# Methodology in support of Performing the Sequential Test

**July 2024**

**Prepared for: Catherine Hutchins**
**Adur District and Worthing Borough Council**

www.jbaconsulting.com

# Document Status

| | |
|---|---|
| Issue date | July 2024 |
| Issued to | Catherine Hutchins |
| BIM reference | KNO-JBAU-XX-XX-RP-Z-0007-S3-P05-Sequential_Test_Methodology |
| Revision | S3-P05 |
| Prepared by | Harriet Freestone BSc (Hons) MCIWEM<br>Senior Analyst |
| Reviewed by | Ed Hartwell BSc MSc MCIWEM C.WEM<br>Project Director |
| Authorised by | Ed Hartwell BSc MSc MCIWEM C.WEM<br>Project Director |

# Carbon Footprint

The format of this report is optimised for reading digitally in pdf format. Paper consumption produces substantial carbon emissions and other environmental impacts through the extraction, production and transportation of paper. Printing also generates emissions and impacts from the manufacture of printers and inks and from the energy used to power a printer. Please consider the environment before printing.

# Contract

| | |
|---|---|
| JBA Project Manager | Harriet Freestone BSc (Hons) |
| Address | 35 Perrymount Road, Haywards Heath, RH16 3XE |
| JBA Project Code | 2023s0597 |

This document describes work commissioned by Adur District and Worthing Borough Council, by an instruction dated 28th April 2023. The Client's representative for the contract was Catherine Hutchins of Adur District and Worthing Borough Council. Harriet Freestone of JBA Consulting carried out this work.

## Purpose and Disclaimer

Jeremy Benn Associates Limited ("JBA") has prepared this Document for the sole use of Adur District and Worthing Borough Council and is prepared in accordance with the conditions and obligations as pertain to the Strategic Flood Risk Assessment Report.

JBA has no liability for any use that is made of this Document except to Adur District and Worthing Borough Council for the purposes for which it was originally commissioned and prepared.

No other warranty, expressed or implied, is made as to the professional advice included in this Document or any other services provided by JBA. This Document cannot be relied upon by any other party without the prior and express written agreement of JBA.

# Contents

# 1 Introduction

## 1.1 Background

JBA Consulting have been commissioned by Adur District Council and Worthing Borough Council to prepare a Level 1 SFRA. As part of the reporting, it was agreed that a sequential test methodology would be outlined for reference and shared with West Sussex County Council. West Sussex County Council are the Lead Local Flood Authority.

The need to address this matter arises from changes to the National Planning Policy Framework (NPPF) in December 2023 and the Planning Practice Guidance (PPG) in August 2022.

The changes to the PPG in August state that all sources of flood risk should be considered now and in the future as part of the Sequential Test. This document addresses the use of flood risk information in the performance of the Sequential Test but does not include the consideration of wider planning issues that also need to be considered as part of the planning process.

It is recommended that this document is read in conjunction with the site screening spreadsheet that provides a percentage coverage of a site by risk from various source. This can be used as a follow on to the sequential test where is it is not possible to identify alternative sites within a lower risk area.

## 1.2 Summary of changes

Paragraph 162 of the NPPF has been changed such that the recommended approach to 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 basis for applying this test. The sequential approach (as described in Para 161) should be used in areas known to be at risk now or in the future from any form of flooding."*

Prior to the changes to the NPPF the recommendation was set out as follows and only included consideration of river and sea flood risk when applying the Sequential Test:

| Previous Policy Wording | New Policy Wording (December 2023) |
|---|---|
| The aim of the Sequential Test is to steer new development to areas with the lowest risk of flooding (the Planning Practice Guidance advised that the exercise should be performed using the flood zones, as describe river and sea flood risk) | The aim of the Sequential Test is to steer new development to areas with the lowest risk of **flooding from any source** |

The August 2022 PPG application of the Sequential Test diagram (Figure 1-1) shows that flood risk should preferably be considered in terms of low, medium and high-risk areas, both now and in the future.

