THE CLIMATE REPORT

COMMUNICATING PROPERTIES' CHANGING HAZARD EXPOSURE DUE TO CLIMATE CHANGE.

Report Summary

Our climate is already changing and it will continue to change over the coming decades. Even under the most optimistic climate scenarios, our summers could become hotter and drier, and our winters could become warmer and wetter. In addition, more frequent and severe extreme weather events are expected, and sea levels could continue to rise. These climatic changes could increase the level of threat from many physical hazards to properties across the UK.

This report provides a summary of how physical hazards affecting this property could change over the coming decades. The report covers soil subsidence, coastal erosion, wind speed and storms, as well as flooding. Information on how the local climate is predicted to change is also included. Because different rates of change are expected depending on how quickly we reduce greenhouse gas emissions, this reports the expected changes to hazards for both medium* and high** emission scenarios.

Site Details

Report address:
Sample Address

Report details:

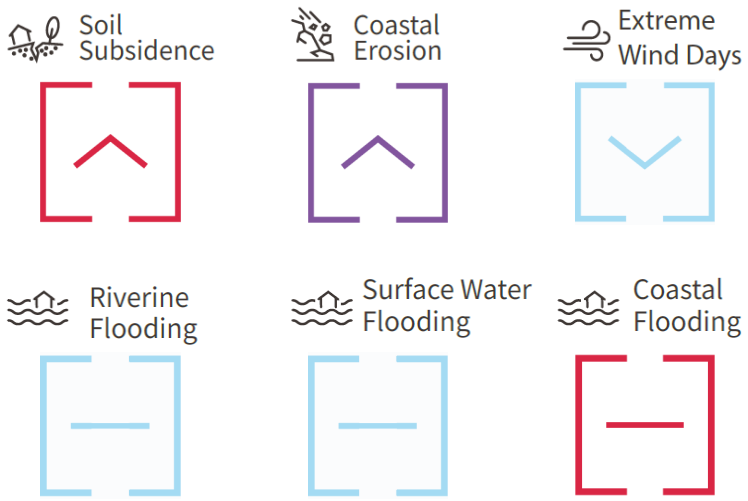
Sample Reference

Date: 19/04/2023

Assessed by the:

Dye & Durham Geohazard Risk Team

Changing Hazard Exposure Dashboard (High Emissions**)



Chevron Shape:
Change in hazard exposure from Present-2050s (average UK mortgage length), High Emissions Scenario**

No Exposure | High decrease | Low decrease | No change | Low increase | High increase

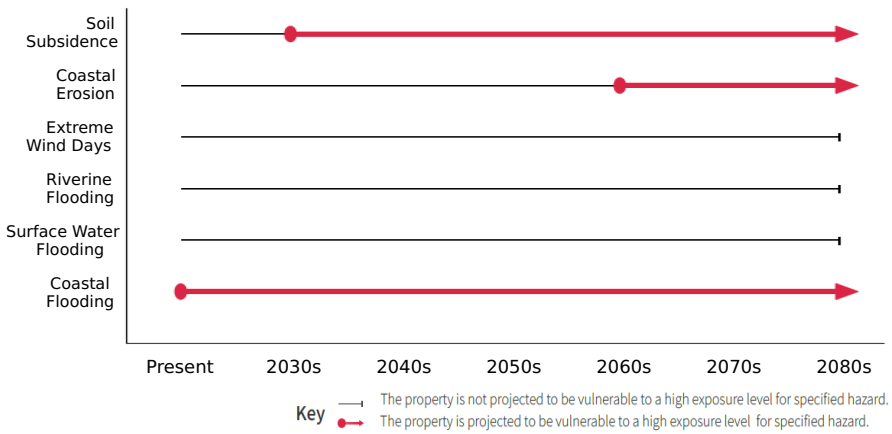
Chevron Colour:
Hazard exposure by the 2050s (average UK mortgage length), High Emissions Scenario**

No Exposure | Very Low | Low | Medium | High

Site Location

Hazard Exposure Timeline (High Emissions**)

The hazard exposure timeline identifies **when** each hazard at the property location will reach the **high exposure level** under a **High Emissions Scenario****.



