

## Appendix B - Data sources used in the SFRA

### 1 Historical Flooding

Essex County Council as Lead Local Flood Authority provided details of historical flooding events and hotspots in the district; Essex Fire and Rescue were also contacted but at the time of the draft report submission, information had not been received. The Environment Agency's Historic Flood Map is also presented in Appendix A: GeoPDF Mapping. Section 5.1 documents historic flooding records obtained.

### 2 Fluvial flooding

#### 2.1 Flood Zones 2 and 3a

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

#### 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 5% AEP (1 in 20-year chance of flooding in any given year) or 4% AEP (1 in 25-year chance of flooding in any given year) extents produced from Environment Agency detailed hydraulic models (see Figure B-1 for model coverage).

For areas not covered by detailed EA 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. If development is shown to be in Flood Zone 3a (or Flood Zone 3b derived from 2D generalised modelling), 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 in an area that has seen some 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 Climate change

Section 4.4 of the Main Report outlines the approach to climate change in the SFRA. Detailed Environment Agency hydraulic models were obtained, and the existing climate change allowances were used, alongside Flood Zone 2 as a proxy for climate change. In general, as the watercourses are headwaters with steep confined floodplain topography, there is little difference between the Flood Zones extents, and therefore climate change extents would sit between these as they uplift on Flood Zone 3a (100-year event). The new allowances have also decreased in all but one scenario compared to the 2016 previous allowances.

Table 4-1 in the Main Report reflects the latest July 2021 revised guidance on which percentage uplifts apply to which catchment management basin for the 2080s epoch.

#### **4 Hydraulic Model Coverage**

Figure B-1 shows the existing EA model coverage, used to inform FZ3b and climate change extents.

