Climate Change Risk Assessment Framework for Public Services Boards

Purpose

Our climate is changing and will continue to do so. We need to take steps to protect the well-being of our communities who are risk of the social, economic, cultural and environmental impacts of the changing climate. Climate Adaptation is the term used to cover the actions needed to cope with the impacts of climate change.

The Climate Change Committee in its report 'Adapting to Climate Change progress in Wales's identified 'Insufficient progress in delivery and implementation of adaptation'.

Section 38 of the Well-being of Future Generations Act requires Public Services Boards (PSBs) to take account of the latest UK Climate Change Risk Assessment (CCRA) when preparing their Well-being Assessments.

Analysis by NRW of Well-being Assessments published in 2022 concluded that most Well-being Assessments did not take account of the latest UK Climate Change Risk Assessment (CCRA). Without undertaking an adequate local assessment of climate risk, it will be difficult for PSBs to effectively prioritise their collective climate adaptation activity.

This framework has been developed specifically to help PSBs consider the risks identified in the UK CCRA in a local well-being context. It has been created by Natural Resources Wales (NRW) in collaboration with the Welsh Government (WG) and Public Health Wales (PHW), for use by PSB practitioners. It has been designed to accelerate effective adaptation action for PSBs. Its application will help PSBs become more informed about the threats that climate changes now, and in the future pose to the well-being of communities in a locality.

PSBs should use of this framework to help inform the delivery of Well-being Plans. It will also help PSBs to ensure that other partnerships and public sector initiatives are considering the multiple, diverse, and cumulative impacts of a changing climate on well-being in their locality.

Scope

Using this framework, together with the associated workbook, will help PSB partnerships to:

- Use the CCRA3 Summary for Wales to consider how and where economic, social, environmental, and cultural well-being dimensions are likely to be impacted by the changing climate now and in the future.

- Consider the local, regional, and national policy context for this work and the links between them.
- Take a collaborative approach with a broad range of partners.
- Provide an evidence base for a sub-set of priority risk areas for further action which should inform the development and delivery of PSBs' well-being objectives.
- Identify necessary steps which the PSB must take to accelerate collective action in response to current and future climate risk.

This framework will:

- Result in a list of prioritised, locally important climate risks that can be used to inform action.
- Help PSBs to develop the information and capabilities required to assess the impact of a changing climate on the well-being of communities in the locality. It is based on the approach outlined by the UK Climate Impacts Programme (UKCIP) Adaptation Wizard Adaptation and Climate-ADAPT Adaptation Support Tool and has been adapted to incorporate the PSB and well-being setting.
- Provide PSBs with a clear step by step process for assessing risk that once completed can serve to better inform local, regional, and national adaptation approaches and actions.
- Help PSBs to ensure that the process of undertaking a climate change risk assessment is a collaborative one, where understanding and expertise from a range of partners is included, and all partners are empowered to interpret climate risk in the context of well-being from the perspective of the community.
- Include information on relevant evidence and where to find it, how to interpret and prioritise risks, and advice on how to structure these conversations within the PSB.
- Take a place-based rather than a service-based approach to assessment of climate risk.
- Recognise that those leading the process will need strong facilitation, engagement, and project management skills.

This framework **will not**:

- Provide specific advice on methods of facilitation or engagement in relation to the steps being undertaken.
- Represent a "one off" exercise for PSBs. It should not be considered in isolation from other local, regional, and national climate risk related initiatives. We recommend that the process of assessing climate risk be inclusive of evidence from various sources, iterative and repeated when new and additional relevant information becomes available.
- Cover the development of a climate adaptation strategy or its delivery.
- Provide a definitive list of evidence sources and tools. It is important to remember that the end goal of this assessment is to assist PSBs to better understand the risks and opportunities that a changing climate poses to the well-being of their communities and to inform climate adaptation action. The use of additional data is most effective when used to add depth of understanding to decision-making.
- Cover disaster response planning.

National context

Our climate has changed and will continue to do so. Extreme weather events are causing impacts today, and over the coming years and decades, even in the best-case scenarios for emissions reduction, we will continue to see the increasing impacts of climate change. We will see further sea level rise, coastal erosion and increasing incidence of extreme weather events such as storms, flooding, heatwaves, wildfire, and drought, as well as changes arising from incremental average warming.

The Climate Change Committee (CCC) publishes an independent assessment every 5 years, setting out the latest evidence on the risks and opportunities arising from climate change. The latest assessment, called Climate Change Risk Assessment 3 (CCRA3), was published in 2021: UK Climate Risk

The CCC advises the UK to adapt to a 2°C rise in temperatures, whilst assessing the risk at 4°C.

The CCRA3 shows that the levels of risk are increasing and further action is needed. Existing adaptation actions will not be sufficient to address future climate risks.

The Welsh Government's current national climate adaptation plan was published in 2019: Prosperity for all: a climate conscious Wales | GOV.WALES

The Welsh Government is due to publish a new national Climate Resilience Strategy in 2024, which will be informed by the CCRA3 and the CCC's Wales Climate Adaptation Progress Report, published in September 2023.

Figure 1: timeline of relevant national and international reports
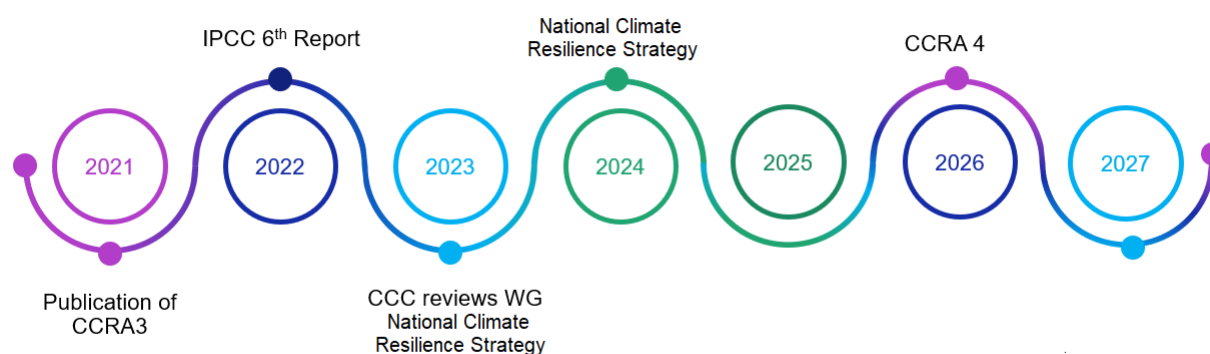
Background on the CCRA3 Summary for Wales

The third Independent Climate Change Risk Assessment (CCRA3) was produced by the UK Climate Change Committee (CCC) in 2021. This report provides the evidence base that underpins national adaptation programmes in England, Scotland, Wales, and Northern Ireland.

Under the Climate Change Act (2008), the UK Government is required to carry out an assessment of the UK's risk from climate change (CCRA) every 5 years (see Figure 1). The Act further stipulates that the Climate Change Committee (CCC) provide advice to UK Government six months before the CCRA is laid before Parliament.

CCRA3 comprises a Technical Report detailing the full analyses of 61 climate risks and opportunities identified for the UK. Further research reports supporting specific aspects of the Technical Report are also available, along with a range of Sector Briefings for specific areas. CCRA3 considers the climate projections through to 2080 for the UK as a whole, and for England, Scotland, Wales and Northern Ireland individually through the National Summaries, which provide more condensed and regionally-specific information.

You should use the Technical and Sector reports for exploring climate risks in depth. The Summary for Wales is a good overview but has not been peer reviewed in the same way as the Technical Report. We would therefore advise those looking to explore climate risks in depth refer to the Technical Report and the sector briefings, referring to the Summary for Wales for an overview only.

The 61 risks identified within the CCRA3 (Summary for Wales) are organised under 5 themes. This framework helps PSBs to consider how these themes relate to the dimensions of well-being:

- Natural environment and natural assets
- Infrastructure
- Health, communities, and the built environment
- Business and industry
- International dimensions

Some of these risks are new and did not appear in CCRA2. UK-wide, 54 of these risks have high urgency scores ('More action needed' or 'Further investigation'). These 61 risks are common across England, Scotland, Wales and Northern Ireland, although slight variations exist in the urgency level assigned to them in the different national summaries, reflecting the specific circumstances of the constituent countries.

Of the 61 risks identified for Wales (Figure 2), **32 have the highest urgency score.** A further 20 have the second highest score (further investigation). The level of current action is only considered appropriate (watching brief) for 4 of the risks listed. **26 risks have increased in terms of their 'urgency' score** since CCRA2.

