

Introduction: Understanding Our Climate Future

Climate change impacts in the coming decades are likely to be significant across the UK, as defined by the country's [Climate Change Risk Assessment](#). Many of the impacts are relevant to Swansea. The information in this document has been developed to outline climate information relevant to communities across Swansea.

Swansea's current climate

Overview: Swansea experiences a mild, wet maritime climate, characterised by moderate temperatures and regular rainfall throughout the year.

Rainfall Patterns: Swansea's maritime climate results in consistent rainfall throughout the year, with the most rain occurring in winter due to the Atlantic's influence and effects from nearby hills. According to the UK Met Office, October is the wettest month with an average of 123mm, while April is drier with 59mm of precipitation.

Temperature Insights: Swansea is slightly warmer than the UK average, with July and August reaching highs of about 19.7°C, and February the coldest at 7.8°C ([UK Met Office, 2020](#)).

Future Headlines

The climate is already changing, and we are already seeing impacts. But how might Swansea, and Wales' climate change in the future? The [statements](#) below are headline statements from the 2018 UK Climate Projections (UKCP18) —which provide an up-to-date assessment of how the climate is expected to change in the future in Wales.



There is an increased chance of **warmer, wetter winters and hotter, drier summers**.



Although the trend is for drier summers in the future, there may be **increases in the intensity of heavy summer rainfall events**.



Hot summers are expected to become more common. By 2050, every other summer may be as hot as the record breaking summer of 2022.



Sea level will continue to rise in the 21st century even if greenhouse gas emissions are reduced rapidly.

Ranges of climate change in Wales

Climate projections are simulations of Earth's climate for future decades (typically until 2100) based on assumed 'scenarios' for the concentrations of greenhouse gases which affect the planet's energy balance. For example, here are expected **summer** and **winter** changes* for **Wales** by the 2070s under a **low emissions scenario (RCP4.5)** and a **high emissions scenario (RCP8.5)**.

Summer Rainfall change	Winter Precipitation change	Summer temperature change	Winter temperature change
30% drier to 6% wetter	2% drier to 19% wetter	No change to 3.3°C warmer	0.1°C warmer to 2.4 °C warmer
56% drier to 2% wetter	No change to 29% wetter	0.9°C warmer to 5.9°C warmer	0.7°C warmer to 4.1°C warmer

*10th-90th percentile range for the 2060-2079 period relative to 1981-2000.

Swansea's Climatic History

Large areas of Swansea are located in Flood Zone 3 and are at risk of **flooding from rivers and sea**, and Flood Zones 2 and 3 for risk of flooding from Surface Water and Small Watercourses.

Zone 2 denotes **medium** annual risk of flooding, with a 1% chance of flooding from rivers or 0.5% from the sea. **Zone 3** has the **highest** risk, with a 1% or higher annual chance of flooding from rivers or 0.5% from the sea.

News agencies reported surface water and tidal surge flood events in the winter of 2020. Recent storms and high winds have also led to localised power cuts and damages.

Across Wales, average land temperature in the decade 2010-2019 was 0.9°C warmer than in the period of mid 1970s to mid-2010s, up to 10°C from 9°C ([Netherwood, A., 2021](#)). Most notable is the greater incidence of hot summer maximum temperatures in Wales for example, in the summer of 2021 the Met Office issued the first extreme heat warning across Wales, including Swansea.

The hot weather and service demands disrupted the ambulance service and reduced the capacity for the service to respond safely ([BBC News, 2021](#)). The summers of 2022 and 2023 also saw similar climatic conditions.



Placing Swansea's Climate in Context with the Past

The effects of climate change are already being felt in Swansea. In recent years, Swansea has experienced flooding, extreme storms and wildfires.

This means climate change is not only a global but a local problem with significant local impacts particularly for the most vulnerable members of our community.

The warming stripes (left), created by [Professor Ed Hawkins \(University of Reading\)](#), illustrate observed temperature change in Swansea, from 1884 to 2023.

