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Guidance

Flood risk assessments: climate change allowances

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Applies to: England

Find out when and how to use climate change allowances in flood risk assessments and strategic flood risk assessments.

Contents

The National Planning Policy Framework (NPPF) sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change. NPPF and supporting planning practice guidance on Flood Risk and Coastal Change (http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/site-specific-flood-risk-assessment/) explain when and how flood risk assessments should be

used. This includes demonstrating how flood risk will be managed now and over the development's lifetime, taking climate change into account. Local planning authorities refer to this when preparing local plans and considering planning applications.

This advice updates previous climate change allowances to support NPPF. The Environment Agency (EA) has produced it as the government's expert on flood risk.

What climate change allowances are

Making an allowance for climate change in your flood risk assessment will help to minimise vulnerability and provide resilience to flooding and coastal change in the future.

The climate change allowances are predictions of anticipated change for:

- peak river flow by river basin district
- peak rainfall intensity
- sea level rise
- offshore wind speed and extreme wave height

They are based on climate change projections and different scenarios of carbon dioxide (CO2) emissions to the atmosphere. There are different allowances for different epochs or periods of time over the next century.

When to use the climate change allowances

You need to bear in mind EA will use these allowances as benchmarks when providing advice on flood risk assessments and strategic flood risk assessments. Contact EA (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#contact) if you are unsure.

Temporary exceptions for transitional arrangements that apply as of 19 February 2016

You may have prepared assessments using the previous allowances (published in 2013). EA will base its advice on the previous allowances where development plans or proposals are well advanced. This will include:

- a development plan already submitted for examination
- a valid planning application already submitted to the local planning authority

If your development is particularly sensitive to flood risk or in a vulnerable location, EA will base its advice on the allowances in this advice. Contact EA (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#contact) if you are unsure.

Other exceptions – when it might be appropriate to use other data or climate change allowances

There may be circumstances where local evidence supports the use of other data or allowances. For example, the impact of climate change on peak river flow may not be even across all river catchments in a river basin district.

In EA's role as a technical advisor they may want to check how and why you used other data in your plans and proposals.

Types of allowances

Peak river flow allowances by river basin district

The peak river flow allowances show the anticipated changes to peak flow by river basin district.

Use the river basin maps (https://www.gov.uk/government/publications/flood-risk-assessments-river-basin-district-maps) to help decide which river basin you are in.

The range of allowances in table 1 (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#table-1) is based on percentiles. A percentile is a measure used in statistics to describe the proportion of possible scenarios that fall below an allowance level. The 50th percentile is the point at which half of the possible scenarios for peak flows fall below it and half fall above it. The:

- central allowance is based on the 50th percentile
- higher central is based on the 70th percentile
- upper end is based on the 90th percentile

So, if the central allowance is 30%, scientific evidence suggests that it is just as likely that the increase in peak river flow will be more than 30% as less than 30%.

At the higher central allowance 70% of the possible scenarios fall below this value. So, if the higher allowance is 40%, then current scientific evidence suggests that there is a 70% chance that peak flows will increase by less than this value, but there remains a 30% chance that peak flows will increase by more.

Decide which peak river flow allowances to use for different types of assessment

EA uses the following data and standards as the benchmarks for the advice it gives as a statutory consultee (http://planningguidance.communities.gov.uk/blog/guidance/consultation-and-pre-decision-matters/statutory-consultees/):

- peak river flow allowances by river basin district in table 1 (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#table-1) for both flood risk assessments and strategic flood risk assessments
- flood risk vulnerability classification for the type of development and flood zone (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#vulnerability), over the lifetime (http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/the-exception-test/what-is-considered-to-be-the-lifetime-of-development-in-terms-of-flood-risk-and-coastal-change/) of the proposed development, in development plan allocations for strategic flood risk assessments
- flood risk vulnerability classification for the type of development and flood zone (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#vulnerability) as a guide to decide which allowances to use based on the vulnerability (http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/flood-zone-and-flood-risk-tables/table-2-flood-risk-vulnerability-classification/) of the development for flood risk assessments - you should consider the lifetime (http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/the-exception-test/what-is-considered-to-be-the-lifetime-of-development-in-terms-of-flood-risk-and-coastal-change/) of the proposed development to decide which future time period to use

EA will want to see if you have considered if it is appropriate to apply high++ allowances (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#high-allowances) for your flood risk assessment or strategic flood risk assessment.