*Medium Emissions Scenario: Equivalent to 2.4°C global warming by 2100s, **High Emissions Scenario: Equivalent to 4.3°C global warming by 2100s

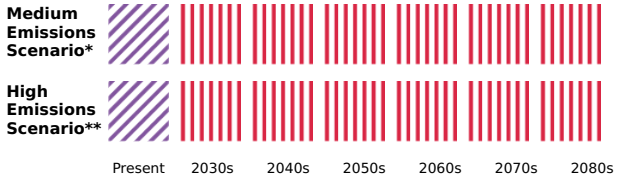
Physical Hazards

Hazard scoring system: No Exposure | Very Low | Low | Medium | High

Text box colour represents hazard exposure by the 2050s using a High Emissions Scenario**

Soil Subsidence

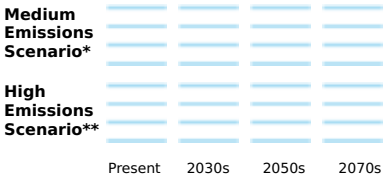
The property is currently considered to have a medium exposure to soil subsidence, this is expected to increase to a high exposure level by the 2050s under a high emissions scenario**. Subsidence here encompasses soil related subsidence including clay related shrinkage and swelling, peat shrinkage and sand washout. Certain climatic conditions (i.e., temperature and rainfall) are required for subsidence to occur. The presence of substantial vegetation can also exacerbate subsidence. Subsidence under a property may cause cracks in the façade, or in the worst-case scenario, cause significant structural damage.



Riverine Flooding

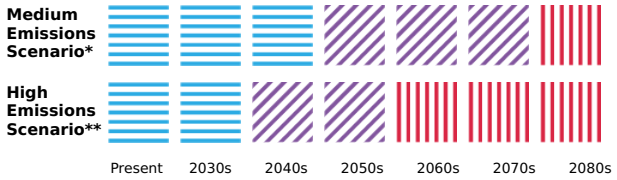
The property is currently considered to have a very low exposure to riverine flooding; a similar level of exposure is expected in the 2050s under a high emissions scenario**. Riverine flooding (a.k.a. fluvial flooding) relates to flooding caused by overflowing bodies of water (e.g., rivers and lakes). Riverine flooding may occur due to heavy rainfall, failing flood defences, or obstruction/filling of the water body with other material (e.g., soil washed into a river).

Flood data supplied by Fathom



Coastal Erosion

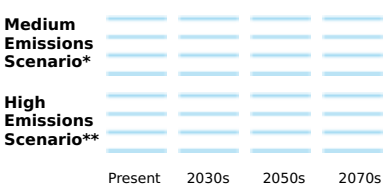
The property is currently considered to have a low exposure to coastal erosion, this is expected to increase to a medium exposure level by the 2050s under a high emissions scenario**. Coastal erosion refers to the process by which land is lost to the sea. Wave action, especially during storms, is often the predominant cause. The weather, underlying geology, and sea level also influence erosion rates.



Surface Water Flooding

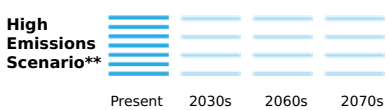
The property is currently considered to have a very low exposure to surface water flooding; a similar level of exposure is expected in the 2050s under a high emissions scenario**. Surface water flooding (a.k.a. pluvial flooding) is triggered by heavy rainfall, which causes water to collect at the surface. Surface water flooding may occur due to extreme rainfall events or broken/insufficient drainage infrastructure.

Flood data supplied by Fathom



Extreme Wind Days

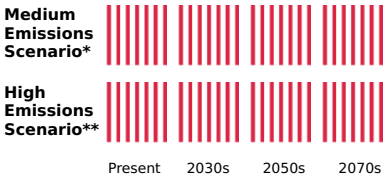
The property is currently considered to have a low exposure to wind, this is expected to decrease to very low by the 2050s under a high emissions scenario**. Globally, extreme weather events such as storms are becoming more frequent due to climate change. High wind speeds associated with extreme weather events can represent a significant hazard to properties and individuals.



