

Appendix E – Models used in the SFRA

Watercourse	Model details	SFRA Flood Zone 2 and 3a	Model used to map Flood Zone 3b?	Return period Flood Zone 3b is taken from	Climate Change 100-year + 20% outline mapped from this model?	Climate Change 100-year + 30% outline mapped from this model?	Climate Change 100-year + 50% outline mapped from this model?	Climate Change 100-year + 25% outline mapped from this model?	Climate Change 100-year + 35% outline mapped from this model?	Climate Change 100-year + 70% outline mapped from this model?	Comment
Aston Chase Brook	2018, Stone hazard mapping study, CH2M	Model results included in Flood Map for Planning	Yes	20-year	Yes	Yes	Yes	n/a	n/a	n/a	
Bell Brook	2015, Penkridge tributaries hazard mapping study, JBA	Model results included in Flood Map for Planning	Yes	20-year	Yes	Yes	Yes	n/a	n/a	n/a	
Dawley Brook	2012, Wolverhampton, Wombourne and Kingswinford FRM study, Capita Symonds and URS	Model results included in Flood Map for Planning	Yes	20-year	n/a	n/a	n/a	Yes	Yes	Yes	See comments below for Smestow/Wom/Warstones Brook.
Kingston Brook	2015, Stafford tributaries study, JBA	Model results not included in Flood Map for Planning, 100-year and 1,000-year undefended model outlines used to define Flood Zones	Yes	20-year	Yes	Yes	Yes	n/a	n/a	n/a	
Otherton Brook	2015, Penkridge tributaries hazard mapping study, JBA	Model results included in Flood Map for Planning	Yes	20-year	Yes	Yes	Yes	n/a	n/a	n/a	
Ridings Brook	2009, Ridings Brook SFRM, JBA	Model results included in Flood Map for Planning	Yes	20-year	Yes	Yes	Yes	n/a	n/a	n/a	
Rising Brook (Rugeley)	2014, Rising Brook FAS, JBA	Model results included in Flood Map for Planning	Yes	20-year	Yes	Yes	Yes	n/a	n/a	n/a	The climate change outlines were derived from the flood alleviation scheme design model, as this scheme has been implemented and supersedes the 2014 baseline model.
Rising Brook (Stafford)	2015, Stafford tributaries study, JBA	Model results not included in Flood Map for Planning, 100-year and 1,000-year undefended model outlines used to define Flood Zones	Yes	20-year	Yes	Yes	Yes	n/a	n/a	n/a	
River Anker	2006, River Anker SFRM, JBA	Model results included in Flood Map for Planning	Yes	25-year	Yes	Yes	Yes	n/a	n/a	n/a	
River Penk	2011, Visualisation model, Halcrow	Model results not included in Flood Map for Planning, 100-year and 1,000-year undefended model outlines used to define Flood Zones	Yes	20-year	Yes	Yes	Yes	n/a	n/a	n/a	Flood Map for Planning has not been updated with these model results.
River Sow	2011, Visualisation model, Halcrow	Model results not included in Flood Map for Planning, 100-year and 1,000-year undefended model outlines used to define Flood Zones	Yes	20-year	Yes	Yes	Yes	n/a	n/a	n/a	Flood Map for Planning has not been updated with these model results.
River Sow	2017, Eccleshall Flood Modelling Study, JBA	Model results included in Flood Map for Planning	No	n/a	Yes	Yes	Yes	n/a	n/a	n/a	Model only run to update Flood Zones 2 and 3a. 20-year model for Flood Zone 3b was not run.

