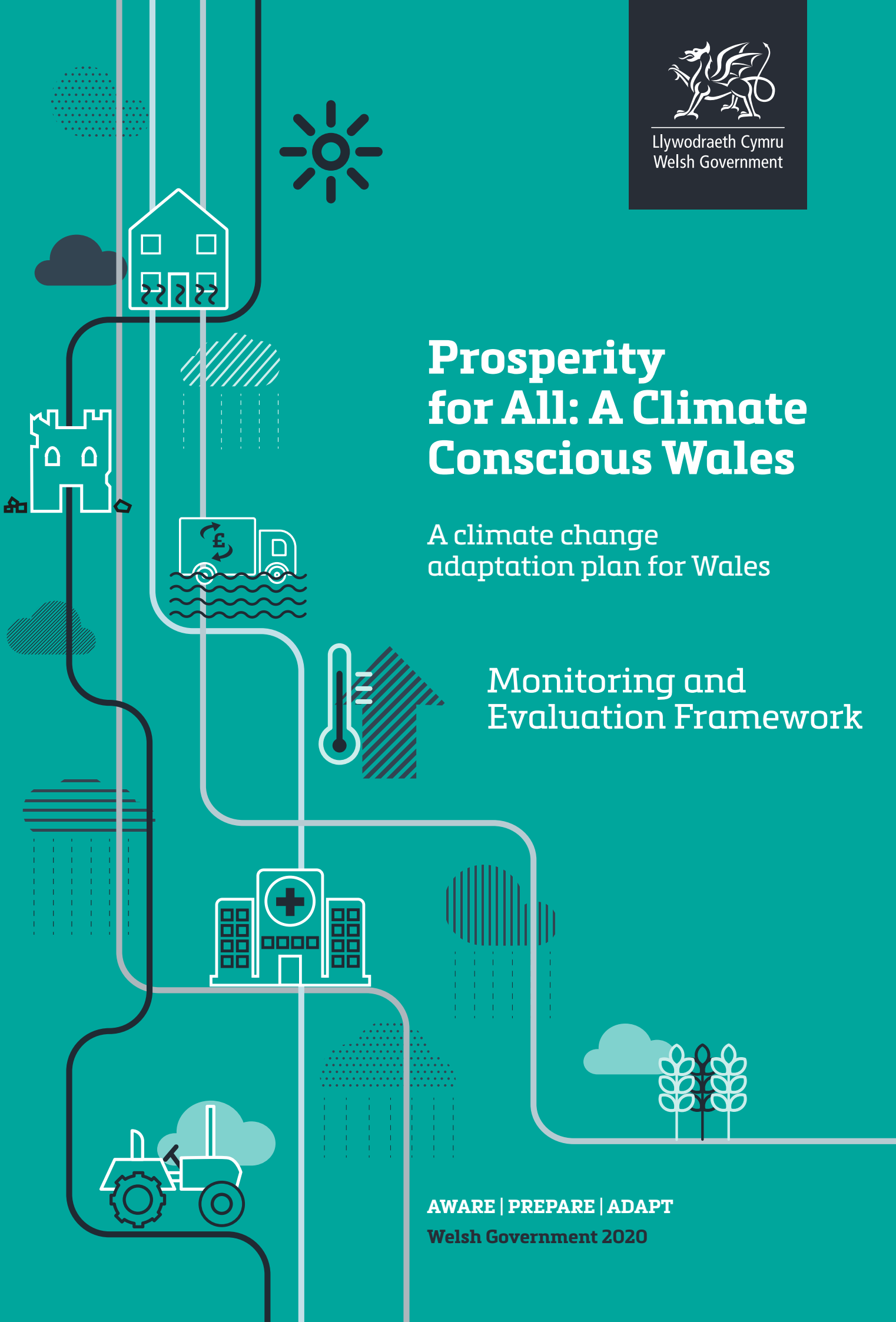Llywodraeth Cymru
Welsh Government

Prosperity for All: A Climate Conscious Wales

A climate change adaptation plan for Wales

Monitoring and Evaluation Framework

AWARE | PREPARE | ADAPT

Welsh Government 2020

Contents

Introduction

This Monitoring and Evaluation Framework (MEF) has been developed to support the delivery of the *Prosperity for All: A Climate Conscious Wales (PfACCW)*, our climate change adaptation plan for Wales. Set out within this MEF is a governance structure allowing for scrutiny of the plan's delivery, as well as the measures, outputs, outcomes and timelines to which we intend to complete the proposed actions.

Methodology

This framework was developed in coordination with Netherwood Sustainable Futures, and follows recommendations made in studies into evaluating climate change adaptation by Power et al (2018) and Russ et al. (2018), commissioned by the UK Committee on Climate Change.

A central approach of this work has been, for each of the actions in PfACCW, to use a 'theory of change' approach as set out in the HM Treasury's Magenta Book[1] to understand what is intended by each action – and therefore determine the best way in which to monitor and evaluate progress. The following questions were used to understand what change was intended through each action:

› what are the outputs from the proposed action?

› what is the desired outcome/impact/ change resulting from the action?

› how does the action reduce climate risk/ vulnerability?

› what indicator, baseline, narrative or measure might best monitor and evaluate progress for each action in the PfACCW?

The approach to determining the MEF involved discussions with policy leads within the Welsh Government, documentary analysis, on-line research, advice from the UK Committee on Climate Change and advice from an external expert group, recruited to represent each of the 8 themes in the plan.

It will be important to monitor and evaluate the change stimulated by the action in PfACCW as well as the delivery of products, such as toolkits, mapping and guidance. However, monitoring and evaluation of climate change adaptation is commonly known to be problematic. Many of the anticipated impacts of climate change, and their resulting risks, have long lead-in times, significant ranges in uncertainty and may indeed never happen. In many cases, climate change is only one contributing factor to the problems we face and, therefore, measuring the attribution of adaptation measures towards success can be difficult.

This necessitates a mainly qualitative approach to capturing progress on PfACCW implementation. Therefore, the approach to this MEF is chiefly qualitative, based on developing:

› narratives on adaptation;

› evidence of change; and

› case studies of practice which reduces climate risk and vulnerability.

