# East Devon District Council – Level 1 Strategic Flood Risk Assessment

## Final Report

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## Revision history

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## Contract

This report describes work commissioned by East Devon District Council, in an email dated 17th May 2022. East Devon District Council's representatives for the contract was Linda Renshaw. Lucy Archer-Lock, Erica Skinner and Jon Wilson of JBA Consulting carried out this work.

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## Purpose

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JBA Consulting has no liability regarding the use of this report except to East Devon District Council.


## Acknowledgements

JBA would like to acknowledge East Devon District Council, the Environment Agency, Devon County Council, neighbouring authorities and South West Water for their assistance in producing this SFRA.




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## Executive summary

This report provides a comprehensive and robust evidence base on flood risk issues to support the review and update of the East Devon Local Plan and associated Planning Policy documents using the best available information. This SFRA can be used to inform the Local Plan on the location of future development and the preparation of sustainable policies for the long-term management of flood risk, provided the potential implications of the proposed changes to the PPG are understood.

**Introduction**

To support the preparation of a new Local Plan for East Devon District Council, the key objectives of the assessment are:

- To update the East Devon District Council Local Plan, taking into account the most recent policy and legislation in the National Planning Policy Framework (2022).
- To collate and analyse the latest available information and data for current and future (i.e. climate change) flood risk from all sources, and how these may be mitigated.
- To inform decisions in the emerging Local Plans, including the selection of development sites and planning policies.
- To provide evidence to support the application of the Sequential Test for the allocation of new development sites, to support East Devon District Council's preparation of the Local Plan.
- To provide a comprehensive set of maps presenting flood risk from all sources that can be used as evidence base for use in the emerging Local Plan.
- To provide advice for applicants carrying out site-specific Flood Risk Assessments and outline specific measures or objectives that are required to manage flood risk.

**Summary of flood risk in East Devon District**

Parts of the East Devon District are at risk of flooding from the following sources: fluvial, tidal, surface water, groundwater, sewers and reservoir inundation. This study has shown that the most significant sources of flood risk in East Devon District are fluvial, tidal and surface water.

- *Fluvial flood risk*: The primary sources of fluvial flood risk in East Devon are along the River Exe, River Clyst, River Otter, River Sid, River Axe and their tributaries. These watercourses present fluvial flood risk to rural communities as well as to the main urban areas in East Devon.
- *Tidal flood risk*: The areas identified most at risk of tidal flooding are Exmouth, Budleigh Salterton, Sidmouth and Seaton. In some places along the coastline, such as settlements along the Exe estuary, tidal flood risk can occur in combination with fluvial and surface water sources which can exacerbate flood risk.
- *Surface water flood risk*: The Risk of Flooding from Surface Water map shows a number of prominent overland flow routes; these predominantly follow topographical flow paths of existing watercourses or dry valleys with some isolated ponding located in low lying areas. There are also considerable flow routes following the roads through the main urban areas of Buckerell, Kilmington, Cranbrook and Clyst St Mary. All of which are designated as a Flood Risk Area due to surface water flooding.
- *Sewer flood risk*: South West Water historical hydraulic flood incident records have been used to identify areas which have experienced sewer flooding. Areas with recorded sewer flooding incidents include Exmouth, Ottery St Mary, Budleigh Salterton, Honiton, Woodbury, Sidmouth, Axminster, Clyst St Mary, Seaton and Colyton.

- *Groundwater flood risk*: JBA's Groundwater Flood Risk map shows the areas with the shallowest groundwater levels generally follow the flow paths of the major watercourses in East Devon District, particularly along the River Otter valley and its tributary valleys, in areas close to the River Clyst in the west of East Devon district and areas in the River Exe valley.
- *Flooding from canals*: There are no canals identified in East Devon.
- *Flooding from reservoirs*: There is a potential risk of flooding from reservoirs both within the district and those outside. The level and standard of inspection and maintenance required under the Reservoirs Act means that the risk of flooding from reservoirs is relatively low. However, there is a residual risk of a reservoir breach and this risk should be considered in any site-specific Flood Risk Assessments (where relevant).

### Defences

Flood defences are located along parts of each main river in the district. The majority of these defences are as natural high ground, however formal defences are located in Stoke Canon, Clyst St Mary, Exmouth, Budleigh Salterton, Ottery St Mary and Axmouth.

### Development and flood risk

The Sequential and Exception Test procedures for both Local Plans and Flood Risk Assessments have been documented, along with guidance for planners and developers. Links have been provided for various guidance documents and policies published by other Flood Risk Management Authorities such as the Lead Local Flood Authority and the Environment Agency.

When necessary, development and redevelopment within East Devon District will require a Flood Risk Assessment appropriate to the scale of the development and to the scope as agreed with the Lead Local Flood Authority and/or Environment Agency. Flood Risk Assessments should consider flood risk from all sources including residual risk, along with promotion of Sustainable Drainage Systems to create a conceptual drainage strategy and safe access/egress at the development in the event of a flood. Latest climate change guidance (last updated in May 2022) should also be taken into account, for the lifetime of developments. Planners and developers must ensure that modelling in line with the most up to date Environment Agency climate change guidance has been run.

## How to use this report

### Planners

This Level 1 Strategic Flood Risk Assessment (SFRA) 2024 is an update to the 2008 document is published as part of the evidence base for the emerging Local Plan. The report has updated the content that was included in the previous SFRA to provide appropriate supporting evidence for the resubmission of the Local Plan.

This includes how the cumulative impact of development should be considered.

It provides the latest flood risk data and guidance to inform the Sequential Test and provides guidance on how to apply the Exception Test. The Council can use this information to apply the Sequential Test to strategic allocations and identify where the Exception Test will also be needed.

The SFRA provides guidance for developers, which can be used by development management staff to assess whether site-specific Flood Risk Assessments meet the required quality standard.

**Developers**

For sites that are not strategic allocations, developers will need to use this SFRA to help apply the Sequential Test. For sites which fall into the following categories, whether strategic allocations or windfall sites, developers will need to apply the Exception Test and use information in a site-specific Flood Risk Assessment to inform this test at planning application stage.

- Highly vulnerable and in Flood Zone 2
- Essential infrastructure in Flood Zone 3a or 3b
- More vulnerable in Flood Zone 3a

This is a strategic assessment and does not replace the need for site-specific Flood Risk Assessments. A Flood Risk Assessment is needed for developments:

- in Flood Zones 2 or 3
- more than 1 hectare in Flood Zone 1
- less than 1 hectare in Flood Zone 1, including a change of use in development type to a more vulnerable class, where they could be affected by sources of flooding other than rivers and sea (for example surface water or reservoir flooding)
- in an area within Flood Zone 1 which has critical drainage problems as notified by the Environment Agency
- land identified in an SFRA as being at increased risk in the future

In addition, a surface water drainage strategy will be needed for all major developments in any Flood Zone to satisfy Devon County Council, the Lead Local Flood Authority (LLFA).

Developers can use the information in this SFRA, alongside site-specific research to help scope out what additional work will be needed in a detailed Flood Risk Assessment. To do this, they should refer to Section 5, Section 8, and the attached Appendices (PDF mapping) A-Q. At the planning application stage, developers may need to undertake more detailed hydrological and hydraulic assessments of the watercourses to verify flood extent (including latest climate change allowances, last updated in May 2022), inform master planning and demonstrate, if required, that the Exception Test is satisfied. As part of the Environment Agency's updated guidance on climate change, which must be considered for all new developments and planning applications, developers will need to undertake a detailed assessment of climate change as part of the planning application process when preparing FRAs.

Developers need to ensure that new development does not increase surface water runoff from a site or contribute to cumulative effects at sensitive locations, see Section 7. Section 9 provides information on the surface water drainage requirements of the LLFA. Sustainable Drainage Systems should be considered early in the development process, helping to minimise costs and overcome any site-specific constraints.

Site-specific Flood Risk Assessments will need to identify how flood risk will be mitigated to ensure the development is safe from flooding. In high-risk areas, the site-specific Flood Risk Assessment will also need to consider emergency arrangements, including how there will be safe access and egress from the site.

Residual risk is the risk that remains after mitigation measures are considered. The residual risk includes the consideration of flood events that exceed the design thresholds of the flood defences or circumstances where there is a failure of the defences, e.g. flood banks collapse. Residual risks should be considered as part of site-specific Flood Risk Assessments.

Any developments located within an area protected by flood defences and where the standard of protection is not of the required standard (either now or in the future) should be identified and the use of developer contributions considered to fund improvements.

### Neighbourhood plans

The SFRA provides:

- Information on the sources of flooding and the variation in the risk across the District.
- Identification of organisations that are involved in flood risk management and their latest strategic plans and plans for major flood defences.
- The requirements for detailed Flood Risk Assessments and to inform the site selection process.

Neighbourhood planning groups can use this information to assess the risk of flooding to sites within their community, using Section 5, the sources of flooding in the East Devon District and the flood mapping in the appendices. The SFRA will also be helpful for developing community level flood risk policies in high flood risk areas. Similarly, all known available recorded historical flood events for the district are listed in Section 5.1 and this can be used to supplement local knowledge regarding areas worst hit by flooding. Ongoing and proposed flood alleviation schemes planned by East Devon District Council and the Environment Agency are outlined in Section 6 and Section 8.3 discusses mitigations, resistance and resilience measures which can be applied to alleviate flood risk to an area.

### Cumulative Impact Assessment

A cumulative impact assessment has been carried out and has identified which catchments in East Devon are more sensitive to the cumulative impact of development and where more stringent policy regarding flood risk is recommended. Any development in these areas should seek to contribute to work that reduces wider flood risk in those catchments.

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## Abbreviations and Glossary of Terms

| Term | Definition |
|---|---|
| AEP | Annual Exceedance Probability |
| BGS | British Geological Survey |
| Brownfield | Previously developed parcel of land |
| CC | Climate change - Long term variations in global temperature and weather patterns caused by natural and human actions. |
| CFMP | Catchment Flood Management Plan- A high-level planning strategy through which the Environment Agency works with their key decision makers within a river catchment to identify and agree policies to secure the long-term sustainable management of flood risk. |
| CIRIA | Construction Industry Research and Information Association |
| DCC | Devon County Council |
| Defra | Department for Environment, Food and Rural Affairs |
| Designated Feature | A form of legal protection or status reserved for certain key structures or features that are privately owned and maintained, but which make a contribution to the flood or coastal erosion risk management of people and property at a particular location. |
| DG5 (Risk) Register | A water-company held register of properties which have experienced sewer flooding due to hydraulic overload, or properties which are 'at risk' of sewer flooding more frequently than once in 20 years. |
| EA | Environment Agency |
| EDDC | East Devon District Council |
| EU | European Union |
| FEH | Flood Estimation Handbook |
| Flood defence | Infrastructure used to protect an area against floods as floodwalls and embankments; they are designed to a specific standard of protection (design standard). |
| Flood Risk Area | An area determined as having a significant risk of flooding in accordance with guidance published by Defra and WAG (Welsh Assembly Government). |
| Flood Risk Regulations | Transposition of the EU Floods Directive into UK law. The EU Floods Directive is a piece of European Community (EC) legislation to specifically address flood risk by prescribing a common framework for its measurement and management. |
| Flood and Water Management Act | Part of the UK Government's response to Sir Michael Pitt's Report on the Summer 2007 floods, the aim of which is to clarify the legislative framework for managing surface water flood risk in England. |
| Fluvial Flooding | Flooding resulting from water levels exceeding the bank level of a main river |
| FRA | Flood Risk Assessment - A site-specific assessment of all forms of flood risk to the site and the impact of |

| Term | Definition |
|---|---|
| | development of the site to flood risk in the area. |
| FRMP | Flood Risk Management Plan |
| FWMA | Flood and Water Management Act |
| GI | Green Infrastructure – a network of natural environmental components and green spaces that intersperse and connect the urban centres, suburbs and urban fringe |
| Greenfield | Undeveloped parcel of land |
| Ha | Hectare |
| Indicative Flood Risk Area | Nationally identified flood risk areas, based on the definition of 'significant' flood risk described by Defra. |
| JBA | Jeremy Benn Associates |
| LFRMS | Local Food Risk Management Strategy |
| LLFA | Lead Local Flood Authority - Local Authority responsible for taking the lead on local flood risk management |
| LPA | Local Planning Authority |
| mAOD | metres Above Ordnance Datum |
| Main River | A watercourse shown as such on the Main River Map, and for which the Environment Agency has responsibilities and powers |
| NFM | Natural Flood Management |
| NPPF | National Planning Policy Framework |
| Ordinary Watercourse | All watercourses that are not designated Main River. Local Authorities or, where they exist, IDBs have similar permissive powers as the Environment Agency in relation to flood defence work. However, the riparian owner has the responsibility of maintenance. |
| OS NGR | Ordnance Survey National Grid Reference |
| PFRA | Preliminary Flood Risk Assessment |
| Pluvial flooding | Flooding as a result of high intensity rainfall when water is ponding or flowing over the ground surface (surface runoff) before it enters the underground drainage network or watercourse, or cannot enter it because the network is full to capacity. |
| PPG | National Planning Policy Guidance |
| Resilience Measures | Measures designed to reduce the impact of water that enters property and businesses; could include measures such as raising electrical appliances. |
| Resistance Measures | Measures designed to keep flood water out of properties and businesses; could include flood guards for example. |
| Risk | In flood risk management, risk is defined as a product of the probability or likelihood of a flood occurring, and the consequence of the flood. |
| Return Period | Is an estimate of the interval of time between events of a certain intensity or size, in this instance it refers to flood events. It is a statistical measurement denoting the average recurrence interval over an extended period of time. |

| Term | Definition |
|---|---|
| RoFSW | Risk of Flooding from Surface Water |
| Sewer flooding | Flooding caused by a blockage or overflowing in a sewer or urban drainage system. |
| SHLAA | Strategic Housing Land Availability Assessment - The Strategic Housing Land Availability Assessment (SHLAA) is a technical piece of evidence to support local plans and Sites & Policies Development Plan Documents (DPDs). Its purpose is to demonstrate that there is a supply of housing land in the district which is suitable and deliverable. |
| SFRA | Strategic Flood Risk Assessment |
| SoP | Standard of Protection - Defences are provided to reduce the risk of flooding from a river and within the flood and defence field standards are usually described in terms of a flood event return period. For example, a flood embankment could be described as providing a 1 in 100-year standard of protection. |
| Stakeholder | A person or organisation affected by the problem or solution, or interested in the problem or solution. They can be individuals or organisations, includes the public and communities. |
| SuDS | Sustainable Drainage Systems - Methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional techniques |
| Surface water flooding | Flooding as a result of surface water runoff because of high intensity rainfall when water is ponding or flowing over the ground surface before it enters the underground drainage network or watercourse, or cannot enter it because the network is full to capacity, thus causing what is known as pluvial flooding. |
| SWMP | Surface Water Management Plan - The SWMP plan should outline the preferred surface water management strategy and identify the actions, timescales and responsibilities of each partner. It is the principal output from the SWMP study. |
| WFD | Water Framework Directive |

# 1 Introduction

## 1.1 Purpose of the Strategic Flood Risk Assessment

> ***"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.".***
>
> (National Planning Policy Framework (December 2023), paragraph 166)

This Level 1 Strategic Flood Risk Assessment (SFRA) 2024, which updates the 2008 document, is published as part of the evidence base for the emerging Local Plan. The report has updated the content included in the previous SFRA and provides appropriate supporting evidence for the resubmission of the Local Plan.

The 2024 SFRA update will be used in decision making, to inform the process for location of land for future development and the preparation of sustainable policies for the long-term management of flood risk.

The key objectives of the review performed during the preparation of the 2024 SFRA are:

1. To take into account the latest flood risk policy.
2. Take into account the latest flood risk information and available data.
3. To provide specific flood risk analyses for sites identified by the Council as part of their Local Plan preparation.
4. To provide comprehensive mapping to support the Local Plan.

## 1.2 Levels of SFRA

The **Planning Practice Guidance** (PPG) identifies the following two levels of SFRA:

- **Level 1**: where flooding is not a major issue in relation to potential site allocations and where development pressures are low. The assessment should be of sufficient detail to enable application of the Sequential Test. The Level 1 should be used to attempt to allocate sites in areas of lowest overall flood risk (including all sources of flood risk).
- **Level 2**: where allocations are proposed in flood risk areas (i.e. from any source now and in the future), or where future windfall pressures in flood risk areas are expected. The L2 SFRA should be detailed enough to identify which development sites have the least risk of flooding and the application of the Exception Test, if relevant. The above text suggests that the Level 2 SFRA will only be used to assess whether the Exception Test can be passed, and not the Sequential Test.

This Level 1 SFRA is intended to aid the council in applying the Sequential Test for their site allocations and identifying where the application of the Exception Test may be required as part of a Level 2 SFRA.

## 1.3 SFRA outputs

- Identification of policy and technical updates.
- Identification of any strategic flooding issues or cumulative effects which may have cross boundary implications.
- Appraisal of all potential sources of flooding, including main river, ordinary watercourse, surface water, sewers, groundwater and reservoirs.

- Review of historic flooding incidents.
- Reporting on the standard of protection provided by existing flood risk management infrastructure.
- Available mapping showing distribution of flood risk across all Flood Zones from all sources of flooding including climate change allowances.
- Assessment of the potential increase in flood risk due to climate change.
- Flood Risk Assessment guidance for developers.
- Assessment of surface water management issues, how these can be addressed through development management policies and the application of Sustainable Drainage Systems.
- Recommendations of the criteria that should be used to assess future development proposals and the development of a Sequential Test and sequential approach to flood risk.
- Assessment of strategic flood risk solutions that can be implemented to reduce risks.

## 1.4 SFRA study area

East Devon District covers an area of approximately 815km$^2$ and has a population of approximately 148,000[1]. There are 30 wards in the district, the largest of which is Exmouth Brixington with a population of approximately 8030[2]. Other sizeable wards include Axminster, Budleigh and Raleigh, Exmouth Halsdon, Exmouth Littleham, Exmouth Town, Honiton St Michael's, Ottery St Mary, Seaton, Sidmouth Sidford, and Woodbury and Lympstone.

[1]Office for National Statistics (November 2021) Ward-level population estimates (Experimental Statistics) (Mid 2020)
[2] Office for National Statistics (November 2021) Ward-level population estimates (Experimental Statistics) (Mid 2020)

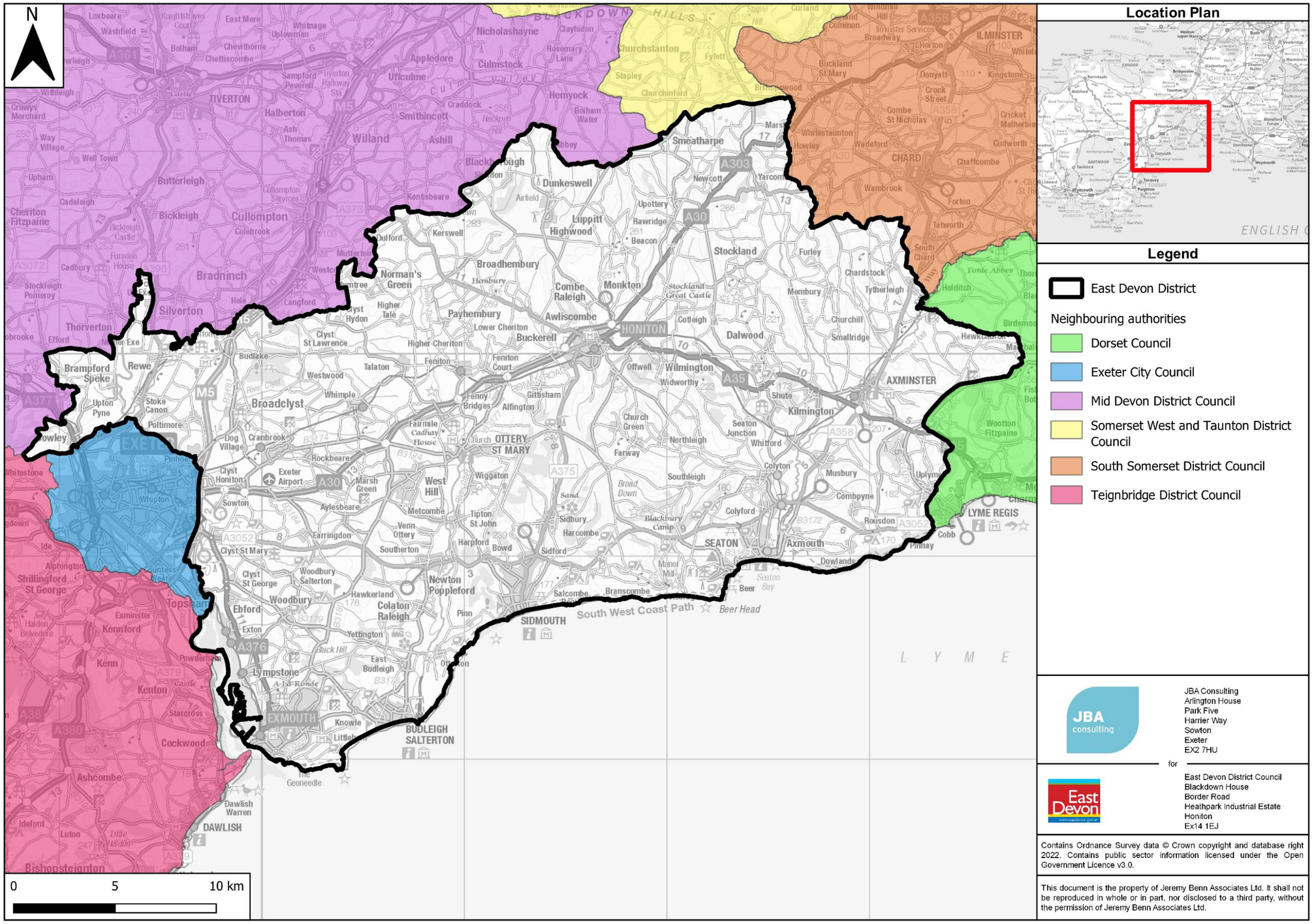


**Figure 1-1: East Devon District and neighbouring authorities**

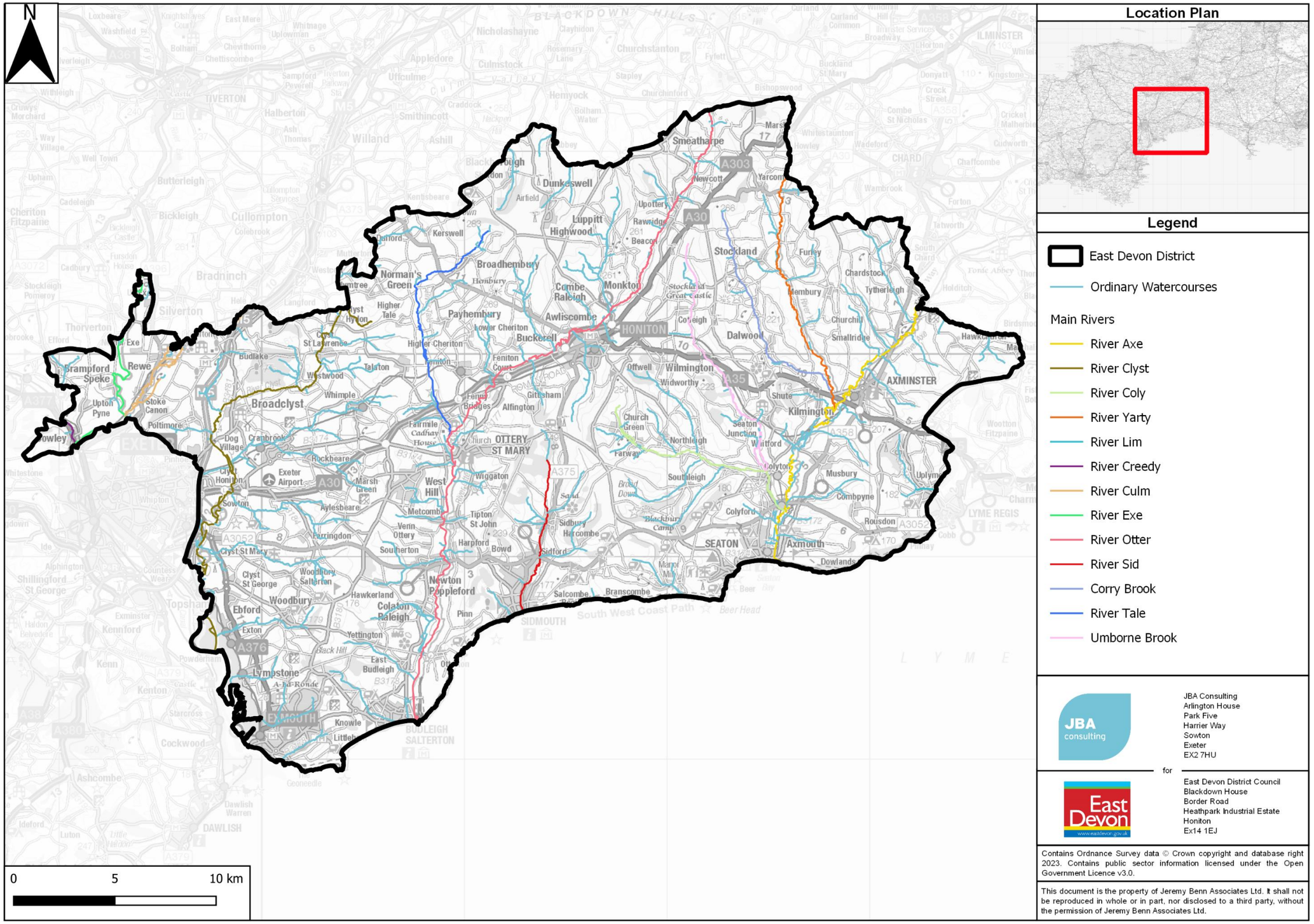


**Figure 1-2 Main Rivers and Watercourses within East Devon District Study Area**

Note that this map displays Ordinary Watercourses from the OS Open Rivers 'WatercourseLink' Shapefile – not all watercourses are included in this.

## 1.5 Consultation

The following parties (external to East Devon District Council) have been consulted during the preparation of this version of the SFRA:

- Environment Agency
- Devon County Council (as Lead Local Flood Authority)
- South West Water
- Neighbouring authorities (Mid Devon District Council, Somerset Council, Dorset Council, Exeter City Council)
- Devon and Somerset Fire and Rescue Service

## 1.6 Use of SFRA data

Level 1 SFRAs are high-level strategic documents and do not go into detail on an individual site-specific basis. The primary purpose is to provide an evidence base to inform the preparation of Local Plans and any future flood risk policies.

Developers will still be required to undertake site-specific Flood Risk Assessments to support Planning Applications. Developers will be able to use the information in the SFRA to scope out the sources of flood risk that will need to be explored in more detail at site level.

Appendix L presents an SFRA User Guide, further explaining how SFRA data should be used, including reference to relevant sections of the SFRA, how to consider different sources of flood risk and recommendations and advice for Sequential and Exception Tests.

Advice to users has been highlighted in **amber boxes** throughout the document.

**Key reference material** such as external guidance documents/ websites are provided in **green** throughout the SFRA

On the date of publication, the SFRA contains the latest available flood risk information. Over time, new information will become available to inform planning decisions, such as updated hydraulic models (which then update the Flood Map for Planning), updated information on other sources of flood risk or evidence showing future flood risks, new flood event information, new defence schemes and updates to policy, legislation and guidance. Developers should check the online **Flood Map for Planning** in the first instance to identify any major changes to the Flood Zones and use the most up to date information available at the time of undertaking a site-specific Flood Risk Assessment.

## 1.7 Structure of this report

The contents of the report are set out according to the following structure:

| Section | Contents | How to use |
|---|---|---|
| Executive Summary | Focuses on how the SFRA can be used by planners, developers and neighbourhood planners | Summarises the Level 1 contents. |
| 1. Introduction | Provides a background to the study, the Local Plan stage the SFRA informs, the study area, the roles and responsibilities for the organisations involved in flood management and how they were involved in the SFRA<br><br>Provides a short introduction to how flood risk is assessed and the importance of considering all sources<br><br>Includes this table of the contents of the SFRA | For general information and context. |
| 2. Flood Risk policy and strategy | Sets out the relevant legislation, policy and strategy for flood risk management at a national, regional and local level. | Users should refer to this section for any relevant policy which may underpin strategic or site-specific assessments. |
| 3. Planning policy for flood risk management | Provides an overview of both national and existing Local Plan policy on flood risk management<br><br>This includes the Flood Zones, application of the Sequential Approach and Sequential/Exception Test process.<br><br>Provides guidance for East Devon District Council and Developers on the application of the Sequential and Exception Test for both allocations and windfall sites, at allocation and planning application stages. | Users should refer to this section to understand and follow the steps required for the Sequential and Exception Tests. |
| 4. Impact of Climate change | Outlines the latest climate change guidance published by the Environment Agency | This section should be used to understand the |

| Section | Contents | How to use |
|---|---|---|
| | and how this was applied to the SFRA<br><br>Sets out how developers should apply the guidance to inform site specific Flood Risk Assessments | climate change allowances for a range of epochs and conditions, linked to the vulnerability of a development. |
| 5. Understanding flood risk in East Devon District | Provides an overview of the characteristics of flooding affecting the study area and key risks including historical flooding incidents, flood risk from all sources and flood warning arrangements. | This section should be used to understand all sources of flood risk in the district, including where has flooded historically. This section may also help identify any data gaps, in conjunction with the attached Appendices. |
| 6. Flood alleviation schemes and assets | Provides a summary of current flood defences and asset management and future planned schemes. Introduces actual and residual flood risk. | This section should be used to understand if there are any defences or flood schemes in a particular area, for further detailed assessment at site-specific stage. |
| 7. Cumulative impact of development and strategic solutions | This section provides an introduction to the cumulative impact assessment (CIA). | Planners should use this section to help develop policy recommendations for the cumulative impact of development. |
| 8. Flood risk management requirements for developers | Guidance for developers on Flood Risk Assessments, considering flood risk from all sources. | Developers should use this section to understand requirements for FRAs and what conditions/ guidance documents should be followed, as well as mitigation options. |
| 9. Surface water management and SuDS | An overview of Sustainable Drainage Systems, Guidance for developers on Surface Water Drainage Strategies, considering any specific local standards and guidance for Sustainable Drainage | Developers should use this section to understand what national, regional and local SuDS standards are applicable. |

| Section | Contents | How to use |
|---|---|---|
| | Systems (SuDS) from the Lead Local Flood Authority. | Hyperlinks are provided. |
| 10. Strategic flood risk measures | Outlines different options which could be considered for strategic flood risk solutions. | Developers should use this section to understand strategic flood risk solutions. |
| 11. Level 1 summary assessment of potential development locations | Summarises the flood risk to potential development locations. | This section should be used to understand flood risk to potential development locations. |
| 12. Summary | Summarises sources of flood risk in the study area | Developers and planners should use this as a summary of the SFRA. |
| 13. Recommendations | Outlines planning policy recommendations | Developers should refer to the Level 1 SFRA recommendations when considering requirements for site-specific assessments. |
| Appendices | • Appendix A: Historic Flooding<br>• Appendix B: Watercourses<br>• Appendix C: Flood Zones<br>• Appendix D: Fluvial and Tidal Climate Change<br>• Appendix E: Risk of Surface Water Flooding<br>• Appendix F: Risk of Surface Water Flooding with Climate Change<br>• Appendix G: Groundwater Flooding<br>• Appendix H: Reservoir Flooding<br>• Appendix I: Flood Defence<br>• Appendix J: Flood Warning and Alerts<br>• Appendix K: Data sources used in the SFRA<br>• Appendix L: SFRA User Guide<br>• Appendix M: Summary of flood risk across the Borough | Planners should use these appendices to understand what data has been used in the SFRA, to inform the application of the Sequential and Exception Tests, as relevant, and to use these maps and tabulated summaries of flood risk to understand the nature and location of flood risk. |

| Section | Contents | How to use |
|---|---|---|
| | • Appendix N: Site screening<br>• Appendix O: Sequential Test Recommendation<br>• Appendix P: Surface Water Zone<br>• Appendix Q: Coastal Change Management Area | |

## 1.8 Understanding flood risk

The following content provides useful background information on how flooding arises and how flood risk is determined.

### 1.8.1 Sources of flooding

Flooding is a natural process and can happen at any time in a wide variety of locations. It constitutes a temporary covering of land not normally covered by water and presents a risk when people and human or environmental assets are present in the area that floods. Assets at risk from flooding can include housing, transport and public service infrastructure, commercial and industrial enterprises, agricultural land and environmental and cultural heritage. Flooding can occur from many different and combined sources and in many different ways. Major sources of flooding include:

Fluvial (rivers) - inundation of floodplains from rivers and watercourses; inundation of areas outside the floodplain due to influence of bridges, embankments and other features that artificially raise water levels; overtopping or breaching of defences; blockages of culverts; blockages of flood channels/corridors.