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River Tame	2009, River Tame SFRM, Halcrow	Model results included in Flood Map for Planning	Yes	20-year	Yes	Yes	Yes	n/a	n/a	n/a	The climate change 1D mapped outputs extended to cover a large area of Tamworth where defences are present. The maximum stage in the model results was analysed to determine whether flooding would overtop the defences, given the crest level specified in the data, and the extents were trimmed to the defences accordingly. More information is shown below.
River Trent	2009, River Trent Model 1 Enhancement Model, Capita Symonds	Model results included in Flood Map for Planning	Yes	20-year	Yes	Yes	Yes	n/a	n/a	n/a	
River Trent	2009, Stone revised flood zones, River Trent 1 Enhancement Model, Capita Symonds	Model results included in Flood Map for Planning	TBC	20-year	Yes	Yes	Yes	n/a	n/a	n/a	
River Trent	2005, Fluvial Trent Strategy Model 2, Environment Agency	Model results included in Flood Map for Planning	Yes*	25-year	Yes*	Yes*	Yes*	n/a	n/a	n/a	*Downstream of the railway line downstream of Rugeley, Flood Zone 2 was used as a conservative indication of climate change and Flood Zone 3a was used as a conservative indication of Flood Zone 3b, due to 1d mapping techniques producing unreliable results, as full GIS mapping data was not included in the supplied model data.
Scotch Brook	2018, Stone hazard mapping study, CH2M	Model results included in Flood Map for Planning	Yes	20-year	Yes	Yes	Yes	n/a	n/a	n/a	
Smestow Brook	2012, Wolverhampton, Wombourne and Kingswinford FRM study, Capita Symonds and URS	Model results included in Flood Map for Planning	Yes	20-year	n/a	n/a	n/a	Yes	Yes	Yes	The 1D-2D version of the model was able to run for the 25% and 35% climate change scenarios; however, the 70% model failed due to model instabilities. The original modelling study stated that the 1D-2D combined model could not be run stably at high flows, therefore for the 1,000-year model event, a 1D-only model had to be run. This model was therefore used to represent the 70% climate change scenarios and means that the 70% extents were created from 1D-mapping techniques, rather
Warstones Brook	2012, Wolverhampton, Wombourne and Kingswinford FRM study, Capita Symonds and URS	Model results included in Flood Map for Planning	Yes	20-year	n/a	n/a	n/a	Yes	Yes	Yes	
Wom Brook	2012, Wolverhampton, Wombourne and Kingswinford FRM study, Capita Symonds and URS	Model results included in Flood Map for Planning	Yes	20-year	n/a	n/a	n/a	Yes	Yes	Yes	

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											than 1D-2D outlines as were produced for the 25% and 35% climate change extents.

River Tame mapping

Due to the nature of 1D mapping techniques, defences are not always represented in the model if cross sections do not extend to reach the defences in the floodplain and must therefore be manually edited out of the flood outlines produced from the model. Several defences exist around Tamworth along the Tame, and investigations were undertaken by comparing the maximum stage at different cross sections to the stated crest level of the defence, to determine whether the flood extents would overtop the defence. If the extents did not overtop, the outlines were manually edited to extend as far as the defence but not overtop. This was also done in comparison to the outlines from the 20% CC outline from the original 2009 model. Where the maximum stage at a cross section was greater than the height of one part the defence, but at another cross section on the same defence the maximum stage was lower than the defence height, the extent was assumed to overtop the defence everywhere, as the extents would likely spread behind the defence if any part of it was overtopped.

The extents have been manually trimmed using the best judgement of topography, defence height, maximum stage and defence location; however, it is strongly recommended that developers conduct more detailed modelling as part of a site-specific assessment to confirm the impacts of residual flood risk against defences.

Defence	Cross section	Defence height (m AOD)	Max stage 20% CC (m AOD)	Max stage 30% CC (m AOD)	Max stage 50% CC (m AOD)	Max stage 20% CC ORIGINAL model (m AOD)	Conclusion
Coton Defences (200-year SoP, built 2013)	TM030023RB	58.83	58.201	58.281	58.547	58.191	Original outlines show overtopping, but defences (2013) are more recent than model (2009). Maximum stage of CC does not overtop the defence.
	TM030167RB	58.82	58.336	58.411	58.657	58.327	
	TM030527RB	58.82	58.408	58.483	58.727	58.4	
	TM031111RB	58.82	58.475	58.549	58.79	58.467	
Upstream A51 defences (100-year SoP, built 1962/1999)	TM032303	59.37	59.046	59.082	59.281	59.045	Original outlines do not overtop defence, maximum stage of CC does also does not overtop the defence.
	TM032494	59.46	59.142	59.192	59.371	59.14	
	TM032653	61.51	59.18	59.23	59.429	59.187	
Bitterscote defences (100-year SoP, built 1962)	TFRC1196LB	59.65	59.153	59.202	59.373	59.151	Original outlines do not overtop defence, maximum stage of CC does also does not overtop the defence.
	FRDR0182D	59.89	59.452	59.502	59.686	59.451	
Fazeley Road defences (100-year SoP, built 1963)	TM034260	61.18	61.223	61.319	61.59	61.231	Original outlines overtop the defence and maximum stage of all CC results for TM034260 overtops the defence.
	TM035002	61.55	61.359	61.446	61.664	61.366	
Brook End defence (200-year SoP, built 1963/2014)	TM040105D	62.8	62.194	62.376	62.676	62.208	Original outlines overtop the defence; however, part of the defence was constructed in 2014 which would not have been included in the original model. The maximum stages of all CC results do not overtop the defence.
	TM040232	62.8	62.22	62.401	62.715	62.234	
Mayfair Drive/ New Mill Lane defence (200-year SoP, built 2018)	TM040573	62.78	62.304	62.455	62.763	62.292	Original outlines show overtopping, but defences (2018) are more recent than model (2009). Maximum stage of CC does not overtop the defence.