Coastal Flooding

The property is currently considered to have a high exposure to coastal flooding; a similar level of exposure is expected in the 2050s under a high emissions scenario**. Coastal flooding occurs when the sea advances inland, this is commonly caused by storm surges (in which low atmospheric pressure causes short-term sea-level rise).

Flood data supplied by Fathom



*Medium Emissions Scenario: Equivalent to 2.4°C global warming by 2100s, **High Emissions Scenario: Equivalent to 4.3°C global warming by 2100s

Climate Introduction

The occurrence and scale of many physical hazards are directly influenced by the local climate. This section of the report summarises how local temperature, windspeed, and rainfall will respond to global climate change. Key climate-related information from the Local Authority is also included, such as, the date by which they plan to become carbon neutral and their current greenhouse gas emissions.

Future climate projections indicate that in the UK we will experience hotter, drier summers, and warmer, wetter winters. Severe weather events will become more severe and sea levels will rise. The prevalence of heat waves in summer will dramatically increase under both scenarios (2.4°C or 4.3°C global warming by 2100s), but more so under 4.3°C warming. Summer rainfall is expected to decrease, but when it does rain, it is expected that storms will be more intense.

Local Authority Climate Plan

Between 2005-2019 local authority end-user emissions (point of energy consumption) emissions decreased by 23% in Northern Ireland, 29% in Wales, 35% Scotland, and by 36% in England. There was a 4% decrease in total national emissions between 2018 and 2019. Carbon dioxide (CO_2) is the main Greenhouse Gas (GHG), accounting for 80% of GHG emissions in the UK in 2019.

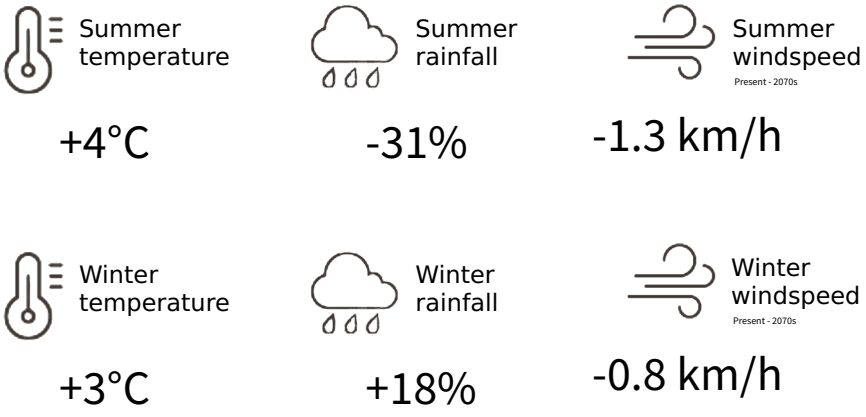
Reducing carbon emissions is a priority for many UK local authorities. The table states the properties' local authority climate reduction plan, proposed carbon neutral (i.e., equal amounts of CO_2 emitted and removed from the atmosphere) date, and current CO_2 emissions. Local emission data is collated from the UK Government Department of Business, Energy & Industrial Strategy.

Local Authority Data

Council Name	**Tendring**
Plan	**Yes**
Carbon Neutral Date	**2030**
Declared Emergency	**June 8, 2019**
Emissions 2019	**573.8 kilotons**
Emissions per Capita	**3.9 tons**
Emissions per km²	**1.6 kilotons**

