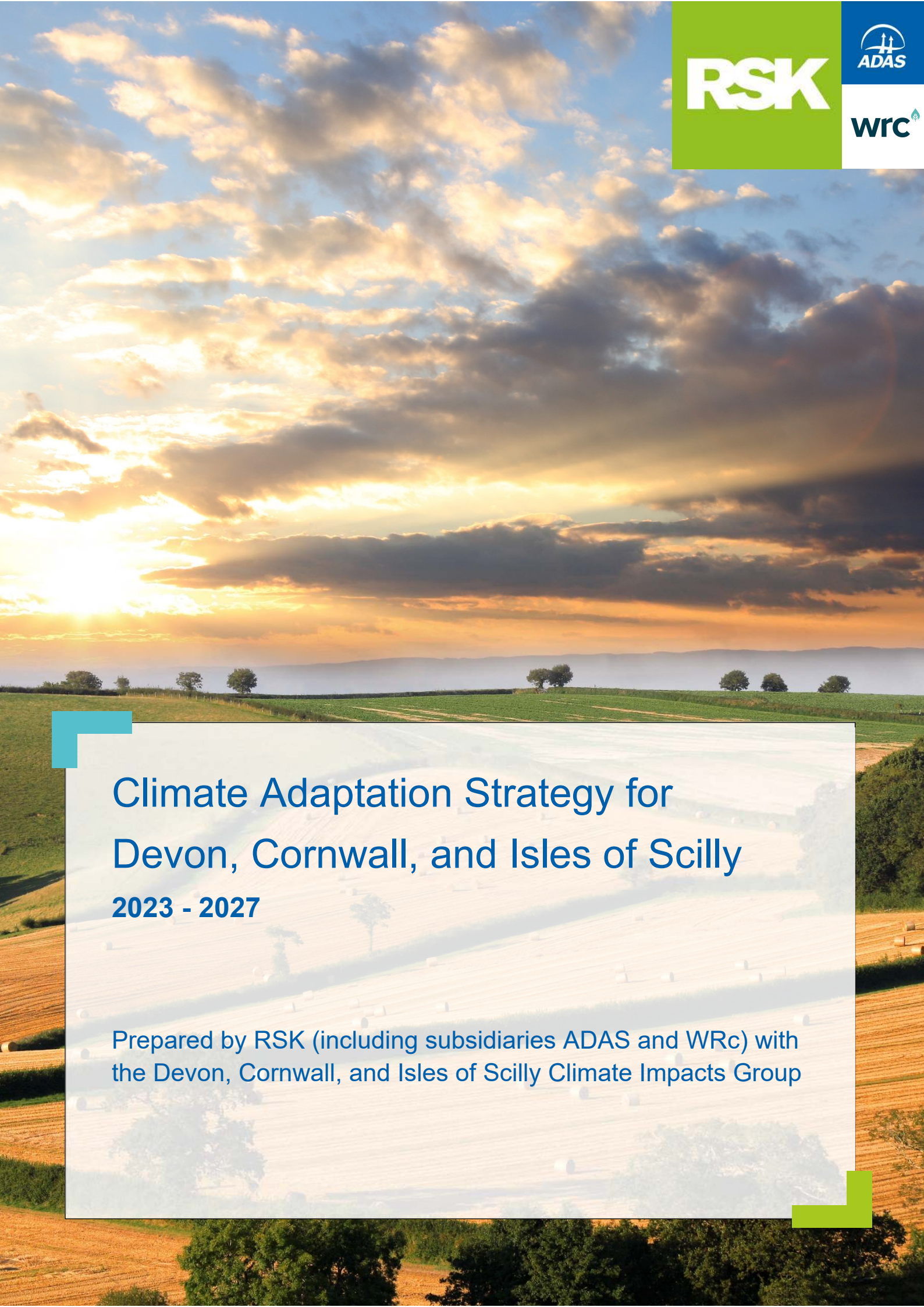

Climate Adaptation Strategy for Devon, Cornwall, and Isles of Scilly

2023 - 2027

Prepared by RSK (including subsidiaries ADAS and WRc) with the Devon, Cornwall, and Isles of Scilly Climate Impacts Group

GENERAL NOTES

The pre-consultation version of this report was produced in March 2023 by RSK, including subsidiaries ADAS and WRc. This publication is the post-consultation version incorporating amendments that respond to comments received from the public consultation.

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Climate Impacts Group

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This work has been undertaken in accordance with the quality management system of RSK.

EXECUTIVE SUMMARY

The Devon, Cornwall and Isles of Scilly Climate Impacts Group commissioned the preparation of this strategic-level Adaptation Strategy, led by RSK Group (including subsidiaries ADAS and WRc) and co-developed with the Climate Impacts Group.

It comprises of three sections:

1. A climate change risk and opportunity assessment for Devon, Cornwall, and the Isles of Scilly.
2. A strategic adaptation plan for the next 5 years, which sets out the conditions for everyone to act on adapting to climate change together.
3. An action plan, which sets out the short-term actions for regional collaboration over the next 2 – 3 years years.

It focuses on climate impacts which require, or which would benefit from, regional collaboration. Due to the place-based and context specific nature of climate risk and opportunities, it is not the purpose of this Adaptation Strategy to plan the detail of how individual areas and communities should adapt. Instead, such detailed plans will be captured under county-level risk assessments and adaptation plans.

Climate change risk and opportunity assessment

A climate change risk and opportunity assessment was co-developed with the Climate Impacts Group. This built upon an initial climate risk assessment that had been prepared previously by the Climate Impacts Group in early 2022.

The climate change risk and opportunity assessment evaluated 62 climate change impacts for the region, considering both positive (i.e. opportunities) and negative (i.e. risks) effects. These were categorised into five sectors that broadly correspond with the sectors highlighted in the national climate risk assessment: natural environment (including agriculture and forestry), infrastructure, health and the built environment, business and industry, and cross-cutting impacts (including international dimensions).

Five main impact themes were scored as being the most severe for the region, all of which have impacts on human health. The themes are not listed in any order but discuss the broad hazards that the region faces from climate change.

- River and surface water flooding**:** Devon and Cornwall are highly susceptible to the impacts of river and surface water flooding. Climate change is projected to increase winter rainfall and increase the intensity and frequency of storm events, furthering the region's vulnerability.
- Sea level rise (coastal flooding and erosion): If global temperatures increase by 4°C by 2100, projections suggest sea level in the region is very likely to rise by between 0.24m and 0.38m by 2050. Wave height, storm surges and offshore wind speed are also expected to increase as a result of climate

change, resulting in more intense storm events and greater impacts from coastal flooding.

- Reduced water availability (drought conditions): It is projected that decreased summer rainfall will increase the likelihood and length of drought periods and water scarcity. Prolonged periods of reduced water availability will have significant negative impacts on agricultural productivity, commercial forestry and terrestrial and freshwater species and habitats.
- Temperature change and extreme heat/cold: Climate change is expected to increase average temperatures, the number of hot days, summers, heatwaves, and periods of extreme heat. These are likely to cause negative health impacts, including direct impacts (e.g. from increased illness and death from cardiovascular and respiratory diseases and other chronic health conditions) and indirect impacts on health (e.g. impact on health services, increased risk of accidents, transmission of food and water borne diseases.
- Cascading impacts: Interacting and cascading impacts can be triggered by multiple hazards that occur coincidentally or sequentially, creating substantial disruption to human and or natural systems. Across the region there is the risk that interaction between named hazards could result in the compounding of impacts across different systems.

Strategic adaptation plan

The purpose of the strategic-level adaptation plan is to set out how Devon, Cornwall and the Isles of Scilly can create the conditions and capacity for everyone to adapt to climate change together over the next 5 years. The adaptation plan considers four levels of adaptation planning and action, relating to different parts of society: policy/regulator-level, organisational-level, community-level, and individual-level actors and actions; with a primary focus on the top two levels to provide the enabling conditions.

Climate change will affect different places in different ways. This drives the need to develop place-based adaptation options with strategies focussed on ‘location’. Locations across the region experience many of the same climate impacts. This means that the region can work collaboratively at a strategic level to ensure that interlinked human-environment systems (e.g. transport, utilities etc.) remain resilient, with the implementation of adaptation options that provide flexibility against uncertainties of future climate impacts.

The regional priorities and strategic directions outlined in this adaptation plan are based on the Climate Impact Group’s assessment of climate risks and local vulnerabilities, alongside the input of stakeholders. Strategic directions and actions to support adaptation include, by sector:

Natural environment (including agriculture and forestry and fisheries):

- To support and actively improve the adaptive capacity of landscapes and habitats.

- To use agriculture / forestry networks and knowledge to implement best practice. Provide them with key information to protect ecosystem services.
- To maximise community participation and connection to nature.

Infrastructure:

- To develop cross-sector collaboration to equip the region with the knowledge and skills to take adaptation action.
- To enhance long-term Infrastructure resilience through local stewardship.

Health and the built environment:

- To increase community awareness of how climate change can impact physical and mental health.
- To support residences and businesses on private water supplies to adapt to climate change threats, including security of supply and changing water quality.
- To assist public services to understand climate change impacts on their assets, service delivery and the community's health.
- To minimise heat-related illness and death.
- To ensure the region is ready for, and resilient to, flooding and coastal change.

Business and industry:

- To equip the sector with the knowledge and skills to take adaptation action.
- To develop industry readiness for impacts (e.g. supply chain security, drought restrictions).
- To enhance long-term business resilience through local stewardship.

Cross-cutting risks and international dimensions:

- To improve the community's knowledge and awareness of the health impacts of climate change, both current and into the future.
- To improve food security within the region.
- To improve information and liaison about the effects of climate change on crime and civil disorder.

Whilst the Climate Impacts Group and local authorities will play an influential role in preparing the community and other stakeholders for the changes ahead, success will require a collaborative approach involving government departments and agencies, transport and utility providers, local businesses, communities and individuals to develop and build the adaptation actions needed in each sector.

Action plan

This action plan summarises the impacts from climate change on each sector and identifies the short-term actions from the adaptation plan for delivery over the next 2 – 3 years. Short-term actions to adapt to climate change for each societal group are:

Policymakers, regional / local government, and arm's length bodies

- Build on and develop resilience partnerships. Ensure their command, control and co-ordination arrangements for an emergency which involves the loss of both power and telecoms, and actively involve utilities companies in local planning where required to ensure linkage with regional and national developments.
- Develop a climate change awareness campaign to inform the public of the projected range of changes and their impacts alongside how we are adapting.
- Public authorities to continue to provide timely & localised information on climate change impacts to enable appropriate adaptation planning by businesses and householders.
- Policymakers to raise public awareness and understanding of the predicted impacts of climate change around the coast generally, and on their local communities specifically – to advance knowledge and engagement.

Organisations, businesses, infrastructure operators, charities, trusts etc.

- Develop a collaborative regional water strategy to manage water availability, including aquifer recharge, control over-extraction, increase the use of rainwater harvesting etc.
- Promote soil management techniques (Min-till cultivation, cover crops, ley-arable rotations) to protect and improve soil structure / nutrient levels and increase resilience to adverse weather / aridity impacts.
- Provision of capacity building support and advice to community groups for taking action to support nature enhancement.
- Develop joint strategies, research, and longer-term schemes with South West Water and catchment partnerships (and other risk management partners where appropriate) to improve catchment management both for high flow areas at flood risk and protect low flow by reducing demand / drought impacts.
- Develop and expand the Climate Emergency / Readiness Action group - (steering group formed from business, public sector, and academia) to take the lead on more projects within the region.
- Put in place a flood plan to ensure business continuity and community awareness - sign up for alerts and check insurances for coverage on flooding / severe weather events.
- Define a regional approach (e.g. 'One Health') to prevent the emergence of zoonotic diseases (infectious diseases transmitted between animals and people).
- Raise awareness on the impacts of anti-microbial resistance and prevention measures (e.g. reducing antibiotics use in livestock).

- Work with partners, including universities, to examine the effects of climate change on crime rates and the potential for civil disorder.

Community Groups, local hubs

- Work with partners, including local authorities, to develop the materials and training to support in the establishment and support of local Community Resilience Groups.

Individuals

For climate change impacts to be effectively addressed and adapted to, individuals should take an active role in assessing their own, and their communities', vulnerabilities to extreme weather events, including impacts from flooding, heatwaves, and water scarcity. Individual property-level adaptation actions may include:

- Install rainwater harvesting, such as a water butt.
- Increase your property's resilience to flooding.
- Check your insurance coverage levels and limitations.
- Upgrade your household water fittings to reduce your water use.
- Switch to water-efficient appliances.
- Choose porous surfaces for your driveways and paths.
- Add solar shading to the south façade of buildings and/or introduce passive cooling measures to reduce heat impacts.
- Fit insect screens where needed.
- Maintain building structure, including roofs.
- Increase the capacity of guttering down-pipes.

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Acronyms and abbreviations

Acronym	Description
ALBs	An arm's-length body; specific category of central government public bodies that is administratively classified by the Cabinet Office.
BEIS	Department for Business, Energy & Industrial Strategy; this department was replaced in February 2023 by three departments.
CCAAP	Climate Change Adaptation Action Plan
CCC	Climate Change Committee
CCRA	Climate Change Risk (and opportunity) Assessment
CIG	Climate Impacts Group
DCIoS	Devon, Cornwall, and the Isles of Scilly
Defra	Department for Environment, Food & Rural Affairs
DfT	Department for Transport
EA	Environment Agency
ELMs	Environmental Land Management scheme
IoS	Isles of Scilly
n.d.	Reference that has no date
LRF	Local Resilience Forum
NGO	Non-Governmental Organisations
NHS	National Health Service
SME	Small and Medium-sized Enterprises
UKCP18	UK Climate Projections 2018

1 Introduction

1.1 Background

The Devon, Cornwall, and Isles of Scilly (DCIoS) Climate Impacts Group (CIG), currently chaired by the Environment Agency, was formed in 2019 by the DCIoS Local Resilience Forum in response to declarations of climate emergency across the three areas.

The climate emergency requires a dual approach:

- **Climate Change Mitigation:** Actions to reduce the region's contribution to climate change (i.e. reducing greenhouse gas emissions) and offset remaining emissions through carbon sequestration and storage.
- **Climate Change Adaptation**: Actions to become more resilient to the changing climate by anticipating the adverse effects of climate change and taking appropriate action to reducing the risk from its impacts (e.g. sea level rise, heatwaves, flooding, drought etc.).

Further detail on key terms and their definitions can be found in Appendix 1 – Glossary of terms. This report focuses on the adaptation element of the climate emergency only. Information on the DCIoS region's response to mitigation can be found in the relevant county-level plans: the Devon Carbon Plan (Devon Climate Emergency, 2022), the Cornwall Climate Change Plan (Cornwall Council, 2019), and the Isles of Scilly Climate Change Action Plan (Council of the Isles of Scilly, 2022).

1.2 Why is climate adaptation necessary?

Climate is the description of average weather over a long period. Future projections of climate throughout the 21st century are presented in Section 1.5. The projections show that average and extreme weather can be expected to continue changing as time progresses. Changes to the climate will continue to occur even if the world stopped emitting greenhouse gases immediately due to the time lag between emissions occurring and the atmosphere reacting to them.

Critical infrastructure (e.g. transport networks, telecoms, and sea defences), community assets (e.g. schools, hospitals, green spaces), homes, the environment, businesses and public services are all sensitive to weather and climate. Therefore climate change will directly affect the resilience of communities and the environment, demand for services, economic productivity, and infrastructure maintenance costs.

- Taking a proactive approach to adapt to climate change will result in many benefits, which could create a fairer, healthier, more resilient and prosperous society now and into the future.

The DCIoS CIG commissioned the preparation of this strategic-level Adaptation Strategy ("DCIoS Climate Adaptation Strategy"), led by RSK Group (including

subsidiaries ADAS and WRc) and co-developed with the CIG. It comprises of three sections:

1. A Climate Change Risk and Opportunity Assessment (CCRA) for Devon, Cornwall, and the Isles of Scilly ("DCIoS Climate Change Risk Register").
2. A Strategic Adaptation Plan, which sets out the conditions for everyone to act on adapting to climate change together ("Adaptation Plan").
3. An Action Plan, which sets out the priority actions for regional collaboration over the next five years ("Action Plan").

It focuses on climate impacts which require, or which would benefit from, regional collaboration. Due to the place-based and context specific nature of climate risk and opportunities, it is not the purpose of this Adaptation Strategy to plan the detail of how individual areas and communities should adapt. Instead, such detailed plans will be captured under county-level risk assessments and adaptation plans, for example the Cornwall Climate Risk Assessment (Cornwall Council, 2022) and the Isles of Scilly Climate Change Adaptation Action Plan (Council of the Isles of Scilly, pending publication). In addition, community or local/parish level adaptation plans are likely to be developed – some communities already have these for specific issues, such as the Slapton Line in South Devon.

The CIG recognises that it has an important role in supporting others to develop their own adaptation plans at a range of scales, from sectoral to household level. The Adaptation Strategy is intended to inform a programme of regional interventions to adapt to climate change, as well as catalysing place-based, grassroots, and organisational action on climate adaptation. It does not intend to replicate or replace county-level CCRAs or adaptation plans.

Whilst the DCIoS CIG and local authorities will play an influential role in preparing the community and other stakeholders for the changes ahead, success will require a collaborative approach involving government departments and agencies, transport and utility providers, organisations, local businesses, communities, and individuals to develop and build the adaptation actions needed in each sector.

1.3 Snapshot of the DCIoS region

The DCIoS region is made up of three areas: Devon (comprising the areas administered by Torbay Council, Plymouth City Council and Devon County Council), Cornwall, and the Isles of Scilly, shown in Figure 1.

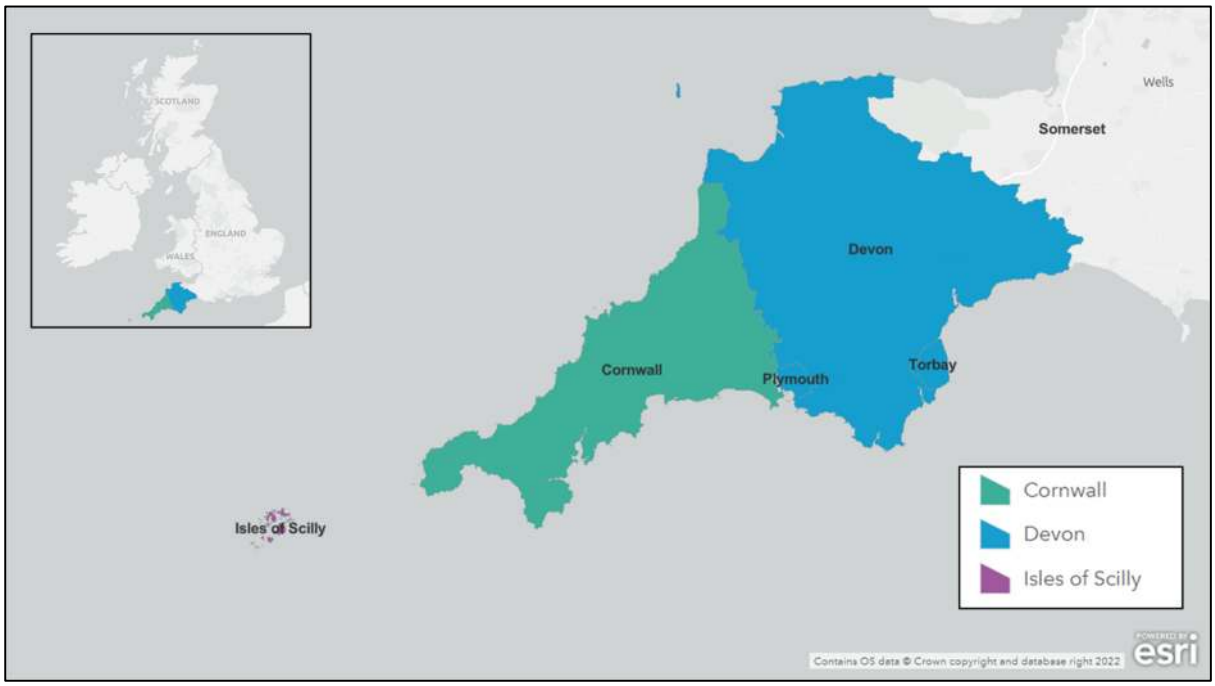


Figure 1. Location of Devon, Cornwall, and the Isles of Scilly within the United Kingdom. Source: ADAS using ArcGIS® software by Esri.

Geography: Devon is the largest county within the DCIoS region covering a land area of 6,707 square kilometres (km^2) (Devon County Council, n.d.). The county has two coastlines, to the north and south, which have a total length of 819 km (British Geological Society (BGS), 2022). Cornwall has the second largest area (3,563 km^2) (Historic Cornwall, n.d.) and a coastline which is 1086 km (BGS, 2022). The Isles of Scilly lie 45 km southwest of Cornwall. Over 200 islands sit within the Isles of Scilly archipelago, but only five of these are inhabited (Natural England, n.d.). The inhabited islands (St Mary's, St Agnes, St Martin's, Tresco, and Bryher), cover a total area of approximately 16 km^2 (Office for National Statistics (ONS), 2016) and are very low lying, sitting on average 17 metres (m) above sea level with a maximum elevation of 51m and a minimum of -0.2m (Natural England, 2010).

Population: The total population is approximately 1,788,000, of which Devon has the largest population at 1,215,600, followed by Cornwall with 570,300 (ONS, 2022a) and the Isles of Scilly with around 2,100 in 2021 (ONS, 2022b). In 2021 the median age of residents in the DCIoS region was 48 years, notably higher than the median age in England and Wales of 40 years (ONS, 2022a). Across the region over a quarter (25.8%) of the population were aged over 65 years, a higher proportion than the average of 18.6% across England and Wales, and this age group is projected to grow as a proportion of total population. The Isles of Scilly has a particularly high proportion of elderly people with a median age of 50 years and 28.2% of the population aged over 65 years. Similarly, there are more retirees in Devon (23.2%), Cornwall (28.8%) and the Isles of Scilly (26.7%) than the average in England and Wales of 21.6% (ONS, 2022a).

The census classifies households in England and Wales by dimensions of deprivation, based on employment, education, health and disability and housing quality and occupancy (ONS, 2022). Overall, 51.7% of households in England and Wales in 2021 were deprived in at least one of the four dimensions (ONS, 2022a). There are fewer deprived households in the DCIoS region than the national average; 35% of households in Devon were deprived in at least one dimension in 2021, 39% in Cornwall and 34% in the Isles of Scilly (ONS, 2022a).

Land use: Agriculture is the primary land use. In Devon 77% of the land area is farmed, 74% in Cornwall and 69% in the Isles of Scilly (Department for Environment, Food and Rural Affairs (Defra), 2016). Grassland for sheep and cattle is the predominant agricultural use on the mainland, which covered 77% and 72% of the agricultural land in Devon and Cornwall respectively (Defra, 2016). The remaining area is largely used to grow cereals, energy crops, arable crops and fruit and vegetables. Horticulture is the dominant sector on the Isles of Scilly, historically a leading producer of narcissus in the cut flower industry. Island production is varied including cut flowers, market gardening, herbs, salads, honey, poultry, and cattle (Council of the Isles of Scilly, 2004). Despite the variety of goods produced, 87% of agricultural land in the Isles of Scilly is grassland (Defra, 2016). As well as defining the region's landscape, agriculture is a key income source, with a total income from farming of £125 million in Devon in 2020 and £281 million in Cornwall and the Isles of Scilly (Defra, 2020).

The DCIoS region has a number of protected landscapes, including two National Parks in Devon (Dartmoor and Exmoor) and seven Areas of Outstanding Natural Beauty (AONBs). The Cornwall AONB is made up of 12 separate geographical areas and covers approximately 27% of the County (The National Association Areas of Outstanding Natural Beauty, 2023). Thirty-five percent of Devon's land area is within Dartmoor and Exmoor National Parks and five AONBs. There are also two World Heritage Sites (the Cornwall and West Devon Mining Landscape and Jurassic Coast) as well as the North Devon Biosphere Reserve and Exmoor's International Dark Skies Reserve. Whilst the Isles of Scilly are the smallest designated AONB in the UK, the islands boast diverse scenery. These valued landscapes are important for the communities living and working there, but also key attractions for the millions of visitors who come each year. They also play an important role in climate adaptation.

Employment: In Devon, 2% of people are unemployed, in Cornwall 2.2%, and in the Isles of Scilly 0.8%, so unemployment is lower in the DCIoS region than the average 3.4% of people unemployed across England and Wales (ONS, 2022a).

Business: In 2022 there were just under 50,000 enterprises in Devon and just over 25,000 in Cornwall (Department for Business, Energy & Industrial Strategy (BEIS), 2022). Business size reflected those found in the rest of the United Kingdom (UK) with almost all (99.75%) businesses in Devon and Cornwall registered as small and medium-sized enterprises (SMEs; typically defined as businesses which employ

fewer than 250 employees) in 2022. All 200 businesses on the Isles of Scilly are classified as SMEs.

