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West Midlands

Climate Change Risk Assessment and Adaptation Plan 2021-2026

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About Sustainability West Midlands

SWM was established in 2002 as an independent, not-for-profit company and is the sustainability adviser for the leaders of the West Midlands.

Our vision is that the West Midlands is leading in contributing to the national target of net zero greenhouse gas emissions by 2050 whilst addressing health inequality and driving inclusive growth. We monitor the West Midlands Sustainability 2030 Roadmap which acts as a framework that all organisations based or operating in the region can use to help them make changes to their activities in the knowledge that they will contribute to wider regional ambition.

SWM's support our members and other local stakeholders in the public, private and third sectors to implement these changes by enabling them to demonstrate innovation and leadership and provide opportunities to collaborate and celebrate success.

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Introduction by the Environment Agency

The Environment Agency is pleased to have worked in collaboration with Sustainability West Midlands to produce the first West Midlands Climate Change Adaptation Plan. This will help to drive forward climate action in the West Midlands as we deal with an increasing severity and frequency of storm, flood and extreme temperature events.

Climate adaptation is a high priority of ours. We help people and wildlife adapt to climate change and reduce its impacts, including flooding, drought, sea level rise and coastal erosion. This is emphasised by the publication of the National Flood and Coastal Erosion Risk Management Strategy for England in 2020 and shown by our Living Better with a Changing Climate report published in 2021, under the Climate Change Act.

In our view, the West Midlands' overarching observations and priorities for climate change adaptation are as follows:

- Climate change impacts will be felt more severely in communities with the highest levels of deprivation and actions need to be taken to support and 'level up' these areas.

- Resilience to the impacts of severe weather on infrastructure, health, vulnerable communities, businesses and new and existing development, as set out in this plan, needs to be considered in all areas of decision making.

- Flood risk from all sources will continue to increase due to climate change and extreme weather events, so we have to become a more resilient region tackling these impacts by working together.

- Development should be steered towards areas of lower flood risk. Where development does go ahead in areas at risk of flooding or coastal erosion, it must be shown to be necessary, safe and resilient to flooding without increasing risk to others, and take account of residual risks.

- Nature Based Solutions should be utilised to provide resilience to climate change and to drive green infrastructure, such as tree planting in urban and rural locations, Sustainable Urban Drainage Systems (SUDs) and green spaces providing environmental, social and economic benefits.

- Climate change makes it harder to ensure clean and plentiful water. The West Midlands (with the exception of Herefordshire) contains areas that have been determined by the Secretary of State to be classed as seriously water stressed alongside the East Midlands and Thames Area. Water efficiency measures need to be prioritised as part of a nationwide approach to tackle water supply.

Summary of very high priority actions

This document sets out the climate change adaptation actions that should be considered for implementation by decision makers in the West Midlands, to ensure that our natural environment, people, infrastructure, buildings and businesses are prepared for the impacts of climate change, including greater incidence and severity of flooding, a higher likelihood of water scarcity and more intense and prolonged heatwaves. Following research and engagement with key stakeholders, the following list summarises those actions that are deemed **'very high'** priority for implementation. Other risks that are deemed 'high' or 'medium' are discussed in the main action plan, section four.

Governance, reporting and monitoring

- Set up a West Midlands Climate Adaptation Working Group which will primarily aim to drive forward some of these actions and lobby national and local funders and policymakers to ensure adaptation to climate change is at the heart of all activities.
- Through the Working Group and/or its subgroups, facilitate potential partnerships and/or funding sources to take forward projects across the region and research innovative approaches to adaptation financing.
- Run an engagement programme and advice sessions for public and private sector organisations to help them develop their own climate risk assessments and adaptation plans.
- Update this plan annually to ensure actions are kept relevant and set up a monitoring process to ensure actions are being delivered with success measures identified.

Natural Environment and Assets

- Capitalise on the rollout of local tree-planting programmes by ensuring that all schemes contribute to climate adaptation objectives, e.g. that they help to reduce flood risk, contribute to urban cooling etc. Potentially link with other planting initiatives and investigate rolling out the Birmingham City Council approach to strategic tree planting mapping. Utilise the Forestry Commission's Woodland Creation Offer, where climate resilience is a key objective, and consult the 'Managing England's woodlands in a climate emergency' publication to support informed decisions on projects.
- Use lessons learnt from urban greening programmes, such as the Sunrise project in Stoke, to establish equivalent programmes in urban areas where species are at greatest risk, and ensure core objectives of these programmes include climate adaptation, e.g. flood alleviation, urban cooling etc. This could also link with urban tree planting initiatives (see above). Lessons can also be learned from the Manchester Ignition Project.
- Use existing evidence, research, surveys and mapping to identify which West Midlands' habitats, species and crops could be most at risk of the negative impacts of new pests, pathogens or invasive, non-native species which are more likely to establish themselves as a result of climate change. If possible, obtain data from the Forestry Commission's TreeAlert system to aid this identification.

- Alongside the above, set up community-led groups who routinely monitor the areas identified as potentially being most vulnerable to pests and diseases and utilise the TreeAlert system for more systematic logging of observed impacts.

- Continue the implementation of Nature Based Solutions such as Natural Flood Management (NFM) projects in areas where they would be of most benefit, learning lessons from previous successes, but ensure all relevant partners are consulted with during the scoping stage and ensure all projects are logged on a transparent database.

- Lobby for, apply to and, if possible, establish long-term funding options for natural environment restoration programmes, such as examples listed above, that will result in a more joined up approach to projects, where regional partners can work collaboratively. Ensure that funding conditions include evidence that projects will include climate adaptation measures; this includes the forthcoming Green Grants Programme to be administered by the WMCA.

Infrastructure

- Ensure climate adaptation is integrated into the design and planning for new infrastructure assets (new roads, rail, sub-stations, drainage etc.). Ensure climate change and its impacts are addressed consistently across the region to support this approach.

Health, Communities and the Built Environment

- Conduct an assessment of all hospitals, care homes and other health centres that support vulnerable people in the West Midlands to identify which are most at risk of overheating and identify the most suitable measures to reduce overheating risk, such as implementing green infrastructure, better ventilation etc, and how these could link with potential measures to achieve Net Zero.

- Ensure NHS Trusts across the region take the opportunity of the requirement to develop new 'Green Plans' by integrating effective adaptation measures into these plans to help ensure hospitals and other NHS health settings are protected from the impacts of a future climate. Peruse the forthcoming Health and Social Care Sector Climate Change Adaptation report to ensure alignment.

- Work with all relevant partners to ensure that climate risks are addressed and considered in the commissioning and provision of all health and social care services referring to the National Planning Policy Framework (NPPF) for details on new developments and climate change.

- Ensure climate risks to health, buildings and infrastructure that affect hospitals, care homes, GPs and other health and care settings are embedded into corporate risk / business continuity plans.

- Ensure planning decisions adhere to the NPPF, which states that new developments avoid flood risk in accordance with the sequential test in the NPPF and inappropriate development directed away from areas of existing or future flood risk. New developments should not cause flooding elsewhere and be resilient to the impacts of climate change.

- Continue the funding and rollout of strategic flood defence schemes and ensure that any properties that are not protected by such schemes, but that are still vulnerable to an increasing flood risk, are prioritised for property-level flood protection measures.

- Possibly linking with the above, ensure climate adaptation measures are requirement of new homes, alongside measures to achieve Net Zero. This could include in-built passive flood risk reduction measures, natural ventilation to improve thermal performance and comfort during heatwaves, natural greening, roof reflectivity, permeable paving and rainwater harvesting to reduce freshwater use. Design guidelines should be produced for large capital investment projects, setting out how to use regionally specific climate projections and adaptation options.

- Ensure home retrofit programmes that are required alongside the delivery of Net Zero targets integrate adaptation measures where possible, such as installation of water efficiency measures, shading options, better ventilation to reduce the overheating risk and to improve indoor air quality, etc.

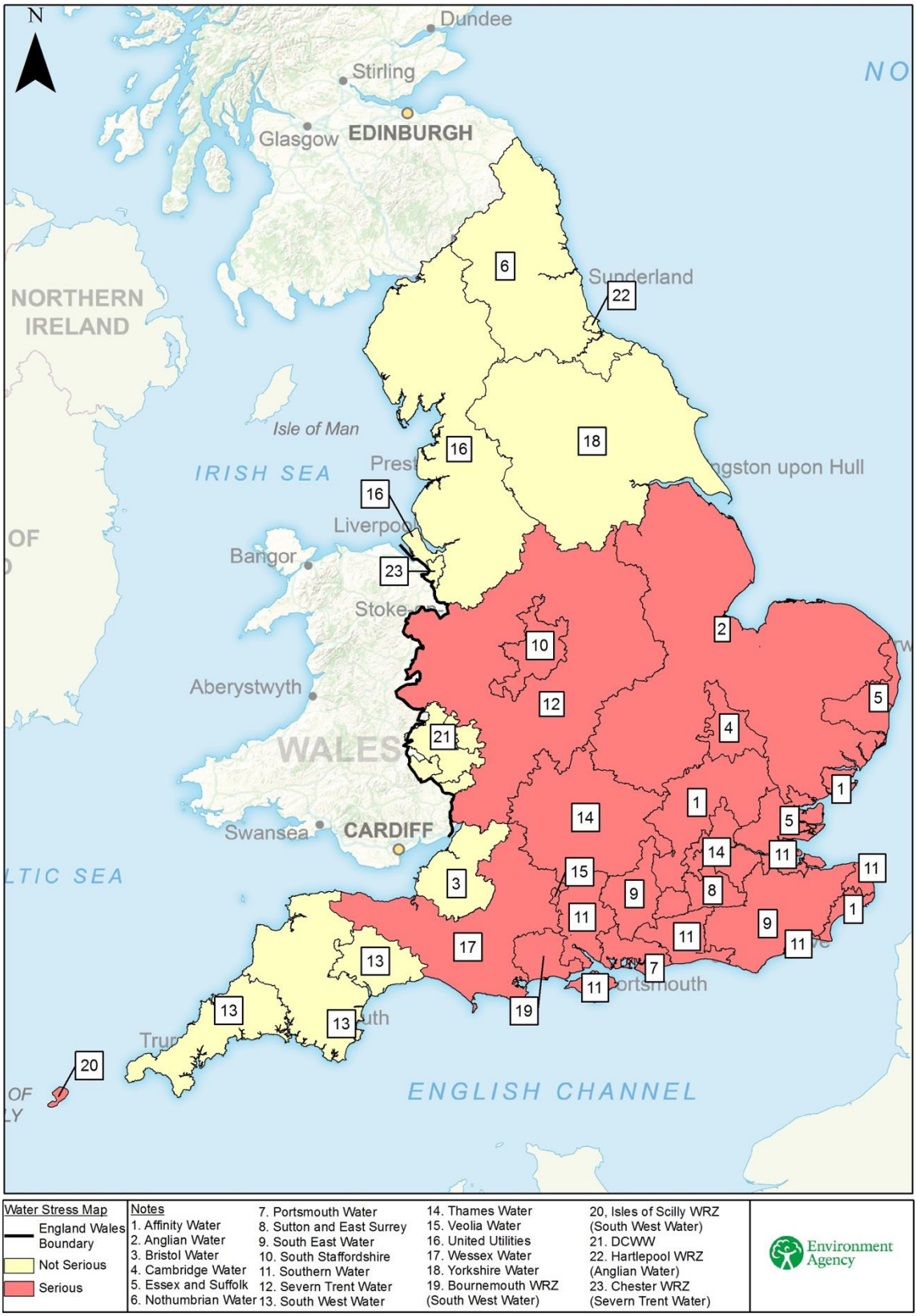
Business and industry

- Continue the funding and rollout of strategic flood defence schemes and ensure that any business premises that are not protected by such schemes, but that are still vulnerable to an increasing flood risk, are prioritised for property-level flood protection measures.

- Ensure the large-scale conversion of brownfield sites across the region integrate adaptation measures, such as natural flood alleviation, sustainable drainage systems (SuDS) and greening initiatives that benefit climate adaptation, and ensuring all new builds contain rigorous climate resilient standards. Where sites are not suitable for development, consider wetland conversion.

Maps: flooding and deprivation, and water stress

Map 1: High areas of deprivation (the darker hues) overlain with fluvial flood risk (the darker hues representing a greater risk of flooding) for part of the West Midlands conurbation. Understanding how climate risks interact with other variables is critical for effective adaptation. © Environment Agency.



Map 2: Areas of water stress in England (see numbers 10, 12 and 21 for West Midlands areas, all of which are under 'serious water stress') © Environment Agency '[Water stressed areas – 2021 classification]'.

1 Introduction and background

1.1 Purpose of this document

This document sets out the climate change adaptation actions that should be considered for implementation by decision makers in the West Midlands, to ensure that our natural environment, people, infrastructure, buildings and businesses are prepared for the impacts of climate change, including greater incidence and severity of flooding, a higher likelihood of water scarcity and more intense and prolonged heatwaves.

The document provides:

- A summary of climate projections for the West Midlands, outlining how the climate is likely to change in our region.
- A list of climate risks, drawing on the England assessment included in the Independent Assessment of UK Climate Risk and extracting those risks relevant to the West Midlands and engaging with stakeholders to determine whether any changes ought to be made to their magnitude and urgency scores.
- A Climate Change Adaptation Plan, that sets out a series of possible responses to the above risks and associated impacts.
- An indication of what actions could take place in the first year of implementation, and their potential impact on other sustainability priorities aligned with the regional 2030 Sustainability Roadmap.
- Recommended next steps.

This document does not provide a detailed, technical assessment of potential adaptation actions. For example, an action included in this plan is to 'assess care homes that are at risk from overheating.' It is only through such an assessment that detailed information would be provided on which care homes are at risk and why (building type, resident population etc.) and what the most appropriate actions are to address these risks (building modifications to improve ventilation, green infrastructure for more shading etc.) against a range of future climatic scenarios. This plan aims to trigger more detailed assessments where required, which would be commissioned and funded by national and local decision makers.

1.2 Background

The Climate Change Committee (CCC) is the Government's statutory adviser on preparing for climate change. Under the Climate Change Act (2008) the CCC, through its Adaptation Committee and secretariat has two main roles in relation to climate change adaptation:

- To provide independent, expert advice on the UK Climate Change Risk Assessment (CCRA).
- To report to Parliament on progress with implementation of the Government's National Adaptation Programme.

In June 2021, the CCC launched its latest Independent Assessment of UK Climate Risk for Government to form the basis of the third CCRA. Over 450 people from more than 130 organisations contributed evidence to the report, which is then used to assess the risks to the UK from climate change and the magnitude and urgency of each.

This assessment will now be used to develop the next UK CCRA (to be published by Defra in 2022) and the next National Adaptation Programme (to be published in 2023).

SWM and our associates have been supporting the development of the Independent Assessment of UK Climate Risk through a commission aimed at improving the accessibility of CCRA3, that is, producing outputs alongside the main technical reports to allow Government users to digest the information and apply it to their main areas of work. Part of this work was to write a summary of the risks for each UK nation with SWM writing the summary for England. As a result of this work, we are in a strong position to use this as a basis to form the West Midlands assessment, supplementing the England summary with West Midlands evidence.

This adaptation plan has been formed on the back of this assessment, using a combination of stakeholder engagement and other evidence (see methodology, Annex 1) to provide a series of high-level actions that should be considered for implementation to help the West Midlands adapt to a future climate. This plan fills a gap in adaptation planning in the region, recognised by the Environment Agency with whom we have collaborated to produce this document.

2 West Midlands Climate Projections

How could the climate change in future?

The changes in climate that we are already experiencing are projected to continue and intensify. In the second half of the century, the amount of change that occurs will depend strongly on how successful we are in reducing greenhouse gas emissions globally. This will influence the extent to which we need to adapt and, therefore, the required implementation of the actions included in this plan.

The latest set of projected changes in climate for the West Midlands come from the 2018 UK Climate Projections as shown in the table below.[1]

	2050s RCP2.6 (50th percentile)	**2050s** RCP6.0 (50th percentile)	**2080s** RCP2.6 (50th percentile)	**2080s** RCP6.0 (50th percentile)
Mean Annual Temperature	+1.2°C	+1.2°C	+1.3°C	+2.4°C
Mean Winter Temperature	+1.1°C	+1.1°C	+1.2°C	+2.0°C
Mean Summer Temperature	+1.7°C	+1.5°C	+1.9°C	+3.2°C
Mean Summer Precipitation	-15%	-15%	-19%	-26%
Mean Winter Precipitation	+6%	+5%	+9%	+14%

Temperature: Annual temperatures in the West Midlands are expected to rise between approximately 1.2°C by the 2050s and between 1.3 and 2.4°C by the 2080s from a 1981-2000 baseline, depending on global efforts to reduce greenhouse gas emissions between now and then. Risks associated with rising temperatures, such as more extreme heatwave events causing impacts on people's health and wellbeing, are likely become more prevalent as a result of these projections, with their magnitude depending on the degree of change that is experienced. Summer temperatures are expected to rise by a slightly greater extent compared to winter temperatures, heightening the concerns around this greater risk of heatwave prevalence.

Rainfall: There is a difference in expected rainfall trends in future in West Midlands, depending on the season. In winter, rainfall is expected to increase by approximately 6% by the 2050s and by between 9% to 14% by the 2080s from a 1981-2000 baseline, depending on global efforts to reduce greenhouse gas emissions. This is projected to lead to an increase in the likelihood of flooding of infrastructure, businesses and homes. Conversely, summer rainfall is expected to decrease by approximately 15% by the 2050s and by between 19% to 26% by the 2080s. Periods of water scarcity are projected to become more prevalent under these scenarios, leading to possible implications for agriculture and industry, for example.

