

3 Approach to strategic flood risk assessment

3.1 Overview

The SFRA is a planning tool that can be used to inform the spatial planning process. The SFRA should be used to refine the information relating to the areas within Adur and Worthing which may flood, taking into account all sources of flooding and climate change. This information should form the basis of both Councils' future flood risk management policies. In addition the SFRA will inform the LDF, and provide the information to enable the Sequential and Exception Tests to be applied during the site allocation and development control process. Land can be separated into four distinct Flood Zones, each zone being at risk from a different annual probability of flooding (Table 3.1).

Table 3.1: Annual probabilities of flooding associated with PPS25 Flood Zones (Source: PPS25 Practice Guide Figure 3.3)

Flood Zone	Annual probability of flooding
1	< 1 in 1,000 (<0.1 %) from river or sea flooding
2	Between 1 in 1,000 (0.1%) and 1 in 100 (1%) for river flooding or between 1 in 1,000 (0.1%) and 1 in 200 (0.5%) for flooding from the sea
3a	1 in 100 (>1%) for river flooding and > 1 in 200 (>0.5%) for flooding from the sea
3b	Functional floodplain

Flood Zone 1 indicates areas with a 'low' probability of inundation from tidal or fluvial sources. Flood Zone 1 essentially covers everywhere outside of Flood Zones 2 and 3.

It is important to remember that the 'low' probability classification only refers to tidal and fluvial flood risk. Flood risk from other sources, such as groundwater, surface water and sewer flooding may also be present.

Flood Zone 2 indicates areas with a 'medium' probability of flooding from tidal or fluvial sources.

Flood Zone 3a indicates areas with a 'high' probability of flooding from tidal or fluvial sources. If the fluvial and tidal zones overlap, the one with the greatest extent defines the Flood Zone. Flood Zone 3a is entirely within the boundaries of Flood Zone 2.

Flood Zone 3b indicates the 'functional floodplain', defined as an area of land where water has to flow or be stored in times of flood. This is usually taken to be either the envelope defined by the 5% annual probability of flooding, also referred to as a return period of 20 years or less or an area that is designed to flood in a more extreme event. The PPS25 practice guide also states that:

- *"Areas which would naturally flood with an annual exceedence probability of 1 in 20 (5 per cent) or greater, but which are prevented from doing so by existing infrastructure or solid buildings, will not normally be defined as functional floodplain."*
- *"Developed areas are not generally part of the functional floodplain. Only water compatible and essential infrastructure (the latter requiring the Exception Test to be passed) are considered suitable development types in the functional floodplain."*
- *"However, PPS25 does not differentiate between developed and undeveloped areas. This is because some developed areas may still provide an important flood storage and conveyance function, such as a car park that has been designed to flood periodically to preserve flood storage volumes at a riverside commercial development. Roads and other linear spaces can act as flow routes and the functionality of such areas should be considered when defining Flood Zones 3a and 3b, taking into account strategic flood risk management policies."*
- *"The area defined as functional floodplain should take into account the effects of defences and other flood risk management infrastructure. Some areas, such as flood storage areas, may flood at a lower frequency than other parts of Flood Zone 3b, but*

should still be classified as functional for the part that they play in managing the impacts of large scale floods."

The Environment Agency publicly publishes maps of Flood Zone 2 and Flood Zone 3 on their website (www.environment-agency.gov.uk). ***It should be noted that Flood Zones 2 and 3a do not take into account the presence of flood defences.***

3.2 Sequential approach

In line with PPS25 guidelines, the Environment Agency recommend that site allocations should be made outside of the flood risk areas (i.e. in Flood Zone 1) wherever possible. If there are no reasonably appropriate Flood Zone 1 sites, site allocations should be made in Flood Zone 2 first, considering flood risk vulnerability of land uses. Only where there are no reasonably available sites in Zones 1 or 2 should Flood Zone 3 site allocations be made. In order to demonstrate that there are no lower risk sites available the Sequential Test needs to be carried out.