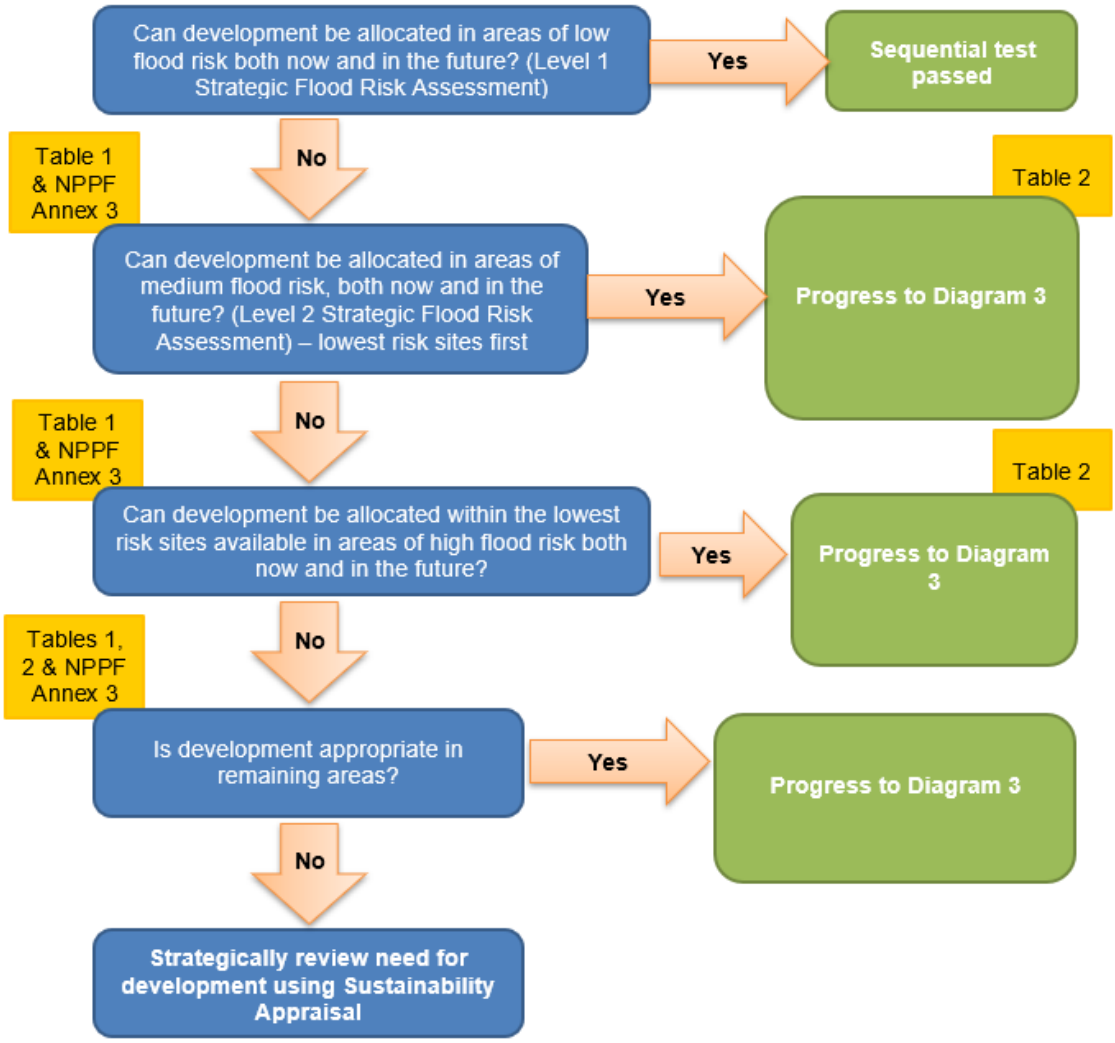



Figure 1-1: Diagram 2 in PPG

In addition, the August 2022 version of the PPG now also notes that where Neighbourhood Plans are considering proposing development they should address how this would be

consistent with the local planning authority's application of the Sequential Test and if necessary, the Exception Test for the plan. If not, these tests will need to be re-visited on a local authority-wide basis.

## 1.3 Considerations for implementation

Formal confirmation is sought from the LLFA that the proposed approach outlined in this document to address surface water and groundwater flood risk and the Sequential Test will be supported at examination.

It is important that the LLFA and EA support the approach so it can be evidenced in the plan documents submitted for Examination.

A Level 2 SFRA, if required, will include more detailed consideration of surface water drainage and groundwater than has previously been the case.

## 1.4 Exception Test

The Exception Test needs to be undertaken if the Sequential Test indicates that it is not possible for development to be located in areas of low risk now and in the future. The Exception Test is a two-part process that requires preparation of evidence to demonstrate that development proposals at risk of flooding deliver wider sustainability benefits and that it is evidenced it can be made safe for the intended lifespan (thus it is a requirement to demonstrate that proposed development will be safe under climate change conditions).

