

Bath & North East Somerset Council



Strategic Flood Risk Assessment of Bath & North East Somerset Council

VOLUME II User Guide

April 2008

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Issue box

The Bath and North East Somerset (Bath & North East Somerset) Strategic Flood Risk Assessment (SFRA) is a "live" document. The current version is developed using the best information and concepts available at the time.

As new information and concepts become available the document will be updated and so it is the responsibility of the reader to be satisfied that they are using the most up-to-date information and that the SFRA accounts for this information.

All revisions to this summary document are listed in the table below

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Foreword

Bath & North East Somerset District Council (B&NES) is required to prepare a Strategic Flood Risk Assessment (SFRA) to support the Local Development Framework (LDF).

The SFRA creates a strategic framework for the consideration of flood risk when making planning decisions. It has been developed with reference to Planning Policy Statement 25 (PPS25): development and flood risk and additional guidance provided by the Environment Agency.

The fundamental concepts that underpin the SFRA are outlined in PPS25. The guidance provided in this document requires local authorities and those responsible for development decisions to demonstrate that they have applied a risk based, sequential approach in preparing development plans and consideration of flooding through the application of a sequential test. Failure to demonstrate that such a test has been undertaken potentially leaves planning decisions and land allocations open to challenge during the planning process.

The underlying objective of the risk based sequential allocation of land is to reduce the exposure of new development to flooding and reduce the reliance on long-term maintenance of built flood defences. Within areas at risk from flooding, it is expected that development proposals will contribute to a reduction of flood risk.

SFRAs are essential to enable a strategic and proactive approach to be applied to flood risk management. The assessment allows us to understand current flood risk on a wide-spatial scale and how this is likely to change in the future.

The main objective of the Bath & North East Somerset SFRA is to provide flood information;

- so that an evidence based and risk based sequential approach can be adopted when making planning decisions, in line with PPS25
- that is strategic in that it covers a wide spatial area and looks at flood risk today and in the future
- that supports sustainability appraisals of the local development frameworks
- that identifies what further investigations may be required in flood risk assessments for specific development proposals.

The SFRA is presented in a number of documents;

- Non technical summary
- Volume I – technical report and flood maps
- Volume II – user guide
- Volume III – management guide

The SFRA is a live document that is intended to be updated as new information and guidance become available. The outcomes and conclusions of the SFRA may not be valid in the event of future changes. It is the responsibility of the user to ensure they are using the best available information.

1. Context

1.1. Introduction

Strategic Flood Risk Assessments (SFRA) inform a range of activities, including land use planning, emergency planning, development control and the development of specific flood risk management policy. The level of detail included in the SFRA depends on the intended use.

The Bath & North East Somerset SFRA was developed at a Strategic Scale in support of the Local Development Framework (LDF), and thus the scale and detail within the assessment reflects this intended use. A Level 2 (more detailed assessment) has been undertaken throughout the Bath & North East Somerset District Council area.

This volume of the Bath & North East Somerset Strategic Flood Risk Assessment is the

User Guide

This decision support document provides comprehensive information on how to interpret the Bath & North East Somerset SFRA technical results contained within Volume 1. These two volumes of the SFRA are intended to be used together in order to inform land use planning, flood warning, emergency planning and development control decisions.

This document includes the definition and description of flood risk, a description of the strategic approach to evaluation flood risk, and a summary of flood statistics for Bath & North East Somerset (taken from Volume 1).

This document includes guidance on how to use the technical information in respect to;

- Land use planning (from spatial planning for the LDF to windfall sites)
- Emergency planning
- Development control

This document also includes an overview of the Sequential and Exception tests and provides guidance on the specification of Flood Risk Assessments.

The document also includes an appraisal of current (November 2007) development sites NOT in the adopted Local Plan (note: this appraisal does should not be considered as a sequential test).

2. How flood risk is assessed

2.1. Source-pathway-receptor model

The latest Government guidance outlined in PPS25 recommends that the source-pathway-receptor model be used when assessing flood risk. This approach is also used when assessing other environmental risks such as land contamination and air pollution. This model requires the identification of;

- **Sources** – where the flood water comes from. PPS25 identifies six sources of flooding (rivers, sea, land, groundwater, sewers and artificial sources)
- **Pathway** – how the receptor and source come into contact. Pathways for flooding include overland pathways, overtopping of flood defences, blockage of culverts and underground barriers causing groundwater levels to rise
- **Receptor** – the people, property and/or environment affected by flooding. For land use planning, the receptors of concern are people and property. PPS25 provides guidance on the vulnerability of different property types to flooding, which includes a consideration of the types of people associated with each property type.

For the purposes of land use planning, it is important to use a precautionary approach in the light of expected changes and events over the lifetime of the proposed developments. The most obvious change relevant to flood risk is likely to be climate change. The latest Government predictions on climate change indicate significant increases in river flows and mean sea levels (Defra 2006). Such changes will have a significant impact on existing source-pathway-receptor relationships.

2.2. Defining flood risk

The Environment Agency's 'Strategy for Flood Risk Management 2003 - 2008' (Environment Agency 2003), describes flood risk as a combination of two components, the:

- *"chance (or probability) of a particular flood event and the*
- *impact (or consequence) that the event would cause if it occurred."*

By considering both the definition of risk and the "source-pathway-receptor" model, it is beneficial to assess risk in terms of the components shown in Figure 2.1.

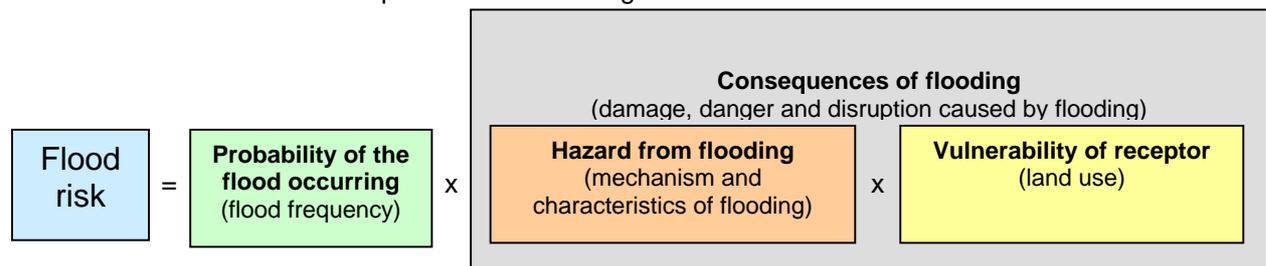


Figure 2.1 Risk equation

Flood risk from rivers and the sea is defined in association with an annual exceedance probability (AEP). The AEP is the chance (or likelihood) of a flood with a stated magnitude occurring in any single year. **Note:** it should not be inferred from this definition that if a flood of a given magnitude does occur in a given year that a flood with the same (or greater) magnitude will not occur in the subsequent year.

The probability of flooding can be defined using data and statistical analysis. The hazard from flooding can be evaluated by considering the depth of floodwater, the velocity of flow, the speed of onset of flooding and the rate of rise of floodwater. The vulnerability of flooding can be assessed through analysis of the land use, property or people that would be affected by flooding.

It can be seen from the risk equation on the previous page that by reducing the hazard or vulnerability of flooding, it is possible to reduce the risk. It follows that, development proposals within Bath & North East Somerset should be developed and assessed using a risk-based approach that avoids risk where possible and manages it elsewhere.

There is inherent uncertainty in the estimation of flood probability due to the need to simplify variability in rainfall, storm types, soil types, land cover and antecedent conditions into one designed flood event. By separating flood risk into its three components, it is possible to gauge risk even if the exact probability is uncertain. In this way a precautionary principle can be applied, as flood risk will be higher for floods with significant hazards and consequences, even when the probability of occurrence is uncertain.

This information can then be used to inform the Sequential Test. By including consideration of climate change the procedure is precautionary, in accordance with PPS25.

The SFRA provides high level information for decisions on land use planning within the Bath & North East Somerset area. The strategic approach defined in this document will require that information supporting all planning applications in the study area make reference to the SFRA and clearly demonstrate adoption of a risk-based sequential approach.

Sources of flood risk

Flooding can occur from a range of sources. Although flooding in Bath & North East Somerset is mainly from the rivers, a significant proportion of incidents are from other forms. The Autumn 2000 Flood Report produced by the Environment Agency reported that 42 per cent of flooding reported nationally arose from other sources (Environment Agency 2000).

Flooding can come from rivers, the sea, directly from rainfall, groundwater, highway and sewer drainage systems, and from artificial sources such as canals. The impact of flooding will depend upon its source and the land-use. Further information on flooding from the six sources is contained within Annex C PPS25 and the PPS25 Practice Companion Guide.

The Flood Zones based on the Environment Agency Flood Zones only take into account flooding from rivers or the sea.

