Central Lancashire Level 1 SFRA - Appendix D

Functional Floodplain Delineation Methodology

Final

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Contents

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 Central Lancashire 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. The previous functional floodplain (Flood Zone 3b) extent (2019) has been significantly superseded by more up-to-date modelled outputs or by the November 2023 version of Flood Zone 3. 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. This distinction is for the use of LPAs and developers in development planning. Flood Zone 3a can be considered to be Flood Zone 3 of the Flood Map for Planning that is not functional floodplain.

The Central Lancashire Local Authorities, Lead Local Flood Authority (LLFA) and the EA must all agree on the extent of the functional floodplain outline and the 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 Central Lancashire authorities and the EA is therefore crucial in defining the functional floodplain as robustly and realistically as possible.

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

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 and the SFRA GeoPDF maps present the extent of the functional floodplain.

The EA's SFRA guidance states:

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

Functional floodplain may not be required in locations where evidence shows flooding would be prevented by existing:

- *Flood defences*
- *Flood risk management features or structures*
- *Solid buildings*

Water storage areas are shown on the Flood Map for Planning. The EA should confirm whether these areas are suitable to include in the functional floodplain extent."

The FRCC-PPG states the functional floodplain:

"Comprises land where water from rivers or the sea has to flow or be stored in times of flood,

Should comprise of land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively, or

Should comprise of land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding),

Should take account of local circumstances and not be defined solely on rigid probability parameters."

If there is not enough detailed modelled information available to identify the functional floodplain, this should be made clear on the Level 1 SFRA maps to ensure risk isn't underestimated. In these areas, site-specific flood risk assessments should determine whether a site is affected by functional floodplain through additional modelling. If sites are proposed for development in such areas in the local plan, a Level 2 SFRA will be required to robustly map the functional floodplain extent.

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2 How to Prepare a Strategic Flood Risk Assessment | Environment Agency | 2022

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 update of the 2019 functional floodplain outline, delineated previously through the 2019 SFRA. Where possible, direct modelling of the present and future 3.33% AEP event has been used to delineate Flood Zone 3b in areas where there are accepted and finalised models. There are a number of exceptions to this, noted below:

- Black Brook - the 2% AEP event MFO has been used as a proxy given the absence of 3.33% AEP event hydrology.
- Bryning Brook - the 1% AEP event MFO has been used as a proxy given the absence of 3.33% AEP event hydrology.
- Croston - the 2% AEP event MFO has been used as a proxy given the absence of 3.33% AEP event hydrology.
- Ribble-Douglas - the 2% AEP event MFO has been used as a proxy given the absence of 3.33% AEP event hydrology.
- River Chor - the 2% AEP event MFO has been used as a proxy given the absence of 3.33% AEP event hydrology.
- River Yarrow - the 2% AEP event MFO has been used as a proxy given the absence of 3.33% AEP event hydrology.

The use of a proxy approach in these areas is an interim measure, and it is recommended that modelling is updated to reflect the 3.33% AEP event either through a further update of the Level 1 SFRA or through a more detailed Level 2 SFRA. It is accepted that there is a greater uncertainty in the delineated Flood Zone 3b outputs across these areas which justifies the use of a conservative approach, drawing on outputs from larger modelled events. Should further modelling be carried out within the Central Lancashire Authority areas that includes the 3.3% AEP event, the functional floodplain outline should be updated to reflect this.

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

1. Use of 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 a proxy approach in areas subject to detailed modelling, where approximate outputs are available (e.g. in areas where outputs for the 3.3% AEP event are not available, but where alternative AEP events are available and can be used as a proxy) (Table 3-1).
3. Retain the current Flood Zone 3 outline in areas where no detailed modelling is available (Table 3-2).
4. Use of the buffered watercourse (8 metres either side of the channel) and delineated Flood Storage Area layers (Table 3-2).

Table 3-1: EA modelled flood outlines

Model	Year	Annual Exceedance Probability (AEP)	Defended?
Bannister Brook	2011	3.33%	Yes
Black Brook	2011	2%	No
Brock	2021	3.33%	Yes
Bryning Brook	2009	1%	No
Buckrow Brook	2017	3.33%	Yes
Croston	2017	2%	Yes
Grimsargh	2009	3.33%	No
Hall Pool	2008	3.33%	Yes
Hennel Brook	2017	3.33%	No
Higher Walton	2009	3.33%	Yes
Horwich	2008	3.33%	No
Longton Brook	2006	3.33%	Yes
Lostock SOC	2020	3.33%	Yes
M6 to Stansfield Lane	2015	3.33%	No
Mill Brook	2006	3.33%	No
Parkgate to Kingsway	2015	3.33%	Yes
Penwortham	2015	3.33%	No
Penwortham Lane	2006	3.33%	No
Ribble-Douglas	2010	2%	Yes
River Chor	2011	2%	No
River Yarrow	2009	2%	Yes
Tidal Lancs Ribble	2014	3.33%	Yes
Wymott Brook	2015	3.33%	No
Wyre	2014	3.33%	Yes

The following models provided by the EA have not been used to update the functional floodplain outline due either to simulations crashing, the model has been deemed no longer appropriate, or the EA do not hold the required model files:

- Chapel Brook 2009
- Lower Lostock 2018
- Savick 2011
- Upper Lostock 2018

Along with the MFOs listed in Table 3-1, the datasets in Table 3-2 were also used to assist with the delineation.