The exception test is required if development is:

- Highly vulnerable and in an area of medium flood risk
- Essential infrastructure in areas of high flood risk or functional flood plain
- More vulnerable in flood areas of high flood risk

The exception test in the SFRA provides additional evidence in relation to flood risk to demonstrate that the principle of development can be supported at a proposed site.

Adur District Council and Worthing Borough Council require that developments in areas at risk of surface water, groundwater or reservoir flooding will be expected to follow the same requirements as those laid out in Parts (a) and (b) of the NPPF's Exception Test.

# 2 Summary of implications of NPPF Policy changes

The Sequential Test, based on the sequential approach was originally conceived to direct proposed new development to locations that did not rely on Flood Risk Management features to make them safe, as this is inherently more sustainable and avoids placing a burden on future generations to address flood risk issues that will potentially be exacerbated by climate change effects. The test was previously performed using a set of "Zone" maps that showed the extent of river and sea flooding for circumstances where no defences were present for events with high, medium and low probability. This provided a logical conceptual basis for the placement of proposed new development that would not require investment in flood risk management (and so not place a burden on future generations).

The test process recognised that in some circumstances it would not be possible to locate development in locations outside of medium and high risk Flood Zones, as there are no reasonable alternatives. In circumstances where the Sequential Test has been performed and it is not possible for development to be located in areas with a lower risk of flooding the policy requires that the Exception Test may also be required.

The updated NPPF (December 2023) recommends that application of the Sequential Test to any source of flooding. The general implications of this are summarised as follows:

- The Sequential Test should preferably be based on mapping that enables decision making according to a prioritisation based on a risk-based sequence (for river and sea flooding national mapping is available that describes low, medium and high risk flood zones but comparable mapping of this specific type and quality is not available for other sources. For river and sea flooding the risk zones are based on the assumption that no flood risk management features are present).
- The other sources of flood risk that can be included in the Sequential Test are surface water, ground water, sewer flooding and reservoir flooding (or other water impounding features such as canals).
- It follows that proposed new development placed in locations at high or medium risk from flooding from other sources now and in the future should be accompanied by evidence that the Exception Test can be satisfied (in a Level 2 SFRA).

A basic requirement for the Sequential Test to be performed is that appropriate, competent mapping is available to enable logical comparison of the flood risk from different sources at alternative locations, both now and in the future, as this is a fundamental to establishing a logical "risk sequence". The following summary of the available data and mapping describes the implications of including different source of flooding both now and in the future in the Sequential Test, highlights matters to be considered and identifies a proposed approach.

## 2.1 River and sea risk - now and in the future

### 2.1.1 Implications

| Source of Flooding | Available Mapping | Implications of making use of mapping in the Sequential Test |
|---|---|---|
| Rivers and sea | Flood Map for Planning and detailed models | • The Sequential Test can be carried out using the Flood Map for Planning for present day low (Flood Zone 1), medium (Flood Zone 2) and high risk (Flood Zone 3) as previously was the case.<br>• Where detailed models are available, Future Flood Zones 2 (0.1% AEP event), 3a (1% AEP fluvial event or 0.5% AEP tidal event) and 3b (now the 3.3% AEP) will be assessed with climate change allowances. It should be noted that there may be instability issues running the 0.1% AEP event with climate change allowances.<br>• The fluvial models may experience instabilities during 0.1% AEP plus climate change runs which may mean that results cannot be prepared.<br>• Generalised modelling (JFlow) is used to delineate Flood Zones where there is no detailed mapping.<br>• Where there is no detailed modelling Flood Zone 2 is used as a proxy for future Flood Zone 3a. Flood Zone 3a is used as a proxy for Flood Zone 3b. |

### 2.1.2 Recommendations for using river and sea flood risk in the Sequential Test

- For present and future river flood risk, the EA's Flood Zones 1, 2 and 3 should be used. Where detailed models are available, the following climate change runs should be assessed as part of the sequential test:
  - Future fluvial Flood Zone 3b – defended 3.3% AEP plus climate change allowances.
  - Future fluvial Flood Zone 3a - undefended 1% AEP plus climate change allowances.
  - Future fluvial Flood Zone 2 - undefended 0.1% AEP plus climate change allowances.
- For present and future sea flood risk EA's Flood Zones 1, 2 and 3 should be used. The following climate change runs should be assessed as part of the sequential test:
  - Future fluvial Flood Zone 3b – defended 3.3% plus climate change allowances.
  - Future fluvial Flood Zone 3a - undefended 0.5% AEP plus climate change allowances.
  - Future fluvial Flood Zone 2 - undefended 0.1% AEP plus climate change allowances.
- Where generalised modelling (JFlow) has been used to delineate Flood Zones, Flood Zone 2 is used as a proxy for future Flood Zone 3a. Flood Zone 3a is used as a proxy for Flood Zone 3b.
- The Environment Agency have been consulted and confirmed that they recommend that future Flood Zones 2, 3a and 3b are assessed as part of the Sequential Test.