It is also important to note that the intention of taking this approach was to avoid assigning key metrics, indicators and statistics to actions to monitor and evaluate progress, because they are vaguely relevant. In many strategies, listing these metrics can often

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[1] 'The Magenta Book', HM Treasury guidance on what to consider when designing an evaluation. Published 27 April 2011.

be meaningless and provide little insight into implementation. Nevertheless, the MEF does consider the use of quantitative indicators where the action clearly influences the indicator, and resources are available for measuring them. Additionally, the combination of qualitative and quantitative indicators will be used to demonstrate attribution of adaptation towards complex multi-causal risks.

The advantage of this approach is the outputs of the MEF can be used to communicate adaptation, build capacity and spread adaptation practice, as well as monitor and evaluate progress. There is an opportunity to use this approach over 5 years to collate and exchange information and build capacity on adaptation action within Welsh Government and partner organisations. The rationale behind this approach is that the MEF needs to enable us to understand how the action has affected change. It should be noted that indicators from the Climate Change Commission, DEFRA and Welsh Government National Indicators have been considered as part of the MEF.

The success of the MEF will be determined by establishing internal and external governance around the Plan and the MEF itself. Therefore in addition to the MEF detailed in part 3 below, a governance structure is first set out in part 1.

Part 1:
Governance structure for monitoring delivery of Prosperity for All: A Climate Conscious Wales

Clear governance and accountability around a Monitoring and Evaluation Framework (MEF) are essential to ensure the PfACCW actions are implemented effectively. This section details the processes through which adaptation in Wales will be governed.

Monitoring and Governance

Step 1.

As actions under the PfACCW are delivered, policy officials (the Welsh Government) and external delivery partners gather evidence as set out in the Monitoring and Evaluation Framework (MEF).

It will be the responsibility of Welsh Government officials and external delivery partners to carry out the process of collecting evidence of progress. Indicators in part 3 of this document set out the expectations of what evidence should be produced.

Step 2.

Evidence gathered from step 1 above is passed to the relevant delivery leads representing sectors in Welsh Government's Climate Change Portfolio Governance Board (CCPG). The CCPG meet once every 8 weeks to discuss progress in delivering commitments set out in PfACCW, and Welsh Government decarbonisation plan, *Prosperity for All: A Low Carbon Wales*.

Step 3.

The CCPG in turn reports to the Climate Change subject committee of the Senedd, and the Cabinet of Welsh Government.

Step 4.

Following each year, Welsh Government's Senior Climate Change Resilience Advisor (SCCRA) collates the evidence from discussions set out in the steps above and prepares the evidence for the annual reporting process using the framework set out in parts 2 and 3 of this document.

To aid delivery of the actions in PfACCW, internal and external delivery groups will be established, as detailed below.

Roles of the Core Internal Adaptation Group (CIAG)

› To provide policy expertise.

› To discuss collaborative delivery of actions and policies stated in *Prosperity for All: A Climate Conscious Wales* where Welsh Government is identified as the lead organisation.

› To interpret new and emerging risks and what they mean for Wales.

› To discuss potential new actions to support Climate Change Adaptation in Wales in response to new and emerging risks and evidence.

Roles of the External Stakeholder Adaptation Group (ESAG)

ESAG will act as a forum, creating the space for external delivery partners, as identified in *Prosperity for All: A Climate Conscious Wales*, to increase Wales' resilience to climate change from a perspective external to that of the Welsh Government.

› To engage and collaborate on outstanding joint issues relating to climate risk in Wales.

› To share latest knowledge and understanding on climate risk and adaptation.

› To provide feedback on external delivery progress to the Chair.

› Suggest ideas for consideration by the Welsh Government Climate Change Portfolio Governance (CCPG) Board.

Part 2:
Reporting structure for evaluating delivery of Prosperity for All: A Climate Conscious Wales

Following on from step 3 in part 1 above, the resulting evidence will undergo a reporting process.

Reporting and Evaluation

1. A draft report is put to the CCPB to discuss outcomes from governance meetings. A final draft is completed following comments from these discussions.

2. Depending on which year the report is completed, the following process is followed:

   a. **Year one.** The report is submitted to the Minister for Energy, Environment and Rural Affairs for information.

   b. **Year two.** The report is submitted to the Minister for Energy, Environment and Rural Affairs for approval to be published.

   c. **Year three.** The report is submitted to the Minister for Energy, Environment and Rural Affairs for information.

   d. **Year four.** An external report is commissioned and developed for publication. Alongside the next Climate Change Risk Assessment, the resulting external report will help identify changes needed to inform the development of the next climate change adaptation plan for Wales.

The governance and reporting processes will inform any additional and proposed actions to be added to PfACCW in order to further progress towards climate change adaptation in Wales.

Part 3:
The Monitoring and Evaluation Framework for Prosperity for All: A Climate Conscious Wales

Note that those sub actions shown in **bold** relate to the four areas of focus with *Prosperity for All: A Climate Conscious Wales*. All other sub-actions refer back to the relevant actions in the technical annex[2].

Contents

Strategic Actions

ST1	Review and update our approach to communication for climate change adaptation in Wales.

Sub-action(s)	• Update and review climate change adaptation webpages. • Review and update adaptation tools. • Increase communication through more online presence and other channels. • Develop and publish a children and young people's version of this adaptation plan. • Publish a Wales-level summary analysis of the UK Climate Projections 2018.
Output(s)	• Adaptation webpages updated. • Online tools and case studies updated. • Improved online and offline communication. • Children and young person's version of plan published. • UKCP18 leaflet published.
Outcome(s)	• Public and organisational understanding of climate risk increased. • Better public awareness of how to prepare for a changing climate and where to find help to achieve this.
Timeline(s)	• Webpages updated in 2019. • Children and Young persons' version published by 2020. • UKCP18 leaflet published online by 2020. • All other communication work ongoing to end of reporting period.
Indicators	Delivery of the following on time, to budget: • adaptation webpages • tools and case studies • young person's version of the PfACCW. Peer review use of: • Adaptation webpages by user groups • Adaptation tools and their use among target audiences • Young Person's Version of the Plan.

