

# **Cotswold District Council SFRA - Appendix E**

## **Local Plan Sites Assessment**

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# 1 Local Plan Sites Assessment

Appendix E provides a strategic assessment of the suitability, relative to flood risk, of the sites to be considered for allocation in the Local Plan.

The information and guidance provided in this Appendix (also supported by the SFRA Interactive Mapping in Appendix A) can be used by the LPA to inform the Local Plan and provide the basis from which to apply the Sequential Test in the development allocation and the development management process.

**The LPA must use Appendix C to record their decisions on how to take each site forward or whether to remove a site from allocation, based on the evidence and strategic recommendations provided in this Level 1 SFRA. Recording decisions in the Sites Assessment Spreadsheet demonstrates that a sequential, sustainable approach to development and flood risk has been adopted.**

Cotswold District Council provided a GIS layer containing potential development sites. The total number of sites assessed was 1,089. In order to inform the Sequential Test to the allocation of development through the Local Plan, this assessment entails a high-level GIS screening exercise overlaying the potential development sites against Flood Zones 1, 2, 3a and 3b, calculating the area of each site at risk. Flood Zones 1, 2 and 3 are sourced from the EA's Flood Map for Planning (Rivers and Sea), Flood Zone 3 is split into Flood Zone 3a and Flood Zone 3b (functional floodplain) as part of this Level 1 SFRA, as required by the National Planning Policy Framework (NPPF). The impacts of climate change have also been included in the sites screening process using the delineated Flood Zone 3b plus climate change outline and modelled 100-year plus climate change outputs. See Section E.2 for details. All flood zones are displayed on the SFRA Interactive Mapping in Appendix A.

Surface water risk to assessed sites is analysed by way of the EA's national scale Risk of Flooding from Surface Water (RoFSW) dataset. The EA states that this dataset is not suitable for identifying whether an individual property will flood. It is recommended that the RoFSW is not displayed on basemapping more detailed than 1:10,000 as the data is open to misinterpretation if viewed at a greater or more detailed scale. Because of the way the RoFSW has been produced and the fact it is indicative, it is not appropriate to act as the sole evidence for any specific planning or regulatory decision or assessment of risk in relation to surface water flooding at any scale without further supporting studies or evidence.

It is important to consider that each individual site will require further investigation, following this assessment, as local circumstances may dictate the outcome of the strategic recommendation. Such local circumstances are discussed in Section **Error! Reference source not found.** The outcomes of the site assessments are presented in the Sites Assessment spreadsheet in Appendix C.

## 1.1 Screening of potential sites

This section of the report draws together the results included in the assessment spreadsheet (Appendix C), produced from a GIS screening exercise. The LPA should use the spreadsheet to identify which sites should be avoided during the Sequential Test. If sites cannot be directed to areas of low flood risk, or where wider strategic objectives require development in areas identified through this Level 1 SFRA to be at risk from flooding, then the LPA should consider the compatibility of vulnerability classifications and flood zones and whether or not a more detailed Level 2 SFRA (including for application of the Exception Test where applicable) will be required before finalising sites for allocation in the Local Plan. Strategic recommendations are based on Tables 1 and 2 of the flood risk and vulnerability tables<sup>1</sup> of the Flood Risk and Coastal Change Planning Practice Guidance (FRCC-PPG) (Paragraphs 065 - 067), and Annex 3 of the National Planning Policy Framework<sup>2</sup>.

The decision-making process on site suitability should be transparent and information from this SFRA should be used to justify decisions to allocate land in areas shown to be at high or medium risk of flooding.

The Sites Assessment spreadsheet provides a breakdown of each site and the area (in hectares) and percentage coverage of each fluvial and surface water flood zone. Fluvial Flood Zones 3b, 3a, 2 and 1 are considered in isolation. Any area of a site within the higher risk Flood Zone 3b that is also within Flood Zone 3a is excluded from Flood Zone 3a and any within Flood Zone 3a is excluded from Flood Zone 2. This allows for the sequential assessment of risk at each site by addressing those sites at higher risk first. The effects of climate change on fluvial flood risk have been assessed additionally to existing risk. Table 1-1 shows the proposed use of the sites and the number of sites within each fluvial flood zone and

Table 1-2 shows the number of sites within each surface water flood zone.