## 2.2 Surface water flood risk now and in the future

### 2.2.1 Implications

| Source of Flooding | Available Mapping | Implications of making use of mapping in the Sequential Test |
|---|---|---|
| Surface Water | Risk of Flooding from Surface Water (RoFSW) | • Mapping based on a generalised modelling methodology.<br>• Generally suitable for showing surface water flow routes at different probability flood events (1 in 30, 1 in 100 and 1 in 1000), although the uncertainty associated with the predicted outlines for the respective probabilities is high. Data is also available for the 3.3% and 1% AEP plus climate change allowances.<br>• It can be difficult to differentiate between flow routes and ponding using the flood extent mapping.<br>• Doesn't always include allowance for drainage features such as culverts and can over or underestimate flooding where there are linear features such as embankments.<br>• Unlike the Zone maps for river and sea flooding the surface water mapping makes an allowance for the assumed performance of a local drainage system.<br>• Normal profile of extent and shape of surface water flooding is a "dendritic" pattern that follows low lying topography and is not an extensive blanket, as is most often the case for river and sea flooding.<br>• The flood risk is normally more likely to be relatively short lived and much more localised than would be the case for river and sea flooding (most likely being caused by local high intensity short duration rainfall events). However, surface water flooding also often occurs more quickly and as a result is harder to prepare for. |

### 2.2.2 Recommendations for using zone maps for surface water flooding

Use the 1 in 100 and 1 in 1000 surface water flood extent mapping to define a simple zoning scheme that identifies a high risk, medium risk and low risk zone.

The use these surface water events should be done with caution due to the highlighted uncertainties in the surface water modelling and mapping. For example, the modelling does not include the representation of tide locking. And linear features such as embankments can lead to over estimation of the flood risk.

If two sites are considered to be at high risk of surface water flooding and no other viable options are available, then a site with 1 in 100yr surface water flood risk would be sequentially preferential to sites with a 1 in 30 year risk.

Surface Water mapping does not strictly describe the same conceptual risk zone as is defined for river and sea flooding (even though it is notionally associated with the same probability) as the mapping is based on different assumptions. However, it does create a product that can accommodate an appropriate level of sequential testing, as it can facilitate strategic decisions that directed development to land in a “low risk surface water flood zone” and identifies locations where it is appropriate to consider the application of the Exception Test. If two surface water sites are considered to have the same risk category the spatial variation of the flood extent, depth and velocity should be considered.

In circumstances where it is not possible to place all proposed development in the “low risk surface water flood zone” or circumstances arose where encroachment on land affected by surface water flood risk could not be avoided then, providing the sequential test can be passed, it would be necessary to provide supplementary evidence that the Exception Test could be satisfied. For the purpose of the Plan this supplementary exercise (where required) will be set out in a Level 2 SFRA. The proposed approach is relatively simple, enables an appropriate level of sequential selection to be made.  For these reasons it is recommended.

## 2.3 Groundwater flood risk

### 2.3.1 Implications

| Source of Flooding | Available Mapping | Implications of making use of mapping in the Sequential Test |
|---|---|---|
| Groundwater | BGS Groundwater flood susceptibility maps<br><br>Also: JBA groundwater Flood Map<br><br>WSCC historic flood events | • BGS mapping does not show the likelihood or risk of groundwater flooding occurring, i.e. it is a hazard and consequence based product and does not enable application of risk based approach.<br>• JBA groundwater map does potentially enable a risk-based approach to be taken as it depicts different levels of risk. The analyses performed to prepare the mapping are all for a 1 in 100-year event and so provide a risk of groundwater emergence to the surface as they are based on predicted difference between groundwater level and the ground surface. Five zones are defined to describe the risk of groundwater being: at or very near ground surface; between 0.025m and 0.5m below the ground surface; between 0.5m and 5m below the ground surface; at least 5m below the ground surface; and negligible risk of groundwater flooding. However, the mapping does not depict the risk of flooding of the land from groundwater and it should be noted that the location of highest risk of emergence might not be coincident with the location at highest risk of flooding.<br>• The underlying challenge with these datasets is that the data is very uncertain and could not be used with confidence unless supported by more detailed local studies. The mapping provides an indication of where risk of elevated groundwater levels might be higher, but it would not be easy to defend.<br>• The mapping and methods generally do not make provision for the effect of changing seal levels in low lowing areas. |

