NOTE TO FILE

JBA Project Code	2017s6427
Contract	Middlesbrough Level 1 SFRA
Client	Middlesbrough Borough Council
Date	14 November 2017
Author	Mike Williamson
Subject	Functional Floodplain Update

1   Introduction

The functional floodplain (Flood Zone 3b) has been updated from the existing version, delineated as part of a 2010 update[1] to the 2007 SFRA, using the most up-to-date data available. This methodology note explains how the 2010 functional floodplain has been updated.

The LPA, LLFA and 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 council and EA is therefore crucial in defining the functional floodplain as robustly as possible.

2   Functional Floodplain Definition

2.1   Flood Risk and Coastal Change PPG – Table 1, Paragraph 065

The Flood Zones, referred to in the table below, show the probability of river and sea flooding, ignoring the presence of defences. Flood zones 1, 2 and 3 are included within the Environment Agency's Flood Map for Planning (Rivers and Sea).   Flood Zone 3b is the functional floodplain and is not included in the Flood Map. This zone is for the use of LPAs and developers. Flood Zone 3a is Flood Zone 3 of the Flood Map that isn't functional floodplain.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	**This zone comprises land where water has to flow or be stored in times of flood**. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Note: The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding. Reference should therefore also be made to the Strategic Flood Risk Assessment when considering location and potential future flood risks to developments and land uses.

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[1] Middlesbrough Council Strategic Surface Water Flooding Study, Final Report, March 2010

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2.2   Flood Risk and Coastal Change PPG – Paragraph 015

The definition of Flood Zone 3b in Table 1 of the FRCC-PPG explains that LPAs should identify areas of functional floodplain in their Strategic Flood Risk Assessments in discussion with the Environment Agency and the lead local flood authority. The identification of functional floodplain **should take account of local circumstances and not be defined solely on rigid probability parameters**. However, land which would naturally flood with an annual probability of 1 in 20 (5%) or greater in any year, or is designed to flood (such as a flood attenuation scheme) in an extreme (0.1% annual probability) flood, should provide a starting point for consideration and discussions to identify the functional floodplain.

A functional floodplain is a very important planning tool in making space for flood waters when flooding occurs. Generally, development should be directed away from these areas using the Environment Agency's catchment flood management plans, shoreline management plans and local flood risk management strategies produced by lead local flood authorities.

The area identified as functional floodplain **should take into account the effects of defences** and other flood risk management infrastructure. Areas which would naturally flood, but which are prevented from doing so by existing flood defence infrastructure, buildings and major transport infrastructure, will not normally be identified as functional floodplain. If an area is intended to flood, e.g. an upstream flood storage area designed to protect communities further downstream, then this should be safeguarded from development and identified as functional floodplain, even though it might not flood very often.

3   2010 Functional Floodplain

Text taken from the 2010 update report:

PPS25 recommends that the functional floodplain (Flood Zone 3b) should be defined using modelled 1 in 20 year flood outlines where available. The modelled outline has then been edited using the following methodology:

- Inclusion of land which provides a function for flood conveyance or flood storage (e.g. washlands)
- Removal of areas benefitting from defences (ABDs)
- Removal of developed land. However opportunities to reinstate functional floodplain on brownfield (derelict) sites will be sought.
- Removal of major transport infrastructure (e.g. motorways and railways)
- Removal of 'dry islands' defined using the 'size standards' within the Environment Agency SFRM Specification for Flood Risk Mapping[2].

For those watercourses that have not been modelled or where a 1 in 20 year flood outline is not available, "Candidate Flood Zone 3b" areas have been identified based on the Environment Agency Flood Zone 3 as a precautionary approach. This has been done by identifying greenfield areas within Flood Zone 3 which should be safeguarded from future development. Storing flood water in these areas during an event could potential reduce risk downstream at urban areas in the future.

However, as these candidate areas have not been explicitly modelled (or have used a 1 in 100 year modelled outline) and are partly based on profession judgement, it is important that they are assessed in more detail at a site-specific FRA level if development is planned in the future. Nevertheless it is recommended in this study that they are left as open greenfield for future flood storage or as possible flood compensation needed to allow other development.

Previously developed brownfield land, adjacent to watercourses may provide opportunities to incorporate space for flood water to reduce flood risk to new and existing developments.

