Appendix B - Data sources used in the SFRA

1 Historical flooding

The Fylde Coast Authorities provided information on historic flood incidents across the study area. The Environment Agency's (EA's) Historic Flood Map is also presented in Appendix A: GeoPDF Mapping and the EA's Recorded Flood Outlines dataset has also been used to understand the flood history across the study area. Section 19 reports published by Blackpool Council and Lancashire County Council have also been used.

Section 4.1 of the Main Report documents the historic flooding records obtained.

2 Fluvial flooding

2.1 Flood Zones 2 and 3a

Flood Zones 2 and 3a, as shown in the Appendix A mapping, show the same extent as the online EA's Flood Map for Planning (FMfP) (which incorporates latest modelled data) other than for Ashbournes Brook (2020). This model is in the east of the study area around the M6. The EA have confirmed that this model is due to be incorporated into the FMfP in due course, and therefore is suitable for inclusion within the Flood Zones for this SFRA.

The extents of the models used for this SFRA are shown in Figure 2-1. Over time, the online mapping is likely to be updated more often than the SFRA, so SFRA users should check there are no major changes in their area.

The following models are included in the EA's Flood Map for Planning Flood Zones 2 and 3a, and therefore have been incorporated into this SFRA. However, due to the age of the models and lack of available outputs, they have not been included within the delineation of Flood Zone 3b or climate change outlines and are therefore not shown in Figure 2-1:

- Burn Drain (2005)
- Pegs Pool (2005)
- Liggard Brook (2006)
- Marton Mere (2009)