### 2.3.2 Recommendations for using zone maps for groundwater flooding

The JBA groundwater flood map and WSCC's historical known events dataset potentially do not provide the confidence or certainty required to undertake the Sequential Test. The available mapping does not provide competent evidence on the relative risk of flooding across the study area (particularly at the coast) and thus could potentially result in inappropriate allocations if used without understanding the limitations of the data.

JBA Groundwater mapping should therefore be used in conjunction with other relevant sources of relevant information (such as historical records and the Lancing SWMP) to provide an indication of groundwater flooding. Within a Level 2 SFRA or site specific Flood Risk Assessment more detailed assessment should be performed of the proposed development sites where the potential for groundwater flooding is medium or high. The potential impacts of climate change should also be considered. The assessment method should draw on the previous SFRA analyses performed for tidal drainage and groundwater risk zones to help understand how rises in tidal levels may impact groundwater risk. Areas which are within permeable geological units connected to the coast should be considered to understand risk of tidally influenced groundwater flooding. This will address the potential effects of climate change on groundwater flood risk to the extent permissible by the available data.

Proposed development sites where groundwater flooding is possible will require an accompanying Flood Risk Assessment and the Exception Test may need to be applied.

## 2.4 Sewer flood risk

### 2.4.1 Implications

| Source of Flooding | Available Mapping | Implications of making use of mapping in the Sequential Test |
|---|---|---|
| Sewer flooding risk | Water Company DG5 records<br><br>Adur and Ouse DWMP and Arun and Western Stream DWMP | • Only available at postcode level and thus mapping does not define spatial extent or location of sewer flooding.<br>• Mapping does not enable execution of risk based sequence. |

### 2.4.2 Recommendations for using zone maps for sewer flooding

It is recommended that the sewer flood risk is not considered in the Sequential Test alongside river, sea and surface water flooding on the basis that the available information is not of appropriate resolution or format. This will be clearly stated in the Level 1 SFRA and where possible the DG5 and DWMP information should be used to inform the scope of site specific Flood Risk Assessments.

Water companies were required to publish Drainage Water Management Plans for river basin catchments across England as part of the Environment Act. The plans describe the basis for long term investment proposals by Water Companies that span for more than 25 years and set out the commitment needed to make wastewater systems safe and secure. The plans contain substantive volumes of mapping, information and data that has not previously been made available by water companies. As part of the DWMPs a risk based catchment screening (RBCS) has been completed, where existing, readily available data is used to identify where there is a current and/or potential risk or vulnerability in the sewer catchment to future changes, such as new residential development or changes in climate. This feeds into a baseline risk and vulnerability assessment (BRAVA) enabling comparison across locations based on different levels of risk. The data resolution used as part of the DWMPs 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 should be evaluated in a Level 2 SFRA or site-specific Flood Risk Assessment and as appropriate inform the Sequential Test process.

## 2.5 Reservoir flood risk

### 2.5.1 Implications

| Source of Flooding | Available Mapping | Implications of making use of mapping in the Sequential Test |
|---|---|---|
| Reservoir flooding risk | Reservoir Flood Mapping (RFM)<br><br>Somerset Lake Mapping | • The latest available 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.<br>• Neither set of mapping describes a risk-based scenario as they do not indicate the relative risk of land to the probability of dam failure but are intended to describe a “worst credible case”. Accordingly, care must be taken in using the information in a comparative assessment alongside other sources of flood risk.<br>• More detailed information on flood velocities and depths has been prepared as part of the reservoir flood mapping study, but this is not publicly available and can only be viewed by those with appropriate security classifications (this is available for Somerset Lake model). The flood extents are publicly available.<br>• A dataset exists, for the reservoir flood mapping, which shows where the impact of reservoir flooding no longer affects the fluvial flood extent. This is known as a Wet Day Termination Extent. This dataset can be used to provide two zones:<br>  ○ Where reservoir flooding is predicted to make fluvial flooding worse.<br>  ○ Where reservoir flooding is not predicted to make fluvial flooding worse.<br>• The mapping could be used to direct proposed new development away from locations that could potentially be affected by reservoir flood risk. However, it would not be |

