1% AEP. The peak river allowances are provided in Table A-1.

⁸ [Flood risk assessments: climate change allowances - GOV.UK](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/544441/flood-risk-assessments-climate-change-allowances-guidance.pdf)

Table A-1 – Peak rainfall allowances for the Central and Upper scenarios, for the 2020s, 2050s and 2080s epochs

Epoch	AEP	Central Allowance	Upper End Allowance
2050s	3.3 %	20 %	35 %
2070s	3.3 %	25 %	40%
2050s	1 %	25 %	40 %
2070s	1 %	25 %	45 %

The Flood risk assessments: climate change allowance guidance⁶ outlines which allowance should be used in a Flood Risk Assessment and Drainage Strategy.

5. Sequential Test of Land Allocations

5.1 Background

The Government requires Local Planning Authorities (LPAs) to apply a risk-based approach to the preparation of development plans and their decisions on development control. The NPPF encourages LPAs to steer development away from areas affected by flood risk and recommends the application of a 'Sequential Test' that splits a local planning district into zones of high, medium or low risk (as set out in Section 3.3.1). The NPPF is the key guidance for planners managing flood risk as it clearly defines the appropriateness of the development type for each of the defined flood risk zones.

As stated above, the Sequential Test splits the planning district into three distinct flood risk zones (see Figure A-1), furthermore, the high flood risk zone is split further into areas of Functional Floodplain as shown in Figure A-2.

In accordance with PPG Paragraph 23 of the Flood Risk and Coastal Change guidance all sources of flooding need to be considered in mapping probability and assessing vulnerability, so that the sequential approach can be applied across all areas of flood risk.

5.2 Assessing flood risk using the Sequential Test

The early stages of a Sequential Test approach have been undertaken for this SFRA on the potential land allocations for the new Local Plan. This Sequential Test assessment identifies:

- Those sites that are considered sequentially acceptable;
- Those for which further information is required to determine whether the Sequential Test could be considered passed; and
- Those for which a passed Sequential Test is unlikely to be demonstrated.

The methodology adopted to undertake the Sequential Test for this SFRA has been provided in Figure A-1.

Flood risk is just one consideration of many in the planning remit that needs to be considered when the site is ultimately allocated within the local plan. The planners need to take on all considerations, of which flood risk is just one.

In considering flood risk, Figure A-1 identifies the steps undertaken to identify the flood risk source that each of the proposed development sites reside within. These steps are outlined as follows:

1. Obtain the latest editions of the Environment Agency Flood Map, Risk of Flooding from Surface Water, Risk of Reservoir Flooding and Areas Susceptible to Groundwater Flooding and overlay within a Geographic Information System (GIS) for review including climate change extents for river and surface water flood risk.
2. Based upon catchment flood knowledge, historical flooding and hydraulic modelling update Flood Zones 2 and 3 if appropriate.
3. Identify Functional Floodplain using hydraulic model data where available or utilise the "High Risk" areas indicated by the Risk of Flooding from Rivers data. Assign this area as Flood Zone 3b.
4. Identify potential development sites to be incorporated into the Local Plan;
5. Incorporate the potential development sites and the flood risk maps (flood risk from all sources) within GIS.
6. Determine which Flood Zone and flooding from surface water, reservoir and groundwater each of the potential development sites are located and tabulate the results.
7. Identify a hierarchy of preferred sites based on flood risk using a traffic light colour coding system (i.e., green go, red no go, as outlined within Section 5.4).



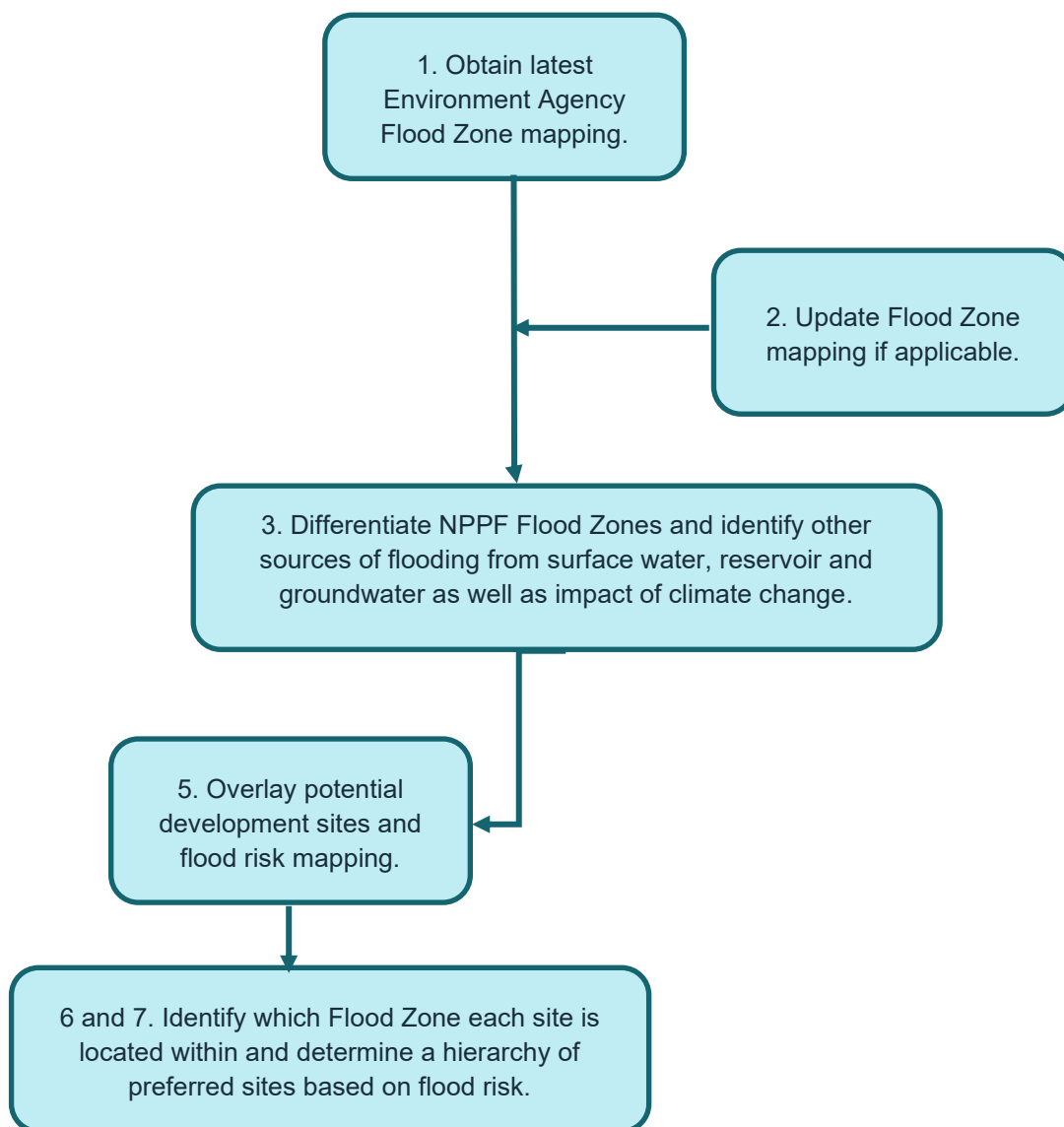


Figure A-1 - Flow diagram of Sequential Test methodology

5.3 Potential Land allocations

The new Local Plan will identify sites for development. B&NESC provided a number of potential allocation sites that have been identified for both housing and employment. These potential sites have been assessed as part of this SFRA.

The potential land allocations that have been assessed within this SFRA are provided in Table A-1, and Figure A-1 shows where they are located across Bath and North East Somerset. Where available the Housing and Employment Land Availability Assessment (HELAA) reference is provided as a label on Figure A-1 otherwise the site name is provided as a label. Not all sites that have been assessed in this SFRA will definitely be allocated for development, as this SFRA will be used to identify those sites that are preferable for allocation based on flood risk considerations alone (i.e. those located in Flood Zone 1).

Table A-1 - Potential land allocations for Bath and North East Somerset

Site Location	Site ID	Site Name	Category	Area (ha)
Bath	A03i	Bath Equestrian Centre	Housing	1.818
Bath	NEW06	Car park adjacent to Combe Park	Housing	0.497
Bath	-	Claverton Down Campus PBSA bedspaces	Housing	73.734
Bath	-	Hampset Cricket Club	Housing	1.118
Bath	B06	Land adjacent to Westmead Gardens, Weston	Housing	0.872
Bath	KING23	Land east of Station Road, Newbridge	Housing	0.308
Bath	NEW05	NHS House, Combe Park	Housing	1.266
Bath	S1PS55	North of Napier Road, Weston	Housing	4.947
Bath	E15	Odd Down - Land to the south west of the Park and Ride	Employment	12.818
Keynsham	-	Avon Mill Lane	Housing	1.780
Keynsham	K62, K54	Devonport House and Durley Farm	Housing	5.152
Keynsham	K25	East Keynsham	Housing	3.527
Keynsham	-	Keynsham Car Parks	Housing	0.486
Keynsham	SAL01	Land at Manor Road, Saltford	Housing	3.134
Keynsham	K29Z, K30	North Keynsham	Mixed	118.261
Keynsham	SAL27c	North West Saltford	Housing	11.414
Keynsham	K21, K22	South East Keynsham	Mixed	14.709
Keynsham	K17c, K17d, K17e, K19, K19a	South Keynsham	Housing	50.467
Keynsham	K23, K24, SAL02	South Saltford	Mixed	22.561
Keynsham	K15a, K15b, K15d	West Keynsham 1	Housing	17.129
Keynsham	K15c, K16a, K16b	West Keynsham 2	Housing	7.720
Keynsham	K24, SAL27b, SAL28	West Saltford	Housing	26.082
Hicks Gate	K53, K59	Hicks Gate	Mixed	94.497
Whitchurch	-	East Whitchurch	Mixed	35.924
Whitchurch	WCH11	North Whitchurch (north of Staunton Lane)	Housing	13.055
Whitchurch	WCH03, WCH04a, WCH26	West Whitchurch	Mixed	17.502
Somer Valley	MSN38a, MSN38b, MSN38c	Chilcompton Road	Housing	5.875
Somer Valley	A367PS1	East of BP	Employment	4.963

Site Location	Site ID	Site Name	Category	Area (ha)
Somer Valley	A367PS1	East of BP	Housing	13.676
Somer Valley	RAD25, RAD26, RAD26a	East Radstock	Housing	46.239
Somer Valley	PEA10	Eckweek Lane, South of A367	Housing	28.591
Somer Valley	PAU12	Farrington Road North	Housing	6.708
Somer Valley	PAU12	Farrington Road North	Housing	0.592
Somer Valley	PAU11	Farrington Road South	Housing	1.482
Somer Valley	PEA11	Fosseway	Housing	12.822
Somer Valley	PAD31c	Haydon	Housing	3.808
Somer Valley	PEA05a, PEA05b, PEA06	Lower Peasedown	Housing	5.258
Somer Valley	S2PS25	Midsomer Norton North	Housing	80.334
Somer Valley	RAD16, RAD18, RAD19b	North Radstock	Mixed	73.482
Somer Valley	PAU 09a	Paulton Mendip Close	Housing	3.496
Somer Valley	PAU 09b, PAU09c, PAU10	Paulton South	Housing	10.121
Somer Valley	PAU15a	Paulton West	Housing	0.708
Somer Valley	A37PS13	South Farrington Gurney	Housing	20.676
Somer Valley	PAU24a, S2PS24, MSN23	Thicket Mead A and B	Housing	8.431
Somer Valley	PEA15	West of BP	Employment	9.456
Somer Valley	WF01, WF36	Westfield Industrial Estate East	Employment	12.065
Rural	BFD03	Ashley Road	Housing	0.336
Rural	FAR03	Bath Road, Farmborough	Housing	1.942
Rural	BFD06	Bathford Nurseries (South)	Housing	1.544
Rural	BIS10	Bishop Sutton West 1	Housing	2.959
Rural	BIS03b, BIS03c, BIS03d	Bishop Sutton West 2	Housing	6.644
Rural	BFD10	Box Road	Employment	0.734
Rural	-	East of St Marys	Housing	2.010
Rural	TIM05, TIM16	East Timsbury	Housing	12.170
Rural	CHS03	Hedgehogs	Housing	0.770
Rural	CHS03	Hedgehogs - further	Housing	4.249
Rural	TIM03, TIM04	Lippiatt Lane / Crocombe Lane	Housing	12.430
Rural	CLU06	Maypole, Clutton	Housing	1.777

5.4 Results of the Sequential Test on potential land allocations

B&NESC have identified the most likely land uses for each of the potential development sites assessed within the SFRA. The application of the Sequential Test to each of these sites and the intended land uses has resulted in 3 groupings:

1. Sites where proposed land use is appropriate (highlighted green in Figure A-1, Appendix N and Table A-1);
2. Sites which require application of the Exception Test, or where the sequential approach should be applied for planning the layout of the site (highlighted amber in Figure A-1, Appendix N and Table A-1); and
3. Sites where the intended land use is not considered appropriate at this stage and further justification as to why the development of the site would have benefits that outweigh the flood risk (highlighted red in Figure A-1, Appendix N and Table A-1).