Industry: 'Professional, scientific, and technical' activities is the leading industry group in the DCIoS region, encompassing 20% of enterprises (BEIS, 2022). This group includes scientific research and development, legal, accounting, architecture, and engineering. Key industry groups are also: retail; agriculture, forestry, and fishing; and accommodation and food services. Businesses operating in these groups represent 17%, 16% and 14%, respectively (BEIS, 2022). Industry distribution differs slightly on the Isles of Scilly; 22.5% of enterprises work within the accommodation and food services sector and 20% within agriculture, forestry, and fishing (BEIS, 2022).

Transport: The region hosts just 24 miles of motorway, all of which are in Devon. Devon has the largest road network in England with 8,953 miles of roads, whilst Cornwall has over 4,500 miles of roads (Department for Transport (DfT), 2022). The road infrastructure on the Isles of Scilly is minimal, comprising of 21 miles (DfT, 2022). The region is served by two rail lines from London which converge at Exeter to continue to Penzance. This includes a number of challenging sections of route such as the sea wall at Dawlish which affects all services to Torbay, Plymouth and Cornwall (Devon County Council, 2011). Other Cornish lines such as Looe and the branch from Par to Newquay are also vulnerable to flooding. There is no rail infrastructure on the islands. Ports and harbours are important to the economy of the region. Plymouth's Millbay docks are the 7th largest passenger port in England, providing services to France and Spain and because half of the passenger traffic originates from outside Devon, the ferry is very dependent on the A38 (Devon County Council, 2011). Millbay is also a cargo portIn Cornwall, Falmouth Docks is the largest harbour. Penzance ferry port links the mainland to the Isles of Scilly. On the islands, transport is largely by car, bike, on foot or by boat. St Mary's, the largest island, is home to St Mary's Harbour in Hugh Town, the main ferry terminal for visitors to the islands in the summer. Air travel is also a primary transport route to and from the islands, with Skybus taking passengers between St Mary's Airport (also known as Isles of Scilly Airport) and the mainland: Land's End Airport, Newquay airport, and Exeter Airport (Isles of Scilly Travel, n.d.). As well as the larger transport infrastructure there are many footpaths and multiple cycleways across Devon and Cornwall that are promoted by the local authorities to support active travel around the region.

1.4 Consideration of vulnerable groups

The impacts of climate change and associated hazards (e.g. heatwaves, floods, and droughts) present direct threats to physical and mental health and indirect threats through impacts on the building blocks of health, i.e. food, housing, employment, transport, green space. There is broad consensus that climate change increases health inequalities. The extent to which people's health is vulnerable to the effects of

climate change is dependent upon three factors: their exposure to climate health hazards (such as flooding or extreme heat or novel diseases), their sensitivity to those hazards, and their adaptive capacity to cope with the consequences. In addition, places (e.g. rural, urban or coastal) have distinct vulnerabilities and vulnerable populations. Some groups more likely to include vulnerable people are: the elderly, young people, those with health conditions and disabilities, low-income groups, communities facing deprivation, and minority communities. There are also many other groups including visitors and new students, homeless and migrant populations, single-pensioner households, those living in caravans or temporary structures etc. Though people within these communities may also provide resilience and support to others.

Elderly: The elderly are more vulnerable to flooding and heatwaves than other age groups. The reasons for this include (Climate Just, n.d.a):

1. Their sensitivity to extreme heat. People over 65, and more so people over 75, are not able to adjust as well as other adults to sudden changes in temperature and are also more likely to have a long-term health condition or take medication that changes their body's ability to respond effectively to heat.
2. More commonly living in certain types of housing, e.g. bungalows, that are more susceptible to flooding.
3. A reliance on friends, neighbours and relatives for aspects of their care.
4. Their limited adaptive capacity perhaps because of reduced mobility and consequently a restricted access to help.

However, not all older people are equally vulnerable. There are huge differences between people in the same age group as a result of varying biological, social and psychological factors.

Children and young people: This group can be affected disproportionately by heat related impacts because their bodies create more heat, they sweat less and dehydration affects them more quickly than in the case of healthy adults. Younger children are dependent on adults to adapt their behaviour and actions to climate impacts, e.g. in the case of higher temperatures - taking shade in the peak sun, wearing appropriate clothes and hats, and applying suncream etc.

Their development can also be affected due to having experienced traumatic events, which can cause aggressive behaviour, mental health issues and the disruption of their schooling (Climate Just, n.d.b).

Physical health conditions: Those with existing health conditions can be more at risk due to an ongoing dependence on local healthcare services and their increased sensitivity e.g. extreme heat can exacerbate asthma and cardiovascular diseases.

Mental health conditions: There is limited evidence on the links between climate change and mental health, but the literature reports that people who are experiencing poor mental health are more vulnerable to the effects of climate change on their physical as well as mental health. One reason given is that the climate crisis

threatens to disrupt the provision of care for people with a mental illness diagnosis (Lawrance *et al*., 2021).

Disabilities: Some people living with disabilities can be more vulnerable due to on average lower incomes, an unawareness of emergency protocols (due to warning and preparedness systems not being accessible to people with low vision or blindness or hearing loss, for example) and separation from carers and any assistive devices relied upon (Clarke, 2022).

Low-income households: A person's income is often closely tied to other causes of vulnerability such as due to being a lone parent, being in ill-health or having a disability. People in these groups tend to have fewer employment opportunities than others and so tend to be on lower incomes. Households with low-incomes and those who are unemployed are less able to adapt to climate impacts as they have reduced financial capability to invest in adaptation and/or manage, cope, or respond to extreme weather events and associated hazards. Low-income households are also more likely to be employed in professions that have a higher exposure to heat due to working outdoors or confined spaces (Climate Just, n.d.c).

Minority communities: Minority communities can be disproportionately vulnerable to the impacts of climate change due to potential language barriers, a higher likelihood of living in dense urban environments (subject to a greater 'heat island' effect) with less access to green space (Climate Just, n.d.d), a greater occurrence of asthma exacerbated by living in areas of poor air quality, and systemic inequalities meaning that diverse voices are under-represented in professions generating solutions to the climate crisis (Chapman, 2022).

Tourists and people who have lived in an area for a short time: May be unaware of local risks like flooding and eroding cliffs. Tourists may also be staying in vulnerable accommodation like campsites, caravans and camper vans.

Homeless: Homeless people are more likely to be in suffering from health conditions than others and clearly more exposed to climate impacts by the very nature of having inadequate shelter (Climate Just, n.d.e).

1.5 Climate Projections

1.5.1 Emissions scenarios

The world has already experienced warming of around 1.1°C above pre-industrial levels (1850-1900) and further temperature changes are expected in the future (Met Office, 2022a).

The use of different future greenhouse gas emissions scenarios enables examination of the impacts and risks from projected climate change.

The UK's third Independent Assessment of UK Climate (known as CCRA3), published in 2022, sets out future climate pathways for global warming of 2°C and 4°C (+ or – 0.5°C) above 1850-1900 levels by 2100. The lower scenario could be

achieved if international climate policy goals (The Paris Agreement) are met. The higher 4°C scenario represents the expected outcomes if current climate policy commitments are undertaken.

For the risk assessment, a baseline and 2050-time horizon were considered, which is widely used across climate change risk assessments as a time horizon that is far enough in the future to indicate how the climate might change compared to present day, but near enough to ensure that the consequences are real for current generations and that action is undertaken within the next 25 years or so. It also aligns with the Government's Net Zero target.

1.5.2 Projected climate change in DCIoS region

The CIG published climate projections for South West England using the UK Climate Projections: Climate Change Impact Projections During the 21st Century (Climate Impacts Group, 2021). The report used the same 2°C scenario (the technical name for which is RCP2.6) but a less optimistic scenario for its high emissions climate projects; a scenario called RCP8.5 which is representative of 4.5°C warming.

To align with the national method for scenario analysis, this Adaptation Strategy considered the climate impacts to the DCIoS region under 2°C and 4°C (known as RCP6.0). The extent of warming and the subsequent impacts are largely similar during the period from now to the 2050s under both scenarios, and it is only later in the century where the two scenarios diverge and the effects of 4°C warming become more prominent. Therefore the 4°C scenario is largely referred to as the point of reference in this report.

Table 1 indicates how temperature, rainfall and sea level rise is very likely to change in the DCIoS region and how these differ between a 2°C and 4°C scenario by 2100.

Table 1. Projected climate changes by 2100 in the DCIoS region under 2°C and 4°C of global warming, in comparison to the 1981 – 2000 average. Source: UK Climate Programme, 2018.

	2°C global warming	4°C global warming
Annual average temperature change	0°C to 3°C	2°C to 5°C
Average maximum temperature change	0°C to 5°C	2°C to 10°C
Summer precipitation change	-70% to +40%	-80% to +20%
Winter precipitation change	-30% to +50%	-20% to +70%
Sea level rise (Plymouth)	0.34m to 0.65m	0.60m to 1.06m*

** Note: this range reflects a 4.5°C warming as data is not available for 4°C warming*

The general trends in climate that the DCIoS is projected to experience in the 2050s is illustrated in Figure 2.

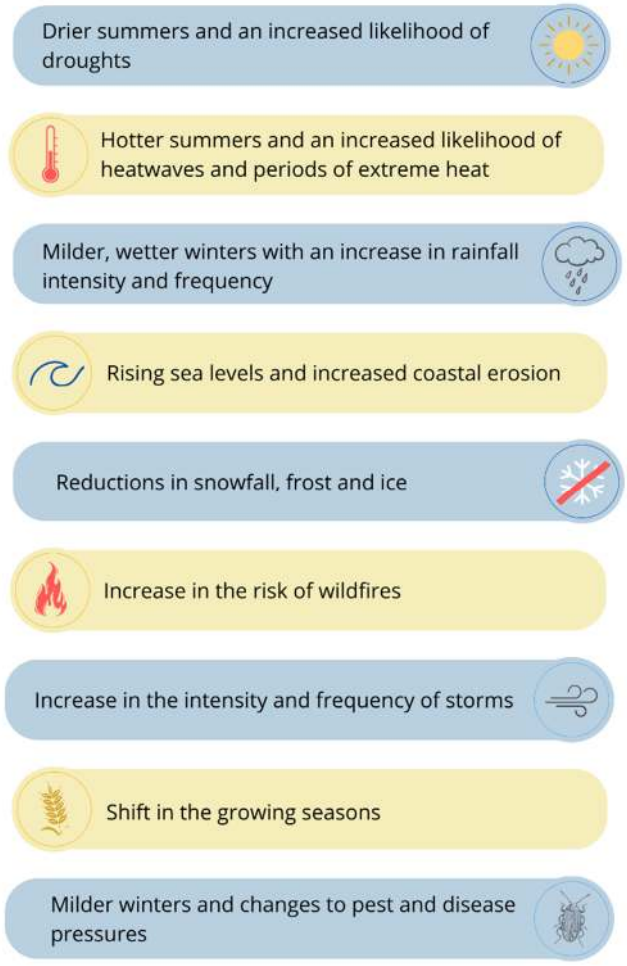


Figure 2. Summary projected impacts of climate change for the DCIoS region.

2 Climate Change Risk and Opportunity Assessment

2.1 Overview

A climate change risk and opportunity assessment (CCRA) was co-developed with the CIG for the DCIoS region. This built upon an initial CCRA that had been prepared by the CIG. The CCRA considered the broad impacts expected within the region from a changing climate. The regional CCRA did not intend to replicate or replace CCRA's being developed at the county-level, which are more detailed and site-specific.

2.1.1 Approach

Using a similar approach to the Climate Adaptation Toolkit and Risk Generator (Local Partnerships, 2023), the 61 risks and opportunities outlined in CCRA3 – the UK's third Climate Change Risk Assessment (Climate Change Committee (CCC), 2021; HM Government, 2022), were used as a basis for the CCRA.

The 61 impacts (both risks and opportunities) from CCRA3 were tailored so that the descriptions were relevant to the DCIoS region (rather than at a UK-level). Through consultation with the CIG, impacts that were considered less relevant to the region were removed (e.g. impacts with international dimensions beyond the remit of the DCIoS region) and additional impacts were added where these were considered important impacts for the region (e.g. impact of fog on maritime and air travel). This resulted in 62 impacts being included in the DCIoS Climate Change Risk Register, which were categorised into five sectors that broadly correspond with the sectors highlighted in CCRA3:

- Natural environment (including agriculture, forestry, and fisheries)
- Infrastructure
- Health and the built environment
- Business and industry
- Cross-cutting (including international dimensions)

Four sector-specific workshops (WS) were then held with stakeholders from the CIG to assess and assign a magnitude and likelihood score for each impact for the 2050s under a 4°C warming scenario. The workshops, facilitated by RSK, were:

- **WS1: Impacts to the natural environment and agriculture sector**, held on 4th October 2022, with representatives from Devon County Council, Cornwall Council, Council for the Isles of Scilly, and Westcountry Rivers Trust.
- **WS2: Impacts to the health and built environment**, held on 10th October 2022, with representatives from Devon County Council, Cornwall Council, the NHS, and Devon and Cornwall Police.

- **WS3: Impacts to infrastructure**, held on 12th October 2022, with representatives from the Environment Agency, Plymouth City Council, Devon Wildlife Trust, Cornwall Council, and Devon and Cornwall Police.
- **WS4: Impacts to business and industry, and cross-cutting impacts**, held on 14th October 2022, with representatives from Cornwall Council, Devon County Council, Plymouth City Council, the NHS, and Devon and Cornwall Police.

Using insight from the national-level scores as a basis (CCC, 2021), discussion was held in each workshop to score the magnitude of the consequence and likelihood of occurrence (i.e. level of probability) relative to the UK-level. In addition, an urgency score was assigned to each impact, outlining the urgency for adaptation action.

The CCRA scores were then shared with the CIG for review. In addition, meetings were held with South West Water, Wales and West Utilities, and Openreach to sense-check and attain consensus on the impacts and scores relevant to key infrastructure in the region.

Risk scoring

Magnitude was scored on five-point scale: very low (1), low (2), medium (3) high (4) and very high (5). Likelihood was also scored on a five-point scale: very unlikely (1), unlikely (2), possible (3), likely (4), and very likely (5). By multiplying the magnitude by the likelihood, a risk score was obtained for each of the impacts.

$$Risk\ Score = Magnitude\ Score \times Likelihood\ Score$$

The risks were then assigned a risk rating based on a five-point scale (Table 2):

- **Negligible risk (score of 1):** Negligible impact expected, associated with a minimal consequence and highly unlikely probability of occurrence.
- **Minor risk (scores of 2 or 3):** Minor impact expected, associated with a minor consequence and unlikely probability of occurrence.
- **Moderate risk (scores from 4 to 9):** Moderate impact expected, associated with a moderate consequence and possible probability of occurrence.
- **Major risk (scores from 10 to 16):** Major impact expected, associated with a major consequence and highly likely probability of occurrence.
- **Severe risk (scores of from 20 to 25):** Severe impact expected, associated with a catastrophic consequence and almost certain probability of occurrence.

Table 2. Risk rating matrix

Risk Rating Matrix		Magnitude of potential consequences				
		Very Low	Low	Medium	High	Very High
Likelihood	Very Likely	Moderate	Major	Major	Severe	Severe
	Likely	Moderate	Moderate	Major	Major	Severe
	Possible	Minor	Moderate	Moderate	Major	Major
	Unlikely	Minor	Moderate	Moderate	Moderate	Major
	Very Unlikely	Negligible	Minor	Minor	Moderate	Moderate

Impacts were then prioritised by their risk rating, for each of the five sectors.

Urgency score

Risk urgency scores, to indicate the need for adaptation action in the next 5 years, were assigned to each of the 62 climate change impacts. The urgency scores were based on a four-point scale from CCRA3:

- **More action needed:** Additional adaptation is needed urgently, either over and above what is already happening, or in some cases adaptation needs to start where there is currently nothing happening
- **Further investigation:** Not enough evidence is available to make a robust judgement on what further action is needed
- **Sustain current action:** The level of current action is in line with the magnitude of the risk or opportunity.
- **Watching brief:** Further action is not currently justified, but monitoring the situation is.

The urgency scores applied in the assessment used the England-level urgency scores in CCRA3 as a basis. Each score was then reviewed and discussed with representatives from the CIG to determine if the score should be different for the DCIoS region.

Whilst most regional scores were similar to the national level, a few were different due to local circumstances (CIG10, CIG11, CIG20, CIG24, CIG25, CIG26, CIG28, CIG30, CIG32, CIG35, CIG45, CIG52, CIG58, CIG59, CIG62).

The urgency scores applied to each risk are outlined in Appendix 3 in the final column of the relevant CCRA tables for each sector: Table 10 (natural environment), Table 11 (infrastructure), Table 12 (health and built environment), Table 13 (business and industry), and Table 14 (cross-cutting).

2.1.2 Summary of materials reviewed

To inform the DCIoS Climate Change Risk Register, a range of materials and literature sources were reviewed. These included research projects prepared by the CIG: Flooding and Coastal Erosion Impacts of Climate Change (Environment Agency, 2021), Health Impacts of Climate Change (Public Health Devon, 2020),

Climate Change and Devon's Natural Environment (Devon Local Nature Partnership, 2021), and Climate Change Impact Projections During the 21st Century (Climate Impacts Group, 2021). Further detail on these documents, including the headline impacts identified in them, can be found in Appendix 2. Other materials reviewed for insight and cross-referencing included the Cornwall Climate Risk Assessment (Cornwall Council, 2022), and the Isles of Scilly Climate Change Adaptation Action Plan (Council of the Isles of Scilly, pending publication), also described in Appendix 2.

2.2 DCIoS Climate Change Risk Register

The CCRA evaluated 64 climate change impacts for the DCIoS region, considering both positive (i.e. opportunities) and negative (i.e. risks) effects, which were outlined in the DCIoS Climate Change Risk Register.

The following sections outline the identified impacts and risk scores within each of the five sectors. Further detail on the risk scores and urgency scores can be found in Appendix 3 – Climate change risk assessment scores. It is noted that communities, organisations and sectors can all be at different starting points when considering risk. For example, flood risk management is far more advanced in understanding and preventative measures compared with the effects of heat on health. The risk assessment considers the current perceived levels of risk, based on current understanding and expert/stakeholder insight.

2.2.1 Headline impacts

Impacts	Type of impacts		Severity of impacts	
64 Impacts evaluated across multiple sectors	**49**	Risks	**18**	Severe
	7	Opportunities	**28**	Major
	8	Risks and opportunities	**16**	Moderate
			1	Minor
			1	Negligible

The five impact themes described below were scored as being the most severe for the DCIoS region. The themes are not listed in any particular order but discuss the broad hazards that the region faces from climate change.

River and surface water flooding

Devon and Cornwall are highly susceptible to the impacts of river and surface water flooding. Climate change is projected to increase winter rainfall and increase the intensity and frequency of storm events, furthering the region's vulnerability. In Devon and Cornwall there are many communities located at the bottom of steeply sided valleys and/or near river channels. As a result, these communities are at high risk of rapid onset flooding following heavy rainfall. Research by the Environment Agency estimated that for a flood event with a 0.1% chance of occurring annually, 65,000 residential properties in the region are at risk from river flooding and 50,000 are at risk from surface water flooding (Environment Agency, 2021). A significant proportion of these properties are at risk of flooding more frequently. There are no main rivers or estuaries on the Isles of Scilly, therefore, the islands are not at risk from fluvial (rivers and streams) flooding but are susceptible to pluvial (surface water flooding). However, the economic impact of damage to properties as a result of flooding (from any source), including insurance costs and health impact are important factors to consider.

Floods can affect vital infrastructure such as water and power supplies, telecoms, and transport networks. The impact of the flood damage can be amplified by the interdependency of the infrastructure systems on one another. Areas within the DCIoS region are relatively remote compared to other parts of the UK, serviced by fewer travel networks, therefore the impacts of loss of services may be greater than in other areas.

Alongside damage to above ground infrastructure such as bridges, surface water flooding impacts drainage systems, which in many areas have a combined flow with sewerage systems. High levels of surface water can overload the system, resulting in issues of sewage outflow. This has impacts for wildlife and ecosystems.

Flooding can have significant impacts on the region's economy, both in the short-term damage to assets and longer-term due to lost revenue from reduced tourism and/or business activity whilst the area recovers. Additionally, individuals' mental health can be negatively impacted by the trauma of experiencing a flood event, on top of risks to physical health from foul water and flood damage. This can have consequences for productivity and place increased pressure on local health services.

As precipitation patterns and intensity continue to be modified by climate change, the frequency and magnitude of flooding are likely to become more common across the region, affecting a greater proportion of the population and natural environment more frequently.

Sea level rise (coastal flooding and erosion)

If global temperatures increase by 4°C by 2100, projections suggest sea level in the DCIoS region is very likely to rise by between 0.24m and 0.38m by 2050 relative to the 1981 – 2000 average (Climate Impacts Group, 2021). Wave height, storm surges

and offshore wind speed are also expected to increase as a result of climate change, resulting in more intense storm events and greater impacts from coastal flooding. Many communities around the coastline are situated on flat, low-lying areas, or at the rear of exposed beaches, both of which are susceptible to coastal flooding and erosion. Fifteen-thousand properties are currently at risk from coastal flooding in the region (Environment Agency, 2021).

The risks to properties from coastal erosion are projected to increase over time. Sixty-seven properties are at risk over the next 20 years. This rises to 122 properties at risk in 20 to 50 years' time and 250 properties in 50 to 100 years' time (Environment Agency, 2021). The general areas at risk are the south coast of Devon to the northeast of Tor Bay, areas around Barnstaple, the Penwith area of Cornwall, and the Isles of Scilly. Coastal erosion will cause the region's coastline to retreat inland, potentially causing conflict over land use and the need for some coastal communities to relocate.

Flooding and coastal erosion threatens multiple critical infrastructure sites and transport networks across the region. Railway lines are particularly at risk; several lines run along the Devon and Cornish coast and there have been incidences of extended mainline railway closure in Devon due to the failure of sea defences. The mainline connects the region to London and the rest of the UK, therefore coastal erosion and flooding can have major economic impacts on the region in terms of both repair costs and lost revenue, as well tourism. Over 30% of the Isles of Scilly is less than five metres above mean sea level, therefore infrastructure on the islands is highly vulnerable to the impacts of coastal erosion driven by more frequent storms and greater wave heights. Sea level rise also presents a risk to the islands' already vulnerable freshwater supplies from sea water inundation. Coastal agricultural areas across the region are also threatened by increases in salinity from tidal flooding and projected sea level rise, which may significantly impact the agricultural productivity of the land.

Reduced water availability (drought conditions)

It is projected that decreased summer rainfall will increase the likelihood and length of drought periods and water scarcity in the southwest of the UK (Metcalf et al. 2003). Prolonged periods of reduced water availability will have significant negative impacts on agricultural productivity, commercial forestry and terrestrial and freshwater species and habitats. Droughts will increase the need for irrigation resulting in increased water demand from agriculture and subsequently threaten produce such as salads and soft and top fruits, which are produced across the DCIoS region.

The risk of increased pollutants in concentrated river flows is heightened during droughts, presenting water quality concerns with implications for human and environmental health. The combined effects of more frequent periods of water scarcity and high numbers of summer tourists poses a risk to the region's public

water supply and will also increase demand for energy (electricity and heating/cooling) and other resources. Reduced water availability is likely to have considerable economic implications for businesses and household water supply interruptions threaten public health, including mental-wellbeing.

Drought stress is a hazard of particular concern for the Isles of Scilly as the islands' groundwater sources have a naturally low capacity leaving the islanders vulnerable to water scarcity in periods of low rainfall, with serious implications for the area economically and for public health. Furthermore, sea level rise and saline intrusion will further exacerbate this is issue and could permanently damage supply.

As climate change progresses there are also potential risks to the region from conflict over water resources. For example, this could include conflict regarding natural competition for water use, through changes in the dynamics of habitats, whereby natural systems and processes require a greater proportion of available water to maintain its natural state, further reducing excess water for human abstraction. Also, the demands of high-water use businesses (hotels, farms, industry etc.) could become conflicted with individual needs and restrictions (e.g. in conflict with domestic hosepipe bans).

Temperature change and extreme heat/cold

Climate change is expected to increase average temperatures, the number of hot days, summers, heatwaves, and periods of extreme heat across the UK, particularly in the south of England, including the DCIoS region. These are likely to cause negative health impacts, including direct negative health impacts from increased illness and death from cardiovascular and respiratory diseases and other chronic health conditions, and indirect impacts on health through impact on health services, increased risk of accidents (especially drowning), increased transmission of food and water borne diseases and marine algal blooms, and through potential disruption to critical infrastructure (World Health Organization, 2018). Buildings will likely require adaptation (e.g. the fitting of brise soleil or other solar shade solutions to deflect sunlight) to combat overheating. Furthermore, the layout, orientation and design of new developments and associated landscaping / green infrastructure will require a high standard of design that helps regulate extremes in temperature and create microclimates for shade and shelter.

The hotter climate is expected to negatively affect productivity in both indoor and outdoor based professions. Infrastructure such as road and rail networks are already adversely affected by high temperatures in the DCIoS region, leading to travel disruption which may have implications for people's health alongside the economy. Periods of extreme heat can cause heat stress, affecting livestock health and productivity and stunting crop growth, resulting in reduced agricultural productivity.

