Rother District Council Level 1 SFRA – Methodology in support of Performing the Sequential Test

September 2024

www.jbaconsulting.com

JBA Project Manager

Ed Hartwell BSC MSc MCIWEM C.WEM - Suite C, First Floor, George Parker Bidder Building, 4 Babbage Way, Exeter EX5 2FN

Client

Holly Harrison
Rother District Council

Purpose

This document has been prepared as a Final Report to outline an appropriate approach to the SFRA Sequential Test for Rother District Council. JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.

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

Copyright

Carbon Footprint

A printed copy of the main text in this document will result in a carbon footprint of 74g if 100% post-consumer recycled paper is used and 94g if primary-source paper is used. These figures assume the report is printed in black and white on A4 paper and in duplex.

JBA is aiming to reduce its per capita carbon emissions.

1 Introduction

1.1 Background

JBA Consulting have been commissioned by Rother District Council to prepare a Level 1 SFRA. Following an initial meeting convened with Rother District Council and JBA Consulting it was agreed that a sequential test methodology would be outlined for reference and sharing with Rother District Council as the Local Planning Authority (LPA), East Sussex County Council as Lead Local Flood Authority (LLFA) and the Environment Agency.

The need to address this matter arises from changes to the National Planning Policy Framework (NPPF) in July 2021 and the revisions to the accompanying Planning Practice Guidance (PPG) in August 2022.

The scope and extent of changes to the PPG in August 2022 require that additional analysis and mapping is prepared. This ensures the SFRA addresses the new matters introduced in the updated guidance and provides the evidence to support that preparation of the Sequential Test.

This document addresses the use of flood risk information in the performance of the Sequential Test with the aim of confirming that the LLFA and Environment Agency are in agreement with the proposed flood risk approach. It does not include the consideration of wider planning issues, as set out in the Sustainability Appraisal.

1.2 Summary of changes

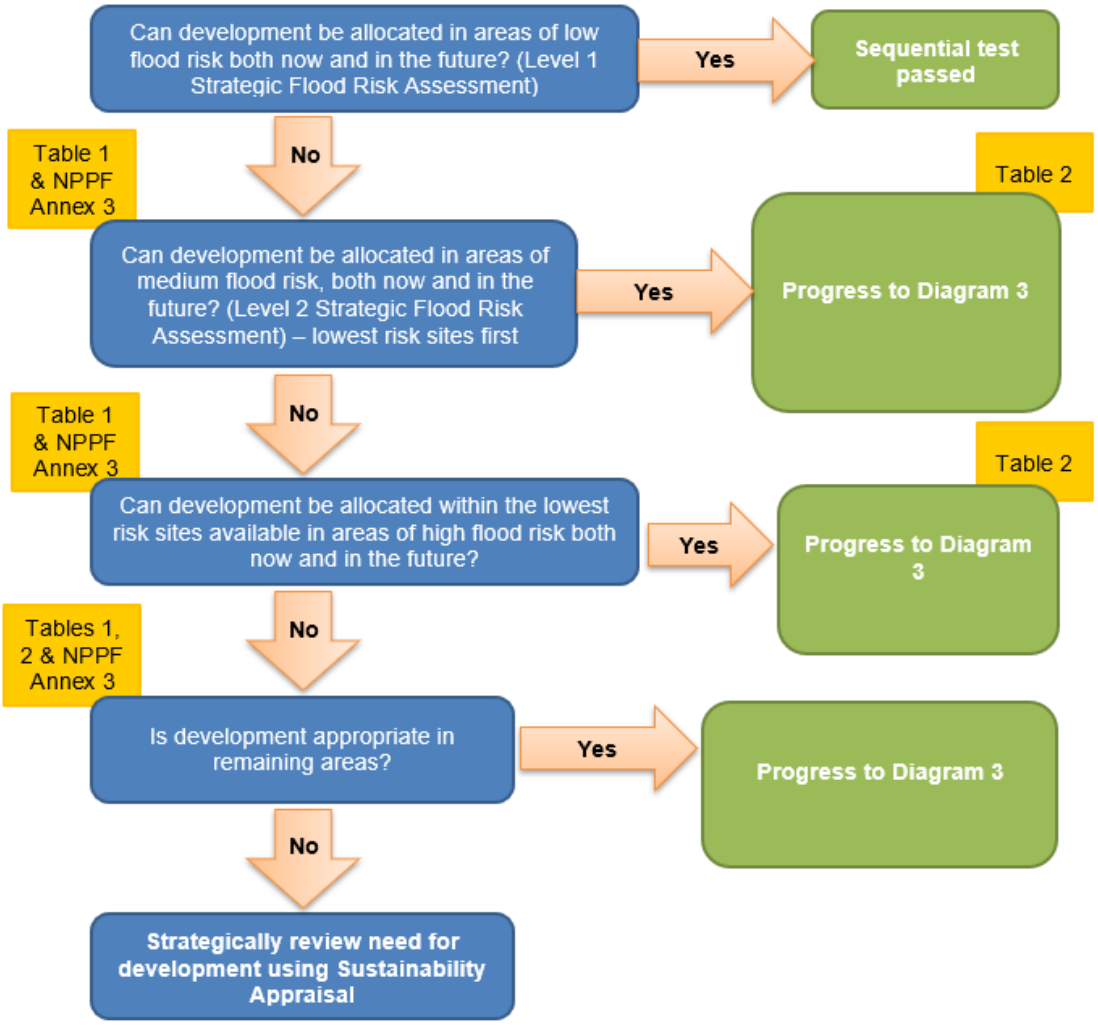
Paragraph 168 of the NPPF has been changed such that the Sequential Test must now *"steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test. The sequential approach (as described in Para 167) 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 requirement was set out as follows and only required consideration of river and sea flood risk when applying the Sequential Test:

Previous Policy Wording	New Policy Wording (July 2021)
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 assuming there are no flood risk management measures or defences in place)*	The aim of the Sequential Test is to steer new development to areas with the lowest risk of flooding **from any source** (*The Planning Practice Guidance has not yet been updated to describe how this exercise should be performed*)

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. To address this requirement, it is necessary to explicitly consider the effects of climate change when performing the Sequential Test. It is important to recognise that the new guidance advises that the Sequential Test can no longer be performed by simply using the present-day Flood Zones describing river and sea risk.

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 will need to show that 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 What happens next

Formal confirmation will be sought from the LLFA and Environment Agency to confirm that the proposed approach outlined in this document to address flood risk and the Sequential Test will be supported in principle at Examination.

The content of the SFRA will be prepared on the basis of the agreed approach.

Should a Level 2 SFRA be found to be required, it will include more detailed consideration of surface water drainage, reservoir flooding and groundwater than was the case prior to the NPPF and PPG updates. The implications of this have not been assessed in this document.

In some circumstances, the proposed approach will require more detailed consideration of surface water drainage requirements in the Level 2 SFRA. At this stage it might be necessary and appropriate to engage more closely with Southern Water (responsible for sewerage) in circumstances where there is long term reliance on the performance of existing drainage systems affected by lack of capacity as a consequence of climate change effects (increased rainfall intensities and depths).

2 Summary of influential changes to the NPPF and implications for Sequential and Exception Tests

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, so they are inherently safe and don't place a burden on future generations. The test was previously performed using a set of "Zone" maps that showed the extent of river 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. An obvious circumstance being proposed town centre development in locations of high flood risk, as it is not possible to redevelop town centre sites unless they remain in the town centre. 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 is performed. 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 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 updated NPPF recommends that application of the Sequential Test applies to any source of flooding. The updated PPG further states in paragraph 23 of the Flood risk and coastal change guidance: *"Other forms of flooding need to be treated consistently with river and tidal flooding in mapping probability and assessing vulnerability, so that the sequential approach can be applied across all areas of flood risk"*. The general implications of this are summarised as follows:

- The Sequential Test must 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, groundwater, 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 (note that the explicit requirement to include climate change in the test, as set out in the August 2022 PPG will require the preparation of additional modelling and mapping or use of proxies) should be accompanied by evidence that the Exception Test can be satisfied (in a Level 2 SFRA).

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 areas of high flood risk

The exception test in the SFRA provides additional evidence to demonstrate that the principle of development can be supported at a proposed site and shows that the sustainability benefits of the development to the community outweigh the flood risk.

A basic requirement for the Sequential Test to be performed is that appropriate, competent mapping can be prepared to enable logical comparison of the flood risk from different sources at alternative locations, both now and in the future, as this is fundamental to establishing a logical "risk sequence".

The following summary describes the implications of including different source of flooding both now and in the future in the Sequential Test. It also highlights matters to be considered and identifies a preferred approach.

