



National assessment of flood and coastal erosion risk in England 2024



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Executive summary

Overview

Understanding of current and future flood and coastal erosion risk is vital to ensuring that policy makers, practitioners and communities are ready to adapt to a changing climate.

We have built a new National Flood Risk Assessment (NaFRA) that provides a single picture of current and future flood risk from rivers, the sea and surface water for England. The last full update to NaFRA was in 2018. It uses the best available data both from the Environment Agency and Local Authorities. Our new data on depth of flooding also provides more information to help people understand the potential flood hazards they could face.

Alongside this we have also updated our National Coastal Erosion Risk Map (NCERM). The last update to NCERM was in 2017. Our new NCERM provides the most up to date national picture of current and future coastal erosion risk for England. It uses the best available evidence from the National Network of Regional Coastal Monitoring Programmes.

For the first time, both NaFRA and NCERM account for the latest UK Climate Projections and the potential impact of climate change on flood and coastal erosion risk.



Reasons behind the changes

There are a variety of reasons for the changes to flood and coastal erosion risk seen in this report. This includes both NaFRA and NCERM being able to use much better data and improved modelling methodologies. It also includes an improved assessment of the risk to properties, infrastructure and agricultural land.

Rather than a real-world increase in risk, the changes we are seeing in the total number of properties at risk of surface water flooding is almost entirely due to significant improvements in our data, modelling and use of technology.

A huge step in our understanding is how we can now incorporate the UK Climate Projections into our assessment of future flood and coastal erosion risk. Under future warming scenarios, the projection of properties in areas at flood risk and coastal erosion risk is likely to increase.

How our assessment of flood risk is changing

The new NaFRA shows that around 6.3 million properties in England are in areas at risk of flooding from one or a combination of sources: rivers, the sea and surface water. With climate change the total number of properties in areas at risk from rivers and the sea or surface water could increase to around 8 million by mid-century. In other words, 1 in 4 properties in England could be in areas at risk of flooding from rivers and the sea or surface water by mid-century.

There are wide regional variations in flood risk. From early 2025 we are making the detailed local mapping available through GOV.UK digital services to help our customers understand what this new information means for them.

Properties in areas at risk of flooding from rivers and the sea

- Total properties in areas at risk of flooding from rivers and the sea is around 2.4 million. This is slightly fewer than our previous assessment (see footnote).
- Properties in areas at high risk of flooding from rivers and the sea increases to 367,900 which is an 88 % increase from our previous assessment (see footnote).
- Of properties in areas at high risk, 163,300 are likely to flood to depths of 30 centimetres or higher from rivers and the sea. This is over two fifths (44 %) of all properties in areas at high risk.
- With climate change, we estimate the total number of properties in areas at risk of flooding from rivers and the sea will increase from 2.4 million to around 3.1 million, a 27 % increase between 2036 and 2069.
- With climate change, properties in areas at high risk of flooding from rivers and the sea could increase to 637,600, a 73 % increase between 2036 and 2069.
- Of properties in areas at high risk, 288,800 could flood to depths of 30 centimetres or higher from rivers and the sea between 2036 and 2069 – a 77 % increase from the present day.

Properties in areas at risk of flooding from surface water

- Total properties in areas at risk of flooding from surface water is around 4.6 million. This is a 43 % increase on our previous assessment (see footnote).
- Properties in areas at high risk of flooding from surface water increases to about 1.1 million. This is an increase of 3 times the number of properties in areas at high risk of surface water flooding.

1 in 4 properties in England could be in areas at risk of flooding from rivers and the sea or surface water by the mid-century.

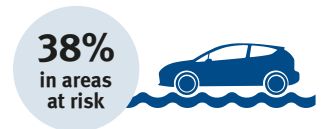


- Of properties in areas at high risk, 184,200 properties are likely to flood to depths of 30 centimetres or higher from surface water. This is 1 in 6 (17 %) of all properties in areas at high risk of flooding.
- 83 % of properties in areas at high risk are in areas with likely flood depths of less than 30 centimetres. This suggests that the typical impacts from surface water flooding are likely to occur at shallower levels than flooding events from rivers and the sea.
- With climate change, we estimate that the total number of properties in areas at risk of flooding from surface water could increase from 4.6 million to 6.1 million, a 30 % increase between 2040 and 2060.
- With climate change, properties in areas at high risk of flooding from surface water could increase to 1.8 million, a 66 % increase between 2040 and 2060.
- Of properties in areas at high risk, 288,400 properties could flood to depths of 30 centimetres or higher from surface water between 2040 and 2060 – an increase of more than half (57 %) from the present day.

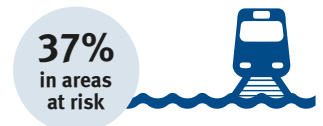
Footnote: Our new assessment is not directly comparable with previous assessments because we now have much better data and improved modelling methodologies.

Flood risk to infrastructure and agriculture

Around a third (38 %) of all roads are in areas at risk from one or more sources of flooding. If we apply the climate change projections the percentage of the road network in areas at risk rises to 46 % by mid-century. This represents an increase of 21 %.



Around a third (37 %) of all railways are in areas at risk from one or more sources of flooding. If we apply the climate change projections the percentage of the rail network in areas at risk rises to 54 % at risk by mid-century. This represents an increase of around half.



About a third (34 %) of water pumping stations and treatment plants are also in areas at risk of flooding from multiple sources.



Around 13 % of all agricultural land and about 59 % of grade 1 agricultural land is at risk of flooding from rivers and the sea. If we apply the climate change projections, this rises by 5 % by the mid-century.

How our assessment of coastal erosion risk is changing

The new NCERM shows that 3,500 properties are in areas at risk of coastal erosion in the period up to 2055. This increases to about 10,100 properties in the period up to 2105. About half of these properties are residential. The other half are non-residential properties such as schools, hospitals, retail and leisure businesses.

3,500
Properties
in areas
at risk



Our assessment of properties in areas at risk assumes that funding and implementation of all actions in Shoreline Management Plans (SMPs) for the coast are delivered. [SMPs](#) set out a planned approach to managing flood and coastal erosion risk around the coast of England to 2105.

In the worst case, where the SMPs are not delivered and no future investment is made to manage coastal erosion, the numbers of properties in areas at risk increases significantly. The total number of properties in areas at erosion risk would be 9 times greater in the period up to 2055, reaching up to 32,800 properties.

The new NCERM shows that coastal erosion risk will increase with climate change. This is mainly due to the effects of sea level rise on erosion rates. Even with SMPs delivered there could be 19,700 properties in areas at risk of erosion in the period up to the end of the century. Without any of the investment set out in SMPs being delivered, this figure is expected to be 5 times greater.

Next steps

We are committed to a rolling programme of data improvements so we can take into account the latest local modelling evidence and national data improvements.

We are also developing a new flood and coastal investment programme using the best available evidence which includes the new NaFRA and new NCERM. This will allow us to assure that our investment programmes are prioritising the places and projects where current and future risk is greatest.

The context: Flooding and coastal erosion risk in a changing climate

Communities are on the frontline of flooding and coastal erosion. We have lived with and seen the effects of flooding and coastal erosion over many decades. This includes devastating events such as the east coast tidal surge in 1953 which resulted in hundreds of fatalities.

We know that flooding can cause significant economic damages to people, businesses, landowners and infrastructure. For instance, following the flooding caused by Storms Ciara and Dennis in 2020, it was estimated that [the average insurance claim per household was £32,000](#).

We estimate the [total economic damages](#) for all floods between January 2016 and November 2019 in England and Wales to be between £504 million and £924 million, with a best estimate of £708 million (2024 prices). Research also shows that flooding can have severe [long-lasting mental health consequences](#) including depression, anxiety and Post-Traumatic Stress Disorder (PTSD).

The last year (April 2023 to March 2024) saw wet, windy and stormy weather across the country. There were 13 named storms compared to just one in 2022 to 2023 and 7 in 2021 to 2022.

Over winter 2023 to 2024, storms Babet, Ciarán and Henk impacted hundreds of homes, businesses and farms:

- during storms Babet and Ciarán we issued over 750 flood warnings including 5 severe flood warnings
- during storm Babet, our Flood Warning System (FWS) recorded its busiest day ever – more than 5,500 new users registered for warnings and almost 400,000 messages were sent in a single day
- during storm Henk several of our biggest river systems – the Trent, Thames, Severn and Avon – saw record levels, or close to record levels, as they drained huge volumes of rain from their catchments

Our flood defences operated well during the winter 2023 to 2024 storms, and whilst around 5,000 properties were sadly flooded, around 250,000 properties were protected. This protection is a result of the investments we have made in flood and coastal defences.

The frequency and severity of flooding and storm surges will get worse with climate change. To keep pace with a changing climate, we need to both cut emissions and adapt to climate risks.

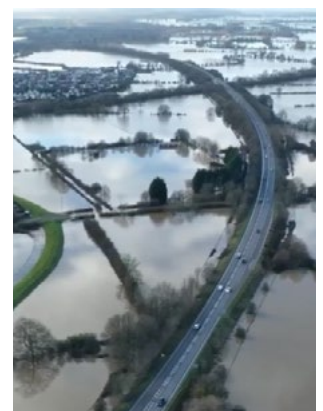
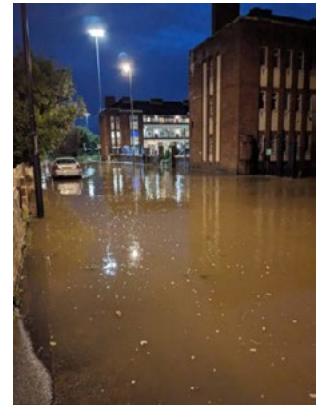
Even if we reach net zero, we can still expect more intense rainfall, more frequently.

In all future climate scenarios, we will experience a continued rise in sea level well into the next century. For example, by 2100:

- extreme once-a-century sea-level events are expected to become annual
- UK sea levels could rise by over a metre

The Intergovernmental Panel for Climate Change have advised that a global sea level rise of 2 metres by 2100 cannot be ruled out.

This means it is essential we prepare for the unavoidable impacts of climate change. We can do this by adapting and helping the nation to prepare for future flooding and erosion risks.



Flood and coastal erosion risk information

Flooding comes from several sources including:

- rivers – where heavy rainfall leads to overtopping of river embankments
- the sea – where high tides and storm surges lead to coastal flooding
- surface water – where there is so much rainwater that it overwhelms drainage systems collecting over the ground causing surface water runoff, also known as flash flooding
- groundwater – where water under the ground (the water table) rises to the surface causing flooding which can persist for days, weeks or even months after heavy or prolonged rainfall

Coastal erosion is where there is loss or displacement of land, or the long term removal of sediment and rocks along the coastline. This can be due to the action of:

- waves
- currents
- tides
- storms

The Environment Agency is required to update our understanding of current and future flood and coastal erosion risk as part of our ‘strategic overview’ role. This is described in the [2010 Flood and Water Management Act](#). This means we have a duty to provide the nation with the best available understanding of flood and coastal erosion risk. We must do this alongside our day-to-day operational role for managing flood risk from rivers and the sea.