However, warmer temperatures may increase tourism to the area, providing economic benefits. In addition, milder winter temperatures will decrease the number

of cold related deaths, with deaths from outcomes associated with cold temperature greatly outnumbering deaths associated with warm temperature (ONS, 2022h).

Cascading impacts

Cascading impacts can be triggered by multiple hazards that occur coincidentally or sequentially, creating substantial disruption to human and or natural systems (Collins et al. 2019). There is a large amount of uncertainty in the quantification of cascading impacts due to the absence of data and the shifting influence of climate change on different hazards over time (Collins et al. 2019). This uncertainty makes the risks of cascading impacts greater. Climate related hazards place key infrastructure and services at risk from cascading failures (e.g. power outages caused by high winds would disrupt operations at the Isles of Scilly's desalination plant, which would have considerable implications for the populations' fresh water supply). Across the DCIoS region there is the risk that interaction between named hazards could result in the compounding of impacts across different systems.

2.2.2 Natural environment (including agriculture, forestry, and fisheries)

Headline summary

Impacts	Type of impacts		Severity of impacts	
19 Impacts evaluated in the **natural environment and land use sector**	**10**	Risks	**6**	Severe
	4	Opportunities	**10**	Major
	5	Risks and opportunities	**2**	Moderate
			0	Minor
			1	Negligible

Key impacts to the sector

Nineteen risks and opportunities were identified, of which six were scored as severe, ten as major, two as moderate and one as negligible.

The climate change risk assessment for the natural environment is summarised below and detailed in Table 10 in Appendix 3 – Climate change risk assessment scores.

Severe risks and significant opportunities

- Risks to terrestrial species and habitats from changing climatic conditions and extreme events, including temperature change, water scarcity, wildfire,

flooding, wind, and altered hydrology (including water scarcity, flooding, and saline intrusion). [CIG01]

- Risk to soils from changing climatic conditions, including seasonal aridity and wetness. [CIG04]
- Risks and opportunities for natural carbon stores (peatlands, forestry, marine etc.), carbon sequestration and GHG emissions from changing climatic conditions, including temperature change and water scarcity. [CIG05]
- Risks to freshwater species and habitats from changing climatic conditions and extreme events, including higher water temperatures, flooding, water scarcity and phenological shifts. Including saline intrusion of wetlands, estuary habitats etc. [CIG12]
- Risks to marine species, habitats, and fisheries from changing climatic conditions, including ocean acidification and higher water temperatures. [CIG15]
- Risks and opportunities to coastal species and habitats due to sea level rise, coastal flooding, erosion, and climate factors. [CIG18]

Major risks and opportunities

- Risks to terrestrial species and habitats from pests, pathogens, and invasive species. [CIG02]
- Opportunities from new species colonisations in terrestrial habitats. [CIG03]
- Risks and opportunities to agricultural productivity from extreme events and changing climatic conditions (including temperature change, water scarcity, wildfire, flooding, coastal erosion, wind and saline intrusion, carbon fertilisation). [CIG06]
- Risks to forestry from pests, pathogens, and invasive species. [CIG09]
- Opportunities for agricultural and forestry productivity from new/alternative species becoming suitable. [CIG10]
- Risks to aquifers from changing climatic conditions, sea level rise, water scarcity, water pollution, saltwater intrusion etc. [CIG11]
- Risks to freshwater species and habitats from pests, pathogens, and invasive species. [CIG13]
- Opportunities to marine species, habitats, and fisheries from changing climatic conditions. [CIG16]
- Risks to marine and coastal species and habitats from pests, pathogens, and invasive species. [CIG17]
- Risks and opportunities from climate change to the way people experience, value and enjoy different landscapes. [CIG19]

Moderate risks and opportunities

- Risks and opportunities to forestry productivity from extreme events and changing climatic conditions (including temperature change, water scarcity, wildfire, flooding, coastal erosion, wind, and saline intrusion). [CIG07]
- Risks to agri-food (agriculture and horticulture) from pests, pathogens, and invasive species. [CIG08]

Negligible risks and opportunities

- Opportunities to freshwater species and habitats from new species colonisations. [CIG14]

Discussion of impacts to the sector

Of the six potentially severe climate change impacts, risks to terrestrial species and habitats (CIG01), risks to soils (CIG02), and risks to freshwater species and habitats (CIG12) all scored the maximum risk score of 25 (i.e., the magnitude and likelihood of the impacts for the 2050s under a 4°C warming scenario were considered *Very High* and *Very Likely* respectively). These impacts indicate a risk of decline in ecosystem services, localised extinction of rare species, habitat fragmentation and reduction, and pollution as the region warms.

Risks to marine species, habitats, and fisheries (CIG15), risks and opportunities for natural carbon stores, carbon sequestration and greenhouse gas (GHG) emissions (CIG05), and risks and opportunities to coastal species and habitats (CIG18) all scored a risk score of 20 (i.e., risk magnitudes were considered *Very High* while risk likelihoods were considered *Likely* for all three impacts). While possible loss of species and habitat were identified for marine species (CIG15), there are also potential opportunities for warm-water marine species to migrate northwards into the DCIoS region under warming climatic conditions. Agriculture is expected to be impacted by increased rainfall intensity and runoff causing increased soil erosion, reducing soil fertility, and subsequently reducing productivity.

Additional adaptation is needed for all six of the impacts that were scored as severe, either over and above what is already happening, or in some cases adaptation needs to start.

Of the ten climate change impacts scored as major, risks to terrestrial species, freshwater species, marine and coastal species and their habitats from pests, pathogens, and invasive species (CIG02, CIG13, CIG17), risks and opportunities to agricultural productivity (CIG06), and opportunities from new species colonisations in terrestrial habitats (CIG03) have a risk score of 16. This meant that the magnitude and likelihood of the impacts for the 2050s under a 4°C warming scenario were considered *High* and *Likely* respectively. Risks to forestry from pests, pathogens, and invasive species (CIG09), risks and opportunities to landscape character (CIG19), opportunities for agricultural and forestry productivity from new or

alternative species (CIG10), and opportunities for marine species, habitats, and fisheries (CIG16) each had a risk score of 12, demonstrating a *High* magnitude and *Possible* likelihood. The risk to aquifers (CIG11) exhibited a *Moderate* magnitude but a *High* likelihood of occurrence.

Additional adaptation is needed for seven of these impacts (CIG02, CIG03, CIG06, CIG09, CIG10, CIG13, CIG17) whilst further investigation is necessary for CIG16 and CIG19 as insufficient evidence is available to make a robust judgement on what further action is required. *Sustain Current Action* was specified for CIG11 for the DCIoS region, although *More Action Needed* was identified for the Isles of Scilly specifically, as saline intrusion due to sea level rise is a large risk to the islands and adaptation to date has been insufficient.

Risks to agri-food from pests, pathogens, and invasive species (CIG08) and risks and opportunities to forestry productivity (CIG07) were both classed as *Moderate* for the 2050s under a 4°C warming scenario. However, more adaptive actions are still needed in the next five years on a region-wide level.

Meanwhile, opportunities to freshwater species and habitats from new species colonisations (CIG14) was classed as *Negligible*. The urgency score was defined as *Sustain Current Action*, although the opportunity for beavers was noted as one area for potential further investigation.

2.2.3 Infrastructure

Headline summary

Impacts	Type of impacts		Severity of impacts	
15 Impacts evaluated in the **infrastructure sector**	**15**	Risks	**4**	Severe
	0	Opportunities	**4**	Major
	0	Risks and opportunities	**7**	Moderate
			0	Minor
			0	Negligible

Key impacts to the sector

Fourteen impacts were identified. Four were classified as *Severe*, four as *Major* and six as *Moderate.* All were considered to present a risk, rather than opportunity.

The climate change risk assessment for the infrastructure sector is summarised below and detailed in Table 11 in Appendix 3 – Climate change risk assessment scores.

Severe risks and significant opportunities

- Risks to infrastructure networks (water, energy, transport, digital) from cascading failures (e.g. access to broadband being disrupted due to power outages; and sewage overflow from heavy rainfall events). [CIG20]
- Risks to infrastructure assets and services from river, surface water and groundwater flooding (including chronic changes), as well as associated landslips and/or soil movement. [CIG21]
- Risks to infrastructure services from coastal flooding and erosion. [CIG22]
- Risks to nearshore infrastructure (e.g. harbours and breakwaters) from storms and high waves and/or offshore infrastructure (where applicable). [CIG30]

Major risks and opportunities

- Risks to bridges and pipelines from flooding (i.e. river, surface water and groundwater flooding) and erosion. [CIG23]
- Risks to public water supplies from reduced water availability (and shifting supply and demand balances). [CIG27]
- Risks to energy from high and low temperatures, high winds, lightning, humidity. [CIG29]
- Risks to transport from high and low temperatures (incl. ice and snow), high winds, lightning, humidity. [CIG31]

Moderate risks and opportunities

- Risks to infrastructure networks (incl. transport, energy etc.) from slope and embankment failure (e.g. landslips). [CIG24]
- Risks to hydroelectric generation from low or high river flows. [CIG25]
- Risks to below (subterranean) and above (surface) ground infrastructure from subsidence (sinking of the ground). [CIG26]
- Risks to energy generation from reduced water availability (i.e. freshwater use in energy generation process). [CIG28]
- Risk of disruption to transport services (e.g. planes, helicopters etc.) from fog (exacerbated by changes in sea surface temperature, humidity, winds etc.). [CIG32]
- Risks to digital from high and low temperatures, high winds, lightning. [CIG33]
- Risks to infrastructure networks from high winds and intense rainfall. [CIG64]

Discussion of impacts to the sector

Of the four potentially severe climate change impacts, risks to infrastructure networks from cascading failures (CIG20), risks to infrastructure assets and services

from river, surface water and groundwater flooding, as well as associated landslips and/or soil movement (CIG21), risks to infrastructure services from coastal flooding and erosion (CIG22) and risks to nearshore infrastructure from storms and high waves and/or offshore infrastructure (CIG30) all had a risk score of 20 out of 25, for the 2050s under a 4°C warming scenario (risk magnitudes were considered *Very High* while risk likelihoods were considered *Likely* for all four impacts). CIG22 was considered to be increasingly vulnerable to the impacts of climate change, as coastal squeeze meant less scope to move assets inland.

Urgency scores for CIG21 and CIG30 were defined as *More Action Needed*, while urgency score for CIG20 and CIG22 were defined as *Further Investigation*.

Four impacts were scored as a major risk from climate change. These included risks to public water supplies from reduced water availability (CIG27) and risks to energy and transport from high and low temperatures, high winds, lightning, humidity (CIG29, CIG31), each of which scored a risk rating of 16 (i.e. *High* magnitude and *Likely* chance of occurrence), whilst risks to bridges and pipelines from flooding and erosion (CIG23) had a risk score of 12 (*High* magnitude and a *Possible* likelihood of occurrence). All four impacts were considered to be particularly vulnerable to the impacts of climate change due to the age and design of infrastructure and the exposure of assets to interacting and cascading impacts.

Urgency scores for CIG27 and CIG31 were defined as *More Action Needed*, while urgency score for CIG23 and CIG29 were defined as *Further Investigation*. All four were considered major regional-wide impacts, although the susceptibility of the Isles of Scilly was deemed slightly greater due to the exposure of assets to various climate impacts.

Risks to infrastructure networks from slope and embankment failure (CIG24), risks to hydroelectric generation from low or high river flows (CIG25), risks to below and above ground infrastructure from subsidence (CIG26), risks to energy generation from reduced water availability (CIG28), risk of disruption to transport services from fog (CIG32), risks to digital from high and low temperatures, high winds, lightning (CIG33) and risks to infrastructure networks from high winds and intense rainfall (CIG64) were all classed as *Moderate* for the 2050s under a 4°C warming scenario.

Further Investigation on what adaptive actions are needed is required for CIG24, CIG33 and CIG64. CIG26 and CIG32 were classed as *Sustain Current Action*, whilst CIG25 and CIG28 were assigned as a *Watching Brief*, whereby the impacts are a lower priority and monitoring of the situation was deemed sufficient at this time.

2.2.4 Health and the built environment

Headline summary

Impacts	Type of impacts		Severity of impacts	
16 Impacts evaluated in the **health and built environment**	**14**	Risks	**4**	Severe
	1	Opportunities	**9**	Major
	1	Risks and opportunities	**2**	Moderate
			1	Minor
			0	Negligible

Key impacts to the sector

Fifteen impacts were identified. Four were classified as *Severe*, nine as *Major*, one as *Moderate* and one as *Minor.* Of these, 13 impacts were considered as a risk, one an opportunity, and one as both a risk and opportunity.

The climate change risk assessment for the health and built environment sector is summarised below and detailed in Table 12 in Appendix 3 – Climate change risk assessment scores.

Severe risks and significant opportunities

- Risks to health and wellbeing from high temperatures; including from direct exposure, overheating of buildings, and urban heat island effect. [CIG34]
- Risks to people, communities and buildings from river, surface water and groundwater flooding. [CIG37]
- Risks to people, communities and buildings from sea level rise and coastal erosion. [CIG38]
- Risks to food safety and food security in the DCIoS region. [CIG42]

Major risks and opportunities

- Risks to mental health and wellbeing from extreme weather events and/or the climate emergency. [CIG35]
- Risks and opportunities from summer and winter household energy demand; opportunity - winter (b) risk – summer [CIG39]
- Risks to health from transmissible diseases (including water-borne, vector-borne, air-borne, bacterial, infectious diseases etc, as well as novel viral and genetic changes). [CIG41]

- Risks to health from water quality (e.g. private drinking water or bathing water), including contamination of drinking water through increased runoff and flooding events that overwhelm current water treatment approaches. [CIG43]
- Risks to health from private water supply (e.g. potential interruptions in household water supply from wells or boreholes). [Excludes public drinking water and wastewater services from South West Water]. [CIG44]
- Risks to cultural heritage and assets in the DCIoS region. [CIG45]
- Risks to health and social care delivery. [CIG46]
- Risks to education services. [CIG47]
- Risks to prison services. [CIG48]

Moderate risks and opportunities

- Risks to health and wellbeing from changes in air quality, both indoor and out. [CIG40]
- Risks to people, communities and buildings from wildfires. [CIG63]

Minor risks and opportunities

- Opportunities for health and wellbeing from higher temperatures. [CIG36]

Discussion of impacts to the sector

Of the four impacts scored as severe, risks to people, communities and buildings from sea level rise and coastal erosion (CIG38) had the maximum risk score of 25 (i.e. the magnitude and likelihood for the 2050s under a 4°C warming scenario were considered *Very High* and *Very Likely* respectively). The DCIoS region is particularly at risk due to its exposure to Atlantic storms, often being the first bit of the country to be hit and taking the brunt of the storm in terms of wind and wave energy. Risks to health and wellbeing from high temperatures (CIG34), risks to people, communities and buildings from river, surface water and groundwater flooding (CIG37), and risks to food safety and food security in the DCIoS region (CIG42) all had a risk score of 20. For these three impacts, risk magnitudes were considered *Very High* while risk likelihoods were considered *Likely*. The frail and the elderly are particularly vulnerable to heatwaves, with respiratory and cardiovascular diseases being common causes of deaths during heatwave events. Health risks associated with building overheating, flooding damage, water and biological contamination, and infectious disease transmission, especially exacerbated by poor infrastructure, are also possible in a rapidly warming climate.

More adaptive action is needed in the next five years for CIG34, CIG37 and CIG38, whilst *Further Investigation* is needed to make a robust judgement call on what actions are needed for CIG42.

Of the nine impacts scored as major, risks to mental health and wellbeing (CIG35), risks to health from transmissible diseases (CIG41), risks to cultural heritage and assets in the DCIoS region (CIG45), risks to health and social care delivery (CIG46), risks to education services (CIG47) and risks to prison services (CIG48) all had a score of 16 (i.e. *High* magnitude and *Likely* chance of occurrence in the 2050s under a 4°C warming scenario). It was noted that climate change can potentially bring a range of impacts, including mental or existential distress, vector-borne diseases and infectious diseases, and cascading impacts that can compromise health and other social services. All the above impacts demand urgent additional adaptation (*More Action Needed*), except for CIG45 where further investigation is necessary.

Risks to health from water quality, including contamination of drinking water through increased runoff and flooding events that overwhelm current water treatment approaches (CIG43), risks to health from private water supply (CIG44) and risks and opportunities from summer and winter household energy demand (CIG39) are also potentially major impacts with a risk score of 12 (risk magnitudes and likelihoods for the 2050s under a 4°C warming scenario were *High* and *Possible* for all 3 impacts). Harmful algal blooms due to rising temperature and reduction in precipitation both threatened the quality and quantity of water.

Urgency scores for CIG43 and CIG44 were classed as *Further Investigation*, while the urgency score for CIG39 was classed as *More Action Needed* in the next five years.

Risks to health and wellbeing from changes in air quality, both indoor and out (CIG40) and risks to people, communities and buildings from wildfires (CIG63) were classed as *Moderate* for the 2050s under a 4°C warming scenario. Meanwhile, opportunities for health and wellbeing from higher temperatures was classed as *Minor*. Urgency scores for all three impacts were defined as *Further Investigation* in the next 5 years.

2.2.5 Business and industry

Headline summary

Impacts	Type of impacts		Severity of impacts	
7 Impacts evaluated in the **business and industry sector**	**5**	Risks	**2**	Severe
	1	Opportunities	**3**	Major
	1	Risks and opportunities	**2**	Moderate
			0	Minor
			0	Negligible

Key impacts to the sector

Seven impacts were identified. Two were classified as *Severe*, three as *Major* and two as *Moderate.* Five impacts were considered as risks, one was an opportunity, and one was considered as both risk and opportunity.

The climate change risk assessment for the business and industry sector is summarised below and detailed in Table 13 in Appendix 3 – Climate change risk assessment scores.

Severe risks and significant opportunities

- Risks to business sites from flooding and flash flooding (fluvial, pluvial and groundwater). [CIG49]
- Risks to business locations and infrastructure from coastal change from erosion, sea level rise, flooding, and extreme weather events. [CIG50]

Major risks and opportunities

- Risks to businesses from water scarcity. [CIG51]
- Risks and opportunities to finance, investment and insurance including access to capital for businesses. [CIG52]
- Risks to business from disruption to supply chains and distribution networks from extreme weather events. [CIG54]

Moderate risks and opportunities

- Risks to business from reduced employee productivity due to infrastructure disruption and higher temperatures in working environments. [CIG53]

- Opportunities for business (i.e. tourism) from changes in demand for goods and services, change in focus of tourism from international to local. [CIG55]

Discussion of impacts to the sector

Of the two potentially severe climate change impacts, risks to business locations and infrastructure from coastal change (CIG50) had the maximum risk score of 25 (*Very High* magnitude and *Very Likely* likelihood) due to the proximity of many businesses and associated infrastructure to the coast, making them vulnerable to sea level rise and coastal erosion. Risk to business sites from flooding and flash flooding (CIG49) was also scored as *Severe* with a risk score of 20 (*Very High magnitude* and a *Likely* chance of occurrence). Additional adaptation actions are urgently needed in the next 5 years for both of these impacts (*More Action Needed*) across the region.

Of the three impacts assessed as *Major*, risks to businesses from water scarcity (CIG51) and risks and opportunities to finance, investment, and insurance (CIG52) both has a risk score of 16. The magnitude and likelihood of the impacts for the 2050s under a 4°C warming scenario were thus considered *High* and *Likely* respectively. In particular, businesses may not be able to operate, or may see reduction in productivity due to water scarcity, especially on the Isles of Scilly. Although Devon and Cornwall get relatively higher amounts of rainfall compared to the Isles of Scilly, only a limited amount is captured and stored due to the small number of reservoirs. There are however opportunities for insurance and green finance to utilise natural capital. Further investigation may be necessary to determine what actions may be needed in the next five years.

Meanwhile, risks to business from disruption to supply chains and distribution networks (CIG54) had a risk score of 12 (*High* magnitude and *Possible* likelihood). This is a global problem, so it is hard to accurately define the risk magnitude and likelihood. However, more adaptation actions are certainly needed in the next five years due to the extensive reach of this particular risk.

Risks to business from reduced employee productivity due to infrastructure disruption and higher temperatures in working environments (CIG53) and opportunities for business from changes in demand for goods and services (CIG55) were both assessed as *Moderate* for the 2050s under a 4°C warming scenario. Urgency score was defined as *Further Investigation* in the next five years.

2.2.6 Cross-cutting (including international dimensions)

Headline summary

Impacts	Type of impacts		`Severity of impacts	
7 Impacts evaluated that were **cross-cutting**	**5**	Risks	**2**	Severe
	1	Opportunities	**2**	Major
	1	Risks and opportunities	**3**	Moderate
			0	Minor
			0	Negligible

Key impacts to the sector

Seven impacts were identified. Two were classified as *Severe*, two as *Major* and three as *Moderate.* Five impacts were considered as risks, one an opportunity, and one considered as both risk and opportunity.

The climate change risk assessment for cross-cutting and international risks and opportunities is summarised below and detailed in Table 14 in Appendix 3 – Climate change risk assessment scores.

Severe risks and significant opportunities

- Risk to public health from climate change overseas (e.g. zoonotic diseases and resultant challenge to health services). [CIG61]
- Risk multiplication from the interactions and cascades of named risks across systems and geographies (i.e. system risk or compound events). [CIG62]

Major risks and opportunities

- Risks to regional food availability, safety, and quality from climate change overseas. [CIG56]
- Risks to law (e.g. environmental crime, domestic violence, acquisitive crime) and governance in the DCIoS region from climate change. [CIG60]

Moderate risks and opportunities

- Opportunities for UK food availability and exports from climate impacts overseas. [CIG57]
- Risks and opportunities to the DCIoS region from climate-related international/regional human mobility. [CIG58]

- Risks to the DCIoS region from civil disorder and conflict resulting from climate change (e.g. battle for water resources). [CIG59]

Discussion of impacts to the sector

The two impacts defined as severe, risks to public health from climate change overseas (CIG61) and risk multiplication from the interactions and cascades of named risks across systems and geographies (CIG62), each had a risk score of 20 out of 25. Risk magnitude was *Very High* for CIG61 but *High* for CIG62; risk likelihood was *Likely* for CIG61 but *Very Likely* for CIG62. More adaptation actions are needed (*More Action Needed*) for CIG61, whilst CIG62 requires *Further Investigation* to better understand where, what, and how bad the problem may be.

Of the two impacts assessed as major, risks to regional food availability, safety, and quality from climate change overseas (CIG56) and risks to law and governance in the DCIoS region from climate change (CIG60) both had a risk score of 12. Risk magnitude was *High* for CIG56 but *Medium* for CIG60; risk likelihood was *Possible* for CIG56 but *Likely* for CIG60. In particular, DCIoS is already experiencing high levels of food insecurity and rising food costs are likely to have an impact on those already struggling. The urgency scores for CIG56 and CIG60 were classed as *More Action Needed* in the next five years.

Risks to the DCIoS region from civil disorder and conflict resulting from climate change (CIG59), opportunities for UK food availability and exports from climate impacts overseas (CIG57), and risks and opportunities to the DCIoS region from climate-related international/regional human mobility (CIG58) were all considered *Moderate* impacts for the 2050s under a 4°C warming scenario. *Further investigation* was recommended in the next five years for site-specific impacts like CIG58 and CIG59, while situation monitoring (*Watching Brief*) is recommended for the regional-wide impact of CIG57.

3 Strategic Adaptation Plan

3.1 About the strategic adaptation plan

The purpose of the strategic-level adaptation plan is to set out how the DCIoS region can create the conditions and capacity for everyone to adapt to climate change together over the next five years.

The adaptation plan considers four levels of adaptation planning and action, relating to different parts of society, shown in Figure 3. These are policy/regulator-level, organisational-level, community-level, and individual-level actors and actions. This strategy document primarily focuses on the top two levels, it does recognise the role of communities in response, capacity building and resilience action planning.