In accordance with PPS25 the SFRA has refined the information on the Environment Agency Flood Map to account for other forms of flooding. Information on groundwater, surface water, sewers and artificial sources has been collated. This information should be used when preparing appropriate policies for flood risk management and land use allocation.

Types of flood risk

The SFRA provides a range of information so that the hazard of flooding, not just the probability of flooding, can be examined. In keeping with PPS25, there are four types of flood risk to be considered.

1. Flood Zones (refer to map F, flood risk without flood defences in place)

As defined in Table D1 of PPS25, Flood Zones show areas at risk of flooding from river or the sea, ignoring the presence of flood defences. It is important to recognise that because the Flood Zones ignore the presence of flood defences, they do not describe an actual level of flood risk. Thus, large areas of development behind flood defences can be shown as at risk.

PPS25 defines the functional floodplain as the area where water has to flow or be stored at times of flood, and that SFRA should identify this by the land liable to flood during a flood with a 5 per cent annual exceedance probability (AEP). The Practice Companion Guide to PPS25 clarifies that this should be with flood defences in place.

PPS25 requires that all sources of flooding be examined. Flood Zones are a good starting point for this assessment as they show areas at risk of flooding from rivers and the sea, which cause the most damage across England and Wales. However other sources and types of flooding must be examined, even if a proposed development lies within a low probability Flood Zone. Thus the actual and residual risks must be examined as well.

2. Actual risk (refer to map A1)

Actual risk provides information on flooding, when the impact of existing flood defences is considered (assuming that they operate as they are supposed to). The actual risk of river flooding is usually assessed using the 1 per cent AEP flood event.

Actual risk of flooding from other sources (land, groundwater, sewers and artificial sources) can be assessed using a range of analyses. However, for the level of assessment required in an SFRA, these sources are usually assessed via a review of historic flood incidents records and a qualitative analysis of catchment characteristics.

3. Residual risk (overtopping or exceedance – refer to map A2 and A3)

In recognition that engineered flood reduction measures cannot completely eliminate flood risk, there is a need to be aware of the residual risk generated by an event more severe than that for which the defences have been designed to provide protection. Accordingly, this risk assessment usually considers the flooding associated with an extreme event (such as a 0.1 per cent AEP) or flooding that may result from climate change.

4. Residual risk (breach and/or failure– refer to map A2 and A3)

This involves the assessment of breach or failure of flood defences or other features, which may act as a defence. Such scenarios may include collapse of a flood defence wall, blockage of a culvert or structural failure of a canal or reservoir embankment. Whilst the probability of a breach or failure is generally low, the consequences of an event are often very high.

2.3. Climate change (refer to map C1)

Projections of future climate change indicate that more frequent short-duration, high intensity rainfall and more frequent periods of long duration rainfall could be expected. Winters are expected to become wetter with summers and autumn becoming much drier than at present. Global sea level rise is also expected to continue. These kinds of changes will have implications for all forms of flooding.

Changes in the extent of inundation as a result of climate change are likely to be negligible in well-defined floodplains but may be dramatic in low-lying and flat areas. It is expected that climate change will lead to a reduction in the standard of protection provided by defences constructed in the past. Changes in the depth of flooding may reduce the return period of a given flood and as a result the flood zone classification within which certain areas fall.

The Bath & North East Somerset SFRA contains information on flood probability in the future based on two time horizons representing 20 years (2025) and 100 years (2105) into the future. Government guidance states that an increase of 10% on present day river flows should be applied to any forecast of river flows up to 2025, and an increase of 20% on present day river flows should be applied to any forecast of river flows between 2025 and 2105 (ie. Map C in this SFRA contains present day rivers flows + 20% contingency for future climate change – this is not cumulative year on year value).

In the UK the implications of climate change are assessed by the UK Climate Impacts Programme and latest government guidance on allowing for the impacts of climate change on flooding is provided in PPS25 Annex B and Defra guidance issued in October 2006. Further research and updates are expected in the future.

It is imperative that allowances for climate change are based on the latest predictions and up to date guidance. PPS25 states:

“The most up-to-date guidance on climate change and flooding from the Environment Agency, Defra, Communities and Local Government and the UKCIP should be considered in the preparation of...Strategic Flood Risk Assessments...”

The user must ensure that the most recent climate change guidance is considered over an appropriate time horizon when using the SFRA to inform decision making.

2.4. Strategic flood risk evaluation procedure

The SFRA has identified and analysed the four different types of flood risk information and six sources of flooding using the strategic risk evaluation procedure (SREP).

It is important to note that there is no implied priority given to any of these specific types of risk and flooding. By considering climate change, the procedure is precautionary, in accordance with PPS25.

It is possible to reduce risk by reducing the hazard associated with the flooding or the vulnerability of the receptor at risk. It follows that development proposals should be developed and assessed using a risk-based search sequence avoiding risk where possible and managing it elsewhere.

The SFRA should be used to provide high level flood risk information for decisions on land use planning. This can be done on an 'as required' basis, matching the needs of phased submission of applications. The SREP is shown diagrammatically in Figure 2.2.

2.5. Tiered approach to risk assessment

Flood risk can be assessed in various degrees of detail, which should be proportionate to its nature and complexity. More specifically, the level of assessment will depend on;

- the relative area affected by flooding
- the severity of the consequences of the flooding
- the receptors affected by the flooding
- the certainty of information.

PPS25 requires that flood risk be considered at all stages of the land use planning process. For this reason it outlines various levels for assessing flood risk, including regional, strategic and site specific flood risk assessments (RFRA, SFRA and FRA respectively). Within those broad categories it is recognised that the degree of assessment required will vary depending on the severity of flood risk.

For SFRAs, the quality and quantity of information used in the assessment depends on the extent and severity of flood risk within the administrative boundary, the vulnerability of the development and the certainty of information. A less detailed assessment is recommended where the relative area of flood risk is small, and all development can be allocated in low probability Flood Zones. However a more detailed assessment is required where development cannot be placed in low probability Flood Zones.

PPS25 recommends a two tiered approach in the assessment of flood risk in SFRAs, allowing flexibility in the level of assessment. The amount of detail required increases at each tier (level), with the risk assessment focussing more closely on higher priority risks identified in the previous tier.

