

Explanatory note on the difference between our planning guidance and the Future Flood Maps

November 2020

Note that SEPA's guidance on [Climate Change Allowances for Flood Risk Assessment in Land Use Planning](#) (Version 1, published in 2019, referred to hereafter as the guidance), represents SEPA's most up to date position on climate change related flood risk for land use planning, and the Future Flood Maps provide a strategic level indication of future sensitivities only. The functional floodplain for land use planning purposes remains that which is currently defined by Scottish Planning Policy 2014 as the area flooded by the present day 0.5% Annual Exceedance Probability event. There are key differences between the Future Flood Maps and the guidance, and these are detailed and explained below.

Non-technical explanation:

SEPA's Future Flood Maps published in 2020 (referred to as the maps hereafter) for the first time provide information on how the areas at risk of river or coastal flooding in a 0.5% Annual Exceedance Probability event may change due to climate change.

However, the climate change uplifts used in the maps are based upon different projections to those used in SEPA's guidance on [Climate Change Allowances for Flood Risk Assessment in Land Use Planning](#).

In short, for **coastal flooding**, the maps use allowances that are smaller than those in the guidance.

For **fluvial flooding** the maps and guidance are consistent at the present time for larger catchments, but there are differences in the uplifts for smaller catchments.

These differences exist because both the maps and the guidance are based on UK climate projections, which are frequently refined over time due to improvements in both our understanding of the climate system and to climate modelling. Work required to update the maps in line with the projections is more resource-intensive than that required to update the guidance. As we have made a clear commitment to keep the guidance up to date so that it reflects the best scientific information available, it is likely to be the case that some differences will persist between the maps and the guidance for some time to come, though their precise form will evolve. We will keep the difference between the two products under continual review, with the longer term aim of ensuring both are in alignment.

More detail on the current difference is provided overleaf.

Technical detail:

Emissions Scenario

The climate change allowances used for both the maps and the guidance are based on the UK Climate Projections.

The maps are based on UK Climate Projections 2009, which was the best information available at the time at which the national flood hazard modelling was carried out in 2011-2013. However, the more recent UK Climate Projections 2018 (these will eventually be used to update the maps), were used in the development of the guidance on sea level rise.

The UK Climate Projections provide information on a range of possible futures depending on the level of action taken to control the concentration of greenhouse gases in the atmosphere (referred to as different emissions scenarios), and how the climate responds to changes in the concentration of greenhouse gases (exceedance probability for a particular level of change in a variable within an emissions scenario).

In both the maps and the guidance, a High Emissions Scenario has been used, which assumes limited or no global action to tackle climate change so that emissions continue to rise. This High Emissions Scenario differs in the way it has been defined in the UK Climate Projections 2009, where it is referred to as the High Emissions Scenario and the more

recent UK Climate Projections 2018, where it is referred to as Representative Concentration Pathway 8.5. However, both are broadly consistent in terms of the assumed global temperature increase by the end of century.

Coastal flooding

As noted above, for coastal flooding the maps use allowances that are smaller than those in the guidance.

The maps are based on the UK Climate Projections 2009 High Emissions Scenario 95th percentile for the year 2080, while the allowances in the guidance are based upon UK Climate Projections 2018 Representative Concentration Pathway 8.5 (High Emissions Scenario) 95th percentile for the year 2100. Projections for global sea level rise increased between UK Climate Projections 2009 and UK Climate Projections 2018 largely due to improved understanding of land ice melt, so that the UK Climate Projections 2018 are higher than the UK Climate Projections 2009 for the same time frame and equivalent emissions scenario, however, there is also a difference in the time frame used for the guidance and the maps.

Comparison of the level of sea level rise used in the maps with the UK Climate Projections 2018 shows that the map scenario is broadly equivalent to the UK Climate Projections 2018 50th percentile for 2100, for a high emissions scenario. This means that with limited global action to tackle climate change there is a 1 in 2 chance that the actual level of sea level rise will be higher than that in the maps by 2100, but only a 1 in 20 chance it will be higher than that in the guidance by 2100.