Table 1-1 Number of sites at risk from fluvial flooding

Proposed Use	Number of sites within each Flood Zone				
	Flood Zone 1*	Flood Zone 2	Flood Zone 3a	Flood Zone 3b	Flood Zone 3b + climate change
Housing	885	172	90	123	37
<b>TOTAL</b>	<b>885</b>	<b>172</b>	<b>90</b>	<b>123</b>	<b>37</b>

1 [Flood Risk and Coastal Change Planning Practice Guidance | GOV.UK | August 2022](#)

2 [National Planning Policy Framework | GOV.UK | July 2021](#)

Proposed Use	Number of sites within each Flood Zone				
	Flood Zone 1*	Flood Zone 2	Flood Zone 3a	Flood Zone 3b	Flood Zone 3b + climate change
*Sites with 100% area within Flood Zone 1					
Note: sites may be in more than one flood zone. In reality, a site in Flood Zone 3a will also be within Flood Zone 2.					

Table 1-2 Number of sites at risk from surface water flooding

Proposed Use	Number of sites within each surface water risk category		
	Low risk zone (1 in 1000)	Medium risk zone (1 in 100)	High risk zone (1 in 30)
Housing	533	306	219
<b>TOTAL</b>	<b>533</b>	<b>306</b>	<b>219</b>
Note: sites may be in more than one surface water risk category. In reality, a site in the high risk category will also be in the medium and low risk categories.			

The strategic recommendations are intended to assist LPAs in carrying out the Sequential Test and to highlight those sites at greatest flood risk. Table 3 shows the number of sites each strategic recommendation applies to:

- Strategic Recommendation A - recommend for withdrawal;
- Strategic Recommendation B - Level 2 SFRA. Exception Test required;
- Strategic Recommendation C - progress to developer-led FRA; and
- Strategic Recommendation D - development could be allocated on flood risk grounds based on the evidence of this Level 1 SFRA. LPA to make decision on allocation.

Table 1-3 Number of sites per strategic recommendation

Proposed Use	Number of sites assigned to each strategic recommendation			
	A	B	C	D
Housing	129	278	293	389
<b>TOTAL</b>	<b>129</b>	<b>278</b>	<b>293</b>	<b>389</b>

It is important to note that each individual site will require further investigation before development is allocated, as local circumstances may dictate the outcome of the strategic recommendation. Such local circumstances may include the following:

- Flood depths and hazards will differ locally to each at risk site therefore modelled depth, hazard and velocity data should be assessed for the relevant flood event outlines, at the site-specific FRA stage;
- Detailed climate change modelling;
- The RoFSW map is national scale and is not considered suitable for robustly identifying risk at the property level. For sites identified to be at medium or high risk from surface water based on the RoFSW, more detailed surface water modelling may reveal higher or lower risk to the site. The LLFA should be consulted when considering development viability at such sites;
- Current surface water drainage infrastructure and SuDS suitability are likely to differ at each site considered to be at risk from surface water flooding. Further investigation would therefore be required for any site at surface water flood risk. The LLFA should require that all planning applications must be accompanied by an appropriate drainage strategy, independent of the requirement for a site-specific FRA;
- If sites have planning permission but construction has not started, the SFRA will only be able to influence the design of the development e.g. finished floor levels. New, more extensive flood extents (from new or updated models) cannot be used to reject development where planning permission has already been granted;
- It may be possible at some sites to develop around the flood risk. Planners are best placed to make this judgement i.e. will the site still be deliverable if part of it needs to be retained to make space for floodwater?
- Surrounding infrastructure may influence scope for layout redesign/removal of site footprints from risk;
- Some sites not currently at flood risk may be at residual risk through the failure of defences during a flood event or through blockage/failure of drainage assets such as culverts;
- Safe and dry access and egress routes must exist at all times during a flood event for emergency response and evacuation. Emergency Planners should be consulted and appropriate emergency plans put in place;
- Current land use. A number of sites included in the assessment are likely to be brownfield, thus the existing development structure and footprint could be taken into account as further development may not lead to increased flood risk; and
- Existing planning permissions may exist on some sites where the EA may have already passed comment and/or agreed to appropriate remedial works concerning flood risk. Previous flood risk investigations/FRAs may already have been carried out at some sites. The LPA should be consulted.