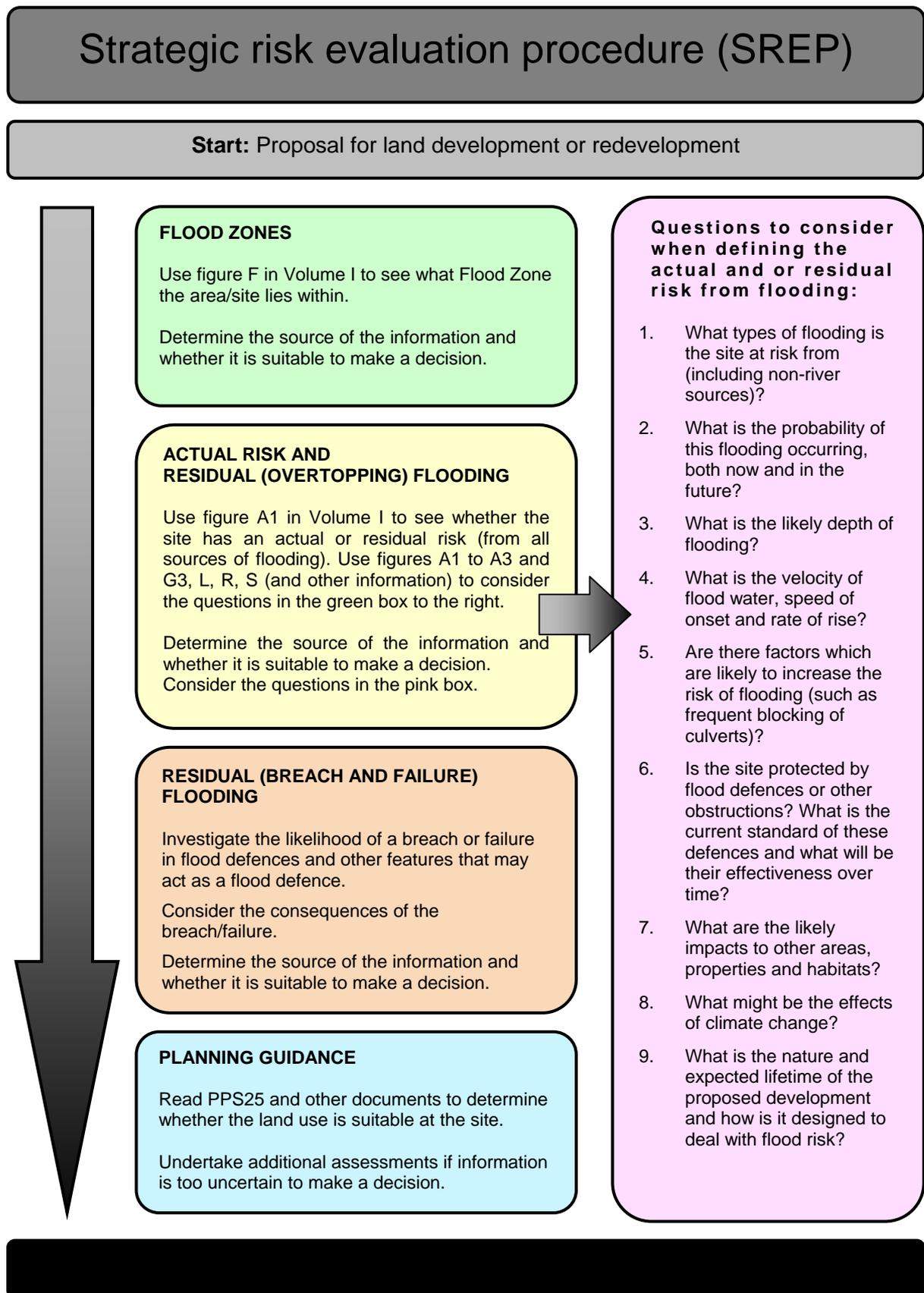


Figure 2.2 Strategic flood risk evaluation procedure

Level 1 SFRA

A Level 1 SFRA provides information so that the Sequential Test can be applied. This involves;

- identifying probable source-pathway-receptor linkages
- predicting how those linkages may alter with climate change
- providing an initial assessment of the likelihood and magnitude of any effects that could be associated with each flooding relationship;
- screening out any insignificant risks
- identifying areas for more detailed studies based on areas of high risk (where receptors maybe placed in areas of higher probability flooding) and where information is too uncertain for an effective land use planning decision to be made.

Level 2 SFRA

A Level 2 SFRA assessment is required if;

- the Level 1 assessment indicates proposed developments are likely to be allocated in areas of higher probability flooding
- the Level 1 assessment indicates that there is insufficient certainty in the source-pathway-receptor linkages and the use of conservative assumptions would not be a suitable basis for a decision
- the receptors of flooding are sufficiently vulnerable to warrant a more detailed assessment.

It is not uncommon for development to be proposed in areas of higher probability flooding due to;

- non-flood related factors limiting development opportunities in lower probability areas
- location specific factors requiring development in these areas
- higher probability flood risk areas covering much of the administrative boundary.

PPS25 states that the Exception Test should be applied (see PPS25 Table D1), where vulnerable land use is planned in areas of higher probability flooding. The SFRA can be used to inform this Test and so must include some indication of;

- Flood probability, depth, velocity and rate of onset, with existing flood defences in place (actual flooding)
- Residual flooding (overtopping and breach failure hazards)
- Appropriate flood policies for different areas within the boundary
- Options for flood management

2.6. Flooding in Bath and North East Somerset

Information concerning the six types of flooding has been collated and analysed for the whole of the study area. The assessment has aimed to characterise flood risk today and also into the future. A 100 year time horizon has been assessed and is considered appropriate for land use planning, based upon the maximum application of the current government guidance on climate change.

The Environment Agency and other key stakeholders have been contacted throughout the SFRA process in an attempt to gather as much information as possible from Wessex Water, Bristol Water, British Waterways and numerous departments within Bath & North East Somerset. In addition, several meetings with the Environment Agency have provided an insight into their expectations of the SFRA.

The methodology proposed for the SFRA was based on the best use of available information and involved minimal new analyses and hydraulic modelling. Each dataset was reviewed with regard to its accuracy and the most appropriate datasets were used to define flood risk across Bath & North East Somerset under varying conditions.

In general, the results of the more detailed Environment Agency hydraulic models (ISIS and TUFLOW) were used in preference to the results from their national generalised broad scale models (JFLOW), in defining Flood Zones. It is important that the source of flood data is considered whenever using it to inform a land use planning decision.

Bath & North East Somerset and the Environment Agency will need to manage the update of the SFRA datasets in the future, as more detailed flood risk information becomes available. The management protocols are outlined in Volume III of the SFRA.

2.7. Level 1 Assessment for Bath & North East Somerset

Summary of flood risk in Bath & North East Somerset

The dominant flood risk affecting the Bath & North East Somerset district is flooding from rivers. The principal watercourses are the Lower Avon, River Chew, Cam Brook and Wellow Brook. Incidents of surface water flooding and sewer flooding are also significant however there is less certainty in assessing this risk at a strategic level. Flooding from artificial sources is also important due to the severity of consequences. The areas most at risk of flooding are;

- Bath - at risk of flooding from rivers, sewers, surface water, artificial sources and to a lesser degree from groundwater
- Keynsham - at risk of flooding from rivers (which may be tidally influenced), surface water, sewers and artificial sources
- Midsomer Norton/Radstock - at risk of flooding from rivers, surface water and sewers. Note: Midsomer Norton benefits from a flood alleviation scheme during a 1% AEP event
- Chew Magna and downstream communities - at risk of flooding from rivers, surface water and artificial sources.

Climate change impacts may increase the severity and frequency of storms and therefore flooding, as well as causing a rise in sea levels. Flooding from rivers, sewers and surface water is therefore likely to increase throughout Bath & North East Somerset in the future. Bath & North East Somerset may also become increasingly affected by tidal flooding as the tidal limit moves further inland.

The areas that are likely to have the biggest increases in flood risk in the future are:

- Bath - increased flooding from rivers, sewers and surface water.
- Keynsham - increased flooding from rivers (which will be more tidally influenced), surface water and sewers.
- Midsomer Norton/Radstock - increased flooding from rivers, surface water and sewers. Note: modelling results indicate that Midsomer Norton benefits from a flood alleviation scheme during a future 1% AEP river flood event.
- Chew Magna and downstream communities - increased flooding from rivers and surface water.

Flood risk statistics in Bath & North East Somerset

A Level 1 SFRA is undertaken over the whole of Bath & North East Somerset administrative boundary so that the Council can make a comparative assessment of flood risk. Thus they may undertake a risk-based approach and 'Sequential Test' as described in PPS25.

The draft RSS directs growth to existing urban areas, the RSS adds a further 6000 dwellings South West of Bristol and 1,500 South West of Bath. Within Bath and North East Somerset growth is to be focused on maximising the potential of brownfield land in Bath and urban extensions to Bath and Bristol. The latter will involve sites that are primarily greenfield.

Potential developments sites are categorised into the four following groups;

- The regional spatial strategy (sites are yet to be chosen, and will be subject to a sequential test by Bath & North East Somerset as part of the allocation process).
- Windfall sites (unknown sites that may be brought to Bath & North East Somerset by potential developers. Each windfall site will require a sequential test, and if appropriate an exception test. A Flood Risk Assessment is required if the site is over 1HA, the scope of the assessment varies according to the level of existing flood risk)
- New potential development sites as identified in the adopted Local Plan (see Map N)
- Existing major development sites

Sites which have been identified as having potential for development or redevelopment in Bath & North East Somerset are shown on Map N. Table 2.1 provides a summary of the key flood risk statistics across Bath & North East Somerset and for these possible development sites, a separate site specific analysis of these sites is provided in Appendix A of this document for reference.

Table 2.1 Key flood risk statistics for Bath & North East Somerset

	Approximate area or number	Percentage of total area or number
Bath & North East Somerset statistics (Map O)		
Bath & North East Somerset district area	350 km ²	100%
Existing developed area	40 km ²	11%
Flood statistics		
Flooding from rivers and sea (Maps F, A1 and W)		
Area of Bath & North East Somerset within Flood Zone 3b (Functional Floodplain)	17 km ²	5%
Area of Bath & North East Somerset within Flood Zone 3a (High flood risk)	19 km ²	5%
Area of Bath & North East Somerset within Flood Zone 2 (Medium flood risk)	25 km ²	7%
Area of Bath & North East Somerset within Flood Zone 3a which is defended	<1 km ²	<1%
Area Bath & North East Somerset within covered by a flood warning service	11 km ²	3%
Area Bath & North East Somerset within covered by a flood emergency plan	All	All
Other sources of flooding (Maps L, G3, S1, S2 and R)		
Area of Bath & North East Somerset prone to flooding from land (high)	77 km ²	22%
Area of Bath & North East Somerset prone to flooding from groundwater (high)	0 km ²	0%
Area of Bath & North East Somerset prone to flooding from sewers (high)	48 incidents	N/A
Area of Bath & North East Somerset prone to flooding from artificial sources (high)	4 km ²	1%

2.8. Level 2 Assessment for Bath & North East Somerset

The South West RSS recognises Bath as a Strategically Significant Cities and Town (SSCT). This means that after a regional sustainability appraisal (informed by a regional flood risk appraisal), the city has been identified as a key development site. For this reason, a more detailed assessment has been undertaken for Bath in the SFRA.