Providing the best available flood and coastal erosion risk information is a vital part of our statutory overview role. It helps:

- individuals, communities and organisations prepare and adapt to flooding and coastal change
- planners decide where to build new homes, roads, railway lines and other critical infrastructure
- identify locations that need more flood risk protection or resilience measures
- prepare our response to flooding, for example defining our flood warning areas or planning evacuation routes

Our assessment of flood and coastal erosion risk has been based on 3 important sources of information:

- the National Flood Risk Assessment for England and the ‘Risk from Flooding from Rivers and the Sea’ maps – an assessment of present-

day risk of flooding from rivers and the sea. This is often referred to a **'NaFRA'** and was first published in 2004

- the National Coastal Erosion Risk Map for England – an assessment of properties at present day risk of coastal erosion. This is often referred to a **'NCERM'** and was first published in 2011
- the 'Risk of Flooding from Surface Water' maps. This was first published in 2013

Our flood and coastal erosion risk data and mapping information is available on [GOV.UK](#) and the [Data Services Platform](#). We also share this risk information through several well-established digital services which are aimed at different customers:

The public use: [Check your long term flood risk for an area in England](#).

This service:

- provides a summary of long flood risk for an area (which can be searched by postcode) – for rivers and the sea, surface water, reservoirs and groundwater
- displays the information on a map and provides the name of the risk management authority responsible for managing flood risk in an area

Over the last 12 months, this service was used by around 1.2 million users.

Coastal local authorities and practitioners use: [Check coastal erosion management in your area](#). This service:

- provides a link to a map which can be searched by place name or postcode
- shows the coastal management approach that is specific to the shoreline location
- shows the projected rates of erosion through this century if the location is on an erodible coast

Town and country planners and developers use [Flood map for planning](#).

This service:

- allows developers and planners to find the data they need to undertake a flood risk assessment for a planning application for a new development proposal

Over the last 12 months, the service was used around 1.5 million times.

For the coast we have recently updated our plans for managing flood and coastal erosion risk around our coastline. In January 2024 we published updated [SMPs](#). These set out a planned approach to managing flood and coastal erosion risk around the coast of England to 2105. The SMPs set out sustainable management approaches for each stretch of coast. The 4 approaches are:

- hold the line – maintain or upgrade protection from flooding or erosion by holding the shoreline in broadly the same position
- advance the line – actively move shoreline defences significantly seawards

- managed realignment – change the position of the shoreline in a controlled way, such as by slowing erosion or creating areas of habitat to help manage flooding
- no active intervention – maintain or encourage a more natural coastline, which may involve discussing adaptation to the risk from flooding or erosion

In January 2024, we also launched [SMP Explorer](#), a new map-based digital tool to make SMPs easier to access and understand.

Part of our key public commitments in the [FCERM Strategy](#) and [Roadmap to 2026](#) is “Between now and 2025 the Environment Agency will have better evidence to inform future risk and investment needs for managing all sources of flooding and coastal change”.

In line with this we are updating our national assessment of risk. We are doing this by updating NaFRA and NCERM using the best available national and local risk information.

Our updated assessment of flood and coastal erosion risk in England

This report provides an updated picture of current flood and coastal erosion risk in England. It also shows how risk could change in future. It provides the latest information on the:

- source and characteristics of flood and coastal erosion risk
- distribution of risk across England
- potential for these to change in the future due to climate change

Our updated national assessment of risk includes flooding from rivers, the sea and surface water as well as coastal erosion. It does not include groundwater flooding. This is because there are too many gaps in our understanding and evidence for groundwater flood risk at this time.

Our new national assessment:

- is an objective assessment of areas that are at risk of flooding and coastal erosion in the present day
- is based on the best available local and national mapping and modelling
- uses the latest data on current properties and other infrastructure to assess the possible impact of flooding and coastal erosion
- provides an overall risk assessment that combines the probability of flooding and coastal erosion with the potential impact
- reflects current housing, infrastructure and land use

- accounts for the current condition of existing flood and coastal defences

For the first time our new national assessment of risk also identifies areas that may be at risk in the future. This is based on climate change leading to increased frequency of storms that can worsen flooding and coastal erosion impacts. We use the UK Climate Projections 2018 from the Met Office. These projections indicate how rainfall, river flows, high tides and wave conditions that cause flooding and erosion may increase in future.

Our assessment of possible risk in the future does not consider:

- any additional development that may occur in future
- where new flood protection and resilience investments could change future risk

Our estimates of future risk due to climate change are therefore based on the potential for risk to increase rather than a prediction.

It is important to recognise that our assessment of risk is not static. Our national assessment of flood and coastal erosion risk will be regularly reviewed and updated to take on board the latest local modelling evidence and national data improvements.

Our previous assessment of flood and coastal erosion risk

We publish our latest information on the properties (homes and businesses) in areas at risk of flooding from different sources in our annual [flood and coastal erosion risk management](#) report.

In our 2023–2024 we reported:

- 2.6 million properties in areas at risk of flooding from rivers and the sea
- 3.2 million properties in areas at risk of surface water flooding

Around twice as many properties were in areas at high risk of flooding from surface water flooding compared to flooding from rivers and the sea.

Some properties are in areas at risk of flooding from multiple sources. For example, around 642,000 properties were in areas at risk from flooding from rivers, the sea, and surface water.

In addition, between 122,000 and 290,000 properties were estimated to be in areas at risk of groundwater flooding. This may include properties also in areas at risk of surface water flooding.

For all sources of flooding, this totalled around 5.5 million properties at risk.

Our new assessment is not directly comparable with previous assessments because we now have much better data and improved modelling methodologies.

Table 1: Properties in areas at risk of flooding from rivers and the sea (as of December 2023), and from surface water flooding (as of January 2024).

| Level of risk | Annual likelihood of flooding (percentage) | Total number of properties in areas at risk of flooding from rivers and sea | Number of residential properties in areas at risk of flooding from rivers and sea | Total number of properties in areas at risk of flooding from surface water | Number of residential properties in areas at risk of flooding from surface water |
|-----------------|--|---|---|--|--|
| High | Greater than 3.3 % | 196,100 | 122,700 | 344,100 | 272,300 |
| Medium | 3.3 % – 1 % | 623,800 | 454,900 | 504,000 | 416,900 |
| Low | 1 % – 0.1 % | 1,069,500 | 851,700 | 2,370,700 | 1,985,500 |
| Very low | Less than 0.1 % | 717,300 | 612,800 | Not assessed | Not assessed |
| Total | | 2,606,600 | 2,042,000 | 3,218,900 | 2,674,600 |

Source: [Flood and coastal erosion risk management report: 1 April 2023 to 31 March 2024 – GOV.UK](#)

The level of risk, or flood risk bands are:

- high risk – this means that each year an area has a chance of flooding of greater than 3.3 % (greater than a 1 in 30 chance of flooding)
- medium risk – this means that each year an area has a chance of flooding between 1 % and 3.3 % (1 in 30 to a 1 in 100 chance of flooding)
- low risk – this means that each year an area has a chance of flooding of between 0.1 % and 1 % (1 in 100 to a 1 in 1,000 chance of flooding)
- very low risk – this means that each year an area has a chance of flooding of less than 0.1 % (less than a 1 in 1,000 chance of flooding)

For national coastal erosion risk we reported that there were 2,000 properties are at risk of being lost to coastal erosion by 2060. This assumed that the management approaches and actions in the SMPs are funded and carried out.

We conducted a survey of public attitudes to flooding over 2023 to 2024. This showed that:

- around half of households at risk of flooding don't believe it will happen to them
- 2 out of every 3 people at risk believed that flooding will be more likely with climate change

These results show that considerable effort is still needed to raise awareness of flood risk in England amongst the public. It also highlights that a significant proportion of the population are anxious about the long-term impacts of adapting to a changing climate.

Why our assessment of flood and coastal erosion risk needs updating

Our first national assessment of flood risk was published 20 years ago in 2004, and is based on technology dating back to that time. The last full update to this assessment was in 2018, using some improvements to the data.

Our first national coastal erosion risk map was produced 13 years ago in 2011, and again was based on technology from that time. The coastal erosion risk map was last updated in 2015 and 2017, using some new local data.

Our new assessment is not directly comparable with previous assessments (see footnote). It will look different for the following reasons:

Much better data

- the new national assessment of flood risk uses the most up to date local flood risk modelling for both surface water and rivers and the sea
- the new national coastal erosion risk map uses a further 10 years of data from the [Coastal Monitoring Programmes](#)

Improved modelling methodologies

- we have created new software which allows us to better combine very detailed local modelling studies into a national assessment, providing a more accurate assessment of risk
- digital terrain modelling now provides us with a much more detailed and accurate map of England. For instance, this means we can now identify the way water flows over roads accounting for the kerb level
- computing has also advanced so that, along with improved data and modelling methods, mapping risk at a more detailed 2 metre resolution is now possible

Improved assessment of properties, infrastructure and assets

- we have factored in new building development since our last analysis
- we are now able to better understand risk for a wider range of properties, infrastructure and other public assets. As set out in table 2, we can now include:

Footnote: Our new assessment is not directly comparable with previous assessments because we now have much better data and improved modelling methodologies.

Table 2: Types of property, infrastructure and assets included in NaFRA and NCERM data

| Residential properties | Non-residential properties | Infrastructure | Our analysis for the new NCERM also includes the risk to other assets such as |
|--------------------------|----------------------------|----------------|---|
| houses | schools | road | heritage assets |
| apartments | hospitals | rail | sites of special scientific interest (SSSIs) |
| caravans with an address | industry | water | landfill sites |
| care homes | retail | electricity | |
| | leisure | gas | |

Climate change projections

We are now able to incorporate the UK Climate Projections 2018 (UKCP18) future warming scenarios from the UK Met Office. We consider different climate change scenarios for different sources of flood risk to reflect the UKCP18 ranges. These are shown in table 3.

Table 3: UK climate change scenarios for different sources of flood risk

| | Mid century range | End of century range |
|---------------------------|-------------------|----------------------|
| Rivers and the sea | 2036 to 2069 | 2070 to 2125 |
| Surface water | 2040 to 2060 | 2061 to 2080 |
| Coastal erosion | Now to 2055 | Now to 2105 |

For potential coastal erosion risk projections, we have based the climate change scenarios on the long term planning periods in the SMPs. The mid-century time period runs from 2025 to 2055 whilst the end of century period runs to 2105.