ST2	Integrate the consideration of climate risks in all future policy and business planning within Welsh Government and encourage the same in all other public bodies.

Sub-action(s)	• Include climate change risk as a requirement in Welsh Government's integrated impact assessment process. • Review and update Welsh Government's adaptation statutory guidance. • Review, if necessary, Welsh Government's position on the use of the Adaptation Reporting Powers (ARP) of the Climate Change Act 2008.
Output(s)	• Climate change risk considered within Welsh Government's Integrated Impact Assessment (IIA) process. • Statutory guidance updated.
Outcome(s)	• Climate risks are considered more in material subject to IIA and therefore more likely to be better managed. • Public bodies are more likely to plan for climate risks if compelled by improved guidance. • Organisations are more likely to act should Ministers require reporting authorities to report on adaptation.
Timeline(s)	• Statutory guidance reviewed in 2020. • IIA process ongoing to end of reporting period. • ARP review to be completed by 2021.
Indicators	Delivery of the following on time and to budget: • Statutory guidance to public bodies • Ministerial Statement on ARP. • Review of use and impact of Statutory Guidance on public bodies. • Quality review of a sample of completed IIAs. • Quality review a sample of public bodies corporate planning for adaptation content.

ST3	Assess the risks and opportunities presented by climate change through active engagement in UK research programmes.
Sub-action(s)	• **Collaboration with academia, research councils, NGOs, UK Government and the devolved administrations to fill knowledge gaps on the risks and opportunities of climate change.** • **Support development of the 3rd UK Climate Change Risk Assessment (CCRA).** • Collaborate with the UK Committee on Climate Change to monitor those risks designated as 'watching brief'.
Output(s)	• Research undertaken. • Third CCRA published. • Risks monitored.
Outcome(s)	• Improved understanding of risks from climate change to Wales in order to assist development of adaptation policy and action. • Monitoring of risks in case of future change of detriment to Wales.
Timeline(s)	• Research will be ongoing to the end of the reporting period. • Publication of the next CCRA is expected in 2021.
Indicators	• Number of research projects completed for all climate related research supported through Welsh Government. • Catalogued summary of research undertaken. • Ministerial statement on outcome of third CCRA for Wales.

ST4	Support the international community to adapt to climate change at a global level.
Sub-action(s)	• Support projects to help other countries adapt to climate change where they are otherwise less able. • Continue collaboration with the international adaptation community to share adaptation best practice and knowledge of climate impacts and risk.
Output(s)	• Engagement with international networks. • International projects delivered.
Outcome(s)	• Knowledge sharing with international partners allows for improved understanding of effective adaptation practice. • Supporting developing countries through adaptation projects reduces climate change risks elsewhere.
Timeline(s)	• Ongoing to the end of the reporting period.
Indicators	• Documentary review of how climate risk has been factored in to projects, including climate change adaptation action. • National Indicator 46 – Social Return on Investment.

Adaptive Nature & The Rural Economy

AN1	Restoration of uplands and managing them for biodiversity, carbon, water, flood risk, energy and recreational benefits.

Sub-action(s)	• **NRW to develop a National Peatland Action Programme with costed proposals for the provision of a 5 year restoration programme.** • **Increase our efforts to protect peatlands from drought and flood, and restore organic soils to become active peatlands.** • Continue a prioritised programme of restoration of afforested deep peatlands on the Welsh Government Woodland Estate.
Output(s)	• Prioritised afforested deep peatland sites are restored on the WGWE. • *Peatland restoration on Welsh Government Woodland Estate through NRW Woodland Estate Management Plans*.
Outcome(s)	• Emissions from damaged peatland is reduced. • Peatlands in good ecological condition are more resilient to climate change, and help to regulate the flow of water, smoothing out flood peaks and ensure a supply of base-flow during drought periods.
Timeline(s)	• Ongoing programme of prioritised sites.
Indicators	• Condition of restored afforested deep peatland sites on the WGWE. • Number of hectares of afforested deep peatland restored to peatland habitat. • Review of content of Woodland Estate Asset Management Plans and Reports via NRW (NRW). • Number of schemes enabling nature based solutions.

AN2	Increased canopy cover and well located woodland for greatest ecosystem service value.

Sub-action(s)	• **Encourage integration of woodland with other land uses to enable them to adapt to climate change.** • **Maximise adaptation benefits in the design of the First Minister's National Forest Programme.** • **Use the statutory and policy framework in Wales to expand the woodland resource in appropriate locations.** • Continue to bring special sites, Plantation on Ancient Woodland sites (PAWS) and priority habitats into favourable management on the Welsh Government Woodland Estate. • Promote the use of i-tree Eco and similar tools. • Promote resilience to pests and diseases and develop and maintain a risk register of pests and diseases and their threat to tree health in Wales.
Output(s)	• Woodlands are safeguarded, enhanced and benefits and associated ecosystem services promoted as an asset for adaptation to climate change. • Prioritised PAWS are restored on the WGWE. • The biodiversity of the WGWE will be maintained, conserved, and if appropriate enhanced, especially in relation to designated sites and priority habitats. • Promote the need to diversity tree species and age structure. • A risk register of pests and diseases is developed and maintained at a UK level, sharing expertise.
Outcome(s)	• Increasing woodland cover in the right areas helps to counteract the impacts of climate change. Woodlands are an important asset to adaptation, for example to improve air quality, increase biosecurity on farms, protect soils, buffer water courses, mitigate flood risk, provide habitat and provide cooler environments. • Woodlands are more resilient to pests and diseases. • Monitor and early detection of pests and diseases and take appropriate and timely action.
Timeline(s)	• Ongoing, with collaboration at UK level.
Indicators	• Number of Forest Design plans containing PAWS restoration and management objectives for designated sites and priority habitats (area managed). • Area of new woodland planting per year. • Protected Zone surveys undertaken to monitor/detect pests and diseases. • Connectivity of woodland networks. • Carbon balance of woodlands.

