

Updated guidance: peak rainfall allowances have been updated in 'Flood risk assessments: climate change allowances'

Who are these messages for?

These messages are for local planning authorities and developers preparing Strategic Flood Risk Assessments (SFRAs) and site specific flood risk assessments (FRAs) respectively.

The peak rainfall allowances will also be updated in Environment Agency guidance ['Flood and coastal risk projects, schemes and strategies: climate change allowances'](#) later in May. This update will take a similar approach. Contact Andrew Eden (andrew.eden@environment-agency.gov.uk) for more information regarding the update to this guidance.

Main messages

What's changed?

On 10th May 2022 the peak rainfall allowances in ['Flood risk assessments: climate change allowances'](#) were updated so they reflect the latest projections in UKCP Local (2.2km)¹ and subsequent research 'FUTURE-DRAINAGE: Ensemble climate change rainfall estimates for sustainable drainage'² (referred to as 'FUTURE-DRAINAGE' herein).

The main changes are as follows:

- Peak rainfall allowances are provided for 'management catchments' rather than a set of single national allowances for England.
- The 1% and the 3.3% annual exceedance probability events are covered.
- Two epochs are provided rather than three as previously – the '2050s' and '2070s'. 2050s epoch should be used for development with a lifetime up to 2060 and 2070s epoch for development with a lifetime between 2061 to 2125 respectively.
- Central and upper end allowances are provided as previously, but there is a focus on using the central allowance for development with a lifetime to 2100 and the upper end for development with a lifetime to 2125.

Why have these changes been made?

These changes have been made because:

- UKCP Local (2.2km) and supporting research FUTURE-DRAINAGE provides updated peak rainfall projections that are based on significantly more robust

¹Part of UKCP18 see [UK Climate Projections \(UKCP\) - Met Office](#)

² [Future drainage - Press Office - Newcastle University \(ncl.ac.uk\)](#)

climate modelling than the peak rainfall allowances published in 2016. By ensuring our guidance is premised on the latest climate change projections, it promotes resilient and sustainable communities and built environment, helping local planning authorities and developers to demonstrate they are prepared for the climate emergency.

- Using management catchments to provide the allowances mean they better reflect the geographic variability in how climate change is likely to affect peak rainfall events in England.
- The 1% and the 3.3% annual exceedance probability events are important for assessing surface water flood risk and informing drainage system design respectively.
- UKCP Local (2.2km) and supporting research 'FUTURE DRAINAGE' only cover 2 epochs.
- The central allowance, based on the 50th percentile of the high emission scenario (RCP8.5), represents scenario that will meet or exceed a 4°C increase in global mean temperature by 2100. However, UKCP Local (2.2km) only provides projections up to 2080. For development with a lifetime up to 2100 it is robust to use the central allowance, however, for longer life development (such as residential which also is more vulnerable), it is more robust to use the upper end in order to account for the relatively short time horizon in the underpinning projections.

This update supports the Environment Agency goal for 'a nation resilient to climate change'

In our corporate plan '[EA 2025](#)' we state our ambition to be a stronger leader on climate adaptation and resilience, encouraging others to act now on the climate emergency and invest in adaptation.

The guidance promotes a robust approach to climate resilience, based on the high emission scenario of UKCP18, with the central allowance representing a 4°C increase by 2100. This ensures our approach is grounded on the latest evidence on the global climate change pathway we are currently following, reflected in [UNEP Adaptation Gap report](#) (Jan 2020), which states we are heading for a 3°C temperature rise this century, but this could be as high as 4°C.

What impact will the update have?

Providing allowances by management catchment means there is more variability in the allowances. For example at the upper end for 2070s the range is 40-45%, with a few locations being 50% - this represents an increase for some locations compared to the previous upper end allowance for the 2080s, which was 40%. Overall, we don't expect the change to have a significant impact in most locations. Transitional arrangements below provide advice to minimise the impact of this update for developments and plans that are submitted or well progressed at the time of the update.

How have customers been prepared for the update?



Since early 2022 the Environment Agency have been liaising with the Association of SuDS Authorities (ASA) to provide information to brief Lead Local Flood Authorities about the upcoming change.