For Grouping 1 above (highlighted in green), sites have been considered as appropriate for land use based on the following criteria:

- Site located in Flood Zone 1;
- Less than 10% of the site has low, medium or high risk of surface water flooding with future climate change;
- Less than 10% of the site has areas susceptibility to groundwater flooding within 50-75% susceptibility or >75% susceptibility.

For Grouping 2 above (highlighted in amber), sites have been identified as requiring an Exception Test or a sequential approach to the masterplan layout of the site based on the following criteria:

- Site located in Flood Zone 2, 3a or 3b present day;
- Site located in combined Flood Zone 2 and 3 with future climate change;
- Greater than 10% of the site has low, medium or high risk of surface water flooding with future climate change;
- Greater than 10% of the site has areas susceptibility to groundwater flooding within 50-75% susceptibility or >75% susceptibility.

Whilst the percentage of the site area at Risk of Flooding from Reservoir for both the dry day and wet day scenarios are provided in Table A-1 as risk of reservoir flooding is low due to the regulations and maintenance regime in place for each reservoir, the risk has not been considered as part of the sequential approach. At this stage no sites have been identified as not appropriate for development (highlighted in red).

Table A-1 - Results of the Sequential Test

Site Location	Site ID	Site Name	Proposed Use	Area (ha)	% FZ1	% FZ2	% FZ3a	% FZ3b	% FZ1 with Climate Change	% FZ2 and FZ3 with Climate Change	% Reservoir Extent (Dry)	% Reservoir Extent (Wet)	% Very Low RoFSW	% Low RoFSW	% Medium RoFSW	% High RoFSW	% Very Low RoFSW with Climate Change	% Low RoFSW with Climate Change	% Medium RoFSW with Climate Change	% High RoFSW with Climate Change	% ASstGWF (Clearwater) <25%	% ASstGWF (Clearwater) 25-50%	% ASstGWF (Clearwater) 50-75%	% ASstGWF (Clearwater) >75%	% ASstGWF (Superficial) <25%	% ASstGWF (Superficial) 25-50%	% ASstGWF (Superficial) 50-75%	% ASstGWF (Superficial) >75%	Result of Sequential Test*
Bath	A03i	Bath Equestrian Centre	Housing	1.818	100	0	0	0	100	0	0	0	100	0	0	0	97	3	0	0	0	0	0	0	30	70	0	0	
Bath	NEW06	Car park adjacent to Combe Park	Housing	0.497	100	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	0	100	0	0	
Bath	-	Claverton Down Campus PBSA bedspaces	Housing	73.734	100	0	0	0	100	0	0	0	91	6	1	1	89	7	2	2	0	0	0	0	22	0	0	0	
Bath	-	Hampset Cricket Club	Housing	1.118	100	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	0	100	0	0	100	0	0	0	
Bath	B06	Land adjacent to Westmead Gardens, Weston	Housing	0.872	100	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	100	0	0	0	
Bath	KING23	Land east of Station Road, Newbridge	Housing	0.308	99	1	0	0	94	6	0	8	100	0	0	0	100	0	0	0	0	0	0	0	46	54	0	0	
Bath	NEW05	NHS House, Combe Park	Housing	1.266	100	0	0	0	100	0	0	0	81	3	13	3	78	4	3	15	0	0	0	0	0	100	0	0	
Bath	S1PS55	North of Napier Road, Weston	Housing	4.947	100	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	0	100	0	0	
Bath	E15	Odd Down - Land to the south west of the Park and Ride	Employment	12.818	100	0	0	0	100	0	0	0	96	3	1	0	94	4	1	1	48	0	0	0	100	0	0	0	
Bath	-	West of Bath Option 3 - housing element only	Housing	100.715	99	0	0	1	96	4	0	8	98	1	0	1	97	1	0	1	16	0	0	0	26	74	0	0	
Keynsham	-	Avon Mill Lane	Housing	1.780	100	0	0	0	100	0	0	35	94	3	2	1	93	3	2	2	100	0	0	0	100	0	0	0	
Keynsham	K62, K54	Devonport House and Durley Farm	Housing	5.152	100	0	0	0	99	1	0	1	99	1	0	0	98	1	1	0	0	0	0	0	0	100	0	0	
Keynsham	K25	East Keynsham	Housing	3.527	100	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	
Keynsham	-	Keynsham Car Parks	Housing	0.486	100	0	0	0	100	0	0	0	98	1	0	0	98	2	0	0	100	0	0	0	100	0	0	0	
Keynsham	SAL01	Land at Manor Road, Saltford	Housing	3.134	100	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	9	0	0	0	
Keynsham	K29Z, K30	North Keynsham	Mixed	118.261	70	6	0	24	62	38	34	47	90	5	3	2	87	6	3	3	25	0	0	0	25	3	64	0	
Keynsham	SAL27c	North West Saltford	Housing	11.414	100	0	0	0	100	0	0	0	98	1	0	1	97	2	0	1	0	0	0	0	0	0	0	0	
Keynsham	K21, K22	South East Keynsham	Mixed	14.709	100	0	0	0	100	0	0	0	100	0	0	0	99	1	0	0	0	0	0	0	19	0	0	0	
Keynsham	K17c, K17d, K17e, K19, K19a	South Keynsham	Housing	50.467	100	0	0	0	100	0	0	0	98	1	0	0	97	2	1	1	28	0	0	0	88	0	0	0	
Keynsham	K23, K24, SAL02	South Saltford	Mixed	22.561	100	0	0	0	100	0	0	0	99	1	0	0	98	1	0	0	0	0	0	0	0	0	0	0	
Keynsham	K15a, K15b, K15d	West Keynsham 1	Housing	17.129	100	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	47	0	0	0	47	0	0	0	
Keynsham	K15c, K16a, K16b	West Keynsham 2	Housing	7.720	100	0	0	0	100	0	0	0	99	0	0	1	99	0	0	1	0	0	0	0	32	0	0	0	
Keynsham	K24, SAL27b, SAL28	West Saltford	Housing	26.082	97	0	0	3	97	3	0	0	97	2	0	1	95	2	1	1	0	0	0	0	0	0	0	0	
Hicks Gate	K53, K59	Hicks Gate	Mixed	94.497	97	1	0	2	97	3	0	0	94	4	1	2	91	5	2	2	16	0	0	0	75	10	0	0	
Whitchurch	-	East Whitchurch	Mixed	35.924	100	0	0	0	100	0	0	0	98	1	0	0	98	2	1	0	75	0	0	0	75	0	0	0	
Whitchurch	WCH11	North Whitchurch (north of Staunton Lane)	Housing	13.055	100	0	0	0	100	0	0	0	100	0	0	0	99	0	0	0	0	0	0	0	0	0	0	0	
Whitchurch	WCH03, WCH04a, WCH26	West Whitchurch	Mixed	17.502	100	0	0	0	100	0	0	0	99	1	0	1	98	1	0	1	0	0	0	0	0	0	0	0	

Site Location	Site ID	Site Name	Proposed Use	Area (ha)	% FZ1	% FZ2	% FZ3a	% FZ3b	% FZ1 with Climate Change	% FZ2 and FZ3 with Climate Change	% Reservoir Extent (Dry)	% Reservoir Extent (Wet)	% Very Low RoFSW	% Low RoFSW	% Medium RoFSW	% High RoFSW	% Very Low RoFSW with Climate Change	% Low RoFSW with Climate Change	% Medium RoFSW with Climate Change	% High RoFSW with Climate Change	% AStGWF (Clearwater) <25%	% AStGWF (Clearwater) 25-50%	% AStGWF (Clearwater) 50-75%	% AStGWF (Clearwater) >75%	% AStGWF (Superficial) <25%	% AStGWF (Superficial) 25-50%	% AStGWF (Superficial) 50-75%	% AStGWF (Superficial) >75%	Result of Sequential Test*	
Somer Valley	MSN38a, MSN38b, MSN38c	Chilcompton Road	Housing	5.875	99	0	0	1	97	3	0	0	98	1	0	0	98	2	0	0	0	0	0	0	0	0	0	0	0	Pass
Somer Valley	A367PS1	East of BP	Employment	4.963	100	0	0	0	100	0	0	0	93	6	0	0	91	7	2	0	0	0	0	0	0	0	0	0	0	Pass
Somer Valley	A367PS1	East of BP	Housing	13.676	100	0	0	0	100	0	0	0	95	5	0	0	92	6	2	0	0	0	0	0	0	0	0	0	0	Pass
Somer Valley	RAD25, RAD26, RAD26a	East Radstock	Housing	46.239	100	0	0	0	100	0	0	0	97	1	1	1	96	1	1	1	100	0	0	0	69	0	0	0	0	Pass
Somer Valley	PEA10	Eckweek Lane, South of A367	Housing	28.591	100	0	0	0	100	0	0	0	100	0	0	0	99	1	0	0	67	0	0	0	0	0	0	0	0	Pass
Somer Valley	PAU12	Farrington Road North	Housing	6.708	100	0	0	0	100	0	0	0	99	0	0	0	99	0	0	0	0	0	0	0	0	0	0	0	0	Pass
Somer Valley	PAU12	Farrington Road North	Housing	0.592	100	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	Pass
Somer Valley	PAU11	Farrington Road South	Housing	1.482	100	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	Pass
Somer Valley	PEA11	Fosseway	Housing	12.822	100	0	0	0	100	0	0	0	96	2	1	1	94	3	1	2	100	0	0	0	0	0	0	0	0	Pass
Somer Valley	PAD31c	Haydon	Housing	3.808	100	0	0	0	100	0	0	0	95	1	1	3	95	2	0	3	14	0	0	0	86	0	0	0	0	Pass
Somer Valley	PEA05a, PEA05b, PEA06	Lower Peasedown	Housing	5.258	100	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	30	0	0	0	7	0	0	0	0	Pass
Somer Valley	S2PS25	Midsomer Norton North	Housing	80.334	100	0	0	0	100	0	0	0	99	1	0	0	98	1	0	0	0	0	0	0	7	0	0	0	0	Pass
Somer Valley	RAD16, RAD18, RAD19b	North Radstock	Mixed	73.482	99	1	0	0	99	1	0	0	99	0	0	0	99	0	0	0	12	0	0	0	71	0	0	0	0	Fail
Somer Valley	PAU 09a	Paulton Mendip Close	Housing	3.496	100	0	0	0	100	0	0	0	100	0	0	0	99	1	0	0	0	0	0	0	0	0	0	0	0	Pass
Somer Valley	PAU 09b, PAU09c, PAU10	Paulton South	Housing	10.121	100	0	0	0	100	0	0	0	99	0	0	0	99	1	0	0	0	0	0	0	0	0	0	0	0	Pass
Somer Valley	PAU15a	Paulton West	Housing	0.708	100	0	0	0	100	0	0	0	100	0	0	0	95	5	0	0	0	0	0	0	0	0	0	0	0	Pass
Somer Valley	A37PS13	South Farrington Gurney	Housing	20.676	100	0	0	0	100	0	0	0	95	4	0	0	93	5	1	0	0	0	0	0	0	0	0	0	0	Pass
Somer Valley	PAU24a, S2PS24, MSN23	Thicket Mead A and B	Housing	8.431	87	3	3	7	87	13	0	0	96	3	0	0	94	5	1	0	0	0	0	0	98	0	0	0	0	Fail
Somer Valley	PEA15	West of BP	Employment	9.456	100	0	0	0	100	0	0	0	99	1	0	0	98	2	0	0	0	0	0	0	0	0	0	0	0	Pass
Somer Valley	WF01, WF36	Westfield Industrial Estate East	Employment	12.065	96	2	1	1	96	4	0	0	99	1	0	0	98	2	0	0	0	0	0	0	19	0	0	0	0	Fail
Rural	BFD03	Ashley Road	Housing	0.336	100	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	100	0	0	0	0	Pass
Rural	FAR03	Bath Road, Farmborough	Housing	1.942	100	0	0	0	100	0	0	0	96	3	0	1	93	5	1	1	0	0	0	0	0	0	0	0	0	Pass
Rural	BFD06	Bathford Nurseries (South)	Housing	1.544	100	0	0	0	85	15	0	8	100	0	0	0	100	0	0	0	0	0	0	0	0	100	0	0	0	Fail
Rural	BIS10	Bishop Sutton West 1	Housing	2.959	100	0	0	0	100	0	0	0	98	1	1	1	98	1	1	1	0	0	0	0	74	0	0	26	0	Fail
Rural	BIS03b, BIS03c, BIS03d	Bishop Sutton West 2	Housing	6.644	100	0	0	0	100	0	0	6	94	4	1	1	89	8	2	2	0	0	0	0	100	0	0	0	0	Fail
Rural	BFD10	Box Road	Employment	0.734	100	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	0	100	0	0	0	Pass
Rural	-	East of St Marys	Housing	2.010	100	0	0	0	100	0	0	0	97	2	1	0	97	2	0	1	51	0	0	0	49	0	0	0	0	Pass
Rural	TIM05, TIM16	East Timsbury	Housing	12.170	100	0	0	0	100	0	0	0	100	0	0	0	99	1	0	0	42	0	0	0	58	0	0	0	0	Pass
Rural	CHS03	Hedgehogs	Housing	0.770	100	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	100	0	0	0	0	Pass
Rural	CHS03	Hedgehogs - further	Housing	4.249	100	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	100	0	0	0	0	Pass
Rural	TIM03, TIM04	Lippiatt Lane / Crocombe Lane	Housing	12.430	100	0	0	0	100	0	0	0	97	3	0	0	95	4	0	0	82	0	0	0	7	0	0	0	0	Pass

