

Flood Consequences Assessments: Climate change allowances

1. Purpose of this Guidance

Flooding is already a serious risk to the people, economy and environment in Wales. Climate change is expected to increase this risk over the coming decades. The effects are well documented and include rising sea levels and more frequent periods of heavy rainfall increasing the risk of flooding.

When considering new development proposals, Technical Advice Note 15: Development, Flooding and Coastal Erosion (TAN15) states that it is necessary to take account of the potential impact of climate change over the lifetime of development. A rule of thumb is that residential development has a lifetime of 100 years while a lifetime of 75 years is assumed for all other developments. Development should be resilient to future flood risks and must demonstrate that such risks can be appropriately managed to provide a safe and secure living and /or working environment throughout its lifetime. National planning policy requires proposals in areas of flood risk to be accompanied by an assessment of flooding consequences both to and from the development, which must consider the impacts of climate change.

This guidance sets out the climate change allowances to be used in flood consequence assessments submitted in support of relevant planning applications, and to inform development plan allocations. In line with TAN15, the allowances are informed by latest available information on climate change projections and different scenarios of increased global mean surface temperatures caused by greenhouse gas emissions to the atmosphere. This document replaces the guidance issued on 23 August 2016 (reference CL-03-16).

It provides **revised** sea level rise allowances based on the most up to date assessment of how climate may change in the UK over the 21st Century as presented by [UK Climate Projections \(UKCP18\)](#).

A **new section** on peak rainfall intensity has been included to reflect the risk from increased rainfall on smaller catchments and on land and urban drainage systems.

There has been **no change** to the guidance for wave height, or for peak river flow which is based on an assessment of UKCP09 data undertaken by the Environment Agency between 2013 and 2015. An update to these allowances will be made following analysis of the impacts of revised UKCP18 climate projections.

For peak river flow and peak rainfall intensity, allowances are provided for different epochs (periods) of time over the next century.

UKCP18 presents sea level rise allowances as regionalised data, with the impact of climate change dependent on location. This guidance has been updated to indicate projected increases in sea level rise for each local authority administrative area. These regional allowances replace the single allowance for Wales previously provided.

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The guidance set out in this document should be applied to planning applications (full, outline and reserved matters) submitted from 1 December 2021. Any development plan under review and yet to reach submission stage should also incorporate the new allowances from 1 December 2021.

2. What are Climate Change allowances?

Considering the potential impacts of climate change when assessing future flood risk allows for development proposals to incorporate design measures that help to manage that risk and improve resilience. Allowances to be applied to peak river flows in areas impacted by river flooding, rainfall intensity for smaller catchments and drainage assessments is provided in this guidance. Updated sea level rise projections based on UKCP18 are also provided as a steer for those locations where there is a risk of flooding from the sea.

3. Peak river flow allowances

Table 1 indicates the anticipated increase in peak river flows for the [3 river basin districts](#) that cover Wales. The allowances present the current national representation of how climate change could impact peak flow. This data will be updated once revised data is made available through UKCP18.

The allowances are based on percentage increases of change from a 1961-1990 baseline and are provided for the:

- 10th percentile (lower end estimate)
- 50th percentile (change factor/central estimate)
- 90th percentile (upper end estimate).

Table 1: peak river flow allowances by river basin district (using 1961 to 1990 baseline¹)

	Total potential change anticipated by the 2020s	Total potential change anticipated by the 2050s	Total potential change anticipated by the 2080s
Severn			
Upper end estimate	25%	40%	70%
Change factor /central estimate	10%	20%	25%
Lower end estimate	0%	5%	5%
West Wales			
Upper end estimate	25%	40%	75%
Change factor /central estimate	15%	25%	30%
Lower end estimate	5%	10%	15%
Dee			
Upper end estimate	20%	30%	45%
Change factor /central estimate	10%	15%	20%
Lower end estimate	5%	5%	5%

The projected peak river flow change is a range, with the highest estimate equally likely to occur as the lowest estimate. For this reason, **it is recommended that the central estimate, or change factor**, for the 2080s for the relevant river basin district is used to assess the potential impact of climate change as part of a flood consequence assessment (FCA) and to inform design levels. If a figure other than the central estimate is used, applicants will be expected to provide full justification within the FCA.

In addition to the change factor, an assessment of risk should be made using the upper end estimate. The information derived from this assessment should be used to inform mitigation measures that help to ensure the long-term resilience of the development. (Note: The upper end estimate may not be applicable to every site but

¹ Source: [UK Climate Projections 2009](#), published June 2009 by the UK Government Department for Environment, Food and Rural Affairs.

will need to be considered depending upon the scale and nature of the site in question).

4. Peak rainfall intensity

Increases in rainfall intensity due to climate change are likely to affect river levels, particularly within smaller catchments (less than 5km²) and on land and urban drainage systems. Rainfall allowances should be used to better understand the impacts of climate change on smaller watercourses, which may see their channel capacity reduced as a result of increased run-off.

Table 2 shows the anticipated changes in peak rainfall intensity for use in small catchments. Both the central and upper estimates should be assessed to understand the range of impact. As a minimum, development proposals should be assessed against the central estimate to inform design levels. Where the assessment indicates a significant flood risk for the upper estimate (e.g. depths, velocity), the flood consequences assessment will need to indicate the mitigation measures required to protect people and property.

For river catchments over 5km², the peak flow ranges in **Table 1** should be used.

Rainfall allowances should also be applied when considering surface water flooding and drainage assessments. Drainage systems should be designed to ensure there is no increase in site run-off when assessed against the upper estimate.