Tidal (sea) – inundation from the sea. This can be assessed using Extreme Still Water Sea Levels (ESWSL), which is the level the sea is expected to reach during a storm event for a particular magnitude tidal flood event as a result of the combination of tides and surges. In exposed locations along the coast, flooding may be more likely to occur from wave overtopping than inundation.

Surface water - surface water flooding covers two main sources including direct run-off from adjacent land (pluvial) and surcharging of piped drainage systems (public sewers, highway drains, etc.)

Groundwater - water table rising after prolonged rainfall to emerge above ground level remote from a watercourse; most likely to occur in low-lying areas underlain by permeable rock (aquifers); groundwater recovery after pumping for mining or industry has ceased.

Infrastructure failure - reservoirs; canals; industrial processes; burst water mains; blocked sewers or failed pumping stations.

Different types and forms of flooding present a range of different risks and the flood hazards of speed of inundation, depth and duration of flooding can vary greatly. With climate change, the frequency, pattern and severity of flooding are expected to change and become more damaging.

## 1.9 Likelihood, consequence and risk

Flood risk is a combination of the likelihood of flooding and the potential consequences arising.

### 1.9.1 Likelihood

Likelihood of flooding is expressed as the percentage probability based on the average frequency measured or extrapolated from records over a large number of years. A 1% probability indicates the flood level that is expected to be reached on average once in a hundred years, i.e. it has a 1% chance of occurring in any one year, not that it will occur once every hundred years.

Considered over the lifetime of development, such an apparently low frequency or rare flood has a significant probability of occurring. For example:

- A 1% flood has a 26% (1 in 4) chance of occurring at least once in a 30-year period - the period of a typical residential mortgage
- And a 49% (1 in 2) chance of occurring in a 70-year period - a typical human lifetime

### 1.9.2 Consequence

The consequences of flooding include fatalities, property damage, disruption to lives and businesses, with severe implications for people (e.g. financial loss, emotional distress, health problems). Consequences of flooding depend on the hazards caused by flooding (depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality) and the vulnerability of receptors (type of development, nature, e.g. age-structure, of the population, presence and reliability of mitigation measures etc). Flood risk is then expressed in terms of the following relationship:

*Flood risk = Probability of flooding x Consequences of flooding*

### 1.9.3 Risk

Flood risk is not static; it cannot be described simply as a fixed water level that will occur if a river overtops its banks or from a high spring tide that coincides with a storm surge. It is therefore important to consider the continuum of risk carefully. Risk varies depending on the severity of the event, the source of the water, the pathways of flooding (such as the condition of flood defences), the presence and vulnerability of receptors as mentioned above.

# 2 Flood Risk policy and strategy

This section sets out the flood risk management roles and responsibilities for different organisations and relevant legislation, policy and strategy.

## 2.1 Roles and responsibilities for Flood Risk Management in East Devon

There are different organisations in East Devon that have responsibilities for flood risk management, known as Risk Management Authorities (RMAs). These are shown on Table 2-1, with a summary of their responsibilities.

It is important to note that land and property owners are responsible for the maintenance of watercourses either on or next to their properties. Property owners are also responsible for the protection of their properties from flooding as well as other management activities, for example by maintaining riverbeds/ banks, controlling invasive species and allowing the flow of water to pass without obstruction. More information can be found in the Environment Agency publication **Owning a watercourse** (2018).

When it comes to undertaking works to reduce flood risk, the Environment Agency and Devon County Council as LLFA do have powers but their limited resources and available funding must be prioritised and targeted to where they can have the greatest effect. Permissive powers mean that Risk Management Authorities are permitted to undertake works on watercourses but are not obliged.

**Table 2-1 Roles and responsibilities for Risk Management Authorities**

| Risk Management Authority | Strategic Level | Operational Level | Planning role |
|---|---|---|---|
| Environment Agency | • Strategic overview for all sources of flooding<br>• National Strategy<br>• Reporting and general supervision | • Main rivers (e.g. River Exe)<br>• Reservoirs<br>• Tidal | • Statutory consultee for development in Flood Zones 2 and 3 |
| Devon County Council as Lead Local Flood Authority (LLFA) | • Preliminary Flood Risk Assessment<br>• Local Flood Risk Management Strategy | • Surface Water<br>• Groundwater<br>• Ordinary Watercourses (consenting and enforcement)<br>• Ordinary watercourses (works) | • Statutory consultee for major developments |
| East Devon District Council as Local Planning Authority | • Local Plans as Local Planning Authority | • Determination of Planning Applications as Local Planning Authority<br>• Managing open spaces under East Devon District Council ownership | • As left |

| Risk Management Authority | Strategic Level | Operational Level | Planning role |
|---|---|---|---|
| | | • Ordinary watercourses (works)<br>• Coastal Protection Authority | |
| South West Water | • Asset Management Plans, supported by Periodic Reviews (business cases)<br>• Develop Drainage and Wastewater management plans | • Public sewers<br>• South West Water can take on maintenance responsibilities for SuDS created though new development. | • Non-statutory consultee |
| Highways Authorities<br>*National Highways (motorways and trunk roads)*<br>*East Devon District Council (for non-trunk roads)* | • Highway drainage policy and planning | • Highway drainage | • Statutory consultee regarding highways design standards and adoptions |

## 2.2 Relevant legislation

The following legislation is relevant to development and flood risk in the East Devon District:

- **Flood Risk Regulations (2009)** - these transpose the European Floods Directive (2000) into law and require the Environment Agency and LLFAs to produce Preliminary Flood Risk Assessments and identify where there are nationally significant Flood Risk Areas. For the Flood Risk Areas, detailed flood maps and a Flood Risk Management Plan is produced; this is done in a six-year cycle. As of 31 December 2023 the Flood Risk Regulations (2009) have been revoked from UK Law as part of a review into retained EU legislation. This was done as the Flood Risk Regulations duplicate existing domestic legislation, namely the Flood and Water Management Act 2010. The Government expects to see the continued implementation of Flood Risk Management Plans 2021-2027, with funding for this still in place over the 6-year period.
- **Town and Country Planning Act (1990), Water Industry Act (1991), Land Drainage Act (1991), Environment Act (2021), Flood and Water Management Act (2010)** – as amended and implanted via secondary legislation. These set out the roles and responsibilities for organisations that have a role in FRM.
- **The Land Drainage Act (1991, as amended) and Environmental Permitting Regulations (2018)** also set out where developers will need to apply for additional permission (as well as planning permission) to undertake works to an Ordinary Watercourse or Main River.

- **The Water Environment Regulations (2017)** – these transpose the European Water Framework Directive (2000) into law and require the Environment Agency to produce River Basin Management Plans (RBMPs). These aim to ensure that the water quality of aquatic ecosystems, riparian ecosystems and wetlands reaches 'good' status.
- Other environmental legislation such as the **Habitats Directive (1992)**, **Environmental Impact Assessment Directive (2014)** and **Strategic Environmental Assessment Directive (2001)** also apply as appropriate to strategic and site-specific developments to guard against environmental damage.

## 2.3 Relevant flood risk policy and strategy documents

Table 2-2 summarises relevant national, regional and local flood risk policy and strategy documents and how these apply to development and flood risk. Hyperlinks are provided to external documents. These documents may;

- provide useful and specific local information to inform Flood Risk Assessments within the local area.
- set the strategic policy and direction for Flood Risk Management (FRM) and drainage – they may contain policies and action plans that set out what future flood mitigation and climate change adaptation plans may affect a development site. A developer should seek to contribute in all instances to the strategic vision for FRM and drainage in the district.
- provide guidance and/or standards that informs how a developer should assess flood risk and/or design flood mitigation and SuDS.

**Table 2-2: National, regional and local flood risk policy and strategy documents**

| | Document, lead author, and date | Relevant direct legislation | Specific Information about East Devon | Policy and measures | Development design requirements | Next update due |
|---|---|---|---|---|---|---|
| National | **National Flood and Coastal Erosion Risk Management Strategy** (Environment Agency) 2020 | Flood and Water Management Act (2010) | No | Yes | No | 2026 |
| | **National Planning Policy Framework** (MHCLG) 2023 | Planning and Compulsory Purchase Act 2004 as amended & The Town and Country Planning (Local Planning) (England) Regulations 2012 as amended | No | Yes | Yes | - |
| | **National Planning Practice Guidance** (MHCLG) 2019 | | Yes | No | Yes | - |
| | **The Climate Crisis: a guide for Local Authorities on Planning for Climate Change** (TCPA) 2023 | N/A | Yes | Yes | No | - |
| Regional | **South West river basin district river basin management plan: updated 2022** (Environment Agency) 2022 | WFD (Section 2.2.2) | Yes | Yes | No | 2028 |

| Document, lead author, and date | | Relevant direct legislation | Specific Information about East Devon | Policy and measures | Development design requirements | Next update due |
|---|---|---|---|---|---|---|
| | **South West River Basin District Flood Risk Management Plan** (Environment Agency) 2022 | Flood Risk Regulations (section 2.2) | Yes | Yes | No | 2027 |
| | **East Devon Catchment Flood Management Plan** and **Exe Catchment Flood Management Plan** (Environment Agency) 2012 | N/A | Yes | Yes | No | - |
| | **South West TraC Management Catchment** (Environment Agency) | WFD (Section 2.2.2) | Yes | No | No | - |
| | **Climate change guidance for development and flood risk** (Environment Agency) 2022 | N/A | No | No | Yes | - |
| | **South West Water Drainage and Wastewater Management Plan** (South West Water) 2023 | N/A | Yes | Yes | No | - |
| Local | **Devon Local Flood Risk Management Strategy 2021 – 2027** (Devon County Council) 2021 | FWMA | Yes | No | Yes | 2027 |
| | **Sustainable Drainage System – Guidance for Devon** (Devon County Council) 2020 | N/A | Yes | No | Yes | - |

## 2.4 Key legislation for flood and water management

### 2.4.1 Flood Risk Regulations (2009)

The **Flood Risk Regulations**[3] translated the **EU Floods Directive**[4] into UK law. The EU required Member States to complete an assessment of flood risk (known as a Preliminary Flood Risk Assessment (PFRA)) and then use this information to identify areas where there is a significant risk of flooding. The threshold for designating significant Flood Risk Areas is defined by DEFRA. For these Flood Risk Areas, States must then undertake Flood Risk and Hazard Mapping and produce Flood Risk Management Plans.

The Flood Risk Regulations as pertain to English and Welsh legislation direct the Environment Agency to do this work for river, sea and reservoir flooding. LLFAs must do this work for surface water, Ordinary Watercourses and groundwater flooding. This is a six-year cycle of work and the second cycle started in 2017. In the instance of this SFRA, the LLFA is Devon County Council (DCC).

The **Devon PFRA**[5] and the **Devon PFRA Addendum**[6] provided information on significant past and future flood risk from localised flooding in Devon, including East Devon District.

**Devon County Council's Flood Risk Management Strategy** and the **Environment Agency's South West River Basin District Flood Risk Management Plan** highlights that within EDDC, Exmouth is identified as a medium high priority Flood Risk Area.

As of 31 December 2023 the Flood Risk Regulations (2009) have been revoked from UK Law as part of a review into retained EU legislation. This was done as the Flood Risk Regulations duplicate existing domestic legislation, namely the Flood and Water Management Act 2010. The Government expects to see the continued implementation of Flood Risk Management Plans 2021-2027, with funding for this still in place over the 6-year period.

### 2.4.2 Flood and Water Management Act (2010)

The **Flood and Water Management Act**[7] (FWMA) was passed in April 2010. It aims to improve both flood risk management and the way we manage our water resources and implements some of Sir Michael Pitt's recommendations following his review of the 2007 floods. The FWMA received Royal Assent in April 2010.

The FWMA has created clearer roles and responsibilities and helped to define a more risk-based approach to dealing with flooding. This included the creation of a lead role for LAs, as LLFAs, assigned to manage local flood risk (from surface water, ground water and ordinary watercourses) and to provide a strategic overview role of all flood risk for the EA.

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3 Flood Risk Regulations. UK Government. (2009). https://www.legislation.gov.uk/uksi/2009/3042/contents/made

4 EU Floods Directive. European Commission. (2007) https://ec.europa.eu/environment/water/flood_risk/

5 Devon PFRA. (2011) https://devoncc.sharepoint.com/sites/PublicDocs/Planning/FloodRisk/Forms/AllItems.aspx?id=%2Fsites%2FPublicDocs%2FPlanning%2FFloodRisk%2FDevon%20Preliminary%20Flood%20Risk%20Assessment%2Epdf&parent=%2Fsites%2FPublicDocs%2FPlanning%2FFloodRisk&p=true&ga=1

6 Devon PFRA Addendum (2017) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/698749/PFRA_Devon_County_Council_2017.pdf

7 Flood and Water Management Act. UK Government. (2010) https://www.legislation.gov.uk/ukpga/2010/29/pdfs/ukpga_20100029_en.pdf

The content and implications of the FWMA provide considerable opportunities for improved and integrated land use planning and flood risk management by LAs and other key partners. The integration and synergy of strategies and plans at national, regional and local scales, is increasingly important to protect vulnerable communities and deliver sustainable regeneration and growth.

Devon County Council as LLFA has developed a **Local Flood Risk Management Strategy**[8] under the Act, in consultation with local partners. This is discussed further in Section 2.7. This Strategy acts as the basis and discharge of duty for Flood Risk Management co-ordinated by Devon County Council. The latest version of the strategy was published in 2021.

Local authorities are responsible for flood management relating to 'Ordinary Watercourses' (i.e. smaller ditches, brooks), with the Environment Agency responsible for 'Main Rivers'.

When considering planning applications, Local Planning Authorities should consult LLFAs on the management of surface water in order to satisfy that:

- the proposed minimum standards of operation are appropriate
- through the use of planning conditions or planning obligations, there are clear arrangements for on-going maintenance arrangements over the development's lifetime.

The FWMA will also update the Reservoirs Act 1975 by reducing the capacity of reservoir regulation from 25,000m$^3$ to 10,000m$^3$. Phase 1 of this intention has been implemented in 2013 requiring large, raised reservoirs to be registered to allow the Environment Agency to categorise whether they are 'high risk' or 'not high risk'.

The Government has announced that it will implement Schedule 3 of the FWMA which will mandate SuDS in new developments. Schedule 3 provides a framework for the approval and adoption of drainage systems, an approving body (SAB), and national standards on the design, construction, operation and maintenance of SuDS. It also makes the right to connect surface water runoff to public sewers conditional upon the drainage system being approved before any construction works begins.

### 2.4.3 The Water Framework Directive & Water Environment Regulations

The purpose of the Water Framework Directive (WFD), which was transposed into English Law by the Water Environment Regulations (2003), is to deliver improvements across Europe in the management of water quality and water resources through a series of plans called River Basin Management Plans (RBMP), which were last published in 2022.

The district lies across the South West River Basin District.

### 2.4.4 Environmental permitting

The **Environmental Permitting Regulations**[9] (2016, amended 2018) set out where developers will need to apply for additional permission (as well as Planning Permission) to undertake works to an Ordinary Watercourse (pollution related works only) or Main River. This includes flood risk activities, for example:

- on or within 8 metres of a main river (16 metres if tidal);

8 Devon Local Flood Risk Management Strategy: https://www.devon.gov.uk/floodriskmanagement/local-flood-risk-management-strategy/

9 Environmental Permitting Regulations. UK Government. (2016) https://www.legislation.gov.uk/uksi/2018/110/contents/made

- on or within 8 metres of a flood defence structure or culvert (16 metres if tidal);
- on or within 16 metres of a sea defence;
- involving quarrying or excavation within 16 metres of any main river, flood defence (including a remote defence) or culvert; and
- in a floodplain more than 8 metres from the riverbank, culvert or flood defence structure (16 metres if it is a tidal main river) and you do not already have planning permission.

Environmental permits may also be required from the Environment Agency to discharge runoff, trade effluent or sewage into a main river. They may also be required in relation to groundwater activities, where there may be a risk of groundwater contamination.

If it is not clear whether work is regulated then the Environment Agency should be contacted via the **general enquiries**.

An ordinary watercourse Land Drainage consent may be required where work is carried out which could affect the flow of water within a watercourse which is not main river (see 2.4.5). These should be acquired from **Devon County Council**[10].

### 2.4.5 Land Drainage Act (1991)

Under the **Land Drainage Act (1991)**[11] Internal Drainage Boards were also given the power to implement their own Byelaws.

Land Drainage Byelaws outline legal obligations and responsibilities when undertaking works on or close to a watercourse, for the purpose of preventing flooding, or mitigating any damage caused by flooding.

There are no internal drainage boards in East Devon.

The act also outlines riparian responsibilities to maintain the flow of water and sets out Local Authority powers to regulate works that may alter the flow of water in a watercourse.

### 2.4.6 Additional legislation

Additional legislation relevant to development and flood risk in East Devon include:

- The **Town and Country Planning Act**[12] (1990) and the **Water Industry Act**[13] (1991). These set out the roles and responsibilities for organisations that have a role in Flood Risk Management (FRM).
- Other environmental legislation such as the **Habitats Directive**[14] (1992), **Environmental Impact Assessment Directive**[15] (2014) and **Strategic Environmental Assessment Directive**[16] (2001) also apply as appropriate to strategic and site-specific developments to guard against environmental damage.

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10 Land drainage. Devon County Council https://www.devon.gov.uk/floodriskmanagement/land-drainage-consent/

11 Land Drainage Act. UK Government. (1991). https://www.legislation.gov.uk/ukpga/1991/59/contents

12 Town and Country Planning Act. UK Government. (1990) https://www.legislation.gov.uk/ukpga/1990/8/contents

13 Water Industry Act. UK Government. (1991) https://www.legislation.gov.uk/ukpga/1991/56/contents

14 Habitats Directive. European Commission. (1992) https://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm

15 Environmental Impact Assessment Directive. European Commission. (2014) https://ec.europa.eu/environment/eia/eia-legalcontext.htm

16 Strategic Environmental Assessment Directive. European Commission. (2001) https://ec.europa.eu/environment/eia/sea-legalcontext.htm

It should be noted that the some of the environmental directives listed are from European Union (EU) legislation, due to the UK leaving the EU these may be subject to change in the future.

## 2.5 Key national, regional and local policy documents and strategies

### 2.5.1 The National Flood and Coastal Erosion Risk Management Strategy for England (2020)

The **National Flood and Coastal Erosion Risk Management Strategy** (FCERM) for England provides the overarching framework for future action by all risk management authorities to tackle flooding and coastal erosion in England. The new Strategy has been in preparation since 2018. The Environment Agency brought together a wide range of stakeholders to develop the strategy collaboratively. The Strategy is much more ambitious than the previous one from 2011 and looks ahead to 2100 and the action needed to address the challenge of climate change.

The Strategy has been split into three high level ambitions: climate resilient places, today's growth and infrastructure resilient in tomorrow's climate and a nation ready to respond and adapt to flooding and coastal change. Measures include:

- updating the national river, coastal and surface water flood risk mapping,
- understanding long term investment needs for flood and coastal infrastructure,
- trialling new and innovative funding models,
- flood resilience pilot studies,
- developing an adaptive approach to the impacts of climate change,
- seeking nature-based solutions towards flooding and erosion issues,
- integrating natural flood management into the new Environmental Land Management scheme,
- considering long term adaptive approaches in Local Plans,
- maximising the opportunities for flood and coastal resilience as part of contributing to environmental net gain for development proposals,
- investing in flood risk infrastructure that supports sustainable growth,
- aligning long term strategic planning cycles for flood and coastal work between stakeholders,
- mainstreaming property flood resilience measures and 'building back better' after flooding,
- consistent approaches to asset management and record keeping,
- updating guidance on managing high risk reservoirs in light of climate change,
- critical infrastructure resilience,
- increasing education, skills, capacity building, research, innovation and sharing of best practise,
- supporting communities to plan for flood events,
- develop world leading ways of reducing the carbon and environmental impact from the construction and operation of flood and coastal defences,

- the development of digital tools to communicate flood risk and transforming the flood warning service
- increasing flood response and recovery support.

The Strategy was laid before parliament in July 2020 for formal adoption and published alongside a New **National Policy Statement for Flood and Coastal Erosion Risk Management.** The statement sets out five key commitments which will accelerate progress to better protect and better prepare the country for the coming years:

1 Upgrading and expanding flood defences and infrastructure across the country,
2 Managing the flow of water to both reduce flood risk and manage drought,
3 Harnessing the power of nature to not only reduce flood risk, but deliver benefits for the environment, nature, and communities,
4 Better preparing communities for when flooding and erosion does occur, and
5 Ensuring every area of England has a comprehensive local plan for dealing with flooding and coastal erosion.

It can be expected that the implementation of the National Strategy will lead to the publication of new guidance and practice that is focused on resilience and adaptation over the coming years. It will be important to adjust the content of the SFRA so that changes in approach are captured in the delivery of the Local Plan.

The National Infrastructure Commission conducted an assessment, **Reducing the risk of surface water flooding**, published in 2022, which looks at how responsible bodies in England can better manage and mitigate surface water flooding.

### 2.5.2 Updated Strategic Flood Risk Assessment guidance

There was an update to the **'How to prepare a Strategic Flood Risk Assessment guidance'** in March 2022, which requires further adjustment to the approaches to both Level 1 and Level 2 assessments. There have also been minor updates to the guidance in September 2020 and a substantive adjustment in August 2019. This Level 1 assessment is undertaken in accordance with the latest guidance.

### 2.5.3 Catchment Flood Management Plans

Catchment Flood Management Plans (CFMPs) are high-level strategic plans providing an overview of flood risk across each river catchment. The Environment Agency use CFMPs to work with other key-decision makers to identify and agree long-term policies for sustainable flood risk management.

There are six pre-defined national policies provided in the CFMP guidance and these are applied to specific locations through the identification of 'Policy Units'. These policies are intended to cover the full range of long-term flood risk management options that can be applied to different locations in the catchment.

The six national policies are:

- No active intervention (including flood warning and maintenance). Continue to monitor and advise
- Reducing existing flood risk management actions (accepting that flood risk will increase over time)

- Continue with existing or alternative actions to manage flood risk at the current level (accepting that flood risk will increase over time from this baseline)
- Take further action to sustain the current level of flood risk (responding to the potential increases in risk from urban development, land use change and climate change)
- Take action to reduce flood risk (now and/or in the future)
- Take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits, locally or elsewhere in the catchment.

East Devon falls within the **East Devon CFMP**[17] **and Exe CFMP**[18]. The CFMP were published in 2009. It is understood from the Environment Agency that the Flood Risk Management Plan (Section 2.5.5) has superseded this document and in the longer term will replace the CFMP.

### 2.5.4 River Basin Management Plans

River Basin Management Plans (RBMPs) are prepared under the Water Framework Directive (WFD) and assess the pressure facing the water environment in River Basin Districts. East Devon falls within the **South West River Basin Management Plan**[19].

The South West river basin district river basin management plan describes the challenges that threaten the water environment and how these challenges can be managed. The plans were updated in 2022.

### 2.5.5 River Basin District Flood Risk Management Plan

Under the Regulations, the Environment Agency exercised an 'Exception' and did not initially prepare a PFRA for risk from rivers, reservoirs and the sea. This then made it a requirement for the Environment Agency to prepare and publish a Flood Risk Management Plan (FRMP). The FRMP process adopts the same catchments as used in the preparation of River Basin Management Plans, in accordance with the Water Framework Directive.

Accordingly, more detailed strategic information on proposed strategic measures and approaches can be found in the **South West River Basin District Flood Risk Management Plan (FRMP)**[20] (2022). The FRMP includes the legislative background and information for all river basin districts, detail about each catchment, the flood risk areas and other strategic areas.

17 East Devon CFMP:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/294049/East_Devon_Catchment_Flood_Management_Plan.pdf
18 Exe CFMP:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/294033/Exe_Catchment_Flood_Management_Plan.pdf
19 South West RBMP: https://www.gov.uk/government/publications/south-west-river-basin-district-river-basin-management-plan
20 South West River Basin District FRMP https://www.gov.uk/government/publications/south-west-river-basin-district-flood-risk-management-plan

## 2.6 Shoreline Management Plan

The Shoreline Management Plan (SMP) forms part of Defra's strategy for flood and coastal defence. It provides a large-scale assessment of risks associated with coastal evolution and presents the policy framework to address these risks in a sustainable manner. The SMP policies defined by DEFRA are:

- **Hold the line** – maintain or upgrade the level of protection provided by defences.
- **Advance the line** – build new defences seaward of the existing defence line.
- **Managed realignment** – allowing retreat of the shoreline, with management to control or limit the movement.
- **No active intervention** – a decision not to invest in providing or maintaining defences.

Not all policies are guaranteed funding and over time the Environment Agency along with other partners will identify the cost. The SMPs are currently undergoing a refresh.

### 2.6.1 Durlston Head to Rame Head Shoreline Management Plan

The coast between Durlston Head, near Swanage, and Rame Head, west of Plymouth, is covered by a Shoreline Management Plan produced by the South Devon and Dorset Coastal Advisory Group. The group works to promote sustainable shoreline management, and facilitate the duties and responsibilities of local authorities and other organisations managing the coast.

The **Shoreline management plan** and **shoreline management plan Information**[21] give an overall strategy for this area of coastline, including East Devon.

The objectives of the SMP are to:

1. Improve our understanding of coastal processes
2. Work in partnership with all interested organisations and the public
3. Prepare a setting for the long term planning of coastal defences

## 2.7 Devon County Council Local Flood Risk Management Strategy

Local Flood Risk Management Strategies set out how Lead Local Flood Authorities such as Devon County Council will manage local flood risk i.e. from tidal, surface water runoff, groundwater and ordinary watercourses, for which they have a responsibility as LLFA and the work that other Risk Management Authorities are doing to manage flood risk in Devon.

The **Local Flood Risk Management Strategy 2021– 2027**[22] sets out the LLFA's plan for managing local flood risk.

The objectives for managing flood risk are:

1. Reduce flood risk to properties and significant infrastructure, and enhance the local economy.
2. Co-ordinate Risk Management Authorities and encourage collaborative working.

21 https://eastdevon.gov.uk/beaches-harbours-and-coastal-information/coastal-protection/shoreline-management-plan

22 Devon LFRMS: https://www.devon.gov.uk/floodriskmanagement/local-flood-risk-management-strategy/

3. Protect and enhance the natural environment, landscape and heritage assets, providing opportunities for carbon storage, energy generation and access and recreation where appropriate.
4. Prioritise high risk communities.
5. Influence the planning process through statutory consultations.
6. Set out a clear strategy.
7. Ensure the latest climate change predictions are incorporated into flood schemes and development proposals.
8. Improve resilience through community engagement and education.

### 2.7.1 LLFAs, surface water and SuDS

The 2023 NPPF states that: 'Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate' (Para 175). When considering planning applications, local planning authorities should consult the relevant LLFA on the management of surface water in order to satisfy that:

- The proposed minimum standards of operation are appropriate
- Through the use of planning conditions or planning obligations there are clear arrangements for on-going maintenance over the development's lifetime

Devon County Council's requirements for new developers on SuDS are set out on their **website**, alongside supporting documents. At the time of writing this SFRA, documents and policies relevant to SuDS and surface water are:

- **Devon County Council Sustainable Drainage Guidance for Devon**
- **Surface Water Management Plan**
- **SuDS Manual (C753)** published in 2007, updated in 2015
- **DEFRA Non-statutory technical standards for sustainable drainage systems, 2015**
- **DEFRA National Standards for sustainable drainage systems Designing, constructing (including LASOO best practice guidance), operating and maintaining drainage for surface runoff, 2011**
- **Building Regulations Part H (MHCLG) 2010**

The 2023 NPPF states that flood risk should be managed "using opportunities provided by new development and improvements in green and other infrastructure to reduce the causes and impacts of flooding." As such, although incorporating SuDS is only a requirement for major development, it is best practice for all development.

## 2.8 Water Cycle Studies

Water Cycle Studies assist local authorities to select and develop growth proposals that minimise impacts on the environment, water quality, water resources, infrastructure and flood risk and help to identify ways of mitigating such impacts. A Water Cycle Study for East Devon District is being updated by Royal Haskoning alongside the Level 1 SFRA.

## 2.9 Surface Water Management Plans

Surface Water Management Plans (SWMPs) outline the preferred surface water management strategy in a given location. SWMPs are undertaken, when required, by LLFAs in consultation with key local partners who are responsible for surface water management and drainage in their area. They are produced to understand the flood risks that arise from local flooding, which is defined by the Flood and Water Management Act 2010 as flooding from surface runoff, groundwater, and Ordinary Watercourses. SWMPs establish a long-term action plan to manage surface water in a particular area and are intended to influence future capital investment, drainage maintenance, public engagement and understanding, land-use planning, emergency planning and future developments. The action plan from SWMPs should be reviewed and updated as a minimum every six years.

Devon County Council published the **Devon Phase 1 SWMP**[23] in 2012 and **Phase 2**[24] in 2013, including a Preliminary Risk Assessment Report and Options Appraisal for Sidmouth.

## 2.10 Natural Flood Management (NFM) Plans

The Environment Agency has developed **Working with natural processes to reduce flood risk** mapping which displays opportunities for NFM. These maps are to be used as a guide and supplemented with local knowledge to provide a starting point for discussions about NFM. NFM aims to protect, restore and emulate the natural functions of catchments, floodplains, rivers and the coast. NFM should be used on a catchment wide scale and is the linking of blue and green infrastructure.

The maps identify NFM opportunities on different catchment scales:

- National River Basin Districts
- River Basin Districts showing Management Catchments
- Management Catchments showing Water Body Catchments
- Water Body Catchments

Discussions about NFM should be had with catchment stakeholders in combination with local knowledge.

Devon County Council as the LLFA have **NFM guidance for Devon**[25].

### 2.10.1 Critical Drainage Areas

A critical drainage area is an area that has critical drainage problems, and which has been notified to the local planning authority by the Environment Agency in line with the NPPF. In these locations, surface water needs to be managed to a higher standard than normal to ensure any new development contributes to a reduction in flooding risks in line with the NPPF. There are three critical drainage areas within East Devon. These are located in Feniton, Axminster and Whimple. These can be viewed on **Devon County Council's Environment Viewer**. It is understood that the Environment Agency are reviewing and updating the Critical Drainage Areas (at the time of preparation of the SFRA) so reference should be made to the latest information at the time an assessment is being prepared.

23 Devon Stage 1 SWMP (2012): https://www.devon.gov.uk/floodriskmanagement/flood-investigations-reports-and-studies/

24 Devon Stage 2 SWMP (2013): https://www.devon.gov.uk/floodriskmanagement/flood-investigations-reports-and-studies/

25 Natural Flood Management (2023): https://www.devon.gov.uk/floodriskmanagement/natural-flood-management/

### 2.10.2 East Devon Draft Local Plan

East Devon District Council have developed draft local policies, which apply to East Devon District, as part of the **Draft Local Plan 2020-2040**. The strategic policy for flooding will be finalised using this SFRA. Of particular importance in relation to the SFRA are those policies which consider flooding, as well as those relating to tackling the climate emergency, responding to climate change and protecting and enhancing biodiversity. Developers should also refer to policies on Coastal Change Management Areas (Policy 36), which does not permit residential development in CCMAs, and sets out the policy for non-residential development.

# 3 Planning policy for flood risk management

This section summaries national planning policy for development and flood risk.

## 3.1 National Planning Policy Framework and Guidance

The revised **National Planning Policy Framework (NPPF)** was updated in December 2023, replacing the 2021 version. The NPPF sets out Government's planning policies for England. It must be considered in the preparation of local plans and is a material consideration in planning decisions. The NPPF defines Flood Zones, how these should be used to allocate land and flood risk assessment requirements. The NPPF states that:

"*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*"

**Planning Practice Guidance** on flood risk was published in March 2014 and sets out how the policy should be implemented. **Diagram 1 in the NPPG** sets out how flood risk should be considered in the preparation of Local Plans. It was updated on the 25 August 2022, see Annex 1 – Updates to the Planning Practice Guidance (25 August 2022) for more information.

## 3.2 The risk-based approach

The NPPF takes a risk-based approach to development in flood risk areas. Since July 2021 the approach has adjusted the requirement for the Sequential Test (as defined in Para 167 of the NPPF) so that all sources of flood risk are included in the consideration. At the time of preparation of the 2024 SFRA no updated guidance (PPG) has been published to describe how the approach to the Sequential Test should be modified. The requirement has been addressed by adopting the approach set out in the sections below. Further information can be found in Appendix O.

### 3.2.1 Flood Zones – fluvial and tidal risk

The definition of the Flood Zones is provided below. The Flood Zones do not take into account defences. This is important for planning long term developments as long-term policy and funding for maintaining flood defences over the lifetime of a development may change over time.