As Bath is constrained by a range of sustainability factors, development may be required in areas with a medium (Flood Zone 2) or higher (Flood Zone 3a) risk of flooding. This section discusses the various options available to Bath & North East Somerset should the Sequential Test indicate that development in those areas is required.

Summary of flood risk

The dominant sources of flood risk in Bath are rivers and sewers, although there is some risk from surface water, artificial sources and groundwater. The main areas at risk are;

- Rivers - Map F_Bath shows the SFRA Flood Zones within Bath as per PPS25. Map A1_Bath shows the actual extent of flooding when existing flood defences are in place

Map A2_Bath indicates the depth of flooding during a 1% AEP event. The existing flood defences do not prevent flooding during a 1% AEP flood event. The most number of properties are at risk in Grosvenor, central Bath (St John's Road and recreation/cricket grounds), Kingsmead (Riverside Road), Lower Weston (around the confluence) and Locksbrook

Map A3_Bath indicates the velocity of flooding during a 1% AEP event. The velocity of floodwater through Bath is expected to be fairly low (<0.5m/s), although some faster velocities are expected around the Cleveland Bridge and around the A367/A36 interchange

- Sewers - the drainage system throughout Bath is historic and aging, and may require a significant upgrade in the future. Incidents of sewer flooding have occurred throughout the City including Central Bath, Larkhall, Walcot, Locksbrook, Weston Park and Southdown
- Surface water - where water may collect in low-lying without sewer systems and behind flood defences
- Artificial sources - some risk of flooding from the Kennet and Avon Canal, east of the City
- Groundwater - small risk of flooding from springs in the north east extents of the City.

Climate change is expected to increase the 1% AEP floodplain along the Lower Avon and tributaries. In particular, the extent of flooding is expected to increase near Great Putney Street, Dolemeads, Kingsmead, Lower Weston, Locksbrook and Newbridge.

2.9. Uncertainty

Flood risk can be assessed using a number of techniques and also to various degrees of detail. It is important to be confident that the methods used for estimation produce results that are sufficiently robust for land use planning decisions to be based upon.

Uncertainty in flood estimation arises from the;

- complexity of the flooding
- quality of the input data
- the potential impact of climate change.

When using the SFRA to inform land use planning the following questions must be answered;

- Is the assessment suitable for the type of flooding and the scenarios being considered (fit for purpose)?
- Is the study appropriate for the level of detail required for the proposed land use (vulnerability)?
- Are the limitations of the method clearly understood and reported?
- Are the studies appropriately verified?
- Are the key assumptions identified and stated?
- Is the key input data justified and appropriate for the level of assessment (fit for purpose)?
- Have sensitivity analyses been carried out?
- Have all relevant uncertainties (ie. climate change) been identified and appropriately addressed?
- Is the information up to date?

Where there is high certainty in flood estimation there may be no need for further analyses. Conversely low certainty requires more detailed assessment.

The potential impacts of climate change are an important aspect of uncertainty relevant to flood risk estimation. Government guidance suggests that the impacts of climate change can be managed by either monitoring change in risk and adapting in the future as the need arises (Managed Adaptive Approach) or acting now to manage the eventuality (Precautionary Approach).

Adopting a "Managed Adaptive Approach" to land use planning is not advised. Future adaptation to the impacts of climate change may not be feasible in the long-term or practical in intervening periods and the requirement to review and take action can be managed more effectively through individual planning applications rather than by Bath & North East Somerset within the LDF process.

Climate change information within the SFRA has been based therefore on a precautionary approach to ensure that planning led decisions are made on a "no-regret" basis.

2.10. Currency of information

It is imperative to ensure that the latest information is used when assessing flood risk. The source and currency of the flood risk information should be checked before using any information. Management protocols are included in Volume III of the SFRA.

3. How to use the SFRA in land use planning

3.1. Introduction

This chapter describes the application of the sequential risk based approach in the formulation of the Local Development Framework proposals.

Guidance on development and flood risk is given in Planning Policy Statement 25 (PPS 25). PPS 25 requires that flood risk be considered through the application of a sequential test.

It must be noted that the guidance provided in this document does not supersede guidance provided in PPS25 or other plans or policies. The information and procedures are simply provided as an interpretation of this guidance for the preparation of the Local Development Framework (LDF).

3.2. Objectives

Bath & North East Somerset District Council is responsible for carrying out spatial planning and developing the LDF. SFRA's are undertaken to inform the spatial planning process at the local scale.

Within the LDF there is;

- A core strategy, which sets out a spatial vision including the identification of broad locations for development
- Site specific allocation documents which identify individual sites that are allocated for future development founded on robust and credible assessments of suitability
- Adopted proposals maps, which provide geographical expression of any strategies, policies and proposals identified within the Development Plan Documents (DPD).

SFRA's must inform the development of the vision, policies and broad search areas during the production of the Core Strategy. A SFRA undertaken to an appropriate level of detail ensures that the Core Strategy is robust and able to underpin the production of LDDs and the LDF in accordance with statutory requirements.

The SFRA will enable Bath and North East Somerset District Council to designate areas for development following the sequential test as required by Planning Policy Statement 25: Development and Flood Risk (PPS25). The SFRA provides the necessary information for planners to be able to take the strategic decisions that identify the where development may be permitted, how the drainage of that development should function and how vulnerable areas should be protected or adapted.

Flood risk can be assessed to various degrees of detail, which should be proportionate to the nature and complexity of the flood risk within the administrative boundary. To ensure that an appropriate level is included, guidance in the draft Practice Companion Guide to PPS25 (CLG 2007) recommends two levels of detail;

- Level 1 (initial assessment) - should be carried out for all of the administrative area, as it is necessary for the LPA to understand comparatively flood hazard across its administrative area, in order to consider flooding on a risk basis
- Level 2 (more detailed) - where the result of the Level 1 assessment indicates that there is an issue of flood risk, then it is necessary to undertake a more detailed assessment of flood risk to collect further information on the spatial distribution of flood hazard

Bath & North East Somerset District Council SFRA has undertaken a Level 1 for the administrative area and a Level 2 assessment in parts. The District Council can use the SFRA to;

- prepare appropriate policies for the management of flood risk within the District
- inform the sustainability appraisal so that flood risk is taken account of when considering options and the preparation of strategic land use policies
- identify the level of detail of required FRAs (see Section 5)
- enable them to determine the acceptability of flood risk in relation to emergency planning capability (see Section 4).

3.3. Decision support guidance

This user guide provides three tools for interpreting the technical information contained in Volume I, maps and data for use in land use planning. Each of these tools is more suited to a different land use planning decisions that must be made. They are;

(1) Application of the Sequential Test

Section 3.4 describes the application of the Sequential Test in determining an appropriate location for an intended land use. Figure 3.2 provides a flow chart for applying the Sequential Test, supported by the Government through its inclusion in the 'Practice Companion Guide to PPS25' (CLG 2007). It is a tool to help the decision-maker locate a proposed development in lower flood risk categories.

(2) Information on which land uses are considered appropriate in different locations

Table 3.1 provides generic decision support in relation to the six sources of flooding and potential land uses for the District Council LDF. This table provides guidance on when the Exception Test is required and expands upon Table D3 of PPS25 by providing additional guidance on the likely criteria for development. Section 3.5 describes the application of the Exception Test.

(3) Finding an appropriate type of land use for a specific location

Figure 4.1 provides a flow chart for using the SFRA when a development is planned in a known location. This flow chart helps the decision maker to determine whether a proposed development is considered appropriate in a known location, based on its vulnerability classification, and if not, what options are available. This figure also provides guidance on the application of the Exception Test as described in Section 3.5.

Whilst different land use planning decisions will require slightly different approaches, the following generic steps should be followed;

- Determine which tool is most suitable for the required land use planning decision (Figure 3.2, Table 3.1 or Figure 4.1 of this guide)
- Use the tool and the maps provided to determine whether the proposed development is considered appropriate
- Use the information in Volume II of the SFRA and questions in Section 2.9, to determine the source and certainty of information, and whether it is appropriate for use in the decision making process
- Consult with the Environment Agency and other key stakeholders to determine currency of information. Pay particular attention to latest Government guidance, findings of strategy studies and current condition of flood defences
- Determine where necessary the requirement for more detailed studies based on areas of high risk (where receptors must be located in higher probability flood zones) or where information is too uncertain for an effective land use planning decision to be made

- Undertake more detailed studies where required. Use the results to revisit steps 1 to 5.
- Consult with the Environment Agency and other key stakeholders
- Where land use is planned in areas of higher probability flood risk, use information in Volume II of the SFRA and where available, more detailed studies, to apply the Exception Test (see section 3.5).