### 1.1.1 Strategic Recommendation A - recommend for withdrawal

This strategic recommendation does not take into account local circumstances, only that part of the site area falls within a flood zone.

Strategic Recommendation A applies to any site where the following criteria is true:

- Any proportion of the site area is within the functional floodplain. The FRCC-PPG flood risk vulnerability classification states that only water compatible uses and essential infrastructure should be permitted in the functional floodplain, though any essential infrastructure must pass the Exception Test and water compatible uses must be designed and constructed to remain operational and safe for users in times of flood; must result in no net loss of floodplain storage; and must not impede water flows and not increase flood risk elsewhere. Development should not be permitted for sites within the highly, more or less vulnerable categories that fall within the functional floodplain. If the developer can ensure no development in 3b however, then part of the site could still be delivered.
- Any proportion of the site is shown to be at additional risk from Flood Zone 3b + climate change.

It is important to state that it may still be possible to deliver a site that has been recommended for withdrawal from allocation upon more detailed investigation through a Level 2 SFRA and subsequent update of the Flood Zone 3b outline through more detailed modelling.

Depending on local circumstances, if it is not possible to adjust the site boundary to remove the developable area from Flood Zone 3b to a lower risk zone then development should not be allocated or permitted.

129 of the 1,089 potential development sites have been recommended for withdrawal.

Any area within Flood Zone 3b must be left as open green space or the site boundary amended to remove the developable area from the risk area. For smaller sites, this approach is unlikely to be achievable compared to larger sites where there may be enough space to limit the impact through effective flood storage or blue green infrastructure. If this is not possible, the site should be withdrawn.



### 1.1.2 Strategic Recommendation B - Level 2 SFRA required. Exception Test may be required.

This strategic recommendation does not consider local circumstances, only that part of a site area falls within a fluvial or surface water flood zone or is modelled to be at risk from climate change.

Strategic Recommendation B applies to any site where the following criteria is true:

- Any part of a site is within Flood Zone 3a
- Any part of a site is within Flood Zone 2
- Any site within the high or medium risk surface water flood zones
- Any site modelled to be at additional risk from climate change

NOTE: the Exception Test only applies to sites at fluvial flood risk, depending on the vulnerability of the site use (see Table 2 of the FRCC-PPG). Less vulnerable (employment) uses of land do not require the Exception Test.

Strategic Recommendation B applies to sites where a Level 2 SFRA is required. According to diagrams 1, 2 and 3 and Table 2 of the FRCC-PPG, any site at high or medium flood risk now and in the future should be assessed in more detail through a Level 2 SFRA.

A number of sites will be subject to application of the Exception Test through the Level 2 SFRA i.e. more vulnerable sites in Flood Zone 3a and highly vulnerable sites in Flood Zone 2. The Sequential Test should have been passed first, using this Level 1 SFRA, before application of the Exception Test. The LPA should always attempt to avoid risk areas where possible.

Strategic Recommendation B applies to 278 of the 1,089 potential development sites assessed.

### 1.1.3 Strategic Recommendation C - site to progress to developer-led FRA

This strategic recommendation does not consider local circumstances, only that part of a site area falls within a fluvial or surface water flood zone.