Local Climate Dashboard

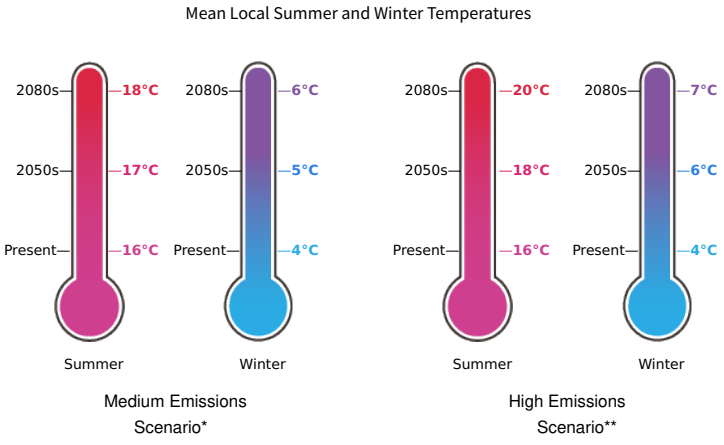
Mean change from present - 2080s, high emissions scenario **



Local Temperature Changes

Temperature projections are modelled under a high emissions scenario**. The local area where the site is located is projected to experience **an increase** in mean summer temperature, with a mean of **16°C** in present day and a projected mean of **18.5°C** in the 2050s. Likewise, mean winter temperatures are projected to experience **an increase**, with a mean of **4°C** in present day and a projected mean of **6.0°C** in the 2050s.

In the 2050s, local mean summer temperature projections using a high emission scenario** are **higher** than the UK mean, whereas local mean winter temperature projections are **similar** to the UK mean.



*Medium Emissions Scenario: Equivalent to 2.4°C global warming by 2100s, **High Emissions Scenario: Equivalent to 4.3°C global warming by 2100s

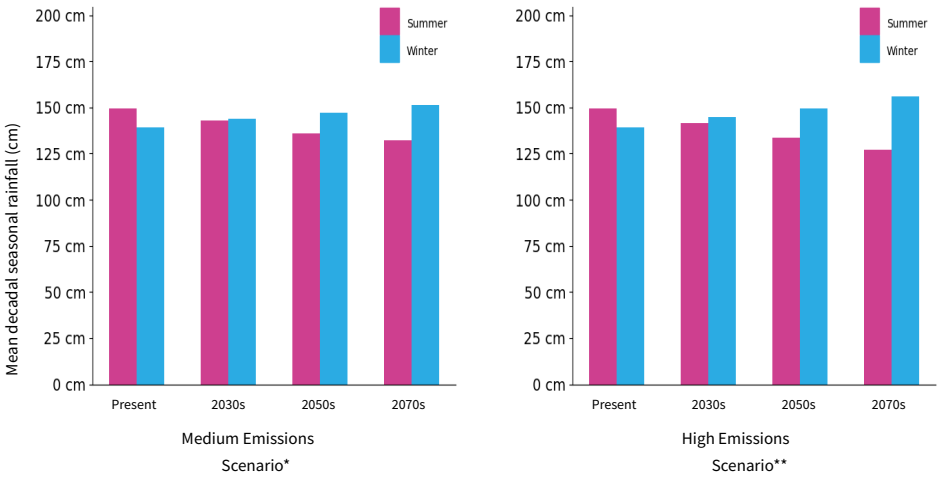
Local Rainfall Changes

Rainfall projections are modelled using a high emissions scenario**. The local area where the site is located is projected to experience **decreases** in average summer rainfall, with **149.5 cm** in present day and **133.5 cm** projected in the 2050s. Mean winter rainfall are projected **to increase**, with **139.0 cm** in present day and **149.6 cm** projected in the 2050s.

Local mean summer rainfall projections using a high emissions scenario are **lower than** projected UK mean summer rainfall in the 2050s.

Local mean winter rainfall projections using a high emissions scenario are **similar to** projected UK mean winter rainfall in the 2050s.