AN3	Develop resilient ecological networks.
Sub-action(s)	• **Develop evidence base for resilient ecological networks to sit alongside ecosystem service mapping for area statements to inform place based working.** • **Promote resilient ecological network delivery across all relevant policies and programmes, including the development of the future land management programme.** • Assess the condition of the protected site network and put in place appropriate restoration management measures.
Output(s)	• Evidence base and mapping established for ecological networks and ecosystem services. • Promotion of ecological network delivery undertaken through area statements. • Condition of protected site network assessed. • Restoration management measures established.
Outcome(s)	• The health and resilience of our ecosystems is incrementally improved so that they continue to support biodiversity and deliver important ecosystem services in the face of climate change.
Timeline(s)	• First iteration of area statements to be in place by March 2020. • Ongoing through reporting period.
Indicators	• Number of area statements in place with links to resilience and ecosystem service mapping layers. • Number of schemes enabling nature based solutions. • Percentage of protected site network in a favourable condition. • Area of habitat restored.

AN4	**Protect our natural habitats from the increasing risks associated with invasive non-native species.**

Sub-action(s)	• Collaborate on and implement actions in the GB invasive non-native species (INNS) strategy. • Incorporate biosecurity measures into marine proposals to reduce the risk of introducing and spreading marine INNS. • Co-ordinate, set priorities and raise awareness of INNS in Wales through the Wales INNS group. • Introduce contingency plans to respond to newly arrived INNS. • Implement EU Invasive Alien Species Regulation obligations.
Output(s)	• Widespread awareness and understanding of the risks and adverse impacts associated with INNS. • Marine proposals include biosecurity measures to reduce risks of introducing and spreading INNS. • Improved co-ordination and co-operation on INNS issues at a Wales, UK and international level. • INNS policy is integrated within the broader biosecurity and ecosystem resilience agendas. • Legislation in place prescribing offences and penalties needed to comply with the requirements of the EU Invasive Alien Species.
Outcome(s)	• Climate change is likely to favour INNS leading to increasing numbers of new species and spread of established INNS in Wales's territorial and marine ecosystems. These actions will support ecosystems from the threats of climate change.
Timeline(s)	• Ongoing, with collaboration at UK level.
Indicators	• Guiding framework in place for national, regional and local mitigation, control or eradication initiatives. • Pathway Action Plans in place. • Contingency plans in place to be able to respond rapidly to the incursion of significant new INNS. • Number of marine proposals which include biosecurity measures to reduce the risk of introducing and spreading invasive non-native species'.

AN5	Maintain, enhance and restore floodplains and hydrogeological systems to reduce flood risk and improve water quality and quantity.
Sub-action(s)	• Utilise the evidence base and collaborations being developed through area statements to deliver targeted interventions in catchments. • **Promotion of good environmental, agricultural practice to increase resilience of soils and water which includes good soils and nutrient management plans.** • **Implement our River Basin Management Plans.** • Promotion of the UK Forest Standard and benefits of certification through the UK Woodland Assurance Scheme, improving uptake of sustainable forest management and new woodland design, protecting soils and water. • **Promotion of the key priority in the FCERM Strategy to deliver more natural interventions and catchment approaches to help improve environmental, social and economic resilience.**
Output(s)	• Targeted interventions implemented. • Increased promotion of environmental and agricultural practices. • River Basin Management Plans implemented. • Increased sustainable forest management and well-designed new woodland. • Improved soil and water management. • Mitigating flood risk through natural flood management (NFM).
Outcome(s)	• The use of nature based solutions is known to be an effective measure to adapt to the risks caused by these impacts. • Increased woodland canopy cover in line with the UK Forest Standard and sustainably managed woodland. • Acting to reduce and delay peak flows, so reducing the risk of other defences failing or being overtopped.
Timeline(s)	• Ongoing.
Indicators	• Area of woodland managed to UK Woodland Assurance Scheme. • Area of new woodland supported through grants. • Number of schemes enabling nature based solutions. • Number of NFM and/or hybrid schemes via the FCERM grant funding as long as the primary scheme objective is to reduce flood risk to properties.

AN6	Deliver climate change adaptation through the new Sustainable Farming Scheme for Wales, by establishing and delivering a set of agriculture emission reduction and adaptation measures to support the agriculture industry in responding to climate change.

Sub-action(s)	• **Utilise the CSA and ERAMMP evidence reviews to help inform and develop current and future agriculture policy on adapting to climate change.** • **Establish an Agriculture Pollution and Climate Change (AP&CC) Working Group within Welsh Government to develop policy and actions which support adaptation in the agriculture sector.** • **Incorporate feedback from the Sustainable Farming & Our Land consultation.** • Enable the principles of Sustainable Brand Values for food productions to be applied at farm level. • Collaborate with academia to improve knowledge and share understanding of adaptation in agriculture.
Output(s)	• New simple and accessible policy developed which recognises and supports the changing environment in which our farmers manage. • Amend or review current policy to include investment support to incentivise uptake of the latest machinery and technology. • Utilise the Welsh Government advice and knowledge transfer programmes to increase knowledge and understanding of climate change in agriculture and encourage changes in behaviour and practices.
Outcome(s)	• Risks to agriculture from the impacts of climate change, on crops and livestock, will be reduced. • Provide ecosystem based solutions to contribute to mitigating the social impact of climate change. • Maintain and develop habitats to maintain biodiversity, allowing species to migrate while contributing to limit the spread on INNS.
Timeline(s)	• On-going.
Indicators	• ERAMMP modelling to assess the contribution of land management to reducing the risk of climate change.

AN7	Deliver the Capability, Suitability and Climate (CSC) programme.

Sub-action(s)	• Produce agricultural capability maps using the UK Climate Projection (2009 and 2018) data sets. • **Assess the suitability of different crops under the different climate change scenarios.** • **Identify future research and adaptation needs for land use.**
Output(s)	• Agricultural capability maps developed. • Suitability of different crops in future climate scenarios assessed. • New adaptation research and needs identified.
Outcome(s)	• Increased understanding of the risks presented by climate change will contribute towards the development of tools and data supporting land managers in adapting to climate change.
Timeline(s)	• June 2018 – June 2020.
Indicators	• Agricultural capability maps under UKCP18. • Crop potential maps under UKCP18. • Next steps & adaptation research and needs identified.