3.4. Sequential Test

It is recognised that flood risk information must be considered alongside other spatial planning issues. Allocations are thus “tested” on the basis of their flood risk attributes and the outcome used to inform decisions that include other spatial planning issues. This is the Sequential Test. Figure 3.1 illustrates the context for the application of the information in the SFRA.

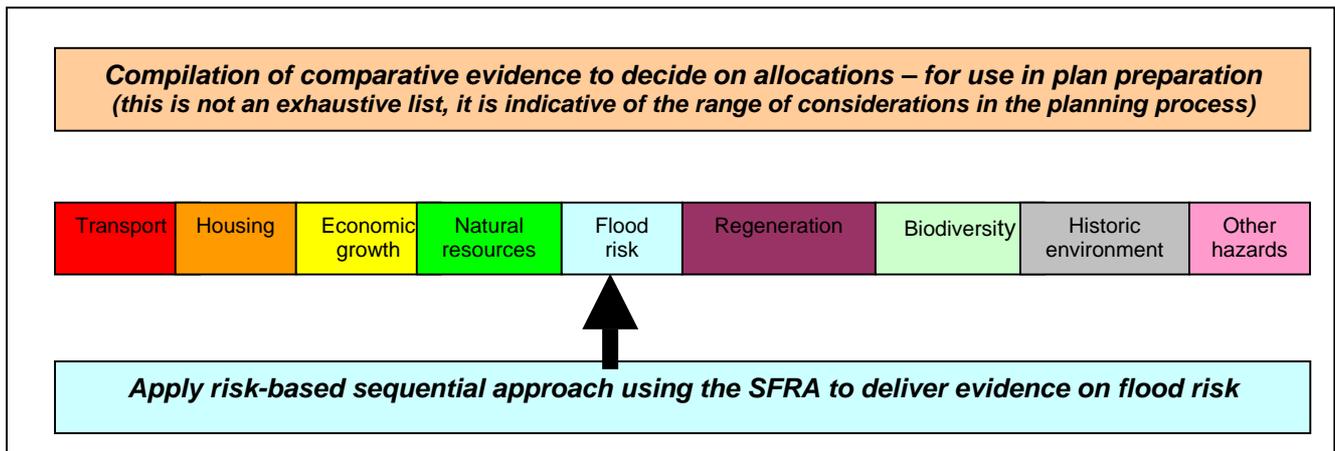


Figure 3.1 How the risk based sequential approach informs decision-making

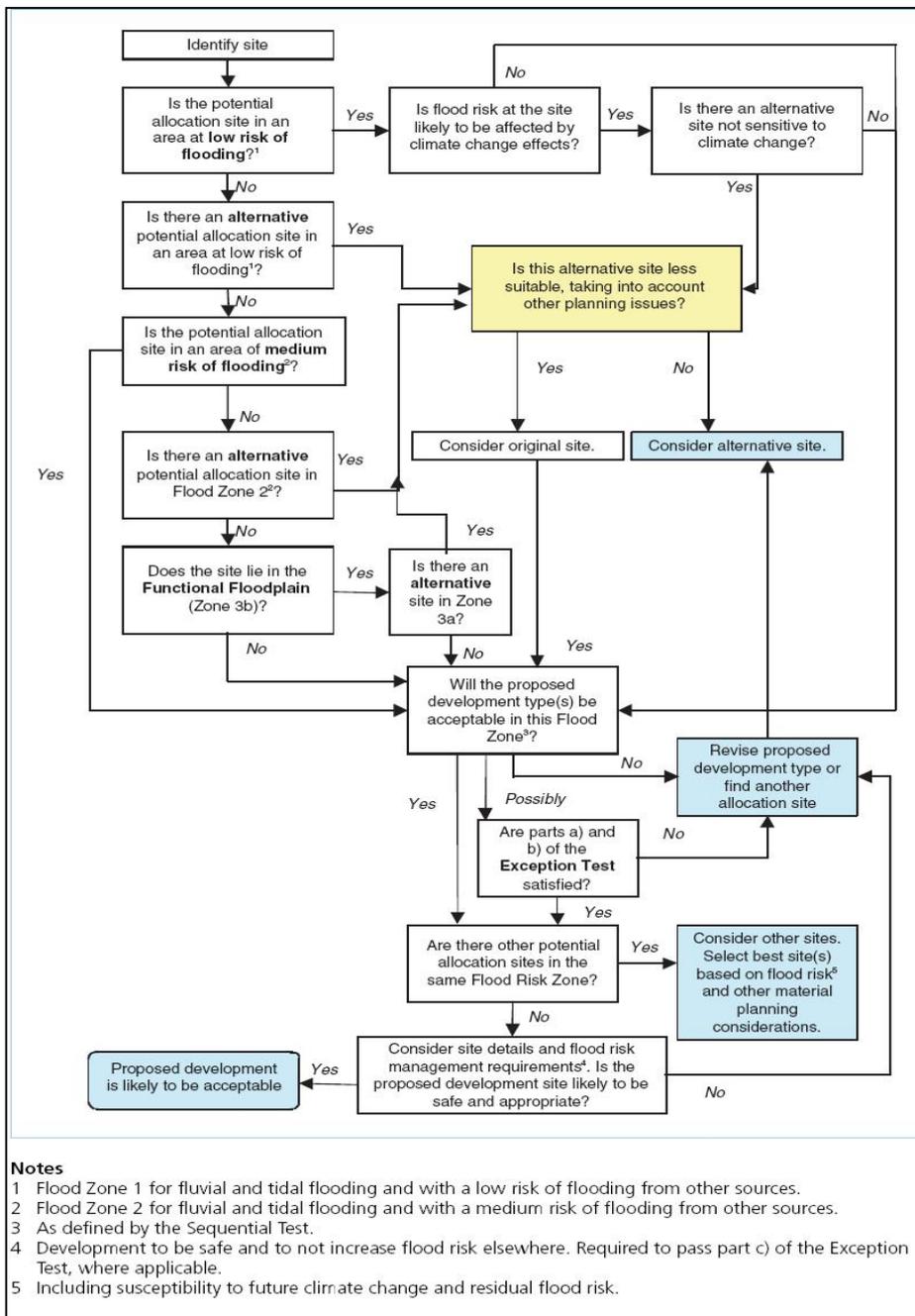
The Sequential Test should be applied by Bath & North East Somerset Council when allocating land for development during the production of the Local Development Framework (LDF).

The Test is applied to demonstrate that there are no reasonably available sites in areas with a lower probability of flooding, which would be appropriate to that type of development.

If there is no other reasonably available site within the lowest risk zone (from all sources of flooding), then the vulnerability of the proposed development can be taken into account. Although there may be times that some land use is considered more appropriate in one of the other vulnerability classes. For example, installations requiring hazardous substances consent are considered highly vulnerable.

Figure 3.2 provides a flow chart for applying the Sequential Test in determining an appropriate location for an intended landuse. This chart is supported by the Government through its inclusion in the 'Practice Companion Guide to PPS25' (CLG 2007). It is a tool to help the decision-maker locate a proposed development in lower flood risk categories.

The guidance provided in these tools should ideally be agreed by the Environment Agency and Bath & North East Somerset. It is important that the decision maker engages key stakeholders early in the decision making process. It is also important to consider uncertainty of information when making land use planning decisions.



(Source: CLG 2007)

Figure 3.2 Application of the Sequential Test

3.5. Exception text

Following the application of the Sequential Test, if it is not possible for the development to be located in zones of lower risk, and it is consistent with wider sustainability objectives, then the Exception Test can be applied in accordance with table D3 and paragraphs D9 to D14 of PPS 25.

The Exception Test provides a method of managing flood risk while still allowing necessary development to occur. It may not always be appropriate to apply the Exception Test, and if applied all three elements must be passed. The three elements of the exception test are;

1. It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk.
2. The development must be on developable previously developed land or, if it is not on previously developed land, that there are no reasonably alternative sites on developable previously developed land (ie. no reasonably alternative 'brownfield' sites exist).
3. A site specific flood risk assessment must demonstrate that the development will be safe, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

PPS25 requires all six forms of flooding (river, sea, land, groundwater, sewer and artificial sources) to be considered when making land planning decisions. Volume 1 of the SFRA has provided information on each of these sources of flooding, including flood maps which predict areas more likely to be affected by the different sources. It is important to note that there is no implied priority given to any of these specific types of risk.

PPS25 also requires the vulnerability of different land uses to flooding to be considered when making land-planning decisions. The land uses in the Bath & North East Somerset Local Development Framework will cover a range of vulnerability classifications of land use as per Table D2 of PPS25 (essential infrastructure, highly vulnerable, more vulnerable, less vulnerable and water compatible).