The Flood Zones do not take into account surface water, sewer or groundwater flooding or the impacts of canal or reservoir failure. They do not consider climate change. Hence there could still be a risk of flooding from other sources and that the level of flood risk will change over time during the lifetime of a development.

The Flood Zones are:

- Flood Zone 1: Low probability: less than a 0.1% chance of river and sea flooding in any given year
- Flood Zone 2: Medium probability: between a 1% and 0.1% chance of river flooding in any given year or 0.5% and 0.1% chance of sea flooding in any given year
- Flood Zone 3a: High probability: greater or equal to a 1% chance of river flooding in any given year or greater than a 0.5% chance of sea flooding in any given year. Excludes Flood Zone 3b.

- Flood Zone 3b: Functional Floodplain: land where water has to flow or be stored in times of flood. SFRAs identify this Flood Zone in discussion with the LPA and the Environment Agency. The identification of functional floodplain takes account of local circumstances. Only water compatible and essential infrastructure are permitted in this zone and should be designed to remain operational in times of flood, resulting in no loss of floodplain or blocking of water flow routes. It may be required to consider climate change on the functional floodplain; this would need hydraulic modelling to confirm extents and therefore it is recommended that this is considered in a Flood Risk Assessment and a suitable approach is agreed with the EA. For more information about the datasets used to define Flood Zone 3b in the SFRA, please see Appendix K. Developers should consult with the Environment Agency to confirm the appropriate data is being used as part of a site-specific FRA. The Environment Agency regularly reviews its hydrology, hydraulic modelling and flood risk mapping, and it is important that they are approached to determine whether updated (more accurate) information is available prior to commencing a site-specific FRA.

**Important note on Flood Zone information in this SFRA**

The Flood Zones (Flood Zone 2 and 3a) in the Appendix C are shown from the online Environment Agency's **'Flood Map for Planning'** which incorporates modelled data where available.

The Environment Agency Flood Zones do not cover all catchments or ordinary watercourses with areas <3km$^2$. As a result, whilst the Environment Agency Flood Zones may show an area is in Flood Zone 1, there may be a flood risk from smaller watercourse not shown in the Flood Zones.

Functional floodplain (Flood Zone 3b) is identified as land which would flood with an annual probability of 1 in 30 years (3.3% AEP), where detailed hydraulic modelling exists. The 1 in 30-year defended modelled flood extents have been used to represent Flood Zone 3b, where available from the Environment Agency. Where the 1 in 30-year extent was not available, the 1 in 50-year (2% AEP) has been used as a conservative proxy. For areas outside of the detailed model coverage, or where no outputs were available, Flood Zone 3a has been used as a conservative indication. Further work should be undertaken as part of a detailed site-specific Flood Risk Assessment to define the extent of Flood Zone 3b where no detailed modelling exists.

### 3.2.2 Surface Water

Paragraph 168 of the NPPF states that the Sequential Test must now "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 strategic flood risk assessment will provide the information that can be used to support the test. The sequential approach (as described in Para 168) should be used in areas known to be at risk now or in the future from any form of flooding."

A Sequential Test Methodology document has been prepared in consultation with Devon County Council and the Environment Agency to address the requirement

that flood risk from any source is considered within the Sequential Test. This is described in Appendix O.

In summary, the Environment Agency's 0.1% AEP Risk of Flooding from Surface Water flood extent mapping has been used to define a simple zoning scheme that identifies a low risk (Zone A) and high risk (Zone B) zone. The zones are shown in Appendix P. It should be noted that the Risk of Flooding from Surface Water includes an allowance for drainage (a flood risk management feature), so this is not strictly the same conceptual risk zone as defined for river and sea flooding (even though it is associated with the same probability). However, it does create a product that can accommodate sequential testing, as it facilitates strategic decisions that direct development to land in a "low risk surface water flood zone".

### 3.2.3 Reservoirs

The Sequential Test Methodology (Appendix O) also outlines how reservoir flooding should be included in the Sequential Test. The latest available Environment Agency Risk of Flood from Reservoirs mapping now shows "wet day" and "dry day" reservoir inundation extents. The "wet day" being a reservoir breach at the same time as a 1 in 1000 river flood (as this is a likely time when a reservoir might fail) and the dry day shows the failure just from the water retained by the dam.

Neither set of mapping describes a risk-based scenario as they do not provide the probability of a dam failure but are intended to describe a "worst credible case". The Risk of Flooding from Reservoir dataset is is not conceptually similar to the risks pertaining to river and sea flooding or surface water.

However, a high risk zone has been prepared for reservoir flood risk which identifies where reservoir flooding is predicted to make fluvial flooding worse and where the placement of new development could result in properties being in a location where hazards from flow depth and velocity were potentially severe. If sites selected through a comparative process of assessing the river, sea and surface water flood risk are located in such zones then the implications are addressed in the Level 2 SFRA and further consideration given to the identification of alternative locations at lower potential risk at this stage.

### 3.2.4 Other sources of flooding

**Groundwater**

Flood Zones have not been prepared for groundwater flooding. The readily available datasets for groundwater flooding do not provide the confidence or certainty required to undertake the Sequential Test. The available mapping provides an indication of where the risk of groundwater emergence might be higher, but competent sequential decisions cannot be appropriately made based on the available mapping. It is assumed that all sites are potential susceptible to groundwater flood risk in the Sequential Test as a precautionary approach.

All sites selected for allocation sites are then subject to a further detailed assessment of groundwater flood risk in the assessment prepared for the Level 2 SFRA. This more detailed assessment considers local conditions on a site-by-site basis using borehole, geological and LIDAR data. If necessary further consideration is given to the identification of alternative site locations at lower potential risk at this stage.

**Sewer flooding**

Historic sewer flood data is only available at a postcode level and does not define spatial extent or location of sewer flooding.

The data resolution provided in South West Water's DWMP is catchment scale and applicable to the entire study area. Consequently, it is not possible to take a risk based approach using this data and it is not considered to be comparable to the river and sea flooding information. If specific spatial information becomes available on sewer flood risk that provides competent data on the spatial relative risk of flooding this will be evaluated in the Level 2 SFRA and as appropriate inform the Sequential Test process.

On this basis, Flood Zones for sewer flooding have not been prepared and the available information is not appropriate for use in the Sequential Test.

Further information can be found in Appendix O.

### 3.2.5 The Sequential Test

Firstly, land at the lowest risk of flooding and from all sources should be considered for development. A test is applied called the 'Sequential Test' to do this. Figure 3-1 summarises the Sequential Test. The LPA will apply the Sequential Test to strategic allocations. For all other developments, developers must supply evidence to the LPA, with a Planning Application, that the development has passed the test.

The LPA should work with the Environment Agency to define a suitable area of search for the consideration of alternative sides in the Sequential Test. The Sequential Test can be undertaken as part of a Local Plan Sustainability Appraisal. Alternatively, it can be demonstrated through a free-standing document, or as part of Strategic Housing Land or Employment Land Availability Assessments.

Whether any further work is needed to decide if the land is suitable for development will depend on both the vulnerability of the development and the Flood Zone it is proposed for. **Annex 3 of the NPPG** defines the vulnerability of different development types to flooding. **Table 2 of the NPPG** shows whether, having applied the Sequential Test first, that vulnerability of development is incompatible for that Flood Zone.

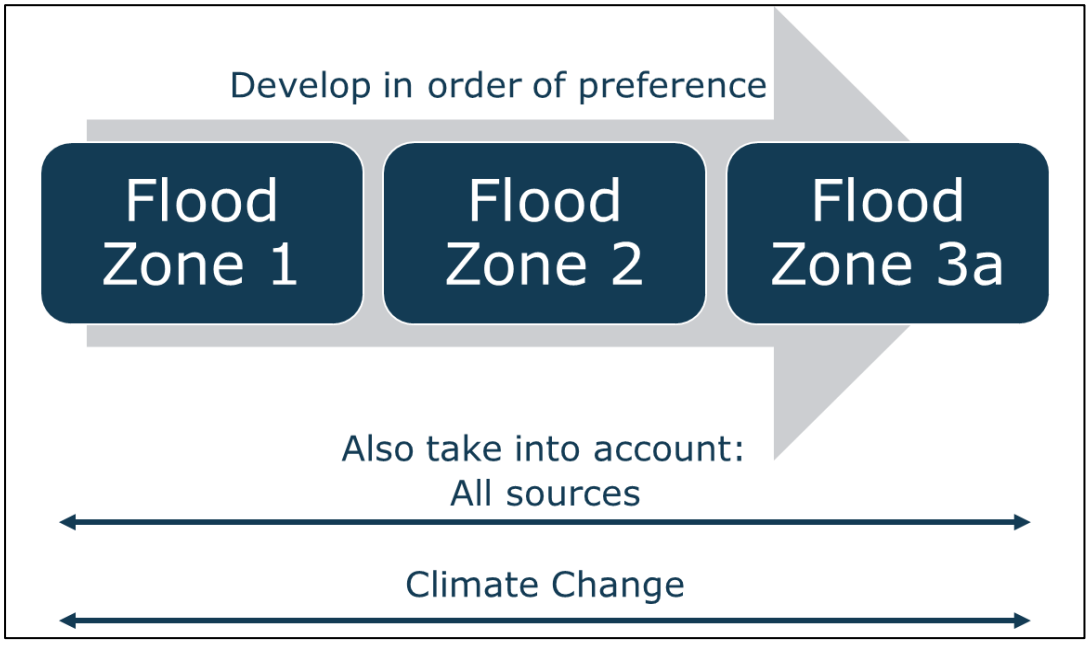
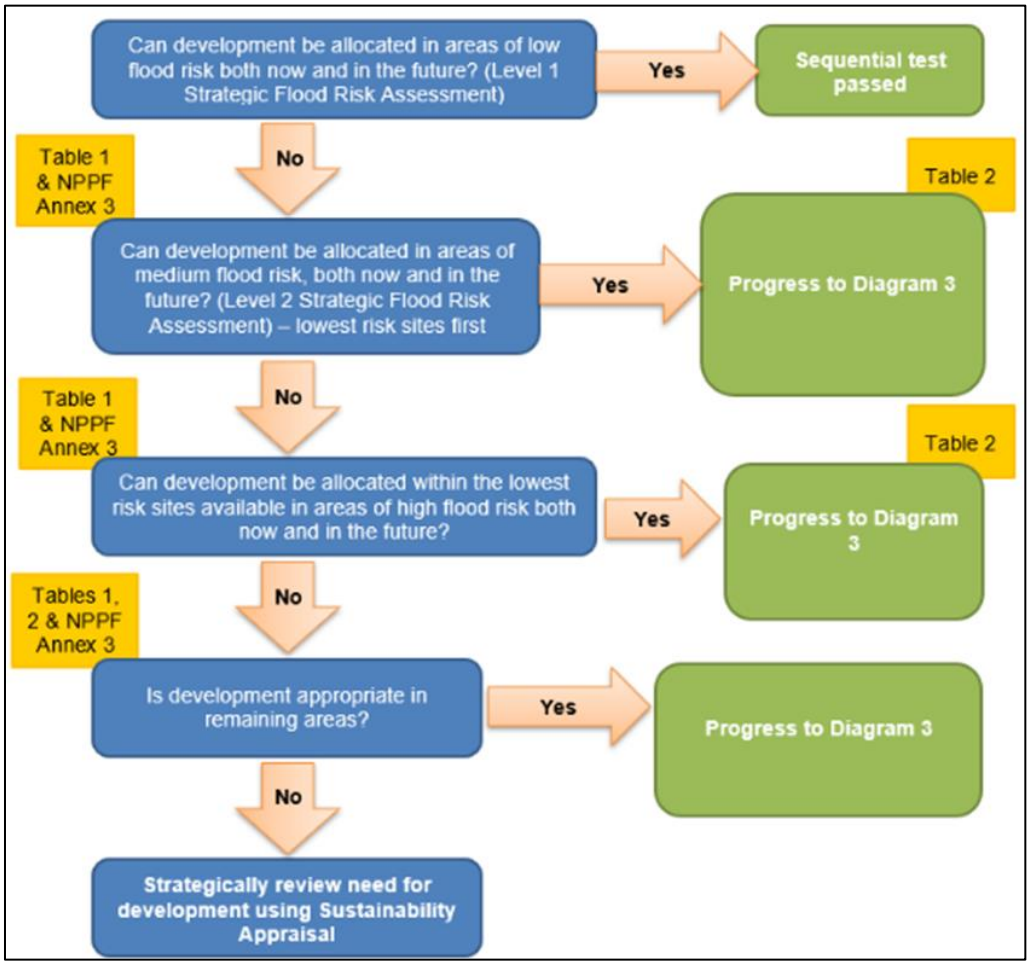



**Figure 3-1 The Sequential Test**

Figure 3-2 illustrates the Sequential Test as a process flow diagram using the information contained in this SFRA to assess potential development sites against the EA's Flood Map for Planning Flood Zones and development vulnerability compatibilities.

This is a stepwise process, but a challenging one, as a number of the criteria used are qualitative and based on experienced judgement. This is an important tool so development is not progressed in areas of flood risk unless it is demonstrated that there are no reasonably available alternatives. The process must be documented, and evidence used to support decisions recorded. In addition, the risk of flooding from outer sources and the impact of climate change must be considered when considering which sites are suitable to allocate. The SFRA User Guide in Appendix L shows where the Sequential and Exception Test may be required for the datasets assessed in the SFRA, and how to interpret different levels of concern with the datasets, recommending what development might be appropriate in what situations.




*Note - other sources of flood risk should also be considered, as per the 2021 update to NPPF but formal zone mapping is not available (* Surface Water Zones "A" and "B" used to define risk sequentially)*

**Figure 3-2: Local Plan sequential approach to site allocation**

### 3.2.6 The Exception Test

It will not always be possible for all new development to be allocated on land that is not at risk from flooding. To further inform whether land should be allocated,

or Planning Permission granted, a greater understanding of the scale and nature of the flood risks is required. In these instances, the Exception Test will be required.

The Exception Test should only be applied following the application of the Sequential Test. It applies in the following instances:

- Essential infrastructure in Flood Zone 3a or 3b
- Highly vulnerable in Flood Zone 2 (this is NOT permitted in Flood Zone 3a or 3b)
- More vulnerable in Flood Zone 3a (this is NOT permitted in Flood Zone 3b)
- Any development in Surface Water Zone "b" (high risk)

Figure 3-3 summarises the Exception Test.

For sites allocated within the Local Plan, the Local Planning Authority should use the information in this SFRA to inform the Exception Test. At planning application stage, the Developer must design the site such that is appropriate flood resistant and resilient in line with the recommendations in National and Local Planning Policy and supporting guidance and those set out in this SFRA. This should demonstrate that the site will still pass the flood risk element of the Exception Test based on the detailed site level analysis.

For developments that have not been allocated in the Local Plan, developers must undertake the Exception Test and present this information to the Local Planning Authority for approval. The Level 1 SFRA can be used to scope the flooding issues that a site-specific FRA should look into in more detail to inform the Exception Test for windfall sites.

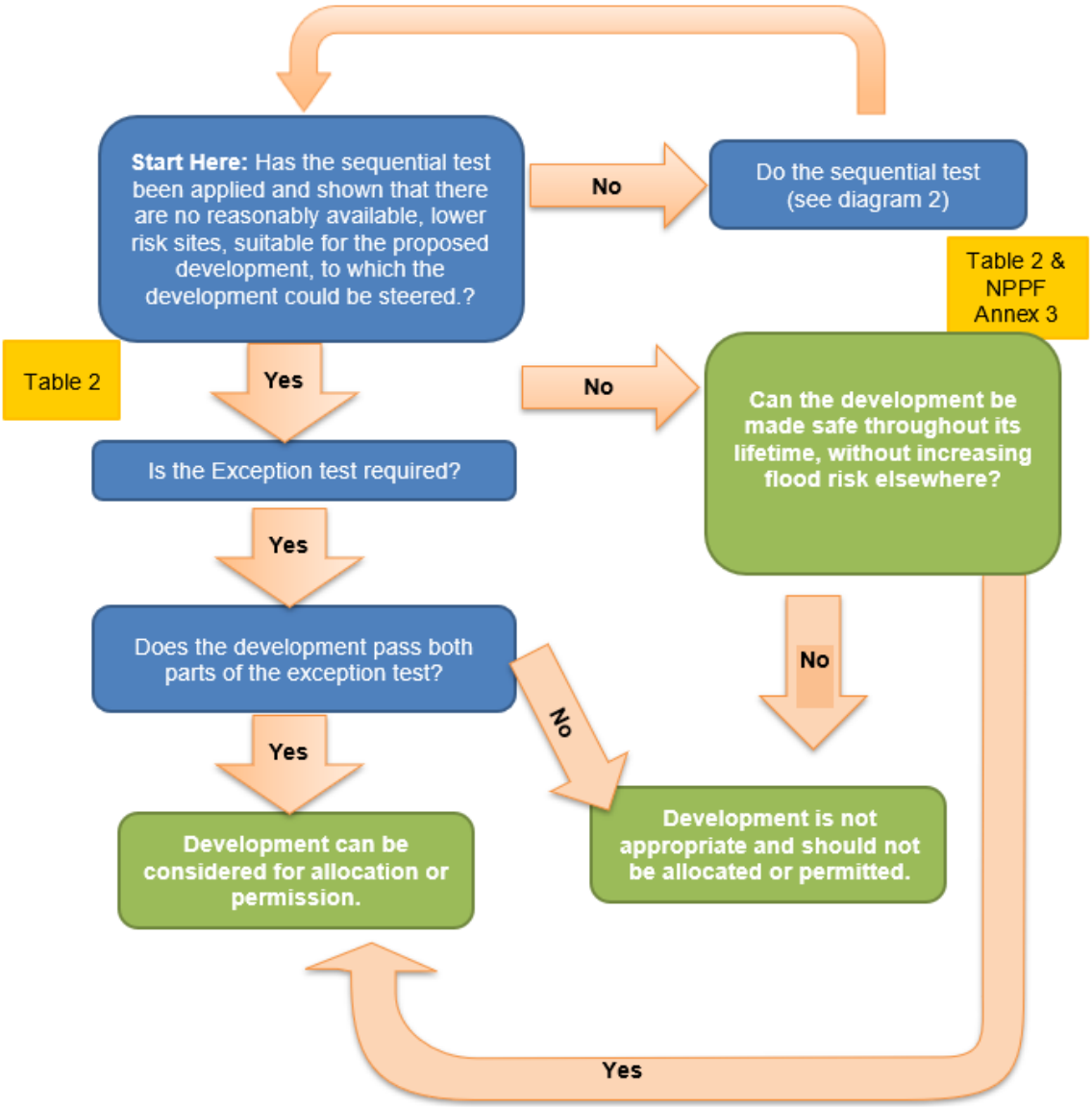



**Figure 3-3 Application of the Exception Test to plan preparation**

There are two parts to demonstrating a development passes the Exception Test:

**Demonstrating that the development would provide wider sustainability benefits to the community that outweigh the flood risk**

Local planning authorities will need to consider what criteria they will use to assess whether this part of the Exception Test has been satisfied and give advice to enable applicants to provide evidence to demonstrate that it has been passed. If the application fails to prove this, the Local Planning Authority should consider whether the use of planning conditions and / or planning obligations could allow it to pass. If this is not possible, this part of the Exception Test has not been passed and planning permission should be refused.

At the stage of allocating development sites, Local Planning Authorities should consider wider sustainability objectives, such as those set out in Local Plan Sustainability Appraisals. These generally consider matters such as biodiversity, green infrastructure, historic environment, climate change adaptation, flood risk, green energy, pollution, health, transport etc.

The Local Planning Authority should consider the sustainability issues the development will address and how doing so will outweigh the flood risk concerns for the site, e.g. by facilitating wider regeneration of an area, providing community facilities, infrastructure that benefits the wider area etc.

**Demonstrating 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.**

In circumstances where the potential effects of proposed development are material a Level 2 SFRA is likely to be needed to inform the Exception Test in these circumstances for strategic allocations to provide evidence that the principle of development can be supported. At Planning Application stage, a site-specific Flood Risk Assessment will be needed. Both would need to consider the actual and residual risk and how this will be managed over the lifetime of the development.

### 3.2.7 Making a site safe from flood risk over its lifetime

Local Planning Authorities will need to consider the actual and residual risk of flooding and how this will be managed over the lifetime of the development:

- The actual risk is the risk to the site considering existing flood mitigation measures. The fluvial and surface water 1% chance (with climate change) and 0.5% tidal (with climate change) flood in any year event are key events to consider because the National Planning Policy Guidance refers to these as the 'design flood' against which the suitability of a proposed development should be assessed and mitigation measures, if any, are designed.
- Safe access and egress should be available during the design flood event, as residents must evacuate safely before an extreme flooding event (0.1% AEP with Climate Change). Firstly, this should seek to avoid areas of a site at flood risk. If that is not possible then access routes should be located above the design flood event levels. Where that is not possible, access through shallow and slow flowing water that poses a low flood hazard may be acceptable. Consideration of access and egress is clearly set out in the August 2022 update to the PPG.
- Residual risk is the risk that remains after the effects of flood defences have been taken into account and/ or from a more severe flood event than the design event. The residual risk can be:
    - a breach of a raised flood defence, blockage of a surface water conveyance system or failure of a pumped drainage system;
    - failure of a reservoir; and
    - a flood event that exceeds a flood management design standard, such as a flood that overtops a raised flood defence, or an intense rainfall event which the drainage system cannot accommodate.

Flood resistance and resilience measures should be considered to manage any residual flood risk by keeping water out of properties and seeking to reduce the damage it does, should water enter a property. Emergency plans should also account for residual risk, e.g. through the provision of flood warnings and a flood evacuation plan where appropriate.

In line with the NPPF, the impacts of climate change over the lifetime of the development should be taken into account when considering actual and residual flood risk.

Section 8.3.3 discusses requirements for finished floor levels.

## 3.3 Applying the Sequential Test and Exception Test to individual planning applications

### 3.3.1 Sequential Test

East Devon District Council, with advice from the Environment Agency, are responsible for considering the extent to which Sequential Test considerations have been satisfied.

Developers are required to apply the Sequential Test to all development sites, unless the site is:

- A strategic allocation and the test has already been carried out by the LPA, or
- A change of use (e.g. from commercial to residential) unless the development is a caravan, camping chalet, mobile home or park home site or
- A minor development (householder development, small non-residential extensions with a footprint of less than 250m$^2$), or
- A development in flood zone 1 unless there are other flooding issues in the area of the development (i.e. surface water, ground water, sewer flooding).

It should also be noted that residential sub-divisions are exempted from the definition of minor development and therefore, by default, should also be subject to the sequential test.

The SFRA contains information on all sources of flooding and taking into account the impact of climate change. This should be considered when a developer undertakes the Sequential Test, including the consideration of reasonably available sites at lower flood risk.

Local circumstances must be used to define the area of application of the Sequential Test (within which it is appropriate to identify reasonably available alternatives). The criteria used to determine the appropriate search area relate to the catchment area for the type of development being proposed. For some sites this may be clear e.g. school catchments, in other cases it may be identified by other Local Plan policies. For some sites e.g. regional distribution sites, it may be suitable to widen the search area beyond LPA administrative boundaries.

The sources of information on reasonably available sites may include:

- Site allocations in Local Plans
- Site with Planning Permission but not yet built out
- Strategic Housing and Economic Land Availability Assessments (SHELAAs)/ five-year land supply/ annual monitoring reports
- Locally listed sites for sale

It may be that a number of smaller sites or part of a larger site at lower flood risk form a suitable alternative to a development site at high flood.

Ownership or landowner agreement in itself is not acceptable as a reason not to consider alternatives.

### 3.3.2 The Exception Test

If, following application of the Sequential Test it is not possible for the development to be located in areas with a lower probability of flooding the Exception Test must then be applied if required (as set out in Table 2 of the NPPG). Developers are required to apply the Exception Test to all applicable sites (including strategic allocations).

The applicant will need to provide information that the application can pass both parts of the Exception Test:

- Demonstrating that the development would provide wider sustainability benefits to the community that outweigh the flood risk.
- Applicants should refer to wider sustainability objectives in Local Plan Sustainability Appraisals. These generally consider matters such as biodiversity, green infrastructure, historic environment, climate change adaptation, flood risk, green energy, pollution, health, transport etc.
- Applicants should detail the suitability issues the development will address and how doing it will outweigh the flood risk concerns for the site e.g. by facilitating wider regeneration of an area, providing community facilities, infrastructure that benefits the wider area etc.
- Demonstrating 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.
- The site-specific Flood Risk Assessment (FRA) should demonstrate that the site will be safe, and the people will not be exposed to hazardous flooding from any source nor result in an increase risk to third parties. The FRA should consider actual and residual risk and how this will be managed over the lifetime of the development, including:
    - The design of any flood defence infrastructure
    - Access and egress
    - Operation and maintenance
    - Design of the development to manage and reduce flood risk wherever possible
    - Resident awareness
    - Flood warning and evacuation procedures, including whether the developer would increase the pressure on emergency services to rescue people during a flood event; and
    - Any funding arrangements required for implementing measures.

# 4 Impact of Climate change

The NPPF sets out that flood risk should be managed over the lifetime of a development, taking climate change into account. This section sets out how the impact of climate change should be considered.

Climate change projections show an increased chance of warmer, wetter winters and hotter, drier summers with a higher likelihood of more frequent and intense rainfall. This is likely to make severe flooding happen more often. It can be expected that there will also be much more frequent events with a magnitude that has only been experienced infrequently in the past.

## 4.1 Revised climate change guidance

The Climate Change Act 2008 creates a legal requirement for the UK to put in place measures to adapt to climate change and to reduce carbon emissions by at least 80% below 1990 levels by 2050.

In 2018, the government published new UK Climate Projections (UKCP18). The Environment Agency has used these projections to update their climate change guidance for new developments with regards to updated tidal, fluvial and rainfall allowances.

The Environment Agency published **updated climate change guidance** for fluvial risk in July 2021 on how allowances for climate change should be included in both strategic and site-specific FRAs. The guidance adopts a risk-based approach considering the vulnerability of the development and considers risk allowances on a management catchment level, rather than a river basin level. The guidance was further updated in May 2022 to address the changes to the requirements for rainfall allowances.

Tidal uplifts (based on river basin districts) were updated in December 2019 brining these in line with the UKCP18 projections.

Developers should check the government website for the latest guidance before undertaking a detailed Flood Risk Assessment.

The **East Devon Climate Change Action** plan sets out to achieve a carbon neutral position for the Council by 2040, or earlier. The themes in this plan where the Council can make meaningful climate change interventions include:

- Energy supply and consumption
- Permitting and encouraging low carbon development
- Improving the carbon footprint of existing buildings (public and private sector)
- Protecting and enhancing the natural environment
- Water supply and flood protection
- Transport and travel
- Purchasing and consumption
- Community resilience
- Education, communication and influencing behaviour.

The **Devon Climate Emergency** project is aiming to create a resilient, net-zero Devon, by raising awareness and encouraging everyone to act.

## 4.2 Applying the climate change guidance

To apply the climate change guidance, the following information needs to be known:

- The vulnerability of the development – see the **NPPF**
- The likely lifetime of the development – in general 75 years is used for commercial development and 100 for residential, but this needs to be confirmed in an FRA. The lifetime of development, if different from that set out in the planning practice guidance, must be agreed with the LPA.
- The Management Catchment that the site is in – the district lies within the East Devon management catchment.
- Likely depth, speed and extent of flooding for each allowance of climate change over time considering the allowances for the relevant epoch (2020s, 2050s and 2080s)
- The 'built in' resilience measures used, for example, raised floor levels
- The capacity or space in the development to include additional resilience measures in the future, using a 'managed adaptive' approach.

## 4.3 Relevant allowances for East Devon

Table 4-1 shows the updated peak river flow allowances that apply in the East Devon for fluvial flood risk (last updated in July 2021). These allowances supersede the previous allowances by River Basin District. SFRAs are required to assess both the central and higher central peak river flow allowances. For East Devon, for the '2080s' this is 46% and 61%.

Climate change modelling has been done as part of the SFRA, based on the latest climate change allowances, in line with the PPG updates, in agreement with the Environment Agency. See Appendix K for more information on the models which were run as part of the SFRA.

**Table 4-1 Peak river flow allowances for the East Devon Management Catchment**

| Allowance Category | Total potential change anticipated for '2020s' (2015 to 2039) | Total potential change anticipated for '2050s' (2040 to 2069) | Total potential change anticipated for '2080s' (2070 to 2115) |
|---|---|---|---|
| Upper end | 34% | 55% | 96% |
| Higher central | 22% | 33% | 61% |
| Central | 16% | 24% | 46% |

Table 4-2 shows the peak rainfall intensity allowances that apply for small catchments (less than 5km$^2$) and urban catchments for surface water flood risk. Catchments which are larger than 5km$^2$ or are rural should use Table 4-1 for peak river flow allowances.

Table 4-2 shows the updated rainfall intensity allowances that apply in the East Devon District for pluvial flood risk for the Management Catchment (as of March 2023). These allowances supersede the previous country wide allowances. For SFRAs, the upper end allowance should be used for development with a lifetime

beyond 2100. For East Devon, for the '2070s' this is 40% for the 3.3% AEP event, and 45% for the 1% AEP event. No guidance on allowances for the 0.1% AEP event is provided.

**Table 4-2: Peak rainfall intensity allowance in small and urban catchments for the East Devon Management catchment**

| Allowance Category | 3.3% annual exceedance rainfall event 2050s | 3.3% annual exceedance rainfall event 2070s | 1% annual exceedance rainfall event 2050s | 1% annual exceedance rainfall event 2070s |
|---|---|---|---|---|
| Upper end | 35% | 40% | 40% | 45% |
| Central | 20% | 25% | 25% | 30% |

Climate change is predicted to result in higher sea levels caused by melting ice sheets and more extreme storm events which will create higher storm surges and the Environment Agency has published sea level rise allowances for this[26]. East Devon district is within the South West River Basin District as indicated by mapping produced by the Environment Agency[27]. The allowances for this district are provided in Table 4-3. The information in the table is for still water levels only. FRAs and SFRAs should assess both the higher central and upper end allowances.

**Table 4-3: Sea level allowances by river basin district for each epoch in mm for each year (based on a 1981 to 2000 baseline) – the total sea level rise for each epoch is in brackets**

| Allowance category | 2000 to 2035 (mm) | 2036 to 2065 (mm) | 2066 to 2095 (mm) | 2096 to 2125 (mm) | Cumulative rise 2000 to 2125 (metres) |
|---|---|---|---|---|---|
| Upper end | 7 (245) | 11.4 (342) | 16 (480) | 18.4 (552) | 1.62 |
| Higher central | 5.8 (203) | 8.8 (264) | 11.7 (351) | 13.1 (393) | 1.21 |

The climate change allowances listed above are regularly updated based on the latest available information. Developers should use the latest allowances.

## 4.4 Representing climate change in the Level 1 SFRA

Representation of climate change within the SFRA was discussed with East Devon District Council and the Environment Agency, and additional climate change modelling has been undertaken following the updates to the PPG.

The existing hydraulic models were re-run using the latest climate change allowances, to provide extents equivalent to Flood Zone 3b, Flood Zone 3a and

[26] Flood risk assessments: climate change allowances: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#river-basin-district

[27] River basin district map: https://www.gov.uk/government/publications/river-basin-district-map

Flood Zone 2 in the future. For more information about the model runs that were done see Appendix K.

Climate change mapping has been provided in Appendix D. Where detailed hydraulic modelling is not available, Flood Zone 2 was used as an indicative climate change extent for Flood Zone 3a. This is appropriate given the Upper End climate change estimates are often similar to the Flood Zone 2 extents.

The Risk of Flooding from Surface Water (RoFSW) mapping has previously been run in East Devon for the 25% and 65% allowances for the 3.3%, 1% and 0.1% AEP events. This was used to assess the impacts of climate change on surface water flood risk in agreement with Devon County Council, as these uplifts provide reasonable upper and lower bounds of the updated allowances.

Developers will need to undertake a more detailed assessment of climate change as part of the planning application process when preparing Flood Risk Assessments, using the percentage increases which relate to the proposed lifetime and the vulnerability classification of the development. In areas where no modelling is present, this may require development of a 'detailed' hydraulic model, using channel topographic survey. The EA should be consulted to provide further advice for developers on how best to apply the new climate change guidance.

It is important to note that although the flood extent may not increase noticeably on some watercourses, the flood depth, velocity and hazard may increase compared to the 1% AEP (100-year) present-day event.

When undertaking a site-specific Flood Risk Assessment, developers should:

- Confirm which national guidance on climate change and new development applies by visiting **GOV.uk**
- Apply this guidance when deciding the allowances to be made for climate change, having considered the potential sources of flood risk to the site (using this SFRA), the vulnerability of the development to flooding and the proposed lifetime of the development. If the site is just outside the indicative climate change extents in this SFRA, the impact of climate change should still be considered because these may get affected should the more extreme climate change scenarios materialise. Climate change may also affect a site when considering site specific, detailed modelling rather than generalised extents.
- Refer to Section 8 which provides further details on climate change for developers, as part of the FRA guidance, and the SFRA User Guide in Appendix L.