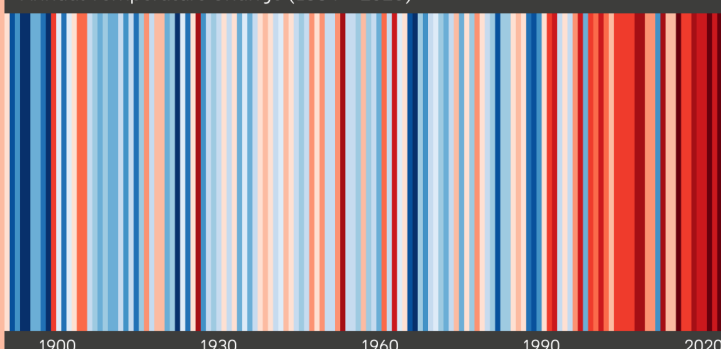
Each stripe represents the average temperature for a single year, relative to the average temperature over the period as a whole.

Shades of **blue** indicate cooler-than-average years, while **red** shows years that were hotter than average.

The graphic displays the rapid heating in recent decades.

You can obtain your own stripe diagrams for many specific locations across the globe (at country, region or city scales) to visualise the change in temperatures over the past 100+ years.

Annual Temperature Change (1884 – 2023)



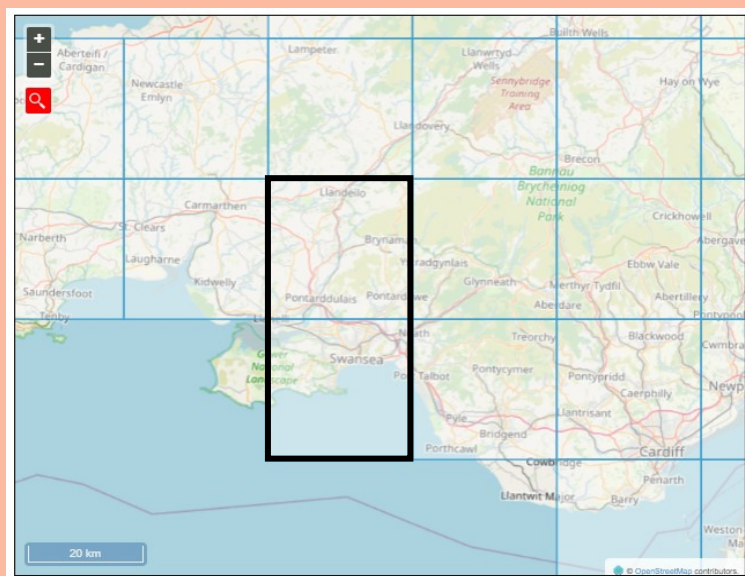
Looking Ahead: Climate Change Projections For Swansea

This map shows the location of Swansea and the area in focus for these climate projections.

Climate projections information provided within this document is presented as the average (mean) value across the two grid cells outlined in black (two 25 km grid cells).

The table below presents two plausible global emission scenarios: an intermediate scenario (termed RCP4.5) and a higher scenario where emissions continue to rise throughout the 21st Century (termed RCP8.5). These are shown to provide some range of the possible estimated changes in climate.

A central estimate of change (50th percentile) is presented in the table, relative to a 1981—2000 baseline.



		2050s	2070s	2100
Annual Average temperature (°C change)	RCP4.5	1.36	1.92	2.81
	RCP8.5	1.90	2.99	4.71
Average Summer temperature (°C change)	RCP4.5	1.71	2.55	4.12
	RCP8.5	2.43	3.96	6.60
Average Winter temperature (°C change)	RCP4.5	1.22	1.58	2.17
	RCP8.5	1.65	2.44	3.71
Summer Rainfall (% change)	RCP4.5	-18.49	-24.59	-33.61
	RCP8.5	-23.56	-34.52	-49.18
Winter Rainfall (% change)	RCP4.5	9.76	15.47	21.30
	RCP8.5	13.94	23.92	35.58
Sea Level rise (m)	RCP4.5	0.27	0.39	0.53
	RCP8.5	0.32	0.51	0.76

Low-probability, high impact outcomes: Climate changes outside of the above estimates are possible. For example, a greater increase in sea level rise could occur due to uncertainties in rates of sea ice melt. Such changes could have major impacts on Swansea but are currently not quantifiable.



Priority Risks Facing Swansea

The indicators below demonstrate potential climate risks by **2°C and 4°C in 2100** across Swansea. Several of these indicators were identified in the UK's national [Climate Change Risk Assessment](#).

Increased Flooding



Expected Annual Damage

Expected Annual Damage (All flooding SW Wales) Residential (Direct) (£ m) ([Savers et al., 2020](#))

	2050	2080
2°C	29.7	28.7
4°C	32.5	34.0

Increased flooding will cause damage to property and will threaten Swansea's infrastructure.