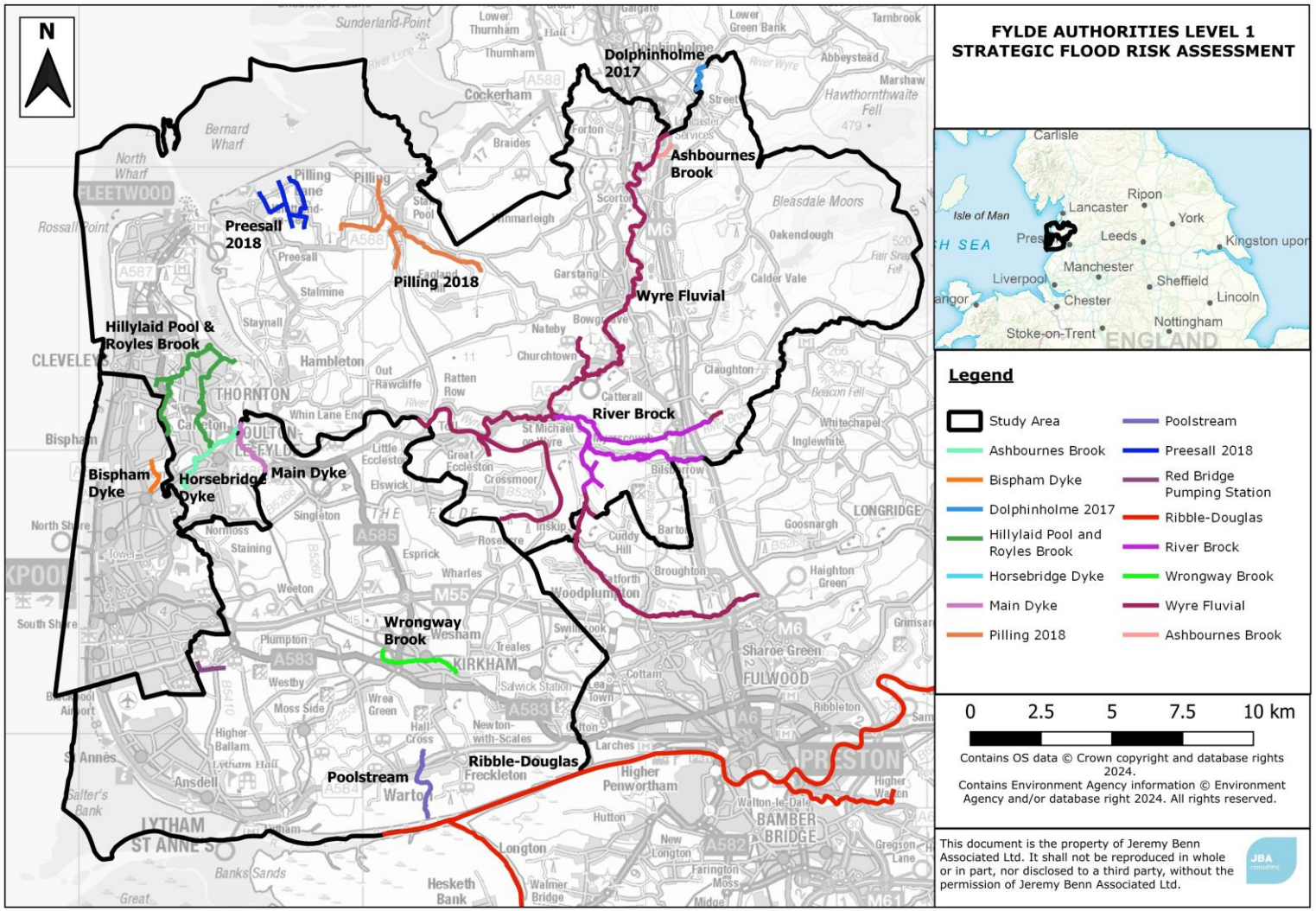

Figure 2-1: Extents of the fluvial hydraulic models used in this SFRA.

2.2 Flood Zone 3b (the Functional Floodplain)

Flood Zone 3b, as shown in Appendix A mapping, has been compiled for the study area as part of this SFRA and is based on the 3.3% AEP (1 in 30-year chance of flooding in any given year) extents produced from detailed hydraulic models, where available, which is in line with the recent updates to the Planning Practice Guidance (PPG).

The 3.3% AEP defended modelled flood extents have been used to represent Flood Zone 3b, where available from the EA. For areas covered by detailed models, but with no defended 3.3% AEP output available, the 2% AEP defended outputs were used as a proxy and then the 3.3% AEP undefended outputs if neither defended output was available. Table 2-1 below details all modelled outputs included in the Flood Zone 3b functional floodplain and indicates which of these include modelled defences.

Table 2-1: Modelled outputs used for the Functional Floodplain

Model	Functional Floodplain
Horsebridge Dyke	2% AEP (No Defences)
Main Dyke	2% AEP (No Defences)
Bispham Dyke	2% AEP (No Defences)
Wrongway Brook	2% AEP (No Defences)
Poolstream	2% AEP Defended
Ribble-Douglas	2% AEP Defended
Hillylaid Pool & Royals Brook	2% AEP Defended
Wyre	2% AEP Defended
Dolphinholme	3.3% AEP (No Defences)
Red Bridge Pumping Station	3.3% AEP Defended
Pilling	3.3% AEP Defended
Preesall	2% AEP Defended
Ashbournes Brook	3.3% AEP Defended
River Brock	3.3% AEP Defended

The extents of the models used in this assessment are shown in Figure 2-1.

For areas not covered by detailed hydraulic models, a precautionary approach should be adopted for Flood Zone 3b with the assumption that the extent of Flood Zone 3b would be equal to Flood Zone 3a (1% AEP). If development is shown to be in Flood Zone 3a, further work should be undertaken as part of a detailed site-specific Flood Risk Assessment to define the extent of Flood Zone 3b.

If the area of interest is located somewhere that shows major changes to the extent of the Flood Zones; having checked the online mapping, developers will also need to remap Flood Zone 3b as part of a detailed site-specific Flood Risk Assessment.

3 Tidal flooding

3.1 Flood Zone 2 and 3a

Flood Zones 2 and 3a, as shown in the Appendix A mapping, show the same extent as the online EA's Flood Map for Planning (FMfP) (which incorporates latest modelled data).

Over time, the online mapping is likely to be updated more often than the SFRA, so SFRA users should make sure there are no major changes in their area.