Figure 2: Summary table of climate risks for Wales

N1: Risks to terrestrial species and habitats from changing climatic conditions	**N2**: Risks to terrestrial species and habitats from pests, pathogens and INNS	**N4**: Risks to soils from changing climatic conditions	**N5**: Risks to natural carbon stores, carbon sequestration and GHG emissions	**N6**: Risks to agricultural and forest productivity from changing climate conditions	**N7**: Risks to agriculture from pests, pathogens and INNS	**N8**: Risk to Forestry from pests, pathogens and INNS	**N11**: Risks to freshwater species and habitats from changing climatic conditions
N12: Risks to freshwater species and habitats from pests, pathogens and INNS	**N14**: Risks to marine species and habitats from changing climatic conditions	**N16**: Risks to marine species and habitats from pests, pathogens and INNS	**N17**: Risks to coastal species and habitats	**I1**: Risks to infrastructure networks	**I2**: Risks to infrastructure services from river and surface flooding	**I5**: Risks to transport networks from slope and embankment failure	**I12**: Risks to transport from temperature, high winds, lightening
H1: Risks to health and wellbeing from high temperature	**H3**: Risks to people, communities and buildings from flooding	**H4**: Viability of coastal communities - risks of sea level rise	**H6**: Risks to household energy demand from temperature changes	**H11**: Risks to cultural heritage from climatic change	**H12**: Risks to health and social care delivery from extreme weather	**H13**: Risks to education and prison services from extreme weather	**B1**: Increased risk of flooding to business sites
B2: Risks to coastal business locations and infrastructure from climatic change	**B6**: Disruption to business supply chains and networks from extreme weather	**ID1**: Risks to food availability, safety and quality	**ID4**: Risks to the UK's international interests and responsibilities	**ID5**: Changes to international governance affecting the UK	**ID7**: Risks to international trade routes from climate hazards	**ID9**: Risks to public health from overseas (vector borne disease)	**ID10**: Risk multiplication to the UK
N3: Opportunities from new species colonisations of terrestrial habitats	**N9**: Opportunities from new/alternative species becoming suitable for agriculture and forestry	**N10**: Risks to aquifers and agricultural land from sea level rise/saltwater intrusion	**N15**: Opportunities for marine species, habitats and fisheries from changing climatic conditions	**N18**: Risks/Opportunities for landscape character from climate change	**I3**: Risks to infrastructure services from coastal flooding and erosion	**I4**: Risks to bridges and pipelines from flooding and erosion	**I6**: Risks to hydroelectric generation from low or high river flow
I7: Risks to subterranean and subsurface infrastructure from subsidence	**I10**: Risks to energy from high and low temperature, high wind and lightening	**I13**: Risks to digital from high and low temperature, high winds and lightening	**H2**: Opportunities for health and wellbeing from high temperatures	**H5**: Risks to building fabric from moisture, wind and driving rain	**H7**: Risks to health and wellbeing from changes in air quality	**H8**: Risks to health from vector borne diseases	**H9**: Risks to food safety (high temperatures) and food security (extreme weather)
H10: Risks to health from poor water quality and interruptions in supply	**B3**: Risks to business production processes from water scarcity	**B5**: Risks from reduced employee productivity due to infrastructure disruption and higher temperatures	**B7**: Opportunities from changes in demand for goods and services due to long-term climate change	**N13**: Opportunities from new species colonisations of freshwater habitats	**I8**: Risks to public water supplies from reduced water availability	**I11**: Risks to offshore infrastructure from storms and high waves	**B4**: Risks to business finance, investment and insurance due to extreme weather
ID8: Risks to the UK financial sector from climate change overseas	**I9**: Risks to energy generation from reduced water availability	**ID2**: Opportunities for UK food availability and exports	**ID3**: Risks and opportunities from climate driven migration to the UK	**ID6**: Opportunities from increased trade for the UK due to new trade routes from Arctic ice melt			

Legend:
- ● More action needed
- ● Further investigation
- ● Sustain current action
- ● Watching brief

National Climate Resilience Strategy

The Welsh Government will be publishing a new National Climate Resilience Strategy in 2024 (See Figure 1 above), which should also help to inform PSBs in undertaking local climate adaptation strategies. This would be a logical next step following completion of a local climate risk assessment but the risk assessment itself will provide the evidence for taking adaptation action.

Background on climate projections

The United Nations (UN) Paris Agreement 2015 says that globally we must limit global warming to well below 2°C, aiming for below 1.5°C above pre-industrial levels. Without global action to limit emissions, we would expect to exceed 4°C average global warming.

Following the 26th Conference of Parties of the UN Framework Convention on Climate Change (COP26), limiting warming to below 1.5°C is becoming increasingly unattainable without very rapid and transformative widespread measures. Current emission reduction pledges, made as part of nationally determined contributions, are likely to lead to warming between 2-3°C.

All projections for future global climate change, including those where we meet the goals of the Paris Agreement to limit warming to below 2 °C, show **continued increases in temperature until the middle of the 21st Century**. The Climate Change Committee advises the UK to adapt to a 2°C rise in temperatures, whilst assessing the risk at 4°C.

Step 1 – Plan your approach

The following tasks have been identified in relation to this step. Refer also to Step 1 in the associated workbook for completion.

Tasks:

- Establish governance
- Appoint a project lead
- Assemble the team
- Stakeholder mapping
- Get the message out
- Consider existing response measures in place and their effectiveness
- Plan evaluation
- Plan methodology

Skills required:

- Project management and coordination
- Stakeholder engagement

Establish governance

Buy-in from the PSB as a whole is essential. Collaborative delivery requires collective leadership.

Think about

Where does responsibility for this work sit? Is there an already established PSB sub-group? Or an external group or forum with the relevant expertise? Is a new task and finish group needed? Who is the PSB sponsor for this work? How and where will progress and outputs be reported and communicated? Who will this work need to influence? Who has the technical expertise to quality assure this work?

Appoint a project lead

This work is potentially time consuming and should move at a steady pace once it has started. It is suggested that a project-based approach is used for this work, including appointing or assigning the role of project manager.

Think about

Is the project lead someone from a PSB organisation? Does the individual have dedicated time to commit to this work? Would procurement of a fixed-term project manager be more suitable? Does the project lead have the right skills to facilitate a collaborative approach **and** to manage a project?

Assemble the team

Remember that this is about assessing risk to well-being, so the team involved in this work should be a mix of climate risk technical specialists and well-being experts. The team should be manageable and representative (not everyone needs to be on the team!). Consider the 'Skills required' in the task section under each step, and ensure these skills are present within your team. This work requires representatives from a range of expertise areas, consider including people with expertise in the natural environment, economy and infrastructure, health, social issues, and culture. Ensure that all team members are clear on what they collectively want to achieve from this process from the start.

Think about

Who needs to be involved? Is the membership of the team set, or will it need to evolve over the course of the work? Do you need a terms of reference, or some shared principles to work by to ensure that all voices on the team are heard?

Workbook action

Complete step 1, table A4- E4

Stakeholder mapping

Take a moment to consider why you are collaborating on this work. The project team will not have all the knowledge and expertise needed to undertake a climate change risk assessment, so which additional stakeholders are required?

Think about

Who are the organisations and individuals across different sectors who should be involved in the climate change risk assessment? Organise your stakeholders by well-being pillar. This will help you to identify potential gaps.

You can find a list of different stakeholder groups that you may wish to consider in Appendix A: stakeholder groups to consider

Think inside the box: who from across PSB organisations should you collaborate with? Which are the key partnerships and organisations in place that will have valuable insight? If you do not have all the answers, who else can you ask?

Think outside the box: who could you collaborate with that might offer a new or different perspective? Do you need to establish a mechanism that enables stakeholders to self-identify as collaborators on this work?

While significant citizen engagement should be considered vitally important when planning or undertaking climate adaptation action (the next phase of this work), it is not necessary to consider it an integral part of the risk assessment phase. It is still important though at this risk assessment stage to consider community perspectives, particularly where those perspectives come from lived experience. Identify stakeholders who can represent the perspectives of community groups.

Think about

Who this is for? Who has the necessary expertise and perspectives to inform this work? What are likely to be the issues and/or opportunities raised through future community involvement in the development of an adaptation plan, and who will understand them to contribute to the climate change risk assessment (an umbrella organisation, for example, or community representatives)? How are you going ensure that the lived experience of the people directly impacted by climate change risks is considered?

Workbook action

Complete step 1, table A15-D15

Get the message out

There are many established methods you can use to get the message out, invite collaboration and facilitate conversations to inform the undertaking of a climate change risk assessment. Be clear with all stakeholders what the task is, and what the mechanisms for engaging in this work are.

Think about

What are the different communication methods and channels for each stakeholder/ stakeholder group? What does a 'lighter touch' opportunity for input, where stakeholders can provide information but are not part of a collaborative process look like? (For example, an online survey)

Consider existing risk assessments and adaptation strategies and their effectiveness

Understand the work that is already happening on climate risk and adaptation within PSB organisations. Local Resilience Forums are undertaking work on present risks, and incident and emergency response, which is a good place to start in building understanding. Publicly available community risk registers can be found here: Wales Resilience Forum | GOV.WALES

Think about

Where are the PSB partnership bodies in their own service-based adaptation journey (this is outside the scope of this assessment, but may provide useful insight)? Which national initiatives could provide meaningful insight and understanding of risk across different sectors? How and when might planned insights from other areas feature in the risk assessment, now and in future iterations? For example, Corporate Joint Committees' climate risk assessments and adaptation strategies.