[1] These values are taken from the UKCP18 probabilistic projections and represent a central (median) estimate of 30-year average change in each variable from a 1981-2000 baseline. Two emissions scenarios are used; RCP2.6 (roughly equivalent to a global warming +2°C above preindustrial scenario by 2100) and RCP6.0 (roughly equivalent to a global warming +4°C above preindustrial levels by 2100). *The exception is Sea Level Rise, where the RCP8.5 scenario is used, as for marine projections this is closer to a +4°C global warming scenario. The full likely range of change (i.e. 10 - 90th percentile) in each average variable is not shown here but is available from the full UKCP18 database. It is important to note that because these projections show average changes for a 30-year period and only the central estimate, changes in individual years would show a much greater range of change and could be significantly higher (or lower).

Weather extremes (England analysis): The frequency and intensity of extreme temperature and rainfall events is also likely to increase in future, with the extent of change depending on global efforts to reduce greenhouse gas emissions. By 2100, in England many areas in the north could exceed 30°C at least once per decade. In the south-east, temperatures above 35°C become increasingly common, and temperatures exceeding 40°C also become more likely. Summers that experience days above 40°C somewhere in the UK have a return time of 100-300 years at present, but in a high climate change scenario this could increase to once every 3.5 years by 2100. The West Midlands is likely to lie somewhere in between these projections.

As well as winters becoming wetter overall, the intensity of rainfall is also projected to increase by as much as 25%, particularly in south-east England. The same analysis for summer shows that, despite overall summer drying with wet days projected to become less frequent, when it does rain, the rainfall will be more intense.

Sea level rise: Although the West Midlands is not directly affected by sea level rise, it is recommended that trends and impacts related to sea level rise are observed as the impacts will be felt in the region in many ways, such as impacts on supply chains and transport infrastructure and a potential influx of coastal residents moving to the region.

3 West Midlands Climate Change Risk Assessment

This section summarises the risks and opportunities that climate change presents in the West Midlands. The list of risks and opportunities marries up with English assessment formulated by the Climate Change Committee as part of their Independent Assessment in informing the latest UK Climate Change Risk Assessment due for publication in 2022, alongside the UKCP18 scenarios outlined in section two. More details about the methodology that was used to produce the England assessment and the urgency scores can be found on the UK Climate Risk website and, regarding the latter, summarised below.

Category	Description
More action needed	New, stronger or different Government action, whether policies, implementation activities or enabling environment for adaptation, over and above those already planned, are beneficial in the next five years to reduce climate risks or take advantage of opportunities. This will include different responses according to the nature of the risks and the type of adaptation: • Addressing current and near-term risks or opportunities with low and no-regret options (implementing activities or building capacity). • Integrating climate change in near-term decisions with a long life-time or lock-in. • Early adaptation for decisions with long lead-times or where early planning is needed as part of adaptive management.
Further investigation	On the basis of available information, it is not known if more action is needed or not. More evidence is urgently needed to fill significant gaps or reduce the uncertainty in the current level of understanding in order to assess the need for additional action.
Sustain current action	Current or planned levels of activity are appropriate, but continued implementation of these policies or plans is needed to ensure that the risk or opportunity continues to be managed in the future.
Watching brief	The evidence in these areas should be kept under review, with continuous monitoring of risk levels and adaptation activity (or the potential for opportunities and adaptation) so that further action can be taken if necessary.

As part of our stakeholder engagement process, we asked adaptation experts in the region whether they feel the list of risks and opportunities for England adequately reflects the regional picture. We also stripped away the coast and marine-related risks and opportunities which are not relevant to the West Midlands.

The resulting risk and opportunity assessment is presented below, which differs slightly from the English assessment and provides a more bespoke assessment for the West Midlands. Nine coastal and marine related risks and opportunities have been removed and four new risks which stakeholders felt are worth extra prominence in the West Midlands have been added, compared to the list of risks for England as a whole.

Risks and opportunities highlighted in yellow are those added to the West Midlands assessment, that differ to the England assessment. Note that International Dimensions risks have not been re-assessed in the West Midlands context, as in the main these risks are UK-wide and unlikely to be influenced greatly by local circumstance, activity and/or policy.

As demonstrated in the next section of this report, we have used this risk assessment to structure the action plan and to develop the actions within it.

Risk or Opportunity	Risk code	Receptor	Nature of risk/opportunity	Urgency score
Natural Environment and Assets				
RISK	NR1	Terrestrial species and habitats	Changing climatic conditions and extreme events, including temperature change, water scarcity, flooding, wind, and altered hydrology (including water scarcity and flooding)	More action needed
RISK	NR2	Terrestrial species and habitats	Pests, pathogens and invasive species as a result of climatic changes	More action needed
RISK	NR3	Terrestrial species, habitats and landscapes	Wildfires causing destruction to habitats, lowlands, upland peatlands and carbon stores	Further investigation
RISK	NR4	Soils	Changing climatic conditions, including seasonal aridity and wetness	More action needed
RISK	NR5	Agriculture	Pests, pathogens and invasive species as a result of climatic changes	More action needed
RISK	NR6	Forestry	Pests, pathogens and invasive species as a result of climatic changes	More action needed
RISK	NR7	Freshwater species and habitats	Changing climatic conditions and extreme events, including higher water temperatures, flooding, water scarcity and phenological shifts	More action needed
RISK	NR8	Freshwater species and habitats	Pests, pathogens and invasive species as a result of climatic changes	More action needed
RISK & OPPORTUNITY	NRO9	Estuarine species and habitats	More frequent estuarine flooding, changes in salinity and impacts on species migration	Further investigation
RISK & OPPORTUNITY	NRO10	Natural carbon stores, carbon sequestration and greenhouse gas (GHG) emissions	Changing climatic conditions, including temperature change and water scarcity causing destruction and release of locked-in carbon	More action needed
RISK & OPPORTUNITY	NRO11	Agricultural and forestry productivity	Extreme events and changing climatic conditions (including temperature change, water scarcity, wildfire, flooding, wind)	More action needed
RISK & OPPORTUNITY	NRO12	Landscape character	Extreme events and changing climatic conditions (including temperature change, water scarcity, wildfire, flooding, wind)	Further investigation
OPPORTUNITY	NO13	Terrestrial species and habitats	New species colonisations as a result of climatic changes	Further investigation
OPPORTUNITY	NO14	Agricultural and forestry productivity	New/alternative species becoming suitable as a result of climatic changes	Further investigation
OPPORTUNITY	NO15	Freshwater species and habitats	New species colonisations as a result of climatic changes	Sustain current action
Infrastructure				
RISK	IR1	Infrastructure networks (water, energy, transport, ICT)	Cascading failure of the infrastructure network; failure of one system leading to multiple failures in others as a result of more extreme weather	More action needed
RISK	IR2	Infrastructure networks and services	More frequent and extensive river, surface water and groundwater flooding	More action needed
RISK	IR3	Transport networks	Greater incidence of slope and embankment failure as a result of climatic changes	More action needed
RISK	IR4	Transport	Greater incidence of high and low temperature extremes, high winds and lightning as a result of climatic changes	More action needed

Risk or Opportunity	Risk code	Receptor	Nature of risk/opportunity	Urgency score
RISK	IR5	Bridges and pipelines	More frequent flooding and severe erosion	Further investigation
RISK	IR6	Energy	Greater incidence of high and low temperature extremes, high winds and lightning as a result of climatic changes	Further investigation
RISK	IR7	Hydroelectric generation	More frequent and extreme low or high river flows as a result of climatic changes	Further investigation
RISK	IR8	Energy generation	Reduced water availability for generation plants as a result of climatic changes	Further investigation
RISK	IR9	Public water supplies	Reduced water availability as a result of climatic changes	More action needed
RISK	IR10	Subterranean and surface infrastructure (cables, pipes etc)	Greater incidence of subsidence as a result of climatic changes	Further investigation
RISK	IR11	Digital infrastructure, telecoms and ICT	Greater incidence of high and low temperature extremes, high winds and lightning as a result of climatic changes	Further investigation
Health, Communities and the Built Environment				
RISK	HR1	Health and wellbeing	Greater incidence of high temperatures resulting in heat related health problems	More action needed
RISK	HR2	Health and wellbeing	Widening health inequalities as a result of greater climate disadvantage due to more extreme weather	Further investigation
RISK	HR3	Health and wellbeing	Changes in indoor and outdoor air quality driven by climate changes	Further investigation
RISK	HR4	Health	Greater incidence of vector-borne disease as a result of climatic changes	More action needed
RISK	HR5	Health	Poor water quality and household water supply interruptions as a result of climatic changes	Further investigation
RISK	HR6	Food safety and food security	Higher temperatures (affecting food safety) and extreme weather (affecting food security) as a result of climatic changes	Further investigation
RISK	HR7	People, communities and buildings	Greater frequency and extent of flooding as a result of climatic changes	More action needed
RISK	HR8	Health and social care delivery	Greater incidence of extreme weather affecting service delivery	More action needed
RISK	HR9	Education and prison services	Greater incidence of extreme weather affecting service delivery and building function	More action needed
RISK	HR10	Building fabric	Potential damage caused by moisture, wind and driving rain	Further investigation
RISK	HR11	Cultural heritage	Negative impacts due to changes in temperature, precipitation, groundwater, landscape change	More action needed
RISK & OPPORTUNITY	HRO12	Household energy demand	Summer and winter temperature changes potentially reducing heating need but increasing cooling need	More action needed
OPPORTUNITY	HO13	Health and wellbeing	Drier, warmer summers leading to more opportunities to use outdoor spaces	Further investigation

Business and Industry				
RISK	BR1	Flooding of business sites	More frequent and extensive river, surface water and groundwater flooding	More action needed
RISK	BR2	Flooding of industrial sites	More frequent and extensive river, surface water and groundwater flooding leading to a greater water pollution risk	Further investigation
RISK	BR3	Business production processes	Water scarcity as a result of climatic changes	Further investigation
RISK	BR4	Business access to finance, investment and insurance	Greater incidence of extreme weather leading to disruption	Sustain current action
RISK	BR5	Disruption to business supply chains and distribution networks	Greater incidence of extreme weather in the UK and abroad leading to disruption	More action needed
RISK	BR6	Reduced employee productivity in businesses	Greater incidence of infrastructure disruption as a result of climatic changes and higher temperatures in working environments	Further investigation
OPPORTUNITY	BO7	Changes in demand for goods and services	Long term climate change effects	Further investigation
International Dimensions				
RISK	IDR1	Food availability, safety, and quality	Decreasing yields from rising temperatures, water scarcity and ocean changes globally	More action needed
RISK	IDR2	The UK's international interests and responsibilities	International violent conflict resulting from climate change overseas	More action needed
RISK	IDR3	Changes to international governance affecting the UK	Reduced international collective governance due to climate change and responses to it	More action needed
RISK	IDR4	International trade routes	Climate hazards affecting supply chains	More action needed
RISK	IDR5	Economic loss to the UK	Climate driven resource governance pressures and financial exposure	Sustain current action
RISK	IDR6	UK public health	Increase in vector borne diseases due to climate change	More action needed
RISK	IDR7	Risk multiplication to the UK	Interactions and cascades of climate risks across systems and geographies	More action needed
RISKS & OPPORTUNITIES	IDRO8	Migration to the UK and effects on the UK's interests overseas	Climate-related international human mobility	Watching brief
OPPORTUNITY	IDO9	UK food availability and exports	Increases in productivity and areas suitable for agriculture overseas as a result of climatic changes	Watching brief
OPPORTUNITY	IDO10	Increased trade for the UK	Arctic ice melt opening up new trading routes as a result of climatic changes	Watching brief

The justification, based on the stakeholder engagement process, for including the new risks as specified is set out below. All new risks bespoke to the West Midlands have been allocated a 'further investigation' urgency score, to reflect that the same rigorous analysis would need to apply to ensure that these risks are sound, and to determine the level of action already being taken to address them, or that is otherwise required.

Risk code	Nature of risk/opportunity	Justification for addition to West Midlands assessment compared to the England assessment
NR3	Wildfires affecting habitats, lowlands, upland peatlands and carbon stores	Wildfire is deemed a particularly high risk of both likelihood of occurrence and extent of impact in the West Midlands. This is due to a high combination of upland peat areas, such as the Staffordshire Moorlands and parts of Shropshire, which are both prone to fire and can cause significant impacts to sensitive ecosystems and carbon stores. Wildfires in other areas, such as lowland grasslands, have also increased in recent years.
NRO9	More frequent estuarine flooding, changes in salinity and impacts on species migration	While risks to coasts are not directly relevant to the West Midlands, we do have estuaries that are affected by coastal change. Therefore, it was deemed important to acknowledge this in the risk assessment, alongside the impact this could have on freshwater species.
HR2	Widening health inequalities as a result of greater climate disadvantage due to more extreme weather	Health inequality is discussed within the UK CCRA Independent Assessment, but given that the West Midlands already has areas experiencing significant health inequality, it was deemed appropriate to include this as a risk in its own right, in terms of how disadvantaged communities could be more affected, and less able to deal with, future climate changes.
BR2	Increase in flood risk leading to greater pollution risk due to high presence of industrial sites	The West Midlands has a high presence of industrial sites, especially in areas such as the Black Country and the Potteries. Therefore, more frequent flooding of such sites may lead to a pollution problem that perhaps would be greater than the flooding of less intensive industry, which would exacerbate the consequences of the flood itself (health, natural environment etc.)

4 West Midlands Adaptation Action Plan 2021-2026

Provided overleaf is an action plan that sets out:

- Actions that have been identified that, if implemented, could help to adapt the West Midlands natural environment, infrastructure, people and businesses to a changing climate, and a justification as to why these actions have been selected.
- (An) organisation(s) that may be able to lead on the implementation of these actions or that could fund the activity.
- Partners with whom the potential lead organisation may benefit from collaborating with, or potential resourcing partners should the suggested lead authority not be in a position to provide this.
- Whether the action should be (either due to urgency or its simplicity) be implemented in the short (within the next 2 years), medium (2-10 years) or long (>10 years) term.
- Whether implementing this action is expected to be intense from a resourcing and cost perspective, from L (Low) to H (High).
- Based on the evidence provided on urgency, resourcing and likely impact, should the implementation of the specified action be a medium (M), high (H), or very high (VH) priority?

As described in the introduction, these actions are essentially recommendations from SWM to local and national decision makers, based on the evidence and feedback provided, to help minimise the risks and associated projected impacts of climate change in the West Midlands.

The actions included are those where there is no strong evidence of a coordinated response. Where there is evidence to suggest action is taking place, such as actions included in the plans published by organisations under the jurisdiction of the Adaptation Reporting Power (ARP), we have not included these in this plan and will assume these actions continue to be implemented. This would include, for example, ensuring our rail network is resilient to extreme heat events, and ensuring our electricity substations are protected from flood risk. It is important, however, to ensure that the organisations bound to report under the ARP are consulted in activities that may be affected by, or where they could add value to, any new adaptation actions implemented locally.

We also fully recognise that some of these actions may be being implemented or considered by organisations that we did not consult with during the evidence-gathering stage. We intend on reviewing this plan next year (2022) to factor in any new activity that comes to light, and would encourage organisations to provide evidence on such activity in the meantime.

Annex 2 provides some examples of measures that could be implemented in the first year of this action being addressed.

Annex 3 gives a high-level indication as to whether the implementation of the actions could affect the successful delivery of the targets and actions to fulfil the other sustainability themes within SWM's 2030

Roadmap. For example, one must consider that reducing overheating risk in buildings cannot lead to an increase in energy use and carbon emissions, as this would conflict with our regional and national Net Zero carbon targets.

Section 5 includes a few case studies of projects happening / that have happened locally that contribute to climate adaptation objectives.

List of acronyms

The table overleaf includes potential lead, supporting and funding organisations that may be able to help implement the suggested action. Most of these are given in acronyms, and they are listed below. It should be noted that organisations listed in the plan are only *potential* implementors of the specified actions; it may be that the action is best led by an organisation not listed in the plan.