For coastal erosion, the new assessment is from now (present day) to either 2055 or 2105. This reflects the reality that coastal erosion impacts could occur following a one-off tidal surge or storm event. It is not always possible to predict when these storm events will happen.

The information presented for climate change is based on percentiles from the UK Climate Projections 2018 (UKCP18) data. A percentile is a measure used in statistics. They describe the proportion of possible scenarios that fall below an allowance level. Representative Concentration Pathways (RCPs) are emissions scenarios that describe possible future greenhouse gas emissions based on assumptions about human activity.

For the purposes of this report:

- for river and surface water flooding, we are using the central allowance, based on the 50th percentile from UKCP18 RCP 8.5
- for sea flooding and coastal erosion, we are using the higher central allowance, based on the 70th percentile from UKCP18 RCP 8.5

We are using the same climate change scenarios for all the data in this report – for properties, infrastructure, public buildings and agricultural land.

The new national assessment of flood risk

Our new NaFRA:

- provides a single picture of current and future flood risk from rivers, the sea and surface water
- uses both existing detailed local information and improved national data
- includes the potential impact of climate change on flood risk

It provides clearer detail than our current risk assessment on the areas at risk – providing much higher resolution maps that make it easier to see where there is risk.

The current Risk of Flooding from Rivers and Sea maps are limited by a 50 metre resolution. The better modelling in the new NaFRA provides a 2 metre resolution.

The new NaFRA will also be able to show characteristics such as:

- potential flood depths
- likelihood and impacts
- economic damages of flooding

We have not previously had information to share on the possible depth of flooding from rivers and sea at a national scale. One of the advantages of our new NaFRA is that we now have information on the chance of flooding to different depths. We will now be able to let people know their chance of flooding to a depth of less than 30 centimetres; between 30 centimetres and 60 centimetres; and greater than 60 centimetres. This allows people to consider the possible impacts on their property, and the scope to apply property flood resilience measures.

Our assessment of flood depths is based on outside ground levels. It is important to note that property floor levels are generally higher than the surrounding land – often by around 20 centimetres. Furthermore, in high flood risk areas developers are often required by planning authorities to raise the floor levels of buildings to mitigate the impacts of internal flooding. For this reason, even if a property is identified by our new NaFRA as being in an area at risk of flooding to a certain flood depth, it does not necessarily mean that flood water will enter the property in a flooding event.

A fundamental principle of the new assessment is that the methods and data standards should be consistent around the country. This allows us to have a credible and robust understanding of risk.

We have also benefited from significant improvements made to the quality of flood risk mapping and modelling in recent years. This has come from both the Environment Agency and local authorities. It has included a 4 year local model data improvement programme which has successfully incorporated around 1,000 existing local flood models.

The new NaFRA outputs and methods are nationally consistent by design, so that they can be:

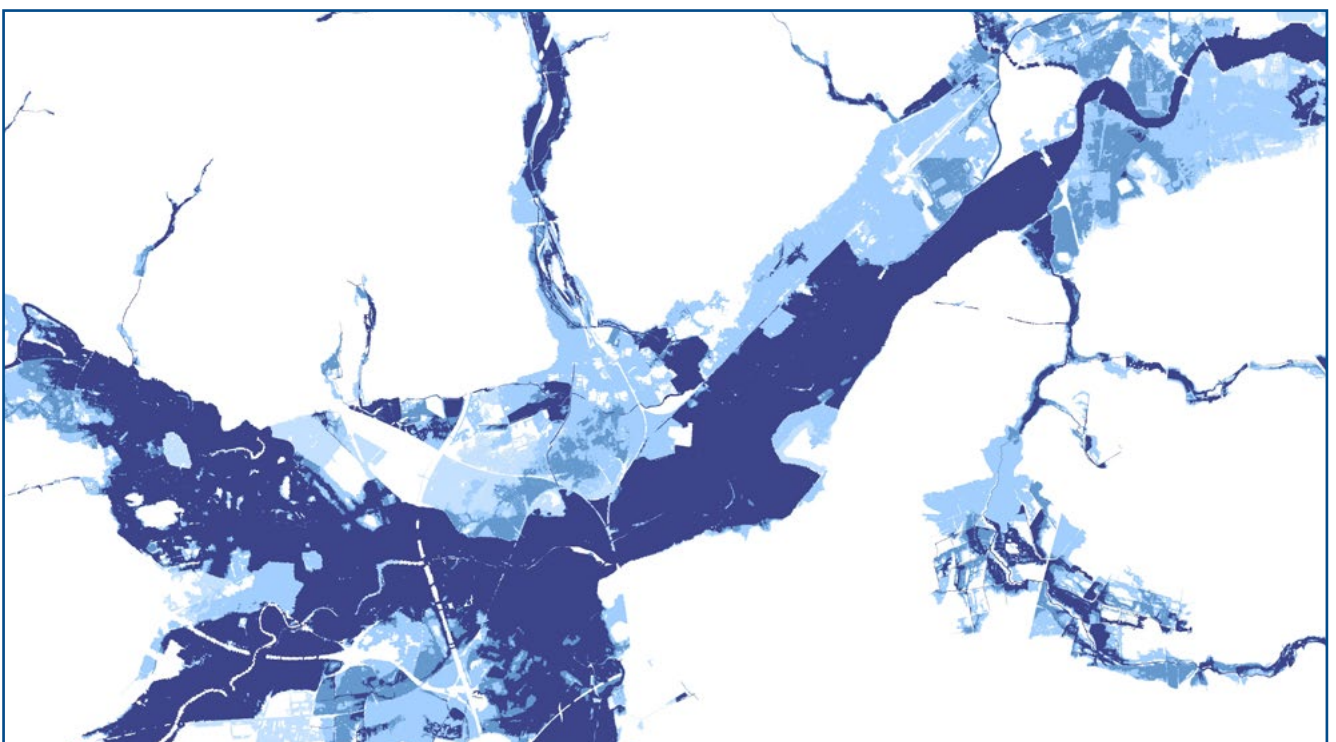
- regularly and easily updated
- improved to take on board the latest local model and data improvements.

In future we will be able to make regular national updates to NaFRA to account for the best available evidence.

In summary the new NaFRA is better for the following reasons; it:

- covers all sources of flood risk – rivers, the sea and surface water
- includes future flood risk due to climate change projections
- combines national models with local flood risk models from the Environment Agency and local authorities to provide more detail
- has clearer detail on the areas at risk through much higher resolution maps
- shows characteristics such as potential flood depths, and the likelihood and impacts, including the economic damages of flooding.
- provides better impact analysis (properties and infrastructure)

New NaFRA: Better methods and input data allow us to produce our data at a much higher resolution



Rivers and sea: How our assessment of flood risk from rivers and the sea is changing

Total properties in areas at risk of flooding from rivers and the sea

Total properties in areas at risk of flooding from rivers and the sea is around 2.4 million. This is slightly fewer than our previous assessment (see footnote).

Properties in areas at high risk of flooding from rivers and the sea increases to 367,900 which is an 88 % increase from our previous assessment (see footnote).

In the new assessment there are a significant number of properties moving from being in areas at medium flood risk to high flood risk. There are 48 % fewer properties in areas at medium risk, many of which we now consider to be in high risk areas



Footnote: Our new assessment is not directly comparable with previous assessments because we now have much better data and improved modelling methodologies.

Table 4: Properties in areas at risk of flooding from rivers and the sea

| | Number of properties | % of total | % change compared to previous assessment (see footnote) |
|-----------------------|----------------------|------------|---|
| High risk | 367,900 | 15.1 % | 87.6 % |
| Medium risk | 323,300 | 13.3 % | - 48.2 % |
| Low risk | 966,500 | 39.7 % | - 9.6 % |
| Very low risk | 777,300 | 31.9 % | 8.4 % |
| All properties | 2,435,000 | 100 % | - 6.6 % |

Table note: new present day risk information without climate change

Our new data on depth of flooding provides more information to help people understand the potential flood hazard they could face.

Of properties in areas at high risk, 163,300 are likely to flood to depths of 30 centimetres or higher from rivers and the sea. This is over two fifths (44 %) of all properties in areas at high risk. A depth of just 30 centimetres of flood water can be enough to move a car during a heavy rainfall event.

If we look at the percentage of properties in areas at high risk that are likely to flood to depths of 60 centimetres or higher, this drops to 24 % of all properties in areas at high risk.

Table 5: Properties in areas at high and medium risk of flooding from rivers and sea, by depth of flooding

| Depth of flooding | Present day risk assessment | Present day risk assessment |
|------------------------|-----------------------------|-----------------------------|
| | High risk | Medium risk |
| Less than 30 cm | 204,600 | 142,600 |
| 30 – 60 cm | 75,800 | 77,400 |
| More than 60 cm | 87,500 | 103,300 |
| Total | 367,900 | 323,300 |

Table note: properties could be in areas that flood to depths of less than 30 cm, 30–60 cm, or more than 60 cm.

Reasons behind the changes

There are a variety of reasons for the changes in risk. The most notable are improved data and modelling methods for assessing the likely frequency of flooding. The key reasons are:

- we have updated the information on the condition of our flood defence assets. This includes improved methods for estimating the chances and impacts of flood defences failing under extreme pressure from flood water

Footnote: Our new assessment is not directly comparable with previous assessments because we now have much better data and improved modelling methodologies.

- we have a better understanding of the natural extents of flood waters in U shaped river valleys or steep coastlines. They may be more susceptible to deeper or more frequent flooding but the number of properties at risk is likely to remain unchanged

Regional distribution of properties in areas at risk of flooding from rivers and the sea

The East Midlands, Yorkshire and the Humber, and South East regions (Office for National Statistics regions) have the highest number of properties in areas at high or medium flood risk. These regions account for about one half (52 %) of the total number of properties in areas at high or medium flood risk.

Less than 1 in 10 of properties in areas at high and medium flood risk are in London. This is largely due to the presence of major flood defences such as the Thames Barrier.

