Kirklees Level 1 SFRA - Appendix C

Functional Floodplain Delineation Methodology Final Report

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Prepared for:
Kirklees Council

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Contents

1 Introduction **1**

2 Functional floodplain definition **2**

3 Functional floodplain delineation **3**

3.1 Datasets 3

4 GIS methodology **5**

5 Conclusions **7**

List of Tables

Table 3-1: EA modelled flood outlines 3

Table 3-2: Additional datasets 4

1 Introduction

The Flood Risk and Coastal Change Planning Practice Guidance[1] (FRCC-PPG) states that local planning authorities (LPA) should identify in their Strategic Flood Risk Assessments (SFRA) areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency (EA). The Kirklees functional floodplain (Flood Zone 3b) extent has therefore been delineated as part of this Level 1 SFRA using the most up-to-date data available from the EA at the time of writing. The previous functional floodplain extent, delineated for the 2016 SFRA for Calderdale, has been significantly updated and superseded by more up-to-date modelled outputs and by the April 2025 version of Flood Zone 3 of the Flood Map for Planning. This methodology note explains the delineation process.

Note that Flood Zone 3b is not included in the Flood Map for Planning. EA guidance states that the Level 1 SFRA should define the functional floodplain. This SFRA therefore sub-divides Flood Zone 3 into Flood Zone 3a and Flood Zone 3b (the functional floodplain). This distinction is for the use of the LPA and developers in plan making and development planning. Flood Zone 3a can be considered to be Flood Zone 3 of the Flood Map for Planning that is not functional floodplain.

In accordance with the results of public consultation in producing a 2024 update to Kirklees Council's Local Flood Risk Management Strategy, Kirklees has a mandate to seek a robust definition of functional floodplain to best avoid risk where reasonably practicable.

The LPA and the EA must consult on and agree the extent of the functional floodplain outline and the methodology used. The Lead Local Flood Authority (LLFA) may also be invited to review the extent and methodology used. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. The local knowledge of the LPA, EA, and the LLFA is therefore crucial in defining the functional floodplain as robustly and realistically as possible.

1 Flood Risk and Coastal Change Planning Practice Guidance | UK Government | 2025

2 Functional floodplain definition

The EA's SFRA guidance[2] states that the Level 1 SFRA should include the functional floodplain extent on maps with a detailed explanation of how the functional floodplain was defined. This methodology note provides this definition.

The EA's SFRA guidance (2025) and FRCC-PPG (2025) state that functional floodplain should show land that:

- *"would flood from rivers or the sea with an annual probability of 1 in 30 (3.3%) or greater in any year, with flood risk management features and structures operating effectively*
- *would normally form the river channel*
- *is designed to flood (such as flood attenuation schemes), even if it would only flood in more extreme events (such as 0.1% annual probability)."*

Regarding the impact of defences on the functional floodplain:

"In any modelling used to identify the functional floodplain, include existing defences and other flood risk management features and structures.

You may not need to designate the functional floodplain in locations where evidence shows flooding would be prevented by existing:

- *flood defences*
- *flood risk management features or structures*
- *buildings."*

Regarding the impact of existing buildings on the functional floodplain:

"The footprints of existing buildings may be removed from functional floodplain extents. However, it may be simpler to include existing buildings and use local policies to control the redevelopment or changes of use that may be acceptable.

Use local policies or guidance to explain the approach you will take when buildings are demolished in functional floodplain. It may be reasonable to assume that sites revert to functional floodplain when buildings have been demolished for more than a year".

2 How to Prepare a Strategic Flood Risk Assessment | Environment Agency | 2025

3 Functional floodplain delineation

3.1 Datasets

Based on the above guidance, the modelled flood outlines (MFO) listed in Table 3-1 below were provided by the EA to assist in the delineation of the functional floodplain extent, which supersedes the previous extent covering the study area. Direct modelling of the present 1% annual exceedance probability (AEP) event has been used to delineate Flood Zone 3b, in addition to the EA 3.3% AEP defended event outline, in areas where there are accepted and finalised models, as agreed with Kirklees Council and the EA. It is acknowledged that the use of the 1% AEP event is conservative. The current Flood Zone 3 outline was appended to the outline in areas not represented by a detailed model. The EA 3.3% AEP defended event outline covering the Kirklees authority area was then added to cover any areas of detailed modelling that are underrepresenting in comparison to the 3.3% AEP defended event.

Note that outputs for the River Spen 2009 model were provided for consideration within the SFRA, however these have since been superseded by new national modelling. Therefore, Flood Zone 3 of the Flood Map for Planning has been used to represent this watercourse.

The hierarchy of methods used to define Flood Zone 3b is outlined below:

1. Use of 1% AEP defended detailed model outputs where they are available. Only final and approved model outputs have been used to delineate Flood Zone 3b (Table 3-1).
2. Use of the current Flood Zone 3 (April 2025) outline in areas where no detailed modelling outputs are available (Table 3-2).
3. Use of the EA 3.3% defended event outline (April 2025).
4. Use of a buffered main river channel polygon (8 metres either side of main rivers) (Table 3-2).