Acronym	Organisation
ARP	Adaptation Reporting Power
BEIS	Department for Business, Energy and Industrial Strategy
BITC	Business in the Community
BRE	Building Research Establishment
C&RT	Canal & River Trust
Defra	Department for Environment, Food and Rural Affairs
DfE	Department for Education
DfT	Department for Transport
DHSC	Department for Health and Social Care
EA	Environment Agency
EAUC	Environmental Association for Universities and Colleges
FC	Forestry Commission
FSA	Food Standards Agency
FSB	Federation of Small Businesses
GWWM	Groundwork West Midlands
HE	Highways England
IAWM	Innovation Alliance for the West Midlands
JRF	Joseph Rowntree Foundation
LAs	Local authorities
LEPs	Local Enterprise Partnerships
LNPs	Local Nature Partnerships
LRFs	Local Resilience Forums
MHCLG	Ministry for Housing, Communities & Local Government
MoJ	Ministry for Justice
MPA	Mineral Planning Authority
NE	Natural England
NFF	National Flood Forum
NFU	National Farmers Union

NLCF	National Lottery Community Fund
NLHF	National Lottery Heritage Fund
NR	Network Rail
NT	National Trust
PHE	Public Health England
RSPB	Royal Society for the Protection of Birds
SHAP	Sustainable Housing Action Partnership
SSW	South Staffordshire Water
STW	Severn Trent Water
SWM	Sustainability West Midlands
TfWM	Transport for West Midlands
WMCA	West Midlands Combined Authority
WPA	Waste Planning Authorities
Wrap	Waste & Resources Action Programme
WRW	Water Resources West
WT	Woodland Trust
WTs	Wildlife Trusts

Action No.	Action	Justification	Possible delivery organisation(s)	Possible example partner(s)	Possible example funder(s)	Timescales for implement	Resource Intensity	Priority
Governance, reporting and monitoring								
1.	Set up a West Midlands Climate Adaptation Working Group which will primarily aim to drive forward some of these actions and lobby national and local funders and policymakers to ensure adaptation to climate change is at the heart of all activities.	Without this coordination and longer-term effort, we risk this plan becoming another unrealistic document that will never be looked at and acted upon. Establishing an expert and influential group representative of the political, business and other sectors should reduce the risk of this happening and help catalyse the implementation of these actions.	SWM	Local and national bodies who can influence the implementation of the actions in this plan	EA Defra	Short-term, on-going	**L**	**VH**
2.	Provide a platform and forum, either as part of or separate to the above, for authorities acting in the West Midlands that are required to set out their adaptation actions under the Adaptation Reporting Power (ARP).	Authorities required to respond to the ARP are amongst those most critical to ensuring our people, infrastructure, economy and natural environment are adequately prepared for climate change. Routinely bringing together these organisations should help to strengthen their collective responses to adaptation and enable them to work collaboratively to accelerate and provide more effective adaptation actions, on a greater scale.	SWM	Relevant organisations required to report under the ARP	EA Defra ARP reporting bodies	Short-term, on-going	**L**	**H**
3.	Identify adaptation leads and other equivalent working groups in neighbouring regions (Wales, SW, NW, East Midlands) in recognition that climate risks and adaptation solutions do not stop at boundaries, and ensure two-way engagement and cooperation takes place.	This will ensure there is, where required, a mechanism to allow solutions to be developed across boundaries, especially relevant in relation to river restoration for example, to prevent maladaptation (e.g. flood protection in one area leading to worsening issues in another) and to share wider good practice and expertise.	SWM	Relevant partners as specified	-	Short-term	**L**	**H**
4.	Through the Working Group and/or its subgroups, facilitate potential partnerships and/or funding sources to take forward projects across the region and research innovative approaches to adaptation financing.	Ultimately, funding will be required to take forward many of the actions given in this plan. Working collaboratively to identify suitable sources will help to be innovative about how to unlock this funding.	SWM	Local and national bodies who can influence the implementation of the actions in this plan	To be determined by this action	Short-term	**L**	**VH**
5.	Integrate climate adaptation as a key theme in existing Youth Boards / Councils across the region. Consider including a	Young people in our region will be affected the most by climate change and have the greatest to lose by us	WMCA LAs	Colleges Universities EAUC	-	Short-term	**L**	**H**

Action No.	Action	Justification	Possible delivery organisation(s)	Possible example partner(s)	Possible example funder(s)	Timescales for implement	Resource Intensity	Priority
	'young person's voice' on the Working Group (see action 1).	not adequately adapting. We need to give them a voice on this issue via existing platforms.	Other youth groups					
6.	Run an engagement programme and advice sessions for public and private sector organisations to help them develop their own climate risk assessments and adaptation plans. Ascertain whether new Government announcements on potential support with this process can be utilised.	This will help to accelerate adaptation in organisations that have limited resource and give them a helping hand and a starting point for action.	SWM	LAs, NHS, Universities BITC, FSB, LEPs	WMCA, LEPs Defra EA	Short-term, on-going	**L**	**VH**
7.	Ensure climate risks are embedded into corporate risk assessments and Local Resilience Fora risk assessments for local areas in the region.	This will help to ensure climate risks and adaptation responses are considered in all decisions made by organisations and in the community.	LAs LEPs LRFs Other organisations that run capital projects	SWM EA Defra	-	Short-term	**L**	**H**
8.	Undertake a data analysis exercise that assesses the 'numbers behind future climate change.' This means looking at the impact on various metrics (excess deaths, buildings at risk, species decline, economic losses etc.) that climate change would have if nothing is done (business as usual), versus effective adaptation.	Putting statistics and data next to the impact of climate change and how this compares to an adapted West Midlands will help to 'sell' the importance of resourcing of these actions to decision makers and build the economic case of adapting early.	Technical consultancies, such as Mott MacDonald, Arup and Climate X	SWM Universities	WMCA, LEPs Defra EA Met Office	Short-term	**M**	**H**
9.	Establish a comprehensive database of projects that are, wholly or in part, focusing on climate adaptation in the West Midlands. Update this at least monthly.	This would help to ensure a joined-up approach to activity and enabling the sharing of good practice across authorities to avoid 'reinventing wheels.'	SWM	Organisations working on climate adaptation projects	WMCA, LEPs Defra EA	Short-term	**M**	**H**
10.	Collate a database of academic research projects that focus wholly or in part on climate adaptation, the findings and	This would ensure that the excellent research universities have published would not be lost and could be used by practitioners to help further adaptation planning.	SWM EAUC	Universities	WMCA, LEPs Defra EA	Short-term	**L**	**M**

Action No.	Action	Justification	Possible delivery organisation(s)	Possible example partner(s)	Possible example funder(s)	Timescales for implement	Resource Intensity	Priority
	intelligence from which may be used to accelerate adaptation actions.							
11.	Provide a climate adaptation webpage which includes a 'hub' of resources on climate adaptation, including this adaptation plan. Link this to existing hubs such as ALARM.	This can act as a useful 'one-stop-shop' for advice, guidance and good practice to help organisations adapt their own estates and make it easier for decision-makers to take forward actions.	SWM	-	-	Short-term	**L**	**M**
12.	Establish a communications campaign that highlights the importance of climate adaptation to individuals and organisations. This should be framed positively and linked with the Net Zero agenda, but emphasising that further action still needs to be taken.	Communications on climate risk and adaptation exists but are outdated. A programme emphasising its importance needs to be established and rolled out to ensure consistent messaging and to encourage further actions such as those outlined in this plan. Lessons could be learnt on how messaging on Covid-19 was established, which resulted in rapid and fundamental change.	SWM	LAs, LRFs, LEPs, Housing Associations	WMCA, LEPs Defra EA	Short-term	**L**	**H**
13.	Develop an awareness campaign and set of legacy resources that are specifically targeted at Cabinet Members and Councillors across the region to engage them in the climate adaptation agenda. Given political changes occur regularly, these must be transferable from one administration to the next and provide the 'business case' for adaptation.	Cabinet Members and Councillors are crucial to enabling local action on climate adaptation. Without their support, many of these actions either could not be implemented at all or as effectively, and therefore their buy-in underpins many actions within this plan.	SWM	LAs	WMCA, LEPs Defra EA	Short-term	**L**	**H**
14.	Update this plan annually to ensure actions are kept relevant and set up a monitoring process to ensure actions are being delivered with success measures identified.	This will ensure that the progress the region is making on climate adaptation will be maintained.	SWM	All partners listed	Defra EA	On-going	**L**	**VH**
Natural Environment and Assets								
15.	Ensure that the Natural Environment Plan published by the WMCA, and other	Many natural environment related activities have the potential to contribute to climate adaptation aims	WMCA, LAs, LNPs	WTs NE	-	Short-term	**L**	**H**

Action No.	Action	Justification	Possible delivery organisation(s)	Possible example partner(s)	Possible example funder(s)	Timescales for implement	Resource Intensity	Priority
	habitat, species and conservation strategies covering areas of the region (such as the Midlands Engine Ten Point Plan for Green Growth and their specific themes of 'Nature's Recovery' and 'Blue-Green Places') align with this Action Plan and embeds climate adaptation as one of its key priorities.	and objectives. The 'value' of the natural environment (natural capital) will be even greater if schemes help to alleviate flood risk to people and housing, for example.		RSPB FC				
16.	Embed climate adaptation into any natural environment/ capital working groups operating region-wide.	This will enable a more joined-up approach to ensure that climate adaptation is one of the main reasons for implementing any project or programme across the region, and that measurable outcomes are achievable.	WMCA, LAs, LNPs	WTs NE FC RSPB	-	Short-term	**L**	**H**
17.	Capitalise on the rollout of local tree-planting programmes by ensuring that all schemes contribute to climate adaptation objectives, e.g. that they help to reduce flood risk, contribute to urban cooling etc (linked to the 'right tree, right place' concept). Potentially link with other planting initiatives such as some of those outlined below, and investigate rolling out the Birmingham City Council approach to strategic tree planting mapping. Utilise the Forestry Commission's Woodland Creation Offer, where climate resilience is a key objective, and consult the 'Managing England's woodlands in a climate emergency' publication to support informed decisions on projects.	Most new tree planting schemes have the primary aims of meeting Net Zero targets or biodiversity benefits in mind, but by planting the right trees in the right place, all future schemes could also have positive impacts on helping alleviate the impacts of climate change too. Ensuring the new trees are also likely to be resilient to a future climate would also be beneficial.	WMCA, LAs, LNPs	WT FC EA NE Defra NT Nurseries should also be consulted to ensure demand can be met locally	WT FC EA NE Defra	Short-term, on-going	**L**	**VH**
18.	Use lessons learnt from urban greening programmes, such as the Sunrise project in Stoke, to establish equivalent programmes in urban areas where species	Urban greening has multiple benefits, from protecting urban species to improving health and wellbeing, to climate mitigation and adaptation. Rolling out programmes similar to Sunrise could result in a huge	WMCA, LAs, LNPs GWWM	WTs FC EA NE	WMCA, LEPs Defra EA NE	Long-term	**H**	**VH**

Action No.	Action	Justification	Possible delivery organisation(s)	Possible example partner(s)	Possible example funder(s)	Timescales for implement	Resource Intensity	Priority
	are at greatest risk, and ensure core objectives of these programmes include climate adaptation, e.g. flood alleviation, urban cooling etc. This could also link with urban tree planting initiatives (see above). Lessons can also be learned from the Manchester Ignition Project.	boost to urban areas as the region recovers from the impact of Covid-19.		RSPB C&RT				
19.	Assess the resilience of West Midlands urban parks and green spaces, considering both the biodiversity of the park and its users. Integrate adaptation measures where appropriate, such as strategic tree planting, water meadows, changing mowing regimes, installing drinking water fountains, planting more drought-resistant species etc.	Our parks have become ever more important in our society, especially since the impact of Covid-19, for both urban wildlife and users. Ensuring they are fit for a future climate is hugely important and will help to contribute to a range of objectives around biodiversity, health and wellbeing and alleviation of air pollution. This is especially important, given that green spaces may be used more in future if summer conditions become more favourable.	LAs GWWM	Community groups WTs RSPB NE	LAs LEPs Defra NE	Medium-term	**M**	**H**
20.	Work with Defra to understand the detail of the new England Peat Map, a commitment under the 2021 England Peat Action Plan, to ensure vulnerabilities in the ecosystem can be identified at a granular level in the West Midlands. Ascertain if local partners will be consulted/can get involved or provide further insight to this process.	Given peat's role in flood alleviation, carbon storage and its vulnerability to wildfire, and its presence in the West Midlands, mapping the ecosystem, especially thin upland peats, will help to identify suitable measures of protection, contributing to climate adaptation objectives. Defra's commitment to mapping is a positive step and local partners have the opportunity to influence this prior to its 2024 publication.	Defra LNPs Technical consultancies	LAs WTs EA NT Peak District National Park Authority	Defra NE LEPs	Short-term	**L**	**H**
21.	Assess those areas that may be most prone to wildfires and provide signage and guidance at these sites encouraging users not to exacerbate the risk, e.g. by having barbecues, campfires etc. Access the Wildfire Risk Map stated in the Forestry Commissions ARP report as a starting point, if possible.	Regional stakeholders deemed wildfire to be a high risk in the West Midlands due to the fire-prone landscapes it contains. Many fires are started by people, therefore simple messaging to encourage people not to provide an ignition in prone areas is a simple starting point.	LAs, LNPs Technical consultancies	WTs FC NT	Defra NE LEPs	Short-term	**L**	**H**

Action No.	Action	Justification	Possible delivery organisation(s)	Possible example partner(s)	Possible example funder(s)	Timescales for implement	Resource Intensity	Priority
22.	Identify, through research and mapping, those species that are less mobile and that may not be able to migrate to more favourable locations as climatic changes occur. Involve community groups and volunteers in this process.	Less mobile species, i.e. those species that cannot easily relocate to areas that are more favourable climatically, could be lost due to climate change, greatly affecting the ecosystems that they a part of. Identifying those species most likely to be at risk, and where they are, represents a first step in ensuring their protection so that actions can be considered for their safe relocation.	LNPs WTs	EA Defra NE FC RSPB	Defra NE LEPs	Short-term	**M**	**M**
23.	Identify which estuarine environments and their species may be most at risk from changes in salinity and other properties because of more frequent flooding.	Although sea-level rise is unlikely to impact directly on the West Midlands, river estuaries still play an important role in our region's biodiversity make-up. Significant changes to these could have negative knock-on effects elsewhere and should be studied to assess this potential threat.	EA WMCA, LNPs, LAs	WTs STW SSW C&RT	EA NE Defra	Short-term	**M**	**M**
24.	Use existing evidence, research, surveys and mapping to identify which West Midlands' habitats, species and crops could be most at risk of the negative impacts of new pests, pathogens or invasive, non-native species which are more likely to establish themselves as a result of climate change. If possible, obtain data from the Forestry Commission's TreeAlert system to aid this identification.	Given the high urgency of this risk, such an exercise would represent a first step to help prepare for an increase in pests, pathogens and non-native, invasive species to protect ecosystems from their most negative consequences, and potentially benefit from opportunities new species may bring. Following this, more targeted measures could be identified.	LNPs WTs	FC EA Defra NE RSPB NT	Defra NE LEPs	Short-term	**M**	**VH**
25.	Alongside the above, set up community-led groups who routinely monitor the areas identified as potentially being most vulnerable to pests and diseases and utilise the TreeAlert system for more systematic logging of observed impacts.	Utilising community groups and volunteers for this exercise will encourage local people to help protect their nearby woods and forests, and monitoring on a more routine basis will ensure diseases are picked up early.	LNPs WTs FC Local community groups	EA Defra NE RSPB NT	Defra NE LEPs FC	Medium-term	**M**	**VH**
26.	Monitor the colonisation of new species to determine which complement native species habitats most favourably and	Climate change will lead to new species colonies in our terrestrial and freshwater environments. While some colonisations may lead to negative impacts,	LAs LNPs WTs	EA Defra NE	Defra NE LEPs	Medium-term	**M**	**M**

Action No.	Action	Justification	Possible delivery organisation(s)	Possible example partner(s)	Possible example funder(s)	Timescales for implement	Resource Intensity	Priority
	have a positive impact on the region's ecosystems.	some may benefit the native ecosystems and landscape and boost biodiversity. Analysis and monitoring of such species will allow for better maintenance and a more resilient ecosystem.	FC Local community groups	RSPB NT	FC			
27.	Continue the implementation of Nature Based Solutions such as Natural Flood Management (NFM) projects in areas where they would be of most benefit, learning lessons from previous successes, but ensure all relevant partners are consulted with during the scoping stage and ensure all projects are logged on a transparent database (see Action 9).	NFM projects can provide multiple benefits alongside flood alleviation, including biodiversity improvements and reducing pollution. These should continue as the most nature-friendly way of alleviating flood risk, but could be done more collaboratively for quicker gains on a greater scale.	EA WMCA, LNPs, LAs	WTs STW SSW C&RT	EA NE Defra	Short-term	**L**	**VH**
28.	Produce guidance for landowners showcasing ways that they can improve the resilience of their sites, using case studies, and ensure climate change impacts forms a key part of this.	Given the huge diversity of land, both in terms of who owns and manages it and its phenological make-up, a guide outlining basic principles of good management practices that can be applied in different settings would be helpful, including ways to adapt to climate change.	Defra NE LNPs	WTs WT FC RSPB EA NT NFU	-	Short-term	**M**	**M**
29.	Capitalise on recently improved engagement on climate change with the farming community to establish a programme of engagement on how farmers can effectively adapt both their business activities (e.g. crop types etc.) to climate change and contribute positively to local land management to help flood alleviation, especially in flood prone areas, through soil management techniques.	Farming represents such a high proportion of the West Midlands' landscape that adopting new land management practices to help alleviate flood risk could positively affect many local communities, and the farm itself. Climate change also poses risks to the types of crops we can grow in the region, therefore raising awareness of alternatives or ways to protect existing crops would also be beneficial from a food security and economic perspective.	Defra EA NFU	NE STW SSW	Defra EA	Medium-term	**M**	**H**
30.	Lobby for, apply to and, if possible, establish long-term funding options for natural environment restoration	It is recognised that funding will be key to implementing many of these activities. Ideally, funds will be set up nationally and allow for joint/cross-	Various local partners working collaboratively		WMCA, LEPs (local)	Medium-term	**H**	**VH**