Mean Local Summer and Winter Rainfall



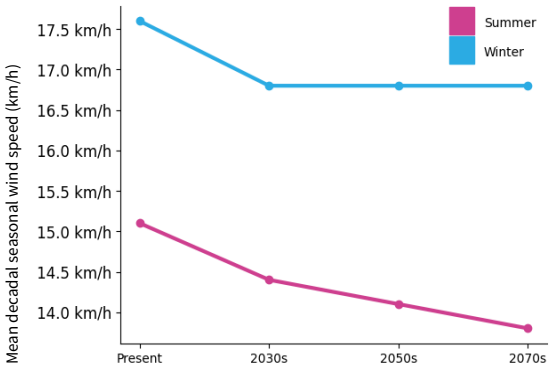
Local Wind Speeds & Extreme Wind Speed Days

Average wind speed projections are modelled using a high emissions scenario**. The local area where the site is located is projected to experience **a decrease** in mean summer wind speed, with a current average of **15.1 km/h** in present day and a projected mean of **14.1 km/h** in the 2050s. Mean winter wind speeds are projected to experience **a decrease**, with a current average of **17.6 km/h** in present day and a projected mean of **16.8 km/h** in the 2050s.

Local mean summer wind speed projections using a high emissions scenario** are **similar to** projected UK mean summer wind speeds in the 2050s.

Local mean winter wind speed projections using a high emissions scenario** are **similar to** projected UK mean winter wind speeds in the 2050s.

Mean Local Summer and Winter Wind Speeds



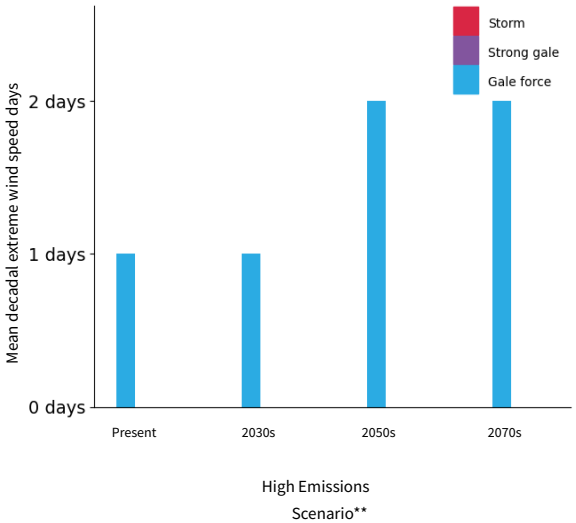
The property could experience an approximate **increase** of 1 extreme wind speed day (Force 8, 9 & 10 days) per year in the 2070s compared to the present. This is projected using a high emissions scenario**. The impact of wind speed is categorised by the Beaufort Scale. Extreme wind speeds:

Force 8 - Gale force: 62 - 74 km/h. Under these wind speeds, twigs will begin to break off trees.

Force 9 - Strong gale: 75 - 88 km/h. Under these wind speeds, the property could experience slight structural damage (chimney pots and slates removed).

Force 10 - Storm: 89 - 102 km/h. Under these wind speeds, mostly experienced along the coast, the property could experience considerable structural damage.

Extreme Wind days per Year by Decade



*Medium Emissions Scenario: Equivalent to 2.4°C global warming by 2100s, **High Emissions Scenario: Equivalent to 4.3°C global warming by 2100s

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General
This report is based on the site submitted at point of order (the Site). Our assessment and communication of future climate hazards is based on the soil subsidence and coastal erosion modules from the National Ground Risk Model: Climate™, which considers the future climate scenarios based on the IPCC emission scenarios. The assessment of future regional climate change is informed by the UK Climate Projections data (UKCP18). The assessment of flood hazard is informed by flood hazard data from Fathom.

No inspection of the Site has been undertaken and this report does not constitute a property survey. Additional information on the datasets used is provided below. This report does not include a site investigation, nor does Dye & Durham (UK) Limited (formerly Terrafirma IDC Limited) make specific information requests of the regulatory authorities for any relevant information they may hold regarding the environmental conditions or ground stability of the Site. This report is concerned solely with the site searched and should not be used in connection with adjacent properties.
For the avoidance of doubt this report does not consider matters related to underground services, land ownership, planning considerations, unexploded ordinance, contamination, pollution, ecological or environmental issues, asbestos or radioactive waste.

Data
It should be noted that unrecorded or unexpected ground hazards can exist. Dye & Durham (UK) Limited (formerly Terrafirma IDC Limited) cannot be held responsible for any damage or ground-related problems because of your site being affected by hazards which are unrecorded or where any relevant information on the hazards is either not available or is of poor quality.