3.3 Sequential Test

The Sequential Test must be performed when considering the placement of future development and for planning application proposals. Again details of the test are described in PPS 25 and the accompanying Practice Guide. The Practice Guide gives detailed instructions on how to perform the Sequential Test. These instructions should be used with the following information from the SFRA:

- Identify the area to be assessed (including alternatives) on the Flood Zone maps that are provided with this assessment;
- establish the risk of flooding from other sources again using the maps in this SFRA; and
- follow the instructions given in Chapter 4 of the Practice Guide.

The Practice Guide gives specific guidance on the application of the Sequential Test in relation to allocation of land, individual planning applications, windfall sites, renewable energy projects, redevelopment of an existing single property and change of use.

The Sequential Test is used to direct all new development (through the site allocation process) to locations at least risk of flooding, giving highest priority to Flood Zone 1. Before the sites being considered in this SFRA can be allocated for development ADC and WBC must complete the Sequential Test to determine whether these sites are appropriate as strategic allocations given the flood risks associated with them.

The output from the Strategic Housing Land Availability Assessment (SHLAA) will be critical evidence in this process. If these sites do not pass the Sequential Test they should not be allocated and alternative sites should be brought forward. Where the Sequential Test alone cannot deliver acceptable sites, the Exception Test will need to be applied.

The Environment Agency (2009)⁷ recommends that the following approach is used by local planning authorities to apply the Sequential Test to planning applications located in Flood Zones 2 or 3. The same approach should also be used for the LDF site selection process, which is undertaken at the larger District/Borough wide scale. There are three stages to the test, as follows:

- Stage 1 – Strategic application & development vulnerability
- Stage 2 – Defining the evidence base
- Stage 3 – Applying the Sequential Test

⁷ Environment Agency (2009) Demonstrating the flood risk (PPS25) Sequential Test for Planning Applications, PPS25 FRSA (national) version 2.0 Advise issued on 27 January 2009
2011s5199 Adur and Worthing Councils SFRA Update Final Report (v1 Jan 12)

Stage 1 – Strategic application & development vulnerability

The Sequential Test can be considered adequately demonstrated if both of the following criteria are met:

- the Sequential Test has already been carried out for the site (for the same development type) at the strategic level (development plan) in line with paragraphs D5 and D6 of PPS25; and
- the development vulnerability is appropriate to the Flood Zone (see table D1 of PPS25).

1.A Has the Sequential Test already been carried out for this development at the development plan level? If yes, reference should be provided to the site allocation and Development Plan Document (DPD) in question.

1.B Is the flood risk vulnerability classification of the proposal appropriate to the Flood Zone in which the site is located according to Tables D1 and D3 of PPS25? The vulnerability of the development should be clearly stated.

Finish here if the answer is 'Yes' to both questions 1.A. and 1.B.

Only complete Stages 2 and 3 if the answer to either questions 1.A and 1.B is 'No'.

Stage 2 – Defining the evidence base

2.A State the geographical area over which the test is to be applied.

2.B If greater or less than the administrative boundary justify why the geographical area for applying the test has been chosen.

Identify the geographical area of search over which the test is to be applied – this will usually be over the whole of the administrative area but may be reduced where justified by the functional arrangements of the development (e.g. catchment area for a school or doctors surgery) or relevant objectives in the LDF. Equally, in some circumstances it may be appropriate to expand the search area beyond the administrative boundary for uses that have a sub-regional, regional or national market.

2.C Identify the source of reasonable available sites, either:

- Background / evidence base documents (state which), or if not available.
- Other sites known to Adur & Worthing Councils that meet the functional requirements of the application.

Identify the source of 'reasonably available' alternative sites – these sites will usually be drawn from the evidence base / background documents that have been produced to inform the emerging LDF. For example, an important source of information from housing sites and employment land will be provided by the SHLAA and the Employment Land Review (ELR).

Until the SHLAA is complete, or in the absence of background documents, 'reasonably available' sites would include any sites that are known to Adur & Worthing Council and that meet the functional requirements of the application in question, and where necessary, meet the LDF Policy criterion for windfall development (see below)

Windfall sites

"Windfall sites are those which have not been specifically identified as available in the local plan process. They comprise previously-developed sites that have unexpectedly become available." (Source PPS3, footnote 31) Government policy in PPS3 para. 59 advises that LPAs should not normally rely on windfall sites to meet housing needs.