2.1 River (fluvial) risk

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. • Where detailed models are available and where practical, Future Flood Zones 2 (0.1% AEP event), 3a (1% AEP event) and 3b (now the 3.3% AEP) will be assessed with climate change allowances. • The fluvial models may experience instabilities during 0.1% AEP plus climate change runs which may mean that results cannot be prepared. • Generalised modelling (JFlow) is used to delineate Flood Zones where there is no detailed modelling or where it is not practicable to use detailed modelling. • NaFRA2 will likely supersede the datasets currently proposed to be used. This document will likely need to be updated once NaFRA2 is released.

2.1.2 Recommendations for using river flood risk in the Sequential Test

- For present river flood risk, the EA's Flood Zones 1, 2 and 3a and 3b should be used.
- For future river flood risk, the EA's Flood Zones 2, 3a and 3b with climate change allowances should be used where there is detailed modelling, and it is practicable to use these. The uplifts per management catchment are:
  - Rother – 28% and 38%
  - Cuckmere and Pevensey Levels – 32% and 43%
  - Medway – 27% and 37%
- Where generalised modelling has been used to delineate Flood Zones and where not practicable to use detailed modelling, Flood Zone 2 should be used as a proxy for Flood Zone 3a with climate change and Flood Zone 3a should be used as a proxy for Flood Zone 3b with climate change. If a development site is located within Flood Zone 2 using generalised modelling, then an assessment of climate change for this zone can be undertaken at the Level 2 SFRA stage.
- There is no readily available proxy for Flood Zone 2 plus climate change and it is not appropriate to use a generalised uplift. For example, the use of a buffer is not advised as this does not account for any topographical constraints.
- The Environment Agency's national team 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

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. • Generally suitable for showing surface water flow routes at different probability flood events (3.3% AEP, 1% AEP and 0.1% AEP), although the uncertainty associated with the predicted outlines for the respective probabilities is high. JBA Consulting also hold the required climate change allowances for the 3.3% AEP, 1% AEP and 0.1% AEP events for Rother and permission has been given from Rother District Council (as LLFA) to use these as part of the SFRA. • 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. • 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. • 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 flooding. • It is likely that in many circumstances surface water flood risk zones based on the surface water mapping could affect a relatively small proportion of a proposed allocation site, but in practical terms this might not in itself be a factor that demonstrated that the principle of development could not be supported.

2.2.2 Recommendations for using zone maps for surface water flooding

- *Use the 1 in 100-year (1% AEP) and 1 in 1000-year (0.1% AEP) surface water flood extents mapping to define a simple zoning scheme that identifies a high, medium and low risk zones:*

Surface Water mapping does not strictly describe the same conceptual risk zone as defined for river and sea flooding (even though it is associated with the same probability) as the mapping is based on different assumptions. However, it does create a product that can accommodate sequential testing, as it would facilitate strategic decisions that directed development to land in "lower risk surface water flood zones".

The proposed approach will direct development to areas at low risk in a similar way to the fluvial/tidal Flood Zone 1 and will not preclude development in the surface water high risk zone provided that an FRA is performed to demonstrate that the risks in the high-risk zone can be appropriately managed.

Using such mapping, it is not anticipated that the Sequential Test for surface water would normally require the consideration of alternative sites at lower risk, as the widespread and dendritic nature of surface water flood risk is conceptually very different to river and sea flood risk. However, in some circumstances, for relatively small sites that are potentially substantially affected, it is possible that alternatives should be considered (as these could

potentially not satisfy the flood risk requirements when assessed under the Exception Test). See Section 3 for further detail on this approach.

The application of the test would logically be accompanied by a commitment to be made in the Plan Policy that all proposed development on sites identified for allocation would be placed in the "low risk surface water flood zone". 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 it would be necessary to provide supplementary evidence that the Exception Test could be satisfied. For the purpose of the Plan, this supplementary exercise could be set out in a Level 2 SFRA and might simply involve more specific requirements with respect to the scope of an FRA. The proposed approach is relatively simple and enables an appropriate level of sequential selection to be made. It is not totally aligned with the river and sea zones (but this is appropriate as the mapping is not based on the same parameters), but from a practical perspective it is strongly aligned with the sequential approach defined in para 167 of the NPPF. See example map showing indicative zone in Appendix A.