Protecting Our Coasts and Seas

MC1	Improve the resilience of habitats and heritage in Wales' coastal zones from the impacts of climate change.

Sub-action(s)	• Understand the quality and quantity of existing habitats within the coastal zone and establish a programme of delivery of compensatory habitat around Wales. • **Habitat compensation will be delivered in the long-term in line with the life of the Shoreline Management Plans (SMP).** • Ensure that underwater cultural heritage considerations are included in relevant plans and policies (such as the Wales National Marine Plan).
Output(s)	• Implementation of SMP policies 2005-2025. • Programme of compensatory habitat delivery established. • Plans and policies that include cultural heritage considerations.
Outcome(s)	• Management of risk of coastal flooding and erosion to habitats and heritage on Wales's coastlines. • Raised awareness of the historic environment which will improve decision making and help to prevent secondary damage and maladaptation. • Improved cross-sector working.
Timeline(s)	• SMP policy implementation goes beyond reporting period for PfACCW (2025). • Compensatory habitat programme delivery ongoing. Otherwise ongoing to the end of the reporting period.
Indicators	• Documentary review of climate risk approach to SMP reports. • Review of habitat compensation. • Proportion of policies from SMPs implemented. • Number of habitat creation projects. • Proportion of coastal schemes with Nature Based Solutions. • Number of relevant plans and policies that include cultural heritage considerations. • Sample review of policies for historic environment related content.

MC2	Provide updated policy and guidance on coastal adaptation.
Sub-action(s)	• **Update and deliver the Welsh Government National Strategy for Flood and Coastal Erosion Risk Management (FCERM).** • Develop and communicate a new Coastal Adaptation Toolkit. • Engage with the newly formed Wales Coastal Monitoring Centre.
Output(s)	• Publication of the new FCERM National Strategy. • Publication of the new Coastal Adaptation Toolkit.
Outcome(s)	• New policy guidance and toolkits will provide the means for others to deliver actions against the impacts of climate change on our coastlines.
Timeline(s)	• Coastal Adaptation Toolkit to be completed by end of 2021.
Indicators	• Production of the Coastal Adaptation Toolkit and case studies of its use by communities (e.g. Coastal Groups, NRW, etc.). • Delivery updates on FCERM National Strategy. • Updates from Wales Coastal Monitoring Centre and on FCERM.

MC3	Improve the condition of the wider marine ecosystem to enable resilience to the impacts of Climate Change.
Sub-action(s)	• Complete the network of Marine Protected Areas (MPAs) in Wales. • Improve the condition of features within designated sites. • Continue to work toward achieving and maintaining good environmental status in the marine environment.
Output(s)	• Identification of Marine Conservation Zones to incorporate the deeper offshore habitats and the communities they support. • Implementation of a risk-based and intelligence led approach to marine enforcement.
Outcome(s)	• Approaches to managing MPAs (and other designated sites) – via the MPA Management Steering Group will take into account latest research on, and hence reduce climate risks to, marine ecosystems. • Marine enforcement will further protect marine ecosystems.
Timeline(s)	• Ongoing for reporting period.
Indicators	Changes in the condition of MPAs and features would be monitored through: • SONAAR; • NRW Area Statements; • Annual Reports under the MPA Management Framework; and • MSFD reporting. Number of MPAs in favourable condition.

MC4	Carry out research to better understand the impact of climate change on marine ecosystems, ecosystem services and marine heritage.
Sub-action(s)	• Collaborate on research to improve knowledge of higher water temperatures on fish stocks and ecosystems, including impacts for fish disease and aquaculture. • Research opportunities for fishing industry diversification and/or increasing the value of current activities and future planning. • Establish the baseline state of the underwater historic environment and monitor potential changes by, for example, seeking to incorporate environmental monitoring of underwater cultural heritage into marine licensing conditions.
Output(s)	• Ocean acidification – research. • Fishing diversification – research. • Underwater historic environment – research. • Baseline condition of underwater cultural heritage established and changes monitored.
Outcome(s)	• Improved knowledge of impacts of climate change on marine ecosystems and ecosystem services. • Those involved in managing marine ecosystems and heritage will be better informed and therefore take climate risks into account in their decision making.
Timeline(s)	• Research will be ongoing to the end of the reporting period (2022).
Indicators	• Listing and reporting on research outputs. • Number of underwater historic assets whose baseline condition has been recorded and monitored.

Staying Healthy

SH1	Increase understanding of the risk increased temperatures bring to public health and well-being.

Sub-action(s)	• Increase knowledge of trend data and forecasts to understand the severity of the risk to public health. • Improve collaboration and joined up working to ensure effective sharing of information. • Continue maintenance of heat related guidance in the Public Health Wales (PHW) Extreme Weather Guidance.
Output(s)	• Wales input via PHW into Public Health England (PHE) Extreme Weather data remodelling completion. • Publication of revised Extreme Weather Guidance by PHW. • Improved data sharing across public health bodies in Wales.
Outcome(s)	• Regularly updated guidance will inform the public and agencies of risk, and both WG/PHW and UKG/PHE responses to extreme weather. • Risk and vulnerability reduction to the public from weather extremes such as heatwaves, flooding and drought etc.
Timeline(s)	• Extreme weather research to be completed during 2021. • Data collection is ongoing. • Publication of guidance will be responsive to future extreme weather events (with a revised approach from 2021).
Indicators	• Listing and reporting on research outputs and approach to disseminating to target audiences and capturing use. • Monitoring of updates on Extreme Weather Guidance from PHW. • Number of Health Board Plans (IMTPs) with clear focus on planning for climate risks.

SH2	Continue tackling fuel poverty through the Welsh Government Warm Homes Programme.

Sub-action(s)	• **A further 25,000 homes to benefit from the Warm Homes Programme by 2021.** • Complete research to evaluate the impacts of Nest and Arbed schemes on health outcomes by 2021. • Develop new proposals to tackle fuel poverty.
Output(s)	• 25,000 homes benefitted from Warm Homes programme. • Nest and Arbed scheme research completed. • New fuel poverty proposals developed.
Outcome(s)	• While climate change may bring benefits from reduced cold, Wales will make further steps towards eradicating fuel poverty.
Timeline(s)	• 2021.
Indicators	• Documentary review of material from Warm Homes Programme, NEST & ARBED projects. • Documentary review of content of new Poverty Proposals and associated guidance focused on climate adaptation. • Number of homes benefitting from Warm Homes Programme. • Number of households living in fuel poverty in Wales.