River flooding

Catchments > 50km²

For catchments larger than 50 km², the guidance and maps are both based on flow uplifts for river basin regions from the Centre for Ecology and Hydrology 2011 report for SEPA, “An assessment of the vulnerability of Scotland’s river catchments and coasts to the impacts of climate change¹”. There are some areas where alternative uplifts have been

¹ Kay, A., Crooks, S., Davies, H., & Reynard, N. (2011). An assessment of the vulnerability of Scotland's river catchments and coasts to the impacts of climate change. Wallingford: Centre for Ecology and Hydrology.

used within the maps - see Table 2 of the appendix of the Future Flood Map Summary on SEPA's [Developing Our Knowledge](#) web page.

Catchments < 50km²

For catchments smaller than 50 km² the maps and guidance are inconsistent at present. The guidance recommends the use of peak rainfall intensity uplifts for catchments <30km². For catchments between 30km² and 50km² the guidance recommends use of either peak rainfall intensity uplifts or peak river flow uplifts, depending on which would produce the higher uplifted flow. The scenario used in the maps, however, uses the peak river flow uplifts for all catchment sizes.

Surface water

A future surface water flood map has not been published at the current time. We intend to publish a surface water Future Flood Map in a future release of the SEPA Flood Maps. This will use new information from UK Climate Projections 2018 on how climate change may affect short-duration high-intensity rainfall events that are typically responsible for surface water flooding.

The published surface water present day low likelihood flood map layer used the medium likelihood flood event with an increase in rainfall intensity of 20% nationally for the 2080s based on Department for Environment, Food & Rural Affairs guidance (2006), which represented the best understanding at the time. This layer may provide a first indication of those areas potentially at risk from surface water flooding in the future, however, due to projected changes in rainfall intensity it may not show all locations that may be affected in the future, and the 20% increase in rainfall intensity everywhere is lower than the rainfall uplifts from the UKWIR 2017² study used in the guidance.

Planned guidance updates

Planned guidance updates for 2020 /21 are to the uplifts for peak river flow so that they reflect UK Climate Projections 2018, and to rainfall intensity to take account of work

² 2017 Research Undertaken by UK Water Industry Research: Report reference number 17/CL/10/17. Rainfall intensity for sewer design – Stage 2, Guidance for water companies. <https://ukwir.org/rainfall-intensity-for-sewer-design-stage-2-0>

currently underway to produce uplifts for short duration rainfall, also based on UK Climate Projections 2018. Other updates will be required as new scientific information emerges.

Comparison summary

Error! Reference source not found. provides a useful summary comparison of the information used in the maps relative to the guidance.

Table 1			
Source of Flooding	Future Flood Map scenario	Land Use Planning Guidance Version 1	
Coastal (sea level rise)	UKCP09 High 2080 95 th ile (broadly equivalent to the UKCP18 RCP8.5 50 th ile for 2100) Varies around coast 0.46-0.63 m	UKCP18 2100 RCP 8.5 95 th ile Applied by river basin region. Varies around coast 0.85-1.02 m	
River (% uplift applied to high flows)	Flow uplifts from CEH 2011 study using UKCP09 High 2080s (2070-2099) 67 th %ile.	Catchments > 50 km ²	CEH 2011 study using UKCP09 High 2080s (2070-2099) 67 th %ile.
		Catchments 30-50 km ²	Highest of CEH 2011 flow uplift or rainfall uplift
		Catchments < 30 km ²	Rainfall uplift from UKWIR 2017 (35% -55%)
Surface water	Future surface water flood map not published at the current time, intend to publish in a later release.	Rainfall uplift from UKWIR 2017 (35%-55%)	

	<p>Note that the present day low likelihood scenario for surface water uses medium likelihood +20% rainfall intensity everywhere.</p>	
--	---	--

For information on accessing this document in an alternative format or language please contact SEPA by email at equalities@sepa.org.uk

If you are a user of British Sign Language (BSL) the Contact Scotland BSL service gives you access to an online interpreter enabling you to communicate with us using sign language.

<http://contactscotland-bsl.org/>

www.sepa.org.uk

Strathallan House, Castle Business Park, Stirling, FK9 4TZ