TECHNICAL NOTE

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Contract	Huntingdonshire IWMS
Client	Huntingdonshire District Council
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Subject	Functional floodplain update and future functional floodplain delineation

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 Huntingdonshire functional floodplain (Flood Zone 3b) extent has therefore been delineated as part of this IWMS using the most up-to-date data available from the EA. The previous functional floodplain (Flood Zone 3b) extent (2016) has been significantly superseded by more up-to-date modelled outputs or by the February 2023 version of Flood Zone 3.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.

Huntingdonshire District Council's (HDC) LPA and the EA must 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 HDC and the EA is therefore crucial in defining the functional floodplain as robustly and realistically as possible. The LPA and EA have agreed on the functional floodplain outline produced for this Level 1 SFRA.

2 Functional floodplain definition

The EA's SFRA guidance[2] says 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 technical 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,*

[1] Flood Risk and Coastal Change Planning Practice Guidance | UK Government | 2022
[2] How to Prepare a Strategic Flood Risk Assessment | Environment Agency | 2022

- *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. If sites are proposed for development in such areas in the local plan, a Level 2 SFRA will be required to map the functional floodplain extent.

3 Functional floodplain delineation

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 2016 functional floodplain outline, delineated previously through the 2016 SFRA. Full models were not required at this stage as it was agreed at the inception meeting that no additional modelling would be required for this Level 1 SFRA. However, only one of the models (Wash 2019) listed in Table 3-1 contained a 1 in 30 year (3.3% AEP) event MFO. HDC and the EA agreed that no additional modelling would be carried out at the Level 1 stage. Therefore 4% AEP and 1% AEP MFOs were used as proxies for the 3.3% AEP event. Should further modelling be carried out within the HDC authority area that includes the 3.3% AEP event, the functional floodplain outline should be updated to reflect this.

It is recommended that the functional floodplain is appropriately modelled i.e. using modelled 3.3% AEP return periods, as advised in EA guidance.

Table 3-1: EA modelled flood outlines

Model	Year	Annual Exceedance Probability (AEP)	Defended?
Bury Brook	2016	4%	Yes
Godmanchester FAS	2015	4%	Yes
Wash	2019	3.33%	Yes
Lower Ouse – Alconbury	2015	4%	Yes
Lower Ouse – Barrack Brook	2015	1%	No
Lower Ouse – Buckden	2015	1%	No
Lower Ouse – Downstream	2015	4%	Yes
Lower Ouse – Kym	2015	4%	Yes
Lower Ouse – Non Main Rivers	2015	1%	No
Lower Ouse – Upstream Lower Ouse	2015	4%	Yes

The following models were provided by the EA but had no Product 6 outputs available:

- 2002 Spaldwick and Ellington PAR,
- 2015 Waterbeach Lower Ouse and

- 2015 Wyboston Lower Ouse models.

The following models were provided by the EA but the outputs were fully outside of the Huntingdonshire District Council boundary:

- 2015 Old West Lower Ouse,
- 2015 Upper Dean Lower Ouse models and
- 2015 Elsworth Lower Ouse models.

Along with the above MFOs, the datasets in the table below were also interrogated to assist with the delineation.

Table 3-2: Additional datasets

Dataset	Purpose
Watercourse Link – OS Open Rivers	To create river channel areas within the functional floodplain as stated in EA SFRA guidance. A buffer of 8m either side of the channels was used to account for the EA's recommended 8m non-development areas from the banks of a watercourse. Culverted and canalised sections have been excluded from the river channel areas of the functional floodplain.
Buildings – OS OpenMapLocalRaster	To remove existing development from the functional floodplain. A buffer of 1m was included around the building perimeters to roughly account for curtilages.
Road Link – OS Open Roads	To remove existing transport infrastructure from functional floodplain.
Flood Zone 3 – EA Flood Map for Planning (February 2023)	To include in the absence of MFOs.
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.

3.1 GIS methodology

- The 2016 FZ3b outline was used as a starting point and the MFOs listed in **Table 3-1** were appended where appropriate to update the outline.
- Any areas not covered by MFOs were represented by the current Flood Zone 3 version from February 2023 or the 2016 FZ3b outline.
- All river channels were added to the outline using OS Open Data Rivers layer plus 8m buffer.
- The EA FSA dataset was reviewed, and it was found that there were two FSAs within the HDC administrative area, both located to the east of the district, adjacent to Old Bedford River.
- Each polygon within the outline was attributed with the source MFO or flood risk dataset to enable easy identification of the source of each polygon.

- The OS Open Data Buildings layer plus 1m buffer for curtilages was used to identify existing buildings which were removed from the outline.
- Checks on the geometry of the outline were performed to ensure geometric correctness in GIS.

The draft functional floodplain outline has been assessed and agreed upon by the LPA and the EA. The extent of the functional floodplain outline produced from this Level 1 SFRA and those areas where functional floodplain has not been delineated due to lack of data should always be assessed in greater detail where any more detailed study such as a Level 2 SFRA or site-specific FRA are undertaken, as directed by EA guidance.

3.2 Future Flood Zone 3b dataset

- The EA's SFRA guidance suggests assessing the potential impacts of climate change on the functional floodplain. None of the available EA models contain the appropriate return periods plus climate change.
- The future functional floodplain extent has therefore been delineated using the next available largest return period flood extent as a proxy for climate change in the absence of detailed climate changed modelling, as agreed by HDC and the Environment Agency. The return periods used to represent the impacts of climate change adopted for each model provided are listed in **Table 3-3**.
- It was agreed to adopt the 2% or 1.33% AEP events in the absence of modelled 3.33% or 4% AEP plus climate change events, depending on the outputs available. Where neither of these outputs were available, the 1% AEP extent was adopted as a proxy.
- In the absence of climate change modelling, it is accepted that there is a greater uncertainty in the future functional floodplain. **It is recommended that any Level 2 SFRA appropriately models a future functional floodplain, alongside a present day functional floodplain**.

Table 3-3: EA modelled flood outlines used as a proxy for climate change

Model	Year	Annual Exceedance Probability (AEP)	Defended?
Bury Brook	2016	2%	Yes
Godmanchester FAS	2015	2%	Yes
Wash	2019	1.33%	Yes
Lower Ouse – Alconbury	2015	2%	Yes
Lower Ouse – Barrack Brook	2015	1%	Yes
Lower Ouse – Buckden	2015	1%	No
Lower Ouse – Downstream	2015	2%	Yes
Lower Ouse – Kym	2015	2%	Yes
Lower Ouse – Non Main Rivers	2015	1%	No
Lower Ouse – Upstream Lower Ouse	2015	2%	Yes