Table 2 - Change to extreme rainfall intensity (compared to a 1961-90 baseline)

Applies across all of Wales	Total potential change anticipated for 2020s (2015-2039)	Total potential change anticipated for 2050s (2040-2069)	Total potential change anticipated for 2080s (2070-2115)
Upper estimate	10%	20%	40%
Central estimate	5%	10%	20%

5. Sea level rise allowances

The science behind climate change projections for sea level rise has changed substantially in recent years. There is greater confidence in the revised projections of global mean sea level presented by UKCP18, which reflects regional variation.

This guidance has been updated to reflect the higher central allowance (70th percentile) and upper end allowance (95th percentile) of RCP28.5. This reflects an increase in global mean surface temperature of around 4.3°C by 2100.

Table 3 sets out estimates of cumulative sea level rise for each local authority area to 2100 and 2120 (to reflect the 100yr lifetime of development for residential development). The allowances are derived using the UKCP18 2100 dataset. The allowances presented for 2120 have been calculated by using the average

² Representative Concentration Pathway
<https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-guidance---representative-concentration-pathways.pdf>

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incremental increase from the last 5 years of the dataset (2095-2099) for each regional area, multiplied by 20.

The allowances in **Table 3** are provided as a guide, with the 2100 figure currently appropriate for development with a 75year lifetime. Location specific allowances, projections for different timescales and projections beyond 2120 should be obtained directly from the [UKCP18 User Interface](#).

As a minimum, development proposals should be assessed against the relevant regional 70th percentile presented in Table 3 to inform design levels. An assessment should also be made against the 95th percentile to inform mitigation measures, access and egress routes and emergency evacuation plans.

To calculate sea level, apply the appropriate regional allowance from **Table 3** and add to the baseline [coastal flood level](#)³ for the relevant location. The allowance used should be appropriate to the lifetime of development.

³ Coastal design (or flood) levels are derived from the Coastal Flood Boundary (CFB) dataset.

Table 3: Estimated mean sea level rise (in metres) for relevant local authority areas by 2100 and 2120. Allowances are based on RCP8.5 70th and 95th percentiles

Local Authority Area	Allowance (percentile)	Mean sea level rise (metres) by 2100 *(UKCP18 baseline 1981-2000)	Mean sea level rise (metres) by 2120 *(UKCP18 baseline 1981-2000)
Flintshire	70th	0.76	0.91
	95th	1.03	1.23
Denbighshire	70th	0.75	0.90
	95th	0.95	1.15
Conwy	70th	0.75	0.89
	95th	1.01	1.21
Anglesey	70th	0.74	0.88
	95th	1.01	1.21
Gwynedd	70th	0.76	0.91
	95th	1.03	1.23
Powys	70th	0.79	0.94
	95th	1.06	1.27
Ceredigion	70th	0.80	0.96
	95th	1.07	1.28
Pembrokeshire	70th	0.83	0.99
	95th	1.10	1.31
Carmarthenshire	70th	0.83	0.99
	95th	1.09	1.30
Swansea	70th	0.84	1.00
	95th	1.11	1.32
Neath Port Talbot	70th	0.84	1.00
	95th	1.11	1.32
Bridgend	70th	0.84	1.00
	95th	1.11	1.32
Vale of Glamorgan	70th	0.85	1.01
	95th	1.11	1.33
Cardiff	70th	0.85	1.01
	95th	1.11	1.33
Newport	70th	0.85	1.01
	95th	1.11	1.33
Monmouthshire	70th	0.85	1.01
	95th	1.11	1.33

When considering proposals with a lifetime of development beyond 2120 an appropriate assessment will be required for the whole of the development lifetime. Allowances up to 2125 should be calculated using the average incremental increase from the last 5 years of the dataset (2095-2099) for the relevant regional area, multiplied by 25. Allowances beyond 2125 can be

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obtained from the [UKCP18 User Interface](#), using the exploratory method dataset (2007-2300)⁴ for RCP8.5.

6. Extreme wave height allowance

Climate change is expected to increase the frequency, duration and severity of storms. An assessment of wave overtopping should be undertaken for all coastal FCAs unless it can be demonstrated that an assessment will not be required (e.g. sheltered location with no known wave problems). You should contact [Natural Resources Wales](#) for further information and advice on this requirement.

7. High⁺⁺ allowances

There has been no change to allowances for a [High⁺⁺ \(H⁺⁺\) scenario](#) within UKCP18. H⁺⁺ provides an estimate of river flood flow change and sea level rise beyond the upper end estimates. It is not possible to say how likely the H⁺⁺ scenario is, however consideration of this scenario may be helpful for contingency planning and for those developments that are very sensitive to flood risk and have lifetimes beyond the end of the century. Examples include major infrastructure projects or developments that significantly change existing settlement patterns.

You should contact the Local Planning Authority to establish whether an assessment of the H⁺⁺ scenario is required as part of a flood consequences assessment.

8. Planning advice

Planning advice on matters relating to flood risk (from rivers and the sea) and how to assess future risk can be obtained from Natural Resources Wales. For advice on flood risk from local watercourses, surface, or groundwater, you should contact the relevant lead local flood authority.

Contact Information

Welsh Government Planning Policy Branch

Email: planningpolicy@gov.wales

⁴ There is lower confidence in the 2300 dataset which has been designed for use alongside the 2100 projections for those interested in exploring post 2100 changes. However, it compares favourably with the 2100 projections and are therefore considered robust up to 2150. Beyond 2150 it provides a reasonable basis for adaption planning and is the best available information for longer term consideration of flood risk.