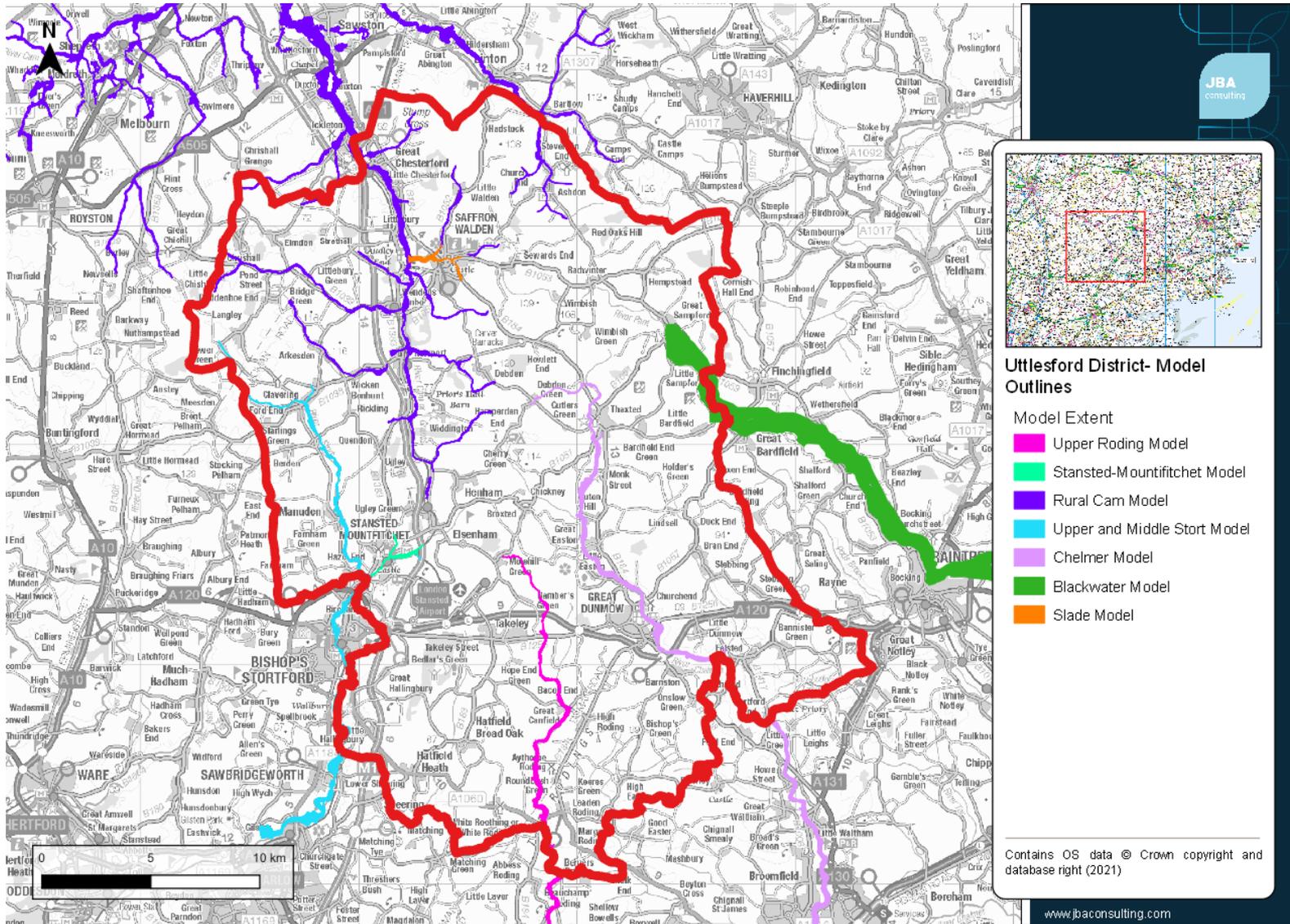


Figure B-1: Existing hydraulic modelling coverage

## 5 Surface water

Mapping of surface water flood risk in study area has been taken from the Risk of Flooding from Surface Water (RoFfSW) maps published online by the Environment Agency. 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 Environment Agency and any potential developers to focus their management of surface water flood risk.

The RoFfSW 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 B-1).

**Table B-1: RoFfSW 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.

Although the RoFfSW 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 Environment Agency mapping to be at risk from surface water flooding, a more detailed assessment should be considered to more accurately illustrate the flood risk at a site-specific scale.

## 6 Groundwater

In comparison to fluvial flooding, current understanding of the risks posed by groundwater flooding is limited and mapping of flood risk from groundwater sources is in its infancy. Groundwater level monitoring records are available for areas on Major Aquifers; however, for lower lying valley areas, which can be susceptible to groundwater flooding caused by a high-water table in mudstones, clays, and superficial alluvial deposits, very few records are available. Additionally, there is increased risk of groundwater flooding where long reaches of watercourse are culverted as a result of elevated groundwater levels not being able to naturally pass into watercourses and be conveyed to less susceptible areas.

Mapping of groundwater flood risk has been based on the Areas Susceptible to Groundwater Flooding (AStGWF) dataset and a 5m resolution JBA Groundwater map. The modelling for JBA's mapping involves simulating groundwater levels for a range of return periods (including 75, 100 and 200-years). Groundwater levels are then compared to ground surface levels to determine the head difference in metres. The JBA Groundwater Map categorises the head difference (m) into five feature classes based on the 100-year model outputs which are outlined in Table 6-1.

**Table 6-1 JBA Groundwater flood risk map categories**

Flood depth range during a 1% AEP flood event	Groundwater flood risk
Groundwater levels are either at or very near (within 0.025m of) the ground surface	Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. Groundwater may emerge at significant rates and has the capacity to flow overland and/or pond within any topographic low spots.
Groundwater levels are between 0.025m and 0.5m below the ground surface	Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. There is the possibility of groundwater emerging at the surface locally.
Groundwater levels are between 0.5m and 5m below the ground surface	There is a risk of flooding to subsurface assets, but surface manifestation of groundwater is unlikely.
Groundwater levels are at least 5m below the ground surface	Flooding from groundwater is not likely.
No risk	This zone is deemed as having a negligible risk from groundwater flooding due to the nature of the local geological deposits.

It is important to note that the modelled groundwater levels are not predictions of typical groundwater levels. Rather they are flood levels i.e. groundwater levels that might be expected after a winter recharge season with 1% AEP, so would represent an extreme scenario.

It should be noted that the JBA Groundwater Flood Map is suitable for general broad-scale assessment of the groundwater flood hazard in an area but is not explicitly designed for the assessment of flood hazard at the scale of a single property. In high-risk areas a site-specific risk assessment for groundwater flooding is recommended to fully inform the likelihood of flooding.