| Source of Flooding | Available Mapping | Implications of making use of mapping in the Sequential Test |
|---|---|---|
| | | conceptually similar to the risks pertaining to river and sea flooding and further assessment would be required to understand the magnitude of the potential hazard.<br>• A consideration with respect to the reservoir maps is that placing new development in locations potentially affected by reservoir inundation could potentially change the "risk category" of the reservoir and this could result in the reservoir owner "undertaker" having to invest in substantive remedial works to demonstrate that the reservoir had the appropriate level of safety. This is not strictly related to the Sequential Test with respect to high or low risk of flooding but should be a consideration that should be appropriately managed when planning new development. |

### 2.5.2 Recommendations for using zone maps for reservoir flooding

It is recommended that the available reservoir flooding makes it inappropriate to be used alongside risk mapping from other sources when performing the Sequential Test and a more detailed assessment included in a Level 2 SFRA or site-specific Flood Risk Assessment. However, it will be made clear in the SFRA that the available information is not conceptually similar to the risks pertaining to river and sea flooding as it shows the worst credible case and not the risk of flooding and so does not support a logical spatial comparison of risk that can be substantiated by appropriate evidence.

The RFM Wet Day Termination Extent will be used to define two zones:

1. Where reservoir flooding is predicted to make fluvial flooding worse.
2. Where reservoir flooding is not predicted to make fluvial flooding worse.

The more detailed assessment in a Level 2 SFRA should also identify locations where proposed development could result in a change to the risk designation of a reservoir. If proposed sites are located in a zone at reservoir risk it will be necessary understand the extent to which the flooding could be made worse and to report on the implications with respect to allocating the land for development. On that basis such an approach is recommended. If proposed development is located in a high hazard zone in the vicinity of an existing dam structure the implications should be considered in a Level 2 SFRA or site-specific Flood Risk Assessment and where appropriate an assessment made of whether alternative sites should be considered in accordance with the Sequential Test.

# 3 Sequential approach at a site level

In cases where the proportion of the site at flood risk is small (for example 20%), a sequential approach at the site level would be appropriate (once the Sequential Test has been applied) and enable development to be placed in locations at low risk of flooding (by avoiding high risk areas that might exist at a particular site). This involves incorporating the less vulnerable aspects of the development (according to the flood risk vulnerability classification in Annex 3 of the NPPF) in the areas at risk of flooding. The more vulnerable aspects can be incorporated within areas at lower risk.

For sites where only a small proportion of the site is identified as being at high or medium risk of flooding it is possible for the Sequential Test to be satisfied if all proposed development can be placed in areas of low flood risk. This can be sequentially preferable to site locations where high or medium flood risk areas cannot be avoided. It should be noted that in most circumstances the flooding from different sources is likely to affect the same “low lying” location within a proposed site, and therefore site selection should usually not be based on the number of different sources of flooding that could affect a site. Also, it is not strictly appropriate to seek to suggest that flood risks from different sources can be simply combined to derive a combined risk or ranking, as the logic and likelihood of such conclusions cannot easily be evidenced by the supporting data.

# 4 Conclusions

This technical note has been prepared to formalise the flood risk arrangements used by Adur District and Worthing Borough Councils in performing the Sequential Test. Updates to the August 2022 PPG recommends that the Sequential Test now assesses all sources of flooding for low to high risk areas both now and in the future.

A review of readily available information has been undertaken to assess suitable data sources which could be considered for other sources of flood risk not previously included in the Sequential Test. A summary of the datasets to be used in the Sequential Test can be found in Appendix A, risk mapping for Fluvial/Tidal and Surface Water is provided in Appendix B and C, respectively.

For river and sea flood risk it is recommended that Flood Zone 2, 3 and 3b are assessed both for the present day and future. For Surface Water, it is recommended that the Environment Agency's 1 in 30-year, 1 in 100-year and 1 in 1000-year Risk of Flooding from Surface Water flood extent mapping is used to define high, medium and low risk area. 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". For sites that are categorised at the same surface water flood risk, 1 in 100 year surface water risk would be sequentially preferable to 1 in 30 year surface water risk. The spatial variability of surface water flood risk should also be taken into account with the proportion, depth and velocity of surface water flood risk on a site being considered. For reservoir flood risk, potential high-risk zones will be assessed and identified and if allocated sites are located in such zones then the implications will be addressed in a Level 2 SFRA. The readily available datasets for groundwater and sewer flood risk do not competently define areas of high or low risk of flooding and so more detailed assessment should be performed in a Level 2 SFRA or site-specific Flood Risk Assessment to inform the Sequential Test.