Strategic Recommendation C applies to any site where the following criteria is true:

- Any site within the low risk surface water flood zone
- Any site 100% within Flood Zone 1 and not shown to be at risk from surface water flooding, but are greater than 1 hectare in area

Strategic Recommendation C applies to 293 of the 1,089 potential development sites assessed. 170 of these are within the low surface water flood risk zone.

#### 1.1.4 Strategic Recommendation D - development could be allocated on flood risk grounds based on the evidence of this Level 1 SFRA. LPA to make decision on allocation

This strategic recommendation does not consider local circumstances, only that part of a site area falls within a fluvial or surface water flood zone.

Strategic Recommendation D applies to any site where the following criteria is true:

- Any site 100% within Flood Zone 1 and not shown to be at risk from surface water flooding and are less than 1 hectare in area
- Any site modelled to not be at additional risk from climate change

Strategic Recommendation D applies to 389 sites. Further investigation (i.e. FRA) may be required by the developer at the planning application stage if any further or new information becomes available since the publication of this Level 1 SFRA.

## 1.2 Assessment of climate change

The site assessment spreadsheet (Appendix C) highlights the additional risk to each site as a result of climate change. To represent the increased flood risk resulting from climate change in fluvially dominated scenarios, peak inflows were uplifted according to EA guidelines. Being located in the Cotswold Management Catchment meant that increases of 30% (central) and 43% (higher central) were applied to represent the allowances, as required by EA guidance<sup>3</sup>.

The site assessment spreadsheet (Appendix C) highlights the additional risk to each site as a result of climate change modelling undertaken for this Level 1 SFRA update. The Risk of Flooding from Fluvial Climate Change columns indicate the area of each site that intersects with each modelled flood outline. The climate change scenarios refer to the additional risk from climate change, with the baseline 1 in 100 year modelled flood outline and present day functional floodplain being erased from each respective scenario.

The climate change scenarios assessed were:

- 1 in 100 year + central climate change allowance
- 1 in 100 year + higher central climate change allowance
- Functional floodplain + higher central climate change allowance

In the absence of up-to-date climate change modelling along some watercourses, Flood Zone 2 has been used as a proxy for the 1 in 100 year plus climate change outline.

## 1.3 Summary of site assessment outcomes

There are several consequential development considerations which could come out of the site assessment sequential testing process. Each outcome is discussed below. The LPA should refer to Section 1.1 and Appendix C for details on the site assessments carried out for this SFRA.

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<sup>3</sup> [Flood risk assessments: climate change allowances | Environment Agency | May 2022](#)

### 1.3.1 Rejection of site

A site which fails to pass the Sequential Test and/or the Exception Test should be rejected and development not permitted. Rejection would also apply to any sites within the functional floodplain (unless water compatible or essential infrastructure informed by a FRA).

However, if the developer can avoid or incorporate the functional floodplain, part of the site could still be delivered.

In terms of surface water flood risk, if risk is considered significant or where the size of the site does not allow for onsite storage or application of appropriate SuDS then such sites could be rejected. The LLFA will be best placed to advise on site-specific surface water flood risk and whether sites can be taken forward or not.

### 1.3.2 Exception Test required

Applies to those sites that, according to diagrams 1, 2 and 3, and Table 2 of the FRCC-PPG, would require the Exception Test. Only less vulnerable land uses would not require the Exception Test in Flood Zone 3a. More vulnerable uses are only permitted if the Exception Test is passed and all development proposals in Flood Zone 3a, or at high or medium risk of surface water flooding, must be accompanied by a Flood Risk Assessment at the planning application stage. A Level 2 SFRA will inform the application of the Exception Test.

### 1.3.3 Consideration of site layout and design

Site layout and site design is important to consider early on in the site planning stage where flood risk exists. The site area would have to be large enough to enable any alteration of the developable area of the site to remove development from a risk area, or to leave space for onsite storage of floodwater. Careful layout and design at the site planning stage may apply to such sites where it is considered viable based on the level of risk. Surface water risk and opportunities for SuDS should also be assessed during the planning stage.