3.2 Flood Zone 3b (Functional Floodplain)

Flood Zone 3b, as shown in Appendix A mapping, has been compiled for the study area as part of this SFRA and is based on the 3.3% AEP (1 in 30-year chance of flooding in any given year) extents produced from detailed hydraulic models, where available, which is in line with the recent updates to the Planning Practice Guidance (PPG).

The following tidal models have been updated for the present day scenario as part of this SFRA, and have available 3.3% AEP defended outputs:

- Blackpool Tidal (2024 epoch)
- Wyre Tidal (2024 epoch)
- Lune Tidal (2024 epoch)

The Ribble Tidal 3.3% AEP defended outputs for the 2023 epoch were also made available for use within this SFRA.

4 Surface water flooding

Mapping of surface water flood risk in the study area has been taken from the Risk of Flooding from Surface Water (RoFSW) maps published online by the EA. These maps are intended to provide a consistent standard of assessment for surface water flood risk across England and Wales in order to help LLFAs, the EA, and any potential developers to focus their management of surface water flood risk.

The RoFSW is derived primarily from identifying topographical flow paths of existing watercourses or dry valleys that contain some isolated ponding locations in low lying areas. They provide a map which displays different levels of surface water flood risk

depending on the annual probability of the land in question being inundated by surface water.

Table 4-1: RoFSW risk categories.

Category	Definition
High	Flooding occurring as a result of rainfall with a greater than 1 in 30 chance in any given year (annual probability of flooding 3.3%).
Medium	Flooding occurring as a result of rainfall of between 1 in 100 (1%) and 1 in 30 (3.3%) chance in any given year.
Low	Flooding occurring as a result of rainfall of between 1 in 1,000 (0.1%) and 1 in 100 (1%) chance in any given year.

Whilst the categories in Table 4-1 are used in the national RoFSW mapping, we have used the following approach to inform the sequential test.

To inform the Sequential test for this SFRA, surface water zones have been used to define locations at either lower or higher risk of surface water flooding based on the extent of the 1% AEP plus 50% climate change allowance surface water event:

- Zone A – lower risk of surface water flooding (lies outside the 1% AEP plus 50% climate change surface water extent)
- Zone B – higher risk of surface water flooding (lies within the 1% AEP plus 50% climate change surface water extent)

Although the RoFSW offers improvement on previously available datasets, the results should not be used to understand flood risk for individual properties. The results should be used for high level assessments such as SFRAs for local authorities. If a site is indicated in the EA mapping to be at risk from surface water flooding, a more detailed assessment should be considered to illustrate the flood risk more accurately at a site-specific scale.

5 Climate change

5.1 Fluvial flooding

Detailed EA hydraulic models were obtained under licence for the SFRA.

The Fylde Coast Authorities fall across three different Management Catchments: Lune, Ribble, and Wyre. As each Management Catchment has different climate change allowances, the allowances for the 2080s epoch vary for the different watercourses across the study area. This is detailed further in Section 5 of the Main Report.

No models were provided with, or run for, 3.3% AEP plus climate change events. The 3.3% AEP climate change outputs will lie within the existing fluvial outputs (for example

they may be commensurate with the 1% AEP extent), and as such would not provide 'new' information on areas at fluvial flood risk at this stage.

For the 1% AEP plus climate change events, existing climate change outputs for the +30%/ 35% and +70% uplifts from 2016 guidance have been used where available, which are similar to the current 2021 allowances for the central and upper end estimates respectively for the Ribble (+36% and +71%) and Wyre (+35% and +67%) catchments. As SFRAs are required to assess the central and higher central estimates, using the previous upper end estimate provides a conservative approach at this stage. The Lune catchment has considerably higher climate change uplifts (+49%, +61% and +92%) and the two models that lie within this catchment do not have any suitable climate change runs for use in this SFRA. However, in these areas the tidal flood extents are considerably greater than the fluvial flood extents and take precedence. They have therefore been rerun with the updated tidal climate change allowances for the 0.5% AEP event (see Section 5.3).