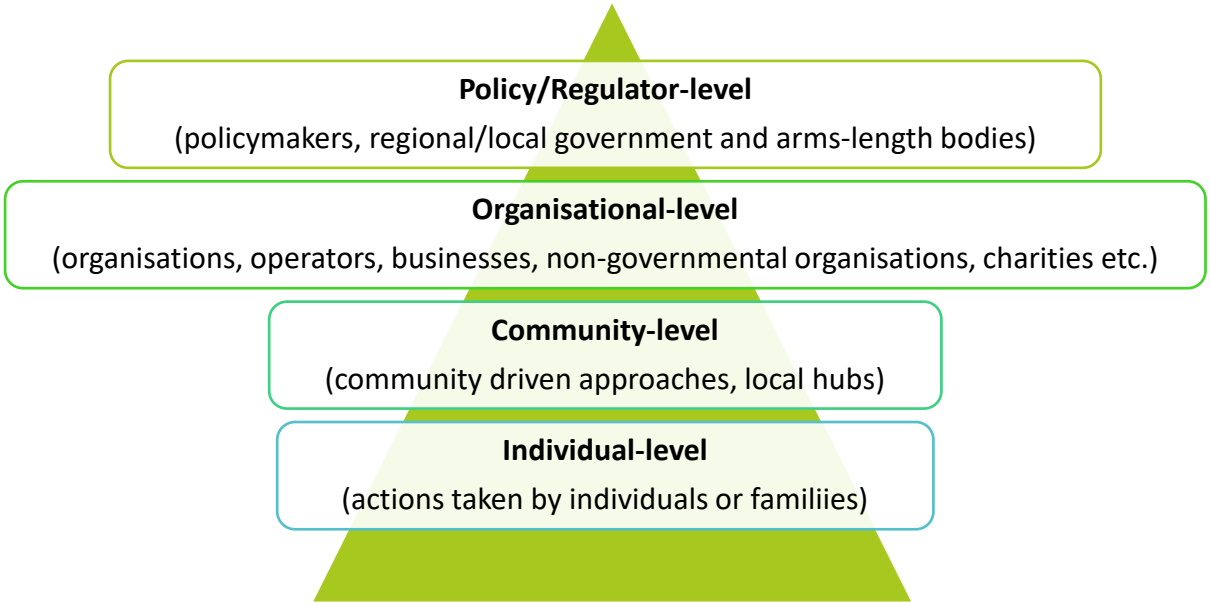


Figure 3. Four spheres of adaptation planning and action considered in the adaptation plan.

3.2 Strategic-level adaptation options

Adaptation at the national level

To create the conditions and capacity for everyone (policy makers, businesses, communities, and individuals) to act, several objectives have been set nationally, outlined in the National Adaptation Programme (Defra, 2023):

- **Infrastructure:** Deliver a whole society approach to resilience, including commitments on resilience standards, as set out in the Resilience Framework. The Department for Environment, Food and Rural Affairs (Defra) will drive investment in resilient water supply through the Plan for Water. The Department for Transport (DfT) will consult on a new transport adaptation strategy.

- **Natural environment:** Defra will account for climate impacts in Local Nature Recovery Strategies and in the Environmental Land Management schemes design, to promote resilient land management and farming. Natural England will launch Six Nature Recovery Projects in 2023 and Defra will work with the Nature Recovery Network partners to identify and launch another 13 projects.
- **Health, communities and the built environment:** The government will invest £5.2 billion in flood and coastal erosion schemes in England; the UK Health Security Agency will continue deploying the Adverse Weather & Health Plan and the National Planning Policy Framework will be updated to support both adaptation and mitigation efforts, further to recent updates to Building Regulations to reduce excess heat and unwanted solar gains in all new residential buildings. Upper tier local authorities will be provided with local climate projections.
- **Business and industry:** The government will work with stakeholders to deliver the Green Finance Strategy 2023, including actions to protect the financial system from climate impacts and increase investment into adaptation. A new strategy on supply chains and imports, including improving resilience to threats from climate change will be published by the Department for Business and Trade (DBT). DBT will also survey businesses to assess readiness for climate impacts and provide information and support to businesses on climate adaptation.
- **Adaptation Reporting Power:** The government will consider expanding the scope of organisations which report, in particular on canals and reservoirs, health and social care, and food supply. New bodies will be invited to report, such as organisations in the food sector and local authority reporting will be piloted.
- **Supporting evidence:** Defra will support research into adaptation needs and approaches, such as through contributing to a £15 million UK Research and Innovation/ Defra programme.

Adaptation at the local level

Climate change will affect different places in different ways. This drives the need to develop place-based adaptation options with strategies focussed on ‘location’.

Locations across the DCIoS region experience many of the same climate impacts. This means that the region can work collaboratively at a strategic level to ensure that interlinked human-environment systems (e.g. transport, utilities etc.) remain resilient, with the implementation of adaptation options that provide flexibility against uncertainties of future climate impacts.

The regional priorities outlined in this adaptation plan are based on the CIG’s assessment of climate risks and local vulnerabilities, alongside the input of stakeholders.

Adaptation options were identified for the impacts that were assessed as severe and major in the Climate Change Risk and Opportunity Assessment. Options to adapt to

and/or reduce the risk of these impacts were co-developed through a series of workshops.

Across the workshops the findings from the risk assessment were presented and existing adaptation activities and actions were outlined. These workshops identified a list of around 80 further strategic adaptation actions and/or enabling conditions to address the risks identified within the assessment. See Appendix 4 – Full list of actions arising from the workshops. for all actions identified.

Feedback from stakeholders indicated that these actions would require prioritisation to focus efforts across each sector on the actions that would most benefit from regional collaboration. To assist with this prioritisation, Strategic Directions were developed, which summarise common themes that emerged from the full list of 80 actions. The workshops were used to prioritise actions from the long list of 80 that will help deliver these Strategic Directions over the next five years. This process selected 40 actions to focus on, and it is these that are included in this Adaptation Plan. These are outlined in the following subsections, by sector. See Appendix 6 – Adaptation Plan for additional detail about timescales and responsible organisations.

Organisations are encouraged to review the full list of 80 actions in Appendix 4 to consider whether they could help deliver these, particularly where these actions would help increase their own resilience. This Adaptation Plan will incorporate more actions from the long list of 80 when it is reviewed.

3.2.1 Natural environment (including agriculture, forestry, and fisheries)

Headline sector risks and opportunities

Severe-rated risks related to impacts on terrestrial and marine habitats due to climate change, damage to soils, aquifers and natural carbon stores all scored in the top category. Major-rated risks impacted the agriculture and forestry sector with increased invasive species, pests, and disease. Changing landscape character also rated as major.

Headline adaptation actions

The actions and strategy within the natural environment (Table 3) relate to measures being implemented to improve and protect habitats, favouring nature based solutions where practicable, thus reducing stress on species allowing them time to adapt to changing conditions. Increased community awareness and involvement will be needed to successfully adapt within this sector. Within agriculture and forestry, supporting primary producers in adapting to change so that they can continue to provide for and support the region will be important.

Table 3. Strategic direction and actions to support adaptation in the natural environment.

Strategic Direction		Actions		Level
A	Support and actively improve the adaptive capacity of landscapes and habitats	NEA1	Work with South West Water in developing a collaborative regional water strategy to manage water availability and safe treatment and disposal of waste water, including aquifer recharge, control over-extraction, increase the use of rainwater harvesting, reduce effluent discharge etc.	Policy Makers
		NEA4	Set out a regional strategy to protect, restore and enhance terrestrial carbon stores from land use change and increase the resilience where possible (e.g. peatland restoration, woodland management, soils).	Policy Makers
		NEA5	Develop long-term green space and Local Nature Recovery strategies to demonstrate what type of habitat will be supported in the future (e.g. intertidal zones, the benefits of different saltwater/freshwater marsh etc.) and opportunities for supporting human health.	Policy Makers
B	Use agriculture / forestry networks and knowledge to implement best practice. Provide them with key information to protect ecosystem services	NEB1	Promote and improve soil management techniques (Minimum-till cultivation, cover crops, nutrient credits, ley-arable rotations) to protect soil structure / nutrient levels and increase resilience to adverse weather / aridity impacts. Consider adoption of a systems thinking approach such as the Land Use Framework.	Policy Makers
		NEB5	Adapt agricultural land use through Environmental Land Management Scheme (ELMs) and Biodiversity Net Gain funding (e.g. buffer strips, conservation areas etc.).	Farming Businesses
		NEB6	Develop alternative water supplies (e.g. boreholes) and use of rainwater harvesting and storage (ponds/reservoirs) on farm. Put in ponds, swales, and wetlands.	Farming Businesses
C	Maximise community participation and connection to nature	NEC1	Provision of capacity building support and advice to community groups from non-governmental organisations (NGOs) for taking action to support nature enhancement.	Policy Makers
		NEC2	Facilitate landowners connecting with local nature groups to understand the benefits around	Landowners

Strategic Direction		Actions		Level
			alternative land use to support biodiversity and the natural environment and human health.	

3.2.2 Infrastructure

Headline sector risks and opportunities

There are major or severe risks related to flooding, erosion, and extreme weather events, which may exacerbate the risk of cascading failures that affect other sectors.

Headline adaptation actions

Many of the key actions relating to infrastructure (Table 4) such as asset flooding and coastal erosion are mirrored within the health and built environment sector, so should be viewed alongside those in section 3.2.3.

Table 4. Strategic direction and actions to support adaptation for infrastructure.

Strategic Direction		Actions		Level
A	Develop cross sector collaboration to equip the region with the knowledge and skills to take adaptation action	INFA1	Build on and develop resilience partnerships that consider short, medium and long-term planning horizons and how resilience changes over time. Ensure command, control and co-ordination arrangements for an emergency which involves the loss of both power and telecoms, and actively involve utility companies in local planning where required to ensure linkage with regional and national developments.	Policy Makers
		INFA2	Emergency Planning – Map voluntary and community sector assets and capabilities in their areas. Develop processes for their swift activation, deployment, and coordination. Ensure distributed energy resources (DER), such as customer-premise microgrids (e.g. solar + storage systems), community microgrids, or mobile battery and generation systems can provide life-preserving power to community shelters and public health facilities during emergencies.	Policy Makers
		INFA3	Develop a working group with infrastructure industry associations and providers at regional level to improve interdependencies awareness within the infrastructure sector (co-location of	Policy Makers

Strategic Direction		Actions		Level
			infrastructure, such as bridge crossings / roadways and impact of cascade failure on infrastructure output). Engage with National Grid, hydrologists, and power system modellers, to simulate and understand the impacts of compounded flooding, heat waves and droughts on the power generation in the region.	
B	Enhancing long term Infrastructure resilience through local stewardship	INFB1	Develop joint strategies, research, and longer-term schemes with the Environment Agency, South West Water, Lead Local Flood Authority, and catchment partnerships to improve catchment management both for high flow areas at flood risk and protect low flow by reducing demand / drought impacts.	Policy Makers
		INFB2	Enable and promote climate resilience through procurement processes. Consider climate resilience of new assets and infrastructure when comparing competing bids, by accounting for costs over the asset lifetime under alternative climate scenarios.	Policy Makers
		INFB3	Using behavioural science / social marketing, coproduce with communities and businesses behavioural change measures to communicate to reduce consumption of water and energy.	Policy Makers

3.2.3 Health and the built environment

Headline sector risks and opportunities

There are major or severe risks related to flooding of properties, heatwaves, and further investigation is required about risks relating to food safety and food security.

Headline adaptation actions

We have outlined key actions suitable for regional collaboration in Table 5. Providing communities and individuals with knowledge and adaptation skills is an effective way of preparing for these challenges. Note that key actions relating to public health, to an extent, mirror health risks in cross-cutting risks, so these should be viewed alongside those in 3.2.5.

Table 5. Strategic direction and actions to support adaptation for health and the built environment.

Strategic Direction		Actions		Level
A	Increase community awareness of how climate change can impact physical and mental health	HBEA1	Working with relevant agencies and our communities, develop a climate change awareness campaign to inform stakeholders, including the public of the projected range of changes and their impacts alongside how we are adapting and what we can all do to respond.	Policy Makers
		HBEA2	Public authorities to continue to provide timely & localised information on climate change impacts to enable appropriate adaptation planning by all.	Policy Makers
		HBEA3	Raise awareness with social care managers, commissioners, staff, and carers on preparing for response to adverse weather, including heatwaves.	Policy Makers
		HBEA4	Public Health teams to engage with NHS partners, Health Protection Teams and LA environmental health departments to raise awareness of climate sensitive non-communicable disease (NCD) e.g. the links between climate change and increased cardiovascular disease and appropriate adaptation for vulnerable groups. This should include developing adaptations for activities such as exercise and active travel which may be impacted by climate change with consequences for non-communicable disease.	Policy Makers
B	Support residences and businesses on private water supplies to adapt to climate change threats, including security of supply and changing water quality	HBEB1	Local Authorities to provide advice and expanded monitoring for properties with private water supplies (quality and quantity).	Policy Makers
		HBEB2	Provide access to and guidance on benefits of rainwater harvesting systems (i.e. to capture excess rainfall for use in the garden) and grey water harvesting systems (i.e. collect and treat wastewater from showers, baths, and wash basins).	Policy Makers
C	Assist public services to understand climate change impacts on their assets, service delivery and the community's health	HBEC1	Promote and provide staff with time to undertake volunteer work with local NGOs and develop Corporate Social Responsibility (CSR).	Policy Makers
		HBEC2	Develop a strategy and guidance for the adaptation of heritage assets to climate impacts, including a	Policy Makers

Strategic Direction		Actions		Level
			"Managed Decline to Adaptive Release[1]" strategy to record historic buildings, sites, and landscapes as a part of managed coastal retreat due to sea level rise, erosion, and storms.	
		HBEC3	Work with partners to develop the materials and training to support in the establishment and operation of local Community Resilience Groups (or similar existing groups) and the development of community adaptation plans.	Policy Makers
D	Minimise heat-related illness and death	HBED1	Provision of funding and guidance for properties to be retrofitted in line with New Building Regulations Part O to prevent buildings overheating and / or reduce heat loss in winter.	Policy Makers
E	Ensure the region is ready for, and resilient to, flooding and coastal change	HBEE1	Policy makers to start gathering evidence of where aspects of community/development/industry/utility etc might need to be relocated due to climate impacts and develop an evidence base that can inform planning activities (e.g. relocation of properties due to insurmountable flood risk).	Policy Makers
		HBEE2	Local Planning Authorities to ensure that their Local Plans utilise and build upon the findings and direction provided by strategic documents dealing with coastal change (e.g. Shoreline Management Plans, Coastal Change Management Areas, Flood Risk Management Plans etc).	Policy Makers
		HBEE3	Policymakers to engage with the public to ensure awareness and understanding of the predicted impacts of climate change around the coast generally, and on their local communities specifically – to co-produce knowledge and agree viable actions.	Policy Makers

[1] Adaptive Release (AR) is an approach that supports the transformation of a heritage asset (including its values and significance), within wider landscape settings. AR is proactive and positive, intended to be applied in situations where anticipated environmental change is likely to lead to eventual loss and/or alteration." (University of Exeter et al., 2022).

3.2.4 Business and industry

Headline sector risks and opportunities

There are major or severe risks related to flooding of premises, water scarcity, and the effects of extreme weather events.

Headline adaptation actions

Small and medium-sized enterprises are instrumental in restoring economic activity within the community following flooding / severe weather events; the faster businesses recover from the impacts, the faster the wider community will recover. Developing mechanisms to enhance preparation, response and recovery capacities within the sector will help build resilience. To enable this activity businesses will require detailed information about how they can successfully adapt. Collaboration within the sector will be required to understand the risks and costs of inaction to encourage effective business continuity planning (BCP) to prepare for potential impacts on infrastructure, services and supply chains. BCP will assist businesses to continue operating if there are ongoing delays in re-establishing these services.

Table 6 outlines key actions suitable for regional collaboration for consideration by policy makers and businesses.

Table 6. Strategic direction and actions to support adaptation for business and industry.

Strategic Direction		Actions		Level
A	Equip the sector with the knowledge and skills to take adaptation action	BIA1	Establish strategies to develop the South West region as a global research and knowledge hub for climate adaptation action and governance.	Policy Makers
		BIA2	Develop business engagement strategies to enable local authorities and regional action groups to assess private sector needs, gain inputs, and consult companies on practical implementation of adaptation actions.	Policy Makers
		BIA3	Develop and expand the Climate Emergency / Readiness Action group (steering group formed from business, public sector, and academia) to take the lead on more projects within the region (e.g. Climate Ready Clyde)	Policy Makers
B	Develop industry readiness for impacts (e.g. supply	BIB2	Severe Weather Policy - set out clearly what workers should do when Met Office severe weather warnings are issued and what thresholds they should work under.	Businesses

	chain security, drought restrictions)	BIB3	Improve water management (reduce / reuse).	Businesses
		BIB4	Put in place a severe weather plan and resilience measures to ensure business continuity, sign up for alerts and check insurances for coverage on flooding / severe weather events.	Businesses
C	Enhancing long-term business resilience through local stewardship	BIC1	Promote the robust and resilient design of new / refurbished assets and infrastructure. E.g., Promote property flood resilience products to protect against severe weather and hazardous events (e.g. flooding).	Policy Makers

3.2.5 Cross-cutting (including international dimensions)

Headline sector risks and opportunities

There are major or severe risks related to increasing disease occurrence and interactions and cascades overseas due to climate change (e.g. regional food availability, safety, and quality from climate change overseas).

Headline Adaptation Actions

Actions to adapt to cross-cutting risks and risk with international dimensions (Table 7) mirror some of those relating to mental health and public order within the health and built environment so should be viewed alongside section 3.2.3. Strategic directions relate to the need for better research and information about the risks and likely outcomes about health and violent crime rate rates, alongside work to improve local food security.

Table 7. Strategic direction and actions to support adaptation for cross-cutting risks and international dimensions.

Strategic Direction		Actions		Level
A	Improve the community's knowledge and awareness of the health impacts of climate change, both current and into the future.	CCA1	Local Authority and UKHSA Health Protection Teams to raise awareness of new disease and transmission vectors and work with key stakeholders, e.g. Integrated Care Board, and Environment Agency.	Policy Makers
		CCA2	Define a regional approach (e.g. 'One Health') to prevent the emergence of zoonotic diseases (infectious diseases transmitted between animals and people).	Policy Makers

		CCA3	As temperatures increase, bacterial infection occurrence may rise in higher latitudes. Alongside the faster bacteria reproduction rates, with higher temperatures there is an increased risk of bacteria becoming drug resistant. Raise awareness on the impacts of anti-microbial resistance and prevention measures (e.g. reducing antibiotics use in livestock).	Policy Makers
B	Improve food security within the region	CCB1	Encourage and stimulate the purchase of local, environmentally sustainable produce to support a healthier and more resilient food system and reduce food miles.	Policy Makers
C	Information and liaison about the effects of climate change on crime and civil disorder	CCC1	Work with partners, including universities, to examine the effects of climate change on crime rates and the potential for civil disorder.	Police service
		CCC2	Police Service to liaise with the Met Office to consider expansion of the weather forecast alert system for high temperatures and potential increase in crime.	Policy Makers

3.3 Case studies of adaptation action

There are numerous examples in the DCIoS region where resilience and adaptation measures have been implemented to reduce the risk from climate and weather hazards. We provide four case studies:

- **Case Study 1:** Extreme rainfall and flooding in Boscastle, Cornwall in August 2004 (section 3.3.1).
- **Case Study 2:** Drought and water scarcity on the Isles of Scilly in August 2022 (section 3.3.2).
- **Case Study 3:** Extreme heat/heatwave in the DCIoS region in July 2022 (section 3.3.3).
- **Case Study 4:** Sea level rise and erosion at Slapton, Devon in March 2018 (section 3.3.4).

The case studies describe resilience mechanisms that were used during the immediate response to the events, and adaptation options that were implemented before or in the aftermath to enhance future resilience. The level at which these resilience mechanisms and adaptation options were delivered are described in the context of the four spheres of adaptation planning (shown in Figure 3).

3.3.1 Case Study 1: Extreme rainfall and flooding

Impacts experienced from the extreme weather event

Event: On the 16th of August 2004, 200 mm of rain fell in twenty-four hours within the catchment of the coastal village of Boscastle in Cornwall causing the rivers Jordan and Valency to rapidly overflow. An estimated 2 billion litres of water rushed down the steep-sided valley into Boscastle. The floods were exacerbated by tidal locking where the rising tide prevented the flood waters from exiting into the sea. This event was the first record of rainfall totals exceeding 200mm in 24 hours in England since 1957. In a warmer climate it is expected that convective rainfall events such as that which caused the Boscastle floods will become more frequent and intense. Sea level rise is also likely to increase the effect of tidal locking.

Impacts: Residents had little time to react. Fifty cars were lost to the flood water, 58 buildings and several bridges were badly damaged or demolished and people had to act quickly to survive. Over 100 people were airlifted out of the floods and residents were displaced from their homes for 18 months. Local wildlife habitats were damaged by the floodwaters and flood debris increased coastal pollution. The long-term financial cost through loss of tourism was estimated to be £50 million. The stress and anxiety caused by the trauma and financial loss of the floods had long-term effects on individual's mental health and wellbeing.

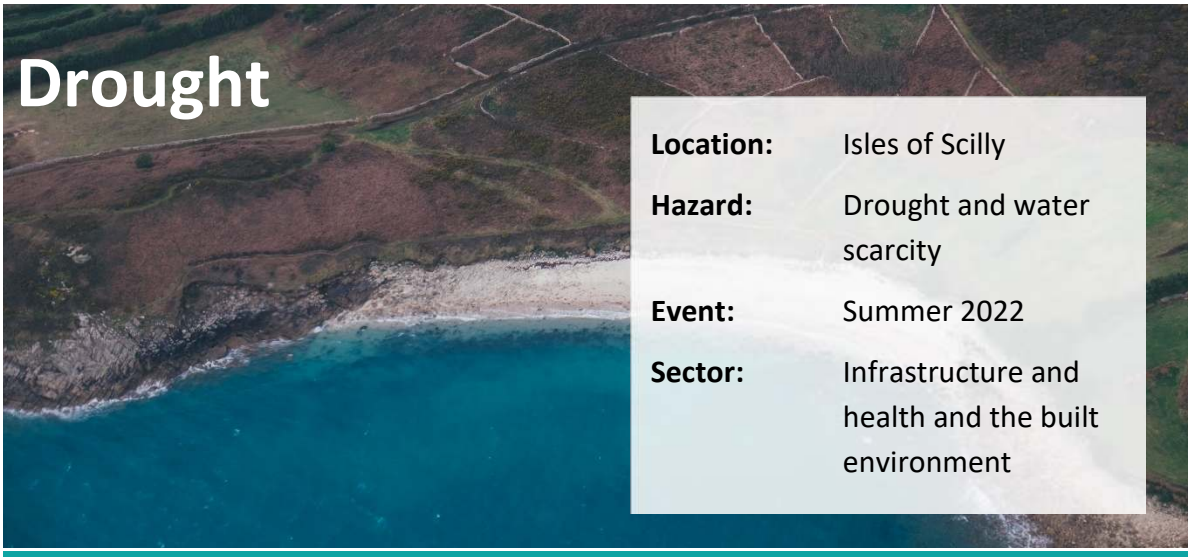
Resilience measures adopted and options for adaptation

	Resilience mechanisms observed	Adaptation options
Strategic	Multi-agency rescue operation coordinated by Gold Command of the Local Resilience Forum involving Royal Navy and Maritime &	A £4.5 million flood defence scheme was built following the floods including new drainage and sewerage systems and the

	Coastguard Agency helicopters, lifeboats, and the fire service.	deepening and widening of the river channel. Boscastle car park has been raised in height to stop the river from bursting its banks so easily.
Organisation	Environment Agency was responsible for warning people about floods. A Floodwatch warning was issued at 12:39pm less than one hour after the rain began.	Organisations have installed flood defences in buildings and assets. Following the floods the Met Office invested in new methods of predicting heavy rainfall events on a small scale to produce better warnings. There is future work for emergency services to enable first responders to be made aware of more vulnerable people who are less able to adapt or respond to flood events.
Community	The community came together to help vulnerable people to escape the floods, preventing any deaths.	Community-level leaf litter clearance projects within flood prone catchments (e.g. Lostwithiel flood prevention project).
Individual	Residents had little time to react.	Individuals have installed property-level flood protection. Individuals have and are encouraged to sign up to Environment Agency flood warnings.

Sources: Met Office, n.d. (a); Cornwall Flood Resilience Pathfinder, 2015; North Cornwall District Council, n.d.; Climate Vision, n.d.; BBC Bitesize, n.d.; Burt, 2005; Independent, 2004; NASA, 2022.

3.3.2 Case Study 2: Drought and water scarcity



Impacts experienced from the extreme weather event

Event: The Isles of Scilly have a naturally low capacity for water storage due to their size and underlying geology. Demand for water is high during the summer tourist season. The islands experienced a notable drought in the summer of 2022 following some of the driest conditions in nearly 90 years. This was not just a local event, with the Environment Agency stating that all of the South West of England was in drought by August 2023.

Impacts: Water became scarce. The IoS Wildlife Trusts were deeply concerned about the impact that the drought was having on local farmers and farmland, as well as wilder landscapes like heathland and wetlands.

Resilience measures adopted and options for adaptation

	Resilience mechanisms observed	Adaptation options
Strategic	Environment Agency officially declared a drought. Fifty percent of the total water supply to St Mary's is provided by a desalination plant which was in response to a lack of potable water in periods of high demand.	The Water Resources Management Plan sets out how South West Water will manage the region's water supply and demand for the next 25 years. There needs to be development of plans to ensure continuation of food supply chains and secure local employment.
Organisation	Environment Agency introduced additional monitoring of the effects of the dry weather on rivers and responded to environmental emergencies, such as rescuing	South West Water (2022) Drought Plan, and continued provision of water butts.

	stranded fish. It also put additional resources into ensuring that people and companies who have water abstraction licences only operated within the terms of their licence. South West Water provided advice on saving water and implemented temporary use bans – 'hosepipe bans'.	There is an existing and future need for local authorities to share public messaging on reducing water use, whilst maintaining human health communications.
Community	Community businesses (e.g. B&Bs) removed bath plugs to reduce excess water use by tourists.	Existing communication around behaviour changes to reduce resident and visitors' water use.
Individual	Reduced and/or more efficient water use. Take up of water harvesting systems.	Installation of water storage tanks and/or further take up of water harvesting.