Table 1 peak river flow allowances by river basin district (use 1961 to 1990 baseline)

River basin district	Allowance category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Northumbria	Upper end	20%	30%	50%
	Higher central	15%	20%	25%
	Central	10%	15%	20%
Humber	Upper end	20%	30%	50%
	Higher central	15%	20%	30%
	Central	10%	15%	20%
Anglian	Upper end	25%	35%	65%
	Higher central	15%	20%	35%
	Central	10%	15%	25%
South East	Upper end	25%	50%	105%
	Higher central	15%	30%	45%
	Central	10%	20%	35%
Thames	Upper end	25%	35%	70%
	Higher central	15%	25%	35%
	Central	10%	15%	25%
South West	Upper end	25%	40%	85%
	Higher central	20%	30%	40%
	Central	10%	20%	30%
Severn	Upper end	25%	40%	70%

River basin district	Allowance category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
	Higher central	15%	25%	35%
	Central	10%	20%	25%
Dee	Upper end	20%	30%	45%
	Higher central	15%	20%	25%
	Central	10%	15%	20%
North West	Upper end	20%	35%	70%
	Higher central	20%	30%	35%
	Central	15%	25%	30%
Solway	Upper end	20%	30%	60%
	Higher central	15%	25%	30%
	Central	10%	20%	25%
Tweed	Upper end	20%	25%	45%
	Higher central	15%	20%	25%
	Central	10%	15%	20%

Using peak river flow allowances for flood risk assessments

Consider the flood zone (http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/flood-zone-and-flood-risk-tables/table-1-flood-zones/) and the appropriate flood risk vulnerability classification (http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/flood-zone-and-flood-risk-tables/table-2-flood-risk-vulnerability-classification/) to decide which allowances applies to your development or plan. This will help you understand the range of impact. The higher central, central, and upper end allowances are in table 1 (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#table-1).

In flood zone 2

- essential infrastructure – use the higher central and upper end to assess a range of allowances

- highly vulnerable – use the higher central and upper end to assess a range of allowances
- more vulnerable – use the central and higher central to assess a range of allowances
- less vulnerable – use the central allowance
- water compatible – use none of the allowances

In flood zone 3a

- essential infrastructure – use the upper end allowance
- highly vulnerable – development should not be permitted
- more vulnerable – use the higher central and upper end to assess a range of allowances
- less vulnerable – use the central and higher central to assess a range of allowances
- water compatible – use the central allowance

In flood zone 3b

- essential infrastructure – use the upper end allowance
- highly vulnerable – development should not be permitted
- more vulnerable – development should not be permitted
- less vulnerable – development should not be permitted
- water compatible – use the central allowance

If (exceptionally) development is considered appropriate when not in accordance with flood zone vulnerability categories, then it would be appropriate to use the upper end allowance.

Peak rainfall intensity allowance

Increased rainfall affects river levels and land and urban drainage systems.

When to use the peak rainfall intensity allowance

Table 2 (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#table-2) shows anticipated changes in extreme rainfall intensity in small and urban catchments.

For flood risk assessments and strategic flood risk assessments, assess both the central and upper end allowances to understand the range of impact.

Table 2 peak rainfall intensity allowance in small and urban catchments (use 1961 to 1990 baseline)

Applies across all of England	**Total potential change anticipated for the '2020s' (2015 to 2039)**	**Total potential change anticipated for the '2050s' (2040 to 2069)**	**Total potential change anticipated for the '2080s' (2070 to 2115)**
Upper end	10%	20%	40%
Central	5%	10%	20%

Sea level allowances

There is a single regional allowance for each epoch or time frame for sea level rise in table 3 (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#table-3).

EA expect sea level rise to increase the rate of coastal erosion. Use the coastal erosion risk maps (http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=357683.0&y=355134.0&scale=1&layerGroups=default&ep=map&textonly=off&lang=_e&topic=coastal_erosion) to plan for any changes in the position of the coastline. The maps are based on the best available data. They show the shoreline management plan policy for each stretch of coast and erosion predictions where there is no policy to maintain defences.