Local Environment Agency teams were briefed about the update in March 2022 and so they could make customers aware of the upcoming changes to the peak rainfall allowances.

On this basis we don't expect the update to present unexpected issues for most local planning authorities or developers.

How soon should developers and LPAs use the updated allowances?

The updated guidance will come into immediate effect from 10th May 2022. However, to avoid significant delays to **development plan documents** (e.g. local plans and spatial development strategies) and strategic flood risk assessments that are well advanced or have already submitted for examination when the updated allowances are published, the Environment Agency will base its advice on the previous guidance in these cases. We advise LLFAs to take the same approach.

To avoid significant delays to **planning applications** validated or well progressed when the updated allowances are published, we advise LLFA to base their advice on the previous guidance in these instances.

The Environment Agency's advisory role on individual applications with surface water issues is limited to areas with critical drainage problems. Areas with critical drainage problems are currently only designated in Devon and Cornwall and are covered by local standing advice. On this basis, LLFAs will provide the sole source of surface water flood risk and drainage advice to LPAs and developers on individual applications.

Once the updated allowances have been published, the Environment Agency will take a risk-based approach when providing its advice on plans that are well progressed, considering the following factors:

- The severity of surface water flood risk in the relevant area, and the scale and vulnerability of the development proposed;
- The sensitivity of existing development and infrastructure in the area that may be affected by a development's management of surface water run-off;
- The difference between the assessed and updated allowances; and
- The amount of time elapsed since the updated allowances were published and thus the time available to update assessments.

We advise LLFAs do the same when advising on plans and planning applications.

Future updates

The allowances for sea level rise and peak river flow were updated based on projections in UKCP18 and supporting research in 2019 and 2021 respectively. Following this update to peak rainfall allowances, we do not anticipate further updates to the climate change allowances in the near future. We will consider customer feedback and update supporting guidance as necessary.

Contact for information

Contact your lead local flood authority, and in some cases your local planning authority, for advice about transitioning to and applying peak rainfall allowances when assessing surface water flood risk and designing drainage systems for new development and plans. Lead local flood authorities do not have a statutory duty to provide advice on surface water flooding or on drainage system design for non-major development and will provide this advice where they have the capacity to do so. The Environment Agency will provide advice on regarding the use of peak rainfall climate change allowances for strategic flood risk assessments to inform plans, but we will do so in liaison with lead local flood authorities.

Frequently asked questions

What are the peak rainfall allowances (published May 2022) based on?

The updated allowances are based on the latest climate change research for sub-daily rainfall provided in UKCP Local (2.2km)³, which is part of the UKCP18 climate projections, and supporting research 'FUTURE-DRAINAGE: Ensemble climate change rainfall estimates for sustainable drainage⁴', which provided % peak rainfall uplifts for a 5km grid for the UK using UKCP Local (2.2km).

UKCP Local (2.2km) provides projections for RCP8.5 (high emission scenario equivalent), hence the allowances are derived from this scenario. FUTURE-DRAINAGE only provides % uplifts for the 50th and 95th percentiles and for two time periods 2040-2060 and 2061-2080, hence these have been used to provide a range of allowances for two epochs.

FUTURE-DRAINAGE provides projections for a range of return periods and event durations. We have provided allowances for the 3.3% and 1% annual exceedance probability events, with the former likely to be of most relevance to some aspects of drainage system design, and the latter key for assessing surface water flood risk. Analysis of the event durations has shown variation between them is not significant enough to justify providing multiple allowances to cover different event durations. With customers strongly advocating for a simple approach we have chosen not to provide multiple sets of allowances for different event durations. Our advice is to apply the single set of allowances irrespective of the event duration being considered (1, 3, 6 or 12hr).

³ Part of UKCP18 see [UK Climate Projections \(UKCP\) - Met Office](#)

⁴ [Future drainage - Press Office - Newcastle University \(ncl.ac.uk\)](#)

How were the previous (2016) peak rainfall allowances calculated?

The 20% lower band allowance was retained from previous climate change allowances published in Planning Policy Statement 25: Development and Flood Risk (2006). An explanation of the basis for this allowance is provided in 'Flood and coastal defence appraisal guidance' [FCDPAG3](#). Evidence available when the allowances were updated in 2016 did not suggest this lower band should be changed.