The Environment Agency recommend that the acceptability of windfall applications in flood risk areas should be considered at the strategic level through a policy setting out broad locations and quantities of windfall development that would be acceptable or not in Sequential Test terms. Evidence on this position should be provided as support to the soundness of the Core Strategy. Guidance on determining the housing potential of windfall (where justified) for broad locations can be found in paras 50-52 of Strategic Housing Land Availability Assessments, Practice Guide to PPS3.

In the absence of flood risk windfall policy, it may be possible (where data is sufficiently robust) for the LPA to apply the Sequential Test taking into account historic windfall rates and their distribution across the district relative to Flood Zones. Where historic and future trends evidence or indicate that housing need in the district through windfall can be met largely/entirely by development outside high flood risk areas, this may provide grounds for factoring this into the consideration of 'reasonably available' alternative sites at the planning application stage.

2.D State the method used for comparing the flood risk between sites, whether it is this SFRA or an alternative (e.g. Environment Agency flood map, site specific flood risk assessment) as new information becomes available.

Stage 3 – Applying the Sequential Test

Compare the reasonably available sites identified under stage 2 with the application site. Sites should be compared in relation to flood risk; development plan status; capacity; and constraints to delivery including availability, policy restrictions, physical problems or limitations, potential impacts of the development, and future environmental conditions that would be experienced by the inhabitants of the development.

- 3.A State the name and location of the reasonably available site options being compared to the application site
- 3.B Indicate whether flood risk on the reasonable available options is higher or lower than the application site. State the Flood Zone or SFRA classification for each site.
- 3.C State whether the reasonably available options being considered are allocated in the Development Plan. Confirm the status of the plan.
- 3.D State the approximate capacity of each reasonably available site being considered. This should be based on;
 - o The density policy within a Local Development Document (LDD).
 - o The current Strategic Housing Land Availability Assessment for the District/Borough.
 - o Past performance.
- 3.E Detail any constraints to the delivery of identified reasonably available options; for example, availability within a given time period or lack of appropriate infrastructure i.e. flood defences which protect the site through its design lifetime. This part of the test should include recommendations on how these constraints should be overcome and when.

Sequential Test conclusion

Are there any reasonably available sites in areas with a lower probability of flooding, which would be appropriate to the type of development or land use proposed?

Next step

Exception Test – Where necessary, the Exception Test should now be applied in the circumstances set out by table D.1 and D.3 of PPS25.

Applying the sequential approach at the site level – In addition to the formal Sequential Test, PPS25 sets out the requirements for developers to apply the sequential approach (see para. 14 and D8) to locating development within the site. The following questions should be considered:

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

3.4 Exception Test

Where departures from the Sequential Test are justified by the need to locate development in higher risk zones than is appropriate, in order to meet the wider aims of sustainable development, it is necessary to apply the Exception Test. PPS25 acknowledges that flood risk is one of many issues (including transport, housing, economic growth, natural resources, regeneration and the management of other hazards) which need to be considered in spatial planning.

PPS25 explains where and for what type of development the Exception Test needs to be applied. In some situations, for certain types of development, it is not appropriate to use the Exception Test to justify development, for example, development which is highly vulnerable to flooding cannot be justified within the high risk zone through the use of the Exception Test. The situations where it is necessary and appropriate to apply the Exception Test are outlined below.

Where the Exception Test is required, it should be applied as soon as possible to all site allocations for development and all planning applications other than for minor development⁸. All three elements of the Exception Test have to be passed before development is allocated or permitted. For the Exception Test to be passed:

- a. *It must be demonstrated that the development provides wider sustainability benefits to the local community that outweigh flood risk, informed by an SFRA, where one has been prepared.*
- b. *The development should be on developable previously developed land or, if it is not on previously developed land, that there are no reasonable alternative sites on developable, previously developed land.*
- c. *A Flood Risk Assessment must demonstrate that the development will be safe, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.*

⁸ Definition of minor development:

-Minor non-residential extensions: Industrial/Commercial/Leisure etc. extensions with a footprint less than 250m²

-Alterations: development that does not increase the size of buildings e.g. alterations to external appearance.