Site Location	Site ID	Site Name	Proposed Use	Area (ha)	% FZ1	% FZ2	% FZ3a	% FZ3b	% FZ1 with Climate Change	% FZ2 and FZ3 with Climate Change	% Reservoir Extent (Dry)	% Reservoir Extent (Wet)	% Very Low RoFSW	% Low RoFSW	% Medium RoFSW	% High RoFSW	% Very Low RoFSW with Climate Change	% Low RoFSW with Climate Change	% Medium RoFSW with Climate Change	% High RoFSW with Climate Change	% AStGWF (Clearwater) <25%	% AStGWF (Clearwater) 25-50%	% AStGWF (Clearwater) 50-75%	% AStGWF (Clearwater) >75%	% AStGWF (Superficial) <25%	% AStGWF (Superficial) 25-50%	% AStGWF (Superficial) 50-75%	% AStGWF (Superficial) >75%	Result of Sequential Test*
Rural	CLU06	Maypole, Clutton	Housing	1.777	100	0	0	0	100	0	0	0	99	1	0	0	93	6	0	0	0	0	0	0	100	0	0	0	
Rural	HAL06	North of Fox Fields	Housing	3.654	100	0	0	0	100	0	0	0	99	1	0	0	98	1	0	0	100	0	0	0	100	0	0	0	
Rural	CHM01	Old Tennis Court	Housing	0.929	100	0	0	0	100	0	0	0	99	1	0	0	97	3	0	0	0	0	0	0	9	0	0	0	
Rural	PEN08	Publow Lane	Housing	0.365	100	0	0	0	100	0	0	3	100	0	0	0	100	0	0	0	0	0	0	0	100	0	0	0	
Rural	-	South Farmborough	Housing	3.252	100	0	0	0	100	0	0	0	99	1	0	0	98	2	0	0	31	0	0	0	0	0	0	0	
Rural	TC01b, TC01c, TC09, CLU01a	Temple Cloud Option 2	Housing	10.834	100	0	0	0	100	0	0	0	96	3	0	1	95	3	1	1	0	0	0	0	100	0	0	0	
Rural	FAR08	Timsbury Road (Phase 1)	Housing	0.991	100	0	0	0	100	0	0	0	83	3	2	12	82	2	2	13	100	0	0	0	0	0	0	0	
Rural	-	Timsbury Road (Phase 2)	Housing	6.401	100	0	0	0	100	0	0	0	96	3	0	1	90	9	1	1	100	0	0	0	0	0	0	0	
Rural	CLU07, S2PS19 (part)	West of Clutton	Housing	27.252	100	0	0	0	100	0	0	0	97	1	1	1	97	1	1	2	0	0	0	0	12	0	0	0	
Rural	TIM09	West of Timsbury	Housing	10.572	100	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	100	0	0	0	
Rural	BIS10c (New Site)	Westway BP (extension)	Employment	1.498	100	0	0	0	100	0	0	30	87	10	1	1	83	12	4	2	0	0	0	0	0	0	0	100	

*Colour coding as outlined within the bulleted list at the start of Section 5.4.

Table A-2 provides a summary of the number of sites defined by the highest risk element within the site. Fluvial flood risk is considered the main factor in determining whether a site is considered sequentially acceptable, although surface water flooding has been used as another flood risk consideration that should be considered during development design and through the planning process and lastly groundwater flood risk.

A summary of flood risk for each of the site allocations and an indication of flood risk considerations that should be made through the planning process is provided in Appendix O.

Table A-2 - Summary of Site Allocation Sequential Test

Highest Flood Risk Level	Housing	Employment	Mixed
Flood Zone 3b	4	1	3
Flood Zone 3a	1		
Flood Zone 2	1		
Flood Zone with Climate Change	1		
Flood Zone 1 plus >10% Surface Water with Climate Change	5	1	
Flood Zone 1 plus >10% AStGWF 50-75% & >75%	1		
Flood Zone 1 (<10% risk from other sources)	43	4	4
Total (Ha)	56	6	7

Table A-2 indicates that most of the site allocations are located within Flood Zone 1 and low risk from other sources. There are, however, a number of sites with areas located within Flood Zone 3b functional floodplain which is not appropriate for the proposed land use and further assessment is required for these sites along with those sites at risk from other sources of flooding. These sites are assessed in further detail as part of the Bath and North East Somerset Level 2 SFRA.

5.5 Windfall sites

Not all proposed development will fall within areas allocated for development within the forthcoming Local Plan and therefore a Sequential Test should also be applied to windfall sites. To assist the LPA development control team a flow chart identifying how the Sequential Test should be applied to windfall sites has been created for this SFRA and is included in Appendix P. Developers should supply sufficient information to the LPA to be able to apply the process outlined within the flow chart. It is recommended that this flow chart is a 'live' document and is updated and evolves as feedback is received from development control officers and flood risk management policy changes such as the potential for Critical Drainage Areas to be established. Critical Drainage Areas are areas that have critical drainage problems, which have been notified to the local planning authority as such by the Environment Agency in line with the NPPF. In these locations, there is a need for surface water to be managed to a higher standard than normal to ensure any new development will contribute to a reduction in flooding risks in line with NPPF. These higher standards are determined by the Environment Agency.

Although the proposal for a change of use to development is not subject to the Sequential Test it will still require a passed Exception Test if located in areas at risk from flooding. The Exception Test would be required to demonstrate that the development is at an acceptable risk of flooding, would not increase flood risk elsewhere,

and/or wider development requirement outweigh flood risk. It is therefore recommended that the flow chart provided in Appendix P is also utilised for change of use development proposals.



6. Cumulative Impact of Development

6.1 Introduction

The cumulative impact of development should be considered at both the Local Plan making stage and the planning application and development design stages. Paragraph 171 of the National Planning Policy Framework states:

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

An assessment of the cumulative impacts of development and land-use change should include an impact expected from:

- strategically planned development
- windfall development
- permitted development
- significant changes in land use, such as paving over domestic gardens or reforestation of uplands

When allocating land for development, it is important to consider the cumulative effects of development on floodplain function across the wider catchment. Although the loss of floodplain storage associated with an individual site may be limited, incremental reductions arising from multiple allocations can collectively influence flood behaviour and increase flood risk elsewhere. A Level 1 SFRA should therefore highlight areas where floodplain storage plays a critical role in managing flows and identify locations where cumulative impacts may be significant.

The assessment should also recognise that new development has the potential to alter surface water runoff characteristics and hydrograph timing. These changes may increase the likelihood of coincident peak flows in downstream watercourses, contributing to elevated flood risk. Identifying such interactions at a strategic scale supports the application of the Sequential Test and helps determine where further, site-specific assessment may be required to ensure development does not exacerbate flood risk.

Conditions applied as part of the granting of planning permission by B&NESC should ensure that any increase in surface water runoff arising from new development is appropriately mitigated and does not lead to an increase in flood risk, either within the site or elsewhere within or beyond the Council's administrative boundary.

The potential cumulative impact of development on flood risk should be considered at both the Local Plan preparation stage and during the assessment of individual planning applications and development designs. Where necessary, suitable mitigation measures must be incorporated to ensure that flood risk is not exacerbated. Opportunities should also be taken, where feasible, for development to contribute to reducing existing flood risk issues in accordance with the strategic objectives of the Level 1 SFRA.

To understand the impact of future development on flood risk in Bath and North East Somerset, catchments were identified where development may have the greatest potential effect on flood risk, and where further assessment would be required within a Level 2 SFRA or site-specific FRA. To identify those catchments most at risk, the assessment considered a range of factors, including the scale of potential increases in developed area within each catchment and the catchments particularly sensitive to surface water and fluvial flood risk.

6.2 Assessment of neighbouring authorities

B&NESC is bordered by neighbouring authorities Wiltshire to the east, Somerset to the south and South Gloucestershire to the north. Parts of these authorities are within the River Avon upper catchments which flow into Bath and North East Somerset. Therefore, any development or flood risk schemes within these upstream authorities may impact on flood risk within Bath and North East Somerset. Downstream of Bath and North East Somerset the River Avon flows into Bristol City Council before discharging into the River Severn at Avonmouth. Any development within Bath and North East Somerset needs to be managed to ensure there are no downstream flood risk impacts within Bristol City.

Neighbouring authorities and cross boundary watercourses and catchments are provided in Figure 6.1.

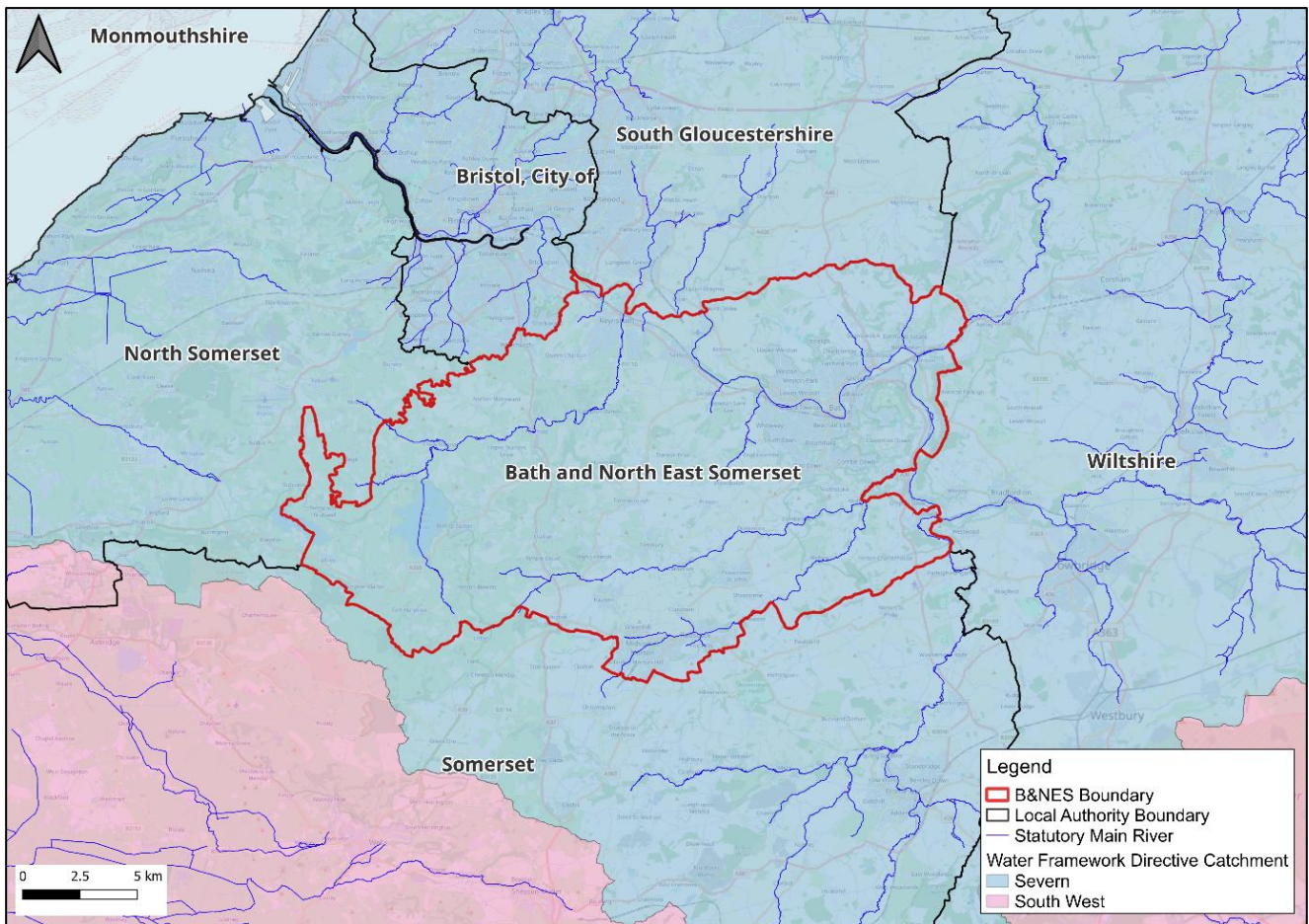


Figure 6.1 - Neighbouring Authorities

6.3 Cumulative Impact Assessment

6.3.1 Catchment Coverage

An assessment has been undertaken on the proportion of each catchment within Bath and North East Somerset which is covered by the site allocation areas. The Water Framework Directive (WFD) Water Body Catchments Cycle 2⁹ have been used as the basis of the assessment. There is a total of 24 WFD catchments

⁹ [Defra Data Services Platform](#)

which fall within Bath and North East Somerset to some extent; 14 of the catchments have proposed site allocations. Figure 6.2 shows the site allocations and the catchment in which they are located.