Table 3-2: Additional datasets

Dataset	Purpose
Flood Zone 3 - EA Flood Map for Planning (November 2023)	Dataset downloaded in November 2023. Use of this dataset in areas not subject to detailed modelling will reflect outputs from the national generalised modelling exercise that are incorporated into Flood Zone 3.
Watercourse link - OS Open Rivers	To create river channel areas within FZ3b as requested by EA SFRA guidance. This dataset includes only watercourses and does not include waterbodies. The dataset has been buffered by 8m either side of the line to broadly represent the width of watercourses across the area. It is recognised that this is an approximation. Policy relating to FZ3b applies to the watercourse and not the mapping where they are different.
EA Flood Storage Areas (FSA)	EA Flood Storage Areas are advised to be included within the functional floodplain but should be consulted on for appropriateness with the EA.

4   GIS methodology

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

- The 2019 Flood Zone 3b outline was used as a starting point and the MFOs listed in Table 3-1 were appended to update the outline.
- Flood Zone 3 has been used to define Flood Zone 3b in areas not subject to detailed modelling. This may be a conservative approach, however, in the absence of other better information, Flood Zone 3b policy should relate to these areas. 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.
- All river channels including culverted sections were added to the Flood Zone 3b outline, as required by the EA's guidance. It is noted that the river channel dataset used (OS Open Rivers Dataset, Watercourse Link Shapefile) is a high level dataset that may not be spatially correct in many areas. At a local scale, this could lead to inaccuracies, especially in hydrologically complex areas where there are man-made interactions or interactions with other bodies of water such as reservoirs or canals. Recognising this, Flood Zone 3b policy relates to the watercourse including an 8m buffer either side of the channel and not the mapping where they are different.
- The river channel dataset includes a high-level and approximate representation of culverted sections of watercourses. 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 differ. The EA and LLFA may be able to advise on the culverted sections in Flood Zone 3b.
- The river channel dataset contains open river channels and culverted sections of channel only and does not include other types of waterbody.
- 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, however waterbodies should be considered as functional floodplain.
- The EA's FSA dataset has been reviewed, and it was found that there were four FSAs within the Central Lancashire authority area. These FSAs have been included within the Flood Zone 3b outline as a default approach.

- 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 they are of solid construction and would prevent flood water ingress.
- The approach taken when delineating the 2019 Flood Zone 3b outline removed existing infrastructure. This therefore means that there may be some instances in the updated Flood Zone 3b outline where infrastructure has been removed, where that area of the outline is based on the previous Flood Zone 3b outline.
- In these circumstances, existing infrastructure should be assumed as being within the functional floodplain.
- It has been assumed that any dry islands within the Flood Zone 3b outline should be considered as functional floodplain, and therefore manual edits have been made to include these dry islands within the 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.

5   Future functional floodplain dataset

In addition to the present day Flood Zone 3b extent, a future Flood Zone 3b extent has also been produced using the present day updated Flood Zone 3b as a starting point, as recommended in the EA's SFRA guidance. This has been updated using climate change enhanced flood modelling across the modelled extents listed in Table 3-1. Within this modelling, an uplift in peak river flow estimates has been applied to make allowance for the future impacts of climate change on peak river flows in accordance with EA guidance. Table 5-1 outlines how the proxy approach has been extended (as outlined in Section 3), where it hasn't been possible to use the 3.33% AEP event detailed model outputs directly.

Table 5-1: Future function floodplain proxy approach

Model	Present day FZ3b approach	Future FZ3b approach
Black Brook	2% AEP event output has been used as a proxy	2% AEP event + climate change output has been used as a proxy
Bryning Brook	1% AEP event output has been used as a proxy	1% AEP event + climate change output has been used as a proxy
Croston	2% AEP event output has been used as a proxy	2% AEP event + climate change output has been used as a proxy
Ribble-Douglas	2% AEP event output has been used as a proxy	2% AEP event + climate change output has been used as a proxy
River Chor	2% AEP event output has been used as a proxy	2% AEP event + climate change output has been used as a proxy
River Yarrow	2% AEP event output has been used as a proxy	2% AEP event + climate change output has been used as a proxy

6   Conclusions

The draft functional floodplain outline should be assessed and agreed upon by the LPA, LLFA and the EA. 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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