If the LPA considers that the Sequential Test is performed and it is not possible for development to be located in areas with a lower risk of flooding then consideration must be given to the Exception Test and more detailed assessment included in a Level 2 SFRA or site specific flood risk assessments.
Adur District Council and Worthing Borough Council require that developments in areas at risk of surface water, groundwater or reservoir flooding will be expected to follow the same requirements as those laid out in Parts (a) and (b) of the NPPF's Exception Test.

# A Summary of the datasets to be used in the Sequential Test

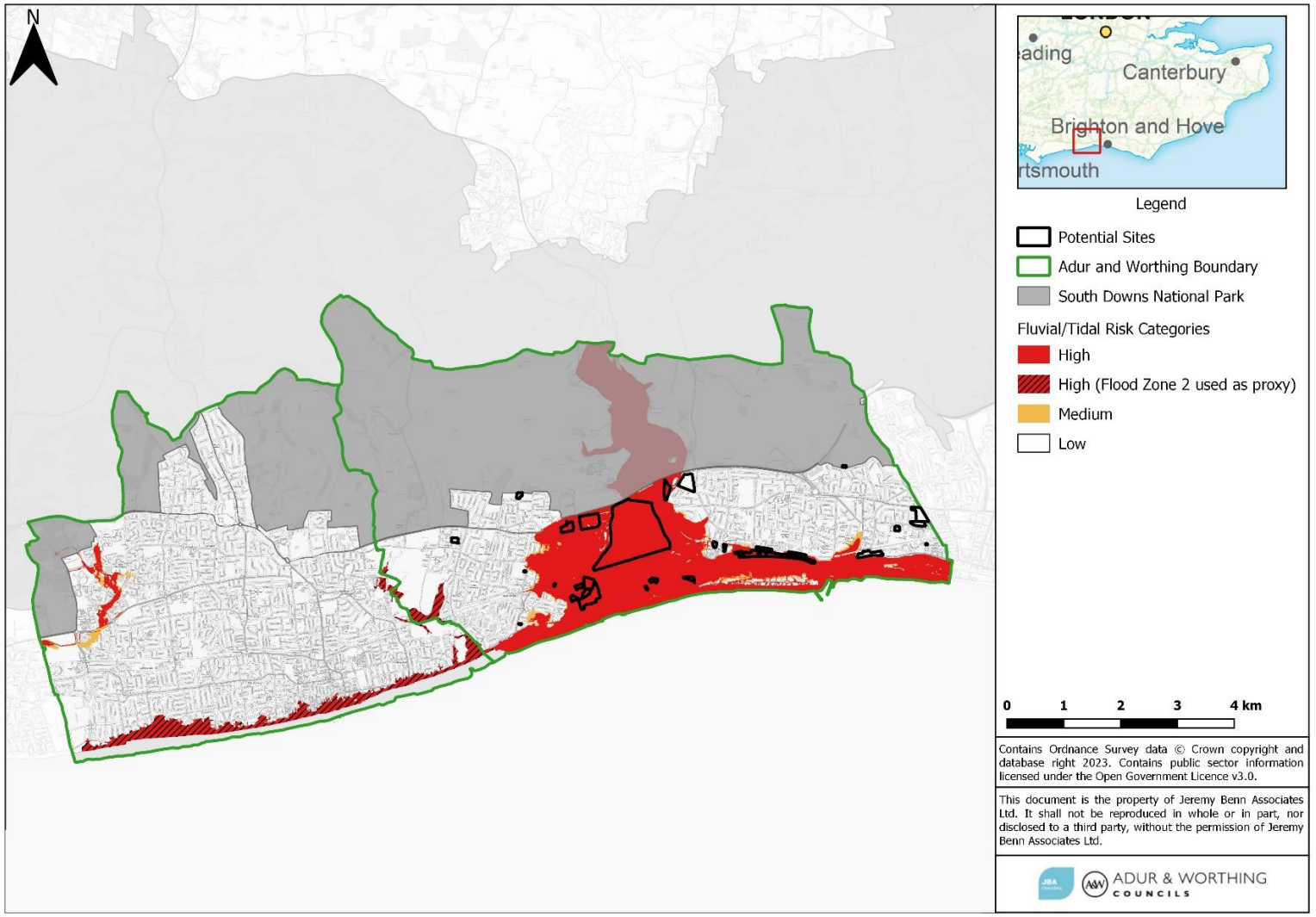
| Source of Flooding | High risk | Medium risk | Low risk | Justification of approach Risk now | Justification of approach Future risk |
|---|---|---|---|---|---|
| Fluvial | Greater than 1 in 100 year (FZ3) | Between 1 in 100 and 1 in 1,000 year (FZ2) | Less than 1 in 100 year | Environment Agency's Flood Zones 1, 2 and 3 use a risk-based approach.<br>Flood zone 3b may be suitable for essential infrastructure and water compatible sites. | Use Flood Zones 1, 2 and 3a and 3b with climate change allowances where available. Use FZ2 as proxy for FZ3a and FZ3a as proxy for FZ3b where not available. |
| Coastal | Greater than 1 in 200 year (FZ3) | Between 1 in 200 and 1 in 1,000 year (FZ2) | Less than 1 in 1,000 year | Environment Agency's Flood Zones 1, 2 and 3 use a risk-based approach | Use Flood Zones 1, 2 and 3a and 3b with climate change allowances. Use FZ2 as proxy for FZ3a and FZ3a as proxy for FZ3b where not available. |
| Surface Water | Greater than 1 in 100 year | Between 1 in 100 and 1 in 1,000 year | Less than 1 in 1,000 year | Environment Agency's Risk of Flooding from Surface Water mapping, 3.3%, 1% and 0.1% AEPs.<br>Different assumptions are used to derive surface water risk than is the case for fluvial and tidal flood zones.<br>If two sites are categorised as at high risk of surface water flooding then a site at 1 in 100 year surface water risk would be sequentially preferable to a site at 1 in 30 year risk.<br>Spatial variation of flood extents, depths and velocities may also need to be considered to identify sequentially preferable sites.<br>Care should be taken using the RoFSW dataset as in some areas it potentially does not provide the confidence or certainty required (for example where there is a risk of | Environment Agency's Risk of Flooding from Surface Water mapping, 3.3% and 1% AEPs plus climate change allowances. |