Table 3-1: EA modelled flood outlines

Model	Year	AEP	Defended / Undefended?
Batley Beck	2015	1%	Defended
Calder and Canals FCRM	2015	1%	Defended
Chickenley Beck	2018	1%	Defended
Colne Holme and Tribs	2020	1%	Defended
Fenay Beck	2007	1%	Undefended
Huddersfield FRM	2011	1%	Defended
Upper Dearne	2010	1%	No defences exist

Along with the MFOs listed in Table 3-1, the datasets in Table 3-2 were also used to assist with the delineation. The EA's Flood Storage Area (FSA) dataset was interrogated and it was found that there were 22 FSA's within the study area to be included within the functional floodplain outline.

Table 3-2: Additional datasets

Dataset	Purpose
Flood Zone 3 - Environment Agency Flood Map for Planning	Dataset version April 2025 Use of this dataset in areas not subject to detailed modelling will reflect outputs from the national generalised modelling exercise that is incorporated into Flood Zone 3.
3.3% AEP defended outline - Environment Agency	Dataset version April 2025 Use of this dataset in combination with the detailed 1% AEP defended modelling, to maintain a conservative approach to delineating the functional floodplain in areas where detailed modelling is smaller in extent than the EA 3.3% AEP defended event. This reflects outputs from approved detailed models and the national generalised modelling.
Flood Storage Areas - Environment Agency Flood Map for Planning	EA SFRA guidance advises that EA Flood Storage Areas should be included within the Flood Zone 3b outline but should be consulted on for appropriateness with the EA. Refer to Section 4 for details on how the Flood Storage Area dataset has been included within the Flood Zone 3b outline.
Main rivers - Environment Agency Statutory Main River map	To create river channel areas within Flood Zone 3b as requested by EA SFRA guidance. This dataset includes only main rivers and does not include ordinary watercourses or waterbodies. The dataset has been buffered by 8m either side of the river centreline to broadly represent the width of the river across the area. It is recognised that this is an approximation. Policy relating to Flood Zone 3b applies to the river and not the mapping where they are different.

4 GIS methodology

The below steps summarise the methodology used to delineate the functional floodplain:

- The previous Flood Zone 3b outline was used as a starting point and the 1% AEP MFOs listed in Table 3-1 were appended to update the outline.
- The existing 1% AEP event MFOs were used to represent Flood Zone 3b, rather than commissioning any new modelling to provide a fit for purpose 3.3% AEP extent. The decision to use the 1% AEP event also provides a conservative approach to defining Flood Zone 3b.
- Flood Zone 3 (version from December 2025) has been used to define Flood Zone 3b in areas not subject to detailed modelling to remain conservative. The future delineation of Flood Zone 3b should draw on outputs from new detailed modelling exercises when they are completed to refine and improve the dataset, either as part of an update to this Level 1 SFRA or through a more detailed Level 2 SFRA. A small area of Flood Zone 2 has also been included to represent the canal near Scarborough Street, Dewsbury.
- The EA's 3.3% AEP defended event outline was included in the functional floodplain extent to represent any areas of detailed modelling that are underrepresenting in comparison to the 3.3% AEP defended event. This is generally in areas where detailed models have been superseded in the Flood Map for Planning by the New National Model (NNM). This dataset has been used in combination with the EA detailed modelling.
- All main river channels including culverted sections were added to the Flood Zone 3b outline, as required by the EA’s guidance. At a local scale, this could lead to inaccuracies, especially in hydrologically complex areas where there may be man-made interactions or interactions with other bodies of water such as reservoirs or canals. Recognising this, Flood Zone 3b policy relates to the river channel including an 8m buffer either side of the channel and not the mapped Flood Zone 3b extent where they are different.
- The main river channel dataset includes a high-level and approximate representation of culverted sections of river. These (culverted) sections are subject to a higher degree of uncertainty as it is more difficult to identify and verify below ground alignments. Within culverted sections, Flood Zone 3b policy relates to the actual confirmed alignment of culverted sections identified through site investigation rather than the alignment shown in Flood Zone 3b outputs where datasets may differ. The EA and LLFA may be able to advise further on the culverted sections in Flood Zone 3b.
- Ordinary watercourses are only represented within the Flood Zone 3b extent where they are included within Flood Zone 3.
- Waterbodies, such as canals and reservoirs, are only included in the delineated Flood Zone 3b outline where they are present within detailed models that have