-‘Householder’ development: e.g. sheds, garages, games rooms etc. within the curtilage of the existing dwelling in addition to physical extensions to the existing dwelling itself. This definition EXCLUDES any proposed development that would create a separate dwelling within the curtilage of the existing dwelling e.g. subdivision of houses into flats.

Compliance “with each part of the Exception Test should be demonstrated in an open and transparent way”.

Table 3.3 summarises the applicability of the Exception Test for different development sites; housing allocations are classified as ‘more vulnerable’ and employment allocations are ‘less vulnerable’.

The advice and guidance given in PPS 25 should be used in conjunction with the mapping issued in this version of the SFRA. The Practice Guide gives specific guidance on:

- The identification of wider sustainability benefits.
- How to determine what is safe.
- Access and egress requirements.

When considering development in areas that are protected by flood defences consideration should also be given to the residual risk that is either a result of the failure or overtopping of defences. Where necessary detailed FRAs should determine the level of hazard (Hazard mapping) that would affect people, property and infrastructure if the existing flood defences failed (due to breaching) or if an event exceeded their original design standard. The methods used to generate the hazard mapping are as described in the PPS 25 Practice Guide. This information can also be used by those preparing for flood emergencies or requiring tactical information during a flood event.

3.4.1 Flood Risk Vulnerability Classification

In PPS25 different types of development are divided into five flood risk vulnerability classifications:

- Essential infrastructure.
- Highly vulnerable.
- More vulnerable.
- Less vulnerable.
- Water compatible development.

Subject to the application of the Sequential Test, PPS25 specifies which of these types of development are suitable within each zone:

Flood Zone 1: All the uses of land listed above are appropriate in this Zone.

Flood Zone 2: The water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure are appropriate in this Zone. The highly vulnerable uses are only appropriate in this Zone if the Exception Test is passed.

Flood Zone 3a: The water-compatible and less vulnerable uses of land are appropriate in this Zone. The highly vulnerable uses should not be permitted in this Zone. The more vulnerable and essential infrastructure uses should only be permitted in this Zone if the Exception Test is passed.

Flood Zone 3b: Only the water-compatible uses and the essential infrastructure that has to be there should be permitted in this Zone. Essential infrastructure in this Zone should pass the Exception Test and be designed and constructed to meet a number of flood risk related targets. The less vulnerable, more vulnerable and highly vulnerable uses should not be permitted in this Zone.

Table 3.2: Flood Risk Vulnerability Classification (Source: PPS25 Table D2)

Vulnerability	Type of use
Essential Infrastructure	<ul style="list-style-type: none"> Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. Wind turbines.
Highly Vulnerable	<ul style="list-style-type: none"> Police stations, ambulance stations, fire stations, command centres and telecommunications installations are required to be operational during flooding. Emergency dispersal points. Basement dwellings. Caravans, mobile homes and park homes intended for permanent residential use. Installations requiring hazardous substances consent 19 (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure').
More Vulnerable	<ul style="list-style-type: none"> Hospitals. Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels. Non-residential uses for health services, nurseries and educational establishments. Landfill and sites used for waste management facilities for hazardous waste. Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	<ul style="list-style-type: none"> Police, ambulance and fire stations which are not required to be operational during flooding. Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution; non-residential institutions not included in 'more vulnerable'; and assembly and leisure. Land and buildings used for agriculture and forestry. Waste treatment (except landfill and hazardous waste facilities). Minerals working and processing (except for sand and gravel working). Water treatment works which do not need to remain operational during times of flood. Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).
Water-compatible Development	<ul style="list-style-type: none"> Flood control infrastructure, water transmission infrastructure and pumping stations. Sewage transmission infrastructure and pumping stations. Sand and gravel workings. Docks, marinas and wharves, navigation facilities.