| Source of Flooding | High risk | Medium risk | Low risk | Justification of approach Risk now | Justification of approach Future risk |
|---|---|---|---|---|---|
| | | | | tide locking or linear features impacting on flood extents) | |
| Groundwater | All sites assumed to be potentially susceptible to groundwater flooding | | | Datasets potentially do not have the confidence or certainty required to provide mapping that enables a comparative assessment to be made of the risk of flooding of land from groundwater. Therefore, a precautionary approach should be taken and all potential allocation sites should be assessed for groundwater flood risk in a Level 2 SFRA or site-specific Flood Risk Assessment and the implications for sequential selection of alternative locations considered at this stage. | (Not available) |
| Sewer | All sites assumed to be potentially susceptible to groundwater flooding | | | Datasets potentially do not have the confidence or certainty required to provide mapping that enables a comparative assessment to be made of the risk of flooding of land from sewers. Therefore, a precautionary approach should be taken and all potential allocation sites should be assessed for sewer flood risk in a Level 2 SFRA or site-specific Flood Risk Assessment where data is available and the implications for sequential selection of alternative locations considered at this stage. | (Not available) |

| Source of Flooding | High risk | Medium risk | Low risk | Justification of approach Risk now | Justification of approach Future risk |
|---|---|---|---|---|---|
| Reservoir | Sites where reservoir flooding is predicted to make fluvial flooding worse for development in high hazard zone to be assessed in Level 2 SFRA. | | | Datasets potentially do not have the confidence or certainty required to provide mapping that enables a comparative assessment to be made of the risk of flooding of land from reservoirs. In addition, the reservoir flood map identifies the consequence of a reservoir breach rather than risk (as no probability of failure is known), so applying high, medium and low 'risk' is not possible using this dataset. Therefore, a precautionary approach should be taken and sites where reservoir flooding is predicted to make fluvial flooding worse for development or where development is proposed in a high hazard zone should be assessed in a Level 2 SFRA or site-specific Flood Risk Assessment and the implications for sequential selection of alternative locations considered at that stage. | (Not available) |

# B Fluvial/Tidal Risk

The fluvial and tidal datasets used include climate change allowances to derive the high, medium and low risk categories.



# C Surface Water Risk

The surface water datasets used include climate change allowances to derive the high, medium and low risk categories.