SH3	Update and revise plans and advice in line with research to increase understanding of the risk extreme weather brings to health and social care delivery.

Sub-action(s)	• Increase our understanding of the risks that long term changes to extreme weather may bring to the delivery of health and social services. • Improve contingency planning.
Output(s)	• Updated National Risk Assessments for the NHS in Wales. • Continued review of climate change matric for NHS Shared Service Partnership. • New NHS estate buildings to be climate resilient.
Outcome(s)	• Improved understanding of potential future impacts from climate change, alongside improved contingency planning, will reduce risks and vulnerability from weather extremes to the NHS estate.
Timeline(s)	• Ongoing to the end of the reporting period.
Indicators	• Documentary review of NHS learning from extreme weather events to estate facilities. • Case studies of how climate change has been factored in to new developments for NHS. • Number of NHS facilities which have completed the climate change matrix – and examples of changes as a result.

SH4	Ensure climate change risk is considered in all future policy development to improve air quality in Wales.
Sub-action(s)	• Deliver the Clean Air Plan for Wales 2018. • Adoption of the National Emission Ceilings Directive (NECD). • Provision of air quality information and forecasts for the public.
Output(s)	• Improved air quality in Wales. • Improved public guidance published.
Outcome(s)	• Risk of climate change exacerbating air quality is mitigated through overall improvement of air quality in Wales.
Timeline(s)	• UK's future emission reduction commitments for 2020. • Others ongoing.
Indicators	• Delivery progress of the Clean Air Plan for Wales. • Emission reduction commitments met.

SH5	Increase understanding of the risks from vector borne pathogens.
Sub-action(s)	• Continuation of monitoring at ports and airports for mosquitoes. • Raise awareness about Lyme disease amongst health care professionals and the general public. • Increase understanding of the increased risk of vector-borne pathogens.
Output(s)	• Monitoring of ports and airports for exotic vectors undertaken. • Lyme disease awareness communications undertaken. • Research into the increased climate change-related risk of vector borne pathogens undertaken.
Outcome(s)	• Monitoring ports and airports for exotic vectors will help reduce risk to public health from their associated vector borne disease. Improved and ongoing advice to the healthcare profession will ensure we are prepared for increased prevalence, and improved knowledge will help make better decisions to reduce risk in the future.
Timeline(s)	• Monitoring of vectors is ongoing. • Lyme disease communications will be ongoing. • Research ongoing.
Indicators	• Reports from vector monitoring. • Lyme disease monitoring and indicators. • Listing and reporting on research outputs and approach to disseminating to target audiences and capturing use.

Safe Homes and Places

HP1	Ensure the planning system in Wales plays a key role in facilitating sustainable growth and helps build resilience to the impacts of climate change.
Sub-action(s)	• **Develop and publish a new National Development Framework (NDF) for Wales.** • **Publish new guidelines for Water Resource Management Plans (WRMP).** • Future review of planning policy and guidance on managing flood risk in Technical Advice Note (TAN) 15. • **Increase the use and quality of green infrastructure through nature based solutions.**
Output(s)	• NDF Published. • TAN 15 reviewed alongside renewed guidance. • Increase number of nature based solutions within planning projects.
Outcome(s)	• An improved planning system will reduce climate risk via better decisions on development sites and more green infrastructure. • This will inform a more systemic change in the planning system to factor in climate risks.
Timeline(s)	• NDF to be completed by 2020. • TAN15 consultation in 2019. • Increased use of NBS is ongoing. • WRMP guidance to be published by 2025.
Indicators	Documentary review and citation/good practice from: • NDF policy and proposals, guidance • LDP policies, proposals, guidance • Planning Appeals • GI Initiatives which support adaptation • Number of planning consent in flood risk zones. Number of GI projects implemented with clear contribution to climate adaptation.

HP2	Influence the design of homes and buildings to protect them from the impacts of climate change.

Sub-action(s)	• Review part L (energy efficiency) of the Building Regulations to mitigate the risk of overheating. • Ensure opportunities for climate change adaptation are considered in Welsh Government research on decarbonising Wales' housing stock. • **Ensure all future programmes to review the building regulations consider the need for climate change adaptation.** • **Water companies to reduce water leakage.**
Output(s)	• Future Building Regulations Review over 5 years topic by topic. Part L review completed. • Housing decarbonisation and adaptation research completed. • Water leakage reduced by 15%, ensuring access to water during droughts.
Outcome(s)	• Future energy efficiency measures will avoid and potentially mitigate increased climate risk of overheating due to improved Building Regulations. • Increased knowledge of housing adaptation options will inform future policy to reduce climate risks in the home.
Timeline(s)	• Review and lay new Part L Building Regulations by Spring 2020. (Other Building Regulations reviews potential over reporting period.) • Housing decarbonisation and adaptation research ongoing. • Ofwat has set minimum target to reduce water leakage by 15% in 2025.
Indicators	• Documentary review of Part L and review of future building regulations on how they promote design to encourage risk management. • Documentary review of Decarbonisation of Housing Stock Research. • Ofwat water leakage reduction reporting.