Table 3.1 provides generic decision support in relation to the six sources of flooding and potential land uses for the Local Development Framework. This expands upon Table D3 of PPS25 by providing additional guidance on the likely criteria for development in each combination of land use and risk.

The following generic steps must be undertaken when considering land-use allocation proposals;

- o Assess the requirement with reference to Table 3.1 and Figure 4.1 and Volume II of the SFRA
- o Identify the source of information and so certainty of the level of flood risk
- o Consult with the Environment Agency
- o Determine where necessary the requirement for more detailed studies based on areas of high risk (where receptors must be located in higher probability flood zones) and where information is too uncertain for an effective land use planning decision to be made
- o Consult with the Environment Agency
- o Where land use is planned in areas of higher probability flood risk, use the SFRA to test the proposed application against the Exception Test (see PPS25 Table D1).

3.6. Windfall sites

Any currently allocated sites that have not been sequentially tested by the LPA, together with any new (windfall) sites that developers bring forward will need to be sequentially tested by the developer. In all cases, the sequential test must be performed in an open and transparent manner, in advance of the exception test. The LPA, along with the Environment Agency, will be responsible for overseeing the process, and for evaluation the submission by the developer.

Table 3.1 SFRA planning guidance summary table (to be used in conjunction with Table D1 and D2 of PPS25, classification of flood risk and vulnerability respectively).

		Essential infrastructure	Water compatible development	Highly vulnerable	More vulnerable	Less vulnerable
Flood zones Map F	Flood Zone 1	Development is appropriate, No constraints on development, other than managing surface water runoff (check Maps A1, R, L,S &G).				
	Flood Zone 2	Development is appropriate. Opportunities should be sought to reduce overall risk by layout and form or development and management of surface water runoff. Must remain operational during extreme flood event.	Development is appropriate. May be suitable with flood resistant construction and suitable evacuation procedures	Development should be avoided. Exception Test is required.	Development is appropriate. Opportunities should be sought to reduce overall risk by layout and form or development and management of surface water runoff.	Development is appropriate. Opportunities should be sought to reduce overall risk by layout and form or development and management of surface water runoff. Risk assessment required to establish level of flood hazard during 1 in 100 year return period flood event. Also detailed risk assessment to identify level of hazard during breach/blockage failure event,
	Flood Zone 3a	Development should be avoided. Exception Test is required. Must remain operational during an extreme flooding event. Consideration of built form, emergency planning and evacuation. Must remain operational during an extreme flooding event. (extreme flood event analyses should consider operation during breach/blockage failures and 1 in 1000 year return period residual risk event)	Development is appropriate. Could be suitable subject to flood resistant construction and suitable warning/evacuation procedures	Development should not be permitted.	Development should be avoided. An Exception test is required.	Development should not be permitted.
	Flood Zone 3b				Development should not be permitted.	
Map A1	Actual Risk (ie. Including defences in 3a)				Development should be avoided. Development could be suitable with strategic solution or careful design of built form. Subject to an Exception Test, and a detailed study of flood hazard being undertaken in relation to possible failure of flood defences. Flood warning measures required	Development should be avoided. Could be to be suitable with strategic solution or careful design of built form. Subject to an Exception test, and a detailed study of flood hazard being undertaken in relation to possible failure of flood defences.
Map R	Reservoirs, canals and other artificial sources	Generally should be avoided. Consideration of built form, emergency planning and evacuation. Must remain operational during an extreme flooding event.	Generally suitable as long as development does not impede floodplain flows or cause a loss of floodplain storage, use of site is expected to be restricted during times of flood risk.	Generally should be avoided unless minor extension to already established use with suitable flood warning and evacuation procedures, if practical, for the lifetime of the development. Not suitable in areas where flood warning and evacuation procedures are not practical due to speed of inundation.		Could be suitable with strategic solution or careful design of built form. Detailed risk assessment to identify level of hazard during breach/blockage failure events
	Coastal flooding	Coastal flooding is not expected to affect B&NES. This must be reconsidered if further government guidance on climate change is published at a later date.				
Map L	Surface water flooding	Consider potential effect of extreme events, particularly in relation to location identified as 'high risk'. Should assess requirement for strategic solutions or careful design of built form.	Generally suitable with flood resistant design.	Consider potential effect of extreme events, particularly in relation to locations identified as being at 'high risk'. Assessments should consider strategic solutions or careful design of individual built form on an case by case basis in relation to a detailed assessment of risk.	Consider potential effect of extreme events, particularly in relation to locations identified as being at 'high risk'. Assessments should consider strategic solutions or careful design of individual built form on an case by case basis in relation to a detailed assessment of risk.	Consider potential effect of extreme events, particularly in relation to locations identified as being at 'high risk'. Assessments should consider strategic solutions or careful design of individual built form on an case by case basis in relation to a further assessment of risk.
Map G	Groundwater flooding					
Map S	Sewer flooding	Consultation with Wessex Water or Bristol Water should be sought to confirm localized risk of flooding and any ongoing mitigation.		Consultation with Wessex Water or Bristol Water should be sought to confirm localized risk of flooding and any ongoing mitigation.	Consultation with Wessex Water or Bristol Water should be sought to confirm localized risk of flooding and any ongoing mitigation.	Consultation with Wessex Water or Bristol Water should be sought to confirm localized risk of flooding and any ongoing mitigation.
<p>Notes:</p> <ul style="list-style-type: none"> i. This Matrix is designed to provide planning guidance to B&NES Local Planning Authority in accordance with the Strategic Flood Risk Assessment, and it does not in any way supersede or replace PPS25 or Table D.2. ii. The Sequential Test should be applied before considering the application of the Exception test or determining whether a particular location is appropriate for the development vulnerability defined. iii. For potential solutions affected by flood risk full consideration shall be given to the management, maintenance and operation of any necessary measures (be they strategic or site specific). Failure to be able to demonstrate commitment to the long term operation, management and maintenance of such measures for the lifetime of development will deliver development that cannot be sustained. iv. This Matrix is based on the principles of PPS25, adjusted in include latest government reaction to the flood risk to essential infrastructure following flooding of July 2007 v. Further details of the exception test can be found in PPS25, the practice guide companion to PPS25 and the Strategic Flood Risk Assessment. Any proposed development requiring an exception test, or development where the actual risk is reduced due to the presence of defences should utilities the velocity and depth data provided in the Strategic Flood Risk Assessment and allocated reduced vulnerability land uses appropriately. vi. Where development is proposed that relies on a reduced level of flood risk due to flood defences, the FRA must include a full assessment of the impact of the failure of flood defence infrastructure (ie. Overtopping, breaching, blockage etc). vii. Third party infrastructure may act as a Flood Defence, although it must never be assumed that this infrastructure IS a flood defence (ie. It may not be constructed of suitable materials, or not be maintained as a flood defence). viii. Flood risk assessments should include consideration of flooding from all sources identified in the SFRA, a qualitative methodology has been used to assess risk of flooding from Surface Water, Sewer and Groundwater in order to predict relatively problematic areas. However the scale of the risk has not been assessed quantitatively, hence the scale of the response in planning or development terms must be considered on a site by site basis and always in consultation with the appropriate responsible body, namely the Environment Agency, Bristol Water, Wessex Water, British Waterways, the Highways Agency (with respect to Surface Water drainage from road network) and B&NES departments as appropriate 						

4. How to use the SFRA in flood warning and emergency planning

Government recognises that it is not possible to protect everyone, everywhere against every flooding eventuality. Extreme or unpredictable events can happen. While physical defences may provide a level of protection, they may be breached or overtopped. A necessary component of flood defence is flood warning, backed up by civil protection measures. In this context, the Environment Agency is the authority responsible for issuing forewarning of possible events to the public, local authorities and emergency services.

Structures and procedures for civil protection drawn up under the Civil Contingencies Act came into force in November 2004. The Act formalises the duties on Category 1 responders to emergencies by requiring risk assessment and contingency planning to deal with emergencies, and the giving of advice and information to the public about actual or likely emergencies.

Under the Act, risk assessment and planning is arranged through Local and Regional Resilience Forums. The Forums, which are led by the Regional Resilience Teams in the Government Offices of the Regions, seek to draw in all those bodies, which may be exposed to risk or be required to respond to events, including flooding. This includes production of an emergency flood management plan, which may then be incorporated into a local emergency plan or major incident plan as judged appropriate. The Teams also assist local authorities and emergency services in responding to and recovering from events.

The SFRA provides information on the spatial distribution of flood hazard, which can inform the production of emergency flood management plans. Emergency flood management plans should minimise risks to life and property, through, for example, ensuring that evacuation procedures are adequate to the kinds of risks that a major flooding event may create.