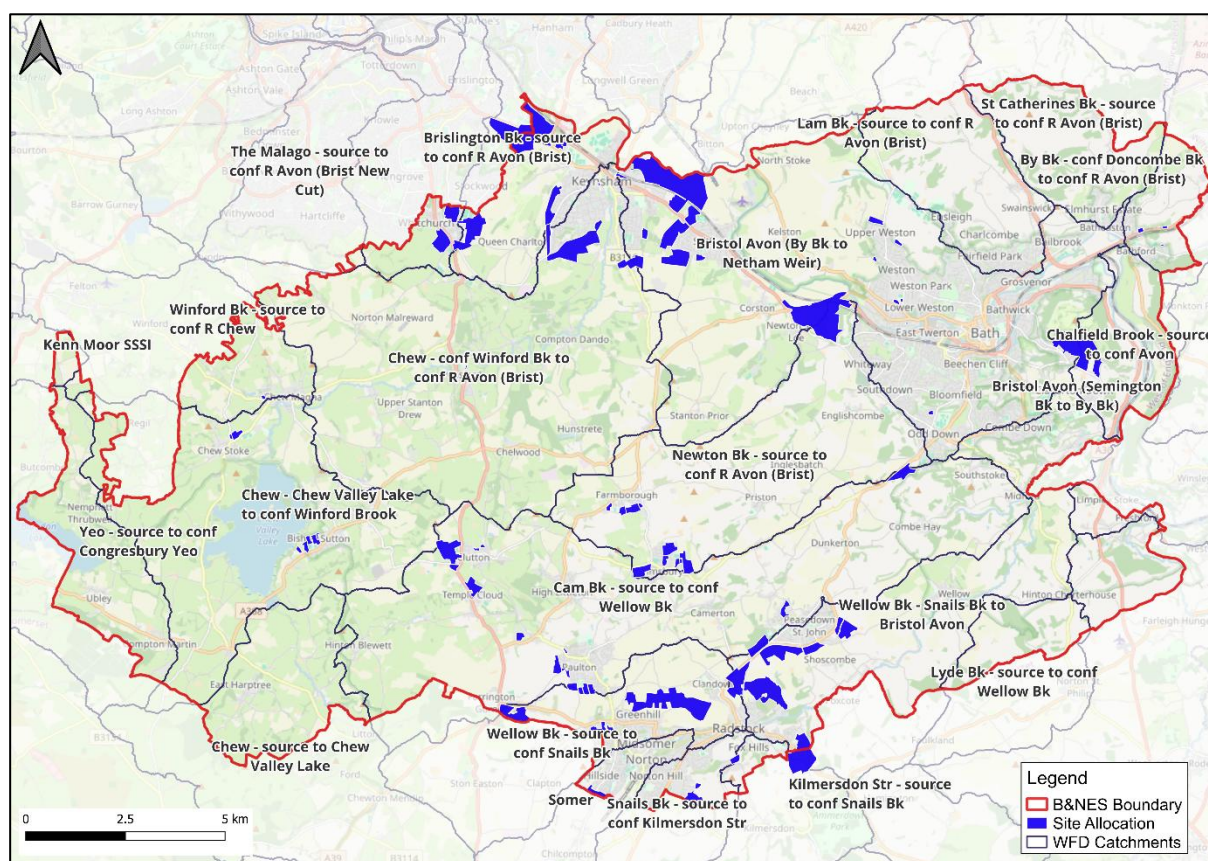


Figure 6.2 – WFD Catchments and Site Allocations

Table 6.1 provides the area of new development within each catchment expressed as a percentage of the total catchment area.

The percentage of the catchment area covered by the proposed development areas assumes that the whole area will be developed as a worst case for development land take with no land use assumptions for the proposed site allocations. Table 6.1 shows that the majority of the catchments have less than 5% cumulative coverage of site allocations and all catchments have less than 10% cumulative coverage from proposed new development. However, catchments where cumulatively there is a notable percentage of coverage from new site allocations include the Bristol Avon, River Chew, Newton Brook and Wellow Brook.

Table 6.1 – Percentage Coverage of Site Allocations within WFD Catchments

WFD Water Body Catchment	Site Allocation	Percentage of catchment area covered by site allocation area
Brislington Bk - source to conf R Avon (Brist)	East Whitchurch, North Whitchurch (north of Staunton Lane), West Whitchurch	4.9
Bristol Avon (By Bk to Netham Weir)	Avon Mill Lane, Bath Equestrian Centre, Car park adjacent to Combe Park, Claverton Down Campus PBSA bedspaces, Devonport House and	7.8

WFD Water Body Catchment	Site Allocation	Percentage of catchment area covered by site allocation area
	Durley Farm East Keynsham, East Whitchurch, Hampset Cricket Club, Hicks Gate, Land adjacent to Westmead Gardens, Weston, Land at Manor Road, Saltford, Land East of Station Road, Newbridge, NHS House, Combe Park, North Keynsham, North Keynsham, North of Napier Road, Weston North, West Saltford, South East Keynsham, South Saltford West Keynsham 1, West Keynsham 2, West of Bath Option 3, West Saltford	
Bristol Avon (Semington Bk to By Bk)	Claverton Down Campus PBSA bedspaces	1.7
By Bk - conf Doncombe Bk to conf R Avon (Brist)	Ashley Road, Bathford Nurseries (South), Box Road	0.1
Cam Bk - source to conf Wellow Bk	East Timsbury, Farrington Road North, Farrington Road North, Farrington Road South, Fosseyway, Lower Peasedown, Maypole, Clutton, North of Fox Fields, Odd Down, Paulton Mendip Close, Paulton South, Paulton West, South Farrington Gurney, Temple Cloud Option 2, West of Clutton West of Timsbury	2.6
Chew - Chew Valley Lake to conf Winford Brook	Bishop Sutton West 1, Bishop Sutton West 2, Hedgehogs, Hedgehogs – Further, West of Clutton, Westway BP (Extension)	1.2
Chew - conf Winford Bk to conf R Avon (Brist)	Avon Mill Lane, Keynsham Car Parks, North Keynsham, North Keynsham, Publow Lane, South East Keynsham, South Keynsham, West Keynsham 2	5.8
Kilmersdon Str - source to conf Snails Bk	East Radstock, Haydon	4.0
Newton Bk - source to conf R Avon (Brist)	Odd Down, West of Bath Option 3, Bath Road, Farmborough, South Farmborough, East Timsbury, Timsbury Road (Phase 1), Timsbury Road (Phase 2), East of St Marys, Lippiatt Lane / Crocombe Lane, West of Timsbury	5.9
Snails Bk - source to conf Kilmersdon Str	Haydon, Westfield Industrial Estate	1.3
Somer	Chilcompton Road	0.7

WFD Water Body Catchment	Site Allocation	Percentage of catchment area covered by site allocation area
Wellow Bk - Snails Bk to Bristol Avon	East of BO, East of BP, East Radstock, Eckweek Lane, Fosseyway, North Radstock, West of BP	5.8
Wellow Bk - source to conf Snails Bk	Midsomer Norton North, North Radstock, Paulton Mendip Close, Paulton South, South Farrington Gurney, Thicket Mead	9.4
Winford Bk - source to conf R Chew	Old Tennis Courts	0.0

6.3.2 Catchment Sensitivity to Fluvial Flood Risk

An assessment of the sensitivity of each catchment to fluvial flood risk has been undertaken to identify whether proposed site allocations are within catchments sensitive to flood risk or to highlight those catchments which may be sensitive to the cumulative effect of windfall sites.

Table 6.2 provides the percentage area of each catchment covered by the flood risk from rivers for the 1% AEP and 0.1% AEP.

Table 6.2 shows that the majority of the catchments have less than 5% coverage of 0.1% AEP area. However, there are a number of catchments where there is a notable percentage of coverage of fluvial flood risk, these include the Bristol Avon, River Chew and Wellow Brook and these catchments all have proposed site allocations.

Therefore, floodplain storage plays a critical role in managing flows in these catchments and cumulative impacts may be significant if development encroaches onto the floodplain. Any site allocations that are located within the fluvial floodplain have been recommended for further assessment as part of the Level 2 SFRA as outlined in Section 5.

Table 6.2 – Percentage Coverage of Fluvial Flood Risk within WFD Catchments

WFD Water Body Catchment	Site Allocations	Percentage Area Covered by 1% AEP (%)	Percentage Area Covered by 0.1% AEP (%)
Brislington Bk - source to conf R Avon (Brist)	East Whitchurch, North Whitchurch (north of Staunton Lane), West Whitchurch	0.05	0.09
Bristol Avon (By Bk to Netham Weir)	Avon Mill Lane, Bath Equestrian Centre, Car park adjacent to Combe Park, Claverton Down Campus PBSA bedspaces, Devonport House and Durley Farm East Keynsham, East Whitchurch, Hampset Cricket Club, Hicks Gate, Land adjacent to Westmead Gardens, Weston, Land at Manor Road, Saltford, Land East of Station Road, Newbridge, NHS House, Combe	7.10	9.91

WFD Water Body Catchment	Site Allocations	Percentage Area Covered by 1% AEP (%)	Percentage Area Covered by 0.1% AEP (%)
	Park, North Keynsham, North Keynsham, North of Napier Road, Weston North West Saltford, South East Keynsham, South Saltford West Keynsham 1, West Keynsham 2, West of Bath Option 3, West Saltford		
Bristol Avon (Semington Bk to By Bk)	Claverton Down Campus PBSA bedspaces	2.71	3.12
By Bk - conf Doncombe Bk to conf R Avon (Brist)	Ashley Road, Bathford Nurseries (South), Box Road	0.65	0.83
Cam Bk - source to conf Wellow Bk	East Timsbury, Farrington Road North, Farrington Road South, Fosseyway, Lower Peasedown, Maypole, Clutton, North of Fox Fields, Odd Down, Paulton Mendip Close, Paulton South, Paulton West, South Farrington Gurney, Temple Cloud Option 2, West of Clutton West of Timsbury	2.84	3.49
Chew - Chew Valley Lake to conf Winford Brook	Bishop Sutton West 1, Bishop Sutton West 2, Hedgehogs, Hedgehogs – Further, West of Clutton, Westway BP (Extension)	11.76	12.70
Chew - conf Winford Bk to conf R Avon (Brist)	Avon Mill Lane, Keynsham Car Parks, North Keynsham, North Keynsham, Publow Lane, South East Keynsham, South Keynsham, West Keynsham 2	3.76	4.61
Chew - source to Chew Valley Lake		0.03	0.03
Kilmersdon Str - source to conf Snails Bk	East Radstock, Haydon	0.29	0.34
Lam Bk - source to conf R Avon (Brist)		1.02	1.51
Lyde Bk - source to conf Wellow Bk		0.81	1.27
Newton Bk - source to conf R Avon (Brist)	Odd Down, West of Bath Option 3, Bath Road, Farmborough, South Farmborough, East Timsbury, Timsbury Road (Phase 1), Timsbury Road (Phase 2), East of St Marys, Lippiatt Lane / Crocombe Lane, West of Timsbury	1.24	1.75
Snails Bk - source to conf Kilmersdon Str	Haydon, Westfield Industrial Estate	0.64	1.12

WFD Water Body Catchment	Site Allocations	Percentage Area Covered by 1% AEP (%)	Percentage Area Covered by 0.1% AEP (%)
Somer	Chilcompton Road	0.46	0.57
Somerset Frome conf with Mells to conf B. Avo		0.99	1.09
St Catherines Bk - source to conf R Avon (Brist)		0.94	1.07
Wellow Bk - Snails Bk to Bristol Avon	East of BO, East of BP, East Radstock, Eckweek Lane, Fosseyway, North Radstock, West of BP	2.76	3.95
Wellow Bk - source to conf Snails Bk	Midsomer Norton North, North Radstock, Paulton Mendip Close, Paulton South, South Farrington Gurney, Thicket Mead	0.78	1.07
Winford Bk - source to conf R Chew	Old Tennis Courts	0.89	1.27
Yeo - source to conf Congresbury Yeo		0.16	0.21

6.3.3 Catchment Sensitivity to Surface Water Flood Risk

An assessment of the sensitivity of each catchment to surface water flood risk has been undertaken to identify whether proposed site allocations are within catchments sensitive to flood risk or to highlight those catchments which may be sensitive to the cumulative effect of windfall sites.

Table 6.3 provides the percentage area of each catchment covered by surface water flood risk for the 1% AEP and 0.1% AEP.

Table 6.3 shows that the majority of the catchments have less than 5% coverage of 0.1% AEP area. However, there are a number of catchments where there is a notable percentage of coverage of surface water flood risk, these include Brislington Brook, Bristol Avon, River Chew, The Malago and Wellow Brook. All these catchments have proposed site allocations except for The Malago.

Any site allocations that are located within areas of significant surface water flooding have been recommended for further assessment as part of the Level 2 SFRA as outlined in Section 5.