Table 6: Regional distribution of properties in areas at high risk of flooding from rivers and the sea

| | Number of properties in areas at high flood risk | % of national properties in areas at high flood risk | As a % of total number of properties in each region | Total property count per region |
|--------------------------|--|--|---|---------------------------------|
| East Midlands | 67,900 | 18.5 % | 2.5 % | 2,758,200 |
| East of England | 28,100 | 7.6 % | 0.8 % | 3,540,400 |
| London | 27,800 | 7.6 % | 0.6 % | 4,315,900 |
| North East | 8,600 | 2.3 % | 0.6 % | 1,520,600 |
| North West | 34,900 | 9.5 % | 0.8 % | 4,168,500 |
| South East | 68,100 | 18.5 % | 1.4 % | 5,011,800 |
| South West | 47,200 | 12.8 % | 1.4 % | 3,495,000 |
| West Midlands | 20,700 | 5.6 % | 0.7 % | 3,184,300 |
| Yorkshire and The Humber | 64,600 | 17.6 % | 2.0 % | 3,159,800 |
| Total | 367,900 | 100.0 % | 1.2 % | 31,154,500 |

Table note: new present day information without climate change



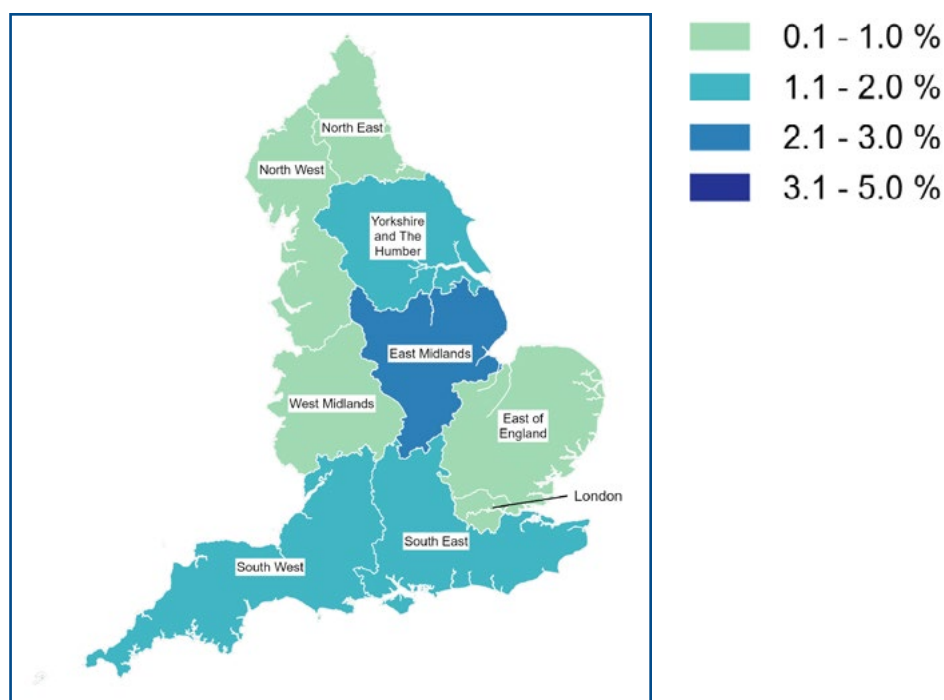
Table 7: Regional distribution of properties in areas at high/medium risk of flooding from rivers and the sea

| | Number of properties in areas at high/medium flood risk | % of national properties in areas at high / medium flood risk | As a % of total number of properties in each region | Total property count per region |
|--------------------------|---|---|---|---------------------------------|
| East Midlands | 127,500 | 18.4 % | 4.6 % | 2,758,200 |
| East of England | 79,000 | 11.4 % | 2.2 % | 3,540,400 |
| London | 51,100 | 7.4 % | 1.2 % | 4,315,900 |
| North East | 13,200 | 1.9 % | 0.9 % | 1,520,600 |
| North West | 68,000 | 9.8 % | 1.6 % | 4,168,500 |
| South East | 113,900 | 16.5 % | 2.3 % | 5,011,800 |
| South West | 86,200 | 12.5 % | 2.5 % | 3,495,000 |
| West Midlands | 37,100 | 5.4 % | 1.2 % | 3,184,300 |
| Yorkshire and The Humber | 115,200 | 16.7 % | 3.6 % | 3,159,800 |
| Total | 691,200 | 100.0 % | 2.2 % | 31,154,500 |

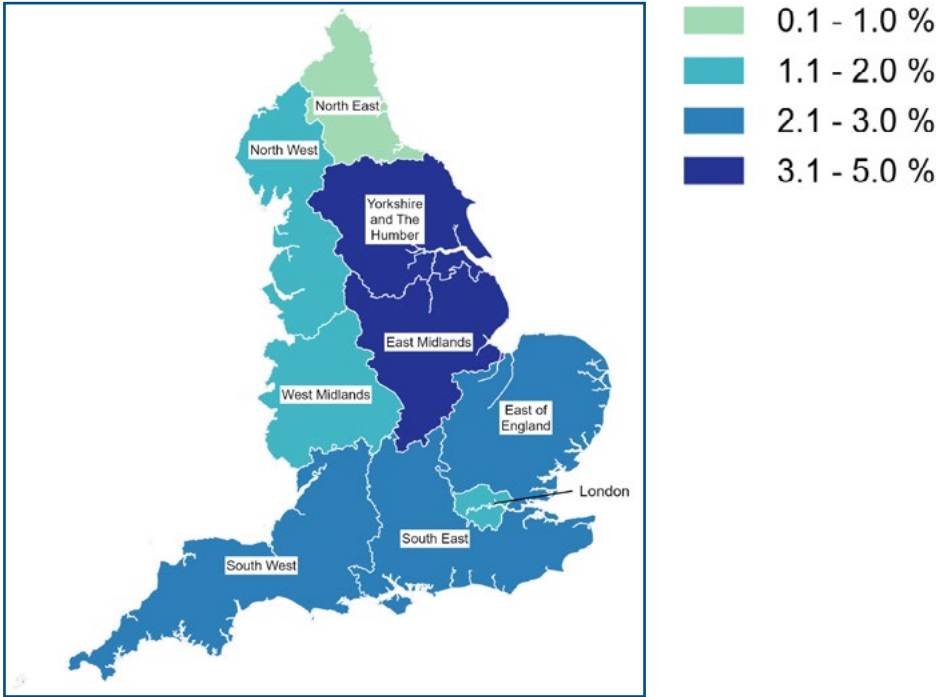
Table note: new present day risk information without climate change

The maps show the importance of considering flood risk relative to population size. For instance, 3.6 % of properties in Yorkshire and the Humber are in areas at a high or medium chance of flooding. In contrast, only 0.9 % of properties in the North East face the same level of risk.

Properties in areas at high risk of flooding from rivers and sea, as a % of total number of properties per region



Properties in areas at high/medium risk of flooding from rivers and sea, as a % of total number of properties per region



Properties in areas at risk of flooding from rivers and the sea with climate change

Overall, climate change will increase the chance of flooding. In many locations which are already at risk, flooding may occur more frequently and to greater depths. This is in line with projections that climate change is driving sea level rise and increases of extreme flows in rivers.

With climate change, we estimate that the total number of properties in areas at risk of flooding from rivers and the sea will increase from 2.4 million to around 3.1 million, a 27 % increase. Properties in areas at high risk could increase by around three quarters (73 %) between 2036 and 2069.

3.1m
Properties in areas at risk by mid-century

Table 8: Properties in areas at risk of flooding from rivers and the sea with climate change between 2036–2069

| | Number of properties in areas at risk between 2036 and 2069 | % of all properties in areas at risk | % change compared to new present day assessment |
|-----------------------|---|--------------------------------------|---|
| High risk | 637,600 | 20.6 % | 73.3 % |
| Medium risk | 538,800 | 17.4 % | 66.7 % |
| Low risk | 1,209,400 | 39.1 % | 25.1 % |
| Very low risk | 710,900 | 22.9 % | - 8.5 % |
| All properties | 3,096,700 | 100 % | 27.2 % |

Table note: with climate change compared to the new present day risk information

We also expect climate change to affect likely flood depths for properties already at risk from flooding from rivers and the sea.

Of properties in areas at high risk, 288,800 could flood to depths of 30 centimetres or higher from rivers and the sea between 2036 and 2069 – a 77 % increase from the present day. The percentage of properties in areas at high risk that could flood to depths of 60 centimetres or higher could increase by 87 % between 2036 and 2069.

Properties in areas at high risk of flooding from rivers and sea, by depth of flooding

| Present day | | With climate change 2036–2069 | |
|----------------------|---------|-------------------------------|---------|
| 60cm (2ft) | 87,500 | 60cm (2ft) | 163,200 |
| 30cm (1ft) | 75,800 | 30cm (1ft) | 125,600 |
| 20cm (8in) | 204,600 | 20cm (8in) | 348,800 |

Table 9: Properties in areas at high and medium risk of flooding from rivers and sea, by depth of flooding with climate change between 2036–2069

| Depth of flooding | Present day | Present day | With climate change (between 2036 and 2069) | With climate change (between 2036 and 2069) |
|------------------------|-------------|-------------|---|---|
| | High risk | Medium risk | High risk | Medium risk |
| Less than 30 cm | 204,600 | 142,600 | 348,800 | 239,000 |
| 30 – 60 cm | 75,800 | 77,400 | 125,600 | 120,700 |
| More than 60 cm | 87,500 | 103,300 | 163,200 | 179,100 |
| Total | 367,900 | 323,300 | 637,600 | 538,800 |

Table note: properties could flood to depths of less than 30 cm, 30–60 cm and more than 60 cm.

Surface water: How our assessment of flood risk from surface water is changing

Total properties in areas at risk of flooding from surface water

Total properties in areas at risk of flooding from surface water is around 4.6 million. This is a 43 % increase on our previous assessment (see footnote).

Our new assessment of risk of flooding from surface water shows about 1.1 million properties in high risk areas of surface water flooding. This compares to our previous assessment (see footnote) of 344,100. This is an increase of 3 times in the number of properties in areas at high risk of surface water flooding.

There are now 3 times as many properties at high risk of flooding from surface water than there are from flooding from rivers and the sea.

The number of properties in areas at medium risk of surface water flooding has also increased by about three quarters (76 %) to 884,800 properties. Unlike flooding from rivers and the sea, this is a very significant increase in properties in areas at medium flood risk from surface water flooding.



Footnote: Our new assessment is not directly comparable with previous assessments because we now have much better data and improved modelling methodologies.

Table 10: Properties in areas at risk of flooding from surface water

| | Number of properties | % of total | % change compared to previous assessment (see footnote) |
|-----------------------|----------------------|------------|---|
| High risk | 1,071,800 | 23.3 % | 211.5 % |
| Medium risk | 884,800 | 19.2 % | 75.6 % |
| Low risk | 2,644,000 | 57.5 % | 11.5 % |
| All properties | 4,600,600 | 100 % | 42.9 % |

Table note: new present day risk without climate change

Our new flood depths information shows that 184,200 properties in areas at high risk are likely to flood to depths of 30 centimetres or higher from surface water. This is 1 in 6 (17 %) of all properties in areas at high risk of flooding. In comparison, over two fifths (44 %) of properties in areas at high risk from rivers and the sea face a 30 centimetres or greater depth hazard.

83 % of properties at high risk are in areas with likely flood depths of less than 30 centimetres. This suggests that the typical impacts from surface water flooding are likely to occur at shallower levels than flooding events from rivers and the sea. As a result of this, the economic costs are likely to be less damaging.