Water Resource Pressure



Hydrological drought

Summer rainfall - % change from 1981-2010 mean

	2050	2070	2100
2°C	-11.5	-13.5	-13.2
4°C	-15.5	-27.6	-32.5

Reduced summer rainfall and higher temperatures will cause water resource pressure for urban and rural communities

Roads and Transport



Rail: bad weather days

Days with temperature, rainfall and wind-speed beyond thresholds

	2050	2070	2100
2°C	20	21	21
4°C	22	28	33

Increased climate linked disruption will threaten Swansea's transport infrastructure.

Extreme weather



Record breaking weather

Number of months per year at least as wet as the wettest month (Tmax) between 1981 and 2010

	2050	2070	2100
2°C	0.02	0.03	0.03
4°C	0.05	0.13	0.15

Increased storm effects and heavy rainfall will impact communities and infrastructure in the area. For example ground movement and landslides at legacy mining sites.

Natural Habitat Pressure



Wildfire risk

Days of 'very high' Met Office fire index used to issue wildfire warnings for open access land.

	2050	2070	2100
2°C	8	9	9
4°C	9	13	15

Although Wales might be at a lower risk of wildfires compared to other regions, the **increasing frequency** of these events due to climate change pose an increasing risk to Swansea's natural habitats and communities.

Health and Wellbeing



Heatwave

Met Office heatwave - three consecutive days with daily maximum temperatures (events/year)

	2050	2070	2100
2°C	1.7	1.8	1.8
4°C	1.9	3.1	3.9

Changing climate conditions, such as **increased heatwaves**, can have direct and indirect effects on the physical and mental health of Swansea's residents.

Understanding and managing the climate change risks shown will help to meet the Well-being Goal of a **Resilient Wales**, under the [Well-being of Future Generations \(Wales\) Act 2015](#): A nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change (for example, climate change).



Understanding Vulnerability to Climate Risks

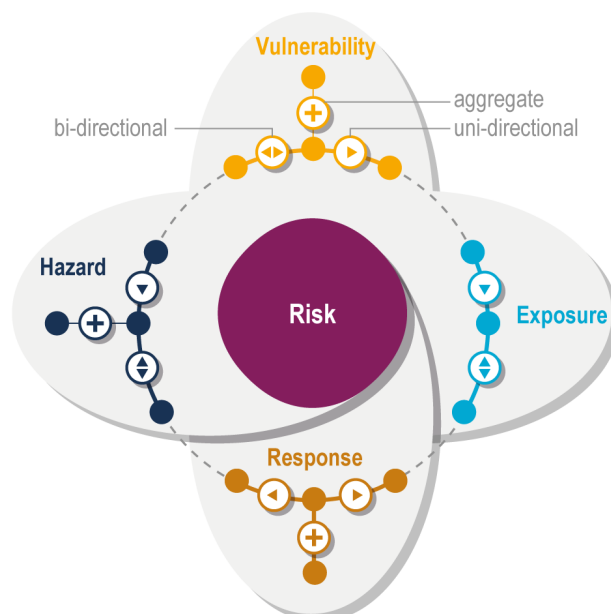
Adaptive capacity: The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences ([IPCC, 2018](#)).

Climate impacts have unequal effects. For many climate risks it is the most vulnerable in society that will be most impacted. They may be more likely to live in properties at flood risk and have less capacity to prepare for and respond to flooding, for example through difficulty in accessing measures to protect their homes or carrying out actions, such as lifting sandbags or flood barriers or access insurance.

Vulnerability and adaptive capacity are therefore interlinked. ([Climate Change Committee, 2023](#)). The diagram below (bottom) shows how four elements affect climate risk: vulnerability, exposure, response and hazard ([IPCC, 2022](#)).