Sources: Environment Agency, 2022; South West Water, n.d.; South West Water, 2022, 2023.

3.3.3 Case Study 3: Extreme heat and heatwaves

Impacts experienced from the extreme weather event

Event: The DCIoS region experienced several major heatwaves in the summer of 2022, most notably in July with temperatures reaching a high of 36°C (Bude in Cornwall). It was provisionally the fourth warmest summer for the UK overall. Four of the five warmest summers on record for England have occurred since 2003. Heatwaves in the region are expected to become more frequent and intense as the climate warms.

Impacts: High temperatures posed a risk to the health of people, particularly for vulnerable groups such as the elderly (where excess mortality was observed), very young and those with pre-existing medical conditions. During the five heat-periods between June and August 2022, 56,303 deaths occurred in England and Wales; this is 3,271 deaths (6.2%) above the five-year average. Wildlife, livestock, and pets were also affected. Wildfires caused the closure of the South West Coast Path in south Devon. Roads became tacky but did not result in road closures. Heatwaves also cause an increase in other risks such as water safety as people spend time in water bodies to cool off.

Resilience measures adopted and options for adaptation

	Resilience mechanisms observed	Adaptation options
Strategic	Met Office Heat Health Alert was issued. UK Government implemented the Heat Wave Plan for England. Councils and NHS shared messages with the public giving	Adapt building regulations to ensure building design and materials used are suitable for a warmer climate. Particular need for care homes and early year/school settings to ensure sustainable building design to protect from extreme heat.

	advice on heat health risks and how to stay cool.	Police Service and partners to prepare for an increase in violent crime, particularly domestic violence.
Organisation	Both the Met Office extreme heat severe weather warning, and UKSHA and Met Office Heat Health Alert, were in place. Businesses encouraged temporary flexible working. Fire services asked people not to participate in campfires or BBQs, not to litter, and to properly dispose of cigarettes. Devon County Council prepared gritters to dust roads as road surfaces hit 57°C. There were changes to working patterns and relaxation of dress codes to reduce exposure.	Installation of air conditioning units in offices (as a short-term solution, noting this practice is not conducive with meeting Net Zero targets). Use of blinds in offices and at home to provide shade and cool conditions indoors. Sympathetic tree planting to provide shade and cooling.
Community	The community checked in on vulnerable groups/individuals and set up cool spaces.	Increase green space and shade.
Individual	Individuals bought cooling devices (e.g. portable fans) and shut blinds, curtains and windows to keep properties cool during the day.	Retrofitting of buildings with cooling measures (e.g. air conditioning units, ventilation units, brise soleil and outside shutters, cool areas). Put into action messaging informed by behavioural science about the adaptations needed to reduce health risks from heat (e.g. hydration, staying in the shade, reducing physical activity at hottest part of the day, checking on vulnerable neighbours).
Sources: BBC News, 2022; Devon County Council, 2022; Met Office, n.d. (b); Met Office 2022b; ONS, 2022f; ONS, 2022g.		

3.3.4 Case Study 4: Sea level rise and erosion

Impacts experienced from the extreme weather event

Event: The A379 road runs along the Slapton Line and is the quickest route between the villages of Torcross and Strete Gate. The road was first closed temporarily due to coastal erosion caused by storms in 2001. From 2002 to 2015 thousands of tonnes of shingle was used to create barriers to protect the line from further erosion. Between 2014 and 2017 south westerly storms accelerated erosion of the beach. Storm Emma in March 2018 washed away a 700m stretch of the road, causing it to be closed for 8-months. Accelerating sea level rise is also contributing to the retreat of the Slapton Line through shoreline erosion.

Impacts: Frequent, temporary road closures over the past 20 years. This has impacts on local people commuting to places of work, operating businesses and accessing education, as well as on local tourist visits and on public transport routes linking Kingsbridge with Dartmouth. It also increases the time required for local deliveries and for the emergency services to respond to local situations. The cost of disrupting local traffic each month that the road is closed is £38k. Continued, temporary closures of the road over 25 years would damage the local visitor economy by up to £2.4m. Local people's health and wellbeing are also impacted by the risks and uncertainties the road closures and slow retreat of the Slapton Line present. .

Resilience measures adopted and options for adaptation

	Resilience mechanisms observed	Adaptation options undertaken
Strategic	Various coastal defences have been constructed over the past 100 years mostly adjacent to the properties on Torcross promenade and often	The Slapton Line Partnership was formed in 2001 to promote a coordinated policy for managing coastal change in the area and

	in response to specific incidents. These defences have included a concrete seawall above sheet piling, sheet pilling, rock revetment, block armour work and periodic beach recycling.	support the community as it adapts to live and work with the changing coast.
Organisation	Devon County Council closes the road as a precaution when high winds and waves are forecast.	Devon County Council has realigned the road (20m further inland). Improvements to passing places and the surfacing of inland lanes has been undertaken to increase the usability of diversion routes.
Community	Alternative, locally agreed and signposted 'one-way' routes through narrow lanes are used by local residents and businesses when the road is closed to avoid local congestion. .	The Management Strategy has worked with the community to conclude that there is now minimal space available to retreat the road further, which has been the strategy to date. A new Strategy for Adaptation is being developed by the Slapton Line Partnership.
Individual	Road users and check the flood warnings on the Slapton flood risk warning page.	
Sources: Slapton Line Partnership, n.d.; Met Office, n.d. I; CMAR, 2017; Lucas & Taylor, 2016; GOV.UK, n.d..		

3.4 Guidance for adaptation planning

This section sets out who is responsible for various elements of adaptation planning, so that those developing their own plans know who to contact.

The objective of this strategy is to drive that conversation and to ensure that consideration is given by each stakeholder as to how the region's plans are aligned. Only in this way will a climate resilient future be achieved.

3.4.1 Roles and responsibilities

Government Departments / Agencies: Defra has overall responsibility for leading government policy on climate change adaptation in England, as well as covering flooding, coastal erosion and, in partnership with Ofwat, managing water demand. Within the infrastructure sector, the Department for Energy Security and Net Zero take the lead on the resilience of energy infrastructure to flooding. The DfT cover flood resilience to all transport infrastructure, whilst telecommunications resilience is led by Ofcom and the Department for Digital, Culture, Media & Sport. Arm's length bodies to government also share some of this responsibility, such as the Environment Agency, Natural England, and the NHS.

Local Authorities: In partnership with Defra, local authorities are guided to plan for and implement climate adaptation at a local level. In addition, there are some functions of local government where adaptation is a statutory requirement. These include planning, flood risk management, public health, and environmental impact assessment.

Furthermore, the government will be piloting adaptation reporting by local authorities (LAs) and the CIG will keep abreast of the requirements to ensure that we are ready for any changes in the responsibilities of the region's LAs (DEFRA, 2023).

Organisations and Businesses: Organisations and businesses are responsible for identifying, understanding, controlling, and adapting to the risks (and opportunities) that climate change poses to their assets, products, and services. This is especially true in the case of energy, water, telecommunications and transport infrastructure resilience. This includes the people, systems, processes, and data needed to deliver business activities across their supply chains.

A number of organisations already have a legal requirement to report on adaptation under the Adaptation Reporting Power, such as South West Water. The government are exploring increasing the number of organisations required to report and the scope of reporting e.g., identifying organisations in the agriculture sector. Furthermore, the Environmental Land Management schemes and Water

Management Grant under the Farming Investment Fund will help to incentivise adaptation measures in the agricultural sector (DEFRA, 2023).

Emergency Services: The emergency services in the UK consist of four main organisations, the Police, the Fire and Rescue Services, the Emergency Medical Services and the Maritime and Coastguard Agency. Other services available include mountain rescue, cave rescue and lifeboat. Emergency and rescue services ensure public safety and health by planning to respond to incidents, responding to incidents when they occur, and engaging communities about the risks so as to increase understanding and influence behaviours that reduce the likelihood of incidents occurring and to improve preparedness. In addition, the Local Resilience Forum (LRF) is made up of Category 1 responders[2] and Category 2 responders[3] whose aim is to work together to plan and prepare for localised incidents and catastrophic emergencies. These services will require enhanced agility, capability, and flexibility to support effective emergency planning, response, and recovery under a changing climate.

Communities and individuals: The public, including individuals, families and communities and their respective parish and town councils, have a key role. Community-based adaptation empowers people to use their local knowledge to reduce their vulnerability to extreme events. To achieve this, communities need to engage with other stakeholders to build awareness and understanding of climate change and consider the risks and opportunities that a changing climate will bring. Knowledge exchange, guidance, and signposting materials, through a variety of mechanisms (social media, radio, TV posters etc.), is critical to enhancing the engagement and enabling adaptation action to take place.

3.4.2 Signposting to useful information and resources

Links and signposting to a range of useful resources to support effective risk management, adaptation planning and knowledge exchange are outlined in Appendix 5 – Signposting to useful resources.

3.5 Governance of the adaptation plan

This concerns the structure and processes for ownership (accountability), management (roles and decision-making), control (rules and procedures), and

[2] Category 1 responders - made up of local public services, including the emergency services, local authorities, the NHS, the Environment Agency and others.

[3] Category 2 responders – made up of the National Highways and public utility companies. Military and voluntary services are also included in the LRF.

resources. It will keep the DCIoS Adaptation Strategy on track and running in accordance with the plan.

It is expected that Governance will evolve over time, as actions and priorities change.

3.5.1 Ownership

The climate emergency response structures within the three geographical areas of Devon, Cornwall and the Isles of Scilly are accountable for ensuring the delivery of the Climate Adaptation Strategy. These are:

- The Devon Climate Emergency Response Group
- The Cornwall Climate Change Board
- Isles of Scilly Emergency Planning

Progress reports will be provided to these groups by the CIG on a quarterly basis. It will be the responsibility of the Devon County Council, Cornwall Council and the Isles of Scilly Council representatives on the CIG to ensure the quarterly reports are reported upwards to the relevant group.

Reports will also be submitted to the Risk Management Group of the DCIoS Local Resilience Forum (LRF) to ensure ongoing cooperation and continuity of approaches. The submission of these reports to the secretariat of the LFR will be the responsibility of the CIG secretariat.

3.5.2 Management

The DCIoS Climate Adaptation Strategy considers climate risk and adaptation at a regional level, that sits above county-level adaptation strategies. The management of the strategy will therefore require a collaborative approach, to ensure the right stakeholders are engaged in the process of addressing risk, identifying adaptation options, and delivering on the action plan.

The CIG will perform this role, being collectively responsible for oversight of the delivery and maintenance of the DCIoS Climate Adaptation Strategy.

The CIG is currently chaired by the Environment Agency.

The secretariat function of the CIG is currently provided by Devon County Council.

These proposed governance arrangements are shown in Figure 4.

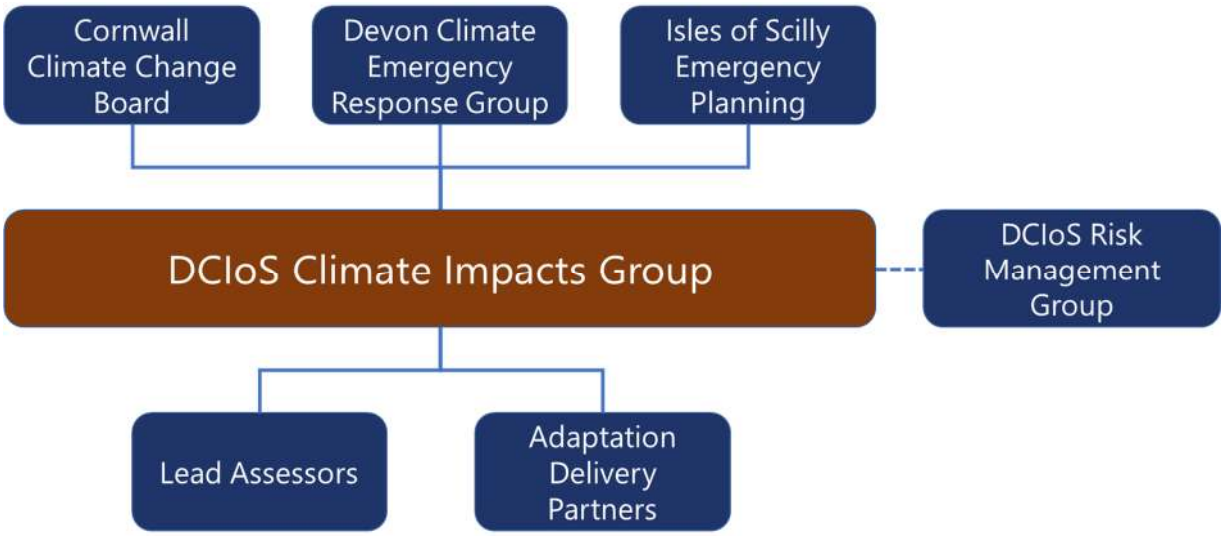


Figure 4. Proposed governance for the Climate Adaptation Strategy

3.5.3 Control

Hosting of resources: To manage version control and avoid duplication of the same resource being published in multiple places, it is recommended that a single platform is used to host information:

- **Internally (CIG members):** Resources will continue to be hosted on the Devon County Council SharePoint for members of the CIG to access.
- **Externally:** Public resources and outputs from the CIG are hosted on the Devon Climate Emergency Adaptation Strategy webpage. Other organisations can link to these materials.

DCIoS Climate Adaptation Strategy: The Adaptation Strategy provides the evidence-base to support an ongoing programme of climate adaptation. It provides a snapshot of risks, adaptation options and actions at a point in time. The Adaptation Strategy will be reviewed every 5 years to provide a coherent update and progress report on actions being taken in the DCIoS region to increase climate resilience.

- **Risk Register:** The risk register is intended to be a live document that evolves over time as new impacts emerge and risk-levels change. The register will be a standing item on monthly CIG meeting agendas to capture any proposed changes in hazards, impacts or risk-levels identified by any member of the CIG. In addition, every month, six risks will be reviewed formally. The Lead Assessor assigned to each risk will bring a recommendation to the CIG. This will mean that over a 12 month period the whole register will have been reviewed. Every five years a full review will be undertaken, in-line with the Strategy update. This will take account of any new information that is made available at the National level (i.e., the UK's next Climate Change Risk Assessment, CCRA4, is due to be published in 2027).
- **Adaptation Plan:** The suite of adaptation options outlined in the adaptation plan provides a range of measures that could be undertaken to address

climate impacts. This 'library' of options will be built upon over time to provide a comprehensive database of indicative options. Adaptation options (suitable for regional level action) can be brought to CIG meetings by any member at any time but the Lead Assessors will have a central role in adding additional adaptation options to the database at the time of reviewing each risk.

- **Action Plan:** The Action Plan sets out the immediate-term activities to support adaptation action. Its delivery will be managed by the CIG (see Management section above). New actions that emerge within the 5-year review period will be added by the CIG.

3.5.4 Resources

The members of the CIG intend to continue providing resources to the group to enable it to perform its role. Additional resource (both personnel and monetary) may be required at various stages of maintaining the Strategy, which will be addressed when requests for these resources emerge.

Opportunities to use existing resilience funding more effectively, combined with applications for grant funding and working with government to identify additional funds will be necessary to deliver the enhanced and/or new adaptation projects as a result of the Action Plan. The private sector, including individuals, is likely to need to fund some project elements, such as adaptations to buildings to reduce their vulnerability to overheating.

In addition, The Third National Adaptation Programme (NAP3) and the Fourth Strategy for Climate Adaptation Reporting (2023) outlines a number of ways in which funding is being provided to regions and local authorities for climate adaptation, including through:

- devolution deals, which Devon is currently negotiating, and Cornwall has completed;
- funding for responsible authorities to lead the preparation of Local Nature Recovery Strategies;
- the UK Shared Prosperity Fund;
- Local Investment in Natural Capital Programme funding;
- and through a pilot to strengthen Local Resilience Forums, as set out in the 2022 UK Government Resilience Framework.

NAP3 also cites estimates that nationally, adaptation investment for the risks and opportunities identified in the Climate Change Risk Assessment 3 could be as much as £10 billion per year (Defra, 2023). The government will support collaboration over the next 5 years to address barriers to investment and the Climate Change Committee is anticipated to further identify adaptation investment needs for CCRA4 in 2027.

The CIG will continue to monitor available funding streams and pursue opportunities to secure investment as they become available, whilst engaging with national government around the finance needed for the region to adapt.

Furthermore, business cases and cost-benefit analysis will need to be developed on an individual scheme and project basis to ensure resources are put to best use. However, work by the Climate Change Committee indicates that the benefit-cost ratios of climate adaptation measures typically range from 2:1 to 10:1. Put simply, £1 spent on adaptation could deliver between £2 to £10 in net economic benefits, as well as other environmental and social co-benefits (Watkiss et al., 2021).

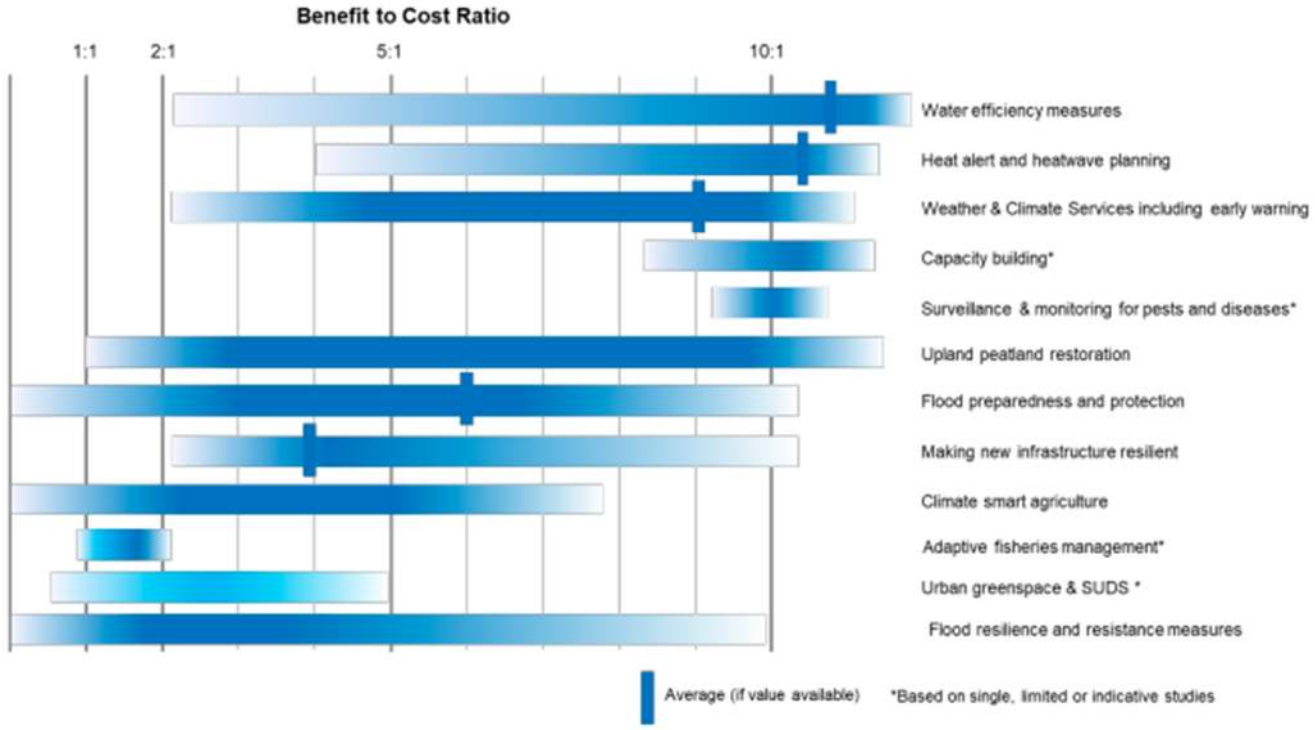


Figure 5 Benefit to Cost rations for Adaptation for Selected CCRA3 risks

3.6 Monitoring and evaluation of adaptation action

3.6.1 Types of monitoring

Metrics are useful to monitor adaptation activity so long as they are objective, transparent and can be understood by a range of users. They allow for comparison with other locations and time periods (Local Partnerships, 2023).

Process indicators measure how a service or intervention has been delivered. In adaptation, the point where the outcome can be evaluated is often in the future, so process indicators allow the consideration of whether the direction of travel is correct given the current information (Local Partnerships, 2023).

Further information on the creation of baseline values and progress indicators to measure how an action has been delivered can be found in section 5 (Monitoring

and Adaptation) of the Local Partnerships Adaptation toolkit (Local Partnerships, 2023).

3.6.2 Example metrics

Indicative example metrics that might be considered for monitoring and evaluating success in the DCIoS region, with regards to adapting to climate change, are outlined below. Each metric has the potential to be turned into an indicator, considering what the baseline (starting point) is, and then considering what the objective (outcome) is to be achieved.

Governance-level metrics

- Number of adaptation projects that have been undertaken.
- Total investment (£value) committed or assigned to adaptation projects.

Vulnerability-level metrics

- The number of people shifted from high to lower exposure to flood risk.
- The length of coastline protected by flood defences.
- Number of community buildings, businesses, and infrastructure with reduced risk of flooding i.e. surgeries, village shops, critical access/egress routes

Impact-level metrics

- The number of people displaced in the region from climate change.
- The total damage (£value) from extreme weather events.
- Number of workdays lost in the region due to extreme weather events.
- Number school days lost due to heatwave conditions causing closures.

Process-level metrics

- Number of individuals or community groups taking part in Climate Change training / workshop sessions.
- Number of visits to online engagement web platforms.
- Level of stakeholder engagement (e.g. workshop attendance / sectors represented).

Following the finalisation of the Adaptation Strategy the Climate Impacts Group will work to agree a monitoring, evaluation and reporting framework for the Action Plan and make this publicly available online.

4 Action Plan

4.1 Actions for regional collaboration

This action plan summarises the impacts from climate change on each sector and identifies the short-term actions from the Adaptation Plan (Section 3) for delivery over the next 2 – 3 years.

It also provides a list of actions that strategic organisations can encourage businesses and individuals to implement.

4.1.1 Steps towards adaptation

Strategic directions for each sector are outlined in Table 8.

Table 8. Climate Impacts and Strategic Directions for Each Sector

Sector and Impacts	Strategic Direction
Natural environment Damage to habitats, soils, aquifers, and natural carbon stores Increased invasive species, pests, and disease	1. Support and actively improve the adaptive capacity of landscapes and habitats. 2. Use agriculture / forestry networks and knowledge to implement best practice. Provide them with key information to protect ecosystem services. 3. Maximise community participation and connection to nature.
Infrastructure Flooding, erosion, and extreme weather events	4. Develop cross sector collaboration to equip the region with the knowledge and skills to take adaptation action. 5. Enhance long term Infrastructure resilience through local stewardship.
Health and built environment Flooding and extreme weather	6. Increase community awareness of how climate change can impact physical and mental health. 7. Support residences and business premises on private water supplies to adapt to climate change threats, including security of supply and changing water quality. 8. Assist public services to understand climate change impacts on their assets, service delivery and the community's health.

	9.	Minimise heat-related illness and death.
	10.	Ensure the region is ready for, and resilient to, flooding and coastal change.
Business and industry Flooding, drought, and extreme weather	11.	Equip the sector with the knowledge and skills to take adaptation action.
	12.	Develop industry readiness for impacts (e.g. supply chain).
	13.	Enhancing long-term business resilience through local stewardship
Cross Cutting Increased disease occurrence Food insecurity Extreme heat	14.	Improve the community's knowledge and awareness of the health impacts of climate change, both current and into the future.
	15.	Improve food security within the region.
	16.	Information and liaison about the effects of climate change on crime and civil disorder.

4.1.2 Getting Started

The Adaptation Plan considers four spheres of adaptation planning and action, relating to different parts of society (policy/regulator-level, organisational-level, community-level, and individual-level actors). Short-term actions for 2023 - 2025 to adapt to climate change for each societal group are outlined in Table 9.

Table 9. Short term actions

Policymakers, regional / local government and arm's length bodies
INFA–1 - Build on and develop resilience partnerships. Ensure their Command, Control and Co-ordination arrangements for an emergency which involves the loss of both power and telecoms, and actively involve utilities companies in local planning where required to ensure linkage with regional and national developments.
HBEA–1 - Develop a Climate Change awareness campaign to inform stakeholders, including the public, of the projected range of changes and their impacts alongside how we are adapting and what we can all do to respond.
HBEA–2 - Public authorities to continue to provide timely & localised information on climate change impacts to enable appropriate adaptation planning byall .