Action No.	Action	Justification	Possible delivery organisation(s)	Possible example partner(s)	Possible example funder(s)	Timescales for implement	Resource Intensity	Priority
	programmes, such as examples listed above, that will result in a more joined up approach to projects, where regional partners can work collaboratively. Ensure that funding conditions include evidence that projects will include climate adaptation measures; this includes the forthcoming Green Grants Programme to be administered by the WMCA.	boundary bids to reduce the risk of fragmentation in responses. Local organisations and support bodies should lobby Government for this emphasising the objectives of the 25 Year Environment Plan.			Defra, EA, Natural England (national) Post-EU funding options			
Infrastructure								
31.	Undertake an assessment/ mapping exercise on the local road network (i.e. those not managed by Highways England) to determine which are most likely to be at risk from failing in future climatic conditions. This should include areas most vulnerable to flood risk, slope failure, drainage pressure and damage caused by storms or overheating, coupled with the strategic importance of the road and popular bus routes. Learn from Highways England approach on adaptation to identify potentially suitable responses and work with them given the required connectivity of the Strategic Road Network and local roads.	Highways England are required to report on adaptation as part of the ARP but local authorities that manage local roads are not. Therefore, all such roads in the region need to be assessed for their likely ability to cope in a future climate to ensure connectivity is maintained.	LAs, TfWM Technical consultancies	HE DfT EA STW SSW	LEPs	Medium-term	**M**	**H**
32.	Prioritise adaptation measures, such as improved drainage, green infrastructure integration and 'cooling stations,' such as water fountains and shaded benches, on the most popular walking and cycling routes across the region.	We need to prioritise and expand walking and cycling opportunities as part of our Net Zero commitments, and one way to do this will be to ensure our most used routes are as resilient to climate change impacts as possible, to ensure they are 'reliable' routes for users.	TfWM LAs	Sustrans	TfWM LAs LEPs	Medium-term	**M**	**H**

Action No.	Action	Justification	Possible delivery organisation(s)	Possible example partner(s)	Possible example funder(s)	Timescales for implement	Resource Intensity	Priority
33.	Undertake an assessment/ mapping exercise on the local tram network to determine which sections are most likely to be at risk from failing in future climatic conditions (more frequent flooding, slope failure, heat exposure, storm damage etc.).	The WMCA's tram network is another key priority for our Net Zero priorities and is expanding in popularity. There is a need to ensure it is fit for a future climate.	TfWM Technical consultancies	DfT	TfWM LEPs	Medium-term	**M**	**H**
34.	Undertake an inspection of all non-ARP reporting body owned bridges (e.g. those outside the jurisdiction of Network Rail, Highways England etc.) to check their viability in a future climate, and their potential likelihood for erosion, and prioritise maintenance and adaptation measures on the most vulnerable coupled with the strategic importance of the bridge.	Bridges have been identified as being especially vulnerable to climate change due to their fragile structure and that they often enable connections over water bodies which are likely to flood more often. An assessment of those owned by local organisations, or national organisations outside the ARP, should be taken to prevent the risk of failure, damage and subsequent connectivity issues.	LAs TfWM C&RT Technical consultancies	HE NR DfT EA STW SSW	LEPs	Medium-term	**M**	**H**
35.	Ensure new local buses are fitted with air cooling devices to minimise the risk of passenger overheating.	Bus use will continue to be a priority to help meet our Net Zero targets. There is an opportunity to take advantage of the rollout of new electric/hydrogen buses to ensure these vehicles are also fitted with air conditioning or equivalent technology to ensure they are cool in summer, to maintain passenger numbers.	TfWM Bus operators such as NXWM, Arriva, First etc.	DfT	TfWM Bus operators LEPs	Medium-term, on-going	**M**	**M**
36.	Build on existing water saving programmes and new Government measures and expand to all West Midlands' households to raise awareness of simple, cost-effective measures that all residents can take to reduce their water usage. Establish a consistent message across the whole region (i.e. ensure Severn Trent and South Staffordshire Water collaborate).	Supply will become more constrained in future as a result of drier summers and an increasing population; most areas of the West Midlands are already classed as 'seriously water stressed (see map 2, page 7)' If all residents saved a small quantity of water each year it could result in a significant cumulative saving, reducing pressure on our water supplies. It will also help the existing resilience plans being implemented by our water companies.	STW SSW	WRW LAs Housing Associations	-	Short-term	**L**	**H**

Action No.	Action	Justification	Possible delivery organisation(s)	Possible example partner(s)	Possible example funder(s)	Timescales for implement	Resource Intensity	Priority
37.	Continue engagement with partners in Wales and Water Resources West, as adaptations made here have a profound effect on the resilience of the West Midlands' water supply.	The majority of the water we use currently comes from Wales, therefore on-going engagement to ensure resilience to a future climate of our water supply is critical.	STW SSW	WRW Welsh Water EA	-	Short-term, on-going	**L**	**H**
38.	Ensure climate adaptation is integrated into the design and planning for new infrastructure assets (new roads, rail, sub-stations, drainage etc.). Ensure climate change and its impacts are addressed consistently across the region to support this approach.	Such standards will ensure any new infrastructure will stand the test of time, preventing damage and saving money in the long-term, while keeping the region connected.	All infrastructure providers	WMCA, LAs	-	Short-term	**M**	**VH**
39.	Ensure waste management practices, storage and treatment facilities are robust to withstand future climatic conditions, including flooding and heatwaves. Currently, new waste and other activities subject to environmental permitting (such as minerals, agriculture and chemical plants) need to undertake a climate change risk assessment if active for 5 years or more, according to EA guidance.	The impact of flooding and extreme heat on waste that is left untreated could be consequential from a health and environmental perspective. Along with continued efforts to reduce, re-use and recycle, we need to ensure that any waste we do treat is done so with a future climate in mind. Landfill, incineration and waste handling, treatment and recycling operations need to be resilient to climate change and extreme weather events, and specifically assess the risk of pollution incidents from flooding.	LAs WPAs Waste contractors/ operators Technical consultancies West Midlands Resource Technical Advisory Body	Defra Wrap Industry	Waste contractors EA Defra	Medium-term	**M**	**H**
40.	Ensure all other sectors and businesses which require environmental permits, such as for activities involving potentially harmful substances, cement works, petrol stations etc. assess all impacts of climate change on their operations.	As with waste management sites above, it is important risk assessments and adaptations are thoroughly conducted on all sites where environmental permits are required, given the disruption of operations and potentially harmful impacts these sites could have on the surrounding area (e.g. contamination of flood water).	LAs Technical consultancies	Defra Industry	EA Defra	Medium-term	**M**	**H**

Action No.	Action	Justification	Possible delivery organisation(s)	Possible example partner(s)	Possible example funder(s)	Timescales for implement	Resource Intensity	Priority
41.	Minerals extraction, a practice which is also subject to environmental permits, frequently involves water abstraction and, therefore, should be subject to consideration for climate adaptation given pressures on water availability in the environment. The restoration of mineral sites also offers wide ranging climate adaptation opportunities including flood alleviation, water resources and green infrastructure.	This is an especially important issue in the West Midlands and operations could be disrupted if future climate scenarios are not borne in mind. Moreover, there are opportunities for adaptation during the restoration of minerals sites which should be considered in appropriate locations and potentially on a strategic level at a river catchment scale.	LAs MPAs/WPAs Technical consultancies and operators Land owners/ NFU Wildlife and environmental organisations	Defra Minerals industry	EA Defra Minerals industry	Medium-term	**M**	**H**
42.	Undertake research into the extent to which digital infrastructure, telecoms and ICT is considering future climate change projections.	We rely on digital technologies but at the time of writing it is unclear whether climate change is being considered in the planning of digital infrastructure and technology. Further investigation into this and how it could affect West Midlands' businesses and communities should be undertaken.	Universities Technical consultants	Telecoms operators, such as BT	Telecoms operators LEPs BEIS	Medium-term	**M**	**H**
Health, Communities and the Built Environment								
43.	Conduct an assessment of all hospitals, care homes and other health centres that support vulnerable people in the West Midlands to identify which are most at risk of overheating and identify the most suitable measures to reduce overheating risk, such as implementing green infrastructure, better ventilation etc, and how these could link with potential measures to achieve Net Zero.	Such locations contain some of our most vulnerable people, especially if they are elderly and have underlying health conditions. All such properties are likely to overheat more often in future if they have not been constructed with climate change in mind, meaning that these individuals are more likely to die as a consequence of extreme heatwave conditions. An assessment of where this risk is greatest, and subsequent measures, will help to prioritise action.	NHS Technical consultancies	PHE Other health bodies BRE WMCA LAs	DHSC NHS WMCA	Medium-term	**H**	**VH**
44.	Alongside the above, ensure all healthcare settings are aware of the Heatwave Plan for England (updated annually),	This is a quick-win as the heatwave plan already exists and it should be used by all healthcare settings in the region when a heatwave occurs to ensure staff and residents are as protected as possible.	NHS SWM	PHE DHSC	-	Short-term	**L**	**M**

Action No.	Action	Justification	Possible delivery organisation(s)	Possible example partner(s)	Possible example funder(s)	Timescales for implement	Resource Intensity	Priority
	disseminate this guidance and apply it to their own settings where relevant.			Other health bodies				
45.	Ensure NHS Trusts across the region take the opportunity of the requirement to develop new 'Green Plans' by integrating effective adaptation measures into these plans to help ensure hospitals and other NHS health settings are protected from the impacts of a future climate. Peruse the forthcoming Health and Social Care Sector Climate Change Adaptation report to ensure alignment.	The 'Green Plans' largely focus on ensuring the NHS meets Net Zero targets, although there is a section for adaptation. Also, many actions that can be taken to achieve Net Zero could also help to adapt to a future climate, such as improving building ventilation and green infrastructure. Integrating adaptation into these plans across the region will ensure our NHS Trusts are better prepared for future climatic conditions.	NHS	SWM	-	Short-term	**L**	**VH**
46.	Work with all relevant partners to ensure that climate risks are addressed and considered in the commissioning and provision of all health and social care services and assets, referring to the NPPF for details on new developments and climate change.	The impacts of climate change will affect the most vulnerable in society the most, so it is critical that climate risk planning is embedded into all aspects of the social care system and that people who need greater support during heatwaves, flood events etc are provided it.	PHE NHS	GPs LAs	PHE	Short-term	**L**	**VH**
47.	Ensure climate risks to health, buildings and infrastructure that affect hospitals, care homes, GPs and other health and care settings are embedded into corporate risk / business continuity plans.	This will ensure such risks can be considered more routinely and discussed and monitored by risk professionals within the heart of the health and social care sector.	NHS GPs LAs Other health and care providers	LRFs PHE	-	Short-term	**L**	**VH**
48.	Establish region-wide supplementary planning guidance that requires the need for SUDS in all new homes and developments across the West Midlands. Ensure the guidance builds on existing resources, is based on best practice and includes case studies (e.g. Birmingham's approach) (see also Action 66).	SUDS are an effective way of reducing flood risk in an around housing developments and prevent the need for high-cost, 'hard' flood defences. They can also provide other benefits such as to local wildlife. At present, implementation of SUDS within new developments is fragmented and not always based on best practice, therefore implementing guidance that must be consulted for all new developments is critical to maximising their effectiveness.	WMCA, LAs Developers	EA NFF	EA MHCLG WMCA LEPs	Medium-term	**M**	**H**

Action No.	Action	Justification	Possible delivery organisation(s)	Possible example partner(s)	Possible example funder(s)	Timescales for implement	Resource Intensity	Priority
49.	Ensure all existing and new SUDS schemes are subject to a regular monitoring and maintenance procedure to ensure continued, long-term effectiveness.	SUDS will be critical to the flood alleviation of developments and flood prone locations, and ensuring a rigorous and frequent monitoring and maintenance regime will be crucial to ensure they are still fit for purpose.	WMCA, LAs, LLFAs Developers	EA NFF	EA MHCLG WMCA LEPs LLFA	Short-term (existing), medium-term (new)	**M**	**H**
50.	Ensure planning decisions adhere to the NPPF, which states that new developments avoid flood risk in accordance with the sequential test in the NPPF and inappropriate development directed away from areas of existing or future flood risk. New developments should not cause flooding elsewhere and be resilient to the impacts of climate change.	New developments that are not likely to be protected by strategic flood defences but that are allocated to flood risk areas should be moved elsewhere, as stated by the NPPF, given the upheaval that the flooding of homes causes. This should also include how the current flood risk could change due to climate change, ensuring all developments are fit for future scenarios.	WMCA, LAs Developers	EA NFF	EA MHCLG WMCA LEPs	Short-term, on-going	**L**	**VH**
51.	Continue the funding and rollout of strategic flood defence schemes and ensure that any properties that are not protected by such schemes, but that are still vulnerable to an increasing flood risk, are prioritised for property-level flood protection measures (see also action 65).	Flood risk is increasing and will continue to do so and it is unfortunately the case that some areas of the West Midlands will become affected more often by more severe flooding in future. Work to identify where existing interventions will largely prevent flooding versus those areas where flooding is still likely to occur should take place, prioritising the latter for property level resilience measures.	EA	STW SSW NFF LAs, LRFs	EA Defra	Long-term	**H**	**VH**
52.	Possibly linking with the above, ensure climate adaptation standards are a requirement of new homes, alongside measures to achieve Net Zero. This could include natural ventilation to improve thermal performance and comfort during heatwaves, natural greening, roof reflectivity, permeable paving and rainwater harvesting to reduce freshwater use. Design guidelines should be produced for large capital investment	People's health is at risk from climate change impacts, and it is the case that many new developments are not prepared for future conditions, potentially exacerbating these health concerns. There is the opportunity to ensure all new builds consider adaptation measures from the outset to make homes resilient for decades to come.	WMCA, LAs Developers	BRE	EA MHCLG WMCA LEPs	Medium-term	**M**	**VH**

Action No.	Action	Justification	Possible delivery organisation(s)	Possible example partner(s)	Possible example funder(s)	Timescales for implement	Resource Intensity	Priority
	projects, which set out how to use regionally specific climate projections and adaptation options.							
53.	Ensure home retrofit programmes that are required alongside the delivery of Net Zero targets integrate adaptation measures where possible, such as installation of water efficiency measures, shading options, better ventilation to reduce the overheating risk and to improve indoor air quality, etc.	Retrofitting existing homes is always a challenge but is necessary if we are to achieve our Net Zero ambitions. Given this commitment to retrofit, adaptation measures should be considered alongside as homes will become increasingly unable to deal with future climatic conditions as they age, leading to health, displacement and financial issues for occupants.	WMCA, LAs Developers	BRE	EA MHCLG WMCA LEPs	Medium-term	**H**	**VH**
54.	Conduct an assessment of all schools in the West Midlands, prioritising special schools where the most vulnerable children attend, to identify which are most at risk of flooding and overheating and identify the most suitable measures for adaptation, such as site-level flood resilience, green infrastructure/SUDS, water efficiency measures etc.	Most schools are likely to overheat more often in future and be at greater risks of flooding if they have not been constructed with climate change in mind, meaning that conditions for education will become more challenging and repair costs will become greater. An assessment of where these risks are greatest, and subsequent measures, will help to prioritise action.	LAs Academy Trusts Technical consultancies	DfE BRE	DfE Defra	Medium-term	**H**	**H**
55.	Conduct an assessment of all prisons in the West Midlands to ascertain which are most likely to be at risk from overheating and flood risk, and identify the most suitable measures for adaptation.	Prisons are also at risk from a future climate, affecting inmates' health and wellbeing. An assessment should take place to identify which in the region are most likely to be at risk.	MoJ Private prisons (e.g. Dovegate, Oakwood) Technical consultancies	BRE	MoJ Private prisons	Medium-term	**M**	**M**
56.	Build on the National Trusts' climate change mapping exercise to ascertain which heritage-sensitive areas in the region are most at risk of negative impacts from climate change and set out options for adaptation. Align discussions with	The West Midlands is home to a huge and diverse range of spectacular heritage assets, bringing huge economic and environmental benefits to the region. Given their historic sensitivity and often remote locations, many of these properties and landscapes are likely to be a high risk of the impacts of climate	NT Historic England	Peak District National Park LNPs, LAs FC NE	NLHF Defra NE	Medium-term	**M**	**H**

Action No.	Action	Justification	Possible delivery organisation(s)	Possible example partner(s)	Possible example funder(s)	Timescales for implement	Resource Intensity	Priority
	Historic England's approach to adaptation under their mandatory ARP requirement.	change. A first step will be to prioritise which assets are of greatest risk and outline options to deal with these.						
57.	Engage with national partners to annually update the Climate Just tool, provide further training sessions on the tool and encourage its use to identify locations where the greatest climate vulnerabilities are likely to occur and examples of good practice (see Map 1, page 6).	The Climate Just tool enables practitioners and decision makers to identify where people are most likely to be experiencing 'climate disadvantage,' i.e. areas where interventions are likely to have the greatest gains. Updating the tool to reflect the latest climate data and case studies will be a simple but valuable use of resources.	SWM JRF University of Manchester	PHE NHS LAs Universities	EA DHSC Defra PHE	Short-term	**L**	**M**
58.	Establish community resilience programmes in areas where climate risks and demographic vulnerabilities intersect (see Map 1, page 6), to ensure these areas are better prepared for more frequent and intense extreme weather events (flooding, heatwaves, storms), and can respond and recover more effectively.	Through existing mapping and tools such as Climate Just, there is good evidence that shows where in the West Midlands communities are that would struggle to cope in the event of an extreme weather incident. Such communities will need better protection and support to prevent issues such as displacement or health implications.	LAs LRFs	EA NFF Local community organisations	EA Defra MHCLG WMCA LEPs NLCF	Short-term, on-going	**M**	**H**
59.	Rollout advice and guidance on what to do if residents are affected by an extreme weather event (e.g. flood, heatwave etc.), and provide resilience kits (for example) to homes, prioritising communities such as those outlined above, so that they can respond quicker in the event of extreme weather.	This will enable householders and communities to be better prepared for a greater number and intensity of extreme weather events and reduce strain on local emergency services and health centres.	LAs, LRFs Housing Associations	WMCA SHAP Parish councils Local community organisations	MHCLG EA NLCF	Medium-term	**H**	**H**
60.	Build on and scale-up existing plans to reduce air pollution in the region, such as through initiatives including the Birmingham Clean Air Zone and the WM-Air Programme, factoring in the impact that climate change could have on this progress.	There is the potential for climate change to affect air pollution, such as through increasing wildfires and longer heatwaves leading to less local atmospheric disturbance. Efforts to reduce air pollution must continue apace, especially in our urban core and where those who are more vulnerable to the health impacts of air pollution are located.	LAs WMCA WM-Air	Defra EA	Defra Innovate UK	Short-term, on-going	**M**	**H**