2.2.3 Groundwater flood risk

2.2.4 Implications

Source of Flooding	Available Mapping	Implications of making use of mapping in the Sequential Test
Groundwater	British Geological Survey (BGS) Groundwater flood susceptibility maps Also: JBA groundwater Flood Map East Sussex County Council historical flooding data	• 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. • JBA groundwater map does potentially enable a risk-based approach to be taken as it depicts different levels of risk. However, this is based on the risk of emergence of groundwater and not surface flooding due to 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. The analyses performed to prepare the mapping are all for a 1 in 100-year (1% AEP) 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. • 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. • Historic flood data is available from East Sussex County Council. However, this does not always list the source of flooding. In addition, it is often difficult to determine the source of historical flood events and groundwater and surface water flooding can often be confused. • There is no climate change mapping available for groundwater and in view of the uncertainty in the present day data it is unlikely that such mapping will be available in the near future.

2.2.5 Recommendations for using zone maps for groundwater flooding

It is recommended that the groundwater flood risk is not considered in the Sequential Test on the basis that the JBA groundwater flood map, and East Sussex County Council's historical known events dataset do not provide the confidence or certainty required to undertake the Sequential Test. As the available mapping does not provide competent

evidence on the relative risk of flooding across the study area it 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 flooding, such as historical records to identify areas that are unlikely to be affected by groundwater flooding (low potential) and where groundwater flooding is potentially a material consideration can be identified (high potential). At a Level 2 SFRA stage (or for a site-specific Flood Risk Assessment), more detailed assessment should be performed of the proposed development sites where the potential for groundwater flooding is high. This will address the potential effects of climate change on groundwater flood risk to the extent permissible by the available data.

2.3 Sewer flood risk

2.3.1 Implications

Source of Flooding	Available Mapping	Implications of making use of mapping in the Sequential Test
Sewer flooding risk	Southern Water DG5 records and Drainage and Wastewater Management Plans (DWMPs)	• Only available at coordinate level and thus mapping does not define spatial extent or location of sewer flooding. • Mapping does not enable execution of risk based sequence.

2.3.2 Recommendations for using zone maps for sewer flooding

It is recommended that the sewer flood risk is not considered in the Sequential Test on the basis that the available information is not of appropriate resolution or format and so does not support spatial comparison of risk. This will be clearly stated in the Level 1 SFRA and, where possible, the DG5 and DWMP information will be used to inform the scope of site specific FRAs.

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. Southern Water published their DWMP in May 2023. As part of the DWMP, a risk-based catchment screening (RBCS) exercise has been completed, where existing readily available data was 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 provided in the DWMP is catchment scale and therefore applicable to large parts of the 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 a Level 2 SFRA and as appropriate inform the Sequential Test process.

2.3.3 Reservoir flood risk

2.3.4 Implications

Source of Flooding	Available Mapping	Implications of making use of mapping in the Sequential Test

Reservoir flooding risk	Reservoir Flood Mapping (RFM)	• The mapping now shows "wet day" and "dry day" reservoir inundation extents. The "wet day" being a reservoir breach at the same time as a 0.1% AEP 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 dam failure but are intended to describe a "worst credible case".
		• More detailed information on flood velocities and depths has been prepared as part of the modelling and mapping study, but this is not publicly available and can only be viewed by those with appropriate security classifications. The flood extents are publicly available.
		• A dataset exists which shows where the impact of "wet day" reservoir flooding affects the fluvial flood extent. This is known as the Reservoir Flood Extents - Fluvial Contribution. This dataset can be used to identify areas where:
		  ○ reservoir flooding is predicted to make fluvial flooding worse.
		  ○ reservoir flooding is not predicted to make fluvial flooding worse.
		• 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 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.
		• 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 (the "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.
		• The mapping does not provide climate change information on future flood risk and provision of such mapping is unlikely based on the existing

		methodology

2.3.5 Recommendations for using zone maps for reservoir flooding

It is recommended that the available reservoir flood mapping is not included in the Sequential Test as the available data is inappropriate to be used alongside risk mapping from other sources.

A more detailed assessment of those sites identified to be at risk of inundation should be included in a Level 2 SFRA. It will be made clear in the Level 1 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 Fluvial Contribution Extent will be used to define areas where:

- reservoir flooding is predicted to make fluvial flooding worse.
- reservoir flooding is not predicted to make fluvial flooding worse.

The more detailed assessment in a Level 2 SFRA will 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.