The 40% upper band came from Met Office research in 2008. Initial results from a 240-member ensemble of the Hadley Centre Global Climate Model allowed a preliminary analysis of modelling uncertainty and provide indicative ranges of likely changes in extreme rainfall at the global climate model scale. In winter, for all but the rarest of events, the ensemble results suggest increases in extreme precipitation of 5-40% across the UK for doubling CO₂ (which is expected sometime between the 2050s and 2070s depending on the emissions scenario). For the rarest events, there was greater uncertainty. For the wettest day in summer on average the ensemble suggested changes in the range -35% to 10% for southern England. This all equates to the old SRES A2 emission scenario, which is a medium high emissions scenario.

In UKCP09, projected changes in average winter precipitation and wettest day of the year (winter) for the High Emissions 2080s and the 50th and 90th percentiles of the UKCP09 sampled data both indicated the possibility of changes of around 70% (or greater) in some locations. In most modelling experiments (such as those underpinning UKCP09) there was insufficient data to be confident about changes in low probability and long return period events. It was for that reason that we didn't use UKCP09 output for the peak rainfall allowances.

What are management catchments and why have they been used as the geographical basis for providing updated peak rainfall allowances?

Management catchments are sub catchments of river basin districts. They were chosen as the geography to provide the updated peak rainfall allowances because advice on how to use the FUTURE-DRAINAGE peak rainfall projections states a regionalised approach should be taken rather than using the data for individual 5km grid squares. Using management catchments provides a suitable regionalisation and is consistent with the approach taken for the peak river flow allowances.

How should the updated allowances be used to assess surface water flood risk and inform drainage system design?

Follow guidance in '[Flood risk assessment: climate change allowances](#)'. LLFAs lead on advising LPAs and developers on how to use the allowances to assess and mitigate surface water flood risk and informing them on drainage system design for development. Further guidance is provided in internal guidance (for internal use only) '[How to apply climate change allowances in flood risk assessments](#)'.

Will the change in peak rainfall allowances mean developments designed and built using the 2016 peak rainfall allowances are under or over resilient?

When deciding on resilience design standards within our planning advice, we can only use the best information available at the time. As our understanding of climate change and modelling processes improves, so too will our understanding of the measures needed to ensure the safety and resilience of development. However, in many locations the allowances will be similar (e.g. within 5%) and thus changes in resilience standards is not likely to be an issue.

For those few areas where allowances have increased more significantly, recent developments will be considered to be resilient to future flood risk for several decades to come, giving us time to adapt to longer term risk as necessary.

The 2070s epoch in UKCP Local (2.2km) only goes to 2080 – won't this underrepresent how climate change is likely to affect peak rainfall in 2125 (accounting for developments with lifetimes of 100 years or more)?

Projections to 2125 are not available, so this risk needs to be managed in our approach to using the range of allowances for assessments. We account for this risk by advising use of the upper end allowances to manage the most important risks (i.e. keeping people and property safe and ensuring no increase risk offsite). The only alternative to this approach is extrapolating the central allowance to 2125. The disadvantages of extrapolation are that there are only two data points to base the extrapolation, making it uncertain and advising such an approach would be very complicated for customers to understand and for LLFAs and LPAs to apply. On this basis, this is not an approach we would advise or support.

Will the updated peak rainfall allowances affect the surface water flood maps provided by the Environment Agency?

The surface water flood maps provided by the Environment Agency as part of the 'Long term flood risk' map do not account for climate change. The update to the peak rainfall allowances will not result in an update to this information. As part of the second national flood risk assessment (NaFRA2) the Environment Agency is aiming to provide climate change flood risk mapping, but this will not be published until 2024.

Will technical surface water flood risk and drainage guidance be updated?

Following the update to the peak rainfall allowances in Environment Agency guidance [Flood risk assessments: climate change allowances](#) and [FCERM projects, schemes and strategies](#), Government and professional bodies that provide guidance on surface water flood risk and drainage will determine if they need to update their guidance and the process to do so.