Action No.	Action	Justification	Possible delivery organisation(s)	Possible example partner(s)	Possible example funder(s)	Timescales for implement	Resource Intensity	Priority
61.	Monitor changes in vector-borne diseases as a result of climate change to provide more accurate advice on where and when the likely hotspots in the region will be, and what to do if affected.	Vector-borne diseases from insects such as ticks and mosquitos are likely to increase due to climate change. These can cause serious diseases in humans and need to be monitored closely over time.	PHE Defra	DHSC NE WTs	PHE Defra	Medium-term, on-going	**M**	**H**
62.	Ensure monitoring of food safety and security as a result of climate change, especially hotter conditions, is taking place (see also Action 74).	This has been identified as a significant risk in the UK CCRA, and it is as yet unclear what activity on this is taking place nationally. The West Midlands needs to ensure work is going on to ensure a safe and secure food supply.	FSA Defra	-	FSA Defra	Medium-term	**M**	**M**
63.	Take advantage of longer, drier summers by encouraging flexible lifestyle choices to enhance health and wellbeing. This could include changes to working patterns, promotion of use of outdoor spaces or encouraging uptake of outdoor past-times to boost local tourism and economic opportunities.	One potential benefit of climate change is that we will see more favourable summer conditions for outdoor recreation. Whilst there are risks to these changes, one should not forget that there is the potential to improve health and wellbeing of communities by undertaking and encouraging more outdoor activities and adopting of an outdoor lifestyle synonymous with warmer countries overseas. This, alongside subtle changes to existing lifestyles, could allow for more opportunities to improve health outcomes.	LAs Community groups	GWWM WTs RSPB NE	LAs LEPs Defra NE	Medium-term	**L**	**M**
Business and Industry								
64.	Run an engagement programme with SMEs to encourage them to prepare for a future with more flooding, water scarcity and overheating. Re-launch the Business Resilience Healthcheck Tool to support this.	Such engagement, combined with more general business continuity planning and sharing good practice, will enable businesses to protect themselves from losses and supply chain disruption due to future weather shocks.	SWM	BITC FSB Chambers LEPs	BEIS LEPs WMCA EA	Short-term	**L**	**H**
65.	Provide advice and guidance to businesses on how to operate in heatwave conditions. Priority should be on employee health and wellbeing, especially in businesses that require manual labour and outdoor working, with guidance	As summers become hotter, more business premises will overheat and become difficult for workers to concentrate and potentially lead to negative health impacts, leading to reduced productivity. Businesses need to be flexible during such conditions, but also provide advice so that employees can keep themselves as cool as possible.	BEIS PHE	FSB BITC Chambers	BEIS PHE LEPs	Short-term	**L**	**H**

Action No.	Action	Justification	Possible delivery organisation(s)	Possible example partner(s)	Possible example funder(s)	Timescales for implement	Resource Intensity	Priority
	extended to include dress code and working at home options.							
66.	Ensure as many businesses as possible, especially those in flood vulnerable areas, sign up to the EA flood warnings service.	This will allow businesses to prepare more effectively for flooding when it is likely to occur, minimising the potential costs as a result.	EA	SWM BITC FSB Chambers LEPs	EA	Short-term	**L**	**H**
67.	Continue the funding and rollout of strategic flood defence schemes and ensure that any business premises that are not protected by such schemes, but that are still vulnerable to an increasing flood risk, are prioritised for site-level flood protection measures (see also Action 49).	Flood risk is increasing and will continue to do so and it is unfortunately the case that some areas of the West Midlands will become affected more often by more severe flooding in future. Work to identify where existing interventions will largely prevent flooding versus those areas where flooding is still likely to occur should take place, prioritising the latter for site level resilience measures.	EA	STW SSW NFF LAs, LRFs	EA BEIS	Long-term	**H**	**VH**
68.	Ensure there is a requirement for all new commercial developments to include a SUDS. Ensure the guidance builds on existing resources, is based on best practice and includes case studies (also see Action 46).	SUDS are an effective way of reducing flood risk in and around commercial developments and prevent the need for high-cost, 'hard' flood defences. They can also provide other benefits such as to local wildlife. At present, implementation of SUDS within new developments is fragmented and not always based on best practice, therefore implementing guidance that must be consulted for all new developments is critical to maximising their effectiveness.	WMCA, LAs	Developers	BEIS LEPs WMCA EA	Medium-term	**M**	**H**
69.	Ensure that large-scale conversion of brownfield sites across the region integrate adaptation measures, such as natural flood alleviation, SUDS and greening initiatives that benefit climate adaptation, and ensuring all new builds contain rigorous climate resilient standards. Where such sites are not	Such sites, regardless of what their overarching use will be when they are complete, have the potential to represent exemplar 'resilient communities' by implementing adaptation measures, meaning that they can grow and thrive for decades to come.	WMCA, LEPs, LAs Technical consultancies	EA NE WTs	WMCA, LEPs	Long-term	**H**	**VH**

Action No.	Action	Justification	Possible delivery organisation(s)	Possible example partner(s)	Possible example funder(s)	Timescales for implement	Resource Intensity	Priority
	suitable for development, consider appropriate site greening options (urban forests, wetlands, parks etc).							
70.	Collate existing mapping, or undertake new mapping, of industrial sites that are likely to be at risk of flooding and where, should flooding occur, there is a greater likelihood of this floodwater becoming polluted. This will enable tailored flood alleviation responses to take place at high-risk sites.	Parts of the West Midlands, such as the Black Country and Potteries, has a rich industrial heritage and includes businesses that, by their very nature, may use chemicals or fuels that must be stored safely to prevent pollution. By determining which of these sites are most at risk of flooding, this will help to prevent a mass pollution event leading to potential implications on the natural environment and human health.	WMCA LEPs	EA STW SSW	BEIS	Short-term	**M**	**H**
71.	Build on existing water saving programmes and new Government measures and expand to all West Midlands' businesses to raise awareness of simple, cost-effective measures that all employers can take to reduce their water usage. Establish a consistent message across the whole region (i.e. ensure Severn Trent and South Staffordshire Water collaborate).	Supply will become more constrained in future as a result of drier summers and an increasing population; most areas of the West Midlands are already classed as 'seriously water stressed' (see map 2, page 7). If all businesses saved a small quantity of water each year it could result in a significant cumulative saving, reducing pressure on our water supplies. It will also help the existing resilience plans being implemented by our water companies.	STW SSW	WRW FSB BITC LEPs	LEPs	Short-term	**L**	**H**
72.	Promote and encourage uptake of ISO 14090:2019 that will allow businesses to commit to and demonstrate progress on adaptation. Integrate this with the development of a new business pledge, similar to that of the West Midlands Net Zero Business Pledge, but instead for adaptation.	This approach would give businesses a framework and incentive for action and provide the opportunity for businesses to share learning and progress with each other on adaptation. Ultimately, it would result in a greater number of businesses more prepared for climate change impacts.	WMCA LEPs	SWM BITC FSB	BEIS	Short-term	**L**	**H**
73.	Ensure climate adaptation and resilience is embedded into refreshes of LEP Strategic Economic Plans or equivalent documents that set out regional	Future investment needs to be resilient to a changing climate, otherwise new projects could fail before they begin. Ensuring that investment strategies include adaptation as a core principle will ensure all funded	LEPs	Technical consultancies BEIS	-	Short-term	**L**	**H**

Action No.	Action	Justification	Possible delivery organisation(s)	Possible example partner(s)	Possible example funder(s)	Timescales for implement	Resource Intensity	Priority
	investment plans, demonstrating integration of adaptation solutions into new investment projects.	projects are as resilient to a changing climate as they can be.		Defra EA				
74.	Provide funding and acceleration opportunities for SMEs to develop adaptation solutions (technologies or processes) that could be used to help with climate adaptation responses, in a similar way to opportunities that are provided to SMEs for developing Net Zero innovations.	This will have the dual benefits of being able to harness the ideas and innovative solutions of SMEs to the climate crisis, while strengthening the local economy. We learnt from the Covid-19 pandemic how responsive and flexible SMEs can be; let's use this to our advantage.	WMCA LEPs	SWM IAWM BITC FSB	BEIS Innovate UK	Medium-term	**M**	**H**
75.	Enhance more sustainable procurement practices being considered by public sector bodies for the purposes of Net Zero to ensure that these practices are also building in a greater resilience to climate change.	This will help to diversify the SME supply chain and reduce reliability on potentially vulnerable sources, especially if businesses rely on a supply chain that comes from a country abroad where climate change is likely to have an even greater impact.	WMCA LEPS	LAs Universities NHS	WMCA LEPs MHCLG	Medium-term	**M**	**H**
76.	Capitalise on local food and growing initiatives to reduce the need to import food from countries where there may be an increase in food safety, availability and quality due to climate change (see also Action 60).	Growing food locally has strong environmental and economic benefits, but can also help to reduce the need for the region to import food from other countries where supply and food safety may be compromised due to the impacts of climate change abroad.	LAs Local community groups	Defra FSA	Defra LEPs	Short-term, on-going	**L**	**M**

5 Case studies

Case study 1: River Severn Partnership

The River Severn Partnership will look to help people, businesses and the environment along the River Severn to be prepared for and resilient to the impacts of climate change, across an area which covers the Rivers Severn, Teme, Warwickshire Avon and Wye.

Proposals to achieve this include options for flood risk management, improving water quality, environmental enhancement and developing an integrated approach to water resource storage and management.

Examples of projects include:

- **The Severn Valley Water Management Scheme**, a £15m project to make the Severn Valley more resilient to climate change by adopting a range of measures that will work together. The Partnership is looking at a wide range of options to reduce flood risk, manage water resources and as far as possible reduce the scale of hard engineering required.

- **The Tenbury Wells Flood Risk Management Scheme** in Worcestershire. Following a series of flooding incidents in the town, adaptation measures will involve the construction of embankments and flood walls through the town. It will include some improvement to existing structures and flood gates are also being considered in specific locations. The scheme would be designed to provide a 1 in 100 year Standard of Protection (equivalent to a 1% chance of flooding at any given year), with an additional allowance for climate change, and at this stage in the design process, it is predicted that the scheme, when complete, will reduce risk of flooding to approximately 120 residential and 145 commercial properties.

- **Piloting an Adaptive Pathways approach.** The River Severn Partnership has been identified as one of four national pilots to develop an Adaptive Pathways Plan. Using evidence, this work will consider and map out the most appropriate pathway for making decisions on a suite of different interventions across the partnership area, which are flexible to adapt to changing circumstances.

The River Severn Partnership's success comes about through the wide range of organisations that contribute to the partnership. This includes the Environment Agency, all local councils and Local Enterprise Partnerships, water companies, Wildlife Trusts, Natural England, Homes England, the National Farmers Union, Severn Rivers Trust, Local Nature Partnerships and Birmingham City University.

Source: River Severn Partnership website
Image: River Severn at Shrewsbury (Pixabay)

Case study 2: HS2 approach to flood risk and resilience

HS2 is a new high speed railway linking up London, the Midlands, the North and Scotland. It is integrating climate change adaptation and resilience into each project stage.

It has assessed the impact of climate change it its Environmental Impact Assessment as well as the in-combination climate change effects.

HS2 is working to understand and manage climate change interdependencies with the existing rail, road and the power infrastructure providers and is addressing climate change in its design. For example, it has completed a climate change adaptation and resilience strategy for stations as part of its work on BREEAM and is also protecting the construction process from extreme weather.

HS2 has completed a climate risk assessment which has considered risks posed by climate related hazards such as extreme hot and cold weather, heavy rain, high winds and storms to the infrastructure and assets associated with the railway including tracks, tunnels, overhead line equipment, rolling stock, earthworks and stations.

Regarding the latter, HS2 is considering how to ensure the new interchange station in Solihull will be fully adapted to climate change. For example, directing rainwater from the main station building via a network of underground pipes into a rainwater harvesting tank will assist in providing part of the building's water requirements. The estimated volume of the rainwater harvesting tank is 150 cubic metres, which will reduce the mains water demand for the station.

Landscaping features include sustainable drainage systems to reduce the burden on surface water drainage and naturally irrigating planted areas, and there will be new natural habitats created around the station, leaving a legacy of biodiversity and an enhancement of native species.

HS2 is also involved in other adaptation projects and groups, including:

- Tomorrow's Railway and Climate Change Adaptation (TRaCCA), a research project run by the Rail Safety and Standards Board (RSSB), the rail safety body.
- The Infrastructure Operators Adaptation Forum, where members learn from each other and work towards a vision for infrastructure assets and services that are resilient to today's natural hazards and prepared for the future climate.
- Collaboration with BSI on the standard ISO 14090 Adaptation to Climate Change. This standard offers a framework that enables organisations to consider climate change adaptation when designing and implementing policies, strategies, plans and activities.

Source: HS2 climate resilience pages
Image: Fast moving train (Pixabay)

Case study 3: Cleone Foods, Birmingham

Cleone Foods, a small Birmingham based food manufacturing business, was recognised for its efforts in implementing an extremely impressive strategy which minimises potential threats to the business. Its comprehensive risk assessment has ensured that whatever the issue, their business is prepared and ready for action. The success of the strategy is highlighted in impressive growth figures and minimal disruption to business practices since its implementation in 2009.

The challenges

- To minimise the possibility of delays in the delivery of its goods as a large proportion of the company's business is with major supermarket chains and any such delays can result in fixed financial penalties.
- Prolonged disruption is not only a risk to profitability, but a threat to the survival of the company.
- To reduce the impact that extreme weather could potentially bring upon the business.
- To minimise the risk of potential prolonged power failure, as any such event would create major implications for the business, as a large amount of finished stock is on site in chillers and freezers.
- To diminish both the likelihood and the impact of possible IT failure upon the business.

The solutions

- Cleone Foods has a reciprocal agreement with Shire Foods in Warwickshire, which allows emergency production to be easily shifted between sites without affecting production.
- An investment was made into the purchase of specialist equipment, including a forklift snowplough and grit spreader. The company operates as a 'snow champion', which involves clearing adjacent public roads and the loan of equipment to other local businesses.
- Generators have been put in place which automatically switch on in the event of mains supply loss.
- Managers and other senior staff are enabled to work from home, thanks to facilities which enable access to remote to IT systems. The company also has dual main servers and mirrored hard drives which are protected further by manufacturers 24 hour replacement warranty.
- The company adopts a local employment policy and most staff live near the site.

The results: Cleone foods were able to convince a major supermarket chain of their ability to deliver and, as a result, an exclusivity deal was agreed upon. This led to an extremely impressive 11% increase in sales. A major computer failure that took place after adaptation was alleviated within 24 hours, with no significant impact upon the normal operations of the company. Cleone was also the winner of the 2013 Business in the Community Business Resilience Award.

Learning points: Excellent planning is essential to maintain a successful and profitable business. A full risk analysis was produced of all possible contingencies along with a rating system which highlighted both the potential impact and possible solutions. Progress of the risk analysis was tracked at monthly managers meetings until its implementation and is now subject to regular review.

Many of the actions implemented by Cleone could be replicated by other businesses and a significant step forward would be to implement a nationwide scale up of resilience measures, especially in SMEs.

Source: Sustainability West Midlands

Case study 4: Regional water resilience

Severn Trent Water (STW) is undertaking a series of actions to adapt its services to a future climate, thus ensuring a secure water supply for the West Midlands.

STW is required to report on adaptation as a requirement of the Adaptation Reporting Power (ARP). Its approach to climate adaptation is as follows:

- Have the right mindset and behaviours in place to understand the issues, plan and implement action.
- Systematically take action to reduce its priority climate change risks.
- Actively seek wider opportunities to transform how and what they do.

Some examples of adaptation actions that STW intends to take include:

- Reducing leakage by 6%.
- Protecting vulnerable communities from failure of three sections of aqueduct at a cost of around £67m.
- £230m investment in water treatment works.
- Doubling the number of SUDS projects.
- Using weather forecast information which is tailored to the region and thresholds to plan resources and maintain our service levels.

STW is also investing £300 million to ensure its customers in Birmingham receive a reliable water supply both now and long into the future. The Elan Valley Aqueduct transports water 118km from mid-Wales to Birmingham and has been serving customers well for over 100 years. It is a critical asset and, without it, a large number of customers would be left without water.

Studies show that the aqueduct is at increasing risk from the impacts of climate change. Heavy rainfall events could cause flooding and increased river scour, affecting the support structures. As the aqueduct passes through steep terrain it is also at risk from landslips.