HBEE–4 - Policymakers to engage with the public to ensure awareness and understanding of the predicted impacts of climate change around the coast generally, and on their local communities specifically – to co-produce knowledge and agree viable actions.
Organisations, NGO's, Infrastructure operators, businesses, charities, trusts
NEA–1 - Develop a collaborative regional water strategy to manage water availability and safe treatment and disposal of waste water, including aquifer recharge, control over-extraction, increase the use of rainwater harvesting, reduce effluent discharge etc.
NEB1- Promote soil management techniques (Min-till cultivation, cover crops, ley-arable rotations) to protect and improve soil structure / nutrient levels and increase resilience to adverse weather / aridity impacts.
NEC–1 - Provision of capacity building support and advice to community groups for taking action to support nature enhancement (e.g. Wild About Devon).
INFB–1 - Develop joint strategies, research, and longer-term schemes with SWW and Catchment Partnerships (and other risk management partners where appropriate) to improve catchment management both for high flow areas at flood risk and protect low flow by reducing demand / drought impacts.
BIAA–3 - Develop and expand the Climate Emergency / Readiness Action gro–p - (Steering group formed from business, public sector, and academia) to take the lead on more projects within the region (e.g. Climate Ready Clyde).
BIAB–4 - Put in place a flood plan to ensure business continuity and community awareness - sign up for alerts and check insurances for coverage on flooding / severe weather events.
CCA–2 - Define a regional approach (e.'. 'One Health') to prevent the emergence of zoonotic diseases (infectious diseases transmitted between animals and people).
CCA–3 - Raise awareness on the impacts of anti-microbial resistance and prevention measures (e.g. reducing antibiotics use in livestock).
CCC–1 - Work with partners, including universities, to examine the effects of climate change on crime rates and the potential for civil disorder.
Community Groups, local hubs

HBEC–3 - Work with partners to develop the materials and training to support in the establishment and operation of local Community Resilience Groups (or similar existing groups) and the development of community adaptation plans.

Wider actions to adapt to climate change for individuals

Individuals

Climate change is a global concern, experienced locally. It requires actions at both levels. For climate change impacts to be effectively addressed and adapted to, individuals should take an active role in assessing their own, and their communities', vulnerabilities to extreme weather events, including impacts from flooding, heatwaves**,** and water scarcity.

Individual property-level adaptation actions may include:

- Install rainwater harvesting, such as a water butt.
- Increase your property's resilience to flooding.
- Check your insurance coverage levels and limitations.
- Upgrade your household water fittings to reduce your water use.
- Switch to water-efficient appliances.
- Choose porous surfaces for your driveways and paths.
- Add solar shading to the south façade of buildings and/or introduce passive cooling measures to reduce heat impacts.
- Fit insect screens where needed.
- Maintain building structure, including roofs.
- Increase the capacity of guttering down-pipes.

4.2 Diagrams of dynamic adaptation pathways

4.2.1 Introduction to dynamic adaptation pathways

Adaptation pathways help to address the challenges and uncertainty involved in climate change decision making given the uncertainties of climate change predictions and international action to reduce greenhouse gas emissions. They allow the consideration of multiple possible futures and provide an opportunity to explore the strengths and flexibility of the various options within each possible future.

The Pathway diagrams (Figure 6) list adaptation options on the y-axis. Each line on the diagram shows how a single adaptation option is likely to remain effective over time. The pathway maps are not meant to imply that all options should be used, instead, they indicate the various options which are available, some of which may be used whilst others not. For each option, future decision points are identified to

indicate when it may be worthwhile switching to deliver an alternative adaptation option.

Ahead of each decision point within an option there would usually be consideration at what point that decision should be made. Decisions are triggered by some change (environmental or social) in the design of the strategy. It is key in the design of these strategies that these trigger points are defined, monitored, and reviewed (e.g. a specific amount of sea level rise or erosion intensity).

The x-axis on the diagrams represents a general trend in changing environmental or social conditions through time, indicating the level at which the threshold had been set in the strategy.

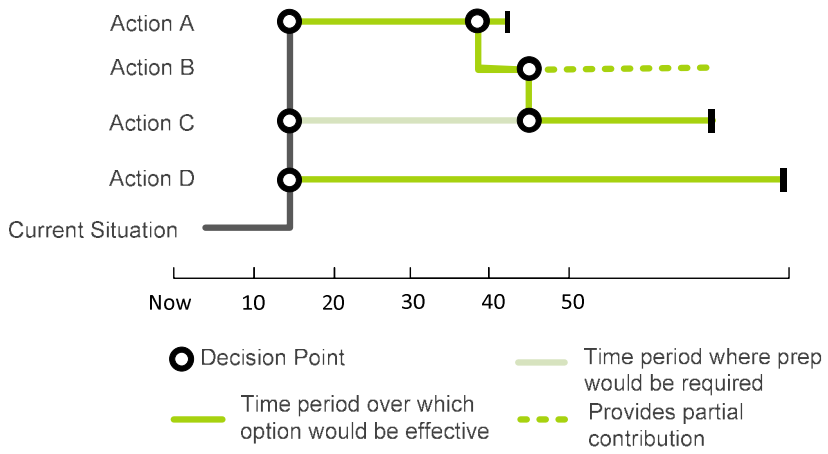


Figure 6. Example Adaptation Pathway and Key. This figure is indicative only and is not representative of a particular location. Source: RSK

The general approach taken for developing adaptation pathways is shown in Figure 7. Key in determining the range of available options is understanding the objective or aim of the adaptation and what impacts would trigger the organisation or community to invest.

Figure 7. Approach taken for the development of dynamic adaptive strategic pathways. Source: RSK

4.2.2 Example adaptation pathways

In some cases actions intended to adapt to climate change may do more harm than good. Hard engineering projects to prevent floods or increased use of air conditioning systems to cope with extreme heat require will divert us from a low-carbon pathway. Adaptation actions, implemented early, may play a key role in delaying harder measures with their associated negative impacts.

We provide four example adaptation pathways that summarise the general adaptive actions and decision points based on arbitrary thresholds that may need to be addressed when developing localised strategies to manage and adapt to the impacts from climate hazards:

- River and surface water flooding - Figure 8
- Reduced water availability (drought conditions) - Figure 9
- Extreme heat and heatwaves - Figure 10
- Sea level rise (coastal flooding and erosion) - Figure 11

River and surface water flooding

Note: This figure is indicative only and is not representative of a particular location.

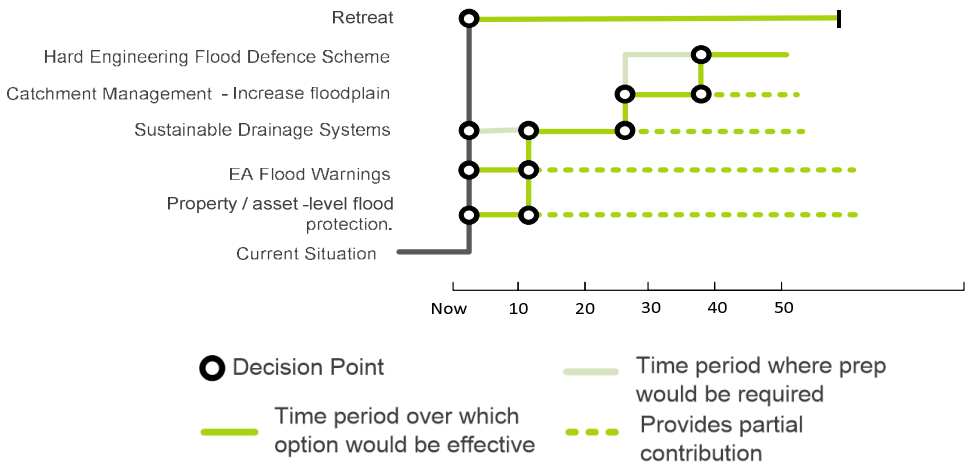


Figure 8. River and surface water flooding example pathways. This figure is indicative only and is not representative of a particular location. Source: RSK

Reduced water availability (drought conditions)

Note: This figure is indicative only and is not representative of a particular location.

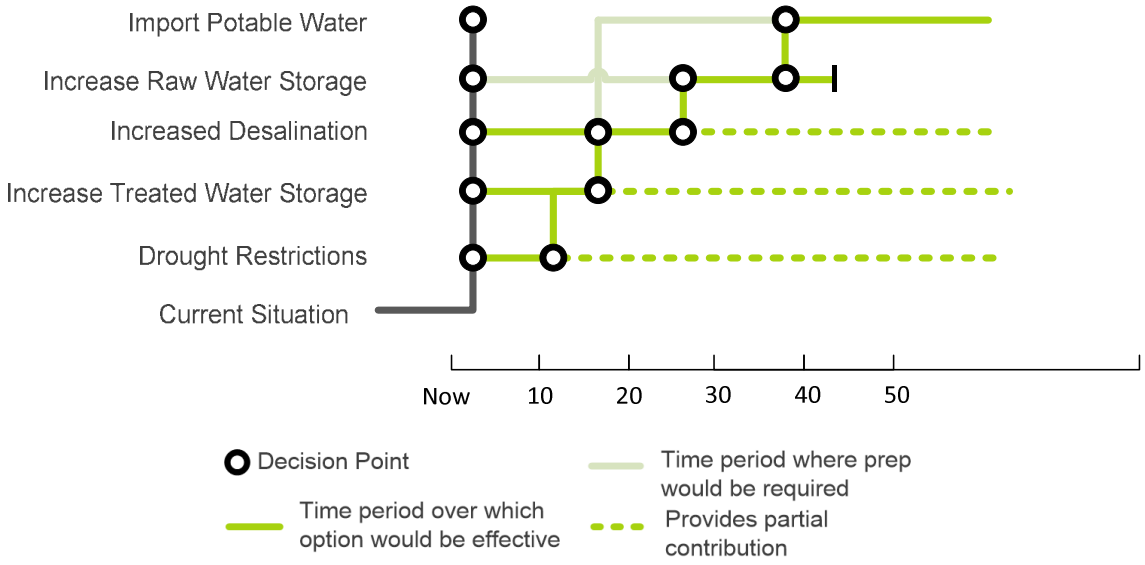


Figure 9. Potable water scarcity example pathways. This figure is indicative only and is not representative of a particular location. Source: RSK

Extreme heat and heatwaves

Note: This figure is indicative only and is not representative of a particular location.

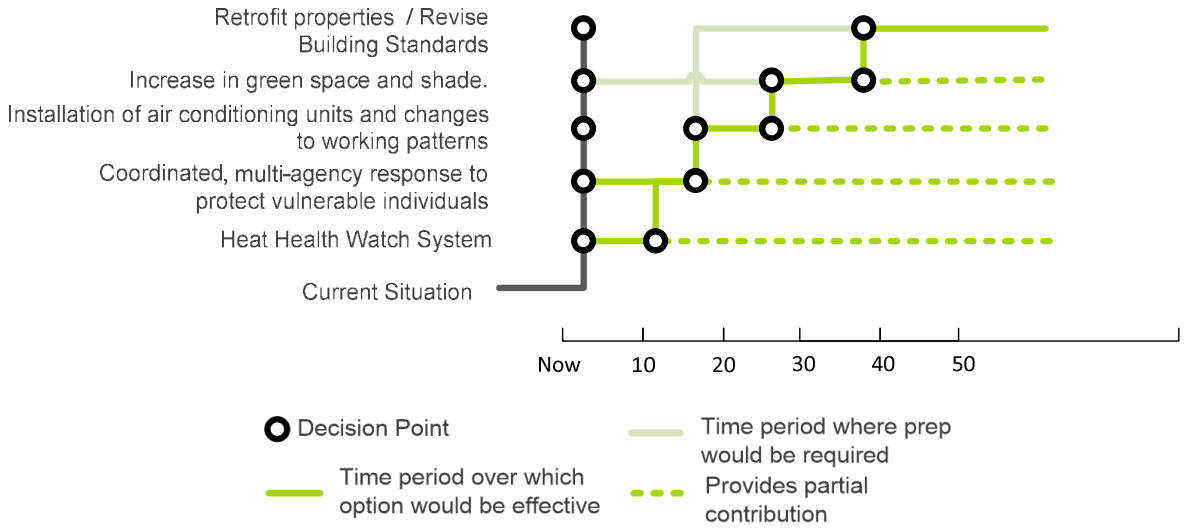


Figure 10. Extreme heat example pathways. This figure is indicative only and is not representative of a particular location. Source: RSK

Sea level rise (coastal flooding and erosion)

Note: This figure is indicative only and is not representative of a particular location.

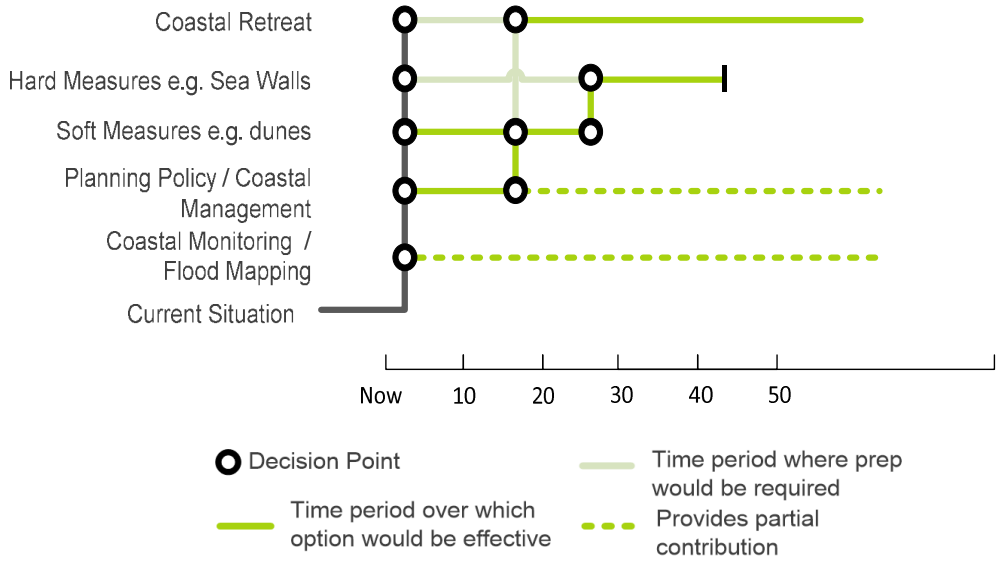


Figure 11. Sea level rise example pathways. This figure is indicative only and is not representative of a particular location. Source: RSK

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Appendices

Appendix 1 – Glossary of terms

Key terms used in the report, along with their definition, are outlined below:

Adaptation	Actions to become more resilient to the changing climate by anticipating the adverse effects of climate change and taking appropriate action to reducing the risk from its impacts (e.g. sea level rise, heatwaves, flooding, drought etc.).
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 (International Organisation for Standardisation, 2019a).
Adaptation Pathway	A series of adaptation choices involving trade-offs between short-term and long-term goals and values. These are processes of deliberation to identify solutions that are meaningful to people in the context of their daily lives and to avoid potential maladaptation (IPCC, 2022).
Cascading impacts	Where an incidence of extreme weather/climate hazard generates a sequence of secondary events in natural and human systems that result in physical, natural, social, or economic disruption, whereby the resulting impact is significantly larger than the initial impact (IPCC, 2019).
Climate	The statistical description of weather in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years.
Climate Change	The change in climate that persists for an extended period, typically decades or longer. Climate change might be due to natural processes, internal to the climate system, or external forcings such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use.
Climate projection	The simulated response of the climate system to a scenario of future emission or concentration of greenhouse gases and aerosols, generally derived using climate models (International Organisation for Standardisation, 2019b).
Exposure	The presence of people, livelihoods, species or ecosystems, environmental functions, services, resources, infrastructure, or

	economic, social, or cultural assets in places and settings that could be affected. Exposure can change over time, for example, because of land use change.
Flood risk reduction	Flood risk reduction, also known as flood risk mitigation, focuses on mitigating or reducing the risk of flood risk; a combination of the probability (likelihood or chance) of an event happening and the consequences (impact) if it occurred (Local Government Association, n.d.).
Hazard	The potential source of harm, in terms of loss of life, injury or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources. Hazard comprises slow-onset developments as well as rapidly developing climatic extremes or increased variability.
Impact	In the context of climate change, the effect on natural and human systems of extreme weather and climate events (International Organisation for Standardisation, 2019a).
Likelihood	The chance of a specific outcome occurring, where this might be estimated probabilistically.
Magnitude	The large size or importance of something. Magnitude considers factors such as severity, size, or extent of an impact. The magnitude of a potential climate change impact is not the same as its significance. If thresholds are defined, the magnitude of a change can indicate its significance (International Organisation for Standardisation, 2019b).
Mitigation	Actions to reduce the regions contribution to climate change (i.e. reducing greenhouse gas emissions) and offset remaining emissions through sequestration and carbon storage.
Risk	The effect of uncertainty. An effect is a deviation from the expected. It can be positive, negative or both, and can arise as a result a response, or failure to respond, to an opportunity or to a threat related to objectives. Uncertainty is the state, even partial, of deficiency of information related to, understanding or knowledge of, an event, its consequence, or likelihood.
Trigger Point	Trigger points mark the necessary lead time for action before reaching a turning point.

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.

Appendix 2 – Literature reviewed to inform the risk assessment

Environment Agency (2021) Climate Impacts Group: Flooding and Coastal Erosion

The *Climate Impacts Group: Flooding and Coastal Erosion* is a report prepared by the Environment Agency. It draws attention to that fact that Devon, Cornwall and the Isles of Scilly (DCIoS) are particularly susceptible to the impacts of climate change due to their coastal locations and urban settings. In the most recent climate projections, DCIoS are projected to see wetter winters and drier summers. Intense rainfall will most likely heighten flood risks as the region has had a long history of flash flooding due to overloaded urban drainage and sewerage systems; sea level rise and storm intensity increases will also bring about an increase in coastal flooding and erosion detrimental to the many communities located in deep and steeply sided valleys, flat and low-lying areas of reclaimed land, and the rear of exposed beaches. In urban environments like that of DCIoS, flood risk can be made worse by joint probability events and a lack of collaborative engagements between the affected stakeholders.

Increase in coastal flooding and erosion due to climate change will have economic, health, infrastructural, agricultural and carbon impacts. The National Flood & Coastal Erosion Risk Management Strategy is working towards adopting a more rounded approach that enhances resilience to flooding and adaptations away from locations where the risks are too high or unresolvable. The aim of the strategy is to create “a nation ready for, and resilient to, flooding and coastal change – today, tomorrow and to the year 2100”. To do so, the Risk Management Authorities have identified the importance of place making, nature-based solutions, habitat enhancement and restoration, soil protection, learning from past experiences, collaborative efforts between different stakeholders, improved flood warning systems, timely reinstatement of infrastructural systems and networks, and the interdependency of infrastructural systems.

Headline impacts: tidal flooding, pluvial flooding, coastal erosion, critical transport and infrastructural damage, sea level rise.

Devon Local Nature Partnership (2021) Climate Change and Devon’s Natural Environment: Evidence Review

The *Climate Change and Devon’s Natural Environment: Evidence Review*, brought together by the Devon Climate Emergency Response Group, is a report that calls attention to the climate and ecological emergency, and serves to (1) outline key climate change risks and opportunities for Devon’s natural environment; (2) identify headline actions required to address the risks through mitigation and adaptation, so as to contribute to achieving net zero emission by 2050; and (3) outline opportunities that some of these actions also present to contribute to climate mitigation. The report draws attention to six environmental habitats and themes (i.e. terrestrial, marine and

freshwater habitats and species, air quality, soil and landscapes), and addresses how climate change can impact these six natural environmental themes, the actions needed to mitigate, adapt and stay resilient, and the opportunities that may arise when the suggested actions to be taken were observed. Devon is home a variety of unique habitats and landscapes and is a stronghold for many rare flora and fauna. Climate change will exacerbate biodiversity and habitat loss in the region and threaten food security. By focusing on the impacts of climate change on Devon's natural environment and environmental aspects, the report highlights the potential for climate co-benefits, in the hopes the Devon Climate Emergency Response Group can engage with Devon's residents, businesses and visitors to develop and implement a plan to reduce Devon's carbon emissions to net-zero by 2050 at the latest.

Headline impacts: biodiversity and habitat loss, species extinction, species behavioural changes, diseases transmission, pollutant deposition.

Climate Impacts Group (2021) Climate Change Impact Projections During the 21st Century

The *Climate Change Impact Projections During the 21st Century* prepared by the Devon, Cornwall and Isles of Scilly (DCIoS) Climate Impacts Group, serves to provide a general overview of how the climate is changing, how it is projected to change, and the effects climate change will have for Southwest England. It draws attention to the fact that human influence has been the primary cause of warming in the 20th and 21st century, and that anthropogenic rise in temperature has been much more rapid as compared to rises due to natural climate cycles. The 21st century so far has been warmer than the previous three centuries, with the UK projected to see warmer and wetter winters and hotter and drier summers. Intensive and torrential downpour are likely in the future, whereas the number and severity of snow events will decline. Sea levels around the UK are projected to keep rising beyond the 2100 even if conscientious efforts are taken to reduce greenhouse gas emissions now.

Climate impact projections in the DCIoS region include major tidal, coastal and fluvial flooding, prolonged low temperatures, heavy snow and/or ice, localised flooding, severe storms and gales, heat wave, drought, forest, wood or moorland fire, tremors and landslides, infrastructural failure, epidemic, pandemic or influenza, and environmental pollution. To avoid significant increases in the average surface temperature, efforts must be taken to cut greenhouse gas emissions, switch to renewable energy sources, use land sustainably, and make use of techniques to remove carbon dioxide from the air.

Headline impacts: sea level rise, tidal and pluvial flooding, infrastructural damages, heatwaves, torrential rain.

Public Health Devon County Council (2020) Health Impacts of Climate Change

The *Health Impacts of Climate Change* is a report prepared by the Public Health Devon County Council. It expounds on the interdependent relationship between the environment and health and highlights how mitigating damaging human activities and conserving the natural systems will have benefits to human health. As climate change has become the "greatest threat to global health of the 21st century", this report considers the health impacts of climate change within six identified priorities, namely, (1) extreme weather events and communities; (2) air; (3) water; (4) food; (5) disease; and (6) mental health. The report also seeks to address the six identified priorities with reference to the priority risks and opportunities identified in UK Climate Change Risk Assessment 2017.

Headline impacts: loss of lives, infrastructural damages, negative impacts upon mental health, pollution and contamination, disease transmission.

Isles of Scilly (2023) Climate Change Adaptation Action Plan (unpublished)

Insert

The Council for the Isles of Scilly Climate Change Adaptation Action Plan (CCAAP), produced by RSK, provides the results of a climate change risk assessment of the islands using the probabilistic and local projection data supplied by the United Kingdom Climate Projections (UKCP18). Applying this data to the methodology outlined in ISO14091, and with reference to the sectoral domains used by the UK CCRA, a detailed assessment was carried out, from which a variety of physical, social and institutional measures were identified, and sequenced, with the help of local stakeholders including communities, businesses and local government. Adaptation pathways were developed which summarise key routes and threshold points for a range of adaptation options.

Cornwall Council (2022) Cornwall Climate Risk Assessment

The *Cornwall Climate Risk Assessment*, commissioned by the Cornwall Council and prepared by Cornwall-based consultancy Climate Change Risk Management, is a report detailing how the South West England county will be affected by the imminent threats of climate change. Acknowledging that the Cornwall's atmosphere has been warming since the 19th century and the sea level around the coast has been increasing for at least the past 100 years, the report sets out to assess trends and projections on Cornwall's climate, outline likely impacts due to the climate change, identify gaps in current knowledge, inform future governance functions and decision making, and inform the Cornwall communities the need to adapt to the changing climate. Ultimately, the report underlines the need to act now to reduce emissions and tackle climate risks.

Appendix 3 – Climate change risk assessment scores

Natural environment (including agriculture, forestry, and fisheries)

Table 10. Climate change risk assessment for the natural environment sector, indicating the risk (magnitude x likelihood) score for the 2050s under a 4°C warming scenario, and the urgency score for action in the next five years. Magnitude scores are as follows: very high (5), high (4), medium (3), low (2) and very low (1). Likelihood scores correspond to the risk being very likely (5), likely (4), possible (3), unlikely (2) and very unlikely (1).