Workbook action

Complete step 1, table A 36- B36

Planning evaluation

Monitoring, evaluation and learning need to be embedded in the early stages to be able to track what is working and what is not, and to track effective use of resources. Consider how you will evaluate the effectiveness of this process in understanding climate risk and its impact on communities in your locality.

Promote effective learning - Effective learning includes: the mindset of the people involved; culture, knowledge management systems, opportunities for reflection, and tailoring and application of evidence for specific purposes. Looking elsewhere for promising practices and reflecting on internal practice can be useful, including the more tacit information that is not written down but is passed on through relationships.

Think about

Who will evaluate the local CCRA to ensure it is relevant? What learning could be taken from the process, in relation to the future undertaking of local CCRAs, the development of an adaptation plan and partnership working/ collaboration in broader terms? Who is accountable for following the local CCRA through to action? Is there someone who could work as a 'critical friend' throughout the process?

Plan methodology

One way to facilitate the conversations between stakeholders around reflecting on the current situation (see step 2) and looking forward (see step 3) is by hosting a workshop (or series of workshops). The following sections of this framework and the accompanying workbook set out the questions that stakeholders should collectively answer to undertake a climate change risks assessment. Getting together to plan these steps in a workshop setting or otherwise is a good first step. There will also be research and synthesis of evidence, and analysis of workshop outputs (see details in steps below). Set out clearly from the beginning who will lead on each step.

Step 2 – Consider past climate impacts

Refer also to Step 2 in the associated workbook for completion.

Tasks

- Reflect on past weather events
- Identify relevant climate risks and well-being impacts associated with past events

Skills required:

- Workshop facilitation
- Collaboration
- Local knowledge

We are already witnessing the impacts of a global average temperature rise of over 1°C compared to pre-industrial levels. Understanding how weather is already impacting the

well-being of our communities can help us identify how ready we are to deal with the climate impacts of the future.

The purpose of this step is to reflect on events that happened over the last few decades and consider how they impacted well-being in place. This is preparation for step 3, which focuses on *future* impacts, where such events will become more frequent and severe. It is NOT intended to be a comprehensive audit or review of all past climate events.

Reflect on past weather events

In a workshop setting, bring relevant stakeholders together to reflect on past climate events. Work with stakeholders to gather locally relevant information on current risk in your locality. Gather images and news stories from past events to aid discussions and feature in scene-setting presentations. Try to cover 2-3 examples of diverse types of climate change events, such as flooding, storm events and heatwaves that have happened in your area recently.

Think about

Examples of past flood events - look at your local authority's section 19 reports on past flood events. What were the impacts of extreme weather events over the short and long term? What were the costs of those events? Who was affected? Who was most vulnerable (Well-being Assessments can provide context for this)? How did these events impact well-being over time? How effectively were these events dealt with? Consider what went well and what did not go well? Explore your collective attitude to risk. Review how services were disrupted. What were the costs in terms of response and reputation? How were different communities affected? How did the event impact social connectivity? Approach your Local Resilience Forum to input into this step and give their insights on past events.

If you are considering engaging communities

It is not anticipated that citizens will be directly engaged in this assessment, however it is important that lived experiences are well understood and feature in this Step. Connect with stakeholders as representatives of community groups. These representatives should be able to articulate the lived experience of past events and their impacts on well-being. If you are considering gaining insights directly from the communities impacted, be mindful of timing when connecting with those affected by past events, consider ethical issues, and get a balance between not connecting too soon, or too late after an event.

Workbook action

Complete step 2, column A-M

Identify relevant climate risks associated with past events

Consider which CCRA 3 risks are relevant to the past events identified. (See the CCRA risk list in the workbook - note international risks have been removed from the list as these

were regarded as less relevant for the PSB). Identify whether some risks are connected, or dependant on each other, and if so, how?

Workbook action

Complete step 2, column N

Step 3 – Looking ahead

Refer also to Step 3 in the associated workbook for completion.

Tasks

- Understand how the Climate is expected to change in the future:
    - Review evidence of climate projections and how this will apply in your locality (hazard and exposure)
- Understand who, and what, is most vulnerable to climate change:
    - Review local evidence of vulnerability to future hazards (vulnerability)
- Identify how the changing climate is likely to impact future well-being in your locality
    - Systematically shortlist and review the 61 risks from the CCRA 3 report. Identify risks to well-being within your locality (not all risks will apply). Assign scores for hazard, exposure, and vulnerability for each identified risk, within your locality.

Skills required:

- Confidence using data platforms and interpreting maps
- Evidence interpretation
- Workshop facilitation
- Collaboration

This step is about exploring climate risk to identify the degree of exposure locally and the extent of vulnerability to the risk of the components of the place that contribute to well-being. The following definitions and Figure 3 are taken from the CCRA 3 report. They explain key terms such as exposure and vulnerability in this context.

> **Risk** - The potential for adverse consequences where something of value is at stake and where the occurrence and degree of an outcome is uncertain. In the assessment of climate impacts, the term risk is often used to refer to the potential for adverse consequences of a climate-related hazard on lives, livelihoods, health and well-being, ecosystems and species, economic, social and cultural assets, services (including ecosystem services), and infrastructure. Risk results from the interaction of vulnerability (of the affected system), its exposure over time (to the hazard), as well as the (climate-related) hazard and the likelihood of its occurrence. Source IPCC SR1.5. Note that in CCRA3, the term risk is used for negative consequences (i.e. threats).

> **Opportunity** - The potential for a beneficial consequence, as a result of a changing climate (the propensity to be beneficially affected). Source: CCRA3 Method Chapter Authors.

Exposure - The presence (of people; livelihoods; species or ecosystems; environmental functions, services, and resources; infrastructure; or economic, social, or cultural assets) in places and settings that could be adversely affected. IPCC, AR5.

Vulnerability - The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt. Source IPCC, AR5.

Hazard - The potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources. In the IPCC, hazard refers to climate-related physical events or trends. Source IPCC AR5.

Figure 3: Key concepts and terms used in the IPCC 5th assessment report

Box 2.1 Figure 1. Core Concepts of the IPCC 5th Assessment Report WG II. Reproduced from IPCC, 2014a.
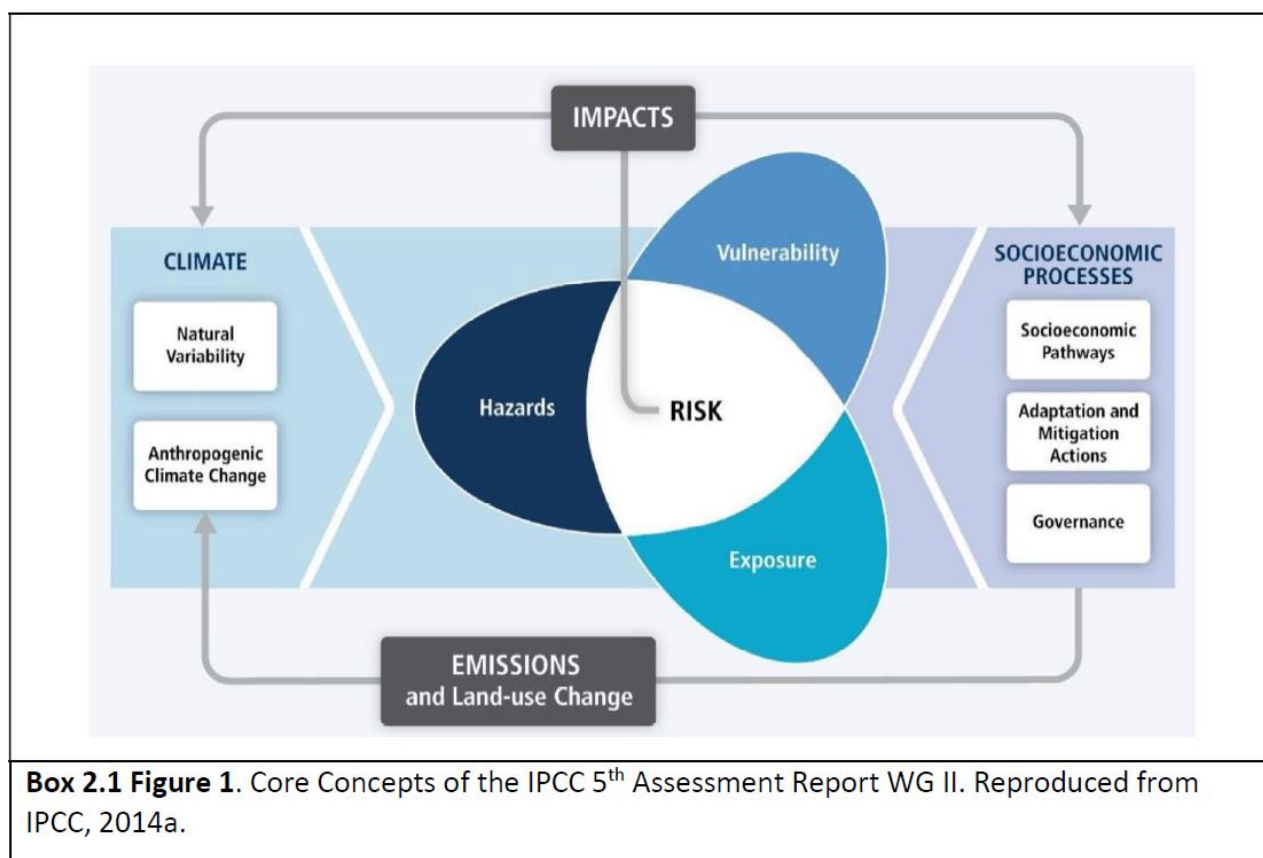
Review evidence of climate projections (hazards)

To gain a better understanding of what climate change will look like in your area, review evidence of projected climate change scenarios (hazards), using UK Climate Projections 2018 (UKCP18): UK Climate Projections (UKCP) - Met Office

These are the sixth generation and most recent set of climate change projections specific to the UK (the last was UKCP09), led by the UK Met Office Hadley Centre. See figure 4 below for an overview of climate impacts in the UK (Met Office).