Any development within 8 metres of any flood defence structure or culvert on a Main River is likely to be a regulated flood risk activity under Schedule 25 of the Environment Permitting (England and Wales) Regulations 2016. Any site redesign, where Flood Zone 3a is included within the site footprint, should allow water to flow naturally or be stored in times of flood. Similarly, any change or alteration to an ordinary watercourse within a site would need consent from the LLFA under the Land Drainage Act 1991<sup>4</sup>.

### 1.3.4 Site-specific Flood Risk Assessment

A site-specific Flood Risk Assessment should assess whether a potential development is likely to be affected by current or future flooding, accounting for the impacts of climate change, from any source. This should include referencing this SFRA to establish sources of flooding. Further analysis should be performed to improve the understanding of flood risk including agreement with the LPA and the EA on areas of functional floodplain that may not

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4 [Land Drainage Act | GOV.UK | 1991](#)

have been robustly defined within this SFRA due to the absence of appropriate EA modelling information. The LLFA should be consulted on risk from surface water and from ordinary watercourses.

According to the FRCC-PPG (Para 020), a site-specific FRA is:

*“...carried out by (or on behalf of) a developer to assess the flood risk to and from a development site and should accompany a planning application where prescribed in footnote 55 of the National Planning Policy Framework. The assessment should demonstrate to the decision-maker how flood risk will be managed now and over the development’s lifetime, taking climate change into account, and with regard to the vulnerability of its users (see NPPF Annex 3 – Flood Risk Vulnerability)”.*

Possible mitigation measures for at risk sites include ensuring floor levels are raised a minimum of 600 mm above the critical design event flood level (as advised by the EA). However, compensatory storage must be found where the risk is fluvial. If this cannot be achieved, it is for the applicant to identify alternative mitigation measures.

Stilted development is an option whereby floodwaters can flow more naturally without obstacles though this can prove to be a costly solution. Any site identified to be at residual risk must have suitable site access and egress routes available during times of flood together with a full emergency plan that should accompany the FRA at the application stage. The provisions of suitable flood warning systems should also be investigated.

Detailed mitigation must be agreed through site-specific FRAs or through Level 2 SFRA's where it would be necessary to demonstrate site allocations would be safe for their lifetime.

#### When is a site-specific FRA required?

According to the NPPF footnote 55, a site-specific FRA should be prepared when the application is:

- Situated in Flood Zone 2 and 3; for all proposals for new development (including minor development and change of use);
- 1 hectare or greater in size and located in Flood Zone 1;
- Located in Flood Zone 1 on land which has been identified by the EA as having critical drainage problems (i.e. within an ACDP);
- Land identified in the SFRA as being at increased fluvial flood risk in future;
- At risk of flooding from other sources of flooding, such as those identified in this SFRA; or
- Subject to a change of use to a higher vulnerability classification which may be subject to other sources of flooding.

Optionally, the LPA may also like to consider further options for stipulating FRA requirements, such as:

- At residual risk from flood defence breach, reservoir or canal failure; or
- Situated over a culverted watercourse or where development will require controlling the flow of any watercourse, drain or ditch or the development could potentially change structures known to influence flood flow.

These further options should be considered using the preparation and development of the Local Plan.

Paragraph 021 of the FRCC-PPG contains information regarding the level of detail required in the FRAs and indicates that it should always be proportionate to the degree of flood risk whilst making use of existing information, including this SFRA. Paragraph 080 of the FRCC-PPG contains an easy to follow FRA checklist for developers to follow.

Together with the information in the FRCC-PPG, there is further detail and support provided for the LPAs and developers via:

[Advice for developers](#)

[Advice for LPAs](#)

The Environment Agency have also produced guidance for Flood Risk Assessments for planning applications<sup>5</sup>.