Work started in 2016 to lay a new 26km pipeline from the River Severn near Stourport on Severn to the water treatment works at Frankley. The pipeline begins at Lickhill where STW is building a new pumping station and there is also a break pressure tank near Romsley.

The new pipeline will significantly improve resilience of the water supply for over 1.2 million customers across Birmingham and surrounding areas and will also support STW's wider network of pipes and so benefiting customers right across the Severn Trent Region.

Source: STW's adaptation pages | Birmingham Resilience Project
Image: Stourport on Severn (Pixabay)

6 Next steps

This action plan, and the engagement that informed it, is just the first step in ensuring that the West Midlands' people, places and businesses can adapt to climate change. SWM can support with the actions included, especially in a catalysing role to ensure action takes place, but cannot enforce the actions or resource them accordingly.

It is, therefore, hugely important that authorities and organisations that are able to take forward these actions do so now, either by providing the necessary resourcing, working collaboratively or sourcing funding from elsewhere. The climate emergency declarations that our national and local governing bodies have made will count for little if action is not taken soon to adapt.

As such, SWM recommends that the next steps and principles towards successful implementation are as follows.

- Identify and implement the quick-wins included in this Action Plan. Many of the suggested actions are likely to take little time or resource to implement; these are indicated by the 'L' in the Resource Intensity column. Implementing these actions while groundwork is prepared to tackle the others would be a good start.

- Following this, other actions in the plan should be prioritised depending on the urgency of action (we have suggested this in the Priority column), the resource requirements and the number of partners that would need to be engaged.

- Taking an adaptation pathways approach is recommended, as this will help to build flexibility into adaptation actions, which can help to manage the long-term and uncertain nature of climate change impacts.

- To enable any actions to be taken, an immediate priority should be in the re-establishment of a West Midlands Climate Adaptation Working Group to drive forward these actions and influence policy and decision makers accordingly. Working in collaboration is crucial to this plan being successfully implemented and setting up the Working Group would represent a good start.

- Engaging with key decision makers, such as Councillors, senior leaders and the West Midlands Mayor, needs to happen quickly, to reflect the urgency of the need to adapt and to establish buy-in.

- There also needs to be engagement with key enablers of these actions, such as technical consultancies, national Government departments, local authorities, Local Resilience Forums and other bodies who influence health, natural environment and resilient infrastructure outcomes. Suggestions of ways to do this are included in the Plan and SWM can support this process.

- A robust monitoring and evaluation process needs to be developed alongside this Plan, to ensure the actions are having the desired impact. This should sit alongside a process for reporting.

- The region is progressing on the implementation of Net Zero projects and activities. Wherever possible, adaptation measures should be integrated into these activities to double the impact of the activity whilst minimising resource requirements. This would also ensure adaptation actions do not threaten to

contradict Net Zero targets, or visa-versa. The same principle applies to natural environment improvement projects.

- Funding opportunities will be crucial to the successful implementation of some of these actions. Mapping of funding opportunities and lobbying of central Government funding needs to take place hand-in-hand, to encourage appropriate investment. There also needs to be strategic use of public sector funds to lever in appropriate private sector investment.

- A final initial and quick step is to peruse the resources included in the next section to enable those less familiar with climate adaptation and resilience to become more informed.

7 Further information sources

- Climate ADAPT: useful summary of UK resources
- Climate Change Adaptation Reporting Power reports
- Climate Change Allowances for flood risk schemes
- Climate Change Committee adaptation pages
- Defra: A Green Future: Our 25 Year Plan to Improve the Environment
- Environment Agency flood risk mapping
- EU adaptation definition
- Government Climate Services for a Net Zero Resilient World research project
- Intergovernmental Panel on Climate Change (IPCC)
- Living better with a changing climate (Environment Agency report, October 2021)
- Met Office weather warnings alert service
- National Adaptation Programme (NAP)
- National Flood and Coastal Erosion Risk Management Strategy for England
- National Framework for Water Resources
- Natural Flood Management Programme: initial findings
- Sign up for flood warnings service
- SWM's Roadmap adaptation priority
- TCPA: 20-Minute Neighbourhoods: Creating Healthier, Active, Prosperous Communities
- TCPA: The Climate Crisis – a guide for local authorities on planning for climate change
- UK Climate Impacts Programme (UKCIP)
- UK Climate Resilience Programme
- UK Climate Risk
- UK Climate Projections 2018

A list of other adaptation plans that were used to inform this one are also available in Annex 1.

Annex 1: Detailed methodology

This annex outlines the methodology used to compile the West Midlands Climate Change Risk Assessment and Adaptation Plan.

Step one: Utilisation of Independent Assessment of UK Climate Risk (CCRA3) resources

SWM has been involved in the development of CCRA3, the intelligence and evidence from which will help to develop next UK Climate Change Risk Assessment (published in 2022) and the National Adaptation Programme for England (published in 2023). These outputs are statutory as part of the Climate Change Act 2008. Section one of this document provides more details.

SWM's involvement has been upon commission with the Climate Change Committee (CCC), who put together CCRA3, to help improve its accessibility. CCRA3 is so vast in its analysis that providing engaging and digestible resources is challenging, hence our role has been to lead a consortium of experts on climate change adaptation and communications to help provide outputs to help CCRA3 achieve this greater engagement. Outputs have included:

- Various rounds of stakeholder engagement
- Research into good practice from other countries
- Production of summaries for each UK nation
- Production of sector briefings

SWM was directly responsible for producing the England summary and overseeing the completion of the sector briefings. The former of these outputs included the list of climate related risks that are projected to affect England, along with their urgency, magnitude and confidence, as put together by the CCC and other academic and consultancy experts. We were, therefore, able to use this as a basis for the West Midlands risk assessment.

The first task was to identify which risks and opportunities were not relevant to the West Midlands. Of the 61 risks and opportunities to England, nine are not relevant to the region; this is because they are risks or opportunities associated with the oceans or coastal environments. They are as follows:

Risk or Opportunity	Receptor	Nature of risk/opportunity	Urgency Score
Natural Environment and Assets			
RISK	Aquifers and agricultural land	Sea level rise leading to saltwater intrusion	**Further investigation**
RISK	Marine species, habitats and fisheries	Changing climatic conditions, including ocean acidification and higher water temperatures	**More action needed**
RISK	Marine species and habitats	Pests, pathogens and invasive species as a result of climatic changes	**More action needed**
RISK & OPPORTUNITY	Coastal species and habitats	Greater incidence of coastal flooding, erosion and climate factors	**More action needed**
OPPORTUNITY	Marine species, habitats and fisheries	Benefits resulting from changing climatic conditions	**Further investigation**
Infrastructure			
RISK	Infrastructure services	More frequent and extensive coastal flooding and erosion	**More action needed**
RISK	Offshore infrastructure	More intense storms and high waves	**Sustain current action**
Health, Communities and the Built Environment			
RISK	Viability of coastal communities	Sea level rise leading to a greater risk of flooding and erosion in coastal areas	**More action needed**
Business and Industry			
RISK	Coastal business locations and infrastructure	Greater incidence of coastal flooding, extreme weather, erosion and sea level rise	**More action needed**

One may argue that there could be a knock-on effect of these risks to the West Midlands over time. For example, regarding coastal risks to businesses, if businesses re-located as a result of more coastal erosion or sea level rise, they could choose to re-locate in the West Midlands, which could have a positive or negative effect on our business base and economy. However, such indirect risks are more speculative in nature and would require further research to qualify, and this is outside the scope of this piece of work.

Following this filtering exercise, SWM utilised a combination of the above resources to inform the West Midlands risk assessment and adaptation plan, primarily by engaging with experts in the region on climate adaptation.

Step two: Stakeholder engagement

In order to determine whether the nature and urgency of the risks to England identified by CCRA3 were appropriate for the West Midlands, we called on the help of local experts in climate adaptation to help us with this. This gave us a more accurate picture of the risks in our region, albeit to provide the level of accuracy and granularity that is provided in the UK CCRA3 would require the undertaking of a mini-CCRA for the region, which would be hugely costly and time-consuming. This approach is the next best thing, as it allows us to challenge whether we need to be more or less worried about some of the 52 risks to England than others.

The other, more primary purpose of engaging with expert stakeholders was to identify adaptation actions that are already taking place in the region that could help us to adapt to some of the risks identified, or to identify gaps where more action is needed.

As a result, we ran seven online workshops with experts, enabling the attendees to offer their perspectives and evidence on both the risk assessment and adaptation plan.

Identifying stakeholders

Through both the work with the CCC and our own local networks and expertise, SWM already had a well-formed list of stakeholders to whom we could invite to the workshops. We decided to make the workshops invite-only, as we specifically wanted those with intelligence on the topic of adaptation to feed into the process, as experts in the field. We undertook a stakeholder mapping exercise to identify these experts, which included a series of local and national contacts gained from years of working in this area.

Workshop structure

There was no perfect way to split the workshops, so for consistency we decided to split them into a combination of CCRA3 chapter themes and sector briefings. The idea here was to bring together common experts into small groups of no more than 20 to allow for maximum interaction. Getting the balance right was a challenge but worked fairly well in the end. The table below shows how each workshop was themed, the organisations that participated at each and the total number of attendees (not including hosts and facilitators).

Theme	**Organisations in attendance** (SWM and EA in attendance at all)	**Total number of individual attendances**
Terrestrial and freshwater biodiversity	Groundwork West Midlands Shropshire Council Staffordshire County Council Staffordshire Wildlife Trust Warwickshire County Council	8
Agriculture and forestry	Forestry Commission National Farmers Union Staffordshire County Council Warwickshire County Council Wilson Sheriff	10
Energy, telecoms and water	Arup Coventry City Council Institute of Civil Engineers National Trust South Staffordshire Water The Royal Orthopaedic Hospital	10
Transport	Birmingham Airport Institute of Civil Engineers	8
Health and social care	Arden Estate Partnerships gbpartnerships Sandwell Council The Royal Orthopaedic Hospital Warwickshire Wildlife Trust	8
Buildings, communities and heritage	National Grid Staffordshire County Council Warwickshire County Council	6
Business	Birmingham Airport	2

We were disappointed with the turnout at some of the sessions, especially business, but this speaks volumes for the need of this plan and the activity that is being delivered alongside. Identifying experts in climate adaptation in our region or nationally was a challenge and it is, therefore, crucial that one of our roles is to maintain engagement and upskill, where needed.

To get the most out of the attendees, but to ensure the workshops did not go on for too long, we limited the sessions to two hours, but allowed for maximum participation. Crucially, the majority of the two hours was interactive and, essentially, the main aim was to gain attendee views on the accuracy of the risk assessment and to feed in evidence that could help form the adaptation plan, in terms of activities that could be rolled out/scaled-up or gaps that need addressing. The agenda for each workshop, regardless of its theme, is below (although this was fluid depending on the number of attendees).

09:45	**Log in for networking**
10:00	**Welcome, introduction and aims of workshop**
10:05	**UK Climate Change Risk Independent Assessment** • **Key messages** • **Implications on relevant sector**
10:20	**Q&A**
10:30	**Workshop 1: Translating risks/opportunities into a West Midlands context** Do we have any evidence that suggests that the key messages for the West Midlands should have a different emphasis, or that the magnitude and urgency scores should be different compared to England as a whole?
10:55	**Comfort break**
11:05	**Workshop 2: Adaptation in the West Midlands** • What projects and activities are already taking place, or are planned to take place in the West Midlands, that are, at least in part, designed to adapt the relevant sector to the risks from climate change, or enhance the opportunities? • What gaps are there in adaptation actions that we need to address?
11:55	**Next steps and opportunity to submit further evidence**
12:00	**Close**

At the workshops where there was a larger turnout, we split the group into Zoom ‘breakout’ sessions and assigned a facilitator to each to take notes, and following the workshops we gave attendees the opportunity to provide further evidence, or more clarity/details on evidence given during the workshops, by email. This included a range of reports, strategies, plans and links to further online information.

Local authority workshop

In addition to the seven workshops outlined above, the West Midlands Combined Authority (WMCA) invited SWM to run an additional workshop specifically for local authorities. The WMCA has a particular interest in its seven constituent authorities (Birmingham, Coventry, Dudley, Sandwell, Solihull, Walsall and Wolverhampton) but we opened the invitation up to all 32 local authorities in the West Midlands, to enable greater sharing of good practice and cross-boundary collaboration opportunities.

This session covered some of the same material as the other seven thematic sessions, but focused more on the basic principles and importance of adaptation, and a discussion around local authority responsibilities on adaptation. The agenda for this session is outlined below.

13:15	**Log in for networking**
13:30	**Welcome, introduction and aims of workshop**
13:35	**UK Climate Change Risk Independent Assessment: Key Messages** SWM
13:50	**Development of West Midlands Risk Assessment and Adaptation Plan** **Fit with #WM2041 objectives** SWM & WMCA
14:00	**Q&A**
14:10	**Workshop 1: Local authority responsibilities** A discussion around what actions local authorities may need to take or support to ensure the West Midlands is prepared for climate change impacts, and the possible barriers to successful implementation.
14:40	**Comfort break**
14:50	**Workshop 2: Good practice in the West Midlands** An opportunity for local authority delegates to share any good examples of adaptation strategies, plans, commitments or projects taking place in their localities.
15:25	**Next steps and opportunity to submit further evidence**
15:30	**Close**

Twenty-eight individuals from 16 different authorities attended this session.

Step three: Developing this risk assessment and action plan

Following the workshops, we collated the notes and evidence from during and after the workshops and supplemented this with other research being undertaken by SWM. This included:

- A local authority benchmark which, amongst other things, asked councils in the region for their progress on and activity around climate adaptation.
- A short desk-based review, that looked at any other local strategies and action plans on climate adaptation undertaken by West Midlands local authorities.
- A short desk-based review of the plans submitted by a selection of organisations that are bound to produce a plan as part of the Adaptation Reporting Power. This included:
    - Birmingham Airport
    - Environment Agency
    - Forestry Commission
    - Highways England
    - Historic England
    - National Grid
    - Natural England
    - Network Rail
    - Peak District National Park Authority
    - Severn Trent Water
    - South Staffs Water
    - Western Power Distribution

The combination of this evidence allowed us to put together the edited risk assessment and high-level action plan set out in this publication. It must be emphasised again here that this is essentially a series of recommendations of next steps and a call to action; ultimately we recognise that homing in on these actions, in terms of which should be prioritised and why, would require a significant amount more research and analysis. It is hoped, however, that this document can be used as an initial basis and framework to allow action to start happening.

The structure of this Action Plan and the tables was developed by SWM based on good practice from elsewhere, not limited to the following examples:

- Birmingham Climate Change Adaptation Action Plan
- Cambridge City Council Climate Change Adaptation Plan
- Derry City and Strabane District Council: Climate Change Adaptation Plan
- Edinburgh Adapts: Climate Change Adaptation Action Plan
- Glasgow City Region Adaptation Strategy and Action Plan
- Northern Ireland Climate Change Adaptation Programme
- The London Mayor's Climate Change Adaptation Strategy
- University of Glasgow Climate Change Adaptation Plan
- Welsh Government: Draft Climate Change Adaptation Plan for Wales
- Wiltshire Council: Climate Change Adaptation Action Plan

We also wanted to give an indication for each action in terms of:

- What could be achieved in the first year of implementation; this is to give an emphasis that proper monitoring procedures must be in place to determine this (Annex 2).
- How implementing the recommended actions could influence how we could meet our other West Midlands Sustainability Roadmap targets (Annex 3).

Upon completion of a draft version of this Action Plan, we consulted with our collaborating partner, the Environment Agency, prior to publication.

Annex 2: Examples of first year measures

The table overleaf provides some example measures that could be implemented within the first year of the action being initiated. These are suggestions in an attempt to catalyse action, and more work should be undertaken by the relevant organisations to identify what outcomes, measures and indicators can realistically be monitored to ensure successful implementation of the identified action.

A key principle is that all actions that go forward for implementation must include a robust monitoring plan to ensure that they meet their objectives in reducing the worst impacts of climate change.

Action No.	Action	Potential first steps to complete within the first year of commencement of action implementation
	Governance, reporting and monitoring	
1.	Set up a West Midlands Climate Adaptation Working Group which will primarily aim to drive forward some of these actions and lobby national and local funders and policymakers to ensure adaptation to climate change is at the heart of all activities.	• Group members identified and agreed involvement. • First and subsequent meetings set up. • Terms of Reference established.
2.	Provide a platform and forum, either as part of or separate to the above, for authorities acting in the West Midlands that are required to set out their adaptation actions under the Adaptation Reporting Power (ARP).	• Group members identified and agreed involvement. • First and subsequent meetings set up. • Terms of Reference established.
3.	Identify adaptation leads and other equivalent working groups in neighbouring regions (Wales, SW, NW, East Midlands) in recognition that climate risks and adaptation solutions do not stop at boundaries, and ensure two-way engagement takes place.	• Completion of mapping exercise of adaptation leads and working groups. • Contact made with these groups and individuals with recurring appointments arranged.
4.	Through the Working Group and/or its subgroups, facilitate potential partnerships and/or funding sources to take forward projects across the region and research innovative approaches to adaptation financing.	• List of opportunities generated from research.
5.	Integrate climate adaptation as a key theme in existing Youth Boards / Councils across the region.	• Youth Boards/Councils identified and engaged. • Adaptation discussed at Board/Council meetings.
6.	Run an engagement programme and advice sessions for public and private sector organisations to help them develop their own climate risk assessments and adaptation plans.	• Workshops arranged across the region. • Good practice guidance produced on how to produce an organisation-level adaptation plan.
7.	Ensure climate risks are embedded into corporate risk assessments and Local Resilience Fora risk assessments for local areas in the region.	• Corporate risk element embedded into the guidance outlined above. • All LRFs engaged with to determine baseline of understanding and engagement on climate risk.
8.	Undertake a data analysis exercise that assesses the 'numbers behind future climate change.' This means looking at the impact on various metrics (excess deaths, buildings at risk, species decline, economic losses etc.) that climate change would have if nothing is done (business as usual), versus effective adaptation.	• Development of specification for the work. • Identification of lead resourcing organisation. • Tender opportunity published.
9.	Establish a comprehensive database of projects that are, wholly or in part, focusing on climate adaptation in the West Midlands. Update this at least monthly.	• Resource secured for work. • Research undertaken on existing projects. • Database skeleton produced.
10	Collate a database of academic research projects that focus wholly or in part on climate adaptation, the findings and intelligence from which may be used to accelerate adaptation actions.	• Resource secured for work. • Research undertaken on existing projects. • Database skeleton produced.
11	Provide a climate adaptation webpage which includes a 'hub' of resources on climate adaptation, including this adaptation plan.	• Webpage published and promoted widely across multiple regional and national networks.