Also review **local** evidence of the following hazards:

- Flooding
- Coastal erosion
- Sea level rise
- Heat effect, both average temperatures and extreme temperatures, for example periods of extreme heat
- Drought
- Wildfire
- Storms

You can find more information about evidence sources in the appendices:
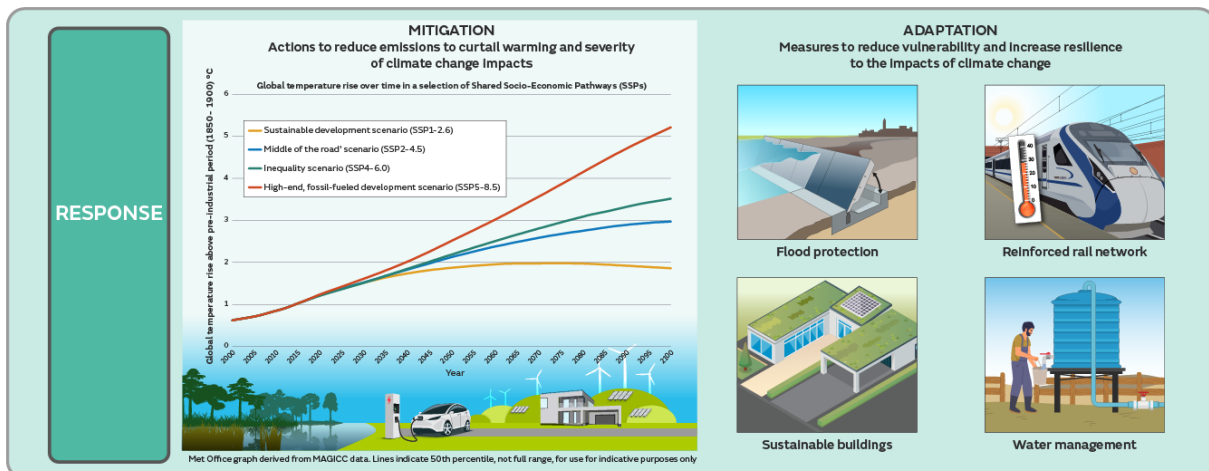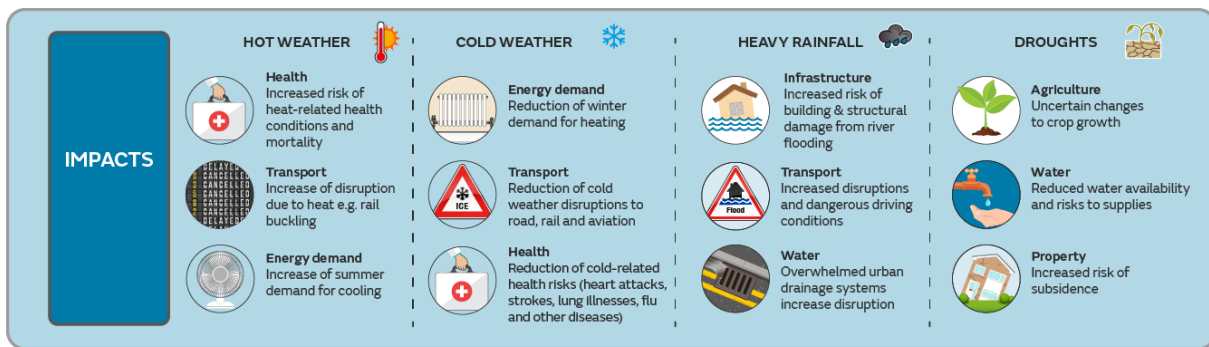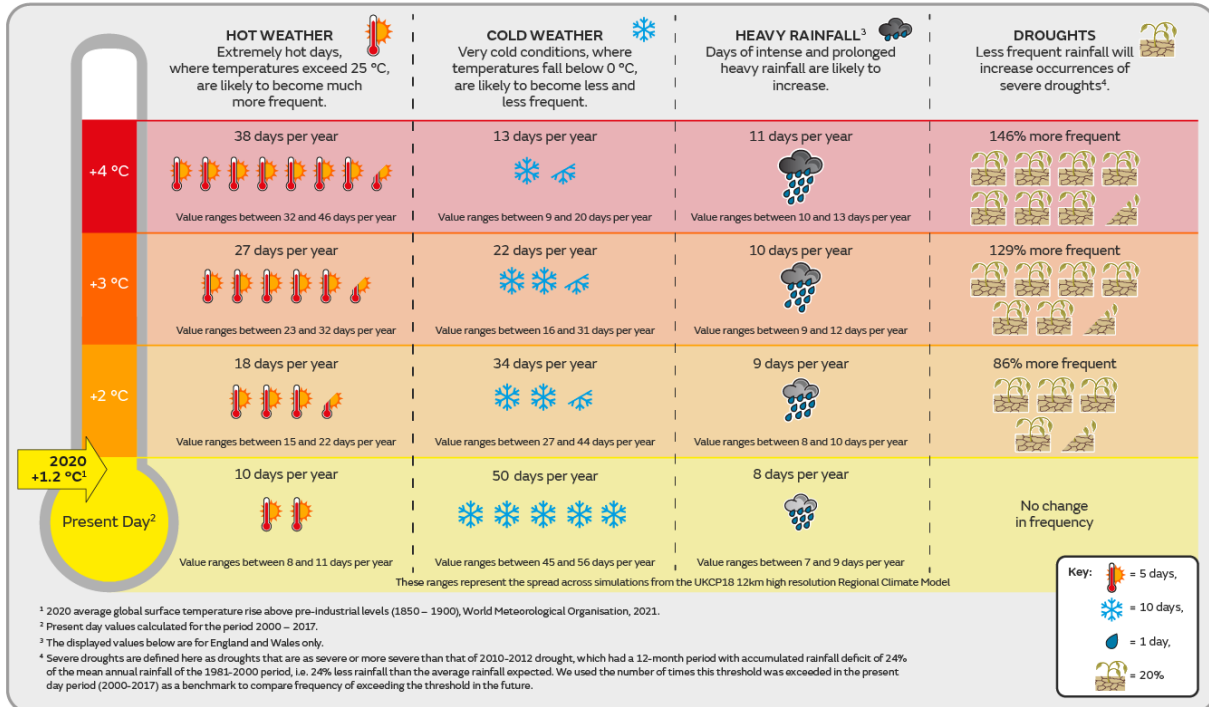
- Appendix B has examples of where to find this evidence
- Appendix C sets out existing climate toolkits

Figure 4 illustrates the type of weather hazards that you need to consider.

Figure 4: Infographic of global warming and future high impact weather in the UK
High-Impact-Weather-infographic

Met Office

Global warming and future high-impact weather in the UK

	HOT WEATHER Extremely hot days, where temperatures exceed 25 °C, are likely to become much more frequent.	COLD WEATHER Very cold conditions, where temperatures fall below 0 °C, are likely to become less and less frequent.	HEAVY RAINFALL[3] Days of intense and prolonged heavy rainfall are likely to increase.	DROUGHTS Less frequent rainfall will increase occurrences of severe droughts[4].
+4 °C	38 days per year	13 days per year	11 days per year	146% more frequent
	Value ranges between 32 and 46 days per year	Value ranges between 9 and 20 days per year	Value ranges between 10 and 13 days per year	
+3 °C	27 days per year	22 days per year	10 days per year	129% more frequent
	Value ranges between 23 and 32 days per year	Value ranges between 16 and 31 days per year	Value ranges between 9 and 12 days per year	
+2 °C	18 days per year	34 days per year	9 days per year	86% more frequent
	Value ranges between 15 and 22 days per year	Value ranges between 27 and 44 days per year	Value ranges between 8 and 10 days per year	
2020 +1.2 °C[1] Present Day[2]	10 days per year	50 days per year	8 days per year	No change in frequency
	Value ranges between 8 and 11 days per year	Value ranges between 45 and 56 days per year	Value ranges between 7 and 9 days per year	

These ranges represent the spread across simulations from the UKCP18 12km high resolution Regional Climate Model

Key: = 5 days, = 10 days, = 1 day, = 20%

[1] 2020 average global surface temperature rise above pre-industrial levels (1850 – 1900), World Meteorological Organisation, 2021.
[2] Present day values calculated for the period 2000 – 2017.
[3] The displayed values below are for England and Wales only.
[4] Severe droughts are defined here as droughts that are as severe or more severe than that of 2010-2012 drought, which had a 12-month period with accumulated rainfall deficit of 24% of the mean annual rainfall of the 1981-2000 period, i.e. 24% less rainfall than the average rainfall expected. We used the number of times this threshold was exceeded in the present day period (2000-2017) as a benchmark to compare frequency of exceeding the threshold in the future.