Where there were no detailed models available, or the existing models could not be re-run with the updated climate change guidance, Flood Zone 2 has been used as an indication of climate change.

Table 5-1 details the climate change allowances used for each model for the central and upper-end allowances for the 1% AEP event, which are shown in Appendix A: GeoPDF mapping.

Table 5-1: Allowance used to represent central and upper-end climate change for the 1% AEP event each modelled watercourse.

Model	Management Catchment	Central climate change allowance	Upper End climate change allowance
Ribble-Douglas	Ribble	35%	70%
Wyre	Wyre	35%	70%
Dolphinholme	Wyre	35%	70%
Red Bridge Pumping Station	Ribble	30%	70%
Ashbournes Brook	Wyre	35%	70%
River Brock	Wyre	35%	70%

5.2 Surface water flooding

The 0.1% AEP surface water extent can be used as an indication of surface water risk, and risk to smaller watercourses that are too small to be covered by the EA's Flood Zones.

Modelled Climate Change uplifts for the 3.3% and 1% AEP events were included as part of this SFRA and are presented in in Appendix A: GeoPDFs as 'SW Climate Change Uplifts' for the following events and scenarios:

Management Catchment	3.3% AEP 2050s upper end	1% AEP 2050s upper end	3.3% AEP 2070s upper end	1% AEP 2070s upper end
Lune	35%	45%	45%	50%
Ribble	35%	40%	40%	50%
Wyre	35%	40%	45%	50%

5.3 Tidal flooding

The four tidal models mentioned in Section 3.2 will be used to determine tidal climate change risk.

The Blackpool, Lune, and Wyre models, developed as part of the Lancashire Tidal Areas Benefitting from Defences project, have been rerun with the updated climate change allowances. The model water level boundaries have been updated for the following events and epochs:

- 3.3% AEP for the 2024 and 2124 epochs
- 0.5% AEP for the 2024 and 2124 epochs
- 0.1% AEP for the 2024 and 2124 epochs

The Ribble model, also developed as part of the Lancashire Tidal Areas Benefitting from Defences project, was recently run with updated climate change water levels in 2023, and therefore has not been rerun as part of this SFRA. The model water level boundaries are available for the following events and epochs:

- 3.3% AEP for the 2023 and 2123 epochs
- 0.5% AEP for the 2023 and 2123 epochs
- 0.1% AEP for the 2023 and 2123 epochs

6 Groundwater

Two datasets were used to assess potential areas that are likely to be at higher risk of groundwater flooding:

- The EA's Areas Susceptible to Groundwater Flooding 2010 (AStGWF) dataset, showing the degree to which areas are susceptible to groundwater flooding based on geological and hydrogeological conditions on a 1km square grid. It does not show the likelihood of groundwater flooding occurring, i.e., it is a hazard, not risk, based dataset. This dataset covers a large area of land, and only isolated locations within the overall susceptible area are likely to suffer the consequences of groundwater flooding.
- The JBA groundwater emergence map, showing the risk of groundwater flooding to both surface and subsurface assets, based on predicted groundwater levels on

a 5m square grid. For each grid cell, a depth range is given for modelled groundwater levels in the 1% AEP event. It takes account of factors including topography, groundwater recharge volumes and spatial variations in aquifer storage and transmission properties.

Section 4.9 of the Main Report details the approach adopted in this SFRA to assess the risk of groundwater flooding:

7 Sewers

United Utilities provided a record of flooding incidents relating to public foul, combined or surface water sewers from 2009 until 2022. For confidentiality, this data was only provided on a 3-digit postcode basis.

Section 4.8 of the Main Report presents this data.

8 Reservoirs

The risk of inundation because of reservoir breach or failure of reservoirs within the area has been mapped using the outlines produced as part of the National Reservoir Flood Mapping (RFM) study and are shown online on the Long-Term Risk of Flooding website at the time of publication.