## 4.5 Impact of climate change in East Devon

This section explores which areas of the district are most sensitive to increases in flood risk due to climate change. It should be noted that areas that are already at high risk will also become at increasing risk in future and the frequency of flooding will increase in such areas.

It is recommended that the Council works with other Risk Management Authorities to review the long-term sustainability of existing and new development in these areas when developing climate change plans and strategies for the district.

### 4.5.1 Impact of climate change on fluvial flood risk

Hydraulic models were re-run using the latest climate change allowances to assess the impact of climate change on fluvial flood risk. For information about which models were run refer to Appendix K Mapping showing the impact of climate change on fluvial flood risk is shown in Appendix D.

Where detailed modelling is not available, the Environment Agency's Flood Map for Planning Flood Zone 2 has been used as a proxy for changes to flood extent due to climate change. Comparing the change in flood extent between Flood Zone 3 and Flood Zone 2 indicates areas which are the most sensitive to fluvial impacts of climate change.

Areas in the district most sensitive to fluvial impacts of climate change are: Kilmington in the east, Sidmouth in the south, Clyst St Mary in the west and Exmouth in the southwest.

### 4.5.2 Impact of climate change on tidal flood risk

Hydraulic models were re-run using the latest climate change allowances to assess the impact of climate change on tidal flood risk. For information about which models were run refer to Appendix K. Mapping showing the impact of climate change on tidal flood risk is shown in Appendix D.

The areas in the district most sensitive to tidal impacts of climate change are Axmouth and Sidmouth.

The model re-runs have not taken wave action into account. Accordingly the actual risk will potentially be greater than the model results suggest, based on the additional potential impacts of increased wave action as a result of climate change. Site-specific Flood Risk Assessments should undertake wave analysis to understand the implications for particular sites.

For areas where there is no detailed modelling, an indicative layer has been produced to assess the impact of climate change on tidal Flood Zone 2 as discussed with the Environment Agency. The Environment Agency Coastal Boundary dataset was used to identify a maximum level along the East Devon coast of 3.48m AOD for the 0.1% AEP event. The maximum cumulative sea level rise of 1.62m (Table 4-3) was added on to this level, to give a level of 5.10m AOD. A layer has been produced covering regions of the district at or below 5.10m AOD to give an indication of areas which could be at risk of 0.1% AEP tidal flooding with climate change – this should be used where no detailed climate change modelling is available. It should be noted that this does not take into account the impact of flood defences or localised topography.

### 4.5.3 Impact of climate change on surface water flood risk

The RoFSW outputs have been assessed for the 25% and 65% climate change allowances for the 3.3% AEP, 1% AEP and 0.1% AEP to understand the impacts of climate change on surface water flood risk.

Areas in the district most sensitive to changes are typically in areas of low-lying topography on the floodplains of the main watercourses. The majority of the district is at risk of increased surface water flooding due to climate change. However particular areas at risk are: Kilmington and Axminster in the east, Buckerell in the centre, Sidmouth in the south, Exmouth in the southwest, and Clyst St Mary and Broadclyst in the west.

### 4.5.4 Impact of climate change on groundwater flood risk

There is no technical modelling data available to assess climate change impacts on groundwater. The impact of climate change on groundwater flooding would depend on the flooding mechanism and geological characteristics, for example prolonged rainfall in a chalk catchment. Flood risk could increase when groundwater is already high or emerged, causing additional overland flow paths or areas of still ponding.

A high likelihood of groundwater flooding may mean infiltration SuDS are not appropriate and groundwater monitoring may be recommended.

### 4.5.5 Adapting to climate change

The **NPPG Climate Change guidance** contains information and guidance for how to identify suitable mitigation and adaptation measure in the planning process to address the impacts of climate change. Examples of adapting to climate change include:

- Considering future climate risks when allocating development sites to ensure risks are understood over the development's lifetime;
- Considering the impact of and promoting design responses to flood risk and coastal change for the lifetime of the development;
- Considering availability of water and water infrastructure for the lifetime of the development and design responses to promote water efficiency and protect water quality;
- Promoting adaptation approaches in design policies for developments and the public realm for example by building in flexibility to allow future adaptation if needed, such as setting new development back from watercourses;
- Identifying no or low-cost responses to climate risks that also deliver other benefits, such as green infrastructure that improves adaptation, biodiversity and amenity, for example by leaving areas shown to be at risk of flooding as public open space;
- Considering the standard of protection of defences and sites for future development, in relation to sensitivity to climate change. East Devon District Council and developers will need to work with RMAs and use the SFRA datasets to understand whether development is affordable or deliverable. Locating development in such areas of risk may not be a sustainable long-term option, such as at the defence locations mentioned in Section 6; and
- It is recommended that the differences in flood extents from climate change are compared by East Devon District Council when allocating sites, to understand how much additional risk there could be, where this risk is in the site, whether the increase is marginal or activates new flow paths, whether it affects access/ egress and how much land could still be developable overall. Recommendations for development are made for the levels of risk in the SFRA User Guide in Appendix L.

# 5 Understanding flood risk in East Devon District

This section explores the key sources of flooding in East Devon District and the factors that affect flooding including topography, soils and geology. The main sources of flooding are from watercourses, the sea, surface water and sewers.

This is a strategic summary of the risk in East Devon District. Developers should use this section to scope out the flood risk issues they need to consider in greater detail in a site-specific Flood Risk Assessment to support a Planning Application.

Appendix K contains a list of the sources of data used in the SFRA and the approach to using hydraulic model data to inform the mapping.

## 5.1 Historical flooding

Settlements in East Devon have suffered from numerous floods, especially in the catchments of the Rivers Axe, Sid and Otter and along the Exe Estuary. The data shows most recorded flood incidents within East Devon to be fluvial flooding and surface water flooding but there is also the risk of significant tidal flooding in communities along the coast. Risks to people, property and infrastructure are focused in the settlements of Axminster, Budleigh Salterton, Honiton, Newton Poppleford, Ottery St Mary, Seaton and Sidmouth.

The key historical incidents of flooding identified are summarised as follows, with source of flooding quoted where known:

- 1960 - Exmouth and Lympstone: severe fluvial flooding. Budleigh Salterton.
- 1968 – Sidmouth, Sidbury, Sidford, Honiton, Ottery St Mary, Fenny Bridges, Tipton St John, Newton Poppleford, Seaton, Colyton, Axminster, Beer: severe fluvial flooding.
- 1979 – Seaton: tidal.
- 1983 – Exmouth: fluvial and tidal.
- 1985 – Lympstone: fluvial and tidal.
- 1996 – Clyst St Mary, Clyst Honiton: fluvial.
- 1997 – Ottery St Mary: surface water.
- 2000 – Stoke Canon: fluvial. Axminster, Colyton, Colyford, East Budleigh.
- 2004 – Beer: surface water.
- 2008 – Ottery St Mary: surface water. Feniton and Fenny Bridges: surface water. Whimple: fluvial. Rockbeare: fluvial and surface water.
- 2012 – the Axe catchment was affected from flooding from the River Axe and other minor watercourse tributaries from Axminster to Kilmington, Whitford, Colyton and Colyford, with a significant number of properties affected in Axminster. Uplyme: surface water and fluvial flooding in December. Stoke Cannon: surface water. Exmouth: tidal and surface water flooding in November. Lympstone: fluvial. Feniton: Surface water.
- 2014 – Sidmouth: Surface water flooding.
- 2021 - Axminster and Seaton: significant numbers of properties affected by fluvial and surface water flooding.
- 2023 – Newton Poppleford, Colaton Raleigh, Venn Ottery, Tipton St John, Metcombe, Harpford, Stoneyford and Fluxton with over 100 properties flooded on 9th May.

Other locations that have suffered from multiple flood incidents are Tipton St John, Otterton, Woodbury, Clyst St Mary, Kerswell and Gittisham.

It is understood from the Environment Agency that under section 19 of the Flood and Water Management Act (FWMA) Devon County Council, as the LLFA, has a duty to investigate a significant flood. A threshold of 5 properties suffering internal flooding in any one location has been set as the trigger for carrying out an investigation. Flood incidents recorded between July 2011 and October 2021 are recorded below by community in Table 5-1.

Many flood events go un-recorded, and the data collated as part of the SFRA is only those that have been recorded.

**Table 5-1 - Recorded flood incidents by community within East Devon between 2011-2021 from Devon County Council flood investigations**

| Community | Number of flood incidents |
|---|---|
| Aylesbeare | 1 |
| Axminster | 5 |
| Beer | 1 |
| Broadhembury | 1 |
| Budleigh Salterton | 3 |
| Clyst Honiton | 1 |
| Clyst St Mary | 4 |
| Colaton Raleigh | 2 |
| Colyford | 2 |
| Colyton | 4 |
| Combe Raleigh | 1 |
| Dalwood | 2 |
| East Budleigh | 2 |
| Exmouth | 5 |
| Exton | 2 |
| Feniton | 4 |
| Fluxton | 2 |
| Gittisham | 1 |
| Harpford | 3 |
| Hawkchurch | 1 |
| Holyford | 1 |
| Honiton | 4 |
| Kerswell | 1 |
| Killerton | 1 |
| Kilmington | 11 |
| Lympstone | 3 |
| Membury | 1 |

| Community | Number of flood incidents |
|---|---|
| Metcombe | 1 |
| Musbury | 1 |
| Nether Exe | 2 |
| Newton Poppleford | 3 |
| Normans Green, Plymtree | 1 |
| Northmostown, Newton Poppleford | 1 |
| Otterton | 2 |
| Ottery St Mary | 5 |
| Payhembury | 2 |
| Rockbeare | 2 |
| Rudway Barton, Thorverton | 1 |
| Seaton | 3 |
| Sheldon | 1 |
| Sidbury | 1 |
| Sidford | 2 |
| Sidmouth | 6 |
| Smallridge | 1 |
| Southleigh | 1 |
| Stockland | 1 |
| Stoneyford | 1 |
| Stoke Canon | 3 |
| Talaton | 1 |
| Tipton St John | 5 |
| Up Exe | 1 |
| Uplyme | 4 |
| Venn Ottery | 1 |
| West Clyst | 1 |
| Westwood | 2 |
| Whimple | 5 |
| Whitford | 2 |
| Wiggaton | 1 |
| Woodbury | 4 |
| Woodbury Salterton | 2 |

In addition, the EA's **Historic Flood Map (HFM)** shows areas of land that have been previously subject to fluvial flooding in the area. This includes flooding from rivers, the sea and groundwater springs but excludes surface water. The Historic Flood Map outlines for East Devon District are shown in Appendix A. The main flood events recorded in the HFM are predominantly from main river and ordinary watercourse sources, in:

- River Axe, Budleigh Salterton, (September 1960),
- River Clyst and River Culm (October 1960),
- River Clyst/Brindle Brook, River Exe, River Kenn, (December 1965),
- River Axe catchment (January 1968),
- River Otter, River Axe, River Coly, River Culm, River Otter, River Sid, River Yarty, Umborne Brook (July 1968),
- River Clyst (July 1972),
- River Clyst (December 1992),
- Budleigh Salterton, Otterton (October 2000),
- River Axe, River Culm, Feniton, Newton Poppleford, River Otter, (October 2008),
- Axminster, Littleham, Sidbury, Sidford, Sidmouth (July 2012),
- Feniton (November 2012),
- Stoke Canon (December 2012),
- Clyst Honiton (January 2014),
- tidal flooding in Seaton, Lympstone and Exmouth in February 2014.

Please note this does not include all recorded flood events, such as those from other sources, which Devon County Council and LLFA's have recorded. Some of the historic extents may refer to older historic flood events, prior to flood defence improvements. It is recommended that the HFM (shown in Appendix A) is viewed alongside the **Recorded Flood Outline** dataset.

Devon County Council provided flood incidents layers containing 1,518 records of flooding. The incidents are largely located near towns like Axminster, Honiton, Ottery St Mary, Sidmouth and Exmouth. However, there is a large spread of incidents across the district. These are shown in Appendix A. The sources of flooding, where known, are fluvial, groundwater, sewer, surface water, surface runoff and tidal.

Devon and Somerset fire brigade have provided details of 65 flooding incidents which have occurred since 2016. These are provided in the first part of the postcode. This includes 31 incidents where the fire brigade did not attend, and 34 incidents which were attended. The Devon and Somerset fire brigade incidents were compared with the Devon County Council flood incidents layer, and the majority of incidents did not overlap with Devon County Council incidents based on date and location.

**Table 5-2 Devon and Somerset fire brigade records of flooding from 2016-2022**

| Year | Number of incidents |
|---|---|
| EX5 | 8 |
| EX8 | 8 |
| EX9 | 1 |
| EX10 | 8 |
| EX11 | 1 |
| EX12 | 11 |
| EX13 | 7 |
| EX14 | 15 |
| EX15 | 1 |
| Not specified | 5 |

## 5.2 Topography, geology, soils and hydrology

The topography, geology and soils are all important in influencing the way the catchments respond to a rainfall event. The degree to which a material allows water to percolate through it, the permeability, affects the extent of overland flow and therefore the amount of run-off reaching the watercourse. Steep slopes or clay rich (low permeability) soils will promote rapid surface runoff, whereas more permeable rock such as sandstone may result in a more subdued response.

### 5.2.1 Topography

The topography that characterises the district is displayed in Figure 5-1. The topography primarily comprises the higher elevations and plateaux which form the Blackdown Hills in the north section of the district, with an area of this high elevation extending south to the coast through the centre of the district. Elevations reach approximately 280m Above Ordnance Datum (m AOD) in the far north of the district. This high land is dissected by steep slopes of river valleys which run predominantly north to south from the Blackdown Hills to the English Channel. The two main river valleys are those of the Rivers Otter and Axe. To the west of the River Otter, the district is lower, sloping west down to the River Exe valley and estuary which forms much of the western boundary of the district.

### 5.2.2 Geology and soils

The geology of the catchment can be an important influencing factor in the way that water runs off the ground surface. This is primarily due to variations in the permeability of the surface material and bedrock stratigraphy.

The bedrock geology of East Devon is dominated by sedimentary deposits, with various formations of sandstones, siltstones, mudstones, conglomerates and limestones and chalk covering the vast majority of the area, as shown in Figure 5-2.

The East Devon coastline extending east from Exmouth to the Dorset Council border and forms the western section of the UNESCO (United Nations Educational Scientific and Cultural Organisation) Jurassic Coast World Heritage Site. This represents a cross section through the geology of much of East Devon with geology becoming younger from east to west as the Permian, Triassic, Jurassic and Cretaceous rocks dip eastwards.

In the west of the district, to the east of the River Exe estuary, are permeable Permian sandstones, mudstones and siltstones. Further east underlying much of the River Otter, Sid and Axe catchments are Triassic sandstones, mudstones, siltstones and conglomerate which are less permeable than the Permian rocks in the west. The Gault Formation and Upper Greensand Formation (mudstone, sandstone and limestone) make up much of the higher elevations extending north from the coast to the Blackdown Hills, providing the watershed between the Otter and Axe catchments. In the south and east of the district are found chalk deposits.

The superficial geology (Figure 5-3) comprises of alluvium occupying the base of all the main river valleys. There are also undifferentiated river terrace deposits in many of the river valleys, especially the Rivers Axe and Sid. Clays with flints are found on the higher elevations between the river valleys in the east of the district.

Mapping from the **Cranfield Soil and Agrifood Institute**[28] shows the most common soil type in the district is slightly acid loamy and clayey soils with impeded drainage, with particularly large extents in the area to the west of the River Otter watershed and in the River Axe catchment. In all main river valley bottoms, except the River Sid, are found loamy and clayey floodplain soils with naturally high groundwater. The River Otter valley has a high proportion of freely draining soils and these are also found on the upper valley sides of many of the high plateaus in the east and north of the district. However, on the high plateaus are found slowly permeable seasonally wet acid loamy and clayey soils.

[28] Cranfield Soil and Agrifood Institute: Soilscapes soil types viewer - National Soil Resources Institute. Cranfield University (landis.org.uk)

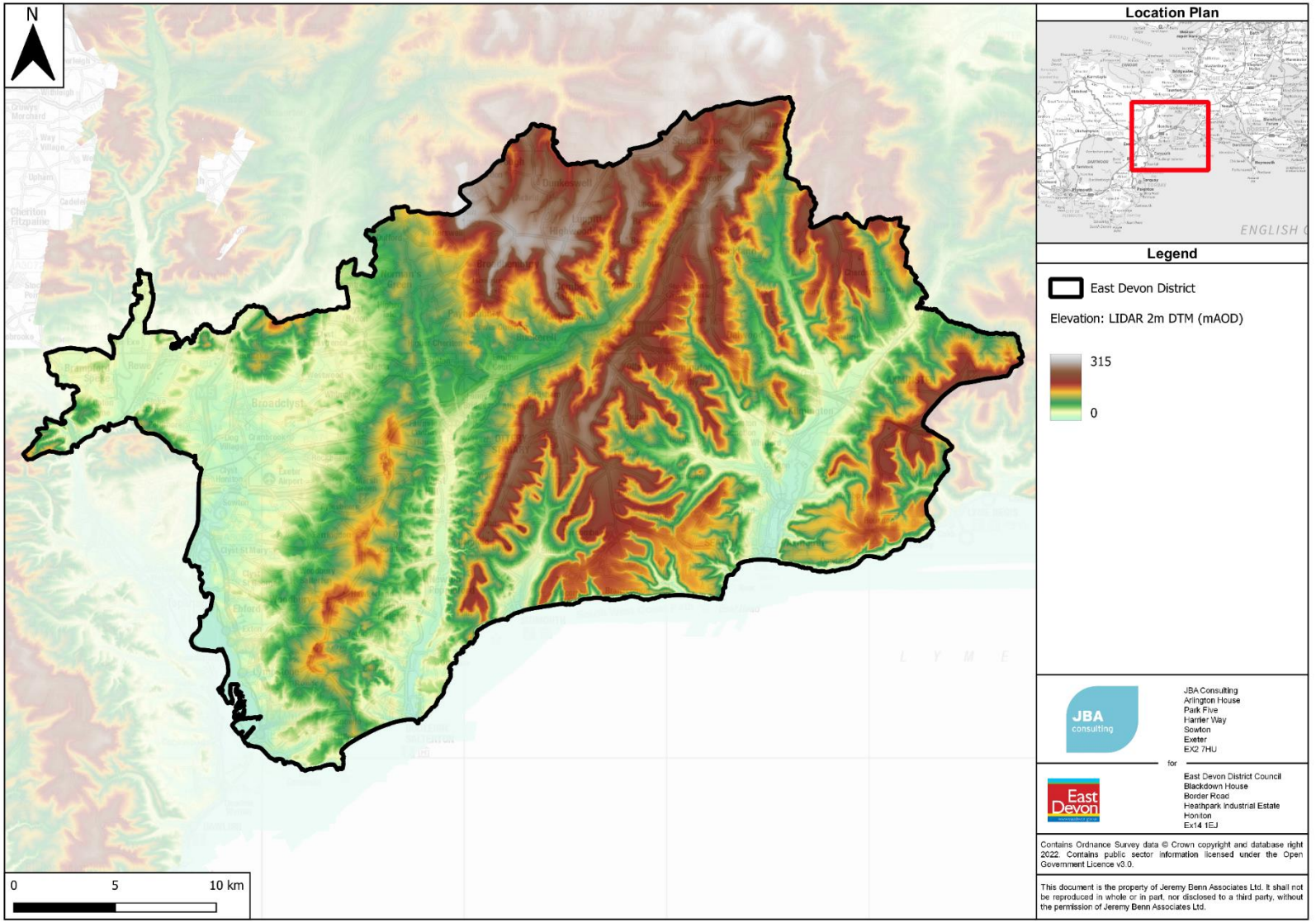



**Figure 5-1: Topography of East Devon**

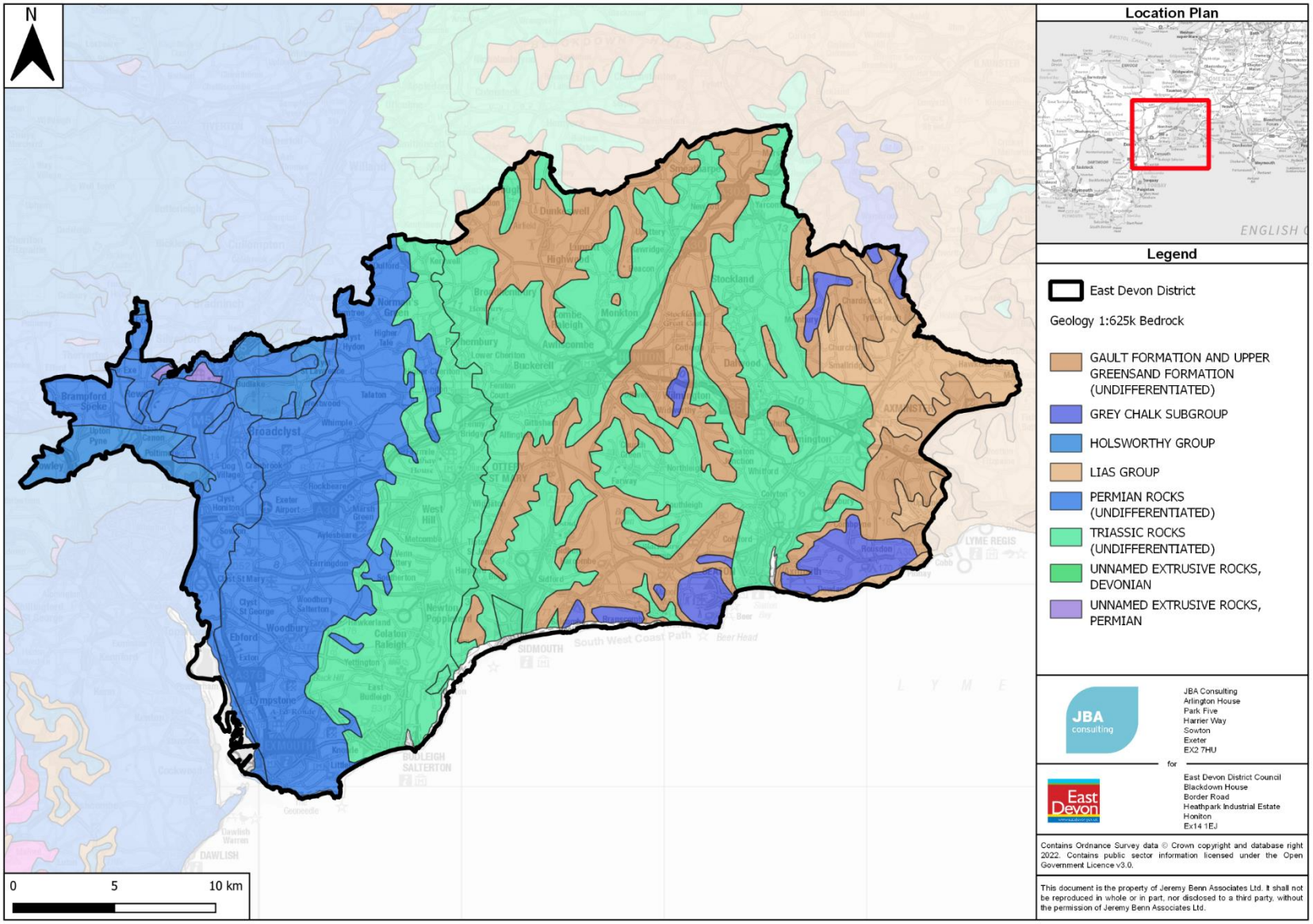



**Figure 5-2: Bedrock geology of East Devon**

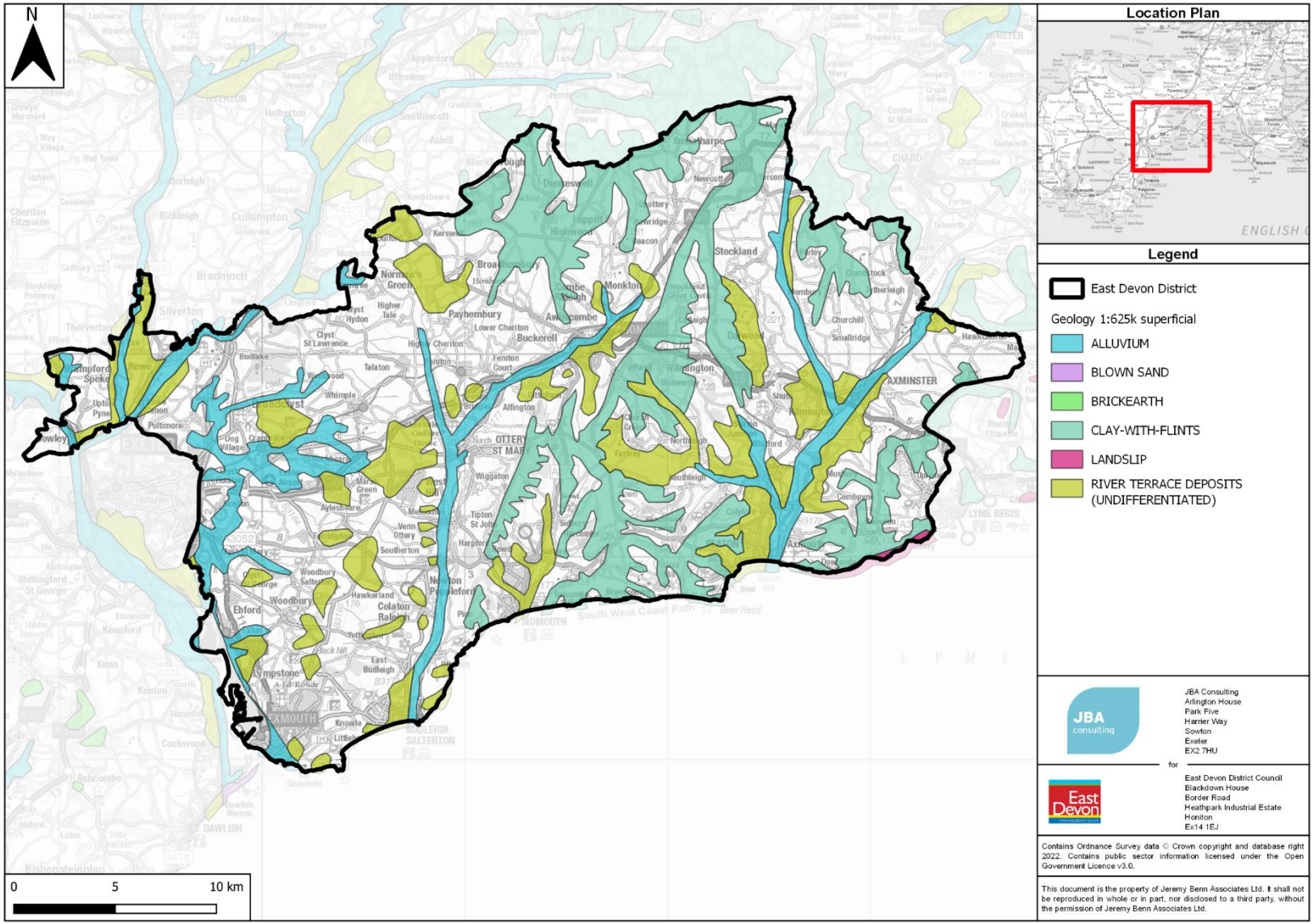



**Figure 5-3: Superficial geology of East Devon**

## 5.3 Hydrology

East Devon district contains many watercourses (shown in Appendix B), the principal ones being the Rivers Exe, Clyst, Otter and Axe. Also, the Rivers Culm and Creedy have short sections within the district. The Rivers Exe, Culm and Creedy all have most of their catchments outside of East Devon district, but both the River Culm and Exe have tributaries within the district. These rivers are all Environment Agency Main Rivers; tributaries to these rivers include many named watercourses and smaller Ordinary Watercourses. The main river catchments in East Devon district are those of the River Otter, River Axe, River Clyst and River Sid. The largest catchment fully within the district is the River Clyst. The catchment of the River Otter is almost wholly within East Devon but has its source just in Somerset; the River Axe is mostly within the district, but its source is in Dorset. Many of the larger settlements in the district are next to these watercourses.

A map of the key watercourses is included in Appendix B.

### Table 5-3: Watercourses in East Devon District

| Watercourse name | Classification | Description |
|---|---|---|
| River Creedy | Main River | This is a significant tributary of the River Exe's lower course, however there is less than 2km of the River Credy's course lying within the far north-west of the district up to its confluence with the River Exe. |
| River Exe | Main River | This is the largest river with a catchment to partly fall within the East Devon district. A short section of its lower course flows through the extreme north-west of the district, both before and after its confluence with the River Culm. The River Exe estuary then forms the far west boundary of the district from between Topsham to Exmouth. |
| River Culm | Main River | The final reach of approximately 5km of the River Culm up to its confluence with the river Exe lies within the extreme north-western section of East Devon district. It is the second longest river to pass through the district and has a large catchment that drains the south-western extent of the Blackdown Hills. |
| River Clyst | Main River | Despite being the longest river wholly within the East Devon district (approximately 40 km long), the River Clyst is a river with all its catchment at lower elevations (the source is below 70m AOD) and hence has a very gently sloping catchment. Its source is approximately 6 km south-east of Cullompton, from here it flows south-west then south to become tidal near Topsham where it joins the River Exe estuary. |
| River Otter | Main River | The River Otter is the largest catchment within the district. It has its source in the Blackdown Hills, just north of the East Devon district boundary in Somerset, to the north-east of Honiton. It flows south-west passing just to the north of Honiton to near Ottery St Mary where it is joined by the River Tale. It then flows south, passing through the edge of Ottery St Mary, to its tidal estuary and river mouth at Budleigh Salterton. It has steeply sloping tributaries from the Blackdown Hills. |
| River Tale | Main River | This is the main tributary of the River Otter, flowing south-west from its source in the Blackdown Hills near Broadhembury to turn and flow south to meet the River Otter near Ottery St Mary. |
| River Sid | Main River | The River Sid has its source south of Honiton on the edge of a high plateau of land extending south from the main mass of the Blackdown Hills. It is a relatively small catchment with steep channel gradients, flowing from the hills through the settlements of Sidbury and Sidford to Sidmouth where it meets the sea. |
| River Axe | Main River | The River Axe forms the second largest catchment within the district. The River Axe has its source in Dorset, it first flows west and forms the county border between Dorset and Somerset to then flow south-west into East Devon district. Its northern and western tributaries (the Rivers Yarty, Coly and Umborne Brook) drain steeply south and east from the high land of the Blackdown Hills but most of the River Axe lies in a broad and gently sloping valley. It flows along the northern edge of Axminster and then turns south to the east of Colyton, it then forms a large tidal estuary at Axmouth and meets the sea at Seaton. |
| River Coly | Main River | This is a significant tributary of the River Axe, flowing east from high ground south of Honiton, around the north and east edges of Colyton to flow south to join the River Axe at Colyford. |
| Umborne Brook | Main River | This is a tributary of the River Coly, flowing south from the Blackdown Hills to the east of Honiton to join the River Coly on the northern edge of Colyford. |
| Corry Brook | Main River | This, with the River Yarty, is the main tributary of the River Axe, flowing south from its source high in the Blackdown Hills and then south-east to its confluence with the River Axe just to the west of Axminster. |

| Watercourse name | Classification | Description |
|---|---|---|
| River Yarty | Main River | The River Yarty flows roughly parallel to and east of the Corry Brook, flowing south from the Blackdown Hills to join the Corry Brook just before it flows into the River Axe. |
| River Lim | Main River | The River Lim's upper catchment lies in the eastern extremity of the district. It has a small catchment with steep channel gradients. |
| This table does not provide information on all Main Rivers in East Devon. Other Main Rivers within East Devon are: Grindle Brook, Wotton Brook, Withycombe Brook, Budleigh Brook, Back Brook, Snod Brook, The Gissage and Woodhayne Range. | | |
| NOTE: This table is based on information extracted from the Environment Agency's Statutory (Sealed) Main Rivers database. Ordinary Watercourses within the district are not included within this table. | | |

## 5.4 Fluvial flood risk

The primary fluvial flood risk in East Devon is along the River Exe, River Clyst, River Otter, River Sid, River Axe and their tributaries. These watercourses present fluvial flood risk to rural communities as well as to the main urban areas in East Devon.

The Flood Zone maps for East Devon District are provided in Appendix C, split into Flood Zones 2, 3a and 3b (including an 'indicative 3b' where FZ3a acts as FZ3b in the absence of detailed model data). The flood risk associated with the major locations in East Devon District are detailed in Appendix M.