IMPACTS

HOT WEATHER	COLD WEATHER	HEAVY RAINFALL	DROUGHTS
Health Increased risk of heat-related health conditions and mortality	**Energy demand** Reduction of winter demand for heating	**Infrastructure** Increased risk of building & structural damage from river flooding	**Agriculture** Uncertain changes to crop growth
Transport Increase of disruption due to heat e.g. rail buckling	**Transport** Reduction of cold weather disruptions to road, rail and aviation	**Transport** Increased disruptions and dangerous driving conditions	**Water** Reduced water availability and risks to supplies
Energy demand Increase of summer demand for cooling	**Health** Reduction of cold-related health risks (heart attacks, strokes, lung illnesses, flu and other diseases)	**Water** Overwhelmed urban drainage systems increase disruption	**Property** Increased risk of subsidence

RESPONSE

MITIGATION
Actions to reduce emissions to curtail warming and severity of climate change impacts

Global temperature rise over time in a selection of Shared Socio-Economic Pathways (SSPs)

- Sustainable development scenario (SSP1-2.6)
- 'Middle of the road' scenario (SSP2-4.5)
- Inequality scenario (SSP4-6.0)
- High-end, fossil-fueled development scenario (SSP5-8.5)

Met Office graph derived from MAGICC data. Lines indicate 50th percentile, not full range, for use for indicative purposes only

ADAPTATION
Measures to reduce vulnerability and increase resilience to the impacts of climate change

Flood protection

Reinforced rail network

Sustainable buildings

Water management

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Review local evidence of vulnerability to climate projections

To gain a better understanding of who and what is most vulnerable to the impacts of climate change, consider the vulnerable population groups identified in the Climate Change Health Impact Assessment, and where these groups are within your area, as well as relevant information available on local businesses, industries and natural resources.

PSB Well-being Assessments and Regional Partnership Board (RPB) Population Needs Assessments are useful sources of vulnerability data (see links in Appendix B). There are also vulnerability layers on the Climate Just Tool.

Think about

Are there particularly vulnerable communities or areas identified in your Well-being Assessment or Plan? Consider whether there are any evidence gaps in your area. Work with your RPB to make sure you get an accurate understanding of vulnerability and the threats to well-being identified for particular groups in your locality.

Systematically shortlist climate risks

Systematically shortlist the risks identified in the CCRA Technical Report and Wales summary report to identify which of the risks are relevant to your local area, and therefore should be included in your risk assessment.

While it is anticipated that most will apply to some extent, we recommend shortlisting these risks under categories, and focusing only on those most relevant to your locality. For example, risks relating to marine will not be relevant to areas which are inland. Likewise, the CCRA highlights risks to the UK arising from climate impacts overseas, in the 'International' category, which might not be relevant to communities in your locality.

Begin by including the list of CCRA risks identified in Step 2 which were relevant to past events. Then short list the remaining risks. This could be done through discussion with a small group of subject matter experts, under the categories included in the risk assessment:

- Natural environment and assets
- Infrastructure
- Health, communities and built environment
- Business & Industry
- International

Systematically review climate risks

In a workshop setting with representative partners, discuss your **short list** of risks in detail. Consider the evidence available for the four determinants of each risk: hazard, exposure, vulnerability, and response (see below). For each risk, make sure to consider and describe the potential impacts to well-being, including social, cultural, environmental, and economic dimensions. You can find helpful prompts Appendix D.

For each risk discussed, identify what is already happening in this space, for example, is there a flood adaptation strategy already in place for infrastructure? Identify where there are gaps. Understand which risks are already a 'work in progress,' this will make it clearer where PSB are adding value or plugging a gap.

How to assess risk

"**Climate risk** is about more than just the climate hazard alone. Risk is a combination of hazard, exposure, and vulnerability, so it is critical that information about the weather and climate is evaluated in the context of the lives and livelihoods of the populations affected." UK Met Office Climate risk reports - Met Office

Risk in this context is the potential for adverse consequences of climate-related hazard on lives, livelihoods, health and well-being, ecosystems and species, economic, social, and cultural assets, services (including ecosystem services), and infrastructure. Risk results from the interaction of vulnerability of the affected system, its exposure over time to the hazard, as well as the climate-related hazard and the likelihood of its occurrence.

1) **Hazard:** This is the weather and climate events that may have adverse effects. The occurrence, frequency, closeness between formerly 'extreme' events, duration, and intensity of these events may change due to climate change, for example, heat waves.
2) **Exposure:** This is where the hazard is, in relation to people, property, infrastructure, etc, that may be impacted by it, for example, the spatial extent of a heat wave in relation to the location of people, buildings and local infrastructure that might be affected by it.
3) **Vulnerability:** This is the likelihood of the exposed people, property and other economic resources suffering adverse effects from the hazard. Factors such as population demographics, ecosystem resilience, economic resilience etc all affect vulnerability. For example, elderly people and the very young are vulnerable to the effect of heat waves. Vulnerability is in turn affected by the capacity of people and places to adapt or respond to the hazard.
4) **Response**: This is the climate adaptation measures that are already in place. For example, the presence of shading, air circulation and insulation would alleviate the negative impacts of a heat wave.

Think about

Consider how different determinants of each risk might interact and how different risks may interact.

Workbook action

Complete step 3, columns A-T

Step 4 – Risk Prioritisation

Tasks
- Prioritise risks
- Consider what is within the influence of the PSB
- Decide on which risks should be acted on and by whom

Skills required:

- Evidence interpretation
- Workshop facilitation
- Collaboration

Prioritise risks

Prioritise the identified risks by looking back at your workbook in Step 3. Identify the specific communities and population groups vulnerable to those risks and use this information to pinpoint spatial hotspots, priority settings (such as schools and care homes), and population groups (such as older adults) where adaptation should be prioritised in the local area.

Consider what is within the influence of the PSB

Some of the risks identified will require adaptation actions that sit outside of the control of the PSB. Consider how these risks could be addressed outside the PSB, where your assessment could be shared and how this could support existing adaptation efforts. Consider which risks are not covered in existing strategies and could benefit from a collaborative approach in a future local adaptation strategy. Where are there gaps in understanding or action? Where should the PSB take direct action? Where might it be appropriate for the PSB to take indirect action such as fulfilling the role of an advocate or champion to better inform the climate adaptation role of others?

Consider which risks may have impacts across multiple dimensions of well-being (cultural, social, environmental, economic), or for which there are significant interdependencies between the remits of PSB member bodies. These may be areas which would particularly benefit from collaborative action from the PSB.

For each risk consider the role of the PSB and whether the required adaptation action is:

- Outside the influence of PSB
- within the PSB's influence and can be addressed through **individual** service planning and action
- within the PSB's influence and requires a **collaborative** approach

Workbook action

Complete workbook Step 4, Columns A-C

Decide which risks should be acted upon, and by whom

What will the PSB do now that risks have been prioritised?

Assign the following categories to each risk

- Take action (direct or indirect)
- Watching brief
- Evidence gathering
- No action required

Decide collectively which PSB partner should lead on each prioritised risk, this will be the 'Risk Owner.'

Workbook action

Complete workbook Step 4, Columns D-E

Step 5 – Iteration

Tasks

- Identify triggers for refreshing the local CCRA
- Monitoring

Skills required:

- Project management

Identify triggers for refreshing the local CCRA

This should be an iterative and adaptive process. Consider what might trigger a need for the assessment to be repeated, for example, with each new Well-being Assessment cycle ahead of the next Well-being Plan, or after publication of an updated national-level climate resilience plan by the Welsh Government or the CCC's UK Climate Change Risk Assessment. Equally, a new assessment might be necessary when significant new data becomes available, or when a new risk emerges, or prior to decision making, or after severe weather-related impacts. In some circumstances it may be appropriate to revisit either one or several specific risks although periodically it will be necessary to assess the full list of risks.

Monitoring

Decide how identified triggers will be monitored, and whose responsibility this should be, and whether there will be collective or individual ownership of that responsibility.

Next steps – what are you going to do about it?

Is there a need for a local climate adaptation strategy or plan?

Not necessarily or immediately. Consider the role of the PSB in helping to address risks in the local area. The local climate risk assessment should enable the prioritisation of adaptation actions. While it may be useful to subsequently develop an adaptation strategy for the PSB, which sets out what each partner will do and what work will be undertaken collaboratively, it is not essential to develop an Adaptation Strategy Plan- the key is that the assessment enables adaptation action. Consider the cost of *not* responding to risk priorities in comparison to the cost of responding to them.