The report is based on available data at the time of preparation. The report has been carried out with reference to licensed data supplied by the British Geological Survey (BGS), Ordnance Survey (OS), HM Land Registry, Environment Agency, UK Climate Projections (UKCP18) and Coordinated Regional Climate Downscaling Experiment (CORDEX). The assessment of flood hazard is informed by flood hazard data from Fathom.

In some cases, data is made up of information supplied to Dye & Durham (UK) Limited (formerly Terrafirma IDC Limited) by third parties, of which Dye & Durham (UK) Limited (formerly Terrafirma IDC Limited) has no direct knowledge. Dye & Durham (UK) Limited (formerly Terrafirma IDC Limited) has endeavoured to verify all database entries, however, given the nature of this third-party information, Dye & Durham (UK) Limited (formerly Terrafirma IDC Limited) can have no liability for the accuracy of the information comprising the databases or for any loss of whatever nature directly or indirectly caused which may result from any reliance placed upon it. The data used to compile this report is continually updated. In line with all search data, if there is a delay in using this report a new version may be required to ensure the most current information is available.

Methodology
This report has been completed in accordance with the Dye & Durham (UK) Limited (formerly Terrafirma IDC Limited) professionally reviewed methodology, produced to evaluate the process of analysing multiple datasets with professional interpretation to provide an evaluation into the changing hazard exposure to property from climate related hazards over the remaining decades of the 21st century. Using this methodology and the available data, we have endeavoured to provide as accurate a report as possible. This report is a ‘remote’ or ‘desktop’ investigation and only reviews information provided by the client (the site location) and from the databases of publicly available (either freely or by licence) information.

Future climate scenarios
To model and predict future climate it is necessary to make assumptions about changes to our environment that will influence climate change. Representative Concentration Pathways (RCPs) are a method for capturing those assumptions within a set of scenarios. The conditions of each scenario are used in the process of modelling possible future climate evolution. RCPs specify concentrations of greenhouse gases that will result in total radiative forcing increasing by a target amount by 2100, relative to pre-industrial levels. Total radiative forcing is the difference between the incoming and outgoing radiation at the top of the atmosphere. Radiative forcing targets for 2100 have been set at 2.6, 4.5, 6.0 and 8.5 watts per square metre (W/m^2) to span a wide range of plausible future emissions scenarios and these targets are incorporated into the names of the RCPs; RCP2.6, RCP4.5, RCP6.0 and RCP8.5. Each pathway results in a different range of global mean temperatures.

More information of the RCP scenarios is available here: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-guidance---representative-concentration-pathways.pdf

This report considers incorporates two emission scenarios, a Medium and High Emission Scenario. The Medium Emissions Scenario is equivalent to 2.4°C global warming by 2100s. The High Emissions Scenario is equivalent to 4.3°C global warming by 2100s. For soil subsidence, extreme wind days and flooding data the emission scenarios are based on the UKCP18 Representative Concentration Pathways (RCP). RCP4.5 is considered to be the most likely or expected scenario to occur, termed a Medium Emissions Scenario* in this report. RCP8.5 is considered to be the current worst case or most extreme scenario to occur, termed a High Emissions Scenario** in this report.

*Medium Emissions Scenario: Equivalent to 2.4°C global warming by 2100s, **High Emissions Scenario: Equivalent to 4.3°C global warming by 2100s

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Soil subsidence
Information on soil subsidence is based on multiple open data sources, combined with the UK Climate Projections (UKCP18) climate data to communicate the changing exposure to the soil subsidence hazard. This section is provided to aid the evaluation of exposure to the subsidence hazard and should not be used as evidence that subsidence claims do or do not exist at the Site. Dye & Durham (UK) Limited (formerly Terrafirma IDC Limited) cannot accept responsibility for the presence of any claims or their accuracy.