Within East Devon it is also possible for flash flooding from watercourses that are within drainage areas called Rapid Response Catchments. Unlike most other types of flooding, the localised nature and speed of the river response means that flooding can occur before flood warnings are issued. Devon has a long history of flash flooding in Rapid Response Catchments with flooding in East Devon in 2004 and 2008, and more recently in May 2023 in Tipton St John.

## 5.5 Tidal flood risk

Tidal flood risk can be assessed using Extreme Still Water Sea Levels (ESWSL). An ESWSL is the level the sea is expected to reach during a storm event for a particular magnitude tidal flood event as a result of the combination of tides and surges. As these levels are based on 'still' water, the effect of short-term fluctuations in sea level associated with wind and swell waves are not included in these predictions, but should be considered at locations where wind and wave effects are influential.

Major tidal flooding occurred in 1960 when Exmouth flooded twice, with nearly 1000 properties flooded.

The areas identified most at risk of tidal flooding are Exmouth, Budleigh Salterton, Sidmouth and Seaton. In some places along the coastline, such as settlements along the Exe estuary, tidal flood risk can occur in combination with fluvial and surface water sources which can exacerbate flood risk.

East Devon is also at risk of tidal locking due to its coastal location, where water is unable to discharge due to high tides. An example would be at Lympstone, where the Wotton Brook is unable to discharge into the River Exe Estuary when tides are high, causing an increase in water levels within the channel in the village.

### 5.5.1 Wave overtopping

In exposed locations along the coast, and within the major estuaries, landward flooding is more likely to occur as a consequence of wave overtopping than inundation. Wave overtopping is a term, which encompasses a number of complex physical processes, which result in the transfer of water from the sea onto the coastal floodplain. The amount of wave overtopping that occurs during an extreme event is dependent on the local water depth, the properties of incoming waves and the geometry of local flood defences. Wave overtopping is one of the principal mechanisms of flooding for the coastal frontage.

## 5.6 Coastal flood risk

In coastal locations the risk of flooding is linked to the stability of the coastline. If the coast is eroding, then the potential effect is that tidal flood defences near to the sea will be lost and flood risk will increase. To maintain an appropriate standard of safety from flooding it is sometimes necessary to implement works to

slow down or stop the rate of coastal erosion and so maintain the integrity of the tidal defences.

The Durlston Head to Rame Head Shoreline Management Plan describe the arrangements and strategy for managing coastal erosion and the influential measures.

### 5.6.1 Coastal change

The University of Plymouth has developed new research for predicting coastal change that East Devon District Council is using to help define Coastal Change Management Areas. This includes future shoreline and future inundation mapping. The main purpose of the University of Plymouth Work is to develop a robust methodology for identifying areas at risk of coastal change that can be used by other Councils. The evidence can be used to inform the policies as part of the new local plan, and to inform coastal protection schemes, to reduce future risks to people and property and help communities prepare and plan for future risks.

The Coastal Change Management Area (CCMA) map can be found in Appendix Q. The impact that CCMAs have on planning in East Devon will be detailed as part of the local plan.

## 5.7 Surface water flooding

Flooding from surface water runoff (or 'pluvial' flooding) is caused by intense short periods of rainfall and usually affects lower lying areas, often where the natural (or artificial) drainage system is unable to cope with the volume of water. Surface water flooding problems are inextricably linked to issues of poor drainage or drainage blockage by debris, and sewer flooding.

The Risk of Flooding from Surface Water (RoFSW) mapping predominantly follows topographical flow paths of existing watercourses or dry valleys with some isolated ponding located in low lying areas and upslope of topographic features including railway lines and roads. RoFSW mapping throughout the district is provided in Appendix E, with the RoFSW included in Appendix F.

The current **Local Flood Risk Management Strategy** identifies Exmouth, Seaton, Budleigh Salterton and Sidmouth as medium / high priority communities at risk from surface water flooding. Ottery St Mary, Feniton and Sidmouth are identified as being at risk of surface water flooding in the **DCC Surface Water Management Plan** (Phase 2a – Risk Assessment) and Sidmouth has a **SWMP** published in 2014.

Data provided by EDDC shows 167 locations where surface water flooding has been recorded as the primary source of flooding and 21 locations where it has been recorded as the secondary source. These locations are widely dispersed across the district. In total, 849 properties were affected, including 791 residential properties.

Surface water flood models of Ottery St Mary and Sidmouth were provided by Devon County Council. The Environment Agency also provided a surface water flood model of Lympstone. These show similar results to the RoFSW mapping, but with a larger flooding extent in areas affected.

As mentioned in 2.10.1 there are three critical drainage areas within East Devon. These are located in Feniton, Axminster and Whimple. These can be viewed on **Devon County Council's Environment Viewer**.

## 5.8 Sewer flooding

Sewer flooding occurs when intense rainfall overloads the sewer system capacity (surface water, foul or combined), and / or when sewers cannot discharge properly to watercourses due to high water levels. Sewer flooding can also be caused when problems such as blockages or collapses or equipment (such as pumps) failure occur in the sewerage system. Surface water inundation of manhole openings and entry of groundwater may cause high flows for prolonged periods of time. Since 1980, the Sewers for Adoption guidelines (now replaced by the Design Construction Guidance) have meant that most new surface water sewers have been designed to have capacity for a rainfall event with a 1 in 30 chance of occurring in any given year (3.33% AEP), although until recently this did not apply to smaller private systems.

Consequently, even where sewers are built to current specifications, they can still be overwhelmed by larger events of the magnitude often considered when looking at river or surface water flooding (e.g. a 1 in 100 chance of occurring in any given year (1% AEP)). Existing sewers can also become overloaded as new development adds to their catchment, even with restrictions in place on permitted discharge, or due to incremental increases in roofed and paved surfaces at the individual property scale (urban creep). Sewer flooding is therefore a problem that could occur in many locations across the study area.

Table 5-4 shows the number of incidents in each postcode, whilst Table 5-5 lists the number of incidents by year. Areas with recorded sewer flooding incidents include Exmouth, Ottery St Mary, Budleigh Salterton, Honiton, Woodbury, Sidmouth, Axminster, Clyst St Mary, Seaton and Colyton.

**Table 5-4: Hydraulic flood incidents from South West Water (by postcode)**

| Postcode | Number of incidents |
|---|---|
| DT7 | 1 |
| EX4 | 1 |
| EX5 | 63 |
| EX8 | 129 |
| EX9 | 26 |
| EX10 | 58 |
| EX11 | 39 |
| EX12 | 6 |
| EX13 | 10 |
| EX14 | 30 |
| EX15 | 2 |
| EX24 | 10 |

**Table 5-5: Hydraulic flood incidents from South West Water (by year)**

| Year | Number of incidents |
|---|---|
| 2011 | 2 |
| 2012 | 156 |
| 2013 | 28 |
| 2014 | 44 |
| 2015 | 14 |
| 2016 | 43 |
| 2017 | 13 |
| 2018 | 21 |
| 2019 | 13 |
| 2020 | 17 |
| 2021 | 19 |
| 2022 | 5 |

In May 2023, South West Water published its DWMP. South West Water have prepared a regional (Level 1 Plan) DWMP which allows overall objectives and targets to be cascaded down and ensure they are connected to local level needs. Local level risks are identified at a catchment scale (Level 3 Plan) to ensure they are connected to the Level 1 Plan. The Level 3 Plan works at a catchment scale, in which there are 653 Tactical Planning Units (TPUs) in the DWMP area. These 653 TPUs are grouped into 22 larger areas, which are known as Strategic Planning Areas, which have a Level 2 Plan. Grouping Level 3 assessments up to Level 2 means the region can be managed as an entire system rather than challenges isolated to individual treatment works. It also encourages collaboration and engagement with risk management agencies that have responsibilities for flood and river management plans at a strategic level.

Within East Devon District, there are three strategic planning areas with a Level 2 plan, these are:

- Exe[29]
- Axe, Sid, Lim, other[30]
- Otter[31]

Outputs from the South West Water DWMP process stages are as follows:

- Risk-based catchment screening (RCBS)
- Baseline risk and vulnerability assessment (BRAVA)
- Bespoke planning objectives

29 https://www.southwestwater.co.uk/siteassets/document-repository/business-plan-2020-2025/exe_l2_dwmp_plan.pdf

30 https://www.southwestwater.co.uk/siteassets/document-repository/business-plan-2020-2025/axe-sid-lim-other_l2_dwmp.pdf

31 https://www.southwestwater.co.uk/siteassets/document-repository/business-plan-2020-2025/otter_l2_dwmp.pdf

- Resilience scoring
- Problem characterisation
- Options appraisal

The RBCS and BRAVA steps identified the Level 3 TPUs that were likely to need interventions to mitigate future risk, assessing the severity and timing of these risks from 2020 to 2050. This considered thresholds on collapse risk, pollution & flooding risk, future flood risk, storm overflow risk and WwTW compliance. Where no thresholds were met, risk was considered low and TPUs did not proceed to option development and appraisal. Performance will continue to be monitored through the DWMP process.

Where future flood risk was identified as a threat, the suitability of nature based solutions, such as SuDS have been considered. Upper catchment solutions are also being explored. South West Water's infiltration and site surveys may identify opportunities for Natural Flood Management and Upstream Thinking interventions in the catchments. South West Water intend to collaborate with the Environment Agency and take a GIS based approach to assessing Natural Flood Management options where tackling shared surface water flooding issues.

Sidmouth is one area in the DWMP that is highlighted as having urgent risk and will see important investment over the next five years.

## 5.9 Groundwater flooding

In general, less is known about groundwater flooding than other sources. Groundwater flooding can be caused by:

- High water tables, influenced by the type of bedrock and superficial geology
- Seasonal flows in dry valleys, which are particularly common in areas of chalk geology
- Rebounding groundwater levels, where these have been historically lowered for industrial or mining purposes
- Where there are long culverts that prevent water easily getting into watercourses

Groundwater flooding is the term used to describe flooding caused by unusually high groundwater levels. It occurs as excess water emerges at the ground surface or within manmade underground structures such as basements. Groundwater flooding tends to be more persistent than surface water flooding, in some cases lasting for weeks or months, and it can result in significant damage to property.

No Defra identified zones of potential groundwater emergence are located in East Devon. The JBA 5m Groundwater Flood Map (see Appendix G) shows the areas in East Devon that are at risk of groundwater emergence and so are potentially susceptible to flooding. The map indicates that most of the East Devon district has groundwater emergence levels greater than 0.5m below the ground surface or is at no risk of groundwater flooding. The areas of East Devon where groundwater levels are either at or very near (within 0.025m of) the ground surface, and between 0.025m and 0.5m below the ground surface during a 1% AEP flood event are mostly found in narrow zones along the base of river valleys, with larger extents within the River Otter valley and its tributary valleys, in areas close to the River Clyst in the west of East Devon district and areas in the River Exe valley.

Flood incident records provided by Devon County Council show groundwater flooding has been recorded at Lower Southwood Farm in Rockbeare, where water came up through vents in the floor. There is also documented evidence of groundwater flooding in East Devon as a result of tidal influence on the groundwater level at a property in Budleigh Salterton.

## 5.10 Flooding from canals

Canals are regulated waterbodies and are unlikely to flood unless there is a sudden failure of an embankment or a sudden ingress of water from a river in areas where they interact closely. Embankment failure can be caused by:

- Culvert collapse
- Overtopping
- Animal burrowing
- Subsidence/ sudden failure e.g. collapse of former mine workings
- Utility or development works close or encroaching onto the footings of a canal embankment.

Flooding from a breach of a canal embankment is largely dictated by canal and ground levels, canal embankment construction, breach characteristics and the volume of water within the canal that can discharge into the lower lying areas behind the embankment. The volume of water released during a breach is dependent on the pound length (i.e. the distance between locks) and how quickly the operating authorities can react to prevent further water loss, for example by the fitting of stop boards to restrict the length of the canal that can empty through the breach, or repair of the breach. The Canal and River Trust monitor embankments at the highest risk of failure.

There are no canals identified in East Devon.

## 5.11 Flooding from reservoirs

Reservoirs with an impounded volume greater than 25,000 cubic metres are governed by the **Reservoir Act 1975** and are on a register held by the Environment Agency. The level and standard of inspection and maintenance required by a Supervising Panel of Engineers under the Act means that the risk of flooding from reservoirs is very low.

Flooding from reservoirs occurs following partial or complete failure of the control structure designed to retain water in the artificial storage area. Reservoir flooding is very different from other forms of flooding; it may happen with little, or no warning and evacuation will need to happen immediately. The likelihood of such flooding is difficult to estimate but is extremely low compared to flooding from other sources. It may not be possible to seek refuge upstairs from floodwater as buildings could be unsafe. The risk of inundation to East Devon District as a result of reservoir breach or failure of a number of reservoirs within the area was assessed as part of the Reservoir Flood Mapping (RFM) study. There are five reservoirs shown to affect East Devon District. The reservoirs inundation extents provided by the Environment Agency can be found on the Environment Agency's **Long term flood risk map for England**, and in Appendix H.

The Environment Agency provide two flooding scenarios for the reservoir flood maps: a 'dry-day' and a 'wet-day'. The 'dry-day' scenario shows the predicted flooding which would occur if the dam or reservoir fails when rivers are at normal levels. The 'wet-day' scenario shows the predicted worsening of the flooding

which would be expected if a river is already experiencing an extreme natural flood.

The current mapping shows that there are three reservoirs located within the southwest of the district, in the Otter and Clyst catchments, and two reservoirs located outside the district that affect the district within both the 'dry-day' and 'wet-day' scenarios. Developers and planners should check the **online mapping** before using the reservoir data shown in appendix H to make sure they are using the most up to date mapping.

The Environment Agency maps represent a credible worst-case scenario. In these circumstances it is the time to inundation, the depth of inundation, the duration of flooding and the velocity of flood flows that will be most influential. Additional modelling may need to be carried out as part of a site specific risk assessment to identify these residual risks.

**Table 5-6 Reservoirs that may potentially affect East Devon District in the event of a breach**

| Reservoir | Location (grid reference) | Reservoir owner[32] | Environment Agency area | Local authority |
|---|---|---|---|---|
| **Within East Devon District boundary** | | | | |
| Bicton College Lake | SY0710086100 | Bicton College of Agriculture | Devon, Cornwall and the Isles of Scilly | East Devon District Council |
| Squabmoor Reservoir | SY0400084000 | South West Water Limited | | |
| Hogsbrook Lake | SY0250088800 | The Club Company (UK) Limited | | |
| **Outside of East Devon District boundary** | | | | |
| Wimbleball Lake | SS9670029300 | South West Water Limited | Wessex | Somerset Council |
| Shobrooke Park Lake | SS8510001100 | Dr J R Shelley | Devon, Cornwall and the Isles of Scilly | Mid Devon |

As above, the risk of reservoir flooding is extremely low. However, there remains a residual risk to development from reservoirs which developers should consider during the planning stage.

Developers should;

- seek to contact the reservoir owner to obtain information which may include:
    - reservoir characteristics: type, dam height at outlet, area/volume, overflow location;
    - reservoir risk designation;
    - operation: discharge rates/maximum discharge;
    - discharge during emergency drawdown; and
    - inspection/maintenance regime.

[32] Data from Defra data services Check your long term flood risk https://check-long-term-flood-risk.service.gov.uk/postcode

- apply the sequential approach to locating development within the site.
- consult with relevant authorities regarding emergency plans in case of reservoir breach.
- consider the impact of a breach and overtopping, particularly for sites proposed to be located immediately downstream of a reservoir. This should consider whether there is sufficient time to respond. It should also be understood that the "risk category" of a reservoir is set by the potential damage and loss of life in circumstances where there is a breach or an extreme flood event. Accordingly, it is possible that allocation of new development downstream of an existing reservoir could potentially change the risk category and result in a legal requirement (under the Reservoirs Act 1975) to improve the structural and hydraulic capacity of the dam. As the cost of implementing such works can be substantial consideration should be given to considering the implications and whether it would be more appropriate to place development in alternative locations not associated with such risk.

The **EA online Reservoir Flood Maps** contain information on the extents following a reservoir breach (note: only for those reservoirs with an impounded volume greater than 25,000 cubic metres are governed by the Reservoirs Act 1975). For proposed sites located within the extents, consideration should be given to the extent shown in these online maps.

In addition to the risk of inundation, those considering development in areas affected by breach events should also assess the potential hydraulic forces imposed by the rapid flood event and check that that the proposed infrastructure fabric can withstand the loads imposed on the structures by a breach event.

## 5.12 Flood alert and flood warnings

There are currently eight flood alert areas and 25 flood warning areas covering East Devon District. The coverage of the flood alerts and flood warning areas can generally be spilt into two areas: those covering the fluvial corridors of the rivers Axe, Sid, Otter, Clyst, and lower Culm and Exe, and those covering the tidal and coastal margins of the district in the southwestern and southern sections of the district.

Appendix J shows the flood warning area coverage for East Devon District. If a home or business falls within the flood warning area coverage, this means that the Environment Agency can provide you with flood warnings. Outside of flood warning areas it is understood that the Environment Agency can only provide flood alerts.

## 5.13 Summary of flood risk in East Devon District

A table summarising all sources of flood risk to key settlements in East Devon District can be found in Appendix M.

# 6 Flood alleviation schemes and assets

This section provides a summary of existing flood alleviation schemes and assets in East Devon District. Planners should note the areas that are protected by defences, where further work to understand the actual and residual flood risk through a Level 2 SFRA may be beneficial. Developers should consider the benefit they provide over the lifetime of a development in a site-specific Flood Risk Assessment.

## 6.1 Asset management

Risk Management Authorities hold databases of flood risk management and drainage assets:

- The Environment Agency holds a national database that is updated by local teams
- The LLFA holds a database of significant local flood risk assets, required under Section 21 of the Flood and Water Management Act (2010)
- Highways Authorities hold databases of highways drainage assets, such as gullies and connecting pipes
- Water companies hold records of public surface water, foul and combined sewers, the records may also include information on culverted watercourses.

The databases include assets RMAs directly maintain and third-party assets. The drainage network is extensive and will have been modified over time. It is unlikely that any RMA contains full information on the location, condition and ownership of all the assets in their area. They take a prioritised approach to collecting asset information, which will continue to refine the understanding of flood risk over time.

Developers should collect the available asset information and undertake further survey as necessary to present an understanding of current flood risk and the existing drainage network in a site-specific Flood Risk Assessment.

## 6.2 Standards of Protection

Flood defences are designed to give a specific Standard of Protection (SoP), reducing the risk of flooding to people and property in flood prone areas. For example, a flood defence with a 100-year SoP means that the flood risk in the defended area is reduced to a 1% chance of flooding in any given year.

Over time the actual SoP provided by the defence may decrease, for example due to deterioration in condition or increases in flood risk due to climate change. The understanding of SoP may also change over time as RMAs undertake more detailed surveys and flood modelling studies.

It should be noted that the Environment Agency's on-going hydraulic modelling programme may revise flood risk datasets and, as a consequence, the standard of protection offered by flood defences in the area may differ from those discussed in this report.

Developers should consider the SoP provided by defences and residual risk as part of a detailed FRA.

## 6.3 Maintenance

The Environment Agency and local authorities have permissive powers to maintain and improve Main Rivers and Ordinary Watercourses, respectively.

There is no legal duty to maintain watercourses, defences or assets and maintenance and improvements are prioritised based on flood risk. The ultimate responsibility for maintaining watercourses rests with the landowner.

Highway's authorities have a duty to maintain public roads, making sure they are safe, passable and the impacts of severe weather have been considered. Water companies have a duty to effectually drain their area. What this means in practise is that assets are maintained to common standards and improvements are prioritised for the parts of the network that do not meet this standard e.g. where there is frequent highway or sewer flooding. Devon County Council as the LLFA has permissive powers and limited resources are prioritised and targeted to where it can have the greatest effect.

There is potential for the risk of flooding to increase in areas where flood alleviation measures are not maintained regularly. Breaches in raised flood defences are most likely to occur where the condition of a flood defences has degraded over time. Drainage networks in urban areas can also frequently become blocked with debris and this can lead to blockages at culverts or bridges.

Developers should not assume that any defence, asset or watercourse is being or will continue to be maintained throughout the lifetime of a development. They should contact the relevant RMA about current and likely future maintenance arrangements and ensure future users of the development are aware of their obligations to maintain watercourses.

Formal structural defences are given a rating based on a grading system for their condition. A summary of the grading system used by the Environment Agency for condition is provided in Table 6-1.

**Table 6-1: Grading system used by the Environment Agency to assess flood defence condition**

| Grade | Rating | Description |
|---|---|---|
| 1 | Very good | Cosmetic defects that will have no effect on performance |
| 2 | Good | Minor defects that will not reduce the overall performance of the asset. |
| 3 | Fair | Defects that could reduce the performance of the asset. |
| 4 | Poor | Defects that would significantly reduce the performance of the asset. Further investigation required. |
| 5 | Very Poor | Severe defects resulting in complete performance failure. |

*Source: Condition Assessment Manual – Environment Agency 2006*

## 6.4 Major flood risk management assets in East Devon District

The Flood Map for Planning was updated in December 2022 to remove the 'Areas Benefiting from Defences' (ABD). This has been superseded by a dataset called 'Reduction in Risk of Flooding from Rivers and Sea due to Defences', shown in Appendix I. This shows areas where this is a reduction in flood risk due to defences, taking into account the condition the defences are in. The main areas

in East Devon shown in the dataset are located around Axminster in the east, Budleigh Salterton, Sidmouth and Seaton in the south, Exmouth, Lympstone, Topsham and Clyst St Mary in the southwest, and Huxham and Broadclyst in the west.

The Environment Agency 'AIMS' flood defence dataset gives further information on all flood defence assets within the district. Mapping showing the condition and design standards of existing flood defences in East Devon can be found in Appendix I; this information is derived from the Environment Agency's Spatial Flood Defences dataset. Other than natural high ground there are a few defences within East Devon contained in the AIMS flood defence layer with embankments and walls along River Exe, River Clyst, River Otter, River Axe, and the key tidal defences are flood gates, walls and embankments in Seaton, Sidmouth, Budleigh Salterton, Lympstone and Exmouth.

## 6.5 Existing and future flood alleviation schemes

### 6.5.1 Natural flood management (NFM)

NFM is used to protect, restore and re-naturalise the function of catchments and rivers to reduce flood risk. A wide range of techniques can be used that aim to reduce flooding by working with natural features and processes in order to store or slow down flood waters before they can damage flood risk receptors (e.g. people, property, infrastructure, etc.). Techniques and measures, which could be applied in the East Devon District include:

- Creation of offline storage areas
- Re-meandering streams (creation of new meandering courses or reconnecting cut-off meanders to slow the flow of the river)
- Targeted woodland planting
- Reconnection and restoration of functional floodplains
- Restoration of rivers and removal of redundant structures i.e. weirs and sluices no longer used or needed
- Installation or retainment of large woody material in river channels
- Improvements in management of soil and land use
- Creation of rural and urban SuDS

In 2017, the Environment Agency published an **online evidence base** to support the implementation of NFM and maps showing locations with the potential for NFM measures. These maps are intended to be used alongside the evidence directory to help practitioners think about the types of measure that may work in a catchment and the best places in which to locate them.

There are areas within East Devon District whereby removing existing defences and reconnecting the floodplain could create areas for potential without causing risk to properties. Areas where such opportunities could potentially be considered includes along the Rivers Exe, Sid, Coly, Otter and Clyst. Areas in East Devon District where tree planting could potentially be considered as an NFM measure are most notably along the Rivers Clyst, Otter, Axe and Sid also.

The **Devon Resilience Innovation Programme** is working with communities in rural, steep, rapidly responding catchments. The projects are piloting flood resilience measures using a catchment-based approach with a range of nature-based solutions, alongside property flood resilience measures in community infrastructure. There are locations in East Devon where work is being carried out,

including Lympstone, Woodbury Salterton, Bicton, Ottery St Mary, Exton, Beer and Honiton.

NFM can be used to increase the benefit achieved from Biodiversity Net Gain (BNG) when implementing new development. New development can help to fund NFM works in the upper catchment that will potentially contribute to reducing flood risk. Developments such as solar farms can be a good opportunity for on-site NFM works that can potentially contribute to downstream improvements.

### 6.5.2 Other schemes

The EA's **Asset Management** map provides an updated indication of schemes that are under construction or have a forecast start date.

Based on the information published by the EA, there are four completed FCERM projects within the development programme (2021-2027) that potentially have benefits for East Devon District:

- Sidmouth Surface Water Flood Improvement Scheme (The Knowle)
- Clyst St Mary Flood Defence Improvements
- Whimple – Webbers Close Culvert Repairs (Whimple has recently been taken off the EA FCERM programme of works).
- Exmouth Tidal Defence Scheme

Completed, ongoing and future investigation schemes from DCC can be found on their **Environment Viewer**.

Data provided by EDDC, is shown in Figure 6-1, which shows completed and ongoing Flood Risk Management Schemes from 2013 – present. Schemes have been located in Axminster, Branscombe, Budleigh Salterton, East Budleigh, Exmouth, Feniton, Old Feniton, Ottery St Mary, Rockbeare, Seaton, Sidmouth, Uplyme and Whimple.

The **Lower Otter Restoration Project** is working with local people and partner organisations, including the Environment Agency, to adapt and enhance the downstream part of the River Otter, its estuary, and its immediate surroundings for future generations in the face of a rapidly changing climate. A managed realignment scheme is being undertaken in Budleigh Salterton. The project is being delivered because the existing tidal defences (with a standard of protection of 0.5% AEP) are starting to fail and are difficult to maintain. It will restore the Lower Otter Valley to more natural conditions, and the river will be reconnected with its floodplain.

Schemes within East Devon that might require upgrading include Membury as this was completed 25 years ago. East Devon District Council are working on the Outline Business Case for Sidmouth and East Beach Management Plan and Scheme. The Sidmouth and East Beach Management Plan has three main aims:

1. Maintain the 1990's Sidmouth Coastal Defence Scheme Standard of Service
2. Reduce the rate of beach and cliff erosion to the east of the River Sid (East Beach)
3. Carry out (1) and (2) in an integrated, justifiable and sustainable way.

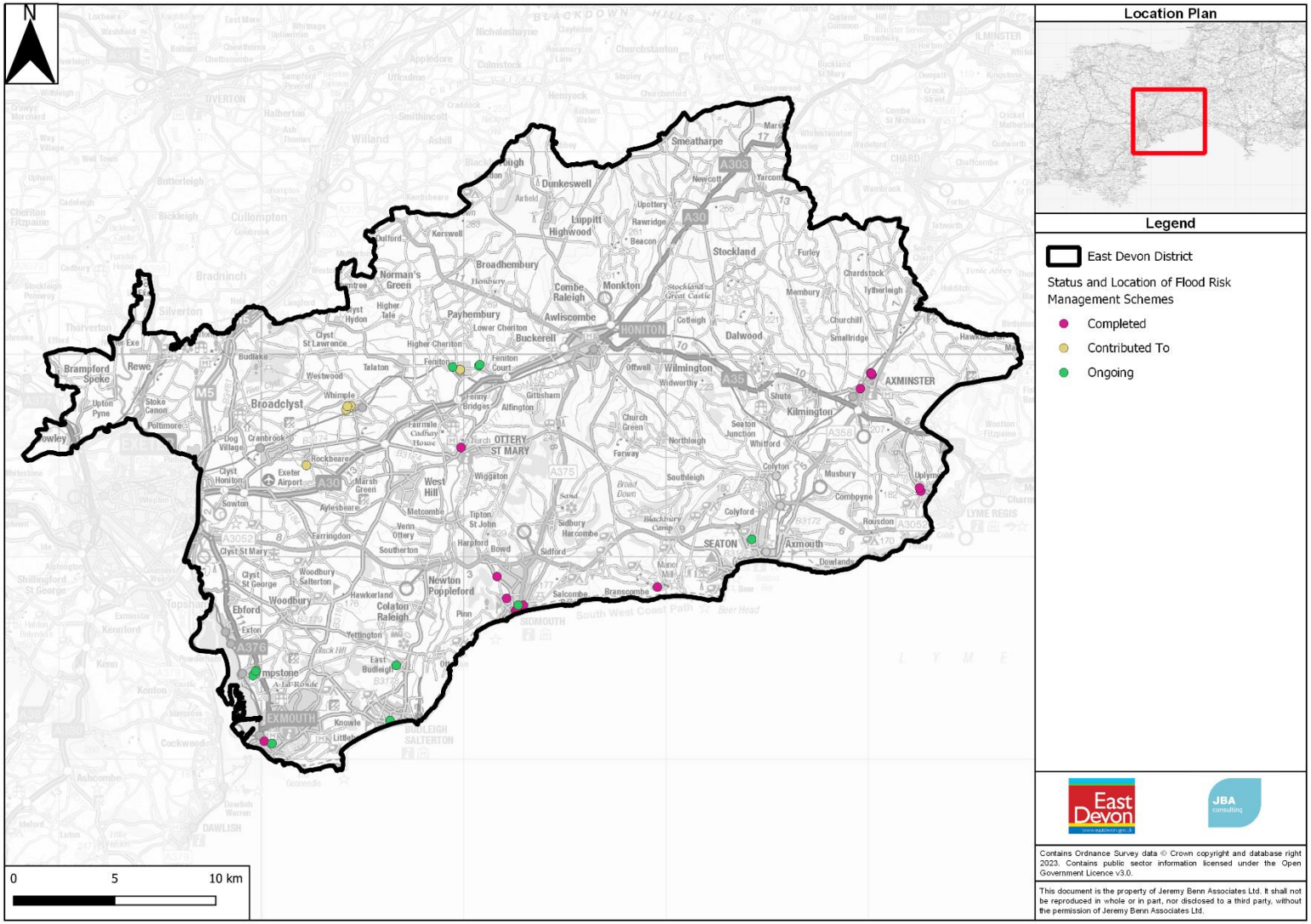



**Figure 6-1 Status and Location of East Devon District Council Flood Risk Management Schemes**

For schemes not yet identified developers should consult with the Council and the Environment Agency to confirm if any land on the site under consideration should be safeguarded for future defences or is adjacent to current defences that must be adapted so they can accommodate future flood risk.

## 6.6 Actual and residual flood risk

A Level 2 SFRA (for strategic allocations) or developer site-specific Flood Risk Assessment will need to consider the actual and residual flood risk due to the presence of flood and drainage assets in greater detail.

### 6.6.1 Actual flood risk

This is the risk to the site considering existing flood mitigation measures and any planned to be provided through new development. Note that it is not likely to be acceptable to allocate developments in existing undefended areas on the basis that they will be protected by developer works, unless there is a wider community benefit that can be demonstrated.

The assessment of the actual risk should take into account that:

- The level of protection afforded by existing defences might be less than the appropriate standards and hence may need to be improved if further growth is contemplated.
- The flood risk management policy for the defences will provide information on the level of future commitment to maintain existing standards of protection. If there is a conflict between the proposed level of commitment and the future needs to support growth, then it will be a priority for this to be reviewed.
- The standard of safety must be maintained for the intended lifetime of the development. Over time the effects of climate change will erode the present-day standard of protection afforded by defences and so commitment is needed to invest in the maintenance and upgrade of defences if the present-day levels of protection are to be maintained and where necessary, land secured and safe-guarded that is required for affordable future flood risk management measures.
- By understanding the depth, velocity, speed of onset and rate of rise of floodwater it is possible to assess the level of hazard posed by flood events from the respective sources.

### 6.6.2 Residual risk

Residual risk is the risk that remains after the effects of flood risk infrastructure have been taken into account. It is important that these risks are quantified to confirm that the consequences can be safely managed. The residual risk can be:

- The effects of a larger flood than defences were designed to alleviate (the 'design flood'). This can cause overtopping of flood banks, failure of flood gates to cope with the level of flow or failure of pumping systems to cope with the incoming amount of water.
- Failure of the defences or flood risk management measures, such as breaches in embankments or walls, failure of flood gates to open or close or failure of pumping stations.

It is the responsibility of the developer to fully assess flood risk, propose measures to mitigate it and demonstrate that any residual risks can be safely managed.

This SFRA does not assess the probability of failure other than noting that such events are very rare. However, in accordance with NPPF, all sources of flooding need to be considered. If a breach or overtopping event were to occur, then the consequences to people and property could be high. Developers should be aware that any site that is at or below defence level, may be subject to flooding if an event occurs that exceeds the design capacity of the defences, or the defences fail, and this should be considered in a detailed Flood Risk Assessment.

The assessment of residual risk should take into account:

- The flood hazard, depth and velocity that would result from overtopping or breach of defences. Flood gate or pumping station failure and/ or culvert blockage (as appropriate). The Environment Agency can provide advice at site-specific development level for advice on breach/ overtopping parameters for flood models.
- The design of the development to take account of the highest risk parts of the site e.g. allowing for flood storage on parts of the site and considering the design of the development to keep people safe e.g. sleeping accommodation above the flood level.
- A system of warning and a safe means of access and egress from the site in the event of a flood for users of the site and emergency services.
- Climate change and/ or policy-dependent residual risks (such as those that may be created if necessary, future defence improvements are required, or those associated with any managed adaptive strategies).