Table 11: Properties in areas at high and medium risk of flooding from surface water, by depth of flooding

| Depth of flooding | Present day | Present day |
|------------------------|-------------|-------------|
| | High risk | Medium risk |
| Less than 30 cm | 887,600 | 660,500 |
| 30 – 60 cm | 153,900 | 174,900 |
| More than 60 cm | 30,300 | 49,400 |
| Total | 1,071,800 | 884,800 |

Table note: properties could flood to depths of less than 30 cm, 30–60 cm, more than 60 cm

Reasons behind the changes

Rather than a real world increase in risk, the changes we are seeing in the total number of properties in areas at risk of surface water flooding is almost entirely due to significant improvements in our data, modelling and use of technology. We do not think that risk has been significantly underestimated until now. Rather, we are now able to describe it with more confidence and detail. The key reasons are:

- we have updated the data and methods to determine frequency of heavy rainfall and how flood water responds. This has included

Footnote: Our new assessment is not directly comparable with previous assessments because we now have much better data and improved modelling methodologies.

inviting some local authorities to provide local evidence about the ability of drainage systems to carry away flood water. This has shown that in some places urban drainage systems do not have the capacity to manage surface water.

- we have revised our approach to determine when a series of puddles on the ground becomes surface water flooding, and the impacts that can have on people and property. This has resulted in more locations being shown at risk but we believe it is a more useful reflection of actual risk to communities. The new information on depth allows us to identify for the first time places where there is a high chance of relatively shallow flooding.
- our previous surface water flood risk maps were limited in the way they deflected water around the walls of buildings. This meant that the properties themselves did not appear to be at risk of flooding on the maps. The new mapping removes this limitation, making it a more realistic local assessment of surface water flood risk.

Regional distribution of properties in areas at risk of surface water flooding

Over one quarter of properties in areas at high risk of surface water flooding are in London – nearly a third of a million. This is over 11 times as many properties as are in areas at high risk of flooding from rivers and the sea.

Other regions with a significant number of properties in areas at high and medium risk from flooding from surface water are the East of England, the North West and the South East. These regions account for 38 % of the total number of properties at risk.

Table 12: Regional distribution of properties in areas at high risk of surface water flooding

| | Properties in areas at high risk of surface water flooding | % of national properties in areas at high risk of surface water flooding | As a % of total number of properties in each region | Total property count per region |
|--------------------------|--|--|---|---------------------------------|
| East Midlands | 67,600 | 6.3 % | 2.5 % | 2,758,200 |
| East of England | 170,600 | 15.9 % | 4.8 % | 3,540,400 |
| London | 319,800 | 29.9 % | 7.4 % | 4,315,900 |
| North East | 39,900 | 3.7 % | 2.6 % | 1,520,600 |
| North West | 123,300 | 11.5 % | 3.0 % | 4,168,500 |
| South East | 127,900 | 11.9 % | 2.6 % | 5,011,800 |
| South West | 86,500 | 8.1 % | 2.5 % | 3,495,000 |
| West Midlands | 73,900 | 6.9 % | 2.3 % | 3,184,300 |
| Yorkshire and The Humber | 62,300 | 5.8 % | 2.0 % | 3,159,800 |
| Total | 1,071,800 | 100 % | 3.4 % | 31,154,500 |

Table note: new present day information without climate change

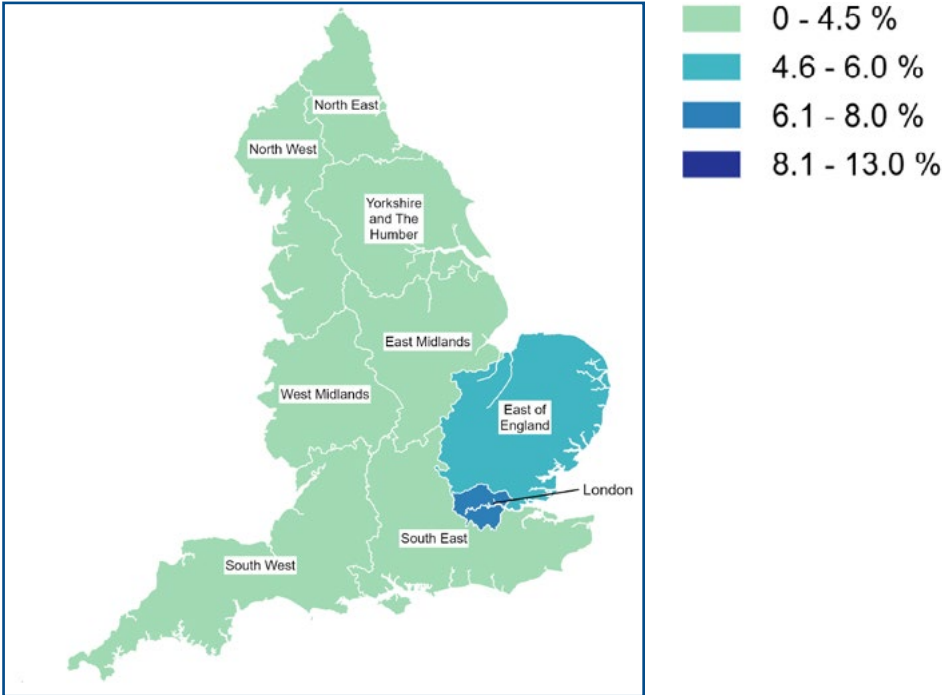
Table 13: Regional distribution of properties in areas at high/medium risk of surface water flooding

| | Properties in areas at high/medium risk of surface water flooding | % of national properties in areas at high/medium risk of surface water flooding | As a % of total number of properties in each region | Total property count per region |
|--------------------------|---|---|---|---------------------------------|
| East Midlands | 136,900 | 7.0 % | 5 % | 2,758,200 |
| East of England | 270,200 | 13.8 % | 7.6 % | 3,540,400 |
| London | 543,500 | 27.8 % | 12.6 % | 4,315,900 |
| North East | 77,800 | 4.0 % | 5.1 % | 1,520,600 |
| North West | 240,200 | 12.3 % | 5.8 % | 4,168,500 |
| South East | 236,100 | 12.0 % | 4.7 % | 5,011,800 |
| South West | 159,800 | 8.2 % | 4.6 % | 3,495,000 |
| West Midlands | 157,600 | 8.0 % | 4.9 % | 3,184,300 |
| Yorkshire and The Humber | 134,500 | 6.9 % | 4.3 % | 3,159,800 |
| Total | 1,956,600 | 100 % | 6.3 % | 31,154,500 |

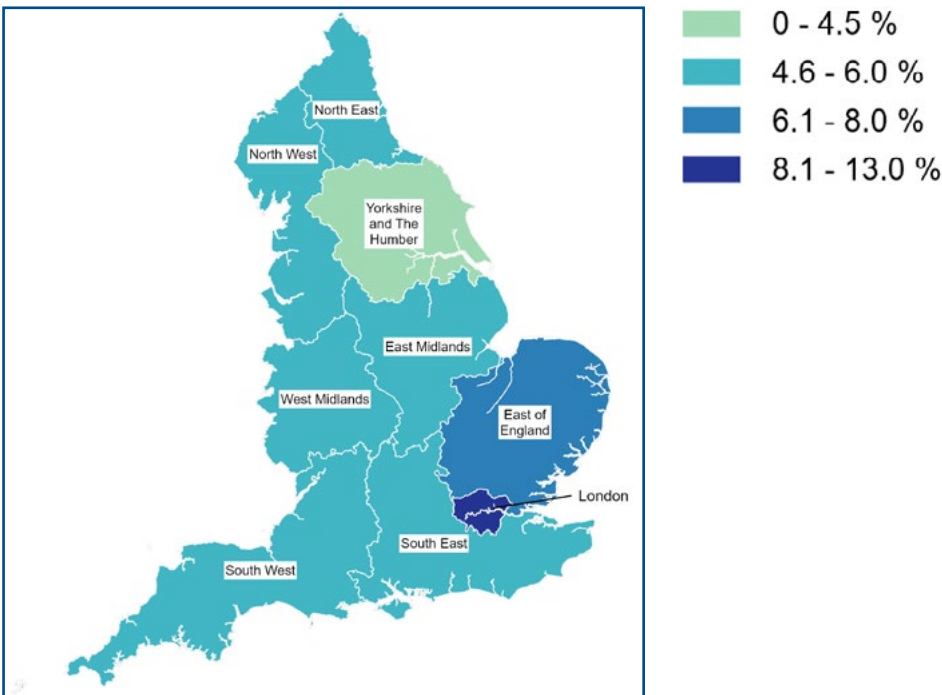
Table note: new present day information without climate change

The maps show the importance of considering flood risk relative to population size. Surface water flood risk is greater in cities where drainage systems are less able to deal with intense rainfall. 1 in 8 (13 %) of properties in London are in areas at high or medium risk of surface water flooding. This is twice the rate compared to the national total, and a far higher rate than any other region.

Properties in areas at high risk of flooding from surface water, as a % of total number of properties per region



Properties in areas at high/medium risk of flooding from surface water, as a % of total number of properties per region



Properties in areas at risk of flooding from surface water with climate change

With climate change, we estimate that the total number of properties in areas at risk of flooding from surface water could increase from 4.6 million to 6.1 million, an increase of one third. Properties in high risk areas could increase by two thirds (66 %) between 2040 and 2060.



Table 14: Properties in areas at risk of flooding from surface water with climate change between 2040 – 2060

| | Number properties in areas at risk between 2040 and 2060 | % of all properties at risk | % change compared to new present day assessment |
|-----------------------|--|-----------------------------|---|
| High risk | 1,784,300 | 29.5 % | 66.5 % |
| Medium risk | 972,300 | 16.0 % | 9.9 % |
| Low risk | 3,299,600 | 54.5 % | 24.8 % |
| All properties | 6,056,200 | 100 % | 31.6 % |

Table note: with climate change compared to the new present day risk information

We also expect climate change to affect likely flood depths for properties already in areas at risk from surface water flooding. We estimate that 288,400 properties in areas at high risk could flood to depths of 30 centimetres or higher between 2040 and 2060. This is an increase of more than half (57 %) on the present day.

The proportion of high risk properties flooding to depths of 60 centimetres or deeper could increase by over two thirds (73 %) between 2040 and 2060.