HP3	Improve measures to protect homes and communities from the risks of flooding.
Sub-action(s)	• Require all future developments in Wales (with the exception of single dwellings with areas less than 100m^2) to be designed and built in accordance with mandatory SuDS standards. • **Introduce evidence based long-term planning for waste water and sewerage management, and develop a planning framework for implementation in Wales.** • **Update the National Strategy for Flood and Coastal Erosion Risk Management (FCERM) in Wales, covering measures to protect homes and communities from flooding.**
Output(s)	• New developments designed in alignment with SuDs standards. • Evidence based waste water and sewer management policy established. • New National Strategy for FCERM published.
Outcome(s)	• Implementing SuDS will contribute to reducing the otherwise expected increase in the risk of flooding to homes and communities, from surface water on new developments across Wales. • Long term planning will need to consider the increase risks posed by climate change on waste water and sewer management. • Welsh Government's renewed FCERM National Strategy will put in place actions to reduce the future expected risk of coastal flooding from rising sea levels.
Timeline(s)	• Schedule 3 of FWMA (2010) commenced with effect from 7 January 2019. From 7 January 2020, certain transitional planning exemptions will end. • Waste water and sewer management policy established 2023. • Final FCERM publication in 2020.
Indicators	• Number of SuDS approvals recorded by SABs. • Review of drainage and Water Management Plans produced and examples of how they are tackling climate risks. • Revised FCERM produced, with Annual reports from NRW on implementation. Examples of how FCERM actions are tackling climate risks. • Examples from FMPs, SMPs and RBPs on climate adaptation actions to protect homes and communities.

HP4	Support adaptation and capacity building at the community level.
Sub-action(s)	• Continue to fund community led climate change adaptation projects (such as the current Welsh expenditure of the BIG Lottery dormant accounts funding).
Output(s)	• Community level climate change projects funded and delivered.
Outcome(s)	• Awareness of climate change risks and issues raised at a community level. • Small scale adaptation actions delivered to lower local risks.
Timeline(s)	• Ongoing to end of reporting period.
Indicators	• Documentary review of project evaluations undertaken for Renew Wales and Create Your Space.

HP5	Work with Public Service Boards to support adaptation and capacity building at the regional level.
Sub-action(s)	• Work with Public Service Boards (PSBs) to develop knowledge of climate risk at the regional level. • **Identify regional adaptation options to be made locally and to help cope with the negative impacts of climate change.** • Share knowledge and best practice with public bodies and other organisations across Wales.
Output(s)	• Adaptation advice and support provided to PSBs. • PSB wellbeing plans developed and delivered to include adaptation actions. • Regional-level adaptation options identified and best practice shared with PSBs and other public sector organisations in Wales.
Outcome(s)	• Raised awareness of climate change risks within the Public Sector. • Public Sector organisations more resilient to the impacts of climate change.
Timeline(s)	• Ongoing to end of reporting period.
Indicators	• Documentary evidence and reports from PSB adaptation projects. • Evidence of learning from the projects informing well-being plans and assessments from the PSBs. • Evaluation of adaptation projects addressing climate risks identified by the regional work.

Caring for the Historic Environment

HE1	Complete and publish the Historic Environment and Climate Change: Sector Adaptation Plan.

Sub-action(s)	• Disseminate and publicise the plan. • Stakeholder engagement with politicians and senior decision-makers to secure resources and practical actions.
Output(s)	• Completed HE adaptation plan in place. • Communications strategy developed. • Engagement activities undertaken.
Outcome(s)	• Raising awareness of the challenges posed by climate change on the historic environment. • Provision of a strategic framework for adaptation actions.
Timeline(s)	• Publication of the plan by January 2020. • Development of the communications strategy by May 2020. • On-going engagement.
Indicators	• SAP published by January 2020. • Communications strategy implemented. • Review of scope and impact of stakeholder engagement.

HE2	Improve understanding of the threats and opportunities for the historic environment from a changing climate.
Sub-action(s)	• Spatial mapping – Establish a working group to develop the enhanced spatial mapping project to identify and prioritise assets at risk and to establish link to monitoring regimes for targeted assets. • Research – Use the research priorities identified in the SAP to help inform partner organisations' future research and investigation programmes, including those supported by government funding and grants. • CHERISH – Disseminate knowledge gained through the project and use outputs to inform future actions. • Knowledge exchange – i) Work with others to seek funding and establish a knowledge exchange group for researchers and practitioners to share ideas, information and good practice and to help identify future research priorities; ii) Continue participation in established UK groups including Fit for the Future and the Historic Environment Adaptation Working Group.
Output(s)	• Spatial mapping steering group established. • Research and investigation programmes informed by SAP. • Knowledge exchange activities and events.
Outcome(s)	• Improved evidence base for statutory protection, decision-making and adaptation strategies. • Provision of data and plans for target sites to assist the development of management strategies.
Timeline(s)	• Ongoing.
Indicators	• Establishment of spatial mapping steering group. • Review of research and investigation programmes. • Review of knowledge exchange activities and events.

HE3	Develop the methodologies, tools and guidance needed to build adaptive capacity.
Sub-action(s)	• Case studies – develop and publish case studies to identify the key issues, test options for management regimes and inform good practice, e.g. vegetation and earthwork recovery strategies following incidents, such as wild fires or erosion. • Guidance – publish and disseminate guidance, e.g. on property flood resilience for traditional and historic buildings. • Cross-sector working – to include historic environment considerations in national and local policy statements, plans and codes, including Shoreline Management Plans and CIRIA Code of Practice and guidance on property flood resilience.
Output(s)	• Published guidance and case studies. • Dissemination activities. • National and local policy statements, plans and codes that include consideration of the historic environment.
Outcome(s)	• Increased resilience of historic assets, improved recovery after climate related events and prevention of secondary damage and maladaptation. • Development and implementation of national and local policy statements, plans and codes that increase the resilience of heritage assets.
Timeline(s)	• Ongoing.
Indicators	• Analysis of take up of case studies and guidance published on the Cadw website. • Number of relevant national and local policy statements, plans and codes that include historic environment considerations. • Quality review of a sample of relevant national and local policy statements, plans and codes for content related to the historic environment.

HE4	**Increase resilience of the historic environment by implementing actions to respond and adapt to the risks.**
Sub-action(s)	• Pre-application advice – provide advice on the design and implementation of adaptation proposals, including flood relief schemes, to help ensure potential risks and opportunities for the historic environment are considered. • Heritage management plans – provide support for the development of heritage management and adaptation plans, e.g. for heritage tourism businesses. • Monitoring and recording – implement programmes and support actions to monitor and record the condition of historic assets at risk.
Output(s)	• Well-designed and implemented adaptation actions. • Heritage management plans that include adaptive actions. • Records of historic assets to help inform the management of change.
Outcome(s)	• Development and implementation of adaptation actions and plans that increase the resilience of heritage assets.
Timeline(s)	• Ongoing.
Indicators	• Number of adaptation proposals where pre-application advice is provided and acted upon. • Number of heritage management and adaptation plans developed. • Number of monitoring and recording programmes implemented.