### 6.6.3 Overtopping

The risk from overtopping of defences is based on the relative heights of property or defence, the distance from the defence level and the height of water above the crest level of the defence. The Defra and Environment Agency **Flood Risks to People** guidance document provides standard flood hazard ratings based on the distance from the defence and the level of overtopping.

Any sites located next to defences or perched ponds/ reservoirs, may need overtopping modelling or assessments at the site-specific FRA stage, and climate change needs to be taken in to account. Section 6.6.2 outlines when should be taken into account when assessing residual risk as part of a Flood Risk Assessment.

It is understood from the EDDC that: within East Devon, overtopping of defences has occured in Seaton, although this is a rare occurrence; the Colonys in Exmouth is an area at risk of overtopping, due to being a low spot, and both the Widecombe Brook and the coastal scheme will impound water above the levels in the Colony, so if the defences failed or were overtopped, flooding would be extensive and deep; and Sidmouth is potentially at high risk if river defences failed.

### 6.6.4 Defence breach

A breach of a defence occurs when there is a failure in the structure and a subsequent ingress of flood water.

Where defences are present, risk of breach events should be considered as part of the site-specific FRA. Flood flows from breach events can be associated with significant depths and flow velocities in the immediate vicinity of the breach location and so FRAs must include assessment of the hazards that might be present so that the safety of people and structural stability of properties and

infrastructure can be appropriately taken into account. Whilst the area in the immediate vicinity of a breach can be subject to high flows, the whole flood risk area associated with a breach must also be considered as there may be areas remote from the breach that might, due to topography, involve increased depth hazards.

Considerations include the location of a breach, when it would occur and for how long, the depth of the breach (toe level), the loadings on the defence and the potential for multiple breaches. There are currently no national standards for breach assessments and there are various ways of assessing breaches using hydraulic modelling. Work is currently being undertaken by the Environment Agency to collate and standardise these methodologies. It is recommended that the Environment Agency are consulted if a development site is located near to a flood defence, to understand the level of assessment required and to agree the approach for the breach assessment.

# 7 Cumulative impact of development and strategic solutions

This section provides information regarding Cumulative Impact of Development and Strategic Solutions.

Under the NPPF, strategic policies and their supporting Strategic Flood Risk Assessments (SFRAs), are required to 'consider cumulative impacts in, or affecting, local areas susceptible to flooding' (para.166), rather than just to or from individual development sites.

When allocating land for development, consideration should be given to the potential cumulative impact of the loss of floodplain storage volume, as well as the impact of increased flows on flood risk downstream. Whilst the loss of storage for individual developments may only have a minimal impact on flood risk, the cumulative effect of multiple developments may be more severe. Similarly the effect of the loss of surface water flow paths, surface ponding and infiltration can also give rise to cumulative effects and potentially exacerbate surface water flood risk.

All developments are required to comply with the NPPF and demonstrate they will not increase flood risk elsewhere. Therefore, providing developments comply with the latest guidance and legislation relating to flood risk and sustainable drainage and appropriate consideration is given to surface water flow paths and storage, proposals should normally not increase flood risk downstream.

It is understood by the Environment Agency that: historic development (especially prior to the requirement for development to have SuDS) has contributed to increased flood risk in East Devon; and new developments pose an opportunity to reduce this risk through implementing flood compensation storage areas, NFM, and restricting SuDS discharge rates to below greenfield runoff rates.

Catchments within the study area that have the potential to influence existing flood risk issues in neighbouring Local Authorities have been identified, as well as catchments in the study area that may be influenced by development in catchments in neighbouring Local Authorities, and are shown in Figure 7-1.

Historic flood incidents, the current and predicted increase in surface water flood risk to properties and cross boundary issues in each catchment have been assessed to identify the catchments at greatest risk.

Local planning policies can also be used to identify areas where the potential for development to increase flood risk is highest and identify opportunities for such new development to positively contribute to decreases in flood risk downstream. Recommendations from the cumulative impact assessment are outlined in 13.2.

## 7.1 Strategic flood risk solutions

East Devon District Council have a vision set forth in their Local Plan for the future management of flood risk and drainage in the region. The plans consider flood risk management, alongside wider environmental and water quality enhancements. Strategic solutions may include upstream flood storage, integrated major infrastructure/ Flood Risk Management (FRM) schemes, new defences, and watercourse improvements as part of regeneration and enhancing green infrastructure, with opportunities for natural flood management and retrofitting sustainable drainage systems. The Devon County Council Local Flood Risk Management Strategy and South West River Basin Flood Risk Management Plan set out specific actions for the authority region.

Section 2 sets out the strategic plans that exist for the authority region.

## 7.2 Assessment of cross-boundary issues

East Devon District Council partially contains catchment areas within the following Local Authorities (see Figure 1-1 for the Local Authority Boundaries):

- Exeter City Council
- Mid Devon District Council
- Teignbridge District Council
- Dorset County Council
- Somerset Council

To the east of EDDC, the River Axe flows along the border of Dorset and Somerset for approximately 4km before entering East Devon. In the southeast the River Lim flows in a south-easterly direction for approximately 1km in East Devon before entering into Dorset and discharging into the sea at Lyme Regis.

To the west of EDDC, the River Exe, the River Creedy and the River Culm flow in a southerly direction from Mid Devon into EDDC before merging into the River Exe and flowing into the Exeter City Council administrative area.

The Pin Brook flows from Exeter into EDDC in an easterly direction before entering the River Clyst. The River Clyst then flows from EDDC along the border of Exeter District before entering the River Exe.

The River Otter flows from Somerset in the north in a southerly direction into East Devon before discharging into the sea at Budleigh Salterton.

As such, future development, both within and outside of East Devon can have the potential to affect flood risk to existing development and surrounding areas, depending on the effectiveness of SuDS and drainage implementation.

Development control should address the potential impact on receiving watercourses from development in the district during the planning stage and appropriate development management decisions put in place so there are no adverse impacts on flood risk or water quality.

The neighbouring authorities were contacted for information on their site allocations, to determine where development in neighbouring authorities may have an impact.

The following Local Plans have been adopted by neighbouring local authorities and include policies relevant to flood risk and drainage:

- **Exeter City Council**
- **Mid Devon District Council**
- **Teignbridge District Council**
- **Dorset County Council**
- **Somerset Council** (Somerset Council was formed as a new unitary on 1 April 2023. Somerset Council will be progressing a Somerset Local Plan to replace former District Council Local Plans)

For the CIA, East Devon was assessed at a sub-catchment level (see Figure 7-1).

## 7.3 Approach and methodology

The approach is based on providing an assessment of catchments where the allocation of more than one site could result in effects that increase the flood risk to third parties. At a strategic level this involves comparison of catchments, to assess the quantum of proposed development and the sensitivity of the catchment to changes in flood risk. Historic flooding incidents are also included in the assessment, as these are an indicator of the actual sensitivity of locations within a catchment to flood events.

The methodology deploys a range of metrics to assess the potential for cumulative impacts to be experienced, which provide a balance between predicted and observed flooding data recorded by Devon County Council and the Environment Agency.

## 7.4 Datasets

The WFD river catchments defined in the River Basin Management Plans were used to divide East Devon District and surrounding local authorities into manageable areas on which to base a cumulative impact assessment.

### 7.4.1 Proposed level of growth

To understand areas of East Devon District that are likely to experience the greatest pressure for future growth, all potential future development sites identified in the Local Plan process have been analysed. This data was collated from shapefiles provide by Local Authorities and existing Local Plan documents. GIS sites were provided by Exeter City Council, Mid Devon District Council, Teignbridge District Council and Dorset County Council.

This will allow calculation of the overall area of suggested sites within each catchment, illustrating the relative pressures on the catchments. This can be used with existing development extent, to identify catchments likely to be under the greatest pressure for development. The context for this being that in circumstances where the proportion of proposed new development is greater, the more likely it is to give rise to cumulative effects.

The proposed level of growth was assessed using development sites provided by East Devon District Council and neighbouring authorities. This was then compared with to the existing area of development, as indicated through the OS Vector Map dataset.

The OS Vector Map dataset is an OS basemap of the UK which contains various receptor layers, of which the buildings layer was used to identify the current level of development.

A development pressure score was derived for each catchment within the study area.

The risk metrics calculated for development pressure were:

- Calculation of total development currently within the catchment (%)
- Indicator of potential change in developed area within a catchment (%)

The total proposed development area was divided by the area of the catchment, and the catchments ranked to see which had the highest level of potential development.

The context for this being that in circumstances where the proportion of proposed new development is greater, then it is more likely to give rise to cumulative effects.

It should be noted that for the purposes of the assessment it has been assumed that all sites will be developed, and that the entire site footprint would be developed. This is a conservative approach, and does not account for sites that are brownfield.

### 7.4.2 Historic and predicted flood risk

A composite flood risk score was derived for each catchment within the study area by taking an average ranking of both recorded (historic incidents) and modelled (predicted) flood risk.

The risk metrics calculated for predicted (modelled) flood risk were:

- Percentage of catchment within the combined Flood Zone 3 and RoFSW 1 in 100-year (1% AEP) flood risk extent
- Sensitivity of catchment to an increase in flood flows to a 1 in 1000-year (0.1% AEP) surface water and Flood Zone 2
- Percentage of properties within the combined Flood Zone 2 and RoFSW 1 in 1000-year (0.1% AEP) flood risk extent
- Sensitivity of catchment to an increase in flood flows to a 1 in 1000-year (0.1% AEP) surface water and Flood Zone 2)

To do this, the Risk of Flooding from Surface Water 1 in 100-year extent was merged with Flood Zone 3a and the 1 in 1000-year extent was merged with Flood Zone 2, to create combined layers showing predicted flood risk. The sensitivity is a measure of the increase in the percentage of catchment / properties at risk of flooding from a 1 in 100-year event to a 1 in 1000-year event.

The risk metrics calculated for historic flood risk were:

- Number of recorded flood incidents, recorded by Devon County Council
- Percentage of NRD points within the Environment Agency's historic flood map.

## 7.5 Scoring

A relative risk score of 1 to 3 (low to high) was applied to each flood risk (Table 7-1) and development pressure metric (Table 7-2) and summed to give an overall relative flood risk score for each WFD catchment (Table 7-3).

It should be noted that scoring is based on the use of national datasets that may not account for localised differences in flood risk. Datasets may be periodically updated and there is a potential for information to not be fully represented (i.e. historic flood events may be under reported). However, the results are deemed suitable for use as a broad-scale assessment of WFD catchments.

**Table 7-1: Individual components of the relative cumulative impacts score for historic and predicted flood risk (per WFD catchment)**

| Point Score | % of catchment within the combined FZ3 and 100-year RoFSW flood risk extent | % increase in percentage of catchment at risk during the combined 1000-year ROFSW and FZ2 flood risk exent | % of properties within the combined FZ3 and 100-year RoFSW | % increase in percetnage of properties at risk during the combined 1000-year RoFSW and FZ2 extent | Recorded flood incidents (DCC) | % of NRD points within the EA historic flood map |
|---|---|---|---|---|---|---|
| 1 – Low risk | <1% | <50% | <1% | <1% | <10 | <1% |
| 2 – Medium risk | 1-3% | 50-200% | 1-3% | 1-3% | 10-50 | 1-5% |
| 3 – High risk | >3% | >200% | >3% | >3% | >50 | >5% |

**Table 7-2: Individual components of the relative cumulative impacts score for development pressure (per WFD catchment)**

| Point Score | % of total current development in catchment | % of potential future change in development |
|---|---|---|
| 1 – Low risk | <2% | <50% |
| 2 – Medium risk | 2 to 5% | 50-500% |
| 3 – High risk | >5% | >500% |

**Table 7-3: Matrix of flood risk and future development pressure**

| | Historic and predicted flood risk | | |
|---|---|---|---|
| **Development pressure** | **Low** | **Medium** | **High** |
| **Low** | 1 | 3 | 4 |
| **Medium** | 3 | 4 | 5 |
| **High** | 4 | 5 | 6 |

**Table 7-4: Summary of Cumulative Impact Assessment results**

| Catchment | Flood Risk | | Development Pressure | | Overall Score |
|---|---|---|---|---|---|
| Alphin Brook | HIGH | 3 | MEDIUM | 2 | HIGH |
| Aylesbeare Stream | MEDIUM | 2 | HIGH | 3 | HIGH |
| Blackwater River | LOW | 1 | LOW | 1 | LOW |
| Bolham River | LOW | 1 | LOW | 1 | LOW |
| Branscombe Stream | MEDIUM | 2 | LOW | 1 | LOW |
| Coastal 1 | LOW | 1 | MEDIUM | 2 | LOW |
| Coastal 2 | HIGH | 3 | MEDIUM | 2 | HIGH |
| Coastal 3 | LOW | 1 | LOW | 1 | LOW |
| Coastal 4 | MEDIUM | 2 | MEDIUM | 2 | MEDIUM |
| Coastal 5 | HIGH | 3 | HIGH | 3 | HIGH |
| Coastal 6 | HIGH | 3 | MEDIUM | 2 | HIGH |
| Corry Brook | MEDIUM | 2 | LOW | 1 | LOW |
| Exe (Barle to Culm) | HIGH | 3 | LOW | 1 | MEDIUM |
| Exe (Creedy to Estuary) | HIGH | 3 | MEDIUM | 2 | HIGH |
| Exe (Culm to Creedy) | MEDIUM | 2 | LOW | 1 | LOW |
| Ford Stream (EXE) | HIGH | 3 | HIGH | 3 | HIGH |
| Forton Brook | MEDIUM | 2 | LOW | 1 | LOW |
| Grindle Brook | HIGH | 3 | HIGH | 3 | HIGH |
| Jackmoor Brook | MEDIUM | 2 | LOW | 1 | LOW |
| Ken Stream | MEDIUM | 2 | MEDIUM | 2 | MEDIUM |
| Kit Brook | LOW | 1 | LOW | 1 | LOW |
| Lim | LOW | 1 | LOW | 1 | LOW |
| Love | MEDIUM | 2 | LOW | 1 | LOW |
| Lower Axe | HIGH | 3 | MEDIUM | 2 | HIGH |
| Lower Clyst | MEDIUM | 2 | HIGH | 3 | HIGH |
| Lower Coly | HIGH | 3 | LOW | 1 | MEDIUM |

| Catchment | Flood Risk | | Development Pressure | | Overall Score |
|---|---|---|---|---|---|
| Lower Cranny Brook | MEDIUM | 2 | HIGH | 3 | HIGH |
| Lower Creedy | HIGH | 3 | LOW | 1 | MEDIUM |
| Lower Culm | HIGH | 3 | MEDIUM | 2 | HIGH |
| Lower River Otter | HIGH | 3 | MEDIUM | 2 | HIGH |
| Madford River | LOW | 1 | LOW | 1 | LOW |
| Middle Culm | HIGH | 3 | LOW | 1 | MEDIUM |
| Middle River Otter | HIGH | 3 | MEDIUM | 2 | HIGH |
| Monkton Wyld Stream | LOW | 1 | LOW | 1 | LOW |
| North Brook (East Devon) | MEDIUM | 2 | MEDIUM | 2 | MEDIUM |
| Offwell Brook | MEDIUM | 2 | LOW | 1 | LOW |
| Polly Brook | HIGH | 3 | HIGH | 3 | HIGH |
| Sheldon Stream | LOW | 1 | LOW | 1 | LOW |
| Sid | HIGH | 3 | MEDIUM | 2 | HIGH |
| Tale | HIGH | 3 | LOW | 1 | MEDIUM |
| Umborne Brook | HIGH | 3 | LOW | 1 | MEDIUM |
| Upper Clyst | HIGH | 3 | MEDIUM | 2 | HIGH |
| Upper Coly | HIGH | 3 | LOW | 1 | MEDIUM |
| Upper Cranny Brook | LOW | 1 | HIGH | 3 | MEDIUM |
| Upper River Otter | LOW | 1 | LOW | 1 | LOW |
| Weaver | LOW | 1 | LOW | 1 | LOW |
| Wolf (Otter) | HIGH | 3 | LOW | 1 | MEDIUM |
| Yarty | HIGH | 3 | LOW | 1 | MEDIUM |

## 7.6 Assumptions

| Assessment aspect | Assumption made | Details of limitation in method | Justification of method used |
|---|---|---|---|
| Surface water flood risk; Flood Zone 2 and 3 | Total number of properties flooded | Assumption that all properties have been included in the 2021 NRD dataset. It may not include all new build properties. | This was the most up to date and best data available at the time of the assessment. |
| Historic Flooding incidents | Total number of historic events and severity of flooding | Only flooding incidents recorded that could be georeferenced with XY coordinates to produce GIS files.<br>Each point represents a location where it is known there has been at least one flood incident. The severity of the historic flooding event relating to the point has not been considered, just the total number of points within each catchment where there has been a flood incident. | GIS data source provided the best available results for the location of historic flooding incidents in East Devon and surrounding authorities. |
| Proposed development | All proposed development sites added onto existing development | Does not account for development that may be on brownfield land and where betterment that may occur, or for windfall sites. | Largest proposed development sites are on greenfield land.<br>Conservative approach. |

## 7.7 Conclusions of the cumulative impact assessment

A summary of the Cumulative Impacts Assessment results is shown in Figure 7-1. It can be seen that the highest risk catchments are generally located in the west of the district in the areas surrounding Exeter and along the Exe Estuary. Other high risk catchments cover Ottery St Mary, Sidford, Sidmouth, Axminster and Axmouth. The Cumulative Impact Assessment highlights areas where there is a greater chance of encountering cumulative effects from planned development. In these catchments this should potentially be considered by developers and specifically addressed within FRAs for proposed development.

Including consideration of cumulative effects requires that FRAs should assess:

- The location and sensitivity of receptors to cumulative effects and the mechanisms that potentially result in flooding (e.g. locations that are reliant on the performance of pumped drainage systems to manage flood risk, locations where existing flooding is experienced and can be exacerbated by relatively small changes in flood flow magnitude, volume or flood duration, etc).
- The potential quantum of proposed cumulative development within a River Basin and assessment of the effect on sensitive receptors of the cumulative benefit afforded by piecemeal mitigation at the respective allocation sites.

- The requirement for measures to address potential cumulative effects (these can be both 'on-site' measures and contributions to strategic 'off-site' measures).
- The opportunity to integrate site mitigation measures with strategic flood risk management measures planned in the River Basin.
- The long-term commitments to management and maintenance.

The cumulative impact of development should be considered at the planning application and development design stages and the appropriate mitigation measures undertaken to ensure flood risk is not exacerbated, and in many cases the development should be used to improve the flood risk. Recommendations from the cumulative impact assessment are outlined in Section 13.2.

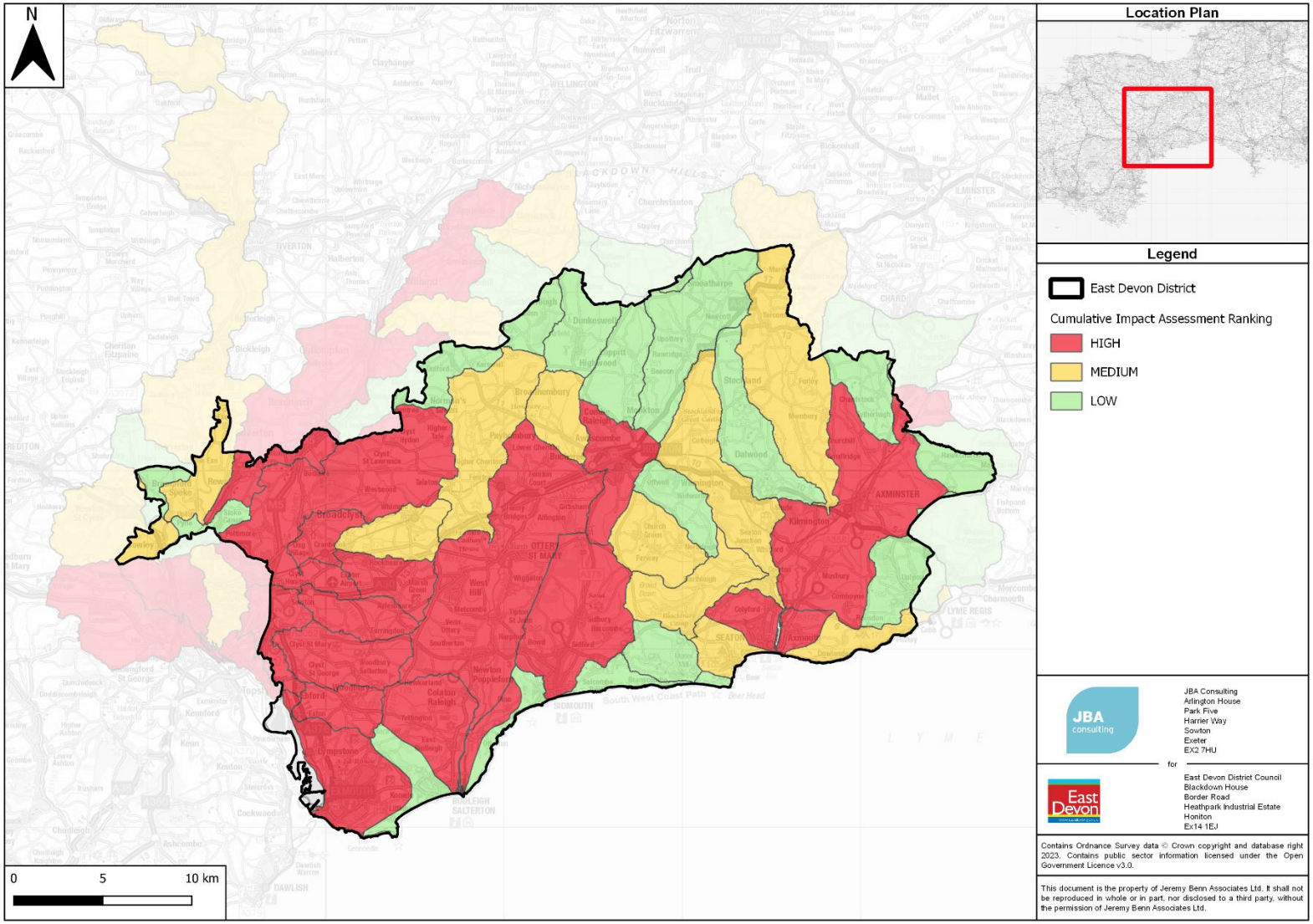



**Figure 7-1 Cumulative impact assessment catchment ranking**

# 8 Flood risk management requirements for developers

This section provides guidance on site-specific Flood Risk Assessments (FRAs). These are carried out by (or on behalf of) developers to assess flood risk to and from a site. They are submitted with Planning Applications and should demonstrate how flood risk will be managed over the development's lifetime, considering climate change and vulnerability of users.

The report provides a strategic assessment of flood risk within East Devon District. Where required, prior to any construction or development, site-specific assessments will need to be undertaken so all forms of flood risk and the actual and residual risk and standard of protection and safety at a site are considered in more detail. Developers should, where required, undertake more detailed hydrological and hydraulic assessments of watercourses to verify flood extents (including latest climate change allowances), to inform the sequential approach within the site and prove, if required, whether the Exception Test can be satisfied.

A detailed FRA may show that a site, windfall[33] or other, is not appropriate for development of a particular vulnerability or even at all. The Sequential and Exception Tests in the NPPF apply to all developments and an FRA should not been seen as an alternative to proving these tests have been met.

## 8.1 Principles for new developments

### 8.1.1 Apply the Sequential and Exception Tests

Developers should refer to Section 3 for more information on how to consider the Sequential and Exception Tests. Before strategic sites are allocated, East Devon District Council should use the information in this SFRA to apply the Sequential Test. For windfall sites a developer must undertake the Sequential Test, which includes considering reasonable alternative sites at lower flood risk. Only if it passes the Sequential Test should the Exception Test then be applied if required. The Planning Practice Guidance (PPG) puts the onus on LPAs to confirm that the Sequential Test has been satisfied.

Using information supplied by applicants East Devon District Council should confirm that the Sequential Test has been appropriately applied for windfall sites not included in the Plan. To comply with the NPPF Developers should apply the sequential approach to locating development within the site following the application of the Sequential Test. The following questions should be considered:

- can risk be avoided through substituting less vulnerable uses or by amending the site layout?
- can it be demonstrated that less vulnerable uses for the site have been considered and reasonably discounted? and
- can the site layout be varied to reduce the number of people, the flood risk vulnerability or the building units located in higher risk parts of the site?

[33] 'Windfall sites' is used to refer to those sites which become available for development unexpectedly and are therefore not included as allocated land in a planning authority's development plan.

### 8.1.2 Consult with statutory consultees at an early stage to understand their requirements

Developers should consult with the Environment Agency, Devon County Council, East Devon District Council and South West Water at an early stage to discuss flood risk including requirements for site-specific FRAs, detailed hydraulic modelling and drainage assessment and design. The Environment Agency can provide any flood model/historic data that is held. Consider the risk from all sources of flooding and that they are using the most up to date flood risk data and guidance.

The SFRA can be used by developers to scope out what further detailed work is likely to be needed to inform a site-specific Flood Risk Assessment. At a site level, developers will need to check before commencing on a more detailed Flood Risk Assessment that they are using the latest available datasets. Developers should apply the most up-to-date **Environment Agency climate change guidance** (last updated in May 2022) and ensure the development has taken into account climate change adaptation measures.

### 8.1.3 Ensure that the development does not increase flood risk elsewhere

Section 9 sets out these requirements for taking a sustainable approach to surface water management. Developers should also ensure mitigation measures do not increase flood risk elsewhere and that floodplain compensation is provided where necessary.

While there are some water compatible developments which the NPPF indicates can be acceptable in functional floodplain (subject to the sequential and exception tests) these are discouraged.

Where appropriate replacement dwellings should provide a flood risk betterment both on site and to third parties.

In catchments potentially at risk from cumulative effects consideration should be given to the cumulative effect of development at locations known to be sensitive to changes in flood risk (these locations might be remotes from applications sites and could require measures assessed at a catchment scale.

### 8.1.4 Ensure the development is safe for future users

Consideration should first be given to minimising risk by planning sequentially across a site. Once risk has been minimised as far as possible, only then should mitigation measures be considered. Developers should consider both the actual and residual risk of flooding to the site, as discussed in Section 6.6.

Further flood mitigation measures may be needed for any developments in an area protected by flood defences, where the condition of those defences is 'fair' or 'poor', and where the standard of protection is not of the required standard.

Safe access and egress will need to be demonstrated at all development sites as outlined in 13.1.8.

### 8.1.5 Enhance the natural river corridor and floodplain environment through new development

Developments should demonstrate opportunities to create, enhance and link green assets. This can provide multiple benefits across several disciplines including flood risk, water quality, amenity and biodiversity/ ecology and may provide opportunities to use the land for an amenity and recreational purposes. Development that may adversely affect green infrastructure assets should not be permitted. Where possible, developers should identify and work with partners to

explore all avenues for improving the wider river corridor environment. Developers should open up existing culverts and should not construct new culverts on site except for short lengths to allow essential infrastructure crossings.

**Biodiversity net gain** (BNG) is a strategy to develop land and contribute to the recovery of nature. It is making sure the habitat for wildlife is in a better state than it was before development. BNG will apply from November 2023 for developments in the Town and Country Planning Act 1990, unless exempt. It will apply to small sites from April 2024.

The local plan will also need to be consistent with the emerging **Local nature recovery strategy** (LRNS). There are 48 strategy areas that cover England. East Devon is within the Devon LRNS, which Devon County Council is the responsible authority for.

### 8.1.6 Consider and contribute to wider flood mitigation strategy and measures in the district and apply the relevant local planning policy

Wherever possible, developments should seek to help reduce flood risk in the wider area e.g. by contributing to a wider community scheme or strategy for strategic measures, such as defences or NFM or by contributing in kind by mitigating wider flood risk on a development site. More information on the contribution developers are expected to make towards achieving the wider vision for FRM and sustainable drainage in the district can be found in Section 8.3. Developers must demonstrate in an FRA how they are contributing towards this vision.

## 8.2 Requirements for site-specific Flood Risk Assessments

### 8.2.1 When is an FRA required?

Site-specific FRAs are required in the following circumstances:

- Proposals of 1 hectare or greater in Flood Zone 1.
- Proposals for new development (including minor development such as non-residential extensions, alterations which do not increase the size of the building or householder developments and change of use) in Flood Zones 2 and 3.
- Proposals for new development (including minor development and change of use) in an area within Flood Zone 1 which has critical drainage problems (as notified to the LPA by the Environment Agency). Details of critical drainage areas in the district can be found in Section 2.10.1.
- Where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding.
- Proposals of less than one hectare in Flood Zone 1 where they could be affected by sources of flooding other than rivers and the sea (e.g. surface water).

An FRA may also be required for some specific situations:

- If the site may be at risk from the breach of a local defence (even if the site is actually in Flood Zone 1)
- Where evidence of historical or recent flood events have been passed to the LPA

- Land identified in an SFRA as being at increased risk in the future.

### 8.2.2 Objectives of a site-specific FRA

Site-specific FRAs should be proportionate to the degree of flood risk and the scale, nature and location of the development. Site-specific FRAs should establish:

- Whether a proposed development is likely to be affected by current or future flooding from any source.
- Whether a proposed development will increase flood risk elsewhere.
- Whether the measures proposed to deal with the effects and risks are appropriate.
- The evidence, if necessary, for the local planning authority to apply the Sequential Test; and
- Whether, if applicable, the development will be safe and pass the Exception Test.

FRAs should follow the approach recommended by the NPPF (and associated guidance) and guidance provided by the Environment Agency and East Devon District Council. Guidance and advice for developers on the preparation of site-specific FRAs include:

- **Standing Advice on Flood Risk** (Environment Agency)
- **Flood Risk Assessment for Planning Applications** (Environment Agency); and
- **Site-specific Flood Risk Assessment: CHECKLIST** (NPPF PPG, Defra)

Guidance for local planning authorities for reviewing Flood Risk Assessments submitted as part of planning applications was published by Defra in 2015 – **Flood Risk Assessment: Local Planning Authorities.**

## 8.3 Local requirements for mitigation measures

### 8.3.1 Site layout and design

Flood risk should be considered at an early stage in deciding the layout and design of a site to provide an opportunity to reduce flood risk within the development.

The NPPF states that a sequential, risk-based approach should be applied to try to locate more vulnerable land use away from Flood Zones to higher ground, while more flood-compatible development (e.g. vehicular parking, recreational space) can be located in higher risk areas. Whether parking in floodplains is appropriate will be based on the likely flood depths and hazard, evacuation procedures and availability of flood warning.

Waterside areas, or areas along known flow routes, can act as green infrastructure, being used for recreation, amenity and environmental purposes, allowing the preservation of flow routes and flood storage, and at the same time providing valuable social and environmental benefits contributing to other sustainability objectives. Landscaping should ensure safe access to higher ground from these areas and avoid the creation of isolated islands as water levels rise.

### 8.3.2 Modification of ground levels

Any proposal for modification of ground levels will need to be assessed as part of a detailed flood risk assessment.

Modifying ground levels to raise the land above the required flood level is an effective way of reducing flood risk to a particular site in circumstances where the land does not act as conveyance for flood waters. However, care must be taken as raising land above the floodplain could reduce conveyance or flood storage in the floodplain and could adversely impact flood risk downstream or on neighbouring land. Raising ground levels can also deflect flood flows, so analyses should be performed to demonstrate that there are no adverse effects on third party land or property.

Compensatory flood storage should be provided, and would normally be on a level for level, volume for volume basis on land that does not currently flood but is adjacent to the floodplain (in order for it to fill and drain). For example, if storage for the 10% AEP flood is being removed, then compensation for this level of flooding must be compensated for. It should be in the vicinity of the site and within the red line of the planning application boundary (unless the site is strategically allocated). Guidance on how to address floodplain compensation is provided in **Appendix A3 of the CIRIA Publication C624**.

Where proposed development results in a change in building footprint, the developer should ensure that it does not impact upon the ability of the floodplain to store or convey water and seek opportunities to provide floodplain betterment. In accordance with the PPG (Reference ID: 7-049-20220825), whilst the use of stilts and voids below buildings may be an appropriate approach to mitigating flood risk to the buildings themselves, such techniques should not normally be relied upon for compensating for any loss of floodplain storage.

Raising levels can also create areas where surface water might pond during significant rainfall events. Any proposals to raise ground levels should be tested to ensure that it would not cause increased ponding or build-up of surface runoff on third party land.

### 8.3.3 Raised floor levels

The raising of internal floor levels within a development avoids damage occurring to the interior, furnishings and electrics in times of flood.