Properties in areas at high risk of flooding from surface water, by depth of flooding

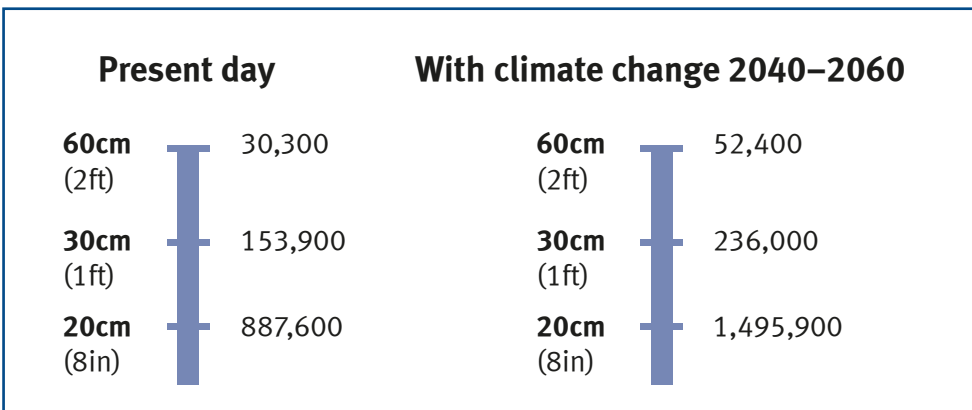


Table 15: Properties in areas at high and medium risk of flooding from surface water, by depth of flooding with climate change between 2040–2060

| Depth of flooding | Present day | Present day | With climate change (between 2040 and 2060) | With climate change (between 2040 and 2060) |
|------------------------|-------------|-------------|---|---|
| | High risk | Medium risk | High risk | Medium risk |
| Less than 30 cm | 887,600 | 660,500 | 1,495,900 | 620,500 |
| 30 – 60 cm | 153,900 | 174,900 | 236,000 | 268,500 |
| More than 60 cm | 30,300 | 49,400 | 52,400 | 83,300 |
| Total | 1,071,800 | 884,800 | 1,784,300 | 972,300 |

Table note: properties could flood to depths of less than 30 cm, 30–60 cm, more than 60 cm

Flood risk from multiple sources – rivers, the sea and surface water

Properties in areas at risk of flooding from multiple sources

Our new national flood risk assessment shows that in total around **6.3 million** properties in England are in areas at risk of flooding from one or a combination of sources: rivers, the sea and surface water.



This figure is based on our new assessment showing:

- **2.4 million** properties in areas at risk of flooding from rivers and the sea. This is slightly fewer than our previous assessment (see footnote).
- **4.6 million** properties in areas at risk of flooding from surface water. This is a 43 % increase on our previous assessment (see footnote).

Our new mapping identifies about 750,000 properties in areas at risk both from rivers or the sea, and surface water.

In reality many flooding events we experience result in flooding to properties and places coming from many sources. For example, high river levels can impede surface water drainage, resulting in increased flood impacts in areas where the main risk is from rivers. As a consequence, it is common to find the same properties impacted by multiple sources of flooding.

We have not included groundwater figures in our new total as this estimate has not been updated for some time. Our next Flood and coastal erosion risk annual report for 2024/25 will reflect the updated assessment from the new NaFRA.

Footnote: Our new assessment is not directly comparable with previous assessments because we now have much better data and improved modelling methodologies.

With climate change the total number of properties in areas at risk from rivers and the sea or surface could increase to:

- **3.1 million** properties in areas at risk of flooding from rivers and the sea between 2036 and 2069.
- **6.1 million** properties in areas at risk of flooding from surface water between 2040 and 2060.

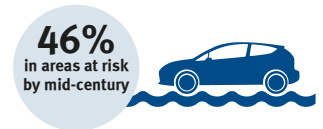
With climate change, our new mapping identifies about 1 million properties in areas at risk both from rivers or the sea, and surface water.

This could take the total number of properties in areas at risk of flooding from rivers and the sea or surface water to around 8 million by mid-century. In other words, 1 in 4 properties in England will be in areas at risk of flooding from rivers and the sea or surface water by mid-century.

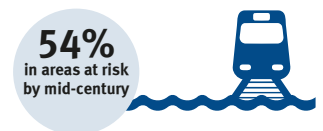
Infrastructure and other public buildings in areas at risk of flooding from multiple sources

If we look at flood risk from rivers, sea and surface water and the potential impact on infrastructure and other public buildings in England, we observe the following:

Our new assessment shows that 113,900 kilometres out of 302,100 kilometres of roads in England are in areas at risk of flooding. This is around a third (38 %) of all roads in areas at risk from one or more sources of flooding. Of that, about 18 % of roads are in areas at high or medium risk of flooding. If we apply the climate change projections the road network at risk rises to 137,700 kilometres or 46 % at risk by mid-century, an increase of 21 %.



Our new assessment shows that 4,300 kilometres out of 11,700 kilometres of railways in England are in areas at risk of flooding. This is over a third (37 %) of all railways in areas at risk from one or more sources of flooding. Of that, around 18 % of railway lines are in areas at high or medium risk of flooding. If we apply the climate change projections the rail network at risk rises to 6,300 kilometres or 54 % at risk by mid-century, an increase of around half. Compared to other major infrastructure sectors, the railways see the largest increase in future risk due to climate change.



A significant proportion of water pumping stations and treatment plants are also at risk of flooding from multiple sources – about a third (34 %). Other important public buildings, such as schools and hospitals, are also at flood risk from multiple sources at about 21 % and 26 % respectively.

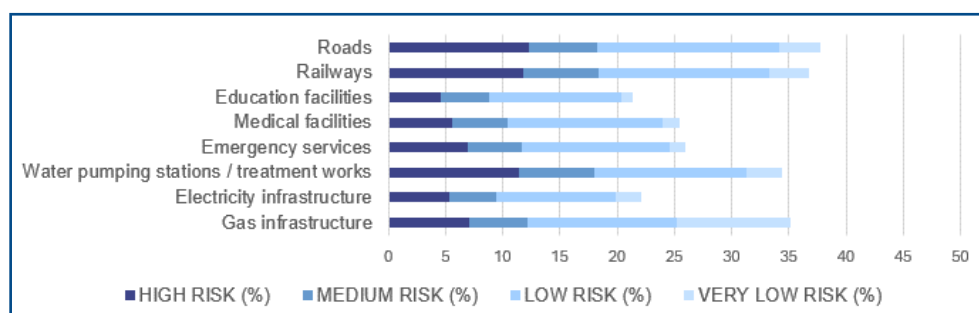
Table 16: Infrastructure and other public buildings in areas at flood risk from rivers, sea and surface water – present day and with climate change

| | Present day km or numbers | Present day % of total | With climate change (between 2040 and 2060) | With climate change (between 2040 and 2060) % of total at risk | % change with climate change (between 2040 and 2060) |
|--|---------------------------|------------------------|---|--|--|
| Roads | 113,900 | 37.7 % | 137,700 | 45.6 % | 20.9 % |
| Railways | 4,300 | 36.8 % | 6,300 | 53.8 % | 46.5 % |
| Education facilities | 30,000 | 21.4 % | 37,000 | 26.4 % | 23.3 % |
| Medical facilities | 11,800 | 25.5 % | 14,600 | 31.5 % | 23.7 % |
| Emergency services | 2,000 | 26.0 % | 2,400 | 31.2 % | 20.0 % |
| Water pumping stations / treatment works | 12,800 | 34.4 % | 14,200 | 38.2 % | 10.9 % |
| Electricity infrastructure | 52,600 | 22.1 % | 61,600 | 25.9 % | 17.1 % |
| Gas infrastructure | 1,300 | 35.1 % | 1,400 | 37.6 % | 7.7 % |

Present day assessment

Table 17: Percentage of infrastructure and other public buildings in areas at flood risk from rivers, sea and surface water – present day, by level of risk

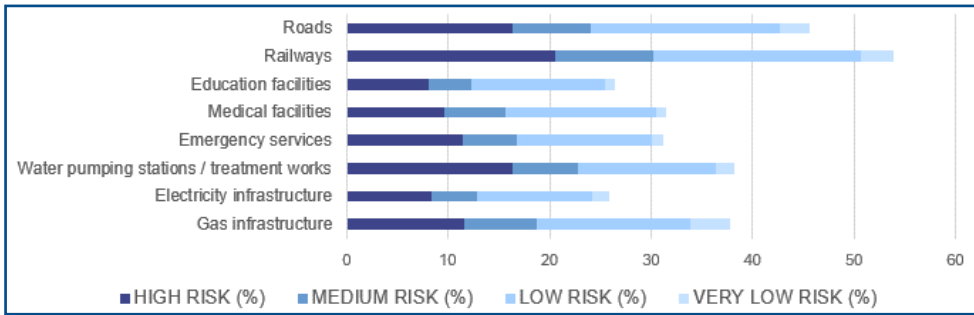
| | High risk (%) | Medium risk (%) | Low risk (%) | Very low risk (%) | Total risk (%) |
|--|---------------|-----------------|--------------|-------------------|----------------|
| Roads | 12.3 % | 5.9 % | 15.9 % | 3.6 % | 37.7 % |
| Railways | 11.8 % | 6.6 % | 14.8 % | 3.6 % | 36.8 % |
| Education facilities | 4.6 % | 4.2 % | 11.5 % | 1.1 % | 21.4 % |
| Medical facilities | 5.6 % | 4.8 % | 13.6 % | 1.5 % | 25.5 % |
| Emergency services | 6.9 % | 4.8 % | 12.9 % | 1.4 % | 26.0 % |
| Water pumping stations / treatment works | 11.4 % | 6.6 % | 13.3 % | 3.1 % | 34.4 % |
| Electricity infrastructure | 5.3 % | 4.1 % | 10.4 % | 2.3 % | 22.1 % |
| Gas infrastructure | 7.0 % | 5.1 % | 13.1 % | 9.9 % | 35.1 % |



Climate change assessment (between 2040 and 2060)

Table 18: Percentage of infrastructure and other public buildings in areas at flood risk from rivers, sea and surface water – with climate change, by level of risk

| | High risk (%) | Medium risk (%) | Low risk (%) | Very low risk (%) | Total risk (%) |
|--|---------------|-----------------|--------------|-------------------|----------------|
| Roads | 16.4 % | 7.7 % | 18.6 % | 2.9 % | 45.6 % |
| Railways | 20.5 % | 9.7 % | 20.5 % | 3.1 % | 53.8 % |
| Education facilities | 8.0 % | 4.3 % | 13.2 % | 0.9 % | 26.4 % |
| Medical facilities | 9.6 % | 6.0 % | 14.9 % | 1.0 % | 31.5 % |
| Emergency services | 11.4 % | 5.4 % | 13.2 % | 1.2 % | 31.2 % |
| Water pumping stations / treatment works | 16.4 % | 6.4 % | 13.5 % | 1.9 % | 38.2 % |
| Electricity infrastructure | 8.3 % | 4.6 % | 11.3 % | 1.7 % | 25.9 % |
| Gas infrastructure | 11.6 % | 7.1 % | 15.1 % | 4.0 % | 37.8 % |



Agricultural land in areas at risk of flooding from rivers and the sea

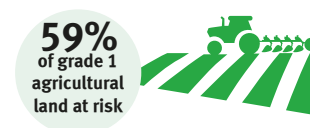
Our new assessment shows that of the 85,000 square kilometres of agricultural land in England, 11,200 square kilometres is in areas at risk of flooding from rivers and sea. This is around 13 % of all agricultural land and about 59 % of grade 1 agricultural land. If we apply the climate change projections, this rises to 11,700 square kilometres, an increase of nearly 5 % by mid-century.