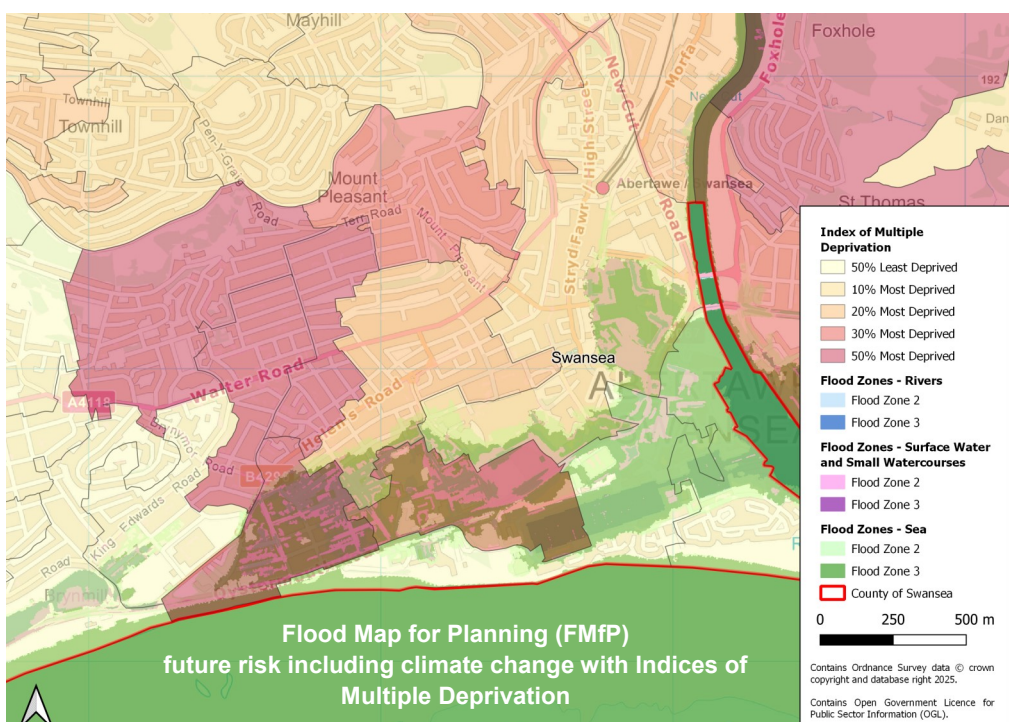
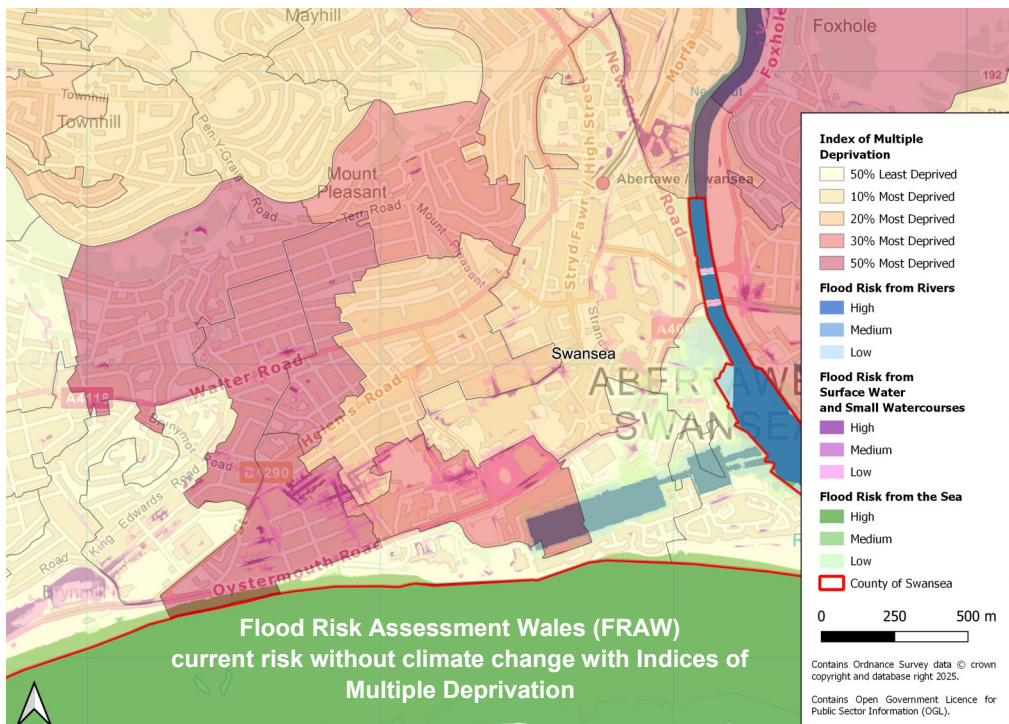
Social Vulnerability— How well are people able to cope with and respond to events like floods and heatwaves. People and communities experiencing multiple causes of deprivation are likely to be more vulnerable - how can we bridge the gap?