2.4 Canal flood risk

2.4.1 Implications

Source of Flooding	Available Mapping	Implications of making use of mapping in the Sequential Test
Canal flooding risk	Canal and Rivers Trust breach and overtopping history data	• 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. • Historic flood data is available from Rother District Council. • Unless the canal is represented in the Environment Agency fluvial flood model used to define the Flood Zones mapping does not enable execution of risk based sequence.

2.4.2 Recommendations for using zone maps for canal flooding

It is recommended that canal flooding is not included in the Sequential Test as the probability of failure is not quantifiable as it is a residual risk. The available information for canal flooding is not conceptually similar to the risks pertaining to river and sea flooding.

Any development proposed adjacent to a canal should include a detailed assessment of how a canal breach would impact the site as part of a site-specific FRA. Breach modelling information has not yet been received from Canal and Rivers Trust. If specific spatial information becomes available on canal flood risk that provides competent data on the spatial relative risk of flooding this will be evaluated in a Level 2 SFRA and as appropriate inform the Sequential Test process.

3 Sequential approach at a site level

In cases where the proportion of the site at risk of flooding is smaller than the proposed non developed area of a site, a sequential approach at the site level would be required (once the Sequential Test has been passed) to enable development to be placed in locations at lowest 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 proportion would be defined in consultation with the Council based on the proportion of site that can be left to blue/green open space. This would likely be linked to densities and housing numbers. 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 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. Addressing where the site is at risk, and the mitigation measures that may be required to be in place, should be completed in a Level 2 SFRA and/or site-specific FRA.

4 Conclusions

This technical note has been prepared to formalise the arrangements used by Rother District Council 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 interim Sequential Test can be found in Appendix D.

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 100-year and 1 in 1000-year Risk of Flooding from Surface Water flood extents are used to define a simple zoning scheme that identifies high, medium and low risk zones. 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".

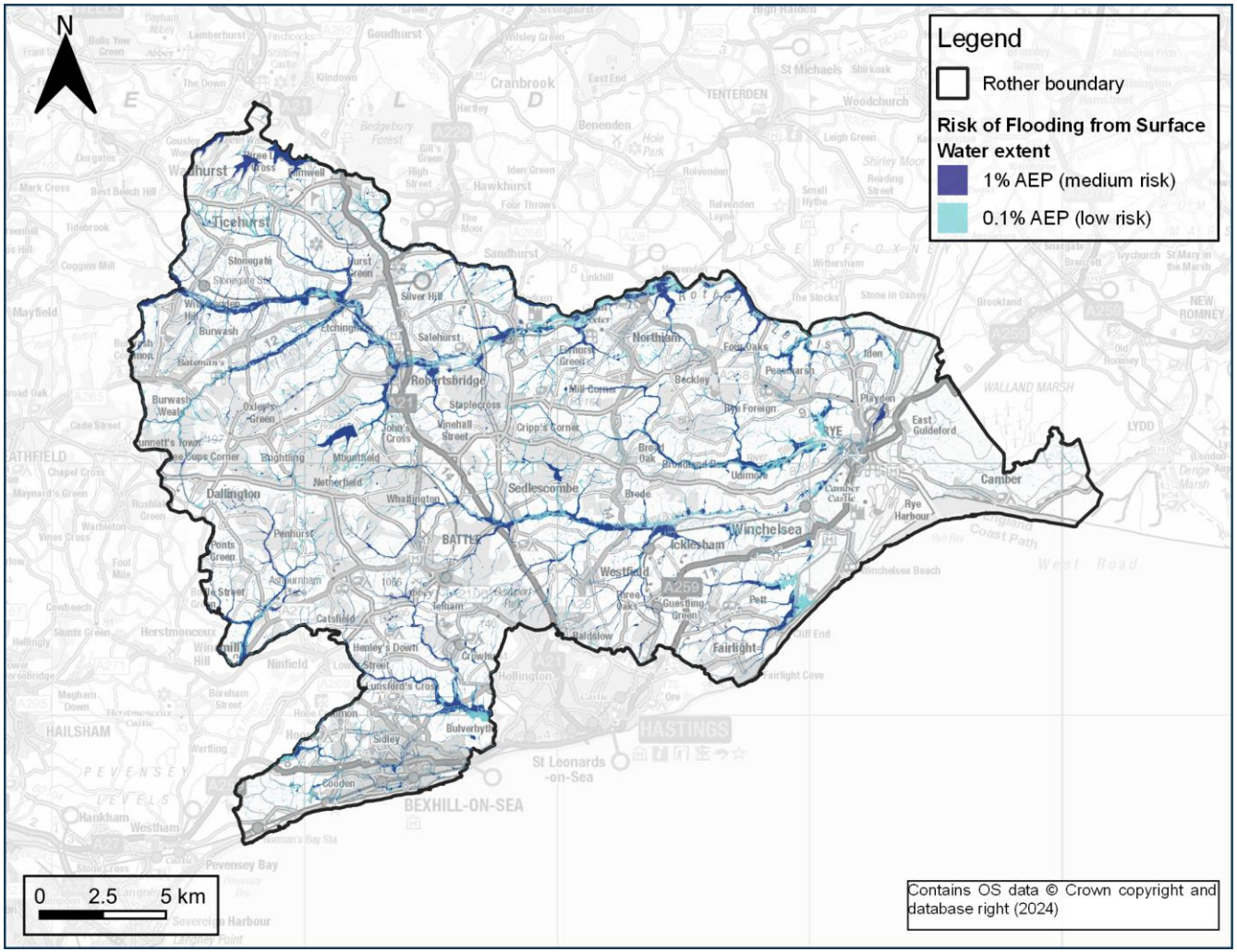
For reservoir flood risk, potential high-risk zones will be assessed and identified and if allocated sites are located in such zones, then the implications will be addressed in a Level 2 SFRA.