Table 19: Agricultural land (by grade) in areas at flood risk from rivers and sea – present day and with climate change

| | Present day risk (km ²) | % of agricultural land at risk | With climate change (2036 to 2069) (km ²) | With climate change (2036 to 2069) % of agricultural land at risk |
|----------------|-------------------------------------|--------------------------------|---|---|
| Grade 1 | 2,100 | 59.2 % | 2,100 | 59.2 % |
| Grade 2 | 3,300 | 17.8 % | 3,400 | 18.4 % |
| Grade 3 | 5,800 | 9.2 % | 6,200 | 9.9 % |
| Total | 11,200 | 13.2 % | 11,700 | 13.8 % |

Table note: For agricultural land we are only presenting the risk of flooding from rivers and the sea.



The new national coastal erosion risk map

The new National Coastal Erosion Risk Map (NCERM) provides the most up to date national picture of coastal erosion risk for England. Our new NCERM:

- is based on coastal monitoring data from the National Network of Regional Coastal Monitoring Programmes. This includes 10 years more evidence on coastal processes since the original map was published
- accounts for the UKCP18 climate projections which includes allowances for sea level rise

The new NCERM reflects the latest coastal management approaches set out in SMPs. Our assessment identifies the impacts of coastal erosion with SMPs being delivered compared to the worst case where the SMPs are not funded or delivered.

The projections of erosion risk around the coast are set to the time periods defined in the SMPs:

- mid-century year of 2055
- the end of century year of 2105

Where a part of the coast is deemed to be predominantly at risk from sea flooding, no erosion projections are provided.

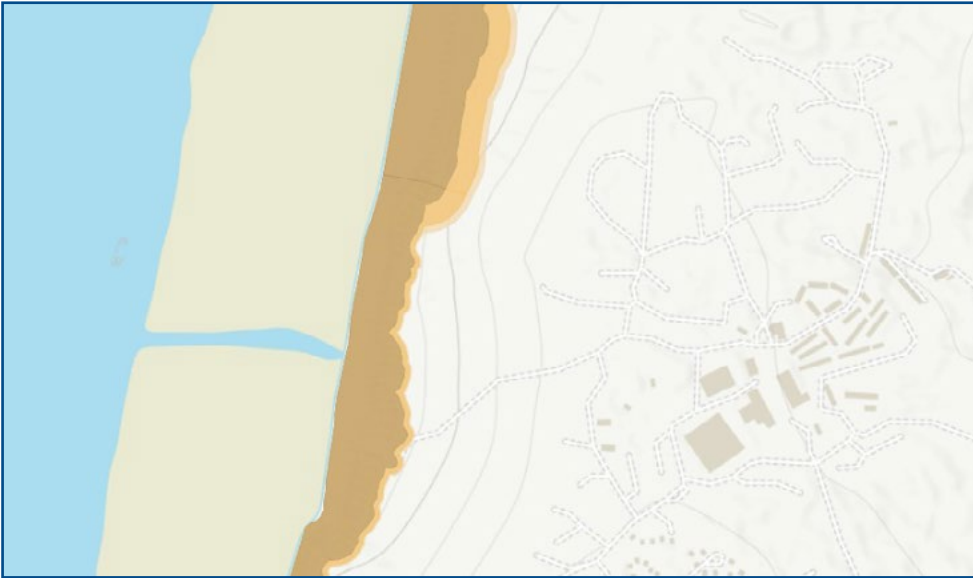
We have worked in collaboration with coastal local authorities to produce the new NCERM. The new erosion risk information will also be used by policy makers and practitioners to inform coastal planning and the designation of Coastal Change Management Areas (CCMAs).

CCMAs are areas identified in strategic Local Plans as likely to be affected by coastal erosion and coastal change where the local planning authority can require constraints on new development.

In summary the new NCERM is better for the following reasons, it:

- makes erosion information more accessible to coastal managers, planners and the public by providing clearer online visualisations
- includes climate change impacts on coastal erosion risk
- uses improved methodologies, more recent data and new research on the acceleration of erosion due to rising sea levels
- includes new information on areas of land instability at the coast caused by rainfall and rising groundwater levels which can contribute to cliff erosion and landslides

NCERM – users will be able to see the area of land that could erode between now and 2055 and 2105.



Coastal erosion: How our assessment of coastal erosion risk is changing

Properties in areas at risk of coastal erosion between now and 2055 and 2105

The new NCERM shows that 3,500 properties are in areas at risk of coastal erosion in the period up to 2055. This increases to about 10,100 properties in the period up to 2105.

About half of these properties are residential. The other half are non-residential properties such as schools, hospitals, retail and leisure businesses. The numbers of properties in areas at risk make the assumption that funding and implementation of all actions in the SMPs are delivered.

In the worst case, where the SMPs are not delivered and no future investment is made to manage coastal erosion, the numbers of properties in areas at risk increases significantly. The total number of properties in areas at risk of coastal erosion would be 9 times greater in the period up to 2055, reaching up to 32,800 properties.

The new NCERM shows that coastal erosion risk will increase with climate change. This is mainly due to the effects of sea level rise on erosion rates. Even with SMPs delivered there could be 19,700 properties at risk of coastal erosion in the period up to the end of the century. Without delivery of any of the investment set out in SMPs, this figure is expected to be 5 times greater.

19,700
Properties in
areas at risk by
the end of the
century




Table 20: Properties in areas at risk of coastal erosion between now and 2055 and 2105 – with and without SMPs delivered

| | With SMPs being delivered | With SMPs being delivered | With SMPs being delivered | With SMPs being delivered | Without SMPs being delivered | Without SMPs being delivered | Without SMPs being delivered | Without SMPs being delivered |
|-------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| | Now to 2055 | Now to 2055 | Now to 2105 | Now to 2105 | Now to 2055 | Now to 2055 | Now to 2105 | Now to 2105 |
| | Present day | With climate change | Present day | With climate change | Present day | With climate change | Present day | With climate change |
| Residential | 1,900 | 2,900 | 6,400 | 13,000 | 25,200 | 34,300 | 51,000 | 80,100 |
| Non residential | 1,600 | 2,300 | 3,600 | 6,800 | 7,600 | 10,200 | 14,000 | 22,000 |
| Total properties | 3,500 | 5,200 | 10,100 | 19,700 | 32,800 | 44,500 | 65,100 | 102,100 |

Table note: with SMPs delivered and without SMPs delivered

Reasons behind the changes

Our understanding of the impacts of coastal erosion has been improved by better evidence as well as accounting for future climate change.

The main reasons are:

- we are using more sophisticated coastal analysis techniques to assess coastal erosion at approximately 8,000 locations along the coast
- we are using a further 10 years of coastal monitoring data from the National Network of Regional Coastal Monitoring Programmes. This provides a more detailed and accurate dataset to assess recent changes to the coast
- we have updated the information on the condition of coastal defences including improved methods for estimating the chances and impacts of defence failure
- we have better information on a wider range of properties at erosion risk in coastal locations. This includes accounting for caravans as well as tourist, leisure and businesses that have located to the coast over time



Regional distribution of properties in areas at risk of coastal erosion between now and 2055 and 2105

England already has some of the fastest eroding coastlines in Europe. In some parts of the east coast, erosion rates can be up to 4 metres per year. The rates of erosion are likely to increase with sea level rise and climate change through this century.

The new NCERM shows that the highest number of properties in areas at risk of coastal erosion are in Yorkshire and The Humber, the South West and the East of England. Places such as East Riding of Yorkshire, North Norfolk and Cornwall have some of the highest numbers of properties in areas at risk of coastal erosion.

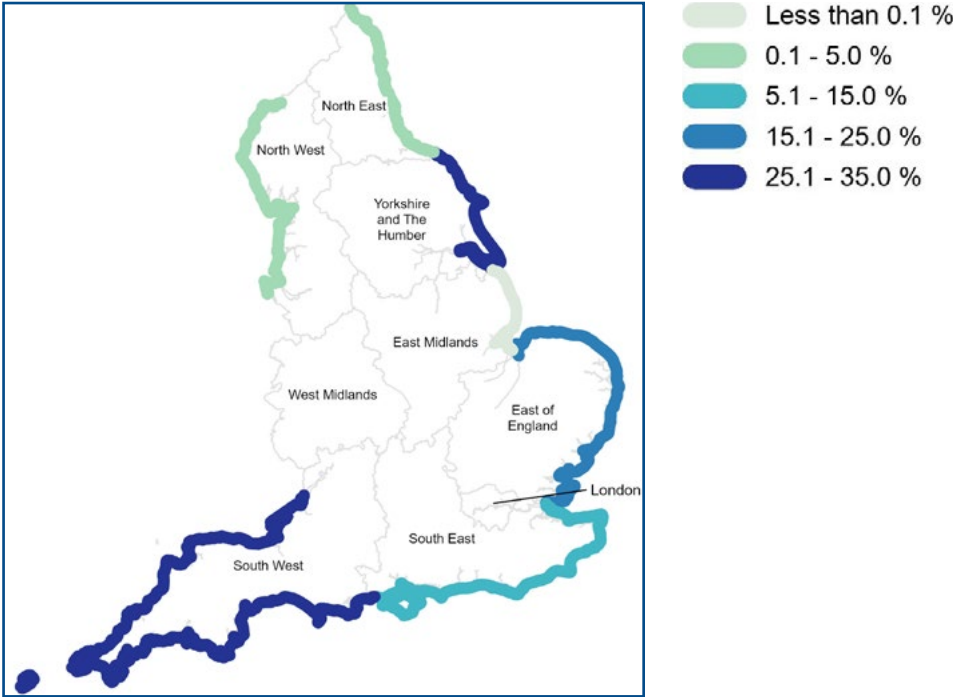
These 3 local authorities contain two-thirds of all residential properties in areas at risk of coastal erosion in England. This is why we are working with these local authorities as part of the £36 million [Coastal Transition Accelerator Programme \(CTAP\)](#). CTAP is exploring how coastal communities and businesses can adapt to the effects of erosion and climate change on the coast.