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<sup>5</sup> [Flood risk assessments for planning applications | GOV.UK | February 2017](#)

### 1.3.5 Sites passing the Sequential and Exception Tests

Development sites can be allocated or granted planning permission where the Sequential Test and the Exception Test (if required) are passed and agreement is reached between the LPA/LLFA, the EA, the water companies and any ancillary stakeholders. In addition, a site is likely to be allocated without the need to assess flood risk where the indicative use is for open space. Assuming the site is not to include any development or land raising / regrading works and is to be left open in its original state then the allocation is likely to be acceptable from a flood risk point of view. However, for sites where there is potential for flood storage, options should be explored as part of a FRA.

In terms of opportunities for reducing flood risk overall as a requirement of the Exception Test, the FRCC-PPG states:

*“Developers should refer to the Strategic Flood Risk Assessments and site-specific Flood Risk Assessments to identify opportunities to reduce flood risk overall and to demonstrate that the measures go beyond just managing the flood risk resulting from the development. Reductions could be achieved, for example by:*

- *Incorporating green infrastructure within the layout and form of development to make additional space for the flow and storage of flood water;*
- *Providing Sustainable Drainage Systems, that manage flood risk beyond the proposed site and above the usual standard, such as by removing surface water from existing combined sewers;*
- *Providing or making contributions to flood risk management infrastructure that will provide additional benefits to existing communities and/or by safeguarding the land that would be needed to deliver it.” (Paragraph 37).*

### 1.3.6 Surface water flood risk to assessed sites

For sites at surface water flood risk, the following should be considered:

- More detailed surface water modelling may reveal increased risk or less risk to a site. The LLFA should be consulted when considering development viability at such sites;
- Outline drainage strategy to ascertain natural flow paths and topographic depressions, particularly for the larger sites which may influence sites elsewhere;
- A detailed site-specific FRA incorporating surface water flood risk management;
- Full drainage strategy encompassing detailed surface water modelling of proposed site layouts, attenuation areas, diversion of flow routes;
- Ensuring future maintenance of surface water and SuDS assets through s106 agreements;
- The size of development and the possibility of increased surface water flood risk caused by development on current greenfield land (where applicable) and cumulative impacts of this within specific areas;

- Management and re-use of surface water onsite, assuming the site is large enough to facilitate this and achieve effective mitigation. Effective surface water management should ensure risks on and off site are controlled;
- Larger sites could leave surface water flood-prone areas as open greenspace, incorporating social and environmental benefits;
- SuDS should be used where possible. Appropriate SuDS may offer opportunities to control runoff to greenfield rates or better. Restrictions on surface water runoff from new development should be incorporated into the development planning stage. For brownfield sites, where current infrastructure may be staying in place, then runoff should attempt to mimic that of greenfield rates, unless it can be demonstrated that this is unachievable or hydraulically impractical. Developers should refer to the national 'non-statutory technical standards for sustainable drainage systems' and other guidance documents cited in the main report. Note that sites considered for surface water SuDS should not be in locations of fluvial flood risk unless they are designed to mitigate for both sources of risk;
- Runoff up to and including the 1 in 100 AEP event (1%) should be managed on-site where possible;
- Measures of source control should be required for development sites;
- Developers should be required to set part of their site aside for surface water management, to contribute to flood risk management in the wider area and supplement green infrastructure networks;
- Developers should be required to maximise permeable surfaces;
- Flow routes on new development where the sewerage system surcharges as a consequence of exceedance of the 1 in 30 AEP design event should be retained; and
- It may then be beneficial to carry out a local SWMP or drainage strategy for targeted locations with any known critical drainage problems. Investigation into the capacity of existing sewer systems would be required in order to identify critical parts of the system i.e. pinch points. Drainage model outputs could be obtained from the water company to confirm the critical parts of the drainage network and subsequent recommendations could then be made for future development i.e. strategic SuDS sites, parts of the drainage system where any new connections should be avoided, and parts of the system that may have any additional capacity and recommended runoff rates. A Water Cycle Study would help to inform this.

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