According to the government's guidance on '**Preparing a flood risk assessment: standing advice**' minimum finished floor levels for vulnerable development should normally be a minimum of whichever is higher of the following:

- 300mm above average ground level of the site.
- 300mm above the adjacent road level to the building.
- 300mm above estimated river or sea flood level.

The Environment Agency can ask for finished floor levels to be raised more than 300mm above flood level. This is usually when there is low confidence in the flood model data and therefore low confidence in the flood level provided.

Construction materials that have low permeability up to at least the same height as finished floor levels should be used. If it is not practical to raise floor levels to those specified above it is understood that the Environment Agency will object to the application scheme. Consultation with the Environment Agency will be required to determine alternative approaches, particularly with respect to "change of use" proposals.

The above guidelines should also apply to replacement dwellings not solely the construction of new properties and in line with the August 2022 changes to the PPG thresholds should be set to provide appropriate freeboard above flooding from surface water and groundwater and not just river and sea flooding.

If it is not practical to raise floor levels to those specified above, consultation with the Environment Agency will be required to determine alternative approaches.

The additional height that the floor level is raised above the maximum water level is referred to as the "freeboard". Additional freeboard may be required because of risks relating to blockages of channels, culverts or bridges and should be considered as part of an FRA.

Allocating the ground floor of a building for non-residential use which is not as vulnerable can be an effective way of raising living space above flood levels.

Single storey buildings such as ground floor flats or bungalows are especially vulnerable to rapid rise of water (such as that experienced during a breach). This risk can be reduced by use of multiple storey construction and raised areas that provide an escape route. However, access and egress would still be an issue, particularly when the flood duration covers many days.

Similarly, the use of basements should be avoided. Annex 3 of the NPPF states that basements are "highly vulnerable" development and in accordance with Table 2 of the Planning Practice Guidance should not be located in flood Zone 3a or areas of high risk from other sources. Basement dwellings in Flood Zone 2 will be required to pass the Exception Test. Access should be situated 300mm above the design flood level and waterproof construction techniques used.

### 8.3.4 Development and raised defences

Construction of localised raised floodwalls or embankments to protect new development is not a preferred option, as a residual risk of flooding will remain if they are overtopped or breached. To account for residual risk, regardless of new flood defences being constructed, it is understood that the Environment Agency advises that finished floor levels must still be raised above the design flood level. Compensatory storage must be provided where raised defences remove storage from the floodplain. It would be preferable for schemes to involve an integrated flood risk management solution.

Temporary or demountable defences are not acceptable forms of flood protection for a new development but might be appropriate to address circumstances where the consequences of residual risk are severe. In addition to the technical measures the proposals must include details of how the temporary measures will be erected and dismantled, responsibility for maintenance and the cost of replacement when they deteriorate.

### 8.3.5 Developer contributions

In some cases, and following the application of the sequential test, it may be necessary for the developer to make a contribution to the improvement of flood defence provision that would benefit both proposed new development and the existing local community. Developer contributions can also be made to maintenance and provision of flood risk management assets, flood warning and the reduction of surface water flooding (i.e. SuDS).

DEFRA's Flood and Coastal Risk Management Grant in Aid (FCRM GiA)[34] can be obtained by operating authorities to contribute towards the cost of a range of activities including flood risk management schemes that help reduce the risk of flooding and coastal erosion. Some schemes are only partly funded by FCRM GiA and therefore any shortfall in funds will need to be found from elsewhere when using Resilience Partnership Funding, for example local levy funding, local businesses or other parties benefitting from the scheme.

For new development in locations without existing defences, or where the development is the only beneficiary, the full costs of appropriate risk management measures for the life of the assets proposed must be funded by the developer.

However, the provision of funding by a developer for the cost of the necessary standard of protection from flooding or coastal erosion does not mean the development is appropriate as other policy aims must also be met. Funding from developers should be explored prior to the granting of planning permission and in partnership with the Council and the Environment Agency.

The appropriate route for the consideration of strategic measures to address flood risk issues is the **Local Flood Risk Management Strategy** (LFRMS) prepared by the Lead Local Flood Authority and the **Flood Risk Management Plan** (FRMP) prepared by the Environment Agency. The LFRMS should describe the priorities with respect to local flood risk management, the measures to be taken, the timing and how they will be funded. It will be preferable to be able to demonstrate that strategic provisions are in accordance with the LFRMS and FRMP, can be afforded and have an appropriate priority.

The Environment Agency is also committed to working in partnership with developers to reduce flood risk. Where assets are in need of improvement or a scheme can be implemented to reduce flood risk, the Environment Agency request that developers contact them to discuss potential solutions.

### 8.3.6 Buffer strips

The provision of a buffer strip to 'make space for water', allows additional capacity to accommodate climate change and ensure access is maintained to the watercourse, structures and defences for future maintenance purposes. It also enables the avoidance of disturbing riverbanks, adversely impacting ecology and having to construct engineered riverbank protection. A buffer strip of 8m is required from any Main River and ordinary watercourse (16m if tidal influence) from the bank of the watercourse. It is understood from the Environment Agency that this is to:

- allow for natural river function (such as erosion and meandering),
- allow for river maintenance,
- allow space for future flood alleviation schemes to be constructed (such as flood walls), and
- ensure the natural river corridor is maintained for biodiversity reasons.

Where flood defences are present, these distances should be taken from the toe of the defence.

Building adjacent to riverbanks can cause problems to the structural integrity of the riverbanks and the building itself, making future maintenance of the river much more difficult. Any development in these areas will likely require a Flood

[34] Principles for implementing flood and coastal resilience funding partnerships (Environment Agency, 2012)

Risk Permit from the Environment Agency alongside any permission. There should be no built development within these distances from main rivers / flood defences (where present).

### 8.3.7 Making space for water

The **PPG** sets out a clear aim in Flood Zone 3 to create space for flooding by restoring functional floodplain. Generally, development should be directed away from these areas.

All new development close to rivers should consider the opportunity to improve and enhance the river environment. Developments should look at opportunities for river restoration and enhancement as part of the development. Options include backwater creation, de-silting, in-channel habitat enhancement and removal of structures. When designed properly, such measures can have benefits such as reducing the costs of maintaining hard engineering structures, reducing flood risk, improving water quality and increasing biodiversity. Social benefits are also gained by increasing green space and access to the river.

## 8.4 Resistance and resilience measures

The consideration of resistance and resilience measures should not be used to justify development in inappropriate locations.

Having applied planning policy, there will be instances where developments, such as those that are water compatible and essential infrastructure are permitted in high flood risk areas. The measures set out in Section 8.3 should be considered before resistance and resilience measures are replied on. The effectiveness of these forms of measures are often dependant on the availability of a reliable forecasting and warning system and the use of back up pumping to evacuate water from a property as quickly as possible. The proposals must include details of how the temporary measures will be erected and dismantled, responsibility for maintenance and the cost of replacement when they deteriorate. Available resistance and resilience measures are shown in Table 8-1.

Paragraph 068 of the PPG sets out that measures should preferably be passive, such as the use of resilient building materials as opposed to demountable ones, and that temporary and demountable defences are not appropriate for new-build developments.

### 8.4.1 Property Flood Resilience

Property Flood Resilience (PFR) includes a range of measures that can be installed on a building to reduce the risk of floodwater entering the property. PFR can also be used to make the inside of a property more resilient (also known as recoverability) minimising damage even if water does still enter the building.

PFR aims to help households and businesses reduce the damage caused by flooding, helping to speed up recovery and reoccupation.

PFR is made up of two main elements: Resistance Measures and Resilient Adaptation. Resilient Adaptation is also sometimes referred to as recoverability.

Resistance Measures can be fitted to the outside of a property, forming a physical barrier between the floodwater and the inside of the building. These measures aim to reduce the amount of water entering the building, reducing the damage caused internally.

Resilient Adaptation (also known as recoverability) can be used alongside the external resistance measures to adapt the internal property, aiming to limit the

damage caused if water does enter a building to speed up recovery and reoccupation.

**Table 8-1: Available temporary measures**

| Measures | Description |
|---|---|
| Permanent barriers | Permanent barriers can include built up doorsteps, rendered brick walls and toughened glass barriers |
| Temporary barriers | Temporary barriers consist of moveable flood defences which can be fitted into doorways and/or windows. The permanent fixings required to install these temporary defences should be discrete and keep architectural impact to a minimum. On a smaller scale, temporary snap on covers for airbricks and air vents can also be fitted to prevent the entrance of flood water. |
| Community resistance measures | These include demountable defences that can be deployed by local communities to reduce the risk of water ingress to a number of properties. The methods require the deployment of inflatable (usually with water) or temporary quick assembly barriers in conjunction with pumps to collect water that seeps through the systems during a flood. |
| Property flood resilience measures | Property Flood Resilience can reduce flood damage and speed up recovery after a flood. These measures are designed to keep as much water out of the property as possible. Measures include flood doors and barriers, self-closing air bricks and non-return valves as well as toilet bungs.<br>Research carried out for the Department for Communities and Local Government (DCLG) and the Environment Agency has recommended that the use of protection measures should generally be limited to a nominal protection height of 600mm above Floor Level. |
| Flood resilience measures | These measures aim to ensure no permanent damage is caused, the structural integrity of the building is not compromised and the clean up after the flood is easier. Interior design measures to reduce damage caused by flooding can include electrical circuitry installed at a higher level and water-resistant materials for floors, walls and fixtures. |

## 8.5 Reducing flood risk from other sources

### 8.5.1 Groundwater

Groundwater flooding has a very different flood mechanism to any other and so many conventional flood mitigation methods are not suitable. The only way to fully reduce flood risk would be through building design (development form), ensuring floor levels are raised above the water levels caused by a 1% AEP plus climate change event. Site design would also need to preserve any flow routes followed by the groundwater overland to ensure flood risk is not increased downstream.

Infiltration SuDS can cause increased groundwater levels and subsequently may increase flood risk on or off a site. Developers should provide evidence and ensure that this will not be a significant risk.

### 8.5.2 Surface water and sewer flooding

Developers should discuss public sewerage capacity with the water utility company at the earliest possible stage. It is important that a Surface Water Drainage Strategy (often done as part of a Flood Risk Assessment) shows that this will not increase flood risk elsewhere, and that the drainage requirements regarding runoff rates and SuDS for new development are met.

If residual surface water flood risk remains, the likely flow routes and depths across the site should be modelled. The site should be designed so that these flow routes are preserved and building design should provide resilience against this residual risk.

When redeveloping existing buildings, the installation of some permanent or temporary floodproofing and resilience measures could protect against both surface water and sewer flooding. Non-return valves prevent water entering the property from drains and sewers. Non-return valves can be installed within gravity sewers or drains within a property's private sewer upstream of the public sewerage system. These need to be carefully installed and must be regularly maintained.

Consideration must also be given to attenuation and flow ensuring that flows during the 1% AEP plus climate change storm event are retained within the site if any flap valves shut. This should be demonstrated with suitable modelling techniques.

### 8.5.3 Reservoirs

As discussed in Section 5.11, the risk of reservoir flooding is extremely low. However, there remains a residual risk to development from reservoirs which developers should consider during the planning stage:

- Developers should contact the reservoir owner for information on:
- the Reservoir Risk Designation
- reservoir characteristics: type, dam height at outlet, area/volume, overflow location
- operation: discharge rates / maximum discharge
- discharge during emergency drawdown; and
- inspection / maintenance regime.
- The EA online Reservoir Flood Maps contain information on the extents following a reservoir breach (note: only for those reservoirs with an impounded volume greater than 25,000 cubic metres which are governed by the Reservoir Act 1975). Consideration should be given to the extent shown in these online maps.
- The GOV.UK website on **Reservoirs: owner and operator requirements** provides information on how to register reservoirs, appoint a panel engineer, produce a flood plan and report an incident.
- In addition, developers should consult the **Devon Resilience Forum**[35] about emergency plans.

Developers should use the above information to:

- Apply the sequential approach to locating development within the site.

35 Devon Resilience Form: https://devoncommunities.org.uk/projects/devon-community-resilience-forum

- Consider the impact of a breach and overtopping, particularly for sites proposed to be located immediately downstream of a reservoir. This should consider whether there is sufficient time to respond, and whether in fact it is appropriate to place development immediately on the downstream side of a reservoir.
- Assess the potential hydraulic forces imposed by sudden reservoir failure event and check that that the proposed infrastructure fabric could withstand the structural loads.
- Develop site-specific Emergency Plans and/ or Off-site Plans if necessary and ensure the future users of the development are aware of these plans. This may need to consider emergency drawdown and the movement of people beforehand.

Consideration should also be given to the potential implications of proposed development on the risk designation of the reservoir, as it is a requirement that in particular circumstances where there could be a danger to life that a commitment is made to the hydraulic capacity and safety of the reservoir embankment and spillway. The implications of such potential obligations should be identified and understood so that it can be confirmed that these can be met if proposed new development is permitted.

## 8.6 Emergency planning

The Civil Contingencies Act 2004 lists Local Authorities, the Environment Agency and emergency services as Category 1 responders. Category 1 responders are responsible for reducing, controlling and mitigating the effects of emergencies in both response and recovery phases.

The National Planning Policy takes this into account by seeking to avoid inappropriate development in areas of flood risk and considering the vulnerability of new developments to flooding.

The 2023 NPPF (para. 173) requires site level FRAs to demonstrate that

*"any residual risk can be safely managed; and*

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

In accordance with the NPPF, SFRAs, PFRAs and SWMPs can be used in the preparation and execution of a flood emergency plan as they can indicate areas that may be at risk of flooding. These can be provided as part as an FRA or as a separate document. Decisions regarding whether an Emergency Plan is required sits with the Local Planning Authority, with advice from their Emergency Planning Teams, the Environment Agency and LLFA.

According to the PPG, an emergency plan is needed wherever emergency flood response is an important component of making a development safe, this includes the free movement of people during a 'design flood' and potential evacuation during an extreme flood.

Emergency plans are essential for any site with transient occupancy in areas at risk of flooding, such as holiday accommodation, hotels, caravan and camping sites (PPG para. 043).

Emergency Plans should consider:

- The type of flood risk present, and the extent to which advance warning can be given in a flood event

- The number of people that would require evacuation from the area potentially at risk
- The vulnerability of site occupants.
- The impact of the flooding on essential services e.g., electricity, gas, telecommunications, water supply and sewerage
- Safe access and egress for users and emergency services

Further information is available from the following documents / websites with hyperlinks provided:

Devon County Council's **Devon Resilience Forum**[36] (DRF) is one of a number of Local Resilience Forums (LRFs) that have been set up across England. The overall aim of an LRF is to ensure that the various agencies and organisations plan and subsequently work together so that responses to emergencies are coordinated appropriately. The DRF is made up of a number of different agencies and organisations that work together across a range of areas including planning for emergencies.

Further information is available from the following documents / websites with hyperlinks provided:

- **The National Planning Policy Guidance**
- **2004 Civil Contingencies Act**
- **DEFRA (2014) National Flood Emergency Framework for England**
- **FloodRe**
- The Environment Agency and DEFRA's **Standing Advice for FRAs**
- Devon County Council's **'Flooding' Page**
- Environment Agency's **'How to plan ahead for flooding'**
- Sign up for **Flood Warnings** with the Environment Agency
- The **National Flood Forum**
- **GOV.UK 'Prepare for flooding' page**
- **ADEPT Flood Risk Plans for new development.**

36 Devon Resilience Form: https://devoncommunities.org.uk/projects/devon-community-resilience-forum

# 9 Surface water management and SuDS

This section provides guidance and advice on managing surface water runoff and flooding.

## 9.1 What is meant by surface water flooding?

Surface water flooding describes flooding from sewers, drains, and ditches that occurs during heavy rainfall.

Surface water flooding includes:

- **pluvial flooding**: flooding as a result of high intensity rainfall when water is ponding or flowing over the ground surface (overland surface runoff) before it either enters the underground drainage network or watercourse or cannot enter it because the network is full to capacity;
- **sewer flooding**: flooding that occurs when the capacity of underground water conveyance systems is exceeded, resulting in flooding inside and outside of buildings. Normal discharge of sewers and drains through outfalls may be impeded by high water levels in receiving waters which may cause water to back up and flood around buildings or in built up areas. Sewer flooding can also arise from operational issues such as blockages or collapses of parts of the sewer network; and
- **overland flows entering the built-up area from the rural/urban fringe**: includes overland flows originating from groundwater springs.

## 9.2 Role of the LLFA and Local Planning Authority in surface water management

In April 2015, Devon County Council as the LLFA was made a statutory planning consultee on the management of surface water. They provide technical advice on surface water drainage strategies and designs put forward for major development proposals, to ensure that onsite drainage systems are designed in accordance with the current legislation and guidance.

When considering planning applications Devon County Council will provide advice to the Planning Department on the management of surface water. As an LPA, East Devon District Council should satisfy themselves that the development's proposed minimum standards of operation are appropriate and ensure, using planning conditions or planning obligations, that there are clear arrangements for on-going maintenance over the lifetime of the development.

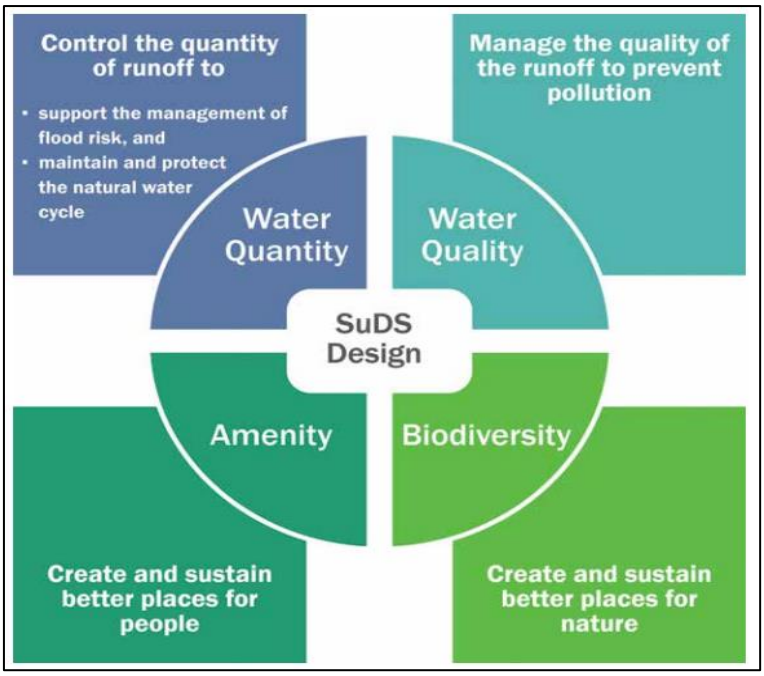
It is essential that developers consider sustainable drainage at an early stage of the development process – ideally at the master-planning stage. To further inform development proposals at the master-planning stage, pre-application submissions are accepted by East Devon District Council, dependent on the area. This will assist with the delivery of well designed, appropriate and effective SuDS.

## 9.3 Sustainable Drainage Systems (SuDS)

Sustainable Drainage Systems are water management practices which aim to enable surface water to be drained in a way that mimics (as closely as possible) the run-off and drainage prior to site development. The primary benefits of SuDS can be categorised under four distinct themes. These are highlighted in Figure 9-1 and are referred to as the four pillars of SuDS design.

There are a number of ways in which SuDS can be designed to meet surface water quantity, water quality, biodiversity and amenity goals. Given this flexibility, SuDS are generally capable of overcoming or working alongside various constraints affecting a site, such as restrictions on infiltration, without detriment to achieving these goals.

The inclusion of SuDS within developments should also be seen as an opportunity to enhance ecological and amenity value as well as promote Green Infrastructure by incorporating above ground facilities into the landscape development strategy. SuDS must be considered at the outset and during preparation of the initial conceptual site layout to ensure that enough land is given to design spaces that will be an asset to the development as opposed to an ineffective afterthought. For SuDS trains to work effectively it needs to be ensured that appropriate techniques are selected based on the objectives for drainage and the site-specific constraints. It is recommended that on all developments source control is implemented as the first stage of a management train allowing for improvements in water quality and reducing or eliminating runoff from smaller, more frequent, rainfall events.




Source: The SuDS Manual C753 (2015)

**Figure 9-1: Four pillars of SuDS design**

All new major development proposals should ensure that sustainable drainage systems for management of run-off are put in place. The developer is responsible for ensuring the design, construction and future/ongoing maintenance of such a scheme is carefully and clearly defined, and a clear and comprehensive understanding of the existing catchment hydrological processes and existing drainage arrangements is essential.

## 9.4 Types of SuDS system

There are many different SuDS techniques that can be implemented in attempts to mimic pre-development drainage (Table 9-1). Techniques can include

soakaways, infiltration trenches, permeable pavements, grassed swales, green roofs, ponds and wetlands and these do not necessarily need to take up a lot of space. The suitability of the techniques will be dictated in part by the development proposal and site conditions. Advice on best practice is available from the Environment Agency and the Construction Industry Research and Information Association (CIRIA) e.g. the **CIRIA SuDS Manual C753 (2015)**.

**Table 9-1: Examples of SuDS techniques and potential benefits**

| SuDS Technique | Flood Reduction | Water Quality Treatment & Enhancement | Landscape and Wildlife Benefit |
|---|---|---|---|
| Living roofs | ✓ | ✓ | ✓ |
| Basins and ponds | ✓ | ✓ | ✓ |
| Constructed wetlands | ✓ | ✓ | ✓ |
| Balancing ponds | ✓ | ✓ | ✓ |
| Detention basins | ✓ | ✓ | ✓ |
| Retention ponds | ✓ | ✓ | ✓ |
| Filter strips and swales | ✓ | ✓ | ✓ |
| Infiltration devices | ✓ | ✓ | ✓ |
| Soakaways | ✓ | ✓ | ✓ |
| Infiltration trenches and basins | ✓ | ✓ | ✓ |
| Permeable surfaces and filter drains | ✓ | ✓ | |
| Gravelled areas | ✓ | ✓ | |
| Solid paving blocks | ✓ | ✓ | |
| Porous pavements | ✓ | ✓ | |
| Tanked systems | ✓ | | |
| Over-sized pipes/tanks | ✓ | | |
| Storm cells | ✓ | | |

### 9.4.1 SuDS management

SuDS should not be used individually but as a series of features in an interconnected system designed to capture water at the source and convey it to a discharge location. Collectively this concept is described as a SuDS Management Train (see Figure 9-2). The number of treatment stages required within the Management Train depends primarily on the source of the runoff and the sensitivity of the receiving waterbody or groundwater. A drainage strategy will need to demonstrate that an appropriate number of treatment stages are delivered.

SuDS components should be selected based on design criteria and how surface water management is to be integrated within the development and landscaping

setting. By using a number of SuDS features in series it is possible to reduce the flow and volume of runoff as it passes through the system as well as minimising pollutants which may be generated by a development.

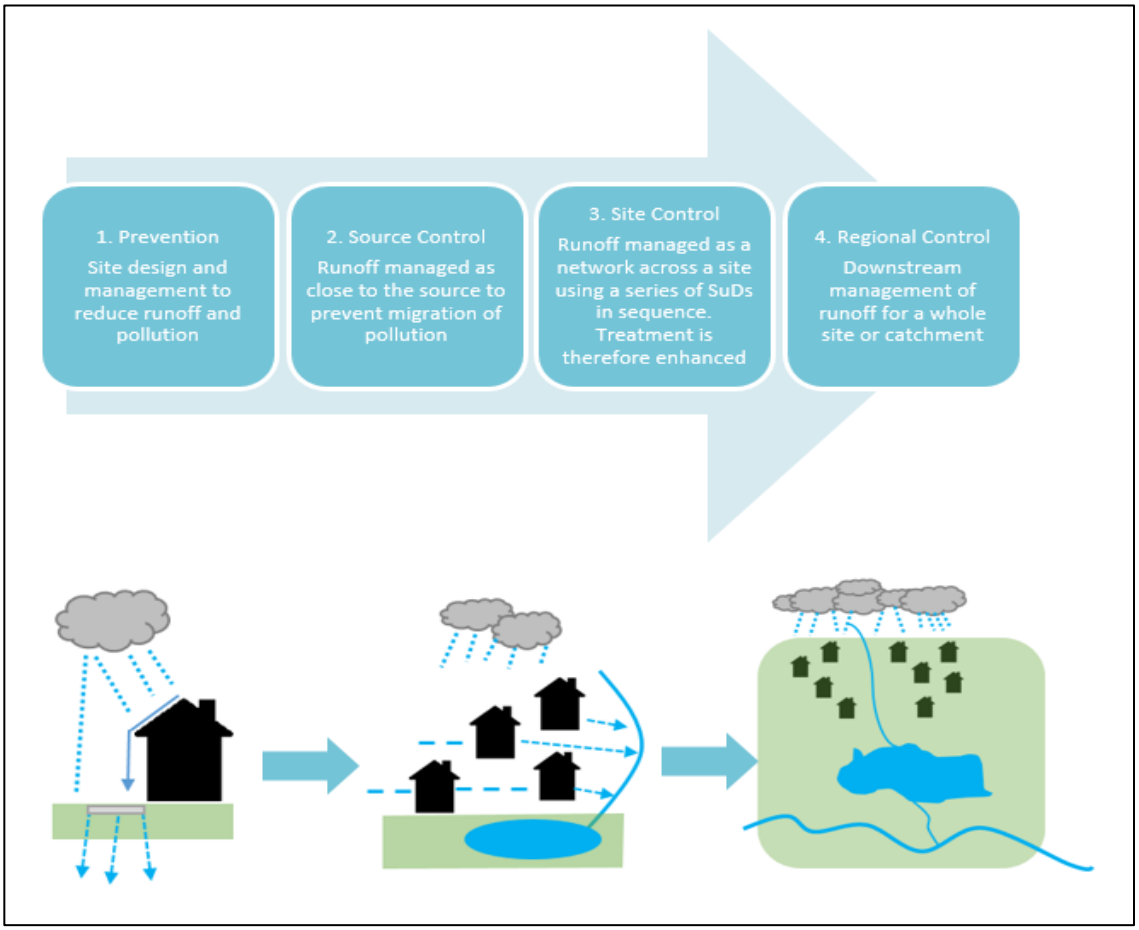



**Figure 9-2: SuDS Management Train**

### 9.4.2 Treatment

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 recommends[37] the following good practice is implemented in the treatment process:

1. **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.
2. **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.
3. **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.

37 C753 CIRIA SuDS Manual (2015)

4. **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.
5. **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. This involves determining a pollutant hazard score for each pollutant type. An index is then used to determine the treatment potential of different SuDS features for different pollutant types. This is known as the mitigation index. The Total SuDS mitigation index should be equal or greater than the pollution hazard score to deliver adequate treatment.

### 9.4.3 Overcoming SuDS constraints

The design of a SuDS system will be influenced by a number of physical and policy constraints. These should be taken into account and reflected upon during the conceptual, outline and detailed stages of SuDS design. Table 9-2 details some possible constraints and how they may be overcome.

**Table 9-2: 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. |
| **High 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 and dictate whether infiltration would be suitable or not. |

| Considerations | Solution |
|---|---|
| **Sites with deep backfill** | Infiltration should be avoided unless the soil can be demonstrated to be sufficiently compacted. 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. |

For SuDS techniques that are designed to encourage infiltration, it is imperative that the water table is low enough and a site-specific infiltration test is conducted early on as part of the design of the development. Infiltration should be considered with caution within areas of possible subsidence or sinkholes. Where sites lie within or close to groundwater protection zones (GSPZs) or aquifers, further restrictions may apply and guidance should be sought from the LLFA and the Environment Agency.

## 9.5 Sources of SuDS guidance

### 9.5.1 C753 CIRIA SuDS Manual (2015)

**The C753 CIRIA SuDS Manual (2015)** provides guidance on planning, design, construction and maintenance of SuDS. The manual is divided into five sections ranging from a high-level overview of SuDS, progressing to more detailed guidance with progression through the document.

### 9.5.2 Non-Statutory Technical Guidance, Defra (March 2015)

**Non-Statutory Technical guidance** provides non-statutory standards on the design and performance of SuDS. It outlines peak flow control, volume control, structural integrity, flood risk management and maintenance and construction considerations.

### 9.5.3 Non-statutory Technical Guidance for Sustainable Drainage Practice Guidance, LASOO (2016)

The Local Authority SuDS Officer Organisation produced their **practice guidance** in 2016 to give further detail to the Non-statutory technical guidance.

### 9.5.4 Devon County Council: Sustainable Drainage System – Guidance for Devon

The **Guidance for Devon** provides a summary of relevant information and signposts the reader to useful documents, whilst providing a local context. This Guidance is therefore intended for use by applicants, developers, architects, engineers and other professionals alike who are seeking advice on the standards and information required by the LLFA when reviewing planning applications.

Devon County Council have also produced a **SuDS checklist for developers.**

## 9.6 Other surface water considerations

### 9.6.1 Groundwater Vulnerability Zones

The Environment Agency published new groundwater vulnerability maps in 2015. These maps provide a separate assessment of the vulnerability of groundwater in overlying superficial rocks and those that comprise of the underlying bedrock. The map shows the vulnerability of groundwater at a location based on the hydrological, hydro-ecological and soil propertied within a one-kilometre grid square.

The groundwater vulnerability maps should be considered when designing SuDS. Depending on the height of the water table at the location of the proposed development site, restrictions may be placed on the types of SuDS appropriate to certain areas. Groundwater vulnerability maps can be found on **Defra's interactive mapping.**

### 9.6.2 Groundwater Source Protection Zones

The Environment Agency defines Groundwater Source Protection Zones (GSPZs) near groundwater abstraction points. These protect areas of groundwater used for drinking water. GSPZs require attenuated storage of runoff to prevent infiltration and contamination. GSPZs can be viewed on **DEFRA's Magic Map.**

Several GSPZs of varying size have been identified within East Devon District. The majority of these GSPZs are situated in the east of the district.

### 9.6.3 Nitrate Vulnerable Zones

Nitrate Vulnerable Zones (NVZs) are areas designated as being at risk from agricultural nitrate pollution. Nitrate levels in waterbodies are affected by surface water runoff from surrounding agricultural land entering receiving waterbodies. The level of nitrate contamination will potentially influence the choice of SuDS and should be assessed as part of the design process.

NVZs in East Devon can be viewed on the **Environment Agency's website.** In East Devon, NVZs cover much of the west of the district, and land between Sidmouth and Seaton.

# 10 Strategic flood risk measures

This section provides information regarding Strategic Flood Risk Measures.

## 10.1 Introduction

Strategic flood risk solutions may offer a potential opportunity to reduce flood risk in the Local Plan area. The following sections outline different options which could be considered for strategic flood risk solutions. Any strategic solutions should ensure they are consistent with wider catchment policy and the local policies. It is important that the ability to deliver strategic solutions in the future is not compromised by the location of proposed development. When assessing the extent and location of proposed development consideration should be given to the requirement to secure land for flood risk management measures that provide wider benefits. Funding for these solutions could be sought via S106 agreements or the Community Infrastructure Levy (CIL).

## 10.2 Flood storage schemes

Flood storage schemes aim to reduce the flows passed downriver to mitigate downstream flooding. Development increases the impermeable area within a catchment, creating additional and faster runoff into watercourses. Flood storage schemes aim to detain this additional runoff, releasing it downstream at a slower rate, to avoid any increase in flood depths and/or frequency downstream. Methods to provide these schemes include[38]:

- enlarging the river channel;
- raising the riverbanks; and/or
- constructing flood banks set back from the river.

Flood storage schemes have the advantage that they generally benefit areas downstream, not just the local area.

## 10.3 Natural flood management

Developments provide opportunities to work with natural processes to reduce flood and erosion risk, benefit the natural environment and reduce costs of schemes. Natural flood management requires integrated catchment management and involves those who use and shape the land. It also requires partnership working with neighbouring authorities, organisations and water management bodies. The Environment Agency has developed **Working with natural process mapping** which displays opportunities for NFM.

Conventional flood prevention schemes may be preferred, but consideration of 're-wilding' rivers upstream could provide cost efficiencies as well as considering multiple sources of flood risk; for example, reducing peak flows upstream through measures such as felling trees into streams or building earth banks to capture runoff, could be cheaper and smaller-scale than implementing flood walls. With flood prevention schemes, consideration needs to be given to the impact that flood prevention has on the WFD status of watercourses. It is important that any potential schemes do not have a negative impact on the ecological and chemical status of waterbodies.

38 http://evidence.environment-agency.gov.uk/FCERM/en/FluvialDesignGuide/Chapter10.aspx?pagenum=2

## 10.4 Catchment and floodplain restoration

Compared to flood defences and flood storage, floodplain restoration represents the most sustainable form of strategic flood risk solution, by allowing watercourses to return to a more naturalised state, and by creating space for naturally functioning floodplains working with natural processes.