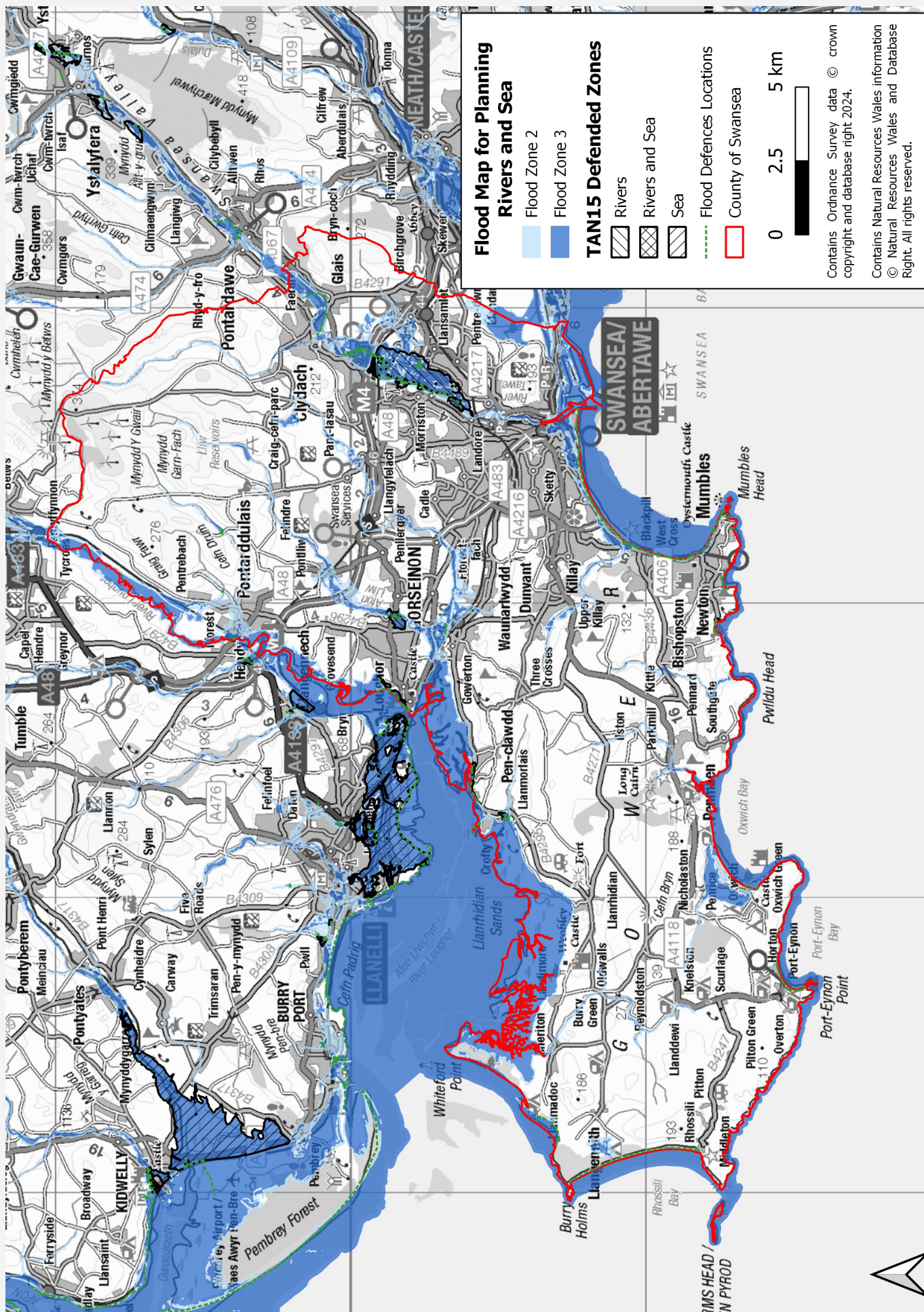
Mapping Vulnerability and Hazard

These maps illustrate how map layers can highlight areas most at risk from flooding from rivers, the sea, and surface water combined with the WIMD. The maps demonstrate where socio-economic challenges and flood risks intersect, helping to prioritise adaptation efforts and address non-climate factors that influence vulnerability. There are two sources of flood risk mapping available in Wales - the current baseline maps account for defences (top). The future mapping accounts for climate change over the coming century but not defences (bottom). So whilst it is useful to look at both, they are not directly comparable.