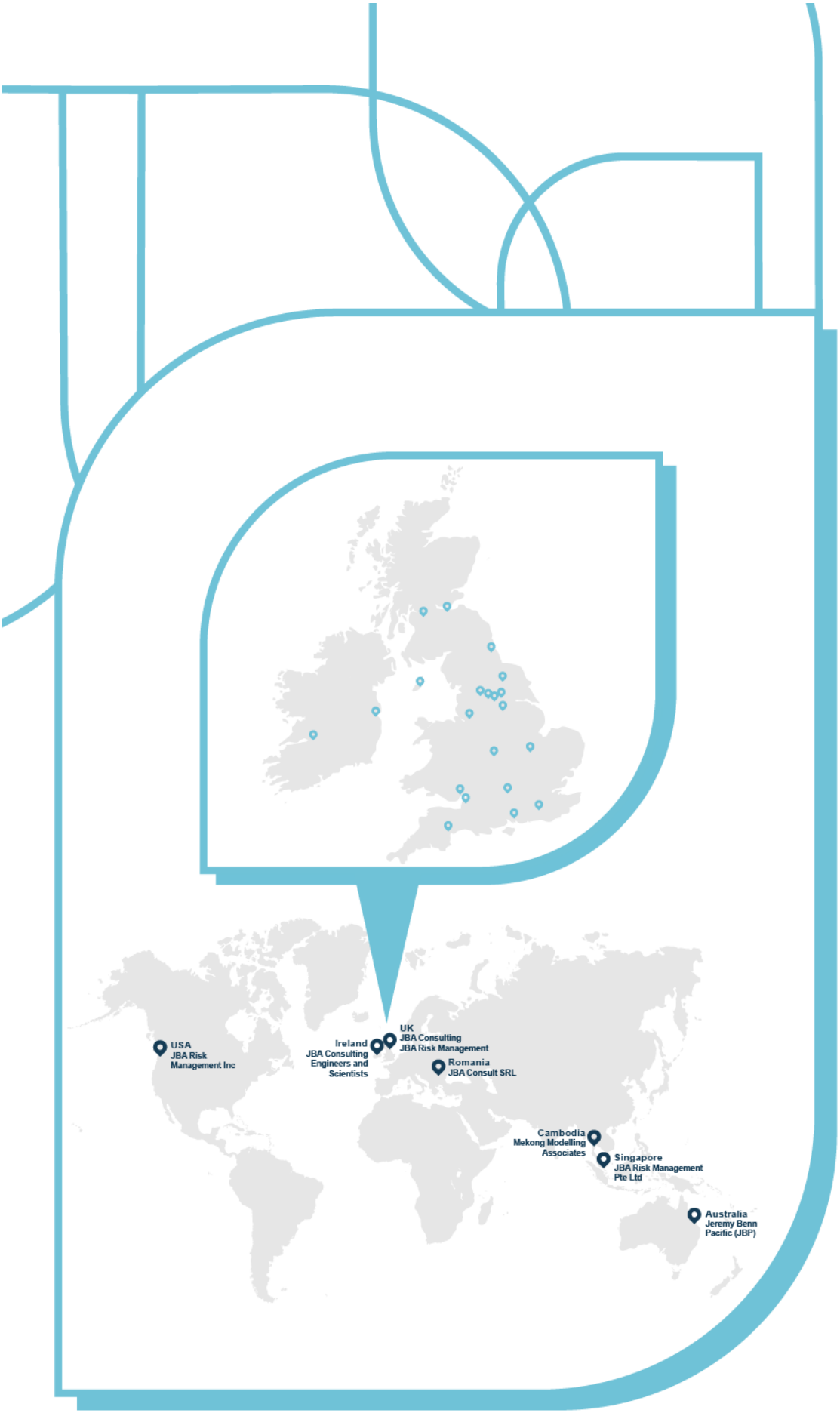
been used. There is no reliable dataset to delineate waterbodies that can be used to delineate the Flood Zone 3b outline.

- The EA FSA dataset has been reviewed and was found to include 22 EA defined FSAs within the Kirklees area. The EA have advised that the FSAs should be incorporated into FZ3b.
- Buildings and infrastructure within the Flood Zone 3b outline have been retained within the outline i.e. they have not been removed on the assumption that floodwater ingress may occur. The guidance[3] states that you do not need to designate functional floodplain in locations where evidence shows flooding would be prevented, for example, by solid buildings. The SFRA should be supported by local policies to control the redevelopment or changes of use that may be acceptable.
- It has been assumed that any dry islands within the Flood Zone 3b outline should be considered as functional floodplain where these areas are located within the Flood Zone 3 extent. Manual edits have been made to 'infill' these dry islands within the functional floodplain outline.
- Each polygon within the Flood Zone 3b outline has been attributed with the source MFO or dataset, so it is possible to ascertain which model or dataset each polygon within the outline came from.
- Checks on the geometry of the Flood Zone 3b outline were carried out to ensure geometric correctness in GIS.

3 How to prepare a strategic flood risk assessment | Environment Agency | May 2024

5 Conclusions

The functional floodplain outline has been assessed and agreed upon by the LPA, EA, and LLFA. The extent of the functional floodplain outline produced from this Level 1 SFRA should always be assessed in greater detail where any more detailed study such as a Level 2 SFRA or site-specific FRA are undertaken.



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