CIG Risk ID	Risk/impact description / climate variables	Magnitude	Likelihood	Risk score	Urgency score
01	Risks to terrestrial species and habitats from changing climatic conditions and extreme events, including temperature change, water scarcity, wildfire, flooding, wind, and altered hydrology (including water scarcity, flooding, and saline intrusion).	5	5	Severe	More action needed
02	Risks to terrestrial species and habitats from pests, pathogens, and invasive species.	4	4	Major	More action needed
03	Opportunities from new species colonisations in terrestrial habitats.	4	4	Major	More action needed
04	Risk to soils from changing climatic conditions, including seasonal aridity and wetness.	5	5	Severe	More action needed
05	Risks and opportunities for natural carbon stores (peatlands, forestry, marine etc.), carbon sequestration and GHG emissions from changing climatic conditions, including temperature change and water scarcity.	5	4	Severe	More action needed
06	Risks and opportunities to agricultural productivity from extreme events and changing climatic conditions (including temperature change, water scarcity, wildfire, flooding, coastal erosion, wind and saline intrusion, carbon fertilisation).	4	4	Major	More action needed
07	Risks and opportunities to forestry productivity from extreme events and changing climatic conditions (including	3	3	Moderate	More action needed

CIG Risk ID	Risk/impact description / climate variables	Magnitude	Likelihood	Risk score	Urgency score
	temperature change, water scarcity, wildfire, flooding, coastal erosion, wind, and saline intrusion).				
08	Risks to agri-food (agriculture and horticulture) from pests, pathogens, and invasive species.	4	2	Moderate	More action needed
09	Risks to forestry from pests, pathogens, and invasive species.	4	3	Major	More action needed
10	Opportunities for agricultural and forestry productivity from new/alternative species becoming suitable.	4	3	Major	More action needed
11	Risks to aquifers from changing climatic conditions, sea level rise, water scarcity, water pollution, saltwater intrusion etc.	3	4	Major	Sustain current action
12	Risks to freshwater species and habitats from changing climatic conditions and extreme events, including higher water temperatures, flooding, water scarcity and phenological shifts. Including saline intrusion of wetlands, estuary habitats etc.	5	5	Severe	More action needed
13	Risks to freshwater species and habitats from pests, pathogens, and invasive species.	4	4	Major	More action needed
14	Opportunities to freshwater species and habitats from new species colonisations.	1	1	Negligible	Sustain current action
15	Risks to marine species, habitats and fisheries from changing climatic conditions, including ocean acidification and higher water temperatures.	5	4	Severe	More action needed
16	Opportunities to marine species, habitats and fisheries from changing climatic conditions.	4	3	Major	Further investigation
17	Risks to marine and coastal species and habitats from pests, pathogens, and invasive species.	4	4	Major	More action needed

CIG Risk ID	Risk/impact description / climate variables	Magnitude	Likelihood	Risk score	Urgency score
18	Risks and opportunities to coastal species and habitats due to sea level rise, coastal flooding, erosion, and climate factors.	5	4	Severe	More action needed
19	Risks and opportunities from climate change to the way people experience, value and enjoy different landscapes.	4	3	Major	Further investigation

Infrastructure

Table 11. Climate change risk assessment for the infrastructure sector, indicating the risk (magnitude x likelihood) score for the 2050s under a 4°C warming scenario, and the urgency score for action in the next five years. Magnitude scores are as follows: very high (5), high (4), medium (3), low (2) and very low (1). Likelihood scores correspond to the risk being very likely (5), likely (4), possible (3), unlikely (2) and very unlikely (1).

CIG Risk ID	Risk/impact description / climate variables	Magnitude	Likelihood	Risk score	Urgency score
20	Risks to infrastructure networks (water, energy, transport, digital) from cascading failures (e.g. access to broadband being disrupted due to power outages).	5	4	Severe	Further investigation
21	Risks to infrastructure assets and services from river, surface water and groundwater flooding (including chronic changes), as well as associated landslips and/or soil movement.	5	4	Severe	More action needed
22	Risks to infrastructure services from coastal flooding and erosion.	5	4	Severe	Further investigation
23	Risks to bridges and pipelines from flooding (i.e. river, surface water and groundwater flooding) and erosion.	4	3	Major	Further investigation
24	Risks to infrastructure networks (incl. transport, energy etc.) from slope and embankment failure (e.g. landslips).	3	3	Moderate	Further investigation
25	Risks to hydroelectric generation from low or high river flows.	2	2	Moderate	Watching brief

CIG Risk ID	Risk/impact description / climate variables	Magnitude	Likelihood	Risk score	Urgency score
26	Risks to below (subterranean) and above (surface) ground infrastructure from subsidence (sinking of the ground).	3	3	Moderate	Sustain current action
27	Risks to public water supplies from reduced water availability (and shifting supply and demand balances).	4	4	Major	More action needed
28	Risks to energy generation from reduced water availability (i.e. freshwater use in energy generation process).	3	3	Moderate	Watching brief
29	Risks to energy from high and low temperatures, high winds, lightning, humidity.	4	4	Major	Further investigation
30	Risks to nearshore infrastructure (e.g. harbours and breakwaters) from storms and high waves and/or offshore infrastructure (where applicable).	5	4	Severe	More action needed
31	Risks to transport from high and low temperatures (incl. ice and snow), high winds, lightning, humidity.	4	4	Major	More action needed
32	Risk of disruption to transport services (e.g. planes, helicopters etc.) from fog (exacerbated by changes in sea surface temperature, humidity, winds etc.).	1	4	Moderate	Sustain current action
33	Risks to digital from high and low temperatures, high winds, lightning.	3	3	Moderate	Further investigation
64	Risks to infrastructure networks from high winds and intense rainfall.	3	3	Moderate	Further investigation

Health and the built environment

Table 12. Climate change risk assessment for the health and built environment sector, indicating the risk (magnitude x likelihood) score for the 2050s under a 4°C warming scenario, and the urgency score for action in the next five years. Magnitude scores are as follows: very high (5), high (4), medium (3), low (2)

and very low (1). Likelihood scores correspond to the risk being very likely (5), likely (4), possible (3), unlikely (2) and very unlikely (1).

CIG Risk ID	Risk/impact description / climate variables	Magnitude	Likelihood	Risk score	Urgency score
34	Risks to health and wellbeing from high temperatures.	5	4	Severe	More action needed
35	Risks to mental health and wellbeing from extreme weather events and/or the climate emergency.	4	4	Major	More action needed
36	Opportunities for health and wellbeing from higher temperatures.	1	2	Minor	Further investigation
37	Risks to people, communities and buildings from river, surface water and groundwater flooding.	5	4	Severe	More action needed
38	Risks to people, communities and buildings from sea level rise and coastal erosion.	5	5	Severe	More action needed
39	Risks and opportunities from summer and winter household energy demand (a) Opportunity - winter (b) Risk – summer.	4	3	Major	More action needed
40	Risks to health and wellbeing from changes in air quality, both indoor and out.	3	2	Moderate	Further investigation
63	Risks to people, communities and buildings from wildfires.	3	3	Moderate	Further investigation
41	Risks to health from transmissible diseases (including water-borne, vector-borne, air-borne, bacterial, infectious diseases etc, as well as novel viral and genetic changes).	4	4	Major	More action needed
42	Risks to food safety and food security in the DCIoS region.	5	4	Severe	Further investigation
43	Risks to health from water quality (e.g. private drinking water or bathing water), including contamination of drinking water through increased runoff and flooding events that overwhelm current water treatment approaches.	4	3	Major	Further investigation

CIG Risk ID	Risk/impact description / climate variables	Magnitude	Likelihood	Risk score	Urgency score
44	Risks to health from private water supply (e.g. potential interruptions in household water supply from wells or boreholes). [Excludes public drinking water and wastewater services from South West Water].	4	3	Major	Further investigation
45	Risks to cultural heritage and assets in the DCIoS region.	4	4	Major	Further investigation
46	Risks to health and social care delivery.	4	4	Major	More action needed
47	Risks to education services.	4	4	Major	More action needed
48	Risks to prison services.	4	4	Major	More action needed

Business and industry

Table 13. Climate change risk assessment for the business and industry sector, indicating the risk (magnitude x likelihood) score for the 2050s under a 4°C warming scenario, and the urgency score for action in the next five years. Magnitude scores are as follows: very high (5), high (4), medium (3), low (2) and very low (1). Likelihood scores correspond to the risk being very likely (5), likely (4), possible (3), unlikely (2) and very unlikely (1).

CIG Risk ID	Risk/impact description / climate variables	Magnitude	Likelihood	Risk score	Urgency score
49	Risks to business sites from flooding and flash flooding (fluvial, pluvial and groundwater).	5	4	Severe	More action needed
50	Risks to business locations and infrastructure from coastal change from erosion, sea level rise, flooding and extreme weather events.	5	5	Severe	More action needed
51	Risks to businesses from water scarcity.	4	4	Major	Further investigation

CIG Risk ID	Risk/impact description / climate variables	Magnitude	Likelihood	Risk score	Urgency score
52	Risks and opportunities to finance, investment and insurance including access to capital for businesses.	4	4	Major	Further investigation
53	Risks to business from reduced employee productivity due to infrastructure disruption and higher temperatures in working environments.	2	2	Moderate	Further investigation
54	Risks to business from disruption to supply chains and distribution networks from extreme weather events.	4	3	Major	More action needed
55	Opportunities for business (i.e. tourism) from changes in demand for goods and services, change in focus of tourism from international to local.	3	3	Moderate	Further investigation

Cross-cutting (including international dimensions)

Table 14. Climate change risk assessment for cross-cutting and international dimensions, indicating the risk (magnitude x likelihood) score for the 2050s under a 4°C warming scenario, and the urgency score for action in the next five years. Magnitude scores are as follows: very high (5), high (4), medium (3), low (2) and very low (1). Likelihood scores correspond to the risk being very likely (5), likely (4), possible (3), unlikely (2) and very unlikely (1).

CIG Risk ID	Risk/impact description / climate variables	Magnitude	Likelihood	Risk score	Urgency score
56	Risks to regional food availability, safety, and quality from climate change overseas.	4	3	Major	More action needed
57	Opportunities for UK food availability and exports from climate impacts overseas.	3	2	Moderate	Watching brief
58	Risks and opportunities to the DCIoS region from climate-related international/regional human mobility.	3	3	Moderate	Further investigation

CIG Risk ID	Risk/impact description / climate variables	Magnitude	Likelihood	Risk score	Urgency score
59	Risks to the DCIoS region from civil disorder and conflict resulting from climate change (e.g. battle for water resources).	2	3	Moderate	Further investigation
60	Risks to law (e.g. environmental crime, domestic violence) and governance in the DCIoS region from climate change.	3	4	Major	More action needed
61	Risk to public health from climate change overseas (e.g. zoonotic diseases; disease transmitted between animals and people).	5	4	Severe	More action needed
62	Risk multiplication from the interactions and cascades of named risks across systems and geographies (i.e. system risk or compound events).	4	5	Severe	Further investigation

Appendix 4 – Full list of actions arising from the workshops.

Natural environment (including agriculture, forestry, and fisheries)

Table 15. Strategic adaptation options and enablers to address climate hazards in the natural environment and agriculture sector.

#	Actions	CIG risks addressed
NEA1	Develop a collaborative regional water strategy to manage water availability and safe treatment and disposal of waste water, including aquifer recharge, control over-extraction, increase the use of rainwater harvesting, reduce effluent discharge etc	1, 5, 6, 11, 12
NEA2	Increased protection and expansion of blue carbon habitats and Marine Special Protected Areas (Blue belt) > 30% - this will reduce stress to allow habitats to adapt.	5, 15, 18
NEA3	Develop a regional Invasive Species Management Plan to ensure pests, pathogens and diseases are monitored and action plans and prevention measures are developed.	2, 3, 9, 13, 17
NEA4	Set out a regional strategy to protect, restore and enhance terrestrial carbon stores from land use change and increase the resilience where possible (e.g. peatland restoration, woodland management, soils).	5
NEA5	Local Nature Recovery strategies to demonstrate what type of habitat will be supported in the future (e.g. intertidal zones, the benefits of different saltwater/freshwater marsh etc.) and opportunities for supporting human health.	1, 15, 16
NEA6	Tree planting (in appropriate places) to support biodiversity net gain, reduce river water temperatures, increase flood risk management, provision of shade for crops and livestock, increase sequestration, support human well-being etc.	1, 6, 12
NEB1	Promote and Improve soil management techniques (Min-till cultivation, cover crops, ley-arable rotations) to protect soil structure / nutrient levels and increase resilience to adverse weather / aridity impacts. Consider adoption of a systems thinking approach such as the Land Use Framework.	4
NEB2	Choose new crop varieties/ different breeds that are: more heat tolerant, drought resistant, less susceptible to pests and disease, reduce run-off and soil erosion.	4, 11
NEB3	Provision of shade to reduce heat stress (e.g. silvopasture to shade livestock, shade cloths for horticulture, trees to shade crops).	6

#	Actions	CIG risks addressed
NEB4	Farmers to engage with the Resilient Farming Futures (RFF) programme; undertake a farm resilience plan to identify climate impacts and opportunities; and assess suitable on-farm adaptation options to increase resilience.	4, 6, 10
NEB5	Adapt agricultural land use through Environmental Land Management Scheme (ELMS) and Biodiversity Net Gain funding (e.g. buffer strips, conservation areas etc.).	1, 4, 12, 18
NEB6	Develop alternative water supplies (e.g. boreholes) and use of rainwater harvesting and storage (ponds/reservoirs) on farm. Put in ponds, swales and wetlands.	4, 11
NEC1	Provision of capacity building support and advice to community groups from non-governmental organisations (NGOs) for taking action to support nature enhancement.	1, 2, 4, 11, 12, 13, 15, 18
NEC2	Facilitate landowners connecting with local nature groups to understand the benefits around alternative land use to support biodiversity and the natural environment and human health.	1, 2, 4, 11, 12, 13, 15, 18
NEX1	LA's to promote the benefits of improved garden habitat (to increase biodiversity) and reduce non-permeable surfaces (to increase infiltration and reduce surface water flood risk).	1, 12
NEX2	Promote soil health, reduce runoff, surface water flooding and adopt soil conservation techniques (e.g. cover crops, wider crop rotations, contour ploughing to reduce soil erosion); preventing landslips and land movement, and reduce compacted soils and improve aeration of soils to increase rate of infiltration and absorption. To address soil wetness and aridity.	4
NEX3	Enhance regional habitat condition and connectivity to increase species resilience and biodiversity (e.g. wildlife corridors, rewilding, river restoration etc.).	1, 4, 15, 16
NEX4	Communities to promote local wildlife and habitat enhancement (e.g. through local charity groups, School Nature Grants Programme, volunteering at Wildlife Trusts).	1, 4, 15, 16
NEX5	Land owners connecting with local nature groups to understand the benefits around alternative land use to support biodiversity and the natural environment (e.g. such as turning less productive areas into woodland, wildlife meadows, hedgerows, creation of wetlands etc.).	1, 4, 15, 16
NEX6	Prioritising nature-based solutions in catchment planning to reduce river flood risk and slow river flows specifically wetland enhancement / re naturalisation and and river restoration.	1, 6, 12

#	Actions	CIG risks addressed
NEX7	Fire services to collaborate with land owners to access water storage in areas at risk of wildfires (e.g. moorlands).	1, 6
NEX8	Livestock housing redesign (e.g. improved insulation, ventilation, heating/cooling requirements).	6
NEX9	Increase water use efficiency (e.g. drip irrigation).	4, 6
NEX10	Improve drainage systems (in the right place and done properly), insert buffer strips, hedgerows etc.	1, 2, 4, 6
NEX11	Increase pest and disease surveillance and change type and use of pesticide/herbicide/fungicide in response to changes in pest and disease prevalence.	2, 9, 13
NEX12	Altering grazing practices (e.g. for cows the key grazing periods are at dawn and dusk. Moving cows indoors mid morning till early evening would reduce the stresses and the lower milk yields caused by high temperatures).	6
NEX13	Fire services to increase the size or number of crews to tackle increased risk of wildfires.	1, 6

Infrastructure

Table 16. Strategic adaptation options and enablers to address climate hazards in the infrastructure sector.

#	Actions	CIG risks addressed
INFA1	Build on and develop resilience partnerships. Ensure their Command, Control and Co-Ordination arrangements for an emergency which involves the loss of both power and telecoms, and actively involve utilities companies in local planning where required to ensure linkage with regional and national developments.	20, 31
INFA2	Emergency Planning - Map voluntary and community sector assets and capabilities in their areas. Develop processes for their swift activation, deployment and coordination. Ensure distributed energy resources (DER), such as customer-premise microgrids (e.g. solar + storage systems), community microgrids, or mobile battery and generation systems can provide life-preserving power to community shelters and public health facilities during emergencies.	20, 21, 30

#	Actions	CIG risks addressed
INFA3	Develop a working group with infrastructure industry associations and providers at regional level to improve interdependencies awareness within the infrastructure sector (co-location of infrastructure - e.g. bridge crossings / roadways and impact of cascade failure). Engage with National Grid, Hydrologists and power system modelers to simulate and understand the impacts of compounded flooding, heat waves and droughts on the power generation in the region.	21, 23
INFB1	Develop joint strategies, research, and longer-term schemes with South West Water, Lead Local Flood Authority, and catchment partnerships to improve catchment management both for high flow areas at flood risk and protect low flow by reducing demand / drought impacts.	20, 21, 27
INFB2	Enable and promote climate resilience through procurement processes. Consider climate resilience of new assets and infrastructure when comparing competing bids, by accounting for costs over the asset lifetime under alternative climate scenarios.	21, 22
INFB3	Communicate behavioural change measures to reduce consumption of water and energy.	27
INFX1	Promote cross sector partnerships to develop industry-accepted climate risk assessment framework for the region. Use common formalised standards of resilience, such as the new ISO 14091 across infrastructure sectors to build system wide resilience. Collaborate with stakeholders including utilities, services, other transport modes on risk management planning to protect business continuity.	20
INFX2	Reassess the inspection schedules on bridges and highway assets (including Public Rights of Way). Reduce risk of cascading failures by inspecting critical assets more frequently than design manual for roads and bridges specifies.	23
INFX3	Due to increased risks of adverse weather events causing surface water (pluvial) flooding all businesses should consider a proactive rolling review of their key site / assets flood vulnerability not just at point of site selection or event.	21, 22
INFX4	Install Battery Energy Storage Systems BESS at transmission level / business level.	20
INFX5	Consider investing in a Power Bank or UPS to help ensure home / business communications available during a power cut.	20

Health and the built environment

Table 17. Strategic adaptation options and enablers to address climate hazards in the health and built environment.

#	Actions	CIG risks addressed
HBEA1	Working with relevant agencies and our communities, develop a climate change awareness campaign to inform stakeholders, including the public, of the projected range of changes and their impacts alongside how we are adapting and what we can all do to respond.	34, 35, 37, 38, 41, 45
HBEA2	Public authorities to continue to provide timely & localised information on climate change impacts to enable appropriate adaptation planning by all.	34, 37 ,43
HBEA3	Raise awareness with social care managers, commissioners, staff, and carers on preparing for response to adverse weather, including heatwaves.	46
HBEA4	Public Health teams to engage with NHS partners, Health Protection Teams and LA environmental health departments to raise awareness of climate sensitive non-communicable disease (NCD) e.g. the links between climate change and increased cardiovascular disease and appropriate adaptation for vulnerable groups. This should include developing adaptations for activities such as exercise and active travel which may be impacted by climate change with consequences for non-communicable disease.	34, 36, 40
HBEB1	Local authorities to provide advice and expanded monitoring for properties with private water supplies (quality and quantity).	41, 43, 44
HBEB2	Provide access to and guidance on benefits of rainwater harvesting systems (i.e. to capture excess rainfall for use in the garden) and grey water harvesting systems (i.e. collect and treat wastewater from showers, baths and wash basins).	44
HBEC1	Promote and provide staff with time to undertake volunteer work with local Non-Governmental Organisations and develop Corporate Social Responsibility (CSR).	35, 37
HBEC2	Develop a strategy and guidance for the adaptation of heritage assets to climate impacts, including a "Managed Decline to Adaptive Release[4]" strategy to record historic buildings, sites, and landscapes	45

[4] Adaptive Release (AR) is an approach that supports the transformation of a heritage asset (including its values and significance), within wider landscape settings. AR is proactive and positive,

#	Actions	CIG risks addressed
	as a part of managed coastal retreat due to sea level rise, erosion and storms.	
HBEC3	Work with partners to develop the materials and training to support in the establishment and operation of local Community Resilience Groups (or similar existing groups) and the development of community adaptation plans.	35, 37, 38
HBED1	Provision of funding and guidance for properties to be retrofitted in line with New Building Regulations Part O to prevent buildings overheating and/or reduce heat loss in winter.	34, 46, 47, 48
HBEE1	Policy makers to start gathering evidence of where aspects of community / development / industry / utility etc will need to be relocated due to climate impacts and develop an evidence base that can inform planning activities (e.g. relocation of properties due to insurmountable flood risk).	38, 46, 47, 48
HBEE2	Local Planning Authorities to identify Coastal Change Management Areas (CCMAs) wherever rates of shoreline change are expected to be significant and implement appropriate regulations to manage development in these areas.	38, 45
HBEE3	Local Planning Authorities to ensure that their Local Plans utilise and build upon the findings and direction provided by strategic documents dealing with coastal change (e.g. Shoreline Management Plans, Coastal Change Management Areas, Flood Risk Management Plans etc).	38, 45
HBEE4	Policymakers to engage with the public to ensure awareness and understanding of the predicted impacts of climate change around the coast generally, and on their local communities specifically – to co-produce knowledge and agree viable actions.	35, 38, 45
HBEE5	Policymakers to investigate (including learning from others) the legal, financial and practical etc means by which coastal communities facing significant adaptation challenges might be helped – so that realistic Adaptation Plans can be developed and delivered where needed. where needed.	35, 38, 45
HBEX1	Encourage installation of green roofs/walls on community buildings.	

intended to be applied in situations where anticipated environmental change is likely to lead to eventual loss and/or alteration." (University of Exeter et al., 2022)

#	Actions	CIG risks addressed
HBEX2	Provide guidance on Flood Re-insurance cover. Flood Re Scheme offers cover to UK mainland households at the highest risk of flooding.	35, 37, 38
HBEX3	Communication of flood warning service by the Environment Agency for individuals to sign up to.	35, 37, 38
HBEX4	Develop and communicate guidance and funds for community contingency plans (e.g. to help remote communities manage risks from flooding, loss of critical power and water supplies).	35, 37, 38
HBEX5	LA's or organisations or sponsors to increase resources (finances, kit etc.) available to cope with climate-related impacts.	35, 37, 38, 46, 47, 48
HBEX6	Beach alerts to expand programme of daily water quality forecasts and electronic beach signage (new app linked to discharges from sewage companies).	43
HBEX7	LA's and EA to communicate the benefits and options for property flood resilience (e.g. flood gates and barriers).	35, 37, 38, 46, 47, 48
HBEX8	Communication of National (UK) Severe Weather Warning Service (NSWWS) by the Met Office for individuals/organisations to sign up to. This service warns for severe/extreme weather relating to: rain, snow, ice, wind, thunderstorm, lightning, extreme heat and fog.	39, 34
HBEX9	Policymakers to ensure that where publicly funded schemes are promoted to provide resilience to coastal erosion/flooding, that they are developed with regard to the predicted long term, climate-change driven coastal changes, and that they incorporate/are contextualised within an understanding of/plans for future adaptation needs.	35, 37, 38, 46, 47, 48

Business and industry

Table 18. Strategic adaptation options and enablers to address climate hazards in the business and industry sector.

#	Actions	CIG risks addressed
BIA1	Establish strategies to develop the South West region as a global research and knowledge hub for climate adaptation action and governance.	49, 50, 51, 52, 54
BIA2	Develop business engagement strategies to enable local authorities and regional action groups to assess private sector needs, gain inputs,	49, 50, 51, 52, 54

	and consult companies on practical implementation of adaptation actions.	
BIA3	Develop and expand the Climate Emergency / Readiness Action group (steering group formed from business, public sector and academia) to take the lead on more projects within the region (e.g. Climate Ready Clyde).	49, 50, 54
BIB1	EA to raise awareness of EA Flood maps and tools for businesses to see if operations will be affected.	49, 50, 54
BIB2	Severe Weather Policy - set out clearly what workers should do when Met Office severe weather warnings are issued and what thresholds they should work under.	49, 50, 54
BIB3	Improve water management (reduce / reuse).	51
BIB4	Put in place a severe weather plan and resilience measures to ensure business continuity, sign up for alerts and check insurances for coverage on flooding / severe weather events.	49, 50, 54
BIB 5	Install moderate / large-scale rainwater harvesting systems.	51
BIC1	Promote the robust and resilient design of new / refurbished assets and infrastructure. E.g., Promote property flood resilience products to protect against severe weather and hazardous events.	49, 50, 54
BIX1	Investment to help pivot local businesses through MP's etc.	52
BIX2	Sustainability Disclosure Requirements (SDR) rollout will have knock-on implications for Small and Medium Sized Enterprises (SMEs) who will increasingly be required to disclose climate related financial risks to financers and major business to business customers. Green Business Grants, and advice and support for SMEs as they transition to net-zero carbon and climate resilience.	49, 50, 51, 52, 54
BIX3	Training and development of key Local Authority, public and private sector personnel.	49, 50, 51, 52, 54
BIX4	Businesses to undertake their own climate change risk assessment, monitor costs from previous severe weather events, build a business case for proactive adaptation measures and resilience planning and the adaptative capacity to integrate these into a programme of change to create a more robust organisation.	49, 50, 51, 52, 54
BIX5	Provide training to staff on the impacts of extreme temperatures in the workplace and encourage appropriate safety procedures for those individuals with medical conditions likely to be aggravated by high levels of heat.	53

Cross-cutting (including international dimensions)

Table 19. Cross-cutting strategic adaptation options and enablers to address climate hazards across multiple sectors (including international dimensions).