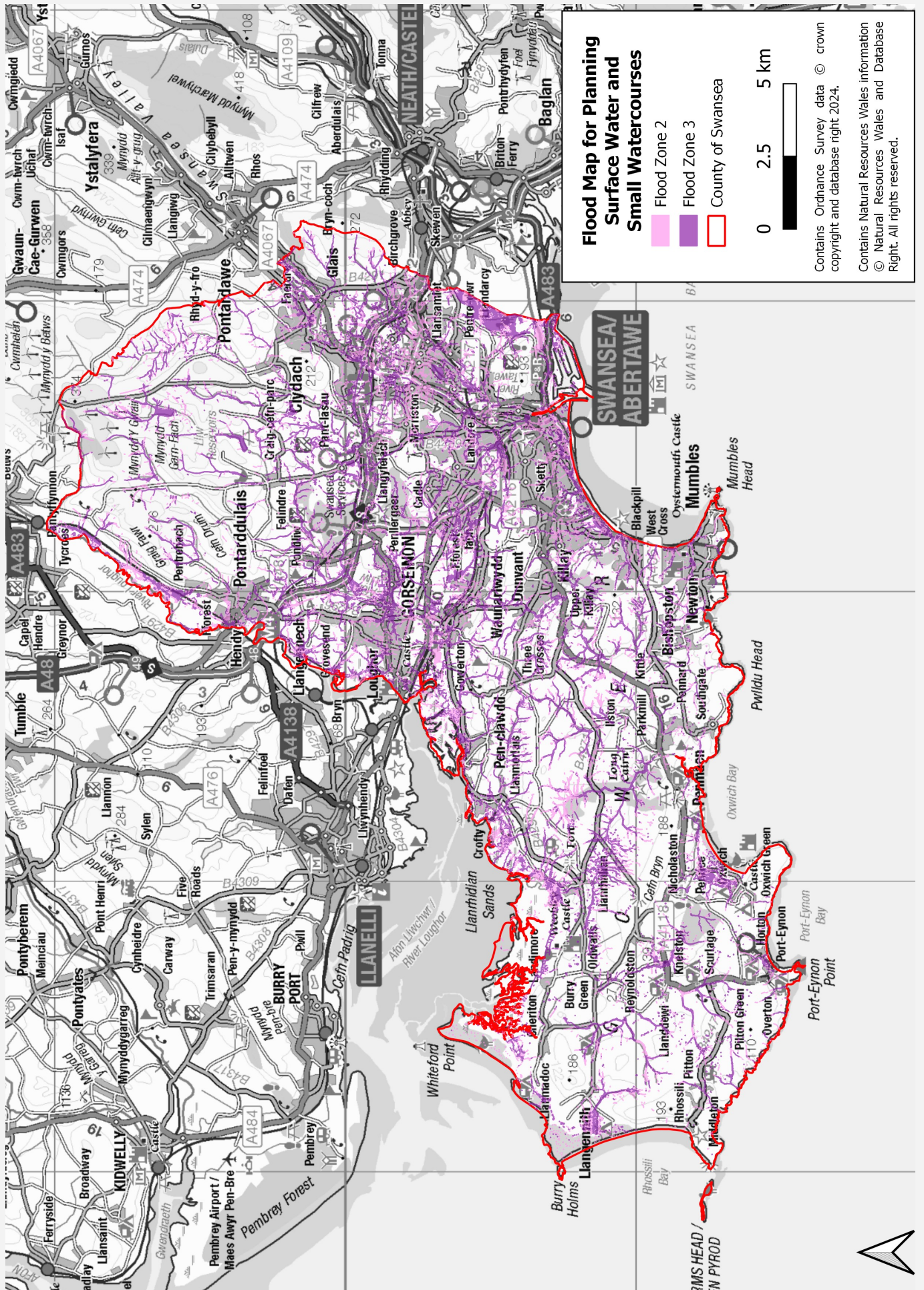
The following pages show future food risk (from rivers and seas, and surface water) and the Indices of Multiple Deprivation, separately.



Mapping Our Risks and Vulnerabilities: Flooding



Mapping Our Risks and Vulnerabilities: Flooding



Mapping Our Risks and Vulnerabilities: Welsh Index of Multiple Deprivation