Action No.	Action	Potential first steps to complete within the first year of commencement of action implementation
12	Establish a communications campaign that highlights the importance of climate adaptation to individuals and organisations. This should be framed positively and linked with the Net Zero agenda, but emphasising that further action still needs to be taken.	• Identify resourcing and appoint suitable contractor to undertake this work. • Development of communications materials for different audiences.
13	Develop an awareness campaign and set of legacy resources that are specifically targeted at Cabinet Members and Councillors across the region to engage them in the climate adaptation agenda. Given political changes occur regularly, these must be transferable from one administration to the next and provide the 'business case' for adaptation.	• All 32 West Midlands local authorities engaged. • Series of workshops organised with at least 2 Councillors in attendance from each area.
14	Update this plan annually to ensure actions are kept relevant and set up a monitoring process to ensure actions are being delivered with success measures identified.	• Resourcing secured to ensure this plan is updated annually.
Natural Environment and Assets		
15	Ensure that the Natural Environment Plan published by the WMCA, and other habitat, species and conservation strategies covering areas of the region (such as the Midlands Engine Ten Point Plan for Green Growth and their specific themes of 'Nature's Recovery' and 'Blue-Green Places') align with this Action Plan and embeds climate adaptation as one of its key priorities.	• Discussion with WMCA and LNPs and clarity on forthcoming strategies being developed. • Integration commenced as appropriate.
16	Embed climate adaptation into any natural environment/ capital working groups operating region-wide.	• Mapping of relevant groups undertaken. • Group secretariat contacted for initial introductions.
17	Capitalise on the rollout of local tree-planting programmes by ensuring that all schemes contribute to climate adaptation objectives, e.g. that they help to reduce flood risk, contribute to urban cooling etc (linked to the 'right tree, right place' concept). Potentially link with other planting initiatives such as some of those outlined below, and investigate rolling out the Birmingham City Council approach to strategic tree planting mapping. Utilise the Forestry Commission's Woodland Creation Offer, where climate resilience is a key objective, and consult the 'Managing England's woodlands in a climate emergency' publication to support informed decisions on projects.	• Birmingham City Council approach promoted across the West Midlands. • Case studies of tree planting schemes that have been implemented with adaptation in mind circulated across the West Midlands.
18	Use lessons learnt from urban greening programmes, such as the Sunrise project in Stoke, to establish equivalent programmes in urban areas where species are at greatest risk, and ensure core objectives of these programmes include climate adaptation, e.g. flood alleviation, urban cooling etc. This could also link with urban tree planting initiatives (see above). Lessons can also be learned from the Manchester Ignition Project.	• Suitable funding options for such projects identified. • Mapping locations where urban greening programmes would result in the greatest range of benefits commenced.

Action No.	Action	Potential first steps to complete within the first year of commencement of action implementation
19	Assess the resilience of West Midlands urban parks, considering both the biodiversity of the park and its users. Integrate adaptation measures where appropriate, such as strategic tree planting, water meadows, changing mowing regimes, installing drinking water fountains etc.	• Map of urban parks across the region established. • Parks prioritised for measures based on usage, those at particular risk of (e.g.) flooding and those in need of improvement works.
20	Work with Defra to understand the detail of the new England Peat Map, a commitment under the 2021 England Peat Action Plan, to ensure vulnerabilities in the ecosystem can be identified at a granular level in the West Midlands. Ascertain if local partners will be consulted/can get involved or provide further insight to this process.	• Engagement with Defra on this issue to determine granularity. • England map analysed by GIS experts to determine usefulness in assessing peat vulnerability in the region.
21	Assess those areas that may be most prone to wildfires and provide signage and guidance at these sites encouraging users not to exacerbate the risk, e.g. by having barbecues, campfires etc. Access the Wildfire Risk Map stated in the Forestry Commissions ARP report as a starting point, if possible.	• FC Wildfire Risk Map accessed. • Mapping of wildfire sensitive areas commenced.
22	Identify, through research and mapping, those species that are less mobile and that may not be able to migrate to more favourable locations as climatic changes occur. Involve community groups and volunteers in this process.	• Resource secured to undertake this analysis. • Pilot locations for analysis identified.
23	Identify which estuarine environments and their species may be most at risk from changes in salinity and other properties because of more frequent flooding.	• Mapping of estuaries where this risk is likely to be most prevalent, or where flooding has occurred previously.
24	Use existing evidence, research, surveys and mapping to identify which West Midlands' habitats, species and crops could be most at risk of the negative impacts of new pests, pathogens or invasive, non-native species which are more likely to establish themselves as a result of climate change. If possible, obtain data from the Forestry Commission's TreeAlert system to aid this identification.	• Data accessed from FC's TreeAlert system. • System rolled out widely across the region for consistent mapping and logging of incidents. • Collation of research to help identify sites and species that are most likely to be at risk.
25	Alongside the above, set up community-led groups who routinely monitor the areas identified as potentially being most vulnerable to pests and diseases and utilise the TreeAlert system for more systematic logging of observed impacts.	• Organisations responsible for dealing with the impact of pests and diseases working together to identify suitable groups.
26	Monitor the colonisation of new species to determine which complement native species habitats most favourably and have a positive impact on the region's ecosystems.	• Monitoring system in place.
27	Continue the implementation of Nature Based Solutions such as Natural Flood Management (NFM) projects in areas where they would be of most benefit, learning lessons from previous successes, but ensure all relevant partners are consulted with during the scoping stage and ensure all projects are logged on a transparent database (see Action 9).	• Cascading of lessons learnt and good practice from existing projects to encourage implementation elsewhere. • Sites most suitable for new NFM projects mapped.

Action No.	Action	Potential first steps to complete within the first year of commencement of action implementation
28	Produce guidance for landowners showcasing ways that they can improve the resilience of their sites, using case studies, and ensure climate change impacts forms a key part of this.	• Draft guidance produced, consultation with selected landowners.
29	Capitalise on recently improved engagement on climate change with the farming community to establish a programme of engagement on how farmers can effectively adapt both their business activities (e.g. crop types etc.) to climate change and contribute positively to local land management to help flood alleviation, especially in flood prone areas, through soil management techniques.	• Establish resourcing for engagement programme. • Identification of channels to promote workshops and to attract audience attendance.
30	Lobby for, apply to and, if possible, establish long-term funding options for natural environment restoration programmes, such as examples listed above, that will result in a more joined up approach to projects, where regional partners can work collaboratively. Ensure that funding conditions include evidence that projects will include climate adaptation measures; this includes the forthcoming Green Grants Programme to be administered by the WMCA.	• Discussions held with potential funding partners. • Identification of future planned funding pots and discussions held on how adaptation can be integrated into the fund requirements.
Infrastructure		
31	Undertake an assessment/ mapping exercise on the local road network (i.e. those not managed by Highways England) to determine which are most likely to be at risk from failing in future climatic conditions. This should include areas most vulnerable to flood risk, slope failure, drainage pressure and damage caused by storms or overheating, coupled with the strategic importance of the road and popular bus routes. Learn from Highways England approach on adaptation to identify potentially suitable responses and work with them given the required connectivity of the Strategic Road Network and local roads.	• Mapping underway following identification of collaborative approach to this task.
32	Prioritise adaptation measures, such as improved drainage, green infrastructure integration and 'cooling stations,' such as water fountains and shaded benches, on the most popular walking and cycling routes across the region.	• Identification of the most 'popular' walking and cycling routes. • A number of these selected to trial measures.
33	Undertake an assessment/ mapping exercise on the local tram network to determine which sections are most likely to be at risk from failing in future climatic conditions (more frequent flooding, slope failure, heat exposure, storm damage etc.).	• Mapping underway.
34	Undertake an inspection of all non-ARP reporting body owned bridges (e.g. those outside the jurisdiction of Network Rail, Highways England etc.) to check their viability in a future climate, and their potential likelihood for erosion, and prioritise maintenance and adaptation measures on the most vulnerable coupled with the strategic importance of the bridge.	• Priority bridges identified and inspections for these underway.

Action No.	Action	Potential first steps to complete within the first year of commencement of action implementation
35	Ensure new local buses are fitted with air cooling devices to minimise the risk of passenger overheating.	• Specifications for new buses adapted to include cooling.
36	Build on existing water saving programmes and new Government measures and expand to all West Midlands' households to raise awareness of simple, cost-effective measures that all residents can take to reduce their water usage. Establish a consistent message across the whole region (i.e. ensure Severn Trent and South Staffordshire Water collaborate).	• Consistent messaging developed. • Identification of channels for promotion of measures. • Commencement of communications tools.
37	Continue engagement with partners in Wales and Water Resources West, as adaptations made here have a profound effect on the resilience of the West Midlands' water supply.	• Maintained engagement, including via the proposed ARP Group (see Action 2).
38	Ensure climate adaptation is integrated into the design and planning for new infrastructure assets (new roads, rail, sub-stations, drainage etc.). Ensure climate change and its impacts are addressed consistently across the region to support this approach.	• Existing design standards consulted to determine current adaptation-related expectations. • Experts consulted to help fill in the gaps.
39	Ensure waste management practices, storage and treatment facilities are robust to withstand future climatic conditions, including flooding and heatwaves. Currently, new waste and other activities subject to environmental permitting (such as minerals, agriculture and chemical plants) need to undertake a climate change risk assessment if active for 5 years or more, according to EA guidance.	• Mapping of which facilities are most likely to be at risk undertaken.
40	Ensure all other sectors and businesses which require environmental permits, such as for activities involving potentially harmful substances, cement works, petrol stations etc. assess all impacts of climate change on their operations.	
41	Minerals extraction, a practice which is also subject to environmental permits, frequently involves water abstraction and, therefore, should be subject to consideration for climate adaptation given pressures on water availability in the environment. The restoration of mineral sites also offers wide ranging climate adaptation opportunities including flood alleviation, water resources and green infrastructure.	• Identification of sites that could potentially provide opportunities for climate adaptation.
42	Undertake research into the extent to which digital infrastructure, telecoms and ICT is considering future climate change projections.	• Canvass universities for existing research into this topic and collate into one place to inform decision making.
Health, Communities and the Built Environment		
43	Conduct an assessment of all hospitals, care homes and other health centres that support vulnerable people in the West Midlands to identify which are most at risk of overheating and identify the most suitable measures to reduce overheating risk,	• Mapping of health facilities most at risk conducted and assets prioritised for implementation of measures.

Action No.	Action	Potential first steps to complete within the first year of commencement of action implementation
	such as implementing green infrastructure, better ventilation etc, and how these could link with potential measures to achieve Net Zero.	
44	Alongside the above, ensure all healthcare settings are aware of the Heatwave Plan for England (updated annually), disseminate this guidance and apply it to their own settings where relevant.	• Communication materials established and circulated to appropriate bodies.
45	Ensure NHS Trusts across the region take the opportunity of the requirement to develop new 'Green Plans' by integrating effective adaptation measures into these plans to help ensure hospitals and other NHS health settings are protected from the impacts of a future climate. Peruse the forthcoming Health and Social Care Sector Climate Change Adaptation report to ensure alignment.	• Guidance provided to Trusts on how to incorporate adaptation into Green Plans, and case studies identified.
46	Work with all relevant partners to ensure that climate risks are addressed and considered in the commissioning and provision of all health and social care services.	• Partners identified and climate change risk messaging cascaded accordingly.
47	Ensure climate risks to health, buildings and infrastructure that affect hospitals, care homes, GPs and other health and care settings are embedded into corporate risk / business continuity plans.	• Examples of integrating climate risks into corporate risk/ business continuity plans collated. • Engagement with risk management officials.
48	Establish region-wide supplementary planning guidance that requires the need for SUDS in all new homes and developments across the West Midlands. Ensure the guidance builds on existing resources, is based on best practice and includes case studies (e.g. Birmingham's approach). (see also Action 66).	• Collation of good practice where guidance has already been produced. • Commence liaison with planning authorities.
49	Ensure all existing and new SUDS schemes are subject to a regular monitoring and maintenance procedure to ensure continued, long-term effectiveness.	• Ascertain existing process for SUDS monitoring.
50	Ensure planning decisions adhere to the NPPF, which states that new developments avoid flood risk in accordance with the sequential test in the NPPF and inappropriate development directed away from areas of existing or future flood risk. New developments should not cause flooding elsewhere and be resilient to the impacts of climate change.	• Commence liaison with planning authorities.
51	Continue the funding and rollout of strategic flood defence schemes and ensure that any properties that are not protected by such schemes, but that are still vulnerable to an increasing flood risk, are prioritised for property-level flood protection measures (also see action 65).	• Mapping of locations and households that would benefit most from property level protection undertaken and prioritised accordingly.
52	Possibly linking with the above, ensure climate adaptation standards are a requirement of new homes, alongside measures to achieve Net Zero. This could include natural ventilation to improve thermal performance and comfort during heatwaves, natural greening, roof reflectivity, permeable paving and rainwater	• Existing design standards consulted to determine current adaptation-related expectations. • Good practice identified from elsewhere and cascaded accordingly.

Action No.	Action	Potential first steps to complete within the first year of commencement of action implementation
	harvesting to reduce freshwater use. Design guidelines should be produced for large capital investment projects, which set out how to use regionally specific climate projections and adaptation options.	
53	Ensure home retrofit programmes that are required alongside the delivery of Net Zero targets integrate adaptation measures where possible, such as installation of water efficiency measures, shading options, better ventilation to reduce the overheating risk and to improve indoor air quality, etc.	• Identification of Net Zero retrofit programmes. • Discussions commenced on integration of adaptation measures.
54	Conduct an assessment of all schools in the West Midlands, prioritising special schools where the most vulnerable children attend, to identify which are most at risk of flooding and overheating and identify the most suitable measures for adaptation, such as site-level flood resilience, green infrastructure/SUDS, water efficiency measures etc.	• Mapping of schools most at risk conducted and assets prioritised for implementation of measures.
55	Conduct an assessment of all prisons in the West Midlands to ascertain which are most likely to be at risk from overheating and flood risk, and identify the most suitable measures for adaptation.	• Mapping of prisons most at risk conducted and assets prioritised for implementation of measures.
56	Build on the National Trusts' climate change mapping exercise to ascertain which heritage-sensitive areas in the region are most at risk of negative impacts from climate change and set out options for adaptation. Align discussions with Historic England's approach to adaptation under their mandatory ARP requirement.	• Identify work NT and Historic England have already done to identify those assets most at risk (buildings and landscapes).
57	Engage with national partners to annually update the Climate Just tool, provide further training sessions on the tool and encourage its use to identify locations where the greatest climate vulnerabilities are likely to occur and examples of good practice.	• Identify current IP for Climate Just tool. • Commence discussions with relevant partners on providing the resource required to update it.
58	Establish community resilience programmes in areas where climate risks and demographic vulnerabilities intersect, to ensure these areas are better prepared for more frequent and intense extreme weather events (flooding, heatwaves, storms), and can respond and recover more effectively.	• Identify current/completed community resilience programmes across the country that demonstrated good practice, and cascade these to partners.
59	Rollout advice and guidance on what to do if residents are affected by an extreme weather event (e.g. flood, heatwave etc.), and provide resilience kits (for example) to homes, prioritising communities such as those outlined above, so that they can respond quicker in the event of extreme weather.	• Identify whether there is existing guidance already in circulation and, if so, tailor accordingly. • Identification of procurement of resilience kits and pilot communities established based on vulnerability indices.
60	Build on and scale-up existing plans to reduce air pollution in the region, such as through initiatives including the Birmingham Clean Air Zone and the WM-Air Programme, factoring in the impact that climate change could have on this progress.	• Commence engagement with relevant air quality improvement initiatives.