The EA provide two flooding scenarios for the reservoir flood maps: a ‘dry-day’ and a ‘wet-day’. The ‘dry-day’ scenario shows the predicted flooding which would occur if the dam or reservoir fails when rivers are at normal levels. The ‘wet-day’ scenario shows the predicted worsening of the flooding which would be expected if a river is already experiencing an extreme natural flood.

Section 4.11 of the Main Report presents the reservoirs affecting the Fylde Coast Authorities.

9 Flood defences

The EA supplied the location of all flood defences within the district in their AIMS database, including information relating to the type of flood defence and their standard of protection. The 2014 coastal defence dataset from the National Network of Regional Coastal Monitoring Programmes was also used. Section 6 of the Main Report provides information on flood defences and schemes.

10 Overview of supplied data

Table 10-1 below provides an overview of the supplied data from stakeholders which has been used to inform the Fylde Coast Authorities SFRA.

Table 10-1: Summary of supplied to inform the Fylde Authorities SFRA.

Source of flood risk	Data used to inform the assessment	Data supplier
Historic (all sources)	Historic flood map Recorded flood outlines	Environment Agency
Historic (all sources)	Section 19 Flood Investigation Reports	Blackpool Council Lancashire County Council
Historic (all sources)	Historic records from previous SFRA's and notes on other known events	Blackpool Council Fylde Council Wyre Council
Fluvial (including climate change)	Horsebridge Dyke (2003) 1D ISIS model Main Dyke (2003) 1D ISIS model Bispham Dyke (2005) 1D ISIS model Wrongway Brook (2006) 1D ISIS model Poolstream (2009) 1D ISIS model Ribble-Douglas (2010) 1D/2D ISIS - TuFLOW model Hillylaid Pool & Royals Brook (2013) 1D/2D ISIS - TuFLOW model Wyre (2014) 1D/2D ISIS - TuFLOW model Dolphinholme (2017) 1D/2D Flood Modeller - TuFLOW model Red Bridge Pumping Station (2018) 1D/2D ISIS - TuFLOW model Pilling (2018) 1D/2D ISIS - TuFLOW model Preesall (2018) 1D/2D ISIS - TuFLOW model Ashbournes Brook (2020) 1D/2D ISIS - TuFLOW model River Brock (2021) 1D/2D ISIS - TuFLOW model	Environment Agency
Fluvial (including climate change)	Flood Map for Planning	Environment Agency

Source of flood risk	Data used to inform the assessment	Data supplier
Surface water (including climate change)	Risk of Flooding from Surface Water dataset	Environment Agency
Tidal (including climate change)	Blackpool Tidal (2014) TuFLOW Ribble Tidal (2014) TuFLOW Wyre Tidal (2014) TuFLOW Lune Tidal (2014) TuFLOW	Environment Agency
Coastal Risk and Erosion	National Coastal Erosion Risk Mapping (2018-2021) Shoreline Management Plan Mapping (2016)	Environment Agency
Coastal Change	Coastal Change Management Areas	Fylde Council Wyre Council
Sewers	Internal and external historic drainage records	United Utilities
Groundwater	Areas Susceptible to Groundwater Flooding dataset	Environment Agency
Groundwater	Groundwater emergence map	JBA
Reservoir	National Inundation Reservoir Mapping (Long term flood risk map)	Environment Agency
Flood defences	AIMS Spatial Flood Defences dataset	Environment Agency
Flood defences	Cell 1 defences 2014 dataset	National Network of Regional Coastal Monitoring Programmes
Cross-boundary impacts	Neighbouring authority sites and Local Plan information, to help assess cross-boundary impacts and the cumulative impact assessment	Planners at neighbouring authorities (Ribble Valley Borough Council, Preston City Council, Lancaster County Council)
Other datasets	Source Protection Zones Aquifer Designation maps (Bedrock Geology and Superficial Deposits) Detailed River Network Flood Alert and Flood Warning areas	Environment Agency (via the Fylde Coast Authorities)

Source of flood risk	Data used to inform the assessment	Data supplier
	Groundwater Vulnerability Risk of Flooding from Rivers and Sea National Receptor Dataset	