Table 6.3 – Percentage Coverage of Surface Water Flood Risk within WFD Catchments

WFD Water Body Catchment	Site Allocations	Percentage Area Covered by 1% AEP (%)	Percentage Area Covered by 0.1% AEP (%)
Boyd - source to conf R Avon (Brist)		0.14	0.38
Brislington Bk - source to conf R Avon (Brist)	East Whitchurch, North Whitchurch (north of Staunton Lane), West Whitchurch	6.80	13.58

WFD Water Body Catchment	Site Allocations	Percentage Area Covered by 1% AEP (%)	Percentage Area Covered by 0.1% AEP (%)
Bristol Avon (By Bk to Netham Weir)	Avon Mill Lane, Bath Equestrian Centre, Car park adjacent to Combe Park, Claverton Down Campus PBSA bedspaces, Devonport House and Durley Farm	2.29	5.05
Bristol Avon (Semington Bk to By Bk)	Claverton Down Campus PBSA bedspaces	1.18	2.28
By Bk - conf Doncombe Bk to conf R Avon (Brist)	Ashley Road, Bathford Nurseries (South), Box Road	0.55	1.09
Cam Bk - source to conf Wellow Bk	East Timsbury, Farringdon Road North, Farringdon Road South, Fosseway, Lower Peasedown, Maypole, Clutton, North of Fox Fields, Odd Down, Paulton Mendip Close, Paulton South, Paulton West, South Farringdon Gurney, Temple Cloud Option 2, West of Clutton	1.71	3.38
Chalfield Brook - source to conf Avon	Bishop Sutton West 1, Bishop Sutton West 2, Hedgehogs, Hedgehogs – Further, West of Clutton, Westway BP (Extension)	0.43	0.83
Chew - Chew Valley Lake to conf Winford Brook	Avon Mill Lane, Keynsham Car Parks, North Keynsham, North Keynsham, Publow Lane, South East Keynsham, South Keynsham, West Keynsham 2	1.67	3.30
Chew - conf Winford Bk to conf R Avon (Brist)	East Timsbury, Farringdon Road North, Farringdon Road South, Fosseway, Lower Peasedown, Maypole, Clutton, North of Fox Fields, Odd Down, Paulton Mendip Close, Paulton South, Paulton West, South Farringdon Gurney, Temple Cloud Option 2, West of Clutton	2.15	3.88
Chew - source to Chew Valley Lake		1.42	2.86
Kilmersdon Str - source to conf Snails Bk	East Radstock, Haydon	1.21	2.40
Lam Bk - source to conf R Avon (Brist)		0.59	1.40
Lyde Bk - source to conf Wellow Bk		0.94	2.07
Newton Bk - source to conf R Avon (Brist)	Odd Down, West of Bath Option 3, Bath Road, Farmborough, South Farmborough, East Timsbury, Timsbury Road (Phase 1), Timsbury Road (Phase 2),	0.71	1.91

WFD Water Body Catchment	Site Allocations	Percentage Area Covered by 1% AEP (%)	Percentage Area Covered by 0.1% AEP (%)
	East of St Marys, Lippiatt Lane / Crocombe Lane, West of Timsbury		
Snails Bk - source to conf Kilmersdon Str	Haydon, Westfield Industrial Estate	0.96	2.69
Somer	Chilcompton Road	1.44	3.55
Somerset Frome conf with Mells to conf B. Avo		2.03	3.75
St Catherines Bk - source to conf R Avon (Brist)		0.42	0.82
The Malago - source to conf R Avon (Brist New Cut)		5.37	11.42
Wellow Bk - Snails Bk to Bristol Avon	East if BO, East of BP, East Radstock, Eckweek Lane, Fosseway, North Radstock, West of BP	1.18	2.50
Wellow Bk - source to conf Snails Bk	Midsomer Norton North, North Radstock, Paulton Mendip Close, Paulton South, South Farrington Gurney, Thicket Mead	1.21	2.78
Winford Bk - source to conf R Chew	Old Tennis Courts	0.43	0.85
Yeo - source to conf Congresbury Yeo		0.01	0.05

6.4 Summary of Cumulative Impacts Assessment and Recommendations

The catchments sensitive to the cumulative area of the proposed site allocations have been identified as Bristol Avon, Chew Brook and Wellow Brook.

The catchments sensitive to fluvial flood risk are Bristol Avon, Chew Brook and Wellow Brook.

The catchments sensitive to surface water flood risk are Brislington Brook, Bristol Avon, Chew Brook, The Malago and Wellow Brook.

In accordance with NPPF and Local Planning policy, all developments should demonstrate that they will not increase flood risk elsewhere. Providing developments as part of site allocations or windfall sites do not encroach within the floodplain of the main river and ordinary watercourses or appropriate flood compensatory storage is designed the proposals should not normally increase flood risk downstream. Where proposed development complies with current flood risk and sustainable drainage guidance and legislation and properly accounts for surface water flow routes and storage, it should not ordinarily lead to increased downstream flood risk.

Where catchments have been identified as being sensitive to the cumulative impacts of development, betterment in flood risk terms across Bath and North East Somerset should be supported where possible to provide effective risk management and ensure that future growth does not exacerbate flood risk.

The following policy recommendations are proposed for Bath and North East Somerset:

- B&NESC should work closely with neighbouring local authorities to develop complementary Local Planning Policies for catchments that drain into and out of the area to other local authorities in order to minimise any cross-boundary issues of cumulative impacts of development.
- Developers should incorporate SuDS on all development sites. Further guidance on SuDS can be found in Section 7 and 8, including reduction in runoff rates to manage downstream flood risk.
- B&NESC as LLFA will review Surface Water Drainage Strategies in accordance with their local requirements for major and non-major developments. These should consider all sources of flooding to ensure that future development is resilient to flood risk and does not increase flood risk elsewhere.

Where required, site-specific FRAs should explore opportunities to provide wider community flood risk benefits through new developments. Measures that can be put in place to contribute to a reduction in flood risk downstream should be considered. This may be either by the provision of additional storage on site e.g. through oversized SuDS, Natural Flood Management techniques, green infrastructure, and green-blue corridors

7. Sustainable flood risk management

7.1 Overview

Flood and coastal erosion risk management is clearly embedded across a range of Government policies, including planning, urban and rural development, agriculture, transport, nature conservation and conservation of the historic environment.

Recent flood events have showed the devastating impact that flooding can have on lives, homes and businesses. A considerable number of people live and work in areas susceptible to flooding, and the ideal scenario would be to relocate this development into areas not susceptible to flooding. However, it is recognised that this is not a practicable solution so measures should be put in place to minimise the risk to property and life posed by flooding. The NPPF requires flood risk mitigation measures to ensure that that new development is safe throughout the lifetime of any development.

In 2010 the Flood and Water Management Act was enacted, which implements the recommendations of the Pitt review, to promote a more consistent and co-ordinated approach to flood risk management.

B&NESC produced their first Local Flood Risk Management Strategy for Bath and North East Somerset in 2015. which includes the objectives and measures by which the local flood risk sources of surface water, groundwater, and ordinary watercourses will be managed. The Strategy is focused around delivering five objectives: Improving understanding of local flood risk; promoting community awareness, managing local flood risk through investment, preventing inappropriate development; and improving flood preparedness, warning and ability to recover. As the LLFA, B&NESC are responsible for the monitoring, management and implementation of the Strategy.

7.2 Responsibility for flood risk management

An overview of the key responsibilities with respect to the management of flood risk is provided below.

7.2.1 Local Authority

The LPA, which is part of the Local Authority, is responsible for carrying out a SFRA to inform the allocation of land for future development, development control policies and sustainability appraisal. LPAs have a responsibility to consult with the appropriate statutory consultees when making planning decisions and the specific consultees will vary based on development type.

The LPA has the responsibility to work with LLFAs, where appropriate to ensure that proposals for flood risk management in their area would effectively manage flood risks.

The LPA has a responsibility for setting the maintenance regime for SuDS systems. These systems include green roofs, permeable paving, swales, detention basins, ponds and wetlands. They aim to mimic the natural drainage processes whilst also removing pollutants from urban runoff at the source before entering a watercourse. The LPA should provide the promotion of SuDS within proposed developments where suitable and should consult with the LLFA in relation to major development that incorporate SuDS.

7.2.2 Lead Local Flood Authorities

The LLFA covering Bath and North East Somerset is B&NESC.



LLFAs are responsible for managing flood risk from surface water, groundwater and ordinary watercourses through developing, maintaining and applying a strategy for local flood risk management in their area. The Local Flood Risk Management Strategy for Bath and North East Somerset outlines the LLFA's focus in better understanding the catchments response to flood risk with an aim of improving flood preparedness, response, and recovery. The Strategy encourages sustainable development and aims to manage local projects for at-risk communities.

The changes to statutory consultees have seen the LLFA become a statutory consultee on major developments that incorporate SuDS from April 2015. The LLFA has also become a statutory consultee for potential development sites that are subject to potential groundwater flooding, those in close proximity to ordinary watercourses and those where there are other known local flood risk issues, for example surface water and groundwater flooding. LLFAs provide technical advice on surface water drainage to LPAs' major developments.

The LLFA is also responsible for maintaining a register of flood risk assets in their area and undertaking flood investigations that fall within their locally defined criteria under Section 19 of the Flood and Water Management Act 2010.

The LLFA has powers under the Land Drainage Act 1991 in respect of ordinary watercourses allowing them to undertake works; serve notice on riparian owners to maintain flow in the watercourse or to maintain control structures on the watercourse. In addition any creation or alteration of culverts; mill dams weirs (or like obstructions) require prior permission from the LLFA in the form of a Land Drainage Consent.

7.2.3 Environment Agency

The Environment Agency has a statutory responsibility for flood management and flood defence in England. The Environment Agency supports the planning system through the provision of information and flood risk advice. At a strategic level, it provides the LLFA and the Local Planning Authority with advice on the preparation of SFRA's.

The Environment Agency is consulted by Local Planning Authorities on certain applications for development in flood risk areas and contributed to their consideration by providing advice. There is guidance for LPAs as to when to consult the Environment Agency at <https://www.gov.uk/flood-risk-assessment-local-planning-authorities>.

Under the Water Resources Act 1991, the Environment Agency has permissive powers for the management of flood risk arising from designated Main Rivers and the sea. The Environment Agency is also responsible for flood forecasting and flood warning dissemination, and for exercising a general supervision over matters relating to flood defence.

For planning purposes, Bath and North East Somerset falls within the Environment Agency area of Wessex, which is based at the Rivers House office located within Bridgwater, Somerset.

7.2.4 The Canal and River Trust

The Canal and River Trust is responsible for maintaining critical infrastructure on the Kennet and Avon Canal and ensuring structures such as locks operate during flood events.

7.2.5 Sewerage and Water Companies

Wessex Water is the sewerage undertaker for Bath and North East Somerset and is generally responsible for surface water drainage from development where this is through adopted sewers. Wessex Water is responsible for ensuring the maintenance of drainage infrastructure through removal of blockages and undertaking improvement works to ensure flooding does not result from capacity problems. This includes ensuring that their



systems incorporate an appropriate level of resilience to flooding and that they are able to maintain essential services during emergencies.

Water companies also have a responsibility to work with the LLFA to identify how their systems integrate with other local sources of flood risk, and to work with the LLFA, developers and landowners to understand the risk and manage the volume and rates of surface water entering the surface water sewer.

In areas that have suffered frequent or severe sewer flooding, the water companies have a responsibility to address these risks through their capital investment plans that are regulated by Ofwat.

7.2.6 Landowners and Developers

Landowners have the primary responsibility for safeguarding their land and other property against flooding. A riparian owner is an individual or entity that owns land directly adjacent to a natural watercourse and holds certain legal rights to use the water while respecting the rights of others. Riparian owners have the responsibility of maintenance of any watercourse which are within and/or bounds their property. Individual property owners and users are also responsible for managing the drainage of their land so that they do not adversely impact neighbouring land. Those proposing development are responsible for providing a site-specific FRA for submission with the planning application if the development is at risk from fluvial flooding or covers a site greater than 1 hectare.

7.3 Strategic flood risk management

Development along river corridors during the industrial age has resulted in large urban areas at risk of flooding. Historically, the management of flood risk was undertaken in a somewhat reactive manner, addressing problems on an 'as needed' basis in response to a flooding event through the construction of flood defence walls or embankments. It was recognised by Government that this approach was generally not a particularly cost-effective solution and often failed to consider individual problem areas within the 'bigger picture' of the wider river system. The Environment Agency is now moving towards a more sustainable management of flood risk by steering away from the construction of raised defences and favouring solutions which work with natural processes.

The Environment Agency also endeavours to take a strategic approach to managing flood risk by considering flood risk on a catchment wide basis. Within the context of effective flood risk management therefore, the importance of influencing both the strategic planning process and development control as an outcome of these strategies is widely recognised as a key Environment Agency objective. For this reason, it is vital that the recommendations of the SFRA are consistent with the long-term strategy(s) for flood risk management within the district (catchment).

A number of flood risk management strategies have been undertaken of the River Avon catchment encompassing Bath and North East Somerset.

7.4 Planning and development control

The NPPF creates a policy framework for B&NESC and the Environment Agency to contribute to a more sustainable approach to managing flood risk through the planning process. Opportunities for sustainable flood risk management that exist within the planning and development control process include:

- Considering flood risk at the early stages of the spatial planning process
- Ensuring planning decisions consider the implications of climate change
- Providing greater clarity to developers regarding which sites are suitable for developments of different types



- Developing local authority, developer and community-led initiatives for reducing flood risk and providing enhancement to the environment
- Ensuring direct and cumulative impacts of development on flood risk are considered and mitigated appropriately
- Considering flood risk and development on a catchment wide basis
- Developing integrated and sustainable developments which can deliver multiple benefits

In addition, certain conditions are imposed on planning applications which contribute to sustainable flood risk management, for example limiting surface water runoff from the site to greenfield runoff rates.

7.5 Development management

B&NESC have staff dedicated to the control of development within Bath and North East Somerset. The Town and Country Planning system is designed to regulate the development and use of land in the public interest. It is the means by which the environment can be enhanced and protected whilst enabling development to take place which is necessary for economic and social well-being. B&NESC's Development Control seeks to ensure the aims of the Town and Country Planning Act are achieved through the submission and determination of applications for planning permission for development.