Coastal erosion
This module considers information from the shoreline management policy for the local area and assesses the instability and erosion risk to the site up to the end of the century from the EA National Coastal Erosion Risk Mapping (NCERM) data. This is aligned with a number of climate scenarios to communicate the changing exposure to the coastal erosion hazard. Whilst every effort has been made to incorporate the various controls into the model, it is possible that the rate of erosion could be affected by factors outside of the scope of this assessment.

Flooding
The sections on flooding consider UK flood data from flood risk intelligence company, Fathom. The evaluation considers the climate change scenarios between the present day and the end of this century, and the potential changes to flooding from the rivers, the sea and pluvial flooding. Flooding from groundwater is not included. The evaluation considers a variety of return periods, ranging from a 1 in 5-year flood event (i.e., high frequency, low magnitude) to 1 in 1000-year flood event (i.e., low frequency, high magnitude). The hazard exposure categorisation is therefore based on a balance between frequency and magnitude.

Our flooding exposure scoring for each time period, category and emission scenario are determined based on 30m resolution flooding data sets provided by Fathom. These datasets indicate under which frequency, if any, a property can expect to experience flooding. Frequencies are given as return periods, which can be interpreted as follows: if a given year with the conditions in that year were to be experienced 100 times, and if only in 1 of those times would flooding be experienced, we can say it would be flooded in a 1 in 100 return period (as well as in any less frequent return period, such as 1 in 200 or 1 in 1000). For a flood period of 1 in 100, it refers to the estimated time interval between events of a similar size or intensity.

The above can also be expressed as the probability of occurring being 1/100, or 1% in any one year. It is important to remember this does not mean that if a flood with such a return period occurs, then the next will occur in about one hundred years' time. It means that, in any given year, there is a 1% chance that it will happen, regardless of when the last similar event was. A 1 in 100 year flood is 10 times less likely to occur than a flood with a return period of 10 years (or a probability of 10%).

To this extent, we have assigned the following exposure categories for flooding risk:
• High, 1 in 20 (or greater) return period
• Medium, 1 in 100 (or greater) return period
• Low, 1 in 1000 (or greater) return period
• Very Low, not flooded in the above return periods

The evaluation of the flooding hazards does not consider the history of flooding for a property. Even though a property has been affected by flooding in the past, circumstances can change, for example the construction of new flood defences can alter flood conditions. This report does not provide any information or advice on flood resilience measures, but more information can be found here:
• UK Government: https://www.gov.uk/prepare-for-a-flood/find-out-if-youre-at-risk
• Natural Resources Wales: https://www.gov.uk/prepare-for-a-flood/find-out-if-youre-at-risk
• Insurance Industry: https://www.abi.org.uk/Insurance-and-savings/Topics-and-issues/Flooding
• RICS: https://future.rics.org/case-studies/adapting-to-thrive-innovative-solutions-to-flood-defence?_ga=2.195239215.203183677.1646060201-1418743761.1645711053

UK and local climate
General information on future UK specific climate projections is based on Met Office data. Local climate projections are based on Climate Projections data (UKCP18) . This section provides summary of the modelled changes (if any) to local temperature, rainfall, windspeed and number of storm days for the summer and winter seasons of the present decade, 2030s, 2050s and 2070s.

Local Authority data
This section provides basic information on the actions taken (or not) by the Local Authority and a summary of greenhouse gas emissions. This is intended to be for information only, therefore this report does not provide an evaluation or professional opinion based on this data.

More information on Local Authority Data:
https://data.climateemergency.uk/councils/

*Medium Emissions Scenario: Equivalent to 2.4°C global warming by 2100s, **High Emissions Scenario: Equivalent to 4.3°C global warming by 2100s

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• Keep you informed by letter, telephone or e-mail, as you prefer, if we need more time.
• Provide a final response, in writing, at the latest within 40 working days of receipt.
• Liaise, at your request, with anyone acting formally on your behalf.
If you are not satisfied with our final response, or if we exceed the response timescales, you may refer the complaint to: The Property Ombudsman scheme. Tel: 01722 333306 E-mail: admin@tpos.co.uk | Website: www.tpos.co.uk.
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