Information held within the SFRA can be used to:

- identify and develop emergency plans for parts of Bath & North East Somerset which respond quickly to rainfall and produce hazardous flows (rapid response catchments);
- identify and develop emergency plans for rapid inundation of properties due to failure of raised sections of defences and structures;
- identify essential infrastructure at higher risk of flooding, such as power stations and public buildings;
- identify major transportation linkages at higher risk of flooding; and
- improve flood warning through further analysis of antecedent conditions and seasonality of flooding.

5. Using the SFRA for development control

SFRAs set the context within which any planning application should be considered, by establishing;

- the category of Flood Zone within which the proposed site sits
- the flood risk constraints in accordance with guidance in PPS25
- the basis of the policies of Bath & North East Somerset regarding proposed development in each Flood Zone.

The SFRA should be used to provide high level flood risk information for decisions on land use planning. This can be done on an “as required” basis, matching the needs of phased submission of applications.

Developers should be referred to the SFRA at the start of any pre-application consultation with the LPA. Where developers promote development outside of the allocated areas identified in the LDDs and within flood risk areas defined by the SFRA they are responsible for;

- demonstrating compliance with PPS25 notably the Sequential Test and if appropriate the Exception Test
- providing an assessment of the impact of flooding on the development and of the development on flood risk elsewhere
- satisfying the LPA that flood risk to the development and the impact of the development on flood risk elsewhere will be appropriately managed.

This will require the preparation of site-specific Flood Risk Assessments (FRAs). The SFRA provides advice on the likely scope of FRAs, and developers should demonstrate that these have been considered prior to consulting further with the LPA and Environment Agency.

The level of information in FRAs should be proportionate to the degree of flood risk and the scale, nature and location of the proposed development. The SFRA provides information already available which should be considered in the production of site-specific FRAs. In these instances the SFRA allows the LPA to identify the level of detail required for site-specific FRAs in particular locations.

The SFRA should also be used to set planning constraints within development areas designated in the LDDs and where relevant in the case of windfall planning applications.

5.1. Guidance for site specific flood risk assessments

The outcomes of the SFRA do not replace the requirement for an appropriate FRA to be undertaken at the planning application stage.

The FRA will be required to demonstrate that flood risk to the development and from the development can be managed now and in the future. The requirement for site-specific flood risk assessments is detailed in PPS25. Planning applications for development proposals of 1 hectare or greater in Flood Zone 1 and all proposals for new development located in Flood Zones 2 and 3 require a FRA.

Flood Risk Assessments should consider all sources of flooding and where appropriate, mitigation measures. Where risk of flooding from sources other than the sea or rivers has been identified such as groundwater or surface water flooding the FRA needs to consider the risk of flooding at the site. FRAs should also consider the impact of the development on flood risk elsewhere.

5.2. Guidance for developers

Paragraphs 22 and 23 of PPS25 clarify the responsibilities of developers to consider flood risk issues at a site as early as possible. Key points include the responsibility of landowners for safeguarding land and other property against hazards. It is the responsibility of property owners and users to manage the drainage of their land, as far as possible to prevent adverse impacts on neighbouring land.

Developers are advised to make independent checks regarding flood risk before purchasing a site. Where a site is allocated within the LDD that has been sequentially tested for the type of development proposed and is supported by a SFRA, the Sequential Test does not have to be applied. However the developer should apply a sequential approach to determine the appropriate land uses across the site with respect to any flood risk within the site.

The scope of any FRA should be agreed with the Local Planning Authority, and if necessary the Environment Agency, and it should be agreed who the developer needs to consult. For example the developer may need to consult Sewerage undertakers, Highways Authorities, Reservoir Undertakers, British Waterways etc. The developer is responsible for demonstrating the development is consistent with the policies in PPS25 and those on flood risk in the LDDs.

SFRAs should be used as the starting point as FRAs may be relatively minor in nature. For example the development may be small, on a low risk site and have minimal secondary effects on flood risk. FRAs should be proportional to the size and type of development and risk of flooding.

LDDs may provide specific guidance on, or criteria for, allocated development sites. Where sites have been allocated by the LPA in accordance with the Exception Test, the SFRA may provide more detailed background information. A key requirement for FRAs is that they consider all sources of flooding and demonstrate how flood risk will be managed taking into account climate change.

5.3. Flood Risk Assessments

Flood Risk Assessments may be standalone documents submitted by the developer to accompany a planning application, or where an environmental statement is required, the developer should ensure that the FRA is incorporated into the study. The objectives of the FRA include;

- Establishing whether a proposed development is likely to be affected by current or future flooding from all sources
- Whether the development will increase flood risk elsewhere
- Whether the measures proposed to manage flood risk are appropriate
- Whether the site will be safe to enable part C of the Exception Test to be passed if required.

The Practice Guide Companion to PPS25 provides guidance on the level of Flood Risk Assessment required and sources of information to aid in completing each stage. The principles and key requirements of a FRA are provided in PPS25 Appendix E. The scope of a FRA includes;

- a description of the development and the planning context
- definition of flood hazard
- probability of flooding and the impact of climate change on flood risk
- surface water drainage
- detailed description of development proposals
- flood risk management measures including the application of SUDs
- impacts of the development off site
- an assessment of residual risk.

Guidance on flood risk management measures, both for the development and to reduce the impact of the development on flood risk elsewhere is provided in Volume 1.

6. How the SFRA links to other plans and policies

SFRA enable Local Planning Authorities (LPAs) to allocate areas for development in accordance with the Sequential Test described in PPS25. Where the Sequential Test cannot be met and allocations are proposed within higher probability Flood Zones, SFRAs should be refined to provide information necessary for application of the Exception Test (PPS25).

SFRA can also be used to set planning constraints within designated development areas and where relevant in the case of windfall planning applications.

In existing urban areas, SFRAs should be used to inform decision makers of the impacts of climate change and urbanisation.

SFRA also allow LPAs to identify the level of detail required for site-specific FRAs in particular locations and enable them to determine the acceptability of flood risk in relation to emergency planning (CLG 2007).

The role of the SFRA in the hierarchical planning structure in England, together with its other possible uses, is summarised in the following sections. Figure 6.1 illustrates how the SFRA may fit into the conceptual land use planning framework.

6.1. Regional spatial strategy

Regional Planning Bodies (RPBs) are required to prepare Regional Flood Risk Appraisals (RFRAs) and in doing so, consider flood risk when preparing Regional Spatial Strategies (RSSs).

RFRAs should make reference to and use existing assessments of flood risk including SFRAs where available. In turn the RFRA should inform the requirements of sub-regional scale SFRAs as they are produced or updated.

The RSS covering Bath & North East Somerset is the Regional Planning Guidance for the South West (RPG10). Policy F1 provides guidance on flooding. Key strategic sustainability policy objectives of the South West RSS of relevance to the Bath & North East Somerset SFRA include:

- Avoiding the need for development in flood risk areas and incorporating measures in design and construction to reduce the effects of flooding
- Requiring 'future proofing' of development activity for its susceptibility to climate change
- Positively planning to enhance natural environments through development, taking a holistic approach based on landscape or ecosystem scale planning

Taking account of climate change and the increased risk of flooding, the priority is to;

- Defend existing properties and, where possible, locate new development in places with little or no risk of flooding
- Protect flood plains and land liable to tidal or coastal flooding from development
- Follow a sequential approach to development in flood risk areas
- Use development to reduce the risk of flooding through location, layout and design
- Identify areas of opportunity for managed realignment to reduce the risk of flooding and create new wildlife areas