The AStGWF dataset is a strategic-scale map showing groundwater flood areas on a 1km square grid. It shows the proportion of each 1km grid square, where geological and hydrogeological conditions indicate that groundwater might emerge. It does not show the likelihood of groundwater flooding occurring and does not take account of the chance of flooding from groundwater rebound. This dataset covers a large area of land, and only isolated locations within the overall susceptible area are actually likely to suffer the consequences of groundwater flooding.

The AStGWF data should be used only in combination with other information, for example local data or historical data. It should not be used as sole evidence for any specific flood risk management, land use planning or other decisions at any scale. However, the data can help to identify areas for assessment at a local scale where finer resolution datasets exist.

Section 5.7 of the Main Report explains groundwater flooding.

## 7 Sewers

Historical incidents of flooding are detailed by Thames Water and Anglian Water through their Hydraulic Flood Risk Registers (HFRR). The HFRR database records

incidents of flooding relating to public foul, combined or surface water sewers and displays which properties suffered flooding.

Section 5.6 of the Main Report presents this data. At the time of draft report submission, Thames Water data had been received but no data had been received from Anglian Water.

## 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 Inundation Reservoir Mapping (NIRIM) study, and are shown online on the Long-Term Risk of Flooding website at the time of publication. The Environment Agency are currently updating their national reservoir flood maps and SFRA users should check there are no major changes to the reservoir maps before relying on the mapping in the SFRA. Section 5.9 of the Main Report presents the reservoirs affecting Uttlesford District.

## 9 Flood Defences

The Environment Agency 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 Areas Benefitting from Defences shapefile was also considered. Chapter 6 of the Main Report provides information on flood defences and schemes.

## 10 Overview of supplied data

Overview of supplied data for the Uttlesford District SFRA from stakeholders is as follows:

Source of flood risk	Data used to inform the assessment	Data supplied by
Historic (all sources)	Historic Flood Map Recorded Flood Outlines Hydraulic Modelling Reports	Environment Agency
	Historic Flooding Incidents and Assets Register	Uttlesford District Council, Essex Fire and Rescue
Fluvial (including climate change)	Blackwater (2016) 1D-2D (ISIS-TUFLOW) Hydraulic Model (HM) Cam Phase 2 (2012) 1D-2D (ISIS-TUFLOW) HM Cam Rural (2014) 1D-2D (ISIS-TUFLOW) HM Chelmer (2020) 1D-2D model (ISIS-TUFLOW) HM Stansted Mountfitchet (2015) 1D-2D (ISIS-TUFLOW) HM Stort Tributaries (2015) – 1D-2D (ISIS-TUFLOW) HM Upper and Middle Stort (2010) 1D-2D (ISIS-TUFLOW) HM Upper Roding (2016) 1D-2D (ISIS-TUFLOW) HM	Environment Agency

Source of flood risk	Data used to inform the assessment	Data supplied by
	Flood Map for Planning Flood Zones	Environment Agency
Surface Water	Risk of Flooding from Surface Water dataset	Environment Agency
Sewers	Hydraulic Flooding Risk Register (HFRR)	Thames and Anglian Water
Groundwater	Areas Susceptible to Groundwater Flooding dataset Bedrock geology/superficial deposits datasets (online dataset)	Environment Agency
Reservoir	National Inundation Reservoir Mapping (Long term flood risk map)	Environment Agency
Flood Defences	Location and description of flood defences	Environment Agency
Cross-boundary impacts	Neighbouring authority sites and Local Plan information, to help assess cross-boundary impacts and the cumulative impact assessment	Braintree District South Cambridgeshire District North Hertfordshire District East Hertfordshire District Epping Forest District Chelmsford District
Other datasets	Partner Data Catalogue: <ul style="list-style-type: none"> <li>- Source Protection Zones</li> <li>- National Receptor Database</li> <li>- Aquifer Designation Maps</li> <li>- Areas Susceptible to Groundwater Flooding</li> <li>- Detailed River Network</li> <li>- Flood Alert Areas</li> <li>- Flood Warning Areas</li> <li>- Flood Maps for Planning</li> <li>- Groundwater Vulnerability</li> <li>- Historic Flood Map</li> <li>- Risk of Flooding from Rivers and Sea</li> </ul>	Environment Agency (via UDC)