The Bath and North East Somerset Local Plan will, once adopted, set out the vision, strategic objectives and spatial strategy for future developments within Bath and North East Somerset. Development Control Policies are a suite of criteria-based policies which are required to ensure that all development within the areas meets the spatial vision and spatial objectives set out in the Local Plan. These Development Control Policies include policies for development within floodplains and will be incorporated into the Local Plan.

The Environment Agency has a role in advising the Town and Country planning process and will object to inappropriate development within areas at risk of flooding as identified within the Flood Zone mapping. If planners are minded to go against Environment Agency advice and approve proposed development, they are required to refer the proposal to the Secretary of State¹⁰. This only applies to 'major developments' which are defined as a development where the number of dwellings to be constructed is 10 or more and/or the site area is greater than 0.5 hectares. For all other uses, a major development is one where the floor space to be built is 1,000 square metres or more, or where the site area is 1 hectare or more.

The Environment Agency has direct control over activities that may affect main river watercourses and the floodplain. According to the Water Resources Act 1991 and local byelaws, anyone wishing to carry out work in, over, under or within 8 metres from the top of bank of a main river needs consent from the Environment Agency.

Under the Land Drainage Act 1991 any proposal to construct works within any other watercourse also need Environment Agency consent if they relate to culverting or structures that resemble a mill, dam, weir or other like obstruction. However in 2012 this responsibility transferred to the LLFA (i.e. B&NESC) under the Flood and Water Management Act 2010.

The Environment Agency's Partnerships and Strategic Overview teams support the planning system through the provision of advice and information on fluvial flood risk to planning authorities and developers to enable full compliance with the NPPF. In April 2015 the Environment Agency's role in relation to comment on planning applications changed such that the Environment Agency will remain the statutory consultee for developments:

- *"In an area with flood zone 2 or flood zone 3;*
- *In an area within flood zone 1 identified as having critical drainage problems; and*

¹⁰ The Town and Country Planning (Consultation) Direction 2021 (publishing.service.gov.uk)

- *In the bed of, or within 20 metres of the top bank of, a main river which has been notified to the local planning authority by the Environment Agency”.*

The Environment Agency will no longer be consulted on certain proposed developments including those that are over one hectare in size (without any other qualifying criteria as listed above) or development involving the culverting or control of flow of any river or stream (without any other quantifying criteria as listed above).

This change has led to the flood risk support in relation to surface water management being required from elsewhere. The LLFA is now a statutory consultee on planning application associated with major development with surface water flood risk. The LLFA may also be required to comment on development with groundwater management implications, those in proximity to ordinary watercourses and those with any other local flood risk issues, depending on the size of the proposed development.

7.6 Mitigation measures

7.6.1 Overview

In the first instance, the primary aim of Strategic Flood Risk Management is to avoid new development in areas of flood risk. The mapping outputs of this SFRA will help B&NESC achieve this aim when planning for the future of new development within their authority.

The sequential approach should be applied within development sites to locate the most vulnerable elements of a development in the lowest risk areas. However, avoidance of flood risk areas may not always be achievable, or a policy of avoidance may prevent the economic and social regeneration of existing developments. In such instances, to meet the wider aims of sustainable development, it may be necessary to locate some development in areas at risk of flooding. In these circumstances careful consideration needs to be given to incorporating appropriate mitigation measures for managing and reducing the risk of flooding to the development. Approval of developments which include such measures should only be accepted providing the development passes the Sequential and Exception Tests (when required depending on development type) and is consistent with the sustainability policies of B&NESC.

7.6.2 Objectives of flood risk mitigation

The general objectives of flood risk mitigation measures are to:

- Reduce the probability of flooding to a development and consequently reduce the associated hazard to people occupying the development.
- Minimise the impact and damage that flood water may cause to a development and thus enable a faster recovery following a flood event.
- Ensure no adverse impacts resulting in increased flood risk to neighbouring sites.
- Wherever possible seek to provide an overall benefit in reducing flood risk for neighbouring sites.
- Be adaptable to future climate change scenarios.

7.6.3 Sources of Information on Flood Risk Response

There are several sources of information on potential flood risk response measures, as follows:

- Flood Risk Assessment Guidance for New Development, Environment Agency Research and Development²



- Development and Flood Risk – Guidance for the Construction Industry, CIRIA 624¹¹
- Improving the flood performance of new buildings in flood risk areas¹²
- Better flood protections for new homes¹³
- Preparing for Floods, ODPM¹⁴
- The SuDS Manual, CIRIA¹⁵
- Code of Practice for Surface water management for development sites (BS8582:2013).
- The SuDS National Standards¹
- West of England Sustainable Drainage Developer Guide¹⁶
- Building Regulations Part H¹⁷

7.6.4 Mitigation Measure Options

The Environment Agency Guidance on Flood Risk Assessments for new development suggests that mitigation measures can be split into three types:

- Measures that reduce the physical hazard, e.g. through raised defences or flood storage.
- Measures that reduce the exposure to the hazard, e.g. raise properties above flood levels.
- Measures that reduce the vulnerability to the hazard, e.g. flood warning or emergency planning.

Consideration of mitigation measures can take place at a number of stages of the development process, these include:

- The Master Planning Stage.
- The Outline Design Stage.
- The Detailed and Internal Design Stage.
- Retrofitting after the development is already in place.

The selection of appropriate mitigation measures depends on the requirements of the development and its sensitivity to flooding. Any mitigation measure selected should be sustainable in the future by taking into consideration the impact of climate change on flood risk. The residual risk of developing an area vulnerable to flooding with mitigation measures in place should also be considered.

Table A-1 summarises the types of mitigation measures, their limitations and the stage of the development process when they should be considered. If the whole of the development site cannot be located away from areas of flood risk, a sequential approach within the site boundary should always be considered as the first mitigation measure. Only if a sequential approach for the site layout cannot fully mitigate the risk of flooding, should the remaining mitigation measures be considered. SuDS however, should always be considered for every new development site.

It is important to note that mitigation measures are only effective up to the magnitude of the flood event for which they are designed. If the design flood event is exceeded, then mitigation measures may not be effective, and the mitigation measures must not increase flood risk during events that exceed the design event. Exceedance of the

¹¹ [Development and Flood Risk – Guidance for the Construction Industry, CIRIA 624](#)

¹² [Improving the flood performance of new buildings in flood risk areas - GOV.UK](#)

¹³ [Better flood protections for new homes - GOV.UK](#)

¹⁴ [Prepare for flooding: Protect yourself from future flooding - GOV.UK](#)

¹⁵ [CIRIA SuDS Manual \(C753F\)](#)

¹⁶ [west of england developer guide.pdf](#)

¹⁷ [Drainage and waste disposal: Approved Document H - GOV.UK](#)

design flood is an important consideration when employing mitigation measures for new development sites. Therefore, in some instances a combination of mitigation measures may need to be considered for a site. For example, flood resilience options should normally be included for all developments where significant mitigation measures have been included. This will provide the added benefit of ensuring a building can be quickly returned to use after an extreme flood event.



Table A-1 - Summary of mitigation measures

Mitigation option	Description	Examples	Development stage	Limitations
Site Zoning / Layout	The sequential approach can be applied within development site boundaries to locate the most vulnerable elements of the development in the areas of lowest risk.	Locating flood-compatible development, such as areas of open space and car parking in areas at higher risk and reserving lower risk areas for more vulnerable land use types such as housing.	Master Planning Stage	The spatial planning of developments sites may not always be achievable in line with a sequential approach for urban brownfield sites where the location of existing development and access routes can prevent zoning of development land use in line with flood risk probability.
Modification of Ground Levels	The probability of flooding can be mitigated through the modification of ground levels to raise developments above the flood level or at least reduce the depth of predicted flood water.	Land raising parts of a development site using material, either from other parts of the site or imported to the site from other locations.	Master Planning and Outline Design Stage	Raising ground levels may not be viable if existing buildings or access routes at ground level need to be maintained. Care is needed to avoid the formation of islands which would become isolated in flood conditions and to ensure there is safe access. Land raising must be accompanied by level-for-level compensatory provision of flood storage either on- or off-site. This option can prove costly if large volumes of material need to be moved or if fill material needs to be imported to the site from other locations.
Flood Walls & Embankments	Construction of engineered defences to prevent flood water entering a development site	Sheet pile walls, earth embankments, sea walls with wave return, revetments.	Master Planning and Outline Design Stage	New defences for developments should only be considered if fully funded and maintained by the developer and if the residual risk behind the development is appropriate to the land use proposed. Compensatory flood storage should be provided if new flood defences have been provided to allow development. Flood defence mitigation options can be costly and will require ongoing investment for maintenance. Developers proposing defences should also ensure that the defences can adapt to future climate change scenarios to maintain the minimum standard of protection required by NPPF for the lifetime of the development. New defences must not increase flood risk to offsite third parties and must be clearly demonstrated.
Flood Storage	The provision of upstream flood storage, either on or off the line of a river or watercourse, may be an effective measure to manage water levels at and downstream of a development site.	Flood storage reservoirs, controlled washlands, flood storage wetlands. Such options can also provide ecological and habitat benefits.	Master Planning and Outline Design Stage	Such options can involve significant land take which will need to be secured by the developer. If operational controls are required for such options consideration needs to be given to how this will be managed over the lifetime of the development. The longer-term maintenance of the flood storage options will also need to be addressed from both a funding and operational perspective.
Building Design	Buildings can be designed such that the ground floor comprises flood compatible uses which are resilient to flood water and the associated damage caused. Residential and other people intensive uses are then located on the first floor upwards. Single-storey residential development and basements should not be considered in flood risk areas as such developments are generally more vulnerable to flood damage and occupants do not have the opportunity to retreat to higher floor levels.	Water compatible uses for the ground floor can include open plan public spaces, car parking and or utility areas. Provision of private garages or other enclosed private spaces should be avoided due to possible vehicle damage, pollution from stored material and a reduction in flow conveyance.	Detailed Design Stage	Where developments incorporate open space beneath the occupied level, measures such as legal agreements need to be in place to prevent inappropriate use or alteration of the ground floor that would impede flood conveyance or reduce flood storage. Safe access to higher ground, above the flood level, should be made available for people to evacuate all buildings where the habitable level is raised above the flood level. In areas of high flood flow velocity buildings should be structurally designed to withstand the expected water pressures, potential debris impacts and erosion which may occur during a flood event.
Temporary, Demountable or Operational Defences	Flood defences which require human intervention to ensure successful operation during a flood event.	Flood barriers and gates	Detailed Design Stage	These measures are unlikely to be suitable as the only mitigation measure as it is not usually appropriate to design a new development to rely on demountable or temporary flood defences to manage flood risk, unless such measures are proposed solely to manage residual flood risk to individual properties.

Mitigation option	Description	Examples	Development stage	Limitations
				For water-compatible and less vulnerable land uses, such measures may be appropriate where temporary disruption is acceptable and appropriate flood warning to activate the defences is provided.
Flood Resilience	External and internal building design, fixtures and fittings which ensure that the building can be quickly returned to use after a flood.	Raising electrical sockets above the predicted flood level. Wet proofing wall and floor furnishings using materials such as tiles and paint.	Detailed and Internal Design Stage	Such measures are unlikely to be suitable as the only mitigation measure to manage flood risk, but they may be suitable where: - disruption to water-compatible and less vulnerable uses is acceptable and appropriate flood warning is provided. - there are instances where the use of an existing building is to be changed and it can be demonstrated that no other measure is practicable.
SuDS	A sequence of management practices and control structures, designed to drain water in a more sustainable manner than some conventional techniques. Typically, these are used to attenuate run-off from development sites.	There are a number of engineered and landscape vegetated types of SuDS options.	Outline and Detailed Design Stage	Issues which require early consideration when proposing SuDS include: - Land Take: is there sufficient land available for the options proposed? - Adoption and Maintenance: Who will fund, own and maintain the systems once installed, for the operational lifetime? This issue can often be secured through a planning condition for simple schemes or through a Section 106 agreement.

7.6.5 Emergency planning

Planning for emergencies will promote an effective response to situations that threaten human welfare, the environment or the security of a community.

The Avon and Somerset Local Resilience Forum (LRF) is responsible for developing emergency plans and does so in close liaison with its partner agencies.

A community risk register¹⁸ has been compiled by members of the LRF to identify the hazards, risks and threats which may be present. Its aim is to deliver a risk awareness framework which will improve the ability to prevent and plan for emergencies.

The LRF states that flooding is a priority risk in Bath and North East Somerset highlighting the need to plan and prepare. The LRF outlines both fluvial and pluvial flooding as two types of flooding risk to be aware of.

The purpose of the community risk register is:

- To ensure that local responders have an accurate understanding of the risks that they face and to provide a sound foundation for emergency planning;
- To provide a rational basis for the prioritisation of objectives, work programmes and allocation of resources;
- To enable local responders to assess the adequacy of their plans and identify any gaps;
- To facilitate joined up emergency planning, based on consistent assumptions;
- To provide an accessible overview of the emergency planning context for the public and officials; and
- To inform and reflect on national and regional risk assessments that support emergency planning and capability development at those levels.