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 performed in a Level 2 SFRA to inform the Sequential Test where applicable (i.e. where the Level 1 SFRA screening finds the susceptibility of a site to these sources of flood risk to be high).

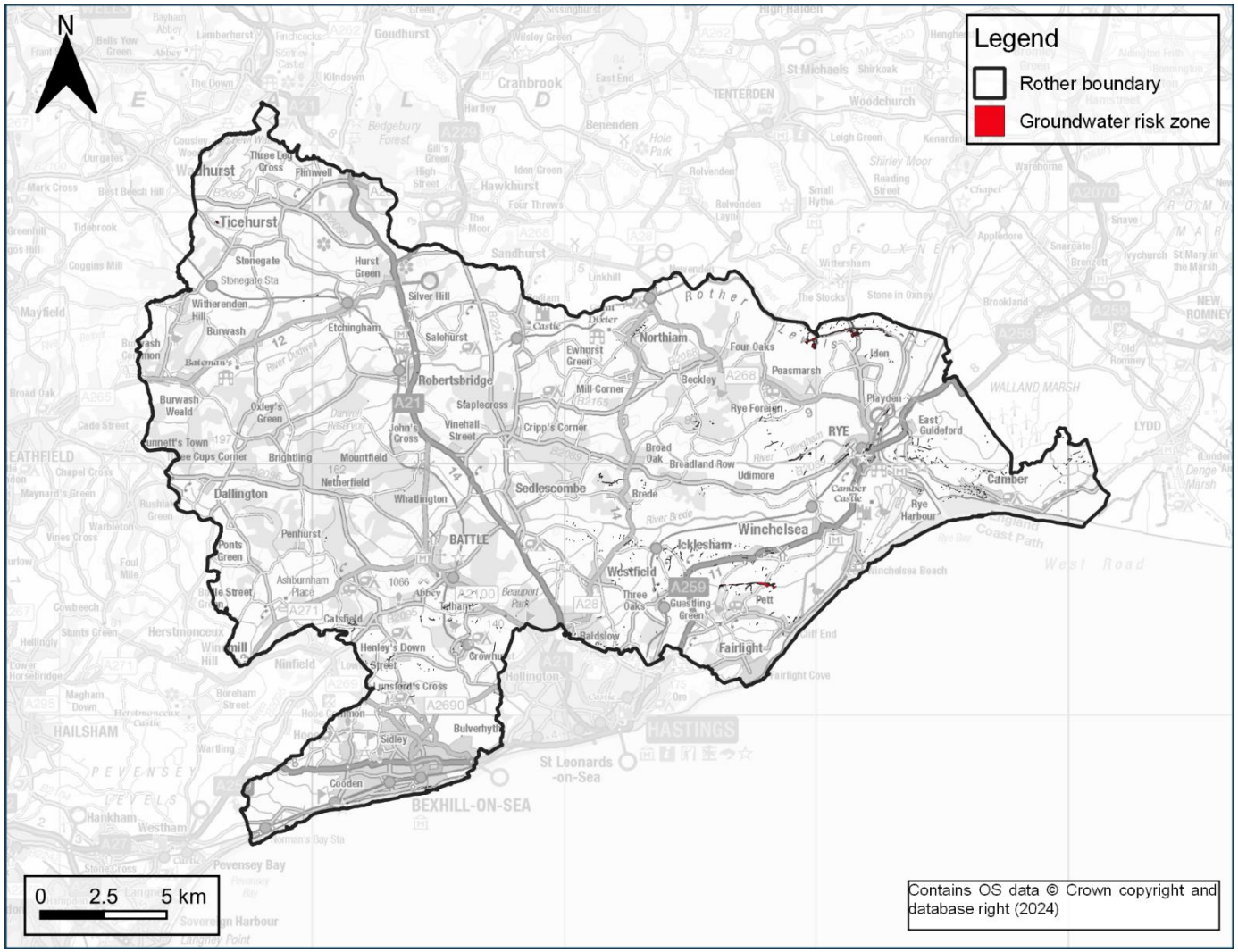
If the Local Planning Authority considers that the Sequential Test is performed and it is not possible for development to located in areas with a lower risk of flooding then consideration must be given to the Exception Test and more detailed assessment included in the Level 2 SFRA.

