

Reduction in Risk of Flooding from Rivers and Sea due to Defences

Product Description

February 2024

REDUCTION IN RISK OF FLOODING FROM RIVERS AND SEA DUE TO DEFENCES PRODUCT DESCRIPTION

- An assessment of where there is a reduction in flood risk for England due to defences
- It shows the area where there is a reduction in risk of flooding from rivers and the sea due to flood defences taking account of the condition they are in and describes the suitable uses of the data.

HOW IT IS PRODUCED

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|------------------------|--|
| Modelling Method | <ul style="list-style-type: none"> • It is produced using the defended scenario of flood risk in the Risk of Flooding from Rivers and Sea dataset and an undefended scenario of flood risk from rivers and sea. • The two scenarios are compared, and a separate grid cell is created where the flood risk likelihood for a 50 x 50m grid is lower in the Risk of Flooding from Rivers and Sea dataset than in the undefended scenario of flood risk from rivers and sea. • The flood risk likelihood categories compared are those used for the Risk of Flooding from Rivers and Sea dataset |
| Investment (2005-2017) | <ul style="list-style-type: none"> • Model development £10m • Survey £20m + • Local validation |

DATA CONTENT

A geospatial dataset, the data is split into 50m x 50m cells indicating where there is a reduction in flood risk from rivers and sea due to defences.

Each impact cell has a suitability rating to show at what scale it is generally appropriate to use the data to assess flood risk, and how suitable the data is for a range of different uses.

USING THE PRODUCT

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|--------------------|--|
| Key Strengths | <ul style="list-style-type: none"> • Local data (defence information including condition, water levels) and expert validation • High quality ground levels • Nationally consistent method for comparing risk in different places • Regularly updated where new data is available. |
| Key Limitations | Like many other flood models, it does not take individual property threshold heights into account so the assessment at property level is indicative only. |
| Companion Datasets | <ul style="list-style-type: none"> • Risk of Flooding from Rivers and Sea • Risk of Flooding from Rivers and Sea - Postcodes in Areas at Risk • Risk of Flooding from Rivers and Sea - Properties in Areas at Risk • Risk of Flooding from Rivers and Sea - key summary information • AIMS Asset Bundle • Flood Map for Planning (Rivers and Sea) • Recorded Flood Outlines |

PUBLIC ACCESS TO THIS INFORMATION

This product can be downloaded from from the [Defra Data Services Platform](#) under the Open Government Licence.

Further information regarding the Defra Data Services Platform can be found on the supporting [Forum](#)

Description

This product is a geospatial dataset, the data is split into 50m x 50m cells indicating where there is a reduction in flood risk from rivers and sea due to defences.

It uses the results of a national flood risk assessment for rivers and sea, undertaken using modelling and local expertise. The assessment considers flood defences and their condition.

The dataset is produced using the difference between the **Risk of Flooding from Rivers and Sea** and the **undefended scenario of flood risk from rivers and sea**.

Data Specification

The product shows the area extent where there is a reduction in risk of flooding from rivers and the sea due to flood defences, taking account of the condition the defences are in.

Each cell has also been assigned a suitability rating to show at what scale it is generally appropriate to use the data to assess flood risk, and how suitable the data is for a range of different uses.

A description of the dataset fields can be found in the table at the end of this document.

How Reduction in Risk of Flooding from Rivers and Sea due to Defences is produced

1. To produce the Risk of Flooding from Rivers and Sea dataset, our local teams provide modelled river and/or sea water levels alongside information for about 175,000 flood defence assets, such as crest level, defence type and condition, as input data to the model.
2. The model calculates how much water would overtop or breach each defence, considering the defence height, type and condition.
3. The model is run to determine how much water would flood the land for a range of events (frequent but small floods to rare but large floods), and where it would go. We model 40 different scenarios of flooding between a 1 in 1 chance each year and a 1 in 1000 chance each year. For each scenario the model runs many thousands of simulations which consider the possible combinations of defences breaching or overtopping. The results are consolidated to give a single likelihood of flooding.
4. The area of floodplain is split into 50m x 50m grid squares (cells), each allocated a likelihood of flooding. We present the likelihood results in four risk categories.
5. The model also calculates a confidence level for each cell based on how well the model performs at that location and how good the input data is. The result is a suitability rating indicating at which spatial scale the results are reliable.