Table 21: Properties in areas at risk of coastal erosion between now and 2055 and 2105 – with SMPs delivered

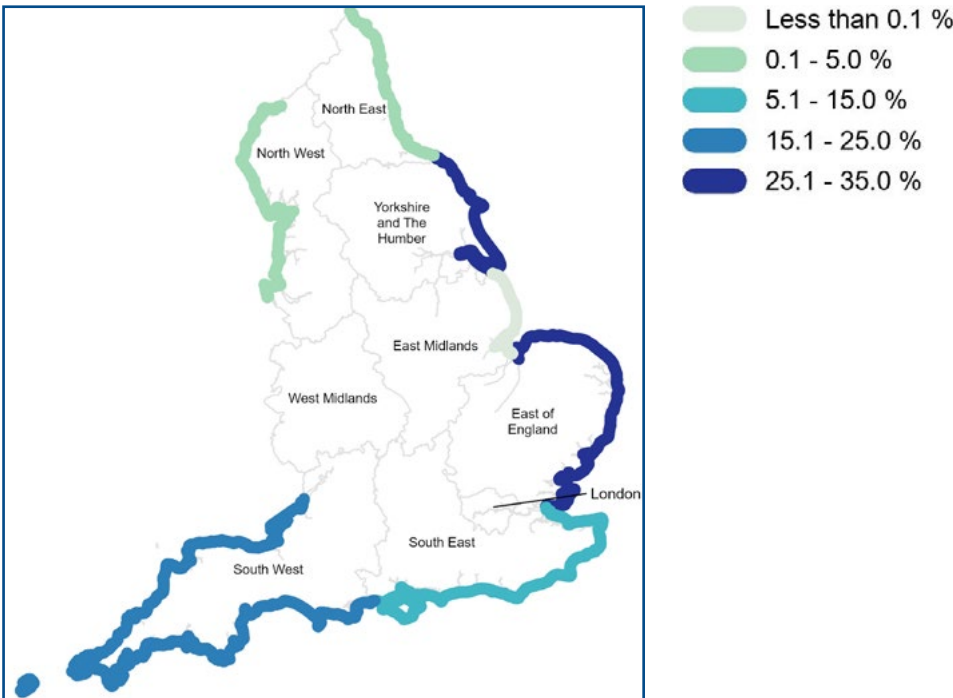
| | Now to 2055 with SMPs being delivered | Now to 2055 with SMPs being delivered | Now to 2105 with SMPs being delivered | Now to 2105 with SMPs being delivered |
|--------------------------|--|--|--|--|
| | Properties in areas at risk of coastal erosion | % of total properties in areas at risk of coastal erosion in England | Properties in areas at risk of coastal erosion | % of total properties in areas at risk of coastal erosion in England |
| East Midlands | - | | - | |
| East of England | 860 | 25 % | 2,760 | 27 % |
| London | - | | - | |
| North East | 160 | 4 % | 410 | 4 % |
| North West | 150 | 4 % | 300 | 3 % |
| South East | 290 | 8 % | 1,290 | 13 % |
| South West | 940 | 27 % | 1,850 | 18 % |
| West Midlands | - | | - | |
| Yorkshire and The Humber | 1,100 | 32 % | 3,490 | 35 % |

Table note: with SMPs delivered and without climate change

Properties in areas at risk of coastal erosion to 2055, as a % of total properties in areas at coastal erosion risk in England



Properties in areas at risk of coastal erosion to 2105, as a % of total properties in areas at coastal erosion risk in England



Other local authorities with significant ‘pockets’ of erosion risk include Great Yarmouth, Swale, South Hams, Dorset, New Forest, Southampton and the Isle of Wight.

Additionally, there are related challenges from ground instability affecting whole communities, especially on the south and north east coasts.

Parts of the Isle of Wight are at high risk of landslides and cliff falls. Significant land movements happened in 2023 and 2024 as a result of:

- erosion at the base of the cliff
- large amounts of winter rainfall raising ground water levels

As well as property, coastal erosion can also affect the natural environment. Erosion can result in the loss and makeup of habitats along the coast, and the new NCERM shows over 6 square kilometres of Sites of Special Scientific Interest are within areas of coastal erosion risk by 2055. Erosion and the movement of sediment along the coast is a natural feature of the coastal environment. However, where losses occur due to flood and erosion defences being in place, we support wildlife in adapting to coastal change. Over recent decades we have created over 2,300 hectares of coastal habitats through our Habitat Compensation and Restoration Programme.

Infrastructure and agriculture in areas at risk of coastal erosion between now and 2055 and 2105

Road networks along the coast mainly consist of minor and unclassified roads but these are often important access routes for coastal communities. A roads, B roads and motorways ('major roads') normally stop short of coastal areas. Where they do feature along the coast there are often sea defences or other beach management protection measures in place. This is also the case for railways which run along the coast.

Much of England's primary (Grade 1 and 2) agricultural land at the coast is in low lying areas where flooding is the main risk. Lower grade agriculture in many parts of the coast is at risk of erosion with some areas eroding naturally. This is in line with the approach set out in SMPs.

Table 22: Infrastructure and agricultural land (by grade) in areas at risk of coastal erosion between now and 2055 and 2105 – with SMPs delivered

| | Now to 2055 with SMPs being delivered | Now to 2105 with SMPs being delivered |
|---|--|--|
| Major roads (Motorway/A/B roads) | Over 1 km | Over 10 km |
| Minor roads and local access roads | Over 55 km | Over 173 km |
| Railways | Over 2 km | Over 6 km |
| Grade 1 and 2 agricultural land | 0.7 km ² | Over 2 km ² |
| Grade 3 agricultural land | Over 7 km ² | Over 17 km ² |

Table note: without climate change

How the new national flood and coastal erosion risk information and data will be made available

Early 2025: New NaFRA and NCERM data published

In early 2025 we will publish:

- the new NaFRA data on ‘Check Your Long Term Flood Risk’ and on data.gov.uk
- the new NCERM data on ‘Check coastal erosion risk for an area in England’, [SMP Explorer](#) and on data.gov.uk

For the first time ‘Check Your Long-Term Flood Risk’ will show information for users:

- on future flood risk taking into account climate change
- on potential flood depths both for present day flood risk and with climate change

The improved service will make it easier for users to understand both the chances and potential impacts of current and future flood risk in the places in which they live or work.

Spring 2025: New NaFRA data published on Flood Map for Planning

In spring 2025 we will be updating our [Flood Map for Planning](#) service which displays the Flood Zones. The Flood Zones are defined by government in planning guidance and will continue to show present day flood risk from rivers and the sea. We will be updating the Flood Zones using the data from the new NaFRA.

The improved service will use data from the new NaFRA to:

- assist planners and developers towards the most appropriate sites for development
- make it easier for developers to produce [Flood Risk Assessments](#) as part of the process to obtain planning permission

For the first time, we will be:

- adding new information to show how climate change may affect the extent of flood risk from rivers and the sea in future
- including mapping showing areas at flood risk from rivers and the sea taking into account the presence of existing flood defences
- displaying surface water flood risk

Following these Spring 2025 improvements to [Flood Map for Planning](#), we will plan further updates to include other helpful information from the new NaFRA. This will include adding information on how climate change could affect surface water flood risk as well as information on flood depths.

Next steps: Continuous improvement in our understanding of risk

We have assessed that nearly 90 % of properties at flood risk in England are in areas that are suitable for the new NaFRA data and mapping. The remaining areas require either new detailed local modelling, or gaps and errors in the input data to be rectified. For areas that are not yet able to benefit from the new NaFRA we are temporarily retaining the existing flood risk information. Local Environment Agency teams will ensure that the best available local understanding of risk is also factored into decisions about future investment options. We are continuing to refine our modelling and data with the aim of reach 100 % coverage with the new NaFRA data by Summer 2026.

We are committed to a rolling programme of data improvements so we can take into account the latest local modelling evidence and national data improvements. Following publication of the new NaFRA data in early 2025, the first update will be in summer 2025. While details are to be confirmed, we expect updates to then follow quarterly.

Following publication of the new NCERM data in early 2025 on SMP Explorer, the first update is expected to be later in 2025. While details are to be confirmed, we expect updates to then follow yearly.

How we will use the new risk information to inform future investments

For the first time, our new national flood and coastal erosion risk assessment gives us an understanding of both risk for the present day, and with climate change projections. This new information is vital for our future planning, especially given climate change projections and aging flood and coastal defences.

Informing our future investment programme

We are currently developing a new flood and coastal investment programme using the best available evidence which includes the new NaFRA and the new NCERM. This will allow us to assure that our investment programmes are prioritising the places and projects where current and future risk is greatest.

Long term investment scenarios

At a national scale, both the new NaFRA and NCERM will provide the underpinning evidence to inform our new Long Term Investment Scenarios (LTIS). These are due to be published by the end of 2025. LTIS will produce detailed insights into future flood and coastal risk, options for managing risk as well as an assessment of the likely long term costs. The new scenarios will provide important evidence for informing future policy and investment choices for improving resilience and adaptation to future climate risks.

Acknowledgements

The new NaFRA and NCERM has taken several years of hard work to develop. This work would not have been possible without the expertise and dedication of colleagues across the Environment Agency's flood and coastal erosion risk mapping, modelling, evidence and project delivery teams. We would like to recognise our collaboration with Jacobs and JBA Consulting in producing the new assessment tools. We would also like to acknowledge the time and effort of Lead Local Flood Authorities across England who have worked in collaboration with us to develop the new surface water flood risk assessment. And finally we would like to thank coastal local authorities and the National Network of Regional Coastal Monitoring Programmes as well as the UK Centre for Ecology & Hydrology and the Ordnance Survey for the data and information they have provided. We will continue to build on these strong partnerships as part of our commitment to keep our national risk information for flooding and coastal erosion up to date.

Julie Foley, Director of Flood Risk Strategy and Adaptation

Report pictures

Front cover

Top – waves crashing against a sea wall. Credit: Environment Agency

Bottom left – Raby Mere, Wirral, October 2023. Credit: Janet Astbury

Bottom right – Environment Agency operations. Credit: Environment Agency

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Flooded riverside. Credit: Flood Re

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Flooded agricultural land. Credit: Pexels

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Top – Chesterfield, Derbyshire. Storm Babet – October 2023. Credit: Environment Agency

Bottom – Flooded fields. Storm Henk – January 2024. Credit: Environment Agency

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Ironbridge, Shropshire. Credit: Environment Agency

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Hythe Ranges, Kent, coastal defences. Credit: Environment Agency

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Van driving through flood water. Credit: Environment Agency

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Flooded fields. Credit: Environment Agency/Getty images

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Aldbrough, East Riding of Yorkshire. Credit: Environment Agency

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Green Lane, Skipsea, East Riding of Yorkshire. Credit: Guy Cooper

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We help people and wildlife adapt to climate change and reduce its impacts, including flooding, drought, sea level rise and coastal erosion.

We improve the quality of our water, land and air by tackling pollution. We work with businesses to help them comply with environmental regulations. A healthy and diverse environment enhances people's lives and contributes to economic growth.

We can't do this alone. We work as part of the Defra group (Department for Environment, Food & Rural Affairs), with the rest of government, local councils, businesses, civil society groups and local communities to create a better place for people and wildlife.

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