Consultation will be sought from the LLFA and the Environment Agency for their comments on the methodology and approval in principle to the approach will be obtained before the inclusion in the SFRA.

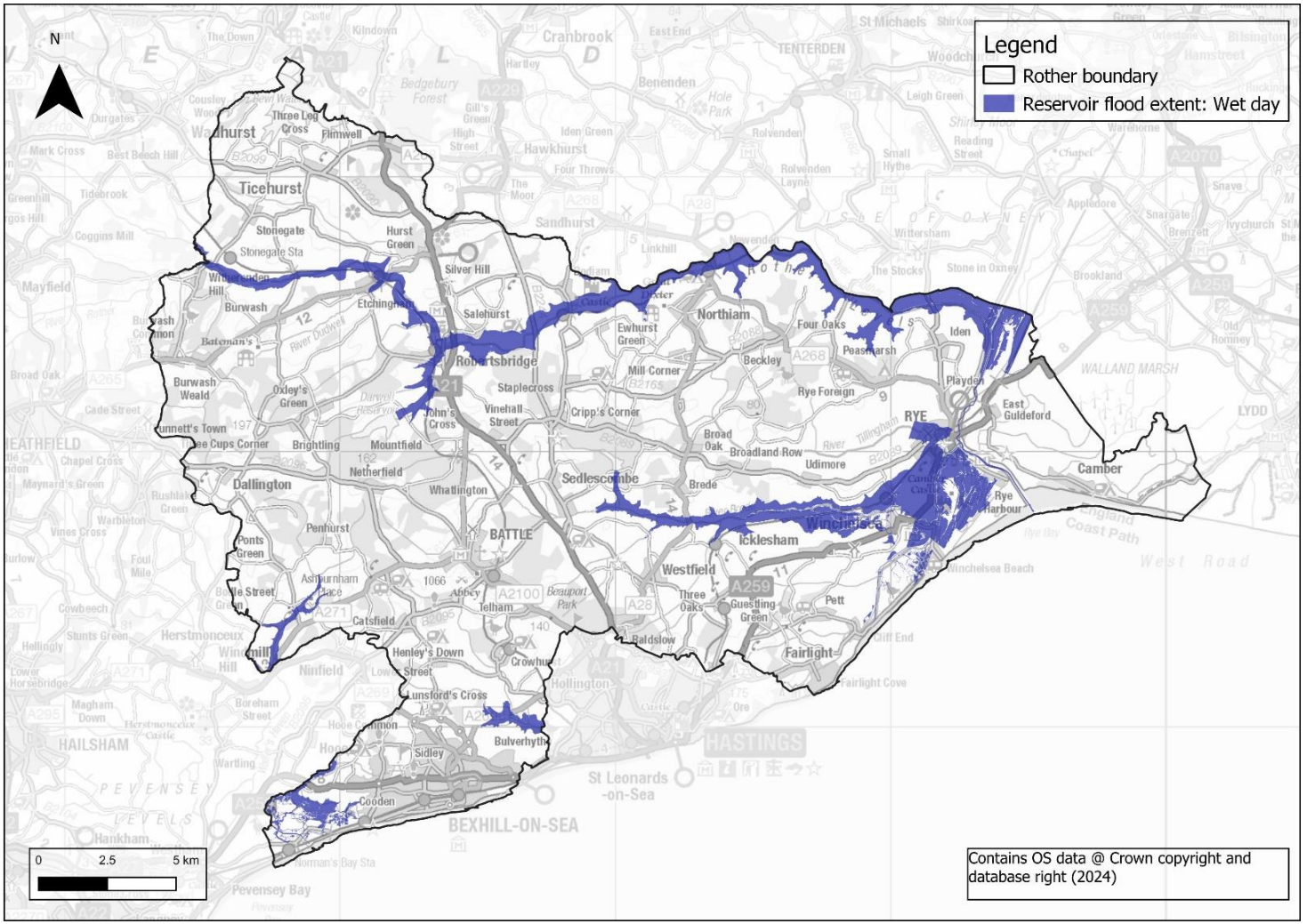
A Surface Water Zone Map



B Groundwater Zone Map



C Reservoir flood risk



D Summary of the Sequential Test methodology

Source of Flooding	High risk	Medium risk	Low risk	Justification of approach	
				Risk now	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 1,000 year	EA'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 where available. Use FZ2 as proxy for FZ3a and FZ3a as proxy for FZ3b where not available.
Surface Water	Greater than 1 in 1000 year	Between 1 in 100 and 1 in 1,000 year	Less than 1 in 1,000 year	Although different assumptions are used to derive surface water risk than is the case for fluvial and tidal flood zones it is felt that the described approach creates a product that can accommodate sequential testing, as it would facilitate strategic decisions that directed development to land in "lower risk surface water flood zones". This approach will require that sites where proposed development is located in a high risk surface water zone are assessed in more detail in a Level 2 SFRA.	1% AEP and 0.1% AEP surface water flood extents with an allowance (Upper End) for climate change should be used.
Groundwater	Screening to be undertaken to assess the potential susceptibility of all sites to groundwater flooding. Additional information required via a Level 2 SFRA or site specific Flood Risk Assessment where susceptibility is considered to be high.			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 sites where groundwater flood risk identified to be high will be identified and assessed in a Level 2 SFRA or site specific Flood Risk Assessment. The implications for sequential selection of alternative locations should be considered at that stage.	(Not available)

Source of Flooding	High risk	Medium risk	Low risk	Justification of approach	
				Risk now	Future risk