EA will want to see if you have considered if it is appropriate to apply high++ allowances (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#high-allowances) for your flood risk assessment or strategic flood risk assessment.

Table 3 sea level allowance for each epoch in millimetres (mm) per year with cumulative sea level rise for each epoch in brackets (use 1990 baseline)

Area of England (https://www.gov.uk/government/publications/flood-risk-assessments-river-basin-district-maps)	**1990 to 2025**	**2026 to 2055**	**2056 to 2085**	**2086 to 2115**	**Cumulative rise 1990 to 2115 / metres (m)**
East, east midlands, London, south east	4 (140 mm)	8.5 (255 mm)	12 (360 mm)	15 (450 mm)	1.21 m
South West	3.5 (122.5 mm)	8 (240 mm)	11.5 (345 mm)	14.5 (435 mm)	1.14 m
North west, north east	2.5 (87.5 mm)	7 (210 mm)	10 (300 mm)	13 (390 mm)	0.99 m

These allowances account for slow land movement. This is due to ‘glacial isostatic adjustment’ resulting from the release of pressure after ice that covered large parts of northern Britain melted at the end of the last ice age. The northern part of the country is slowly rising and the southern part is slowly sinking. This is why net sea level rise is less for the north west and north east than the rest of the country.

To calculate sea level, add the allowances for the appropriate one of the 3 geographical areas to the 1990 base sea level year. For example, to derive sea levels:

- up to 2025, use the 4 mm per year, 3.5 mm per year or 2.5 mm per year rates or the 140 mm, 122.5 or 87.5 mm cumulative totals for the appropriate geographical area
- from 2026 to 2055, the increase in sea level in this period is derived by adding the number of years on from 2025 (to 2056), multiplied by the respective rate shown in the table for the appropriate geographical area, or if the whole time period applies use the cumulative total
- treat subsequent time periods 2056 to 2085 and 2086 to 2115 as you would 2026 to 2055

Offshore wind speed and extreme wave height allowance

Wave heights may change because of increased water depths resulting from climate change. The frequency, duration and severity of storms could also change. EA will want to see if you have used the single allowance for each epoch for wind speed and wave height in table 4 (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#table-4) and the 10% sensitivity allowance to understand the range of impact.

Table 4 offshore wind speed and extreme wave height allowance (use 1990 baseline)

Applies around all the English coast	**1990 to 2055**	**2056 to 2115**
Offshore wind speed allowance	+5%	+10%
Offshore wind speed sensitivity test	+10%	+10%
Extreme wave height allowance	+5%	+10%
Extreme wave height sensitivity test	+10%	+10%

High++ allowances for peak river flood flow and mean sea level

The high++ allowances will only apply in assessments for developments that are very sensitive to flood risk and with lifetimes beyond the end of the century. For example, infrastructure projects or developments that significantly change existing settlement patterns. This includes urban extensions and new settlements.

The high++ allowances are in EA guidance 'Adapting to climate change - advice for flood and coastal erosion risk management authorities' (https://www.gov.uk/government/publications/adapting-to-climate-change-for-risk-management-authorities).

How to use a range of allowances for peak river flow and peak rainfall intensity

To help you decide which allowances to use to inform the flood levels that the flood risk management strategy will be based on for a development or development plan allocation, consider the:

- likely depth, speed and extent of flooding for each allowance of climate change over time considering the allowances for the relevant epoch (2020s, 2050s and 2080s)
- vulnerability of the proposed development types or land use allocations to flooding
- 'built in' resilience measures used, for example, raised floor levels
- capacity or space in the development to include additional resilience measures in the future, using a 'managed adaptive' approach

Future flood risk management

There may be instances where some flood risk management measures are not necessary now but may be in the future. This is a 'managed adaptive approach', for example, setting a development away from a river so it is easier to improve flood defences in the future.

EA will consider whether a managed adaptive approach might be appropriate when reviewing your plans or proposals.

Get planning advice on your proposals

EA can give a free preliminary opinion to applicants on their proposals at pre-application stage. There is a charge for more detailed pre-application planning advice. Contact your local EA office (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#contact) for a consultation. Contact your lead local flood authority (https://www.gov.uk/find-your-local-council) for advice on flood risk from local watercourses, surface, or groundwater.

Contact the Environment Agency

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