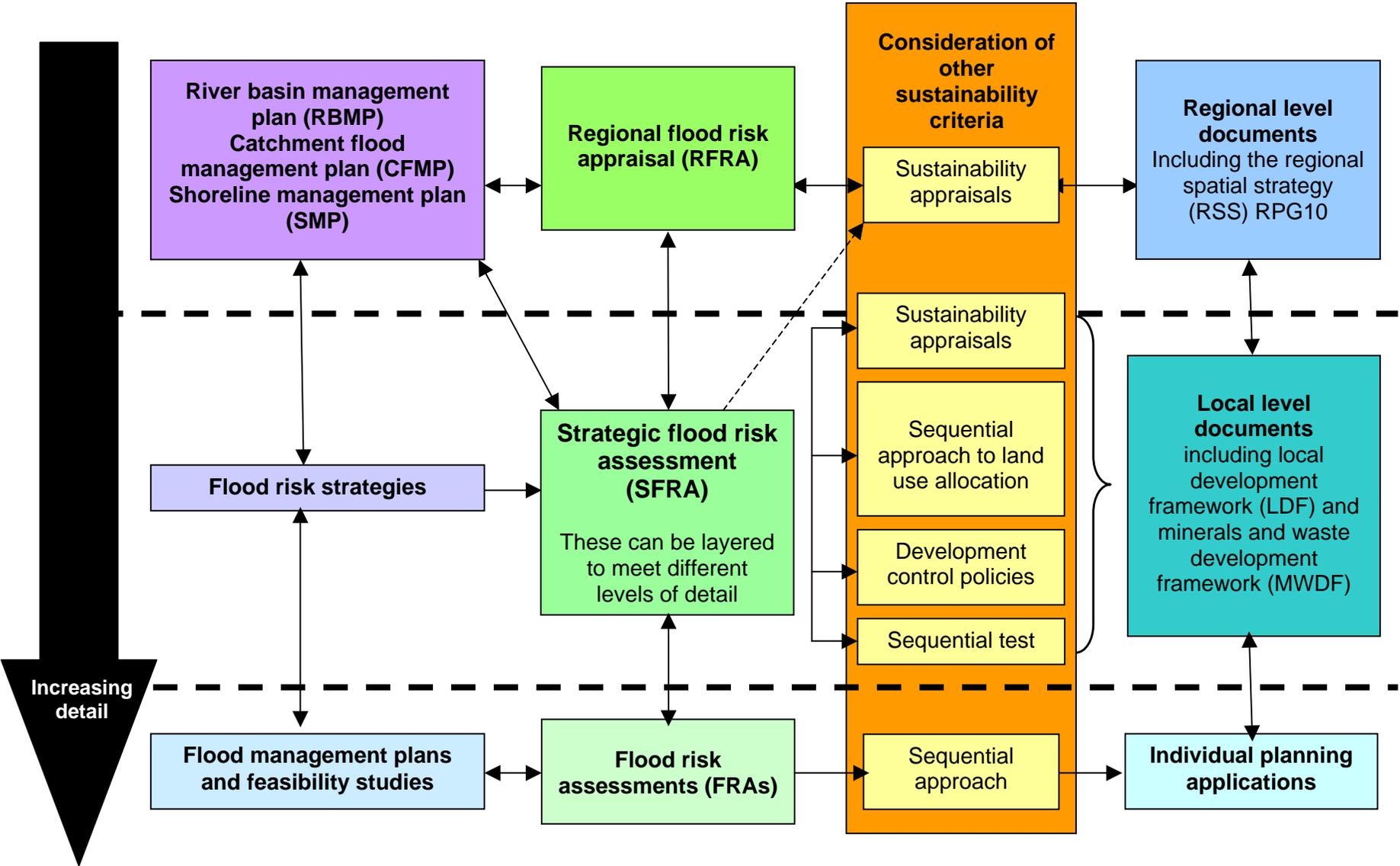


Figure 6.1. How the SFRA may fit into the conceptual land use planning framework

6.2. Other local development frameworks

Local Planning Authorities (LPAs) are responsible for carrying out spatial planning and developing Local Development Frameworks (LDF). SFRA are undertaken to inform the spatial planning process at the local scale.

Within a LDF there are a number of local development documents (LDD):

- a core strategy, which sets out a spatial vision including the identification of broad locations for development;
- site specific allocation documents which identify individual sites that are allocated for future development founded on robust and credible assessments of suitability; and
- adopted proposals maps, which provide geographical expression of any strategies, policies and proposals identified within the Development Plan Documents (DPD).

SFRA must inform the development of the vision, policies and broad search areas during the production of the Core Strategy. SFRA undertaken to an appropriate level of detail ensures that the Core Strategy is robust and as demonstrated is able to underpin the production of LDD and the LDF in accordance with statutory requirements.

SFRAs enable LPA to designate areas for development following the Sequential Test as required by PPS25. SFRA should provide the necessary information for planners to be able to take the strategic decisions that identify the amount of development that may be permitted, how the drainage of that development should function and how vulnerable areas should be protected or adapted.

Additionally the Planning and Compulsory Purchase Act 2004, there is a requirement for LDDs to have regard to national policies and guidance issued by the Secretary of State. The Act also requires those preparing (RSS and) LDDs consider the needs of sustainable development. The Act requires therefore a sustainability appraisal of the strategies and policies in the LDDs.

Whilst this SFRA has been developed to inform the LDF, the technical information held within the SFRA could be used to inform these other frameworks and the accompanying assessments of flood risk therein.

When using this SFRA to inform other LDFs, consideration must be given to the level of detail and certainty of information provided, as the spatial extent and detail of the technical assessments undertaken have been tailored to be appropriate to inform a strategic scale.

It may be necessary to further refine some of the information presented in Volume I of this SFRA to ensure that it is sufficiently detailed and presented at a level that is appropriate to inform other LDFs.

7. References

- Communities and Local Government (2006) 'Planning Policy Statement 25' (PPS25)
- Communities and Local Government (2007) 'A Practice Guide Companion to Planning Policy Statement 25' Living draft, consultation paper
- Environment Agency (2000) 'Lessons learnt - Autumn 2000 floods' November 2000
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- CIRIA 624 (2004) 'Development and Flood Risk – Guidance for the Construction Industry'
- Fleming, G (2001) 'Learning to Live with Rivers – Final Report to the Institution of Civil Engineers.'
- P.B Sayers, J.W. Hall, I.C. Meadowcroft, (May 2002) 'Towards risk-based flood hazard management in the U.K.'

8. Glossary and notation

Actual risk	The risk that has been estimated based on a qualitative assessment of the performance capability of the existing flood defences
AEP	Annual probability of exceedence. The annual chance of experiencing a flood with the corresponding flood magnitude, i.e. a 1% AEP flood is a flood with a flow magnitude that has a 1% chance of occurring in each and every year
Bath & North East Somerset	Bath and North East Somerset
Breach or failure hazard	Hazards attributed to flooding caused by a breach or failure of flood defences or other infrastructure which is acting as a flood defence.
CFMP	Catchment Flood Management Plan
CLG	Communities and Local Government. Government Department responsible for issuing Planning Policy Statement 25: Development and Flood Risk
Flood defence	Natural or man-made infrastructure used to prevent flooding
Flood risk	<i>Flood risk is a combination of two components: the chance (or probability) of a particular flood event and the impact (or consequence) that the event would cause if it occurred (EA 2003).</i>
FRA	Flood Risk Assessment
Flood risk management	<i>Flood risk management can reduce the probability of occurrence through the management of land, river systems and flood defences, and reduce the impact through influencing development in flood risk areas, flood warning and emergency response (EA 2003).</i>
Flood Zones	This refers to the Flood Zones in accordance with Table D1 of PPS25. For the purpose of the SFRA, the definition of flood zones varies slightly from PPS25 in that it shows the extent of flooding ignoring the presence of flooding defences, "except where the 'actual risk' extent is greater"
LDD	Local Development Documents
LDF	Local Development Framework
LPA	Local Planning Authority
PPS25	Planning Policy Statement Note 25: Development and Flood Risk (December 2006).
Precautionary	<i>"Where there are threats of serious or irreversible damage, lack of full scientific</i>

principle	<i>certainty shall not be used as a reason for postponing cost effective measures to prevent environmental degradation</i> '. The precautionary principle was stated in the Rio Declaration in 1992. Its application in dealing with the hazard of flooding acknowledges the uncertainty inherent in flood estimation.
Residual risk	Flood risks resulting from an event more severe than for which particular flood defences have been designed to provide protection.
RFRA	Regional Flood Risk Appraisal
RPB	Regional Planning Body
RSS	Regional Spatial Strategy
Sequential risk-based assessment	Priority in allocating or permitting sites for development, in descending order to the flood zones set out in Table 1 of PPG25, including the sub divisions in Zone 3. Those responsible for land development plans or deciding applications for development would be expected to demonstrate that there are no reasonable options available in a lower-risk category (PPG25 paragraph 30).
SFRA	Strategic Flood Risk Assessment
SREP	Strategic Risk Evaluation Procedure
SUDs	Sustainable Urban Drainage Systems

9. Site specific analysis of potential development sites (Appendix A)

Schedule of figures presented on following pages		
Figure	Local plan reference	Name
1	B2	MOD Foxhill
2	B7	Englishcombe lane
3	B12	Lower Bristol road
4	B16	The podium / cattlemarket
5	B18	Hayesfield school playing field
6	K1	Somerdale
7	K2	South west Keynsham
8	K3	Broadmead lane
9	K4	St. Johns Court
10	NR3	Former sewerage works, Welton Hollow
11	NR12	Enterprise park west of Midsomer Norton
12	NR13	Coombe end, Radstock
13	NR14	Welton bag factory, Radstock
14	NR15	Land at Cautletts close, Midsomer Norton
15	V4	Old Mills, Paulton
16	V8	Former Radford Retail Systems Site, Chew Stoke
17	V10	Land between Wellow Lane and the bypass, Peasedown St. John