Partner agencies are either Category 1 or Category 2 responders. For a major flood event in Bath and North East Somerset the Category 1 responder is anybody in the UK that has specific duties as determined under the Civil Contingencies Act (2004) and includes:

- Local Authority – Bath and North East Somerset
- Government Agency – Environment Agency
- Emergency Services – Avon and Somerset Constabulary, Avon Fire and Rescue Service, South Western Ambulance Service NHS Foundation Trust
- Health Bodies - Health Protection Agency, South West Partnership NHS Trust

For a major flood event in Bath and North East Somerset the Category 2 responders are those who have a role in supporting Category 1 responders in their duties under the Civil Contingencies Act (2004) and include:

- Utilities – Electricity, Gas, Water and sewerage, public communications providers (landlines and mobiles)
- Transport - Network Rail, Train Operating Companies, Airports, Highways Agency
- Government - Health and Safety Executive
- Health Sector - Strategic Health Authority

Emergency planning for extreme flood events is a key consideration for new developments located in areas at risk from flooding that have passed the Sequential Test. When preparing planning applications for such developments, developers should consult with the Environment Agency, emergency services and local resilience

¹⁸ Community Risk Register

forums when developing emergency and evacuation plans. This consultation should feed into the submitted supporting information i.e. Flood Risk Assessment and evidence for the Exception Test to determine whether the site users are at an acceptable level of risk. The outputs of the SFRA will provide a useful information base from which to initially consider viable routes for safe evacuation during flood events. At the site-specific level, a more detailed appraisal of proposed evacuation routes may be required to confirm that the route is safe for the lifetime of the development.

A key part of emergency planning also involves raising public awareness to the potential risks and providing comprehensive information regarding flood warning and evacuation routes for members of the public to follow during extreme flood events. Both developers and B&NESC should give particular consideration to communication of flood warnings and advice to people with impaired hearing and/or sight and with restricted mobility.

B&NESC can also use the outputs from this SFRA to facilitate the development of emergency planning policies for existing developments at risk within their local authority by considering the feasibility and sustainability of key access routes within their administrative boundary and across boundaries into neighbouring authorities.

7.6.6 Flood warning

Although B&NESC is responsible for developing emergency plans for their individual authority, the work undertaken by the Environment Agency in relation to flood warning is a key element which should be integrated into the process of developing such plans.

The Environment Agency's National Flood Warning Centre is currently responsible for co-ordinating and issuing flood warnings via 'Floodline'. The Environment Agency has developed a range of integrated catchment flood forecasting models for catchments which contain Flood Warning Areas. The main objective of this modelling is to improve the prediction of water levels at designated forecasting points and to assist in the process of issuing flood warnings. Consideration should be given to the estimated lead times which can be provided when developing strategies for emergency evacuation and response to flood events.

7.7 Surface water management

The planning system can act as an effective means of ensuring that all new developments manage surface water in a sustainable manner. Conventional surface water drainage systems have traditionally used underground pipe networks to efficiently convey water away from sites. In the past this has led to problems of downstream flooding, reductions in groundwater recharge and waste pollution incidents associated with surface water overwhelming combined sewers. Both 'Making Space for Water' and the Water Framework Directive have highlighted the need for an improved understanding and better management of how our urban environments are drained. The Flood and Water Management Act encourages the uptake of SuDS. Major development must consider the use of SuDS systems through applying the SuDS hierarchy, where Priority 1 is the highest priority and Priority 5 is the lowest.:

- Priority 1: collected for non-potable use
- Priority 2: infiltrated to ground
- Priority 3: discharged to an above ground surface water body
- Priority 4: discharged to a surface water sewer, or another piped surface water drainage system
- Priority 5: discharged to a combined sewer

The hierarchy approach requires that infiltration and soakaway systems are considered in the first instance. Only if these SuDS approaches are not considered appropriate at the site, then discharge to watercourses can be considered. If neither these options are possible, in the final instance discharge to sewers would be assessed.



The NPPF promotes Local Plans to consider climate change in respect to flood risk management and develop local planning policies that facilitate the requirement of SuDS in new developments.

The Delivering Sustainable Drainage Systems document¹⁹ outlines the Governments approach to deliver effective sustainable drainage systems that will be maintained for the lifetime of the development they serve.

The NPPF requires that a site-specific flood risk assessment is undertaken for all sites including those in Flood Zone 1 with an area greater than one hectare to ensure that downstream flooding problems are not made worse by surface water runoff from the development.

Surface water drainage systems for a development should ensure that there is little or no residual risk of flooding for events in excess of the storm event for which the sewer system on the site is designed.

For previously undeveloped sites the rate of runoff from the development sites should be no greater than the existing (greenfield) rate of runoff from the site and should be in accordance with National SuDS Standard 3 (section 18 to 20). For developments on previously developed (brownfield) sites the rate of runoff should not exceed the runoff of the site in its previously developed condition and should be in accordance with National SuDS Standard 3 (section 21). However, developers are encouraged to manage runoff from these developments to targets set out in the West of England Sustainable Drainage Developer guide wherever practicable and accommodate climate change.

As the upper part of the River Avon and its tributaries are within Bath and North East Somerset, the Council has responsibility to ensure development does not increase flows downstream in neighbouring authorities.

The different types of SuDS and where they can be used appropriately within Bath and North East Somerset are discussed in Section 8.2.

¹⁹ RFI7086_sud_consult_doc_final.pdf (publishing.service.gov.uk)

8. Flood risk management for Bath and North East Somerset

8.1 Funding of flood defence works

Where proposed developments include the provision of new flood mitigation measures, these should generally be funded wholly by the developer. Developers proposing new mitigation measures which solely benefit new development should not call on public resources as a means of funding. It should be noted that the construction of new flood defences to enable a development to proceed are not normally favoured or acceptable to the Environment Agency. The NPPF sets out an approach in placing development in lowest risk areas so the Environment Agency are not in favour of any development which needs its own flood defence scheme to manage the flood risk. In accordance with the Sequential Approach, the development should not be deemed appropriate irrespective of whether there is funding for defences.

B&NESC may wish to consider entering into an agreement under Section 106 of the Town and Country Planning Act 1990 to ensure that the developer carries out the necessary works and that future maintenance commitments are met. They may also apply planning conditions which would require completion of the necessary works before the rest of the development can proceed. Section 106 of the Town and Country Planning Act 1990 allows a local planning authority to enter into an agreement with a landowner or developer in association with the granting of planning permission. A Section 106 agreement is used to address issues that are necessary to make a development acceptable, such as supporting the provision of services and infrastructure. One of the recommendations of 'Making Space for Water' was that local planning authorities should make more use of Section 106 agreements to ensure that there is a strong planning policy to manage flood risk. This means that any flood risk which is caused by, or increased by, new development should be resolved and funded by the developer.

Where the mitigation measures proposed provide benefit to the wider community, or where the proposed works include upgrade or replacement of existing defences or flood alleviation schemes, it may be reasonable for the developer to contribute a proportion of the funding in partnership with the operating authority responsible for the existing works. Potential sources of funding that could be explored for such schemes are:

1. Flood & Coastal Erosion Risk Management or Flood Defence Grant in Aid (FDGiA)
2. Local community contributions
3. Infrastructure Levy
4. Growth Hubs
5. Council revenue and capital budgets
6. Regeneration grants

Capital works can seek funding through the FDGiA funding stream. To qualify for funding through this source it is necessary to demonstrate that the proposed scheme is cost beneficial which should be determined in accordance with the Flood and Coastal Erosion Risk Management (FCERM) guidance²⁰.

The Environment Agency has developed a six-year capital programme (2021 to 2027)²¹. For projects which are currently approved to receive Flood Defence Grant in Aid (FDGiA) funding. There are two proposed schemes within Bath and North East Somerset for the six-year programme, the Twerton Gates Replacement as part of the Bath flood defence scheme and the Bristol Avon Boat Ramps. The previous programme 2015-2021 included the

²⁰ FCERM grant-in-aid: discount rates, price indices and capping - GOV.UK (www.gov.uk)

²¹ Flood and coastal erosion risk management investment plan for 2021 to 2027 (publishing.service.gov.uk)

Bath Flood Risk Management Project which better protected 114 properties. In order to submit any further Bath and North East Somerset schemes for inclusion in the Medium-Term Plan significant benefits must be demonstrated, and a high partnership funding score identified. Therefore, unless proposed flood risk mitigation schemes are considered very highly beneficial, protecting a significant number of properties, gaining full funding through this programme is unlikely. In addition to contributions from developers, another important funding mechanism will come from local fundraising from the local communities and businesses who benefit from the proposed flood defence schemes. Where FDGiA, local levy, developer contributions and the promoting authority's own funds are insufficient to fund flood risk management work, contributions may be sought from the local community.

Through resident engagement within areas that have suffered ongoing flooding problems, it may be possible to create a resident group that would help contribute to ongoing works.

There are other potential funding mechanisms available such as through Bath and North East Somerset Revenue and Capital Budgets, there are also regeneration grants from the Ministry of Housing Communities and Local Government²² for growth areas, growth points and housing market renewal pathfinders, grants linked to new housing through Homes England²³.

8.2 Sustainable Drainage Systems

Local Authorities should prepare and implement planning strategies that help to deliver sustainable development, by using opportunities offered by new development to reduce the causes and impacts of surface water flooding. By implementing policies to encourage developers to incorporate SuDS wherever possible, Local Authorities can help to mitigate the impacts that development has on surface water runoff rates and volumes.

The general soil type within Bath and North East Somerset is 'loamy'. This soil type is moderately well drained, but it can be seasonally waterlogged. Along the river corridors there is more presence of clays which have impeded drainage. The catchment run-off can, therefore, be quite variable, and when waterlogged will result in a rapid response with high run-off rates.

8.2.1 Infiltration Systems

Infiltration systems allow surface water to discharge directly into the ground. These systems are only appropriate where site conditions meet the following criteria:

1. Ground which has a suitable water acceptance potential; and
2. Locations where groundwater recharge will not adversely affect drinking water aquifers as identified by the Environment Agency's source protection zones, available on their website <http://www.environmentagency.gov.uk>.

Such systems may include:

- Permeable surfaces
- Gravel
- Permeable Paving
- Block Paving with voids
- Grassed areas

²² Ministry of Housing, Communities & Local Government - GOV.UK (www.gov.uk)

²³ Homes and Communities Agency - GOV.UK (www.gov.uk)

Sub Surface Infiltration may include:

- Filter Drains
- Geocellular Systems
- Soakaways

When designing infiltration systems reference should be made to British Geological Survey Infiltration SuDS mapping²⁴ and on-site infiltration testing to BRE Digest 365²⁵ is required.

8.2.2 Attenuation Systems

If ground conditions cannot support infiltration systems, surface water may need to be attenuated using measures to store surface water. Attenuation systems, if designed at ground level, have the potential to take up large areas of development sites. Early consideration of such constraints is therefore essential to ensure that sufficient land is allocated to accommodate SuDS systems. Attenuation systems may include:

Landscaped solutions may include:

- Detention Basins
- Balancing Ponds
- Retention Ponds
- Wetlands
- Lagoons

Engineered solutions may include:

- Underground Tanks
- Ornate Water Features
- Green Roofs
- Oversized Pipes

Rainwater harvesting is another approach that can be considered to help attenuate surface water runoff, however this system cannot be considered as a formal attenuation system for planning purposes. This is because the system is likely to be already storing water during storm events, and the capacity of a rainwater harvesting system cannot be guaranteed during potential flood events.

8.2.3 Combined Infiltration and Attenuation Systems

SuDS designs for most sites can include a combination of infiltration and attenuation systems and they have been categorised above according to the dominant process. Other forms of SuDS which can provide more balanced benefits of infiltration and attenuation include swales and filter strips.

8.2.4 SuDS Guidance

The West of England SuDS guidance¹⁶ should be consulted when designing surface water management for proposed development within Bath and North East Somerset along with SuDS National Standards¹.

²⁴ [Infiltration SuDS map - British Geological Survey](#)

²⁵ [Soakaway design \(DG 365 - 2016\) DOWNLOAD](#)

SuDS should be provided in accordance with Paragraph 182 of NPPF to include multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity. Figure A-1 shows the four pillars of SuDS design.

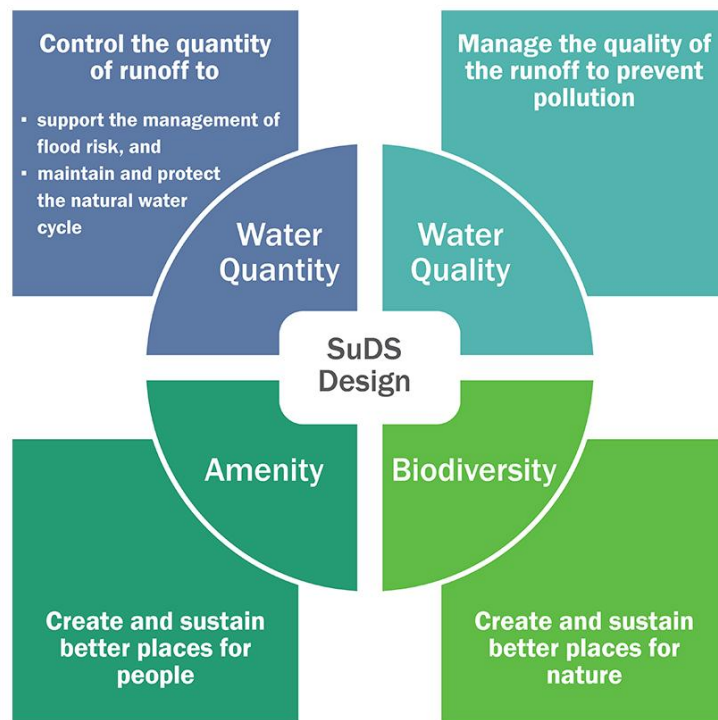


Figure A-1 - Four Pillars of SuDS Design (based on SuDS Manual Update, 2015)

A key part of the four pillars of SuDS is to provide the maximum improvement to water quality through the use of the “SuDS management train”. To maximise the treatment within SuDS, CIRIA recommends¹⁵ the following good practice is implemented in the treatment process:

- **Manage surface water runoff close to source:** This makes treatment easier due to the slower velocities and also helps isolate incidents rather than transport pollutants over a large area.
- **Treat surface water runoff on the surface:** This allows treatment performance to be more easily inspected and managed. Sources of pollution and potential flood risk is also more easily identified. It also helps with future maintenance work and identifying damaged or failed components.
- **Treat a range of contaminants:** SuDS should be chosen and designed to deal with the likely contaminants from a development and be able to reduce them to acceptably low levels.
- **Minimise the risk of sediment remobilisation:** SuDS should be designed to prevent sediments being washed into receiving water bodies or systems during events greater than what the component may have been designed.
- **Minimise the impact of spill:** Designing SuDS to be able to trap spills close to the source or provide robust treatment along several components in series.