Sewer	Screening to be undertaken to assess the potential susceptibility of all sites to sewer flooding. Additional information required via a Level 2 SFRA or site specific Flood Risk Assessment where susceptibility is considered to be high.			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 sites where sewer flood risk identified to be high will be identified and assessed in a Level 2 SFRA or site specific Flood Risk Assessment. The implications for sequential selection of alternative locations should be considered at that stage.	(Not available)
Reservoir	Screening to be undertaken to identify sites where reservoir flooding is predicted to make fluvial flooding worse for development or where development is proposed in a high hazard zone. Additional information required via a Level 2 SFRA or site specific Flood Risk Assessment where susceptibility is considered to be high.			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, 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 will be identified and assessed in a Level 2 SFRA or site specific Flood Risk Assessment. The implications for sequential selection of alternative locations should be considered at that stage.	(Not available)

Source of Flooding	High risk	Medium risk	Low risk	Justification of approach	
				Risk now	Future risk
Canal	Screening to be undertaken to assess the potential susceptibility of all sites to sewer flooding. Additional information required via a Level 2 SFRA or site specific Flood Risk Assessment where susceptibility is considered to be high.			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 canals. Therefore, a precautionary approach should be taken and sites where canal flood risk identified to be high will be identified and assessed in a Level 2 SFRA or site specific Flood Risk Assessment. The implications for sequential selection of alternative locations should be considered at that stage.	(Not available)

Offices at

Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Haywards Heath
Isle of Man
Limerick
Newcastle upon Tyne
Newport
Peterborough
Saltaire
Skipton
Tadcaster
Thirsk
Wallingford
Warrington

Registered Office
1 Broughton Park
Old Lane North
Broughton
SKIPTON
North Yorkshire
BD23 3FD
United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
www.jbaconsulting.com
Follow us:

Jeremy Benn Associates Limited

Registered in England 3246693

JBA Group Ltd is certified to:
ISO 9001:2015
ISO 14001:2015
ISO 27001:2013
ISO 45001:2018