#	Actions	CIG risks addressed
CCA1	Local Authority and UKHSA Health Protection Teams to raise awareness of new disease and transmission vectors and work with key stakeholders, e.g. Integrated Care Board, and Environment Agency.	61
CCA2	Define a regional approach (e.g. One Health) to prevent the emergence of zoonotic diseases (infectious diseases transmitted between animals and people).	61
CCA3	As temperatures increase bacterial infection occurrence may rise in higher latitudes. Alongside the faster bacteria reproduction rates, with higher temperatures there is an increased risk of bacteria becoming drug resistant. Raise awareness on the impacts of anti-microbial resistance and prevention measures (e.g. reducing antibiotics use in livestock).	61
CCB1	Encourage and stimulate the purchase of local, environmentally sustainable produce to support a healthier and more resilient food system and reduce food miles.	56
CCC1	Work with partners, including universities, to examine the effects of climate change on crime rates and the potential for civil disorder.	59, 60
CCC2	Police Service to liaise with the Met Office to expand weather forecast alert system for high temperatures and potential increase in crime.	34, 60

Appendix 5 – Signposting to useful resources

Links and signposting to a range of useful resources to support on risk management, adaptation planning and knowledge exchange.

Table 20. List of useful resources to support on risk management, adaptation planning and knowledge exchange

Resource Name	Resource Type	Geographic Scope	Resource description / added notes
Achieving Sustainable Agricultural Systems	Materials	National	Achieving Sustainable Agricultural Systems (ASSIST) - Research by Rothamsted exploring opportunities to reduce the environmental footprint of agriculture while maintaining yields.
Adaptive Release paper	Materials	National	Explores range of options available to natural and historic environment professionals in responding to climate change (paper by Historic England and the University of Exeter).
Antibiotic Guardian	Organisation	National	Resources and signposting to useful organisations and awareness campaign.
Be Flood Ready	Materials	National	Information and guidance on property flood resilience.
Beat the Heat	Materials	National	Top tips for staying cool in a heat wave from UK Government.
Business Resilience Health Check	Tool	National	Bespoke action plan for organisations.
Carbon Neutral Cornwall Hive	Materials	Cornwall	Resources to help reach carbon neutrality.
CCC - 2021 Progress Report to Parliament	Materials	National	Overview of an annual assessment of UK progress in reducing emissions, a biennial assessment of progress in adapting to climate change and recommendations to government.
CCRA3 - National Summary for England	Materials	National	National summary of climate risk for England.
CCRA3 - Research and	Materials	National	A number of commissioned research projects that provide research and

Resource Name	Resource Type	Geographic Scope	Resource description / added notes
Supporting Analysis			supporting analysis for the technical chapters within CCRA3.
CCRA3 - Sector Briefings	Materials	National	Key sector and themed briefings to accompany CCRA3.
CCRA3 - Technical Report	Materials	National	Assessment of the level of risk or opportunity across key sectors, including, Natural Environment, Infrastructure, Health, Communities & Built Environment, Business & Industry and International Dimensions.
CCRA3 - CCC independent advice report of UK climate risk	Materials	National	The Climate Change Committee's (CCC) independent advice report of UK climate risk report on the priority climate change risks and opportunities for the UK.
CCRA3 - The UK's third climate change risk assessment	Materials	National	Five-year assessment which identifies the risks that climate change poses to multiple parts of our society and economy.
Chambers of Commerce	Organisation	National	Support (e.g. resources) for businesses working towards net-zero.
Climate ADAPT - Adaptation Pathways Map	Materials	National	Example adaptation pathways map.
Climate Adaptation Scilly Rainwater Harvesting Grants	Grants	Isles of Scilly	Grants closed 14/10/22. Funding allocated to 20 local businesses across the islands.
Climate Change and Health Adaptation Tool	Tool	Cornwall	Evidence-based tool to support public sector decision makers in climate adaptation.
Climate Change and UK Wildfire	Materials	National	A summary of management of wildfires in the UK, potential impacts of wildfire to society and policy options for increasing the UKs resilience.
CoaST	Network	Cornwall	Support sustainable tourism by connecting organisations and individuals.
Coastal Based Approach (CoBA)	Tool	National	Build resilience in existing coastal community structures, bringing together marine and land-based ecologists.

Resource Name	Resource Type	Geographic Scope	Resource description / added notes
Cornwall & Isles of Scilly Local Nature Partnership	Network	Isles of Scilly + Cornwall	Collaboration of local partners providing joined-up leadership on nature.
Cornwall Climate Action Network	Network	Cornwall	CIC supporting local climate groups. (In development).
Cornwall Climate Care	Organisation	Cornwall	A series of documentaries highlighting the impacts of climate change already being felt in Cornwall.
Cornwall Council Community Emergency Planning	Tool	Cornwall	Practical support for emergency planning for communities.
Cornwall Flood Forum	Organisation	Cornwall	Information on flood risk, preparation and recovery.
Cosy Devon (rebranding as Energy Saving Devon)	Network	Devon	Free retrofitting for lower-income households.
Daras - the Cornwall Land Hub	Materials	Cornwall	One stop shop for funding opportunities and agricultural advice for farmers and landowners.
DATA (Devon Agri-Tech Accelerator)	Tool	Devon	Support and research for farms and agri-businesses looking to move towards sustainable farming.
DEFRA - Property Level Flood Protection Case Studies	Materials	National	DEFRA - Post-Installation Effectiveness of Property Level Flood Protection provides Case Studies.
Devon and Cornwall Health Protection Committee	Organisation	South West	Assurance that adequate arrangements are in place for prevention, surveillance, planning and response to communicable disease and environmental hazards, required to protect the public's health.
Devon and Severn IFCA	Network	Devon	Devon and Severn Inshore Fisheries and Conservation Authority (IFCA) marine management framework.

Resource Name	Resource Type	Geographic Scope	Resource description / added notes
Devon Carbon Plan	Materials	Devon	Sets out how Devon will reach net-zero by 2050, with actions for each level of society.
Devon Climate Emergency	Network	Devon	Resources to support Devon achieving net-zero and increased resilience.
Devon Communities Together	Organisation	Devon	Support, services, funding opportunities aimed at communities.
Devon County Council Flooding	Materials	Devon	Signposting to flood resources.
Devon Food Partnership	Network	Devon	Facilitating communication between food stakeholders to improve food distribution, governance and sustainability.
Devon Local Nature Partnership	Network	Devon	Collaboration of local partners providing joined-up leadership on nature.
Devon Maritime Forum	Organisation	Devon	Provide services to improve communication between coastal and marine stakeholders.
DCIoS Nature Based Solutions and NFM Group	Network	South West	Devon, Cornwall and Isles of Scilly Nature Based Solutions and Natural Flood Management (NFM) Group.
	Network	Devon	Partnership for each of Devon's main river estuaries.
EA Flood Risk Warnings	Tool	National	Environment Agency (EA) flood warnings and alerts in England, check for flooding near you and get flood warnings by phone, text or email.
EA Pathfinder Projects	Network	South West	Environment Agency (EA) promoting property flood resilience.
Environmental Improvement Plan 2023	Materials	National	First revision of the government's 25 Year Environment Plan for England.
Environmental Land Management Scheme (ELMS)	Materials	National	Briefing on Environmental Land Management Scheme (ELMS) introduction and benefits.

Resource Name	Resource Type	Geographic Scope	Resource description / added notes
Farm Innovation Toolkit	Tool	National	A toolkit that provides options for innovation and technology for individual farm businesses.
Flood Re	Organisation	National	Flood Re information on flood re-insurance scheme.
Flood risk management plans (FRMP)	Materials	National	National and regional plans for FRM.
FloodHub - Property	Materials	National	Property Flood Resilience Toolkit.
Food Farming Countryside Commission land use framework	Network	National	Guide for decision makers to support better decisions about land.
Green Futures Network	Network	National	Access to academic research on climate mitigation and adaptation.
Heart of the South West Local Enterprise Partnership	Network	Devon	Advice and support for businesses in Devon on economic growth, employments and prosperity.
IPCC AR6	Climate data	National	Climate projection data.
Islands Futures Board	Organisation	Isles of Scilly	Group of representatives of IoS stakeholders that guide the Islands' economic plan.
Isles of Scilly Inshore Fisheries and Conservation Authority (IFCA)	Network	Isles of Scilly	Marine management framework.
ISO 14090:2019 Adaptation to climate change – Principles, requirements and guidelines	Materials	National	Principles, requirements, and guidelines for climate change adaptation. This includes integrating adaptation within organizations, understanding impacts and uncertainties and how these can be used to inform decisions.
Lagas	Tool	Cornwall	Tool for viewing nature recovery network and habitat opportunities.

Resource Name	Resource Type	Geographic Scope	Resource description / added notes
Local Climate Adaptation Tool (LCAT)	Tool	South West	Tool for local government and public health professionals to explore climate change forecasts.
Local Government Association Coastal Special Interest Group	Organisation	National	Influence government and support local authorities on coastal issues. Membership held by Cornwall Council, Devon County Council, Teignbridge, East Devon, Torridge and North Devon councils.
Local Resilience Forum	Network	South West	Coordinates responses to major emergencies, provides emergency plans and training.
Magic Maps	Tool	National	Tool for viewing environmental GIS data i.e. species, habitats etc.
Met Office	Organisation	National	Weather forecasts, advice and warnings, plus projected climate change impacts.
	Materials	National	The key actions the government is taking to address the risks and opportunities posed by a changing climate for the 5-year period of 2018 to 2023.
National Adaptation Programme	Materials	National	Latest report published summer 2023 for– 2023 - 2028.
National Coastal Erosion Risk Map (NCERM)	Tool	National	Interactive map showing erosional extents, where certain habitats will start to disappear.
National Trust Climate Hazards	Tool	National	Tool that shows the exposure of UK sites to climate hazards, comparing 2020 to 2060.
NHS Heatwave	Materials	National	Information on how to cope in hot weather.
North Devon Biosphere	Network	Devon	Strategy for sustainable development of nature and communities.
North Devon Marine Natural Capital Plan	Materials	Devon	Locally specific marine plan based on a natural capital approach.
Parish County Forums	Network	-	Community groups for parish council areas.

Resource Name	Resource Type	Geographic Scope	Resource description / added notes
Plan for Water	Strategy	National	The Defra (2023) Plan for Water outlines how the government will deliver a clean and sustainable water supply, including delivering on its own goals in the Environmental Improvement Plan 2023.
Plymouth - projecting sea state (warning system)	Materials	Devon	Sea state warning system.
Plymouth Sound National Marine Park	Organisation	Devon	Aim to create better access to Plymouth Sound. Providing resources to marine activities and connecting organisations.
Property Flood Resilience Grants	Grants	Devon	Funding scheme for homeowners to cover a property survey and purchasing of necessary flood resilience measures.
South West Climate Change Portal (Australia)	Materials	National	Information on adaptation pathway planning.
South West Net Zero Hub	Organisation	South West	Resources to support organisations and communities to implement low carbon energy projects.
South West Rail Resilience Programme	Materials	South West	Information on a programme run by Network Rail to increase the rail resilience between Dawlish and Teignmouth.
South West Water Website	Organisation	South West	Signposting to grants, free water saving devices and tips.
	Organisation	Cornwall & Isles of Scilly	Business sustainability consultation, access to grant funding.
The Adaptation and Resilience in the Context of Change network (ARCC)	Materials	National	Adapting UK homes to reduce overheating – policy & practice briefing.
Transition Network	Organisation	National	e.g. Transition Town Totnes. Community-led charity working on projects to reduce emissions use.
UCKP18 data	Climate data	National	Local level climate projections produced by the Met Office.

Resource Name	Resource Type	Geographic Scope	Resource description / added notes
UK Health Security Agency	Organisation	National	Developing a 'Climate Change and Health Security' unit to provide adaptation options and monitoring.
UKCIP Adaptation Wizard	Tool	National	A 5-step process to help your organisation adapt to climate change, with useful information and resources.
Volunteer Cornwall	Organisation	Cornwall	Information and support.
Wild About Devon	Network	Devon	Project within the Devon Local Nature Partnership, signposting to useful resources to help communities take action.
Your Shore Network	Network	Cornwall	List of community led marine conservation groups.
Zoonoses Contingency Plan	Materials	National	How Defra will manage incidents of endemic zoonotic diseases in England.

Appendix 6 – Adaptation Plan

Natural environment (including agriculture and forestry)

Strategic Direction A - Support and actively improve the adaptive capacity of landscapes and habitats

Ref	Action	Timescale	Responsible
NEA1	Develop a collaborative regional water strategy to manage water availability and safe treatment and disposal of waste water, including aquifer recharge, control over-extraction, increase the use of rainwater harvesting, reduce effluent discharge etc	Short	**Environment Agency**, Natural England, South West Water, Cornwall Catchment Partnership, West Country Water Resources, East Devon Catchment Partnership
NEA4	Set out a regional strategy to protect, restore and enhance terrestrial carbon stores from land use change and increase the resilience where possible (e.g. peatland restoration, woodland management, soils).	Medium	**Natural England**, Peatland Partnerships, Wildlife Trusts, Cornwall Catchment Partnership, Local Authorities
NEA5	Local Nature Recovery strategies to demonstrate what type of habitat will be supported in the future. (e.g. intertidal zones, the benefits of different saltwater / freshwater marsh etc.) and opportunities for supporting human health.	Long	**Wildlife Trusts**, Natural England, Peatland Partnerships

Strategic Direction B - Use agriculture / forestry networks and knowledge to implement best practice. Provide them with key information to protect ecosystem services

Ref	Action	Timescale	Responsible
NEB1	Promote and Improve soil management techniques (Min-till cultivation, cover crops, ley-arable rotations) to protect soil structure / nutrient levels and increase resilience to adverse weather / aridity impacts. Consider adoption of a systems thinking approach such as the Land Use Framework.	Short	**The Devon and Cornwall Soils Alliance**, Soil Association, Duchy of Cornwall. Mid-Devon Silvopasture Group
NEB5	Adapt agricultural land use through Environmental Land Management Scheme (ELMS) funding and Biodiversity Net Gain funding (e.g. buffer strips, conservation areas etc.).	Medium	**Future Farming Resilience Project** DEFRA, Local Authorities, AONB Bodies

NEB6	Develop alternative water supplies (e.g. boreholes) and use of rainwater harvesting and storage (ponds/reservoirs) on farm. Put in ponds, swales and wetlands.	Medium	**DEFRA**, Natural England, Farming Resilience Fund Wildlife Trusts, Natural England, AHDB

Strategic Direction C - Maximise community participation and connection to nature

Ref	Action	Timescale	Responsible
NEC1	Provision of capacity building support and advice to community groups from non-governmental organisations (NGOs) for taking action to support nature enhancement.	Short	**Wildlife Trusts**. Exeter University, Local Nature Partnerships
NEC2	Facilitate landowners connecting with local nature groups to understand the benefits around alternative land use to support biodiversity and the natural environment and human health.	Medium	**Future Farming Resilience Project** DEFRA, Local Authorities, AONB, Wildlife Trusts

Infrastructure

Strategic Direction A - Develop cross sector collaboration to equip the region with the knowledge and skills to take adaptation action

Ref	Action	Timescale	Responsible
INFA1	Build on and develop resilience partnerships. Ensure their Command, Control and Co-Ordination arrangements for an emergency which involves the loss of both power and telecoms, and actively involve utilities companies in local planning where required to ensure linkage with regional and national developments.	Short	**Local Authorities**, Fire and Rescue Services, South West Water, National Grid, Openreach, Environment Agency, Highways Agency
INFA2	Emergency Planning - Map voluntary and community sector assets and capabilities in their areas. Develop processes for their swift activation, deployment and coordination. Ensure distributed energy resources (DER), such as customer-premise microgrids (e.g. solar + storage systems), community microgrids, or mobile battery and generation systems can provide life-preserving power to community shelters and public health facilities during emergencies.	Medium	**Local Authorities**, Community Councils, National Grid, Openreach, Devon Community Resilience Forum, Cornwall Rural Community Charity

INFA3	Develop a working group with infrastructure industry associations and providers at regional level to improve interdependencies awareness within the infrastructure sector (Co-location of infrastructure, e.g. bridge crossings / roadways and impact of cascade failure). Engage with National Grid, Hydrologists and power system modelers to simulate and understand the impacts of compounded flooding, heat waves and droughts on the power generation in the region.	Medium	**Local Authorities**, Highways Agency, National Grid, Network Rail, Openreach, EE, Vodaphone

Strategic Direction B - Enhancing long term Infrastructure resilience through local stewardship

Ref	Action	Timescale	Responsible
INFB1	Develop joint strategies, research and longer-term schemes with South West Water, Lead Local Flood Authority, and Catchment Partnerships to improve catchment management both for high flow areas at flood risk and protect low flow by reducing demand / drought impacts.	Short	**Catchment Partnerships**, South West Water, Environment Agency, ANOB bodies, Openreach, Environment Agency, Highways Agency
INFB2	Enable and promote climate resilience through procurement processes. Consider climate resilience of new assets and infrastructure when comparing competing bids, by accounting for costs over the asset lifetime under alternative climate scenarios.	Medium	**Local Authorities**, Local Government Association, South West Water, National Grid, Openreach, Environment Agency, Highways Agency
INFB3	Communicate behavioural change measures to reduce consumption of water and energy.	Short	**South West Water, National Grid,** Local Authorities, Catchment Partnerships

Health and the built environment

Strategic Direction A - Increase community awareness of how climate change can impact physical and mental health

Ref	Action	Timescale	Responsible
HBEA1	Working with relevant agencies and our communities, develop a climate change	Short	**Local Authorities**

	awareness campaign to inform stakeholders, including the public, of the projected range of changes and their impacts alongside how we are adapting and what we can all do to respond.		
HBEA2	Public authorities to continue to provide timely & localised information on climate change impacts to enable appropriate adaptation planning byall .	Short	**Environment Agency, Local** Authorities, Local Government Association,

Strategic Direction B - Support residences and businesses on private water supplies to adapt to climate change threats, including security of supply and changing water quality

Ref	Action	Timescale	Responsible
HBEB1	Local authorities to provide advice and expanded monitoring for properties with private water supplies (quality and quantity).	Short	**Local authorities,** DWI, South West Water
HBEB2	Provide access to and guidance on benefits of rainwater harvesting systems (i.e. to capture excess rainfall for use in the garden) and grey water harvesting systems (i.e. collect and treat wastewater from showers, baths and wash basins).	Medium	**South West Water,** Local Authorities, Environment Agency, Catchment Partnerships. Local Government Association,

Strategic Direction C - Assist public services to understand climate change impacts on their assets, service delivery and the community's health

Ref	Action	Timescale	Responsible
HBEC1	Promote and provide staff with time to undertake volunteer work with local Non-Governmental Organisations and develop Corporate social responsibility (CSR).	Medium	**Local authorities,** DWI, South West Water
HBEC2	Develop a strategy and guidance for the adaptation of heritage assets to climate impacts, including a "Managed Decline to Adaptive Release[4]" strategy to record historic buildings, sites, and landscapes as a part of managed coastal retreat due to sea level rise, erosion and storms.	Medium	**Historic England,** Local Museums, Community Archaeology Society, Duchy of Cornwall, ANOB groups
HBEC3	Work with partners to develop the materials and training to support in the establishment	Short	**Local Authorities,** Devon / Cornwall / ISO

	and operation of local Community Resilience Groups (or similar existing groups) and the development of community adaptation plans.	Community Resilience Forums, Cornwall Rural Community Charity, Community Councils,

Strategic Direction D - Minimise heat-related illness and death

Ref	Action	Timescale	Responsible
HBED1	Provision of funding and guidance for properties to be retrofitted in line with New Building Regulations Part O to prevent buildings overheating and / or reduce heat loss in winter.	Medium	**Local authorities,** Historic England, CITB, National Housing Federation

Strategic Direction E - Ensure the region is ready for, and resilient to, flooding and coastal change

Ref	Action	Timescale	Responsible
HBEE1	Policy makers to start gathering evidence of where aspects of community / development / industry / utility etc will need to be relocated due to climate impacts and develop an evidence base that can inform planning activities (e.g. relocation of properties due to insurmountable flood risk).	Medium	**Environment Agency,** Local authorities
HBEE3	Local Planning Authorities to ensure that their Local Plans utilise and build upon the findings and direction provided by strategic documents dealing with coastal change (e.g. Shoreline Management Plans, Coastal Change Management Areas, Flood Risk Management Plans etc).).	Medium	**Local authorities,** Environment Agency
HBEE4	Policymakers to engage with the public to ensure awareness and understanding of the predicted impacts of climate change around the coast generally, and on their local communities specifically – to co-produce knowledge and agree viable actions.	Short	**Environment Agency,** Local authorities

Business and industry

Strategic Direction A - Ensure the region is ready for, and resilient to, flooding and coastal change

Ref	Action	Timescale	Responsible
BIA1	Establish strategies to develop the South West region as a global research and knowledge hub for climate adaptation action and governance.	Medium	**CIOS Local Enterprise Partnership, South West LLEP,** Exeter University
BIA2	Develop business engagement strategies to enable local authorities and regional action groups to assess private sector needs, gain inputs, and consult companies on practical implementation of adaptation actions.	Medium	**CIOS Local Enterprise Partnership, South West LLEP,** Local Authorities
BIA3	Develop and expand the Climate Emergency / Readiness Action group - (Steering group formed from business, public sector and academia) to take the lead on more projects within the region (e.g. Climate Ready Clyde).	Short	**Climate Emergency / Readiness Action Group** Environment Agency**,** Local authorities, LLEP's

Strategic Direction B - Develop industry readiness for impacts e.g. supply chain security, drought restrictions

Ref	Action	Timescale	Responsible
BIB2	Severe Weather Policy - set out clearly what workers should do when Met Office severe weather warnings are issued and what thresholds they should work under.	Medium	**Environment Agency**, CIOS Local Enterprise Partnership, South West LLEP, Exeter University
BIB3	Improve water management (reduce / reuse).	Medium	**South West Water**, CIOS Local Enterprise Partnership, South West LLEP, Local Authorities
BIB4	Put in place a severe weather plan and resilience measures to ensure business continuity, sign up for alerts and check insurances for coverage on flooding / severe weather events.	Short	**Environment Agency**, Climate Emergency / Readiness Action Group, Local authorities, LLEP's

Strategic Direction C - Enhancing long term business resilience through local stewardship.

Ref	Action	Timescale	Responsible
BIC1	Promote the robust and resilient design of new/refurbished assets and infrastructure. E.g., Promote property flood resilience products to protect against severe weather and hazardous events.	Medium	**Local authorities,** Environment Agency

Cross-cutting (including international dimensions)

Strategic Direction A - Improve the community's knowledge and awareness of the health impacts of climate change, both current and into the future.

Ref	Action	Timescale	Responsible
CCA1	Local Authority and UKHSA Health Protection Teams to raise awareness of new disease and transmission vectors and work with key stakeholders, e.g. Integrated Care Board, and Environment Agency.	Medium	**Local authorities,** NHS Boards
CCA2	Define a regional approach (e.g. 'One Health') to prevent the emergence of zoonotic diseases (infectious diseases transmitted between animals and people).	Short	**NHS Boards**, Animal Plant Health Agency, Public Health England, DEFRA, Local Authorities
CCA3	As temperatures increase bacterial infection occurrence may rise in higher latitudes. Alongside the faster bacteria reproduction rates with higher temperatures there is an increased risk of bacteria becoming drug resistant. Raise awareness on the impacts of anti-microbial resistance and prevention measures (e.g. reducing antibiotics use in livestock).	Short	**Responsible use of medicines in agriculture alliance,** NHS Boards, NFU, National Office of Animal Health (NOAH)

Strategic Direction B - Improve the community's knowledge and awareness of the health impacts of climate change, both current and into the future.

Ref	Action	Timescale	Responsible
CCB1	Encourage and stimulate the purchase of local, environmentally sustainable produce to support a healthier and more resilient food system and reduce food miles.	Medium	**Local authorities,** NHS Boards

Strategic Direction C - Information and liaison on effects climate change have on crime rates and civil disorder.

Ref	Action	Timescale	Responsible
CCC1	Work with partners, including universities, to examine the effects of climate change on crime rates and the potential for civil disorder.	Medium	**Devon and Cornwall Police, Universities,**
CCC2	Police Service to liaise with the Met Office to expand weather forecast alert system for high temperatures and potential increase in crime.	Short	**Devon and Cornwall Police,** Met Office, NHS Boards, Local Authorities (Social Care)

Appendix 7 – Full list of Climate Impacts Group Membership

Environment Agency (Current Chair)
Met Office
University of Exeter
NHS England
Devon County Council
Devon Climate Emergency Partnership
South West Water
Devon & Cornwall Police
Public Health Devon
Devon Local Nature Partnership
Devon, Cornwall and the Isles of Scilly Local Resilience Forum
Cornwall Council
Council of the Isles of Scilly
Ministry of Housing, Communities & Local Government
Westcountry Rivers Trust