The number of treatment stages required depends primarily on the source of the runoff. A drainage strategy will need to demonstrate that an appropriate number of treatment stages are delivered. The information provided by the applicant must include information for the ongoing maintenance of a drainage system.

The CIRIA SuDS Manual¹⁵ provides industry best guidance and advice on the design, construction operation and management of sustainable drainage systems.

8.2.5 Overcoming SuDS Constraints

SuDS design is influenced by both physical constraints (such as ground conditions, groundwater levels, topography, flood risk, and available space) and policy constraints (including national guidance, local authority requirements, environmental regulations, and maintenance responsibilities). These factors must be considered throughout the conceptual stage to assess feasibility, the outline stage to refine system selection and layout, and the detailed stage to finalise technical design and ensure compliance. Accounting for these constraints at each stage helps deliver an effective, compliant, and sustainable SuDS solution. Table A-1 details some possible constraints and how they may be overcome.

Table A-1 - Example SuDS design constraints and possible solutions

Considerations	Solution
Land availability	SuDS can be designed to fit into small areas by utilising different systems. For example, features such as permeable paving and green roofs can be used in urban areas where space may be limited.
Contaminated soil or groundwater below site	SuDS can be placed and designed to overcome issues with contaminated groundwater or soil. Shallow surface SuDS can be used to minimise disturbance to the underlying soil. The use of infiltration should also be investigated as it may be possible in some locations within the site. If infiltration is not possible linings can be used with features to prevent infiltration.
Groundwater levels	Non-infiltrating features can be used. Features can be lined with an impermeable line or clay to prevent the egress of water into the feature. Additional, shallow features can be utilised which are above the groundwater table.
Steep slopes	Check dams can be used to slow flows. Additionally, features can form a terraced system with additional SuDS components such as ponds used to slow flows.
Shallow slopes	Use of shallow surface features to allow a sufficient gradient. If the gradient is still too shallow pumped systems can be considered as a last resort.
Ground instability	Geotechnical site investigation should be done to determine the extent of unstable soil or geology and dictate whether infiltration would be suitable or not.
Sites with deep backfill	Infiltration should be avoided unless the soil can be demonstrated to be sufficiently compacted or have no significant concerns regarding contamination from backfill material. Some features such as swales are more adaptable to potential surface settlement.
Open space in floodplain zones	Design decisions should be done to take into consideration the likely high groundwater table and possible high flows and water levels. Features should also seek to not reduce the capacity of the floodplain and take into consideration the influence that a watercourse may have on a system. Facts such as siltation after a flood event should also be taken into account during the design phase.
Future adoption and maintenance	Local Planning Authority should ensure development proposals, through the use of planning conditions or planning obligations, have clear arrangements for on-going maintenance over the development's lifetime. The Developer should demonstrate that a robust means of operating and maintaining the SuDS for the life of the development will be implemented.

Infiltration-based SuDS require a sufficiently low water table and early site-specific infiltration testing to confirm feasibility. A minimum separation of 1 metre is required from the highest seasonal level of the water table and the invert of the infiltration system. Where there is concern that this may not be fully achieved, groundwater level monitoring may be required to inform the design. Extra caution is needed in areas prone to subsidence or

sinkholes. Where developments are located near groundwater protection zones or aquifers, additional restrictions may apply, and advice should be sought from the LLFA and the Environment Agency.

8.3 Development Control

Advice notes for developers for undertaking site specific FRAs within Bath and North East Somerset is provided within the Government's online flood risk assessment guidance². This guidance outlines when a site-specific FRA is required and the scope of the study that needs to be included within the FRA. Potential developers should consult this guidance early in the development planning process to determine the flood risk implications.

An FRA should be completed for most types of development (including minor works and changes of use) if the site is in, or at risk of, flooding. This includes when a development is:

- In **Flood Zones 2 or 3**, including **3b**
- In **Flood Zone 1** but:
 - The site is **1 hectare or larger**
 - There is **future flood risk (climate change)** from rivers or the sea
 - It is at risk of **surface water flooding**
 - It is identified as having **critical drainage problems**
 - The **SFRA** shows increased flood risk within the development lifetime
- A proposal that **increases vulnerability to flooding**, including from sources beyond rivers or the sea

In addition, a Sustainable Drainage Strategy should be included with a development application if the proposal could:

- Affect drainage on or near the site, or
- Be located in an area at risk of flooding, such as Flood Zones 2 or 3, or areas prone to surface water flooding.

9. Conclusion and Recommendations

9.1 Conclusions

This SFRA report provides an overview of the planning context in relation to flood risk and development within Bath and North East Somerset.

The data provided has been collated through consultation with B&NESC, the Environment Agency and Wessex Water.

Sources of flood risk in B&NESC include: fluvial (arising from the River Avon, River Chew, By Brook, Wellow Brook, Cam Brook and River Somer and their tributaries), surface water, sewers and groundwater.

There are existing flood risk management schemes in place, including formalised flood defences and flood storage areas. These flood risk management schemes fall under a range of responsibilities including the Environment Agency and private land owners and provide varying levels of protection.

Climate change is predicted to cause an increase in flood risk in the future and therefore needs to be considered when designing flood risk mitigation and surface water management systems for new development.

A Sequential Test has been undertaken on potential sites for allocation. Of the 69 sites assessed, there are 51 individual sites that are considered suitable for development as they are located within Flood Zone 1 and have less than 10% of the area at risk from surface water or groundwater flooding in the future. There are no sites which are considered not acceptable for development. There are 11 sites that have areas of Flood Zone 2, 3a and 3b now or in the future with climate change and a Sequential approach to the layout of the sites is required and an Exception Test may be required. There are 6 sites that are within Flood Zone 1 but over 10% of the site is within an area of surface water flooding and a Sequential approach to the layout of the sites is required or demonstration that a site can remain safe from flood risk through a site specific flood risk assessment. There is 1 site that is within Flood Zone 1 but over 10% of the site is within an area susceptible to groundwater flooding and a Sequential approach to the layout of the sites is required or demonstration that a site can remain safe from flood risk through a site specific flood risk assessment. Sites located within Flood Zone 2, 3a and 3b or are at risk of surface water or groundwater flooding have been assessed further as part of the Level 2 SFRA.

Windfall sites are potential development sites that are not allocated through the Local Plan and have not been individually sequentially tested for this SFRA. The Sequential Test will need to be applied to these sites, which can be informed by the Sequential Test flowchart provided in this SFRA in Appendix P. If necessary, evidence to meet the requirements of the Exception Test at the planning application stage would also be required.

9.2 Recommendations

The recommendations from this SFRA are as set out below and it is recommended that the list is considered when completing the Local Plan for Bath and North East Somerset.

9.2.1 Process

1. This SFRA should support the completion of site specific FRAs. FRAs are required for submission with the associated planning application for all development located within areas at risk from flooding as defined in the fluvial flood risk mapping and surface water flood risk mapping provided in the Appendices to this report (and as shown on the Environment Agency's website).



2. The risk to and impact of new development should be minimised through careful planning considerations in relation to flood risk. This would be achieved through promoting development to be located within the lowest areas of flood risk, from all sources.
3. The Sequential Test will need to be carried out for windfall sites and applicants should provide sufficient information to the Local Planning Authority to be able to assess it. It is recommended that the flow chart provided in this SFRA for assessing windfall sites is a 'live' document. As a live document it should be updated and evolved as feedback is received from development control officers and flood risk management policy changes such as the potential for Critical Drainage Areas to be established.
4. All sources of flood risk need to be considered when assessing the risk to new and proposed development. These sources of flood risk include fluvial, surface water, sewers and groundwater.

9.2.2 Mitigation

5. It is recognised that not all development could be located in areas at lowest risk from flooding, as in some cases the need for the proposed development will outweigh the risks of flooding. Where development is required in areas at risk from flooding it is necessary that new development will incorporate flood risk mitigation measures to ensure that both the site is at an acceptable level of risk, whilst preventing an increase in risk elsewhere. This would need to be demonstrated through the application of the Exception Test.
6. Where flood risk mitigation measures are required to ensure an acceptable level of flood risk associated with new development, these mitigation measures need to be agreed with the LPA (and potentially other statutory consultees) as appropriate to the level and nature of the flood risk. Furthermore, the measures need to be satisfactorily implemented and maintained.

9.2.3 SuDS

7. There is increased focus on suitable surface water management in new development, through the use of SuDS to prevent increased flood risk both on site and elsewhere. For development on greenfield sites surface water runoff from the site must be attenuated to the pre development rate. For development on brownfield sites, surface water runoff should be reduced as recommended by the West of England SuDS guide and in accordance with National SuDS Standards.
8. SuDS must be selected following the SuDS hierarchical approach and in accordance with national and local standards. The exception would only be if it can be clearly demonstrated that SuDS would not be technically, economically or operationally viable but other forms of surface water management would be possible, or in locations where SuDS would present health and safety concerns that could not be suitability addressed, and only with agreement of the LLFA.
9. It is recommended that where appropriate, especially for larger development sites, SuDS should also be planned at a strategic scale and linked to wider sustainability benefits to enhance green infrastructure, improve water quality and provide wildlife and ecosystem benefits.
10. Development proposing SuDS needs to have a clear maintenance schedule outlining responsibilities for the management of the SuDS over the lifetime of the development to ensure the surface water drainage remains effective.

9.2.4 General

11. Where possible it is recommended that redundant watercourse crossings and culvert structures are removed to provide flood risk and ecological benefits. When proposing the removal of such structures, that have the potential to act as a constriction to flow, the downstream implications should be determined, and mitigation provided, to avoid detrimental downstream impacts. Any works on watercourses will

require approval through an Environment Agency Flood Risk Activity Permit for main river or Land Drainage Consent approval from the LLFA for ordinary watercourse.

12. It is recommended that this SFRA is considered to be a live document, which has been based on current understanding of flood risk and existing and available flood risk information. In the future as further flood events occur, as flood risk policy advances and as studies are completed to improve flood risk understanding, information in this SFRA will become outdated. To address these potential future changes, it is recommended that this SFRA is reviewed and updated as appropriate.



APPENDICES



Appendix A. NPPF Vulnerability Classification

Table A-1 – Flood risk vulnerability classification – taken from Annex3 in the NPPF flood risk planning practice guidance

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 electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines.
Highly Vulnerable • Police and ambulance stations; fire stations and command centres; 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 <u>hazardous substances consent</u>. (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, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'More Vulnerable' class; 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.



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.
- Ministry of Defence 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.

*Information as of 08/08/2023. Please see <https://www.gov.uk/guidance/national-planning-policy-framework/annex-3-flood-risk-vulnerability-classification> for the live document.

Table A-2 - Flood risk vulnerability and Flood Zone 'compatibility' - taken from Table 2 in the NPPF flood risk planning practice guidance

Flood Zones	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Flood Zone 1	✓	✓	✓	✓	✓
Flood Zone 2	✓	Exception Test required	✓	✓	✓
Flood Zone 3a [†]	Exception Test required [†]	X	Exception Test required	✓	✓
Flood Zone 3b*	Exception Test required*	X	X	X	✓*

Key

✓ Development is appropriate

x Development is not appropriate

†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 must demonstrate a passed Exception Test. Water compatible development 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.

*Information as of 08/08/2023. Please see [Flood risk and coastal change - GOV.UK \(www.gov.uk\)](https://www.gov.uk/guidance/flood-risk-and-coastal-change) for the live document.



Appendix B. Topography



Appendix C. Bedrock Geology



Appendix D. Superficial Geology



Appendix E. Watercourses



Appendix F. Historical Flood Map



Appendix G. Flood Zones



Appendix H. Risk of Fluvial Flooding with Climate Change



Appendix I. Risk of Flooding from Surface Water



Appendix J. Risk of Flooding From Surface Water with Climate Change



Appendix K. Areas Susceptible to Groundwater Flooding



Appendix L. Risk of Flooding from Reservoirs



Appendix M. Flood Warning and Flood Alert Areas



Appendix N. Result of the Sequential Test



Appendix O. Individual Site Allocation Summaries



Appendix P. Sequential Test for Windfall Sites

**Flowchart of the processes in applying the
Sequential Test to windfall sites**



AtkinsRéalis