Although the restoration of floodplain is difficult in previously developed areas where development cannot be rolled back, the following measures should be adopted:

- Promoting existing and future brownfield sites that are adjacent to watercourses to naturalise banks as much as possible. Buffer areas around watercourses provide an opportunity to restore parts of the floodplain
- Removal of redundant structures to reconnect the river and the floodplain.
- Apply the Sequential Approach to avoid new development within the floodplain.

For those sites considered within the Local Plan Review and / or put forward by developers, that also have watercourses flowing through or past them, the sequential approach should be used to locate development away from these watercourses. This will ensure the watercourses retain their connectivity to the floodplain. Loss of floodplain connectivity could potentially increase flooding.

### 10.4.1 Restoring the River Axe

The **River Axe Site of Special Scientific Interest and Special Area of Conservation River Restoration Plan** focuses on actions that can be undertaken within the Special Area of Conservation river channel and river corridor. The aim of the strategic restoration plan is to identify high level river restoration or enhancement actions to address the physical conditions of the River Axe that are contributing to unfavourable condition. This includes identifying opportunities for natural flood risk management.

### 10.4.2 Lower Otter Restoration Project

The **Lower Otter Restoration Project** is working with local people and partner organisations, including the Environment Agency, to adapt and enhance the downstream part of the River Otter, its estuary, and its immediate surroundings for future generations in the face of a rapidly changing climate. A managed realignment scheme is being undertaken in Budleigh Salterton. The project is being delivered because the existing tidal defences were starting to fail and were difficult to maintain. It will restore the Lower Otter Valley to more natural conditions, and the river will be reconnected with its floodplain.

### 10.4.3 Connecting the Culm

The **Connecting the Culm project** is focused on working with nature and people to adapt to the increased risk of flooding and drought in the catchment of the River Culm as a result of climate change. The River Culm flows from its source at Culmhead in the Blackdown Hills to its confluence with the River Exe just north of Exeter. The Culm and its tributaries drain 100 square miles of Somerset, and Mid and East Devon, 87% of which is agricultural land, 9% woodland and 4% the built environment[39].

[39] https://connectingtheculm.com/discover-the-culm/

### 10.4.4 Re-naturalisation

There is potential to re-naturalise a watercourse by re-profiling the channel, removing hard defences, re-connecting the channel with its floodplain and introducing a more natural morphology (particularly in instances where a watercourse has historically been modified through hard bed modification). Detailed assessments and planning would need to be undertaken to gain a greater understanding of the response to any proposed channel modification.

### 10.4.5 Structure removal and/ or modification (e.g. Weirs)

Structures, both within watercourses and adjacent to them can have significant impacts upon rivers including alterations to the geomorphology and hydraulics of the channel through water impoundment and altering sediment transfer regime, which over time can significantly impact the channel profile including bed and bank levels, alterations to flow regime and interruption of biological connectivity, including the passage of fish and invertebrates.

Many artificial in-channel structures (examples include weirs and culverts) are often redundant and / or serve little purpose and opportunities exist to remove them where feasible. The need to do this is heightened by climate change, for which restoring natural river processes, habitats and connectivity are vital adaptation measures. However, it also must be recognised that some artificial structures may have important functions or historical/cultural associations, which need to be considered carefully when planning and designing restoration work.

In the case of weirs, whilst weir removal should be investigated in the first instance, in some cases it may be necessary to modify a weir rather than remove it. For example, by lowering the weir crest level or adding a fish pass. This will allow more natural water level variations upstream of the weir and remove a barrier to fish migration.

### 10.4.6 Bank stabilisation

Bank erosion should be avoided and landowners encouraged to avoid using machinery and vehicles close to or within the watercourse.

There are several techniques that can be employed to restrict the erosion of the banks of a watercourse. In an area where bankside erosion is particularly bad and/or vegetation is unable to properly establish, ecologically sensitive bank stabilisation techniques, such as willow spiling, can be particularly effective. Live willow stakes thrive in the moist environment and protect the soils from further erosion allowing other vegetation to establish and protect the soils.

## 10.5 Green Infrastructure

Green Infrastructure (GI) is a planned and managed network of natural environmental components and green spaces that intersperse and connect the urban centres, suburbs and rural fringe and consist of:

- Open spaces – parks, woodland, nature reserves, lakes
- Linkages – River corridors and canals, and pathways, cycle routes and greenways
- Networks of "urban green" – private gardens, street trees, verges and green roofs.

The identification and planning of Green Infrastructure is critical to sustainable growth. It merits forward planning and investment as much as other socio-economic priorities such as health, transport, education and economic development. GI is also central to climate change action and is a recurring theme

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

A **Green Infrastructure Delivery Document (2009)** has been prepared by East Devon District Council, in conjunction with Natural England, Exeter City Council and Teignbridge District Council, as a guidance note to help developers incorporate green infrastructure into their development.

## 10.6 Promotion of SuDS

Surface water flood risk is present in the area. By considering SuDS at an early stage in the development of a site, the risk from surface water can be mitigated to a certain extent within the site as well as reduce the risk that the site poses to third party land. Regionally SuDS should be promoted on all new developments to ensure the quantity and quality of surface water is dealt with sustainably to reduce flood risk. Given the various policies and guidance available on SuDS, developers should use this information to produce technically proficient and sustainable drainage solutions that conform with the non-statutory standards for SuDS (2015).

## 10.7 Flood defences

There are a number of formal flood and coastal defences present within the study area (see Section 6 for further information).

Flood mitigation measures should only be considered if, after application of the Sequential Approach, development sites cannot be located away from higher risk areas. If defences are constructed to protect a development site, it will need be demonstrated that the defences will not have a resulting negative impact on flood risk elsewhere, and that there is no net loss in floodplain storage.

## 10.8 Engaging with key stakeholders

Flood risk to an area or development can often be attributed to a number of sources such as fluvial, surface water and/or groundwater. In rural areas the definition between each type of flood risk is more distinguished. However, within urban areas flooding from multiple sources can become intertwined. Where complex flood risk issues are highlighted it is important that all stakeholders are actively encouraged to work together to identify issues and provide suitable solutions.

Engagement with riparian owners is also important to ensure they understand their rights and responsibilities including:

- maintaining river bed and banks;
- allowing the flow of water to pass without obstruction; and
- controlling invasive alien species e.g. Japanese knotweed.

More information about riparian owner responsibilities can be found in the Environment Agency's guidance on **Owning a Watercourse** (2018).

# 11 Level 1 summary assessment of potential development locations

This section provides information on flood risk to potential development sites.

## 11.1 Introduction

A total of 937 sites were provided by East Devon District Council as shown in Appendix N; three of which were new Settlement sites. The three new settlement sites are located to the east of Clyst St Mary and Topsham. Option 1 is the first choice settlement, and Option 2 and 3 are alternative choice settlements.

These sites were identified through East Devon District Council's 2022 SHELAA and were screened against a suite of available flood risk information and spatial data to provide a summary of risk to each site (see Appendix N).

The information considered includes the flood risk datasets listed below:

- SFRA Flood Zones 2, 3a and 3b
- Fluvial and tidal climate change allowances
- Environment Agency Risk of Flooding from Surface Water
- Environment Agency Risk of Flooding from Surface Water with allowances for climate change
- Environment Agency Historic Flood Map
- Devon County Council recorded flood incidents
- JBA Groundwater Flood Map
- Critical Drainage Areas
- Coastal Change Management Areas.

A site screening spreadsheet has been prepared which identifies the proportion of each site that is affected by the different sources of flooding. The information provided is intended to enable a more informed consideration of the sites when applying the sequential approach. The site screening spreadsheet will be used to determine whether more detailed assessment of sites is needed to further identify those that should be taken forward as potential development allocations for a Level 2 assessment.

## 11.2 Overview of flood risk at identified sites

A summary of flood risk across the sites in light of the screening is provided below:

- 553 sites completely located within Flood Zone 1.
- 294 sites are partially located in Flood Zone 3b.
- 84 sites are partially located in Flood Zone 3a.
- 324 sites are partially located in Flood Zone 2.
- 490 sites are predicted to be at risk during a current day 1% AEP surface water flood event.
- 647 sites are predicted to be a risk during a future 1% AEP surface water flood event with a 65 % increase in rainfall.
- 209 sites intersect the Environment Agency's historic flood outlines.

## 11.3 Sequential Test

The SFRA does not include the Sequential Test of the development sites that were screened. However, Appendix N summarises the flood risk to the potential and confirmed development sites and provides evidence for use in the completion of the Sequential Test.

The assessments undertaken for this SFRA will assist East Devon District Council in the preparation of the Sequential Test. A Sequential Test Methodology is provided in Appendix O.

# 12 Summary

This Level 1 SFRA delivers a strategic assessment of all sources of flooding in the Local Plan area. It also provides an overview of policy and provides guidance for planners and developers.

The study area comprises the administration area of East Devon District.

Parts of East Devon District are at risk of flooding from the following sources: fluvial, surface water, groundwater, sewers and reservoir inundation. This study has shown that the most significant sources of flood risk in East Devon District are fluvial, tidal and surface water.

- *Fluvial flood risk*: The primary fluvial flood risk in East Devon is along the River Exe, River Clyst, River Otter, River Sid, River Axe and their tributaries. These watercourses present fluvial flood risk to rural communities as well as to the main urban areas in East Devon.
- *Tidal flood risk*: The areas identified most at risk of tidal flooding are Exmouth, Budleigh Salterton, Sidmouth and Seaton. In some places along the coastline, such as settlements along the Exe estuary, tidal flood risk can occur in combination with fluvial and surface water sources which can exacerbate flood risk.
- *Surface water flood risk:* The Risk of Flooding from Surface Water map shows a number of prominent overland flow routes; these predominantly follow topographical flow paths of existing watercourses or dry valleys with some isolated ponding located in low lying areas. There are also considerable flow routes following the roads through the main urban areas of Buckerell, Kilmington, Cranbrook and Clyst St Mary. All of which are designated as a Flood Risk Area due to surface water flooding.
- *Sewer flood risk*: South West Water historical hydraulic flood incident records have been used to identify areas which have experienced sewer flooding. Areas with recorded sewer flooding incidents include Exmouth, Ottery St Mary, Budleigh Salterton, Honiton, Woodbury, Sidmouth, Axminster, Clyst St Mary, Seaton and Colyton.
- *Groundwater flood risk:* JBA's Groundwater Flood Risk map shows the areas with the shallowest groundwater levels generally follow the flow paths of the major watercourses in East Devon District, particularly along the River Otter valley and its tributary valleys, in areas close to the River Clyst in the west of East Devon district and areas in the River Exe valley.
- *Flooding from canals*: There are no canals identified in East Devon.
- *Flooding from reservoirs:* There is a potential risk of flooding from reservoirs both within the District and those outside. The level and standard of inspection and maintenance required under the Reservoirs Act means that the risk of flooding from reservoirs is relatively low. However, there is a residual risk of a reservoir breach, and this risk should be considered in any site-specific Flood Risk Assessments (where relevant).

## 12.1 Key policies

There are many relevant regional and local key policies which have been considered within the SFRA, such as the CFMPs, RBMPs, the PFRA and LFRMS. Other policy considerations have also been incorporated, such as sustainable development principles, climate change and flood risk management.

## 12.2 Development and flood risk

The flood risk information used to inform the Sequential and Exception Test procedures for both Local Plan Reviews and FRAs has been documented, along with relevant guidance for planners and developers. A Sequential Test Methodology for the use of flood risk information is outlined in Appendix O. Links have been provided for various guidance documents and policies published by other Risk Management Authorities such as the LLFA and the Environment Agency.

# 13 Recommendations

A review of national and local policies has been conducted against the information collated on flood risk in this SFRA. Following this, several recommendations have been made for East Devon District Council to consider as part of Flood Risk Management in the study area.

## 13.1 Existing policy to be maintained

### 13.1.1 Sequential approach to development

The NPPF supports a risk-based and sequential approach to development and flood risk in England, so that development is located in the lowest flood risk areas where possible; it is recommended that this approach is adopted for all future developments within the District.

New development and re-development of land should wherever possible seek opportunities to reduce overall level of flood risk at the site, for example by:

- Reducing volume and rate of runoff through the use of SuDS, as informed by the **'Sustainable Drainage System – Guidance for Devon'.**
- Relocating development to areas with lower flood risk
- Creating space for flooding
- GI should be considered within the mitigation measures for surface water runoff from potential development and consider using areas at risk of flooding as public open space
- Consideration must be given to the potential cumulative impact of development on flood risk.

### 13.1.2 Site-specific flood risk assessments

Site specific FRAs are required to be produced by developers to provide a greater level of detail on flood risk and any protection provided by defences and, where necessary, demonstrate the development passes part b of the Exception Test.

Developers should, where required, undertake more detailed hydrological and hydraulic assessments of the watercourses to verify flood extent (including latest climate change allowances), inform development zoning within the site and prove, if required, whether the Exception Test can be passed. The assessment should also identify the risk of existing flooding to adjacent land and properties to establish whether there is a requirement to secure land to implement strategic flood risk management measures to alleviate existing and future flood risk. Any flood risk management measures should be consistent with the wider catchment policies set out in the CFMP, FRMPs and LFRMS.

Developers should consult with East Devon District Council, Devon County Council, the Environment Agency and South West Water at an early stage to discuss flood risk including requirements for site-specific FRAs, detailed hydraulic modelling, and drainage assessment and design.

### 13.1.3 Sequential and Exception tests

The SFRA has identified that parts of the study area are at high risk of flooding. Therefore, it is expected that several proposed development sites will be required to pass the Sequential and, where necessary, Exception Tests in accordance with the NPPF. East Devon District Council should use the information in this SFRA when deciding which development sites to take forward in the Local Plan Review.

It is the responsibility of East Devon District Council to be satisfied that the Sequential Test has been satisfied.

### 13.1.4 Council review of planning applications

The Council should consult the Environment Agency's '**Flood Risk Assessment: Local Planning Authorities**', last updated February 2022, when reviewing planning applications for proposed developments at risk of flooding.

The Council will consult the relevant statutory consultees as part of the planning application assessment and they may, in some cases, also contact non-statutory consultees (e.g. South West Water) that have an interest in the planning application.

### 13.1.5 Drainage strategies and SuDS

Planners should be aware of the conditions set by the LLFA for surface water management and ensure development proposals and applications are compliant with Devon County Council's **Sustainable Drainage System – Guidance for Devon** for the relevant wastewater treatment catchment. The enactment of Schedule 3 of the FWMA means that there will be mandatory standards for delivery and adoption of SuDS in new developments.

SuDS design should demonstrate how constraints have been considered and how the design provides multiple benefits e.g. landscape enhancement, biodiversity, recreation, amenity, leisure and the enhancement of historical features.

Planning applications for phased developments should be accompanied by a drainage strategy, which takes a strategic approach to drainage provision across the entire site and incorporates adequate provision for SuDS within each phase.

Use of the SuDS management train to prevent and control pollutants to prevent the 'first flush' polluting the receiving waterbody.

SuDS are to be designed so that they are easy to maintain, and it should be set out who will maintain the system, how the maintenance will be funded and should be supported by an appropriately detailed maintenance and operation manual.

### 13.1.6 Residual risk

Residual risk is the risk that remains after mitigation measures are considered. The residual risk includes the consideration of flood events that exceed the design thresholds of the flood defences or circumstances where there is a failure of the defences, e.g. flood banks collapse. Residual risks should be considered as part of site-specific Flood Risk Assessments.

Further, any developments located within an area protected by flood risk management measures, where the condition of those defences is 'fair' or 'poor', where the standard of protection is not of the required standard or where the failure of the intended level of service gives rise to unsafe conditions should be identified.

The risk to development from reservoirs is residual but developers should consider reservoir flooding during the planning stage. They should seek to contact the reservoir owner to obtain information and should apply the sequential approach to locating development within the site. Developers should also consult with relevant authorities regarding emergency plans in case of reservoir breach.

Consideration should be given to the potential for safe access and egress in the event of rapid inundation of water due to a breach with little warning.

### 13.1.7 Reduction of flood risk through site allocations and appropriate site design

- To locate new development in areas of lowest risk, in line with the Sequential Test, by steering sites to river Flood Zone 1 and avoiding where possible surface water Flood Zone B. If a Sequential Test is undertaken and a site at flood risk is identified as the only appropriate site for the development, the Exception Test shall be undertaken. If development can't be avoided in a high risk surface water Zone, then part "b" of the Exception Test should be satisfied.
- After application of the Exception Test, a sequential approach to site design will be used to reduce risk. Any re-development within areas of flood risk which provide other wider sustainability benefits will provide flood risk betterment and made resilient to flooding.
- Ordinary watercourses must be considered during site allocation and design. For ordinary watercourses not currently afforded flood maps, these may need to be modelled to an appropriate level of detail to enable a sequential approach to the layout of the development.
- Identify opportunities for brownfield sites in functional floodplain to reduce risk and provide flood risk betterment.
- Identify opportunities to help fund future flood risk management through developer contributions to reduce risk for surrounding areas.
- Seek opportunities to make space for water to accommodate climate change.

### 13.1.8 Safe access and egress

Safe access and egress will need to be demonstrated at all development sites. Access considerations should include the voluntary and free movement of people during a 'design flood', as well as the potential for evacuation before a more extreme flood, considering the effects of climate change for the lifetime of the development. Access and egress routes need to be designed to be functional for changing circumstances over the lifetime of the development. For more details on the requirements see Paragraph: 047 Reference ID: 7-047-20220825.

Emergency vehicular access should also be possible during times of flood so that it can be confirmed that flood risk does not compromise the capacity of the emergency services response. In all such circumstances the emergency services should be consulted to confirm that the proposed arrangements are appropriate. If at risk, then as assessment should be made to detail the flood duration, depth, velocity and flood hazard rating in the 1% AEP plus climate change flood event, in line with FD2320.

Where development is located behind, or in an area benefitting from, defences, consideration should be given to the potential safety of the development, finished floor levels and for safe access and egress in the event of rapid inundation of water due to a defence breach with little warning.

Resilience measures will be required if buildings are situated in the flood risk area, and opportunities to enhance green infrastructure and reduce flood risk by making space for water should be sought.

### 13.1.9 Future flood management

Developments should demonstrate opportunities to create, enhance and link green assets. This can provide multiple benefits across several disciplines including flood risk and biodiversity/ ecology and may provide opportunities to

use the land for an amenity and recreational purposes. Development that may adversely affect green infrastructure assets should not be permitted.

The information provided in the SFRA should be used as a basis for investigating potential strategic flood risk solutions within the study area. Opportunities could consist of the following:

- Catchment and floodplain restoration;
- Flood storage areas;
- Opening up culverts, weir removal, and river restoration;
- The Regional Habitat Creation Programme; and
- Green infrastructure.
- River corridors and utilising the required river easement to improve flood risk

For successful future flood risk management, it is recommended that local planning authorities adopt a catchment partnership working approach in tackling flood risk and environmental management.

- Identification of long-term opportunities to remove development from the floodplain and safeguard the functional floodplain from future development to make space for water.
- Identify opportunities to help fund future flood risk management through developer contributions to reduce risk for surrounding areas.

### 13.1.10 Reduce surface water runoff from new developments and agricultural land

- Space should be provided for the inclusion of SuDS on all allocated sites, outline proposals and full planning applications.
- Encourage runoff from new developments to be restricted to less than greenfield rates to account for existing surface water runoff problems.
- Promote biodiversity, habitat improvements and **Countryside Stewardship schemes** to help prevent soil loss and to reduce runoff from agricultural land.

### 13.1.11 Enhance and restore river corridors and habitat

- Assess condition of existing assets and upgrade, if required, to ensure that the infrastructure can accommodate pressures/flows for the lifetime of the development.
- Natural drainage features should be maintained and enhanced.
- Identify opportunities for river restoration/enhancement to make space for water.
- A presumption against culverting of open watercourses except where essential to allow highways and/or other infrastructure to cross, in line with CIRIA's Culvert design and operation guide, (C689) and to restrict development over culverts.
- There should be no built development within 8m from the top of a watercourse or Main River for the preservation of the watercourse corridor, wildlife habitat, flood flow conveyance and future watercourse maintenance or improvement.

#### 13.1.12 Mitigate against risk, improved emergency planning and flood awareness

- Work with emergency planning colleagues and stakeholders to identify areas at highest risk and locate most vulnerable receptors.
- Exceedance flows, both within and outside of the site, should be appropriately designed to minimise risks to both people and property.
- For a partial or completely pumped drainage system, an assessment should be undertaken to assess the risk of flooding due to any failure of the pumps to be assessed. The design flood level should be determined if the pumps were to fail; if the attenuation storage was full, and if a design storm occurred.
- An emergency overflow should be provided for piped and storage features above the predicted water level arising from a 1% AEP rainfall event, inclusive of climate change and urban creep.
- Consideration and incorporation of flood resilience measures up to the 0.1% AEP event.
- Ensure robust emergency (evacuation) plans are produced and implemented for major developments.
- Increase awareness and promote sign-up to the Environment Agency's **Sign up for flood warnings** online. Flood Warnings Direct (FWD) within East Devon.

### 13.2 Cumulative impact assessment recommendations

The cumulative impact of development should be considered at the planning application and development design stages and the appropriate mitigation measures undertaken to ensure flood risk is not exacerbated, and in many cases the development should be used to improve the flood risk.

#### 13.2.1 Broadscale recommendations

The broadscale cumulative impact assessment for East Devon has highlighted the potential for development to have a cumulative impact on flood risk. Catchments have been identified as high, medium or low risk.

New development can potentially increase flood risk and thus the need for incremental action and betterment in flood risk terms across all of East Devon is appropriate.

The following policy recommendations therefore apply to all catchments within the study area:

- EDDC should work closely with neighbouring local authorities to develop complementary Local Planning Policies for catchments that drain into and out of the District to other local authorities in order to minimise cross boundary issues of cumulative impacts from development.
- Developers should incorporate SuDS and provide details of adoption, ongoing maintenance and management on all development sites. Proposals will be required to provide reasoned justification for not using SuDS techniques, where ground conditions and other key factors show them to be technically feasible. Preference will be given to systems that contribute to the conservation and enhancement of biodiversity and green infrastructure in the districts where practicable. Developers should refer to the relevant **LLFA guidance** (DDC) for the requirements for SuDS in Devon, including Technical and Development Type-specific Guidance for Developers. Further guidance on SuDS can be found in Section 9. With the

enactment of Schedule 3 of the FWMA, DCC will be the SuDS Approval Board (SAB).

- DDC as LLFA will review Surface Water Drainage Strategies in accordance with their local requirements for major and non-major developments. These should take into account all sources of flooding so that future development is resilient to flood risk and does not increase flood risk elsewhere.
- Where appropriate, the opportunity for Natural Flood Management in rural areas, SuDS retrofit in urban areas and river restoration should be maximised. Culverting should be opposed, and day-lighting existing culverts promoted through new developments.
- Encourage runoff from new developments to be restricted to less than greenfield rates to account for existing surface water runoff problems. Developers should refer to the relevant LLFA guidance for the requirements for **SuDS in Devon**.
- Where applicable, development proposals should undertake a site-specific Flood Risk Assessment. Site-specific FRAs should explore opportunities to provide wider community flood risk benefit 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 provision of additional storage on site e.g. through oversized SuDS, natural flood management techniques, green infrastructure and green-blue corridors, and/ or by providing a Partnership Funding contribution towards any flood alleviation schemes.
- EDCC should consider requiring developers to contribute to community flood defences outside of their red line boundary to provide wider benefit and help offset the cumulative impact of development. There are proposed and ongoing Flood Alleviation Schemes which may help to reduce fluvial risk in the district, and there may be opportunities for development to support the funding/delivery of these schemes.
- Section 8.3 of this report details the local requirements for mitigation measures. Catchment-specific recommendations are made for high and medium-risk catchments below.
- LPAs should work closely with the EA and the LLFA to identify any areas of land that should be safeguarded for any future flood alleviation schemes and natural flood management features.
- There is the potential for development in these catchments to contribute towards works to reduce flood risk and enable regeneration as well as contributing to the wider provision of green infrastructure.

### 13.2.2 Recommendations for developments in high-risk catchments

- LLFAs and LPAs should work closely with the EA and the LLFA to identify any areas of land that should be safeguarded for any future flood alleviation schemes and natural flood management features. **The Working with Natural Processes mapping** shows there are opportunities for floodplain reconnection, riparian woodland and additional floodplain woodland in high risk catchments. The mapping also indicates locations where there are potential for runoff attenuation features to reduce flows. These areas should all be safeguarded.
- The LPAs should explore the potential for development in High-Risk catchments to contribute towards works to reduce flood risk and enable

regeneration as well as contributing to the wider provision of green infrastructure.

- Within any FRAs consideration should be given to the potential cumulative effects of all proposed development and how this affects sensitive receptors.
- Developers should also include a construction surface water management plan to support the Construction Drainage Phasing Plan. This should provide information to the EA, the LLFA and the LPA regarding the proposed management approach during the construction phase to address surface water management during storm events.
- The LLFA and LPA should consult with Local Non-For-Profit organisations such as wildlife trusts, rivers trusts and catchment partnerships to understand ongoing and upcoming projects where NFM, flood storage and attenuation, and environmental betterment may be possible alongside developments and aid in reducing flood risk.

## 13.3 Further specific policy recommendations for East Devon

The following specific policy recommendations have been made for East Devon.

### 13.3.1 Safeguarding of land

- As outlined in Section 11.1, there are three new settlement choices in East Devon, Option 1, 2 and 3. In settlement Option 1, **The Working with Natural Processes mapping** shows there are opportunities for floodplain reconnection, riparian woodland and additional floodplain woodland along the watercourses that run through the settlement. The mapping also indicates locations where there are potential for runoff attenuation features to reduce flows. These areas should all be safeguarded.
- In settlement Option 2, south of the A3052, the mapping shows there are opportunities for floodplain reconnection, riparian woodland and additional floodplain woodland along the Grindle Brook and tributaries. There are also opportunities along the watercourses to the north of the A3052. The mapping also indicates locations where there are potential for runoff attenuation features to reduce flows. These areas should be safeguarded.
- In settlement Option 3, there are opportunities for floodplain reconnection, riparian woodland and additional floodplain woodland along the Grindle Brook and tributaries. The mapping also indicates locations where there are potential for runoff attenuation features to reduce flows. These areas should be safeguarded.
- EDDC should also identify long-term opportunities to remove development from the floodplain and safeguard the functional floodplain from future development to make space for water.

### 13.3.2 Critical Drainage Areas

- Within Critical Drainage Areas, new development should provide betterment (reduction of existing runoff rates) through use of SuDS.

### 13.3.3 Coastal Change Management Areas

- Section 2.10.2 outlines the existing draft policy for Coastal Change Management Areas (CCMA). Policies for CCMAs will be delivered through the Local Plan, and developers should refer to these.

### 13.3.4 Basements

- No basements should be permitted in areas at risk of flooding.

## 13.4 Requirements for Level 2

Following the application of the Sequential Test, where sites cannot be appropriately accommodated in low risk areas, East Devon District Council will apply the NPPF's Exception Test. In these circumstances, a Level 2 SFRA may be required, to assess in more detail the nature and implications of the flood characteristics. A Level 2 SFRA will be required for any more vulnerable development allocated in an area at risk of flooding. This is necessary to demonstrate that the principle of development is supported and it is safe over its lifetime without increasing risks elsewhere.

For areas within 5m horizontal distance of Flood Zone 2, where there is no detailed modelling, assessment of this Zone with climate change will need to be undertaken as part of a Level 2 SFRA or by the developer as part of a site specific FRA.

## 13.5 Technical recommendations

### 13.5.1 Potential modelling improvements

The Environment Agency regularly reviews its flood risk mapping, and it is important that they are approached to determine whether updated (more accurate) information is available prior to commencing a site-specific FRA. Appendix K outlines the data sources used in the SFRA.

### 13.5.2 Updates to SFRA

SFRAs are high level strategic documents and, as such, do not go into detail on an individual site-specific basis. This SFRA has been developed using the best available information, supplied at the time of preparation.

The Environment Agency regularly reviews its hydrology, hydraulic modelling and flood risk mapping, and it is important that they are approached to determine whether updated (more accurate) information is available prior to commencing a site-specific FRA. When using the SFRA to prepare FRAs it is important to check that the most up to date information is used, as is described in amendments to the flood mapping prepared and issued by the Environment Agency at regular intervals.

Other datasets used to inform this SFRA may also be updated periodically and following the publication of this SFRA, new information on flood risk may be provided by Risk Management Authorities.

# Annex 1 – Updates to the Planning Practice Guidance (25 August 2022)

The Planning Practice Guidance on Flood Risk and Coastal Change was updated on the 25 August 2022, triggered by: revisions to the NPPF in 2018, 2019 and 2021; practice experience since the PPG was first published in 2014; Policy review of development in flood risk areas; and other stakeholder and committee reviews.

Key Details of the changes included in the PPG update of 25 August 2022:

**General**

- 'Design flood' includes Climate Change and surface water risk
- Hierarchical approaches prioritises avoidance and passive approaches, which also applies to residual risk.
- Safety of development now accounts for impact of flooding on the services provided by development
- Inappropriate to consider likelihood of defence breach
- Functional floodplain "starting point" for extent uplifted to the 3.3% AEP from 5% AEP
- Lifetime of non-residential development now has a 75yrs starting point
- New culverting and building over culverts is discouraged
- Defra FD2320 research referenced for calculating flood hazard to people

**Sequential Test**

- Removal of reference to Flood Zones (Diagram 2) when performing Sequential Test and requirement must now consider whether development can be located in the lowest areas (high – medium – low) of flood risk both now and in the future (the test applies to all source of flood risk – whereas previously the test was only performed for present day flood risk for the "Flood Zones" i.e. river and sea flood risk).
- Improved clarity about when test needs to be applied. Potential confusion about 'minor' development has been clarified.
- Clearer roles and responsibilities, with emphasis on the LP to define the area of search and decide if the test is passed.
- Key terms defined (e.g. 'reasonably available')
- Suggests approaches to improve certainty and efficiency
- Clarification about when it's appropriate to move onto the Exception Test
- Explicit statement that Table 2 (was Table 3) cannot be used to support performance of Sequential Test

**Exception Test**

- Key terms defined (e.g. 'wider sustainability benefits to the community')
- New section on how to demonstrate development has reduced flood risk overall
- Table 2 (was Table 3) shows flood zone ***incompatibility***, NOT whether 'development is appropriate'.

**Integrated approach to flood risk management**

- Catchment based approaches

- Improved connectivity with other strategies e.g. water cycle studies and drainage and wastewater management plans
- Encourages measures which deliver multiple benefits – including those which unlock sustainable development

**Impact of development on flood risk elsewhere**

- FRA's must detail any increase in risk elsewhere
- Guidance on compensatory flood storage – requirement for level-for-level storage
- Guidance on mitigating cumulative impacts
- Clarification that stilts/voids should not be relied upon for compensatory storage

**Safe access and egress**

- Guidance of safe access and egress has been strengthened

**Safeguarding land and relocation**

- Guidance on how to safeguard land needed for future FCERM infrastructure
- Definition included for unsustainable locations
- Guidance for control of developments in unsustainable locations
- More detail and expectation on requirement to exercise Plan process to relocate development that is susceptible to frequent flood risk or coastal erosion.

**Sustainable Drainage Systems (SuDS)**

- Clearer definition of what SuDS are – this must meet the '4 pillars'
- Clearer requirement for SuDS Strategy
- Better recognition of wider SuDS benefits e.g. BNG, carbon sequestration, urban cooling
- Encouragement for earlier consideration in the design process
- Encourages policies setting out where SuDS would bring greatest benefits
- Highlights the need to check the need for other permits for SuDS

**Reducing the causes & impacts of flooding**

- Whole new section – links to all the EA's latest NFM tools, maps and research
- Support for river restoration such as culvert removal and other 'slow the flow' approaches
- Support for making space for river geomorphology e.g. meander migration

**Coastal Change**

- Encourages more precautionary designation of Coastal Change Management Areas (CCMAs)
- Allows more flexibility for existing buildings/land-use to adapt to change
- Clearer requirement for a 'coastal change vulnerability assessment' with apps for development in CCMAs
- Highlights need to consider removal of some Permitted Development rights in CCMAs

**Other changes**

- Guidance on how to consider flood risk in LDOs
- More detailed framework for local design code preparation
- Approach to article 4 in relation to flood risk
- Greater clarity on the application of the call-in direction process
- Guidance on development that might affect existing reservoirs
- Updated links to the latest tools and guidance

**Impacts on the SFRA**

The most relevant points to consider in relation to updating the SFRA process relate to the changes to the Sequential Test requirements and Exception Test requirements, particularly the requirement for updated Climate Change modelling for all sources of flood risk and the functional floodplain starting point at 3.3% AEP. Consideration also needs to be made to the changes to Table 2 (was Table 3) and the flood zone incompatibility. This should be considered during the screening phase prior to the Level 2 SFRA being undertaken.

For more information on the PPG updates, please visit the **gov.uk website**.

## Appendices

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