See Appendix E for useful resources.

Building adaptive capacity and capability amongst PSB partners

PSBs may require support to develop a better understanding of **local climate risk** within their area. The following bullets are designed to support the PSB to collectively consider its own role in the wider context of climate adaptation as the partnership increases its awareness of activity in this area. PSBs are advised to consider the following:

- Opportunities to influence systems' change and transformation such as the PSB's influence on other strategic partnerships operating in the region (for example, Corporate Joint Committees, Regional Partnership Boards, Local Resilience Fora, Local Government Climate Strategy Panel) should be identified and acted on to avoid duplication.
- How the five ways of working can support climate change adaptation activity, for example, by developing a long-term shared vision, involvement of communities, and prevention of adverse effects.
- How to decide collectively which PSB partner should lead on each prioritised risk.
- Whether existing local policy, practice and resource allocation will be enough to manage the long-term climate change impact. This activity should also consider what existing activity needs to stop, change, or be renewed.
- The need to develop a mechanism for engagement and involvement with communities most at risk.
- Where and how public sector assets could be used or repurposed to increase resilience and mitigation.
- How a sustainable long term investment stream could be achieved to enhance community resilience via mutual aid groups and locally led adaptation actions and projects.
- The need to continue to develop evidence and insights on interactions between climate risks and wider social, economic, and natural systems.

- How to monitor and evaluate progress and take an adaptive management approach to continually improve performance.

A useful resource is the [Adapting to Climate Change Progress in Wales report from the CCC](#), which indicates particular areas where more action and/or evidence is needed by Welsh public bodies and stakeholders . The report uses the CCC's Adaptation Monitoring Framework, which includes useful indicators and measures for climate adaptation.

Appendix A: Stakeholder groups to consider

Note that this is not an exhaustive list

- Age Cymru
- Association of British Insurers
- Asylum and Refugee agencies
- British Red Cross
- Children's Safeguarding Partnership
- Cluster leads for GP surgeries
- Commissioning teams for residential care
- Community Safety Partnership
- Corporate Joint Committees
- Dŵr Cymru Welsh Water and/or Hafren Dyfrdwy (Links to flooding as Water / Sewerage undertakers)
- Elected Members
- Electricity distributors and transmitters
- Existing community flood plan/groups
- Further Education institutions
- Gas distributors
- Gypsy, Roma, and Traveller agencies
- Higher Education institutions
- HM Coastguard
- HM Prison Service
- Homelessness agencies
- Local County Voluntary Council
- Local Drainage or flood risk practitioners (Local Authority representatives for surface water flooding, ordinary watercourses /groundwater will be important, and they will be more familiar with their flood risk management plan too. May be more of an 'inform stakeholder' but important to note)
- Local Emergency Planners or Civil Contingencies Officers (main link to Local Resilience Forum).
- Local Environmental Health Practitioners
- Local Highways (Responsible for flood risk issues on highways (excluding motorways and trunk roads) –and possibly other issues such as increased potholes or the melting of surfaces in heat)
- Local Planning Officers
- Local Resilience Forum
- Mental health agencies
- National Flood Forum (Flood risk charity based in England and Wales)
- National Infrastructure Commission for Wales
- Network Rail
- North Wales Councils - Regional Emergency Planning Service
- One Voice Wales / Town and Community Councils (They've produced climate change guidance Tackling Climate Chaos - updated 6 Sept 2023.pdf (onevoicewales.org.uk))
- Regional Coastal Groups and regional Lead Local Flood Authority groups
- Regional Partnership Board
- Telephone service providers (fixed and mobile)

- Tenants' & Residents' Associations
- Transport for Wales
- Utilities and Infrastructure, such as Welsh Water
- Voluntary & Community Sector Emergencies Partnership
- Wales Coastal Group Forum
- Wales County Voluntary Council (New volunteering portal includes option to volunteer in emergencies. Working with the LRFs to get the set up in various emergency situations)
- Youth Services

Appendix B: Where to find evidence

River, marine and water resource data

Table 1: Primary river, marine and water resource data

Hazard	Information/Data	Brief description (what the data/evidence includes)	National/Regional information	Externally available/published?
Flood	Flood risk data (Present and future risk)	Flood Risk assessment Wales maps showing present day, defended flood risk from sea, rivers, and surface water Flood Map for Planning which shows undefended predicted future flood risk for 100 years' time (2120). This includes coastal erosion and Shoreline Management Plan data so it is a great resource with everything all together.	National	Flood Risk Assessment Wales: Natural Resources Wales / Check your flood risk on a map (Flood Risk Assessment Wales Map) You can view and download data from: Flood Risk Assessment Wales	DataMapWales (gov.wales)Present day total figures of people and properties at risk for a Local Authority area are available upon request. Please contact your NRW PSB practitioner for more information. Flood Map for Planning: Natural Resources Wales / Flood Map for Planning / Development Advice Map You can view and download data from: • Flood Map for Planning Flood Zones 2 and 3	DataMapWales (gov.wales)

Hazard	Information/Data	Brief description (what the data/evidence includes)	National/Regional information	Externally available/published?
				• [Flood Map for Planning (FMfP) TAN15 Defended Zones | DataMapWales (gov.wales)](#) Future risk total figures of people and properties at risk for a Local Authority will be available in late spring 2024. Your NRW PSB practitioner will share updates when available.

Table 2: Additional river, marine and water resource data

Hazard	Information/Data	Brief description (what the data/evidence includes)	National/Regional information	Externally available/published?
Flood	Communities At Risk Register (Present day)	Data that quantifies the level and distribution of flood risk across Wales. This can be used to identify which areas are most at risk	National	You can view data: [Communities at Risk Register (CaRR) | DataMapWales (gov.wales)](#)
Flood	National Flood Risk Management Plan (NRW) (Present and future flood risks)	The plan explains the priorities and actions that NRW propose to manage the risk of flooding at a national level. They also consider how we need to adapt and mitigate against climate change. They cover the risk of flooding from rivers, reservoirs, and the sea. Flooding from surface water and smaller	National	You can find plans and environment assessments on the NRW website: [Natural Resources Wales / Flood risk management plan 2023 to 2029](#)

Hazard	Information/Data	Brief description (what the data/evidence includes)	National/Regional information	Externally available/published?
		watercourses is led by the Lead Local Flood Authorities (LLFAs). They publish their own strategies on how they deal with this type of flooding in their area.		
Flood	Regional Flood Risk Management Plan (NRW)	The plan explains the priorities and actions that NRW propose to manage the risk of flooding at a local level: Mid Wales North-east Wales North-west Wales South-central Wales South-east Wales South-west Wales They also consider how we need to adapt and mitigate against climate change. They cover the risk of flooding from rivers, reservoirs, and the sea. Flooding from surface water and smaller watercourses is led by the Lead Local Flood Authorities (LLFAs). They publish their own strategies on how they deal with this type of flooding in their area.	Regional	You can find plans and environment assessments on the NRW website: Natural Resources Wales / Flood risk management plan 2023 to 2029

Hazard	Information/Data	Brief description (what the data/evidence includes)	National/Regional information	Externally available/published?
Flood	Flood Risk Management Plan (Local Authorities)	The Flood Risk Management Plan sets out how each Local Authority, in its capacity as a Lead Local Flood Authority, will manage the risk of flooding from ordinary watercourses, surface water and groundwater.	Regional / Local	Contact relevant local authority
Coastal erosion and sea level rise	Coastal erosion predictions/risk maps	Maps showing coastal erosion risk (National Coastal Erosion Risk Management data – predictions of erosion up to 2105 under 2 scenarios: no active intervention and with Shoreline Management Plan policies implemented).	National	You can find map layers on the NRW website: Natural Resources Wales / Check your coastal erosion risk (National Coastal Erosion Risk Management map) You can download data from: National Coastal Erosion Risk Management (NCERM) | DataMapWales (gov.wales)
Coastal erosion and sea level rise	Shoreline Management Plan policy data	Shoreline Management Plans present preferred sustainable coastal management policies from 2005 – 2105 for the Welsh coastline.	National	You can find the shoreline management plans on the NRW website: Natural Resources Wales / Shoreline Management Plans You can find map layers on the NRW website: Flood and Coastal Erosion Risk

Hazard	Information/Data	Brief description (what the data/evidence includes)	National/Regional information	Externally available/published?
				Maps (naturalresources.wales) You can download data from: Shoreline Management Plan Policies | DataMapWales (gov.wales)
Coastal erosion and sea level rise	Coastal Squeeze impacts	Information from the Habitats Regulations Assessment of the Shoreline Management Plans contains information on climate change (sea-level rise) associated coastal squeeze on the designated features of Marine Protected Areas. A further project is underway to understand the likely scale of deterioration of Marine Protected Area features due to coastal squeeze which will look at the scale, extent and location of habitat loss that is likely to occur.	National	Summary information on predicted effects of coastal squeeze are provided in annex 1 of NRW's guidance on assessing coastal squeeze. You can find this on the NRW website: Natural Resources Wales / Assessing coastal squeeze Results of the new project are expected spring/summer 2024 and could be shared with partners once available. Project completion spring/summer 2025
Coastal erosion and	Land use change through ground sea water intrusion and	Rising sea levels resulting from climate change will impact agricultural land	UKCP18 tidal estimates, NRW Flood Maps and local	You can find 2018-19 Soil Policy on the Welsh Government website: Sea Level Rise & Agricultural