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6. Our local staff validate the categorised results from the computer model using their local knowledge and expertise.
7. The State of the Nation: No Defences dataset, was first produced in 2018 using the same method but the flood defences were removed from the modelling.
8. The latest products are compared to identify where the flood risk likelihood assigned to a 50m x 50m cell in the Risk of Flood from Rivers and Sea dataset is less than in the equivalent cell of the State of the Nation: No Defences dataset.

How suitable are the Reduction in Risk of Flooding from Rivers and Sea due to Defences results for different uses?

We consider each 50m x 50m cell and using a nationally consistent method and tools, which we developed with input from our local area experts, and assign a suitability rating to each cell.

The suitability rating indicates the spatial scale at which we think the results are reliable at, and therefore reflects how confident we are that each cell has been assigned the correct flood likelihood category, based broadly on:

- how well we think the computer flood model performs in that location
- how good the input data, e.g. water levels, defence levels is for the location.

Our local experts review this information and change results where they have better local data.

This is a national flood risk assessment, so suitability is generally in the 'national - county' and 'county – town' categories. We include the "Property (including internal)" scale but do not yet have any data reliable at this scale because the national flood risk assessment does not contain information about property thresholds. The data can be combined with other risk information to make it more reliable at smaller scales.

The scales describing suitability and reliability are set out in the following table:

| Suitability: 'it's good enough for...' | | Reliability: 'how good is it for...' | |
|--|--|--|--|
| Indicative suitable scale | Indicative suitable use | How reliable is this for a local area? | How reliable is this for an individual property? |
| National to county - suitable for identifying which parts of countries or counties are at risk, or which countries or counties have the most risk. | Suitable for identifying areas with a natural vulnerability to flood first, deepest, or most frequently. | Very unlikely to be reliable for a local area. | Extremely unlikely to be reliable for identifying individual properties at risk. |
| County to town - suitable for identifying which parts of counties or towns are at risk, or which counties or towns have the most risk. | Suitable for identifying approximate extents, shallower and deeper areas. | Unlikely to be reliable for a local area. | Very unlikely to be reliable for identifying individual properties at risk. |
| Town to street - suitable for identifying which parts of towns or streets are at risk, or which towns or streets have the most risk. | Suitable for identifying flood extents, approximate depth of flooding, and identifying streets at risk of flooding. | Likely to be reliable for a local area (and so the information is suitable for areas of land, not individual properties). | Unlikely to be reliable for identifying individual properties at risk (and so the information is suitable for areas of land, not individual properties). |
| Street to parcels of land - suitable for identifying which parts of streets or parcels of land are at risk, or which streets or parcels of land have the most risk. | Suitable for identifying flood extents, depths and approximate velocities. | Very likely to be reliable for a local area (and so the information is suitable for areas of land, not individual properties). | Likely to be reliable for identifying individual properties at risk (though not whether they flood internally, so the information is suitable for areas of land, not individual properties). |
| Property (including internal) - suitable for identifying which parts of a property are at risk (including internal / external distinction), or which properties have the most risk. Currently no data in NaFRA has this category. | Suitable for identifying flood extents, depths, velocities, and distinguishing between street and property flooding. | Extremely likely to be reliable for a local area. | Likely to be very reliable at identifying individual properties at risk, including depths of flooding internally (this provides a genuine property level assessment). |

Improvements / Update frequency

There are ongoing improvements to the method and the input data used to produce the Risk of Flooding from Rivers and Sea. Consequently, we publish updates to it regularly (typically every 3 months) and users are strongly advised to ensure they are referring to the most current information. The reduction in risk of flooding from rivers and the sea due to flood defences dataset will be updated to reflect these updates.