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[2] Environment Agency (2006) Strategic Flood Risk Management Specification for Flood Risk Mapping release 1.2

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4 Functional Floodplain Update

The following data sets have been interrogated to update the existing 2010 functional floodplain:

- Functional Floodplain outline from 2010 SFRA update
- EA Flood Storage Areas (FSA) – none present
- EA Areas Benefitting from Defences (ABD) – none present
- EA Historic Flood Map (HFM) – present along Ormesby Beck. Inclusion of the HFM means that some areas of the functional floodplain exceed the boundary of Flood Zone 3a
- Urban areas - OSOpenMapLocal_Raster (to remove developed areas and transport infrastructure from functional floodplain)

4.1 GIS Methodology

- The existing 2010 functional floodplain provided a starting point for review. The 2010 outline was clipped to the MBC boundary
- Middle Beck 25 year outline (assumed undefended) from the 2014 Middlesbrough Becks Flood Warning Improvements study was used to update FZ3b along Middle Beck
- Spencer Beck 25 year outline (assumed undefended) from the 2014 Middlesbrough Becks Flood Warning Improvements study was used to update FZ3b along Spencer Beck
- Ormesby Beck 20 year outline (assumed undefended) from the 2015 Ormesby Beck Flood Modelling Update was used to update FZ3b along Ormesby Beck, Marton West Beck and Newham Beck
- The HFM was used in various locations where it was considered appropriate. In some of these areas, the functional floodplain boundary exceeds Flood Zone 3
- The OS Open Data OSOpenMapLocal_Raster Dataset was used to identify urban areas and transport infrastructure to be removed from the functional floodplain.

Table 1 below lists the locations where the 2010 functional floodplain has been updated. Any locations not cited remain unchanged from the 2010 version.

Table 1 Functional floodplain data sources

Watercourse	Extent	Data Source
Middle Beck	From B1380 to Cotswold Avenue, Pallister	2014 Middlesbrough Becks Flood Warning Improvements study
Ormesby Beck	Nunthorpe to Tees	2015 Ormesby Beck Flood Modelling Update
Marton West Beck	Coulby Newham to Ormesby Beck confluence at A66	2015 Ormesby Beck Flood Modelling Update
Newham Beck	Coulby Newham to Marton West Beck confluence	2015 Ormesby Beck Flood Modelling Update
Spencer Beck	Oakfield Gardens, Ormesby to Tees	2014 Middlesbrough Becks Flood Warning Improvements study
Ormesby Beck	Kentmere Road, Berwick Hills to just north of confluence with Marton West Beck	HFM

The extent of the functional floodplain outline produced from this 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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4.1.1 Cross boundary checks

It was required to check the consistency of the Middlesbrough functional floodplain with the functional floodplain of the neighbouring authorities where watercourses crossed or shared authority boundaries. Table 2 shows the comparisons between each.

Table 2 Functional floodplain comparisons with adjacent authorities

Watercourse	Neighbouring LPA	MBC data source	Neighbouring LPA data source	Comment
Main Stell	Redcar and Cleveland	Flood Zone 3 (from 2010 SFRA update)	Flood Zone 3 (from 2016 Redcar and Cleveland SFRA update)	No action required for MBC
River Tame	Hambleton	Flood Zone 3 (from 2010 SFRA update)	Not designated FZ3b	No action required for MBC
Main Stell	Hambleton	Flood Zone 3 (from 2010 SFRA update)	Not designated FZ3b	No action required for MBC
Ormesby Beck	Redcar and Cleveland	2015 Ormesby Beck Flood Modelling Update	2015 Ormesby Beck Flood Modelling Update	No action required for MBC
Middle Beck	Redcar and Cleveland	2014 Middlesbrough Becks Flood Warning Improvements study	Middle Beck & Spencer Beck Data Improvements/JBA Consulting 2008	No action required for MBC
Spencer Beck	Redcar and Cleveland	2014 Middlesbrough Becks Flood Warning Improvements study	Middle Beck & Spencer Beck Data Improvements/JBA Consulting 2008	No action required for MBC
Maltby Beck	Stockton	Flood Zone 3 (from 2010 SFRA update)	Flood Zone 3 (from 2017 Stockton-on-Tees SFRA update)	No action required for MBC

Table 2 shows that MBC is using the most up-to-date data available compared to neighbouring authorities.