Hazard	Information/Data	Brief description (what the data/evidence includes)	National/Regional information	Externally available/published?
sea level rise	associated salt blight	through both tidal inundation and ground water impacts resulting in salt blight.	coastal adaptation Project assessments.	Land Loss under UKCP18 (gov.wales)
Coastal erosion and sea level rise	Impact of landfill sites at the coast on Marine Protected Area features in Wales	A report which investigates the potential pressures caused by landfill sites at the coast, including looking into the future across the 3 Shoreline Management Plan epochs, taking into consideration coastal flood risk and coastal erosion risk.	National – with an emphasis on pressures to Marine Protected Area features (including saltmarsh and sand dune).	You can find the report on the NRW website: Investigating the impact of landfill sites at the coast on Marine Protected Area features in Wales (cyfoethnaturiol.cymru) The GIS data and supporting spreadsheets are available on NRW's GIS X Drive.
Coastal erosion and sea level rise	SoNaRR: Future trends in coastal margin habitats	Provides summary details of impacts of changing weather patterns & sea-level rise on coastal margin ecosystems.	National	Coastal chapters of SoNaRR are available on the NRW website: Natural Resources Wales / SoNaRR2020: Coastal margins
Coastal erosion and sea level rise	Coastal access & adaptation	A report which looks at how coastal access (public rights of way & Wales Coastal Path) may be affected by coastal adaptation measures associated with Shoreline Management Plans.	Regional information	You can find the report on the NRW website: 435: Advice on locations where Coastal Adaptation measures may affect Coastal Access over the lifetime of the Shoreline

Hazard	Information/Data	Brief description (what the data/evidence includes)	National/Regional information	Externally available/published?
				Management Plans (cyfoethnaturiol.cymru)
Drought	Individual water companies water resource management plans and drought plans.	Water companies have assessed climate change and drought risks in terms of water supply for each of their Regional Zones, PSB areas fall within a range of these zones.	Regional information	Refer to relevant water companies water resource management plans and drought plans.
Drought	Review of the research and scientific understanding of drought.	The Environment Agency's Chief Scientist's Group recently published its Review of the research and scientific understanding of drought.	National	Review of the research and scientific understanding of drought - GOV.UK (www.gov.uk)
Drought	SoNaRR	SoNARR 2020 -Cross Cutting Themes-Resource Efficiency-water for general awareness	National	
Drought/ Habitats	Sensitivity of habitats to climate change.	Report from Natural England on re-evaluating the sensitivity of habitats to climate change.	National	Re-evaluating the sensitivity of habitats to climate change - NECR478 (naturalengland.org.uk)

Nature data

Table 3: Sites and site management

Dataset	What is it?	What they contain and how they can be used
Natural Resources Wales / LIFE N2K Programme Reports	Reports	Thematic action plans that can be used to understand priority strategic actions needed to address major issues and risks identified as negatively affecting the condition across SAC/SPA/Ramsar features. Prioritised Improvement Plans (PIPs)* that can be used to understand the proposed actions needed to restore the condition of SAC/SPA/Ramsar features.
NRW's Protected Sites Baseline Assessment 2020	Report	Data on the indicative condition assessment category for interest features on terrestrial and freshwater protected sites in Wales.
NRW's Indicative Features Condition Assessment	Report	Details of Marine SACs and SPAs in Wales that can be used to understand the condition of their interest features.
NRW's Safle Database Available on request from NRW	Report	Details of protected site interest features in Wales that can be used to: i. describe the diversity of habitats and species from a protected site perspective and in some instances the extent of features. ii. understand what conservation management issues and risks are likely to be affecting the condition of a protected site in the absence of an up-to-date condition assessment. iii. Understand what actions have been identified which could be taken to address the identified conservation management issues.

Dataset	What is it?	What they contain and how they can be used
NRW's Core Management Plans	Report	Details of terrestrial/freshwater SACs and SPAs that can be used to understand what needs to be achieved for their interest features and NRW's advice on the action needed to achieve this.
Conservation Advice for European marine sites	Report	Details of Marine SACs and SPAs in Wales including their conservation objectives and operations that may cause deterioration and/or disturbance to their interest features.
NRW's Site Management Statements	Report	Details of SSSIs that can be used to understand what needs to be achieved for their features and NRW's advice on the action needed to achieve this.
Upland SPA buffer	GIS layer	Primarily in relation to tree planting activities in proximity to SPAs. This dataset includes only the upland SPAs as lowland SPAs were not seen as threatened by woodland creation.
Sites of Importance for Nature Conservation (SINC) **Contact your local authority for access**	GIS layer	Layer on Geospatial portal, data owned by Local Authorities. Shows the location, extent, condition of locally designated SINCs. Can be considered alongside protected sites data to identify land considered suitable for protection to prevent further decline of ecosystem resilience. They can also be used to inform identification of adjoining or linked land that could be managed to buffer, increase extent, connectivity or otherwise address pressures and demands upon these sites (condition).
Local Nature Reserves	GIS layer	Layer on Geospatial portal showing location and extent of LNRs.
National Nature Reserves	GIS layer	Layer on Geospatial portal showing location and extent of NNRs.

Table 4: ecosystems and the DECCA framework

Dataset	What is it?	What they contain and how they can be used
SoNaRR 2020	Report	Natural Resource Registers that can be used to understand the key pressures affecting a wide range of habitats (including Section 7 habitats) and their ecological networks and so their likely condition. The Registers can also be used to understand the key opportunities to address these pressures
SoNaRR 2020	Report	Ecosystem Chapters that can be used to understand how resilient individual ecosystems are and which DECCA based attributes are a priority for action.

Table 5: Habitats

Dataset	What is it?	What they contain and how they can be used
Phase 1 Habitat GIS data layer (available on ArcMap and Geospatial Portal and DataMap Wales)	GIS layer	Maps showing the type and location of a range of terrestrial semi-natural habitats that can be used to describe the diversity and extent of habitats and species from a Section 7 habitat and ecological network perspective. They can also be used, in conjunction with PENs, to identify where habitat restoration and creation could best take place to improve extent, connectivity and other aspects of ecosystem resilience (adaption, recovery and resistance).
Aerial Imagery	GIS layer	Aerial imagery GIS layers can be viewed alongside dated habitat layers in a desk-based exercise for an indication of habitat extent and to some degree condition and connectivity.
Environment (Wales) Act Section 7 and OSPAR Marine Habitat	GIS layer	Maps showing the type and location of a range of marine and inter-tidal habitats that can be used to describe the diversity and extent of habitats and species from a Section 7 habitat and ecological network perspective. They can also be used in conjunction with Marine Protected Area maps to identify where habitat restoration and creation could best

Dataset	What is it?	What they contain and how they can be used
		take place to improve extent, connectivity, and other aspects of ecosystem resilience (adaption, recovery and resistance).
Environment (Wales) Act Section 7 Terrestrial Habitats of Principle Importance	GIS layer	Maps showing the type and location of a range of terrestrial habitats that can be used to describe the diversity and extent of habitats and species from a Section 7 habitat and ecological network perspective. They can also be used in conjunction with Marine Protected Area maps to identify where habitat restoration and creation could best take place to improve extent, connectivity, and other aspects of ecosystem resilience (adaption, recovery and resistance).
National Forest Inventory	GIS layer	This dataset shows the location and extent of all woodlands of 0.5 ha and over across Wales. It shows the types of woodland (broadleaved, mixed etc) including ancient woodland classifications and interpreted open areas within woodland.

Table 6: Species

Dataset	What is it?	What they contain and how they can be used
Local Record Centre protected and priority species data **Contact your local records centre for access**	GIS layer	Records about the location of various species that can be used to check that any creation proposals do not negatively impact sensitive species.

Dataset	What is it?	What they contain and how they can be used
Local Record Centre Invasive non-native species data **Contact your local records centre for access**	GIS layer	Records about the location of various invasive non-native species that can be used to consider the pressures, and therefore potential condition, on a site.

Table 7: Ecosystem resilience and ecological networks

Dataset	What is it?	What they contain and how they can be used
CuRVe Atlas	GIS layers	Maps showing variations in relative ecosystem resilience across Wales at a 1km resolution that can be used to understand a range of DECCA based attributes and how these interact. When viewing on a landscape scale, you will be able to see how the area in question compares.
Priority Ecological Networks (PENs)	GIS layers	The Map includes datasets and evidence on habitat connectivity that can be used to inform actions to bring protected sites into favourable condition and build connectivity between them. On-land, PENs that show the best current connectivity between SSSIs and other biodiversity hotspots for a range of broad habitats. The maps should help guide the locations of activities so that they enhance, consolidate or link networks in the landscape. For marine areas, the map shows the full extent of the MPA network, highlighting the sites where one or more features are known to be in unfavourable condition.