This year we are pausing the updates to this dataset after December 2023. This is in advance of publishing the first outputs from our new National Flood Risk Assessment. These outputs will be published by the end of 2024 and will include a new version of this dataset. Please visit the [“Pause to Updates of Flood Risk Maps” announcement](#) on the Defra Data Services Platform support pages for further information. You can also contact us for the latest information about these changes at fcrn_risk_assessment@environment-agency.gov.uk.

Using the product

This dataset has been created to provide an indication of where there is a reduction in risk of flooding from rivers and sea due to defences. The acknowledged limitations mean that it is not suitable for property level assessment, and local model information should be requested from the Area team for the location in order to understand the effects of defences on flood risk for the area.

Each of our flood risk maps is an assessment of flood risk from one or two sources of flooding and shows the likelihood of flooding from that source (or those sources). A full picture of the likelihood of flooding at any location will need to take into consideration all sources of flooding at that site.

However, the total overall likelihood of flooding cannot be calculated by simply adding the likelihood of flooding from different individual flood risk assessments or flood risk maps. This is because there are dependencies between the weather conditions which generate flooding from these different sources. We are investigating ways to provide information on flooding from all sources in the future.

To further understand national flood risk, other companion datasets mentioned are available from [Defra Data Services Platform](#) to use in combination with this dataset.

Strengths

- Includes local data (defence features including condition, water levels)
- Validated by local experts
- Uses high resolution ground levels where available (~70% of England)
- Nationally consistent method for comparing risk in different places
- Can be updated regularly where new data is available

Limitations

- Flood estimation is not an exact science and any flood risk assessment needs to be understood and used in that context.
- Results are generally not reliable for property level assessment. The method does not provide information relating to when the floodwater may be deep enough to start causing damage or disruption to homes, roads or other infrastructure. Even if suitable depths were available, additional information on properties (including floor levels) would be required to say with any confidence whether flooding of a certain depth would enter into a property and cause damage. It can only provide an indication of the likelihood of flooding and further information is required to determine the actual impact on a specific property.
- The modelling used to generate the source data does not work well in all catchment types, for example, narrow steeped catchment, pumped catchments and those where the land slopes gently away from the river.
- The State of the Nation – No Defences scenario has only been partially updated since it was first created in 2018. Therefore, it covers a different flood extent to Risk of Flooding from Rivers and Sea. This means that in some locations, this dataset may not indicate the reduced risk of flooding due to the presence of defences.

Companion datasets

- Risk of Flooding from Rivers and Sea
- Risk of Flooding from Rivers and Sea – Postcodes in Areas at Risk
- Risk of Flooding from Rivers and Sea – Properties in Areas at Risk
- Risk of Flooding from Rivers and Sea – key summary information
- AIMS Assets Bundle
- Flood Map for Planning:
 - Flood Zone 2
 - Flood Zone 3
 - Flood Storage Areas
 - Spatial Flood Defences
- Recorded Flood Event Outlines

Public access to this information

The product can be downloaded from the [Defra Data Services Platform](#) under the Open Government Licence.

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Data fields

The table below is an example schema for the Reduction in Risk of Flooding from Rivers and Sea due to Defences. It describes the geometry and the attributes of the data. When delivered, some file formats such as ESRI Shapefiles may truncate the fieldnames.

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|-----------------------------|-----------|-------------|---------------|---------------------------------|-----------|-------|--------|
| Simple Feature Class | | | | Geometry: | Polygon | | |
| Reduction_in_RoFRS_<YYYYMM> | | | | Contains M Values: ¹ | No | | |
| | | | | Contains Z Values: ² | No | | |
| Field name | Data type | Allow nulls | Default value | Domain | Precision | Scale | Length |
| FID | Object ID | | | | | | |
| Shape | Geometry | | | | | | |
| SUITABILITY ³ | Text | No | | | | | 30 |

¹ Measure length (for linear referencing)

² Height value

³ SUITABILITY is the scale at which it is suitable to use the likelihood information (National to County, County to Town, Town to Street, Street to Parcels of land, Property (including internal)- currently no data in NaFRA has this category)