Successful Businesses

SB1	Do more to understand the risks to businesses from infrastructure disruption and higher working temperatures.

Sub-action(s)	• UK-wide research undertaken to identify industry sectors at risk and potential climate change mitigating options for businesses.
Output(s)	• Research delivered. Knowledge gap is filled on temperature and infrastructure disruption to businesses.
Outcome(s)	• Improved knowledge to put in place improved guidance and tools in future.
Timeline(s)	• 2020.
Indicators	• Review of research outcome.

SB2	Provide support to businesses to help them adapt to the future risks from climate change.

Sub-action(s)	• Revision of Business Wales website, newsletter and twitter content to provide relevant and absorbing advice. • Delivery of workshops to businesses to raise awareness of climate change issues. • Provide 1-2-1 business advice to companies that are moving towards building an adaptation plan.
Output(s)	• Adaptation communications for business reviewed. • Workshops delivered to businesses. • Support provided to businesses developing adaptation plans.
Outcome(s)	• Providing support to businesses will help raise awareness of the risks faced by them in a future climate, give access to advice on adapting to climate change, and lower the risks from climate change to the Welsh economy.
Timeline(s)	• Any new actions integrated into new framework by 2021/2022.
Indicators	• Feedback from stakeholder discussions with businesses. • Review of workshops delivered.

Resilient Infrastructure and Transport

IT1	Improve understanding of the risks from climate change to transport infrastructure in Wales.

Sub-action(s)	• Welsh Government to ensure Wales is comprehensively catered for within research undertaken for transport to enable the development of appropriate support. • Work with Highways England in setting new standards on climate change for road transport. • Review of transport sector case studies to share best practice in adapting to transport related climate change risks in Wales.
Output(s)	• Climate change risk research to transport undertaken for Wales. • Improved standards implemented. • Case study review undertaken and best practice shared.
Outcome(s)	• Improved knowledge of the risks from climate change to transport infrastructure will allow for improved policy to be developed in the future. This will then ensure our transport infrastructure can be adapted to those anticipated risks.
Timeline(s)	• Ongoing.
Indicators	• Review of completed climate risk related research. • Qualitative study of impacts from new road standards. • Review of case studies and approach to sharing best practice on transport related climate risks.

IT2	**Strengthen our preparedness against multiple risks to interdependent infrastructure networks.**
Sub-action(s)	• Complete delivery of pilot exercise to improve emergency response to threats to infrastructure. • Roll out new infrastructure emergency response processes across all Local Resilience Forums (LRFs). • Work with utility companies specifically to address the risk of a total failure of the UK's national electricity transmission network.
Output(s)	• New emergency response procedures tested. • LRFs educated in improved approaches to emergency response. • Utility companies better engaged to understand potential threats to infrastructure from climate change.
Outcome(s)	• Wales will have the capacity to respond to acute episodes of weather which impact multiple infrastructure systems, meaning we are able to respond quickly and with as little disruption as possible.
Timeline(s)	• Ongoing.
Indicators	• Review of pilot process. • Utility companies in Wales with adaptation measures in place.

IT3	**Raise awareness of the level of risk to bridges and pipelines from climate change, and address research gaps to help inform adaptation.**
Sub-action(s)	• Understand the research gaps into erosion and scour, and address the gaps. • Improve understanding of the level of risk to bridges and pipelines across Wales, the bridge owners involved, and the action being taken.
Output(s)	• Assessment of structures supporting the strategic road network. • Identify and prioritise structure at most risk as high priority. • New assessment standards developed with Highways England. • New research reviewed to increase understanding of risk.
Outcome(s)	• Completing an assessment of those bridges and pipelines which could be affected by the anticipated increase in river flows will provide the knowledge needed for the Welsh Government and other bodies to consider what action to take against this risk.
Timeline(s)	• Review bridge scour assessments against new standards 2021.
Indicators	• Completion and review of assessment under new scour assessment standards. • Review of work undertaken to improve those bridges identified as most at risk. • Summary review of new evidence gathered.

Abbreviations

ALC	Agricultural Land Classification
ANC	Area of Natural Constraints
BREEAM	Building Research Establishment Environmental Assessment Method
CCA	Climate Change Act 2008
CCRA	Climate Change Risk Assessment
CCRAER	Climate Change Risk Assessment Evidence Report
CSA	Climate Smart Agriculture
CSC	Capability, Suitability & Climate
DNOs	Distribution Network Operators
ERAMMP	Environment and Rural Affairs Monitoring and Modelling Programme
EU	European Union
FCERM	Flood and Coastal Erosion Risk Management
FEE	Foundation for Environmental Education
GHG	Greenhouse Gas Emissions
INNS	Invasive Non-Native Species
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
MPA	Marine Protected Areas
MSFD	Marine Strategy Framework Directive
NDF	National Development Framework
NECD	National Emission Ceiling Directive
NFM	Natural Flood Management
NGO	Non-Governmental Organisation
NHCP	National Habitat Creation Programme
NHS	National Health Service
NRAP	Nature Recovery Action Plan
NRP	Natural Resources Policy
NRW	Natural Resources Wales

NWSSP-SES	NHS Shared Services Partnership Special Estate Services
OPM	Oak Processionary Moth
PAWS	Plantations on Ancient Woodland Sites
PHW	Public Health Wales
Regions4	Network of Regional Governments for Sustainable Development
SAB	Sustainable Drainage Approving Body
SoNaRRI2	State of Natural Resources Report
SMP	Shoreline Management Plan
SMNR	Sustainable Management of Natural Resources
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
TAN	Technical Advice Note
UAA	Utilised Agricultural Area
UKCCC	United Kingdom Committee on Climate Change
UKCIP	United Kingdom Climate Impacts Programme
UKCP09/UKCP18	United Kingdom Climate Projections
UKFS	United Kingdom Forest Standards