Dataset	What is it?	What they contain and how they can be used
[Habitat Networks maps](#)	GIS layers	Focal, local and core maps showing the functional connectivity between habitat patches and Level II maps showing similar between terrestrial protected sites that can be used to identify gaps and pinch points in ecological networks where habitat restoration or creation could be undertaken to enhance connectivity.
Resilient Ecological Networks (RENs) – speak to relevant Area Statement Officers **Available on request from NRW**	Reports and spatial data	Intended outcomes i.e. functionally and structurally connected series of important sites for biodiversity that have existing, or the potential for healthy and resilient ecosystems, and provide benefits for biodiversity and well-being. RENs can be developed at any scale, from landscape-scale to very local. RENs feature core areas and an intervening land-use matrix and should be informed by co-design.

- [Aderyn: Home (lercwales.org.uk)](#)
- [Landscape and a Changing Climate](#) a resource showing the impacts of projected climate changes for Wales in 2050 on landscape character and qualities.
- [Living with Environmental Change: archive of publications and reports – UKRI](#)
- The UK habitat sensitivity report [Re-evaluating the sensitivity of habitats to climate change - NECR478 (naturalengland.org.uk)](#)

Socio-economic data

PSB Well-being Assessments

Refer to your PSB Well-being Assessment

RPB Population Needs Assessments

Cardiff and Vale of Glamorgan Population Needs Assessment 2022

Cwm Taf Morgannwg Population Needs Assessment

Gwent Population Needs Assessment

Population Assessment 2022 - West Wales Care Partnership (wwcp-data.org.uk)

North Wales Population Needs Assessment (northwalescollaborative.wales)

West Glamorgan Population Needs Assessment

Powys Population Needs Assessment

Cultural risk

WFG report chapter on Culture and Welsh Language:
https://www.futuregenerations.wales/wp-content/uploads/2020/06/Chap-3-Culture-and-Lang.pdf (page 34 onwards)

Article on how culture sector can drive the green transition:
https://futureobservatory.org/news/drive-the-green-transition.

Dr Lana St Leger from Cardiff Met is also working on the potential impacts of climate change on Welsh language and heritage. Cultural considerations include land management and risk related to the loss of stories, Welsh names, habitats, native biodiversity, and animals.

Infographics

The following are links to infographics about future climate scenarios, which may be helpful to communicate likely changes in weather patterns to PSB partners:

- HEADLINE_FINDINGS (metoffice.gov.uk)
- High-Impact-Weather-infographic-v14FINAL.png (1404×1903) (ukclimateresilience.org)
- What will climate change look like in your area? - BBC News
- The Met Office climate data portal (arcgis.com)
- UK Climate Resilience outputs - Met Office
- National Trust Climate Hazards (arcgis.com)
- UK Flooding report | Research | British Red Cross
- New research shows increasing frequency of extreme rain - Met Office– Findings from the first high resolution 100-year model that captures the detail of convective, or extreme, rainfall events (published March 2023)

Appendix C: Existing toolkits

Credit: Public Health Wales and Urban Habitats.

What is included in existing toolkits?

Adaptation toolkits differ in their content, data used and their output. Table 8 suggests topics/ domains of inclusion you would expect to find within a 'good' adaptation toolkit, assessing their inclusion within the existing toolkits.

Table 8: Assessment of topics in assessment toolkits

Topic	Local climate adaptation toolkit	UK Adaptation Inventory	UK Heat stress	Climate Just
Climate change: weather	Yes	Yes		
Climate change: extremes		Yes		Yes
Climate change: flooding		Yes		Yes
Climate change: heat stress		Yes	Yes	Yes
Climate change: seasonal data (winter and summer)	Yes			
Model data: identifies model used		Yes	Yes	Yes
Model data: uses a Regional Climate Model (RCM)	Yes	Yes	Yes	Yes
Model data: uses Shared Socio-Economic Pathways (SSPs)		Yes	Yes	
Model data: refers to uncertainty of data		Yes		Yes
Model data: refers to alternative warming scenarios and emissions pathways (Representative Concentration Pathways, RCPs)		Yes	Yes	Yes

Topic	Local climate adaptation toolkit	UK Adaptation Inventory	UK Heat stress	Climate Just
Adaptation: mentions adaptation	Yes	Yes		Yes
Adaptation: refers to alternative types of adaptation		Yes		
Adaptation: states its role in supporting local authority planning	Yes	Yes		Yes
Tool outcomes: produces a map			Yes	Yes
Tool outcomes: produces a report	Yes			Yes
Tool outcomes: visual tool	Yes		Yes	Yes
Tool outcomes: downloadable data		Yes		Yes
Ease of use: provides a guide/ step by step process on how to use tool	Yes		Yes	Yes
Ease of use: provides a video guide	Yes	Yes	Yes	Yes
Ease of use: provides resources on key terms, information and data used within the tool		Yes		Yes
Ease of use: provides extra resources	Yes	Yes		Yes

See also a link to the Climate Adaptation toolkit created by Local Partnerships:

Climate adaptation toolkit and risk generator (localpartnerships.gov.uk)

Appendix D: Prompts for considering impacts on well-being when reviewing climate risks, organised by risk category

Please note, not all questions are relevant for each risk

Natural environment and assets

- Will this impact species or habitats?
- Will this impact habitat connectivity extent, and condition?
- Will cultural/ heritage sites be impacted/ This could be buildings or landscapes.
- Will this result in changes in practices which might contribute to a change in Welsh historic culture, for example agriculture?

Infrastructure

- Will this impact habitat connectivity, extent, and condition? For example, are bridges providing habitat connection to allow passage for species.
- Will sources or infrastructure of natural resources be impacted (e.g., water)?
- Will this impact cultural events or the creative arts?
- Will this impact heritage collections (for example in museums or libraries)?
- Will this impact community owned sites of heritage significance?

Health communities and built environment

- Will people's access to green space for well-being benefit be a factor?
- Will this impact people's access to cultural sites and activities?
- Will this impact people's ability to connect to others?
- Will this impact access to education, including Welsh language education?

Business and Industry.

- Will this impact business's ability to carry out sustainable practices?
- Will this impact people's access to cultural activities?
- Can nature-based solutions be used as an alternative/as standard?
- Will green infrastructure at business sites be impacted?
- Will local supply chains be impacted?

Appendix E: Resources for next steps and adaptation plans

- Current national climate adaptation plan - Prosperity for All: A Climate Conscious Wales
- CCC report Adapting to Climate Change, Progress in Wales 2023

- [Working together to adapt to a changing climate - flood and coast - GOV.UK (www.gov.uk)](www.gov.uk)
- [Future Wales: the national plan 2040 | GOV.WALES]
- [5.1 Designing an effective adaptation action plan — English (europa.eu)]

7th March 2024

Dear Darren,

Climate Change Risk Assessment Framework for Public Services Boards

I am pleased to share with you a copy of the Climate Change Risk Assessment (CCRA) Framework for PSBs.

This framework has been developed in partnership with Public Health Wales and Welsh Government. It has been designed to help the PSB Partnership work together to better understand how the risks identified in the UK Climate Change Risk Assessment will impact the well-being of current and future generations in this locality.

During the framework's development we received really valuable feedback from PSB partners across Wales which helped to inform the final document.

The framework is a blueprint for collaborative action. It provides a clear step-by-step process for assessing risk that, once completed, can serve to better inform local, regional, and national adaptation approaches and actions.

We hope that carrying out the following specific action will be of assistance:

- Systematically review the risks identified in the Climate Change Risk Assessment Evidence Report (CCRA3) – Wales summary, and develop a partnership response
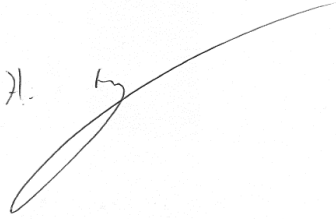
The Welsh Coastal Groups' Forum have developed a video highlighting risks linked to climate change on the coast and the concept of adaptation. For the moment it has been published on the Wales Coastal Monitoring Centre and Forum website but it is downloadable from Vimeo using the below links which I would also like to share with the PSB for information at the request of the WLGA:
English https://vimeo.com/883313310/e39d1af184?share=copy
Cymraeg https://vimeo.com/906753292/992a4709b9?share=cop

We look forward to collaborating with partners to ensure that Carmarthenshire is recognised as a county that protects and enriches its environment and biodiversity, making the best use of its natural resources.

Yours sincerely,

Huwel Manley
Head of Operations South West Wales
Pennaeth Gweithrediadau De Orllewin Cymru

Ffôn/Phone: 03000 654 071 / 07779 613 347
Ebost/Email: Huwel.Manley@cyfoethnaturiolcymru.gov.uk
                    Huwel.Manley@naturalresourceswales.gov.uk

Croesewir gohebiaeth yn Gymraeg a byddwn yn ymateb yn Gymraeg, heb i hynny arwain at oedi.
Correspondence in Welsh is welcomed, and we will respond in Welsh without it leading to a delay.