Action No.	Action	Potential first steps to complete within the first year of commencement of action implementation
61	Monitor changes in vector-borne diseases as a result of climate change to provide more accurate advice on where and when the likely hotspots in the region will be, and what to do if affected.	• Existing monitoring processes identified via liaison with relevant organisations.
62	Ensure monitoring of food safety and security as a result of climate change, especially hotter conditions, is taking place.	• Existing monitoring processes identified via liaison with relevant organisations.
63	Take advantage of longer, drier summers by promoting the multiple health benefits of using our outdoor green spaces. Develop promotional material to encourage a greater number of users, while balancing this with the provision of advice and resources to prevent degradation.	• Selection of green spaces identified to pilot engagement process.
Business and Industry		
64	Run an engagement programme with SMEs to encourage them to prepare for a future with more flooding, water scarcity and overheating. Re-launch the Business Resilience Healthcheck Tool to support this.	• Establish resourcing for engagement programme. • Identify current IP for Healthcheck tool. • Commence discussions with relevant partners on providing the resource required to update it.
65	Provide advice and guidance to businesses on how to operate in heatwave conditions. Priority should be on employee health and wellbeing, especially in businesses that require manual labour and outdoor working, with guidance extended to include dress code and working at home options.	• Collate good examples of such guidance already in existence and tailor accordingly.
66	Ensure as many businesses as possible, especially those in flood vulnerable areas, sign up to the EA flood warnings service.	• Establish list of communication channels that could be used to promote flood warning service.
67	Continue the funding and rollout of strategic flood defence schemes and ensure that any business premises that are not protected by such schemes, but that are still vulnerable to an increasing flood risk, are prioritised for site-level flood protection measures (also see action 49).	• Mapping of locations and households that would benefit most from property level protection undertaken and prioritised accordingly.
68	Ensure there is a requirement for all new commercial developments to include a SUDS. Ensure the guidance builds on existing resources, is based on best practice and includes case studies (see also Action 46).	• Collation of good practice where guidance has already been produced. • Commence liaison with planning authorities
69	Ensure the large-scale conversion of brownfield sites across the region integrate adaptation measures, such as natural flood alleviation, SUDS and greening initiatives that benefit climate adaptation, and ensuring all new builds contain rigorous climate resilient standards. Where such sites are not suitable for development, consider wetland conversion.	• Discussions taken place with those responsible for brownfield conversion. • Pilot sites determined for adaptation measures.
70	Collate existing mapping, or undertake new mapping, of industrial sites that are likely to be at risk of flooding and where, should flooding occur, there is a greater	• Identify whether existing mapping already exists, and if not commence new mapping.

Action No.	Action	Potential first steps to complete within the first year of commencement of action implementation
	likelihood of this floodwater becoming polluted. This will enable tailored flood alleviation responses to take place at high-risk sites.	
71	Build on existing water saving programmes and new Government measures and expand to all West Midlands' businesses to raise awareness of simple, cost-effective measures that all employers can take to reduce their water usage. Establish a consistent message across the whole region (i.e. ensure Severn Trent and South Staffordshire Water collaborate).	• Consistent messaging developed. • Identification of channels for promotion of measures. • Commencement of communications tools.
72	Promote and encourage uptake of ISO 14090:2019 that will allow businesses to commit to and demonstrate progress on adaptation. Integrate this with the development of a new business pledge, similar to that of the West Midlands Net Zero Business Pledge, but instead for climate adaptation.	• Set up a business pledge on adaptation, using Net Zero pledge as a template. • Integrate ISO 14090:2019 into relaunch of Business Resilience Healthcheck (see Action 62).
73	Ensure climate adaptation and resilience is embedded into refreshes of LEP Strategic Economic Plans or equivalent documents that set out regional investment plans, demonstrating integration of adaptation solutions into new investment projects.	• Engagement with LEPs on the importance of adaptation from an economic perspective. • Collation of good practice from elsewhere; re-run of Fit for the Future programme.
74	Provide funding and acceleration opportunities for SMEs to develop adaptation solutions (technologies or processes) that could be used to help with climate adaptation responses, in a similar way to opportunities that are provided to SMEs for developing Net Zero innovations.	• Engage with the business support community to identify opportunities for integrating adaptation support into existing programmes.
75	Enhance more sustainable procurement practices being considered by public sector bodies for the purposes of Net Zero to ensure that these practices are also building in a greater resilience to climate change.	• Engage with Net Zero procurement programmes locally and identify why suitable ways of integrating adaptation requirements into these.
76	Capitalise on local food and growing initiatives to reduce the need to import food from countries where there may be an increase in food safety, availability and quality due to climate change (see also Action 60).	• Promote existing local food schemes. • Identify opportunities for expansion of schemes region-wide, potentially linking with waste and Net Zero strategies.

Annex 3: Impact on other sustainability themes

The table overleaf gives a high-level indication as to whether the implementation of the actions identified in the Action Plan could affect the successful delivery of the targets and actions to fulfil the other sustainability themes within the West Midlands' 2030 Sustainability Roadmap, either positively or negatively.

Taking the example of reducing overheating risks in care homes:

- Care home residents would be at a reduced risk of illness or early morbidity if their home did not overheat during a heatwave, positively impacting our Social Equity and Health Roadmap priority.
- Conversely, energy use and carbon emissions could increase if the implemented measures to prevent overheating include, for example, installation of energy intensive air conditioning, negatively impacting on our regional Net Zero target.

The key principle here is that decision makers should consider how any identified actions affect wider sustainability objectives, and where possible only implement those that neutrally or positively affect the regional Roadmap priorities.

The priorities, as translated into the table overleaf, are as follows:

Roadmap symbol	Roadmap theme and vision	Associated targets
	**Carbon reduction:** The West Midlands is leading in contributing to the national target of net zero greenhouse gas emissions by 2050	As specified
	**Resource efficiency:** Supporting a system that minimises resources whilst maximising productivity	By 2030, achieve a household recycling rate of 55%
	**Clean and active travel:** Promoting an active, accessible and connected lifestyle for everyone regardless of demographics	A) By 2030, one third of all trips made by walking or cycling B) By 2030, 50-70% of new car sales should be Ultra Low Emission Vehicles
	**Clean air and water:** Creating a cleaner environment for all generations to come	By 2030, reduce mortality as a result of PM2.5 pollution exposure by 75% from 2019 levels
	**Natural environment:** Protecting and conserving the environment so that it thrives with our presence	None at present
	**Sustainable growth:** Empowering the economic development of the West Midlands whilst encouraging environmental improvement	A) By 2030, sales in the Low Carbon Goods and Services sector will reach £40 billion
	**Social equity and health:** Addressing health inequality to give everyone an equal opportunity in life	A) By 2030, achieve a 40% reduction in male and female health inequality from 2019 levels B) By 2030, reduce the proportion of households in fuel poverty by 50% from 2019 levels
	**Sustainable energy use:** Meeting the energy demand of today and tomorrow, without compromising environment outcomes	By 2030 achieve a 79% increase in the amount of energy generated by renewables from 2019 levels

The final Roadmap priority is climate adaptation, against which all actions included in this plan will positively contribute if implemented.

The symbols included in this table refer to the following:

- ✓✓ = implementing measures to fulfil this action could significantly and positively contribute to the achievement of the 2030 vision and target against the specified Roadmap theme.
- ✓ = implementing measures to fulfil this action could modestly but positively contribute to the achievement of the 2030 vision and target against the specified Roadmap theme.
- ✓? = There is potential that the implemented measures to fulfil this action could both positively and negatively affect the achievement of the 2030 vision and target against the specified Roadmap theme, depending on the suite measures installed. For example, measures to adapt buildings could increase carbon emissions if this isn't considered in initial planning, or conversely, adapting a building could improve carbon emissions if ventilation is improved.
- Blank cell = The action is unlikely to affect the specified Roadmap priority positively or negatively.

The Governance actions have not been included in this analysis.

Action No.	Adaptation action from Plan	West Midlands Roadmap Theme							
									
Natural Environment and Assets									
15.	Ensure that the Natural Environment Plan published by the WMCA, and other habitat, species and conservation strategies covering areas of the region (such as the Midlands Engine Ten Point Plan for Green Growth and their specific themes of 'Nature's Recovery' and 'Blue-Green Places') align with this Action Plan and embeds climate adaptation as one of its key priorities.	✓			✓	✓✓			
16.	Embed climate adaptation into any natural environment/ capital working groups operating region-wide.	✓				✓✓			
17.	Capitalise on the rollout of local tree-planting programmes by ensuring that all schemes contribute to climate adaptation objectives, e.g. that they help to reduce flood risk, contribute to urban cooling etc (linked to the 'right tree, right place' concept). Potentially link with other	✓			✓	✓✓		✓	

Action No.	Adaptation action from Plan	West Midlands Roadmap Theme							
									
	planting initiatives such as some of those outlined below, and investigate rolling out the Birmingham City Council approach to strategic tree planting mapping. Utilise the Forestry Commission's Woodland Creation Offer, where climate resilience is a key objective, and consult the 'Managing England's woodlands in a climate emergency' publication to support informed decisions on projects.								
18.	Use lessons learnt from urban greening programmes, such as the Sunrise project in Stoke, to establish equivalent programmes in urban areas where species are at greatest risk, and ensure core objectives of these programmes include climate adaptation, e.g. flood alleviation, urban cooling etc. This could also link with urban tree planting initiatives (see above). Lessons can also be learned from the Manchester Ignition Project.	✓			✓	✓✓		✓	
19.	Assess the resilience of West Midlands urban parks, considering both the biodiversity of the park and its users. Integrate adaptation measures where appropriate, such as strategic tree planting, water meadows, changing mowing regimes, installing drinking water fountains etc.	✓		✓	✓	✓?	✓	✓✓	
20.	Work with Defra to understand the detail of the new England Peat Map, a commitment under the 2021 England Peat Action Plan, to ensure vulnerabilities in the ecosystem can be identified at a granular level in the West Midlands. Ascertain if local partners will be consulted/can get involved or provide further insight to this process.	✓✓				✓✓			
21.	Assess those areas that may be most prone to wildfires and provide signage and guidance at these sites encouraging users not to exacerbate the risk, e.g. by having barbecues, campfires etc. Access the Wildfire Risk	✓✓			✓✓	✓✓		✓	

Action No.	Adaptation action from Plan	West Midlands Roadmap Theme							
									
	Map stated in the Forestry Commissions ARP report as a starting point, if possible.								
22.	Identify, through research and mapping, those species that are less mobile and that may not be able to migrate to more favourable locations as climatic changes occur. Involve community groups and volunteers in this process.					✓✓			
23.	Identify which estuarine environments and their species may be most at risk from changes in salinity and other properties because of more frequent flooding.				✓	✓✓			
24.	Use existing evidence, research, surveys and mapping to identify which West Midlands' habitats, species and crops could be most at risk of the negative impacts of new pests, pathogens or invasive, non-native species which are more likely to establish themselves as a result of climate change. If possible, obtain data from the Forestry Commission's TreeAlert system to aid this identification.	✓				✓✓		✓	
25.	Alongside the above, set up community-led groups who routinely monitor the areas identified as potentially being most vulnerable to pests and diseases and utilise the TreeAlert system for more systematic logging of observed impacts.	✓				✓✓		✓	
26.	Monitor the colonisation of new species to determine which complement native species habitats most favourably and have a positive impact on the region's ecosystems.					✓✓			
27.	Continue the implementation of Nature Based Solutions such as Natural Flood Management (NFM) projects in areas where they would be of most benefit, learning lessons from previous successes, but ensure all relevant partners				✓	✓✓	✓		

Action No.	Adaptation action from Plan	West Midlands Roadmap Theme							
									
	are consulted with during the scoping stage and ensure all projects are logged on a transparent database.								
28.	Produce guidance for landowners showcasing ways that they can improve the resilience of their sites, using case studies, and ensure climate change impacts forms a key part of this.				✓	✓?	✓		
29.	Capitalise on recently improved engagement on climate change with the farming community to establish a programme of engagement on how farmers can effectively adapt both their business activities (e.g. crop types etc.) to climate change and contribute positively to local land management to help flood alleviation, especially in flood prone areas, through soil management techniques.	✓?			✓?	✓?	✓✓	✓?	
30.	Lobby for, apply to and, if possible, establish long-term funding options for natural environment restoration programmes, such as examples listed above, that will result in a more joined up approach to projects, where regional partners can work collaboratively. Ensure that funding conditions include evidence that projects will include climate adaptation measures; this includes the forthcoming Green Grants Programme to be administered by the WMCA.	✓			✓	✓✓	✓	✓	

Infrastructure									
31.	Undertake an assessment/ mapping exercise on the local road network (i.e. those not managed by Highways England) to determine which are most likely to be at risk from failing in future climatic conditions. This should include areas most vulnerable to flood risk, slope failure, drainage pressure and damage caused by storms or overheating, coupled with the strategic importance of the road and popular bus routes. Learn from Highways England approach on adaptation to identify potentially suitable responses and work with them given the required connectivity of the Strategic Road Network and local roads.	✓?		✓?	✓?	✓?	✓✓	✓?	
32.	Prioritise adaptation measures, such as improved drainage, green infrastructure integration and 'cooling stations,' such as water fountains and shaded benches, on the most popular walking and cycling routes across the region.	✓		✓✓	✓	✓	✓	✓	
33.	Undertake an assessment/ mapping exercise on the local tram network to determine which sections are most likely to be at risk from failing in future climatic conditions (more frequent flooding, slope failure, heat exposure, storm damage etc.).	✓		✓✓	✓	✓?	✓		
34.	Undertake an inspection of all non-ARP reporting body owned bridges (e.g. those outside the jurisdiction of Network Rail, Highways England etc.) to check their viability in a future climate, and their potential likelihood for erosion, and prioritise maintenance and adaptation measures on the most vulnerable coupled with the strategic importance of the bridge.	✓?		✓?	✓?	✓?	✓✓	✓?	
35.	Ensure new local buses are fitted with air cooling devices to minimise the risk of passenger overheating.	✓?		✓✓	✓?		✓	✓✓	

36.	Build on existing water saving programmes and new Government measures and expand to all West Midlands' households to raise awareness of simple, cost-effective measures that all residents can take to reduce their water usage. Establish a consistent message across the whole region (i.e. ensure Severn Trent and South Staffordshire Water collaborate).	✓✓	✓		✓		✓	✓	✓
37.	Continue engagement with partners in Wales and Water Resources West, as adaptations made here have a profound effect on the resilience of the West Midlands' water supply.	✓						✓	✓
38.	Ensure climate adaptation is integrated into the design and planning for new infrastructure assets (new roads, rail, sub-stations, drainage etc.). Ensure climate change and its impacts are addressed consistently across the region to support this approach.	✓?		✓?	✓?		✓✓		✓?
39.	Ensure waste management practices, storage and treatment facilities are robust to withstand future climatic conditions, including flooding and heatwaves. Currently, new waste and other activities subject to environmental permitting (such as minerals, agriculture and chemical plants) need to undertake a climate change risk assessment if active for 5 years or more, according to EA guidance.	✓	✓✓		✓		✓		
40.	Ensure all other sectors and businesses which require environmental permits, such as for activities involving potentially harmful substances, cement works, petrol stations etc. assess all impacts of climate change on their operations.	✓	✓		✓✓		✓		
41.	Minerals extraction, a practice which is also subject to environmental permits, frequently involves water abstraction and, therefore, should be subject to consideration for climate adaptation given pressures on water availability in the environment. The restoration of	✓	✓		✓	✓	✓		✓

	mineral sites also offers wide ranging climate adaptation opportunities including flood alleviation, water resources and green infrastructure.								
42.	Undertake research into the extent to which digital infrastructure, telecoms and ICT is considering future climate change projections.			✓					✓
Health, Communities and the Built Environment									
43.	Conduct an assessment of all hospitals, care homes and other health centres that support vulnerable people in the West Midlands to identify which are most at risk of overheating and identify the most suitable measures to reduce overheating risk, such as implementing green infrastructure, better ventilation etc, and how these could link with potential measures to achieve Net Zero.	✓?			✓?	✓		✓✓	✓?
44.	Alongside the above, ensure all healthcare settings are aware of the Heatwave Plan for England (updated annually), disseminate this guidance and apply it to their own settings where relevant.	✓?			✓?	✓		✓✓	✓?
45.	Ensure NHS Trusts across the region take the opportunity of the requirement to develop new 'Green Plans' by integrating effective adaptation measures into these plans to help ensure hospitals and other NHS health settings are protected from the impacts of a future climate. Peruse the forthcoming Health and Social Care Sector Climate Change Adaptation report to ensure alignment.							✓✓	
46.	Work with all relevant partners to ensure that climate risks are addressed and considered in the commissioning and provision of all health and social care services.							✓✓	
47.	Ensure climate risks to health, buildings and infrastructure that affect hospitals, care homes, GPs and other health and care settings are embedded into corporate risk / business continuity plans.							✓✓	

48.	Establish region-wide supplementary planning guidance that requires the need for SUDS in all new homes and developments across the West Midlands. Ensure the guidance builds on existing resources, is based on best practice and includes case studies (e.g. Birmingham's approach).	✓			✓	✓✓	✓	✓	
49.	Ensure all existing and new SUDS schemes are subject to a regular monitoring and maintenance procedure to ensure continued, long-term effectiveness.	✓			✓	✓✓	✓	✓	
50.	Ensure planning decisions adhere to the NPPF, which states that new developments avoid flood risk in accordance with the sequential test in the NPPF and inappropriate development directed away from areas of existing or future flood risk. New developments should not cause flooding elsewhere and be resilient to the impacts of climate change.				✓	✓?	✓	✓	
51.	Continue the funding and rollout of strategic flood defence schemes and ensure that any properties that are not protected by such schemes, but that are still vulnerable to an increasing flood risk, are prioritised for property-level flood protection measures.				✓		✓	✓	
52.	Possibly linking with the above, ensure climate adaptation standards are a requirement of new homes, alongside measures to achieve Net Zero. This could include natural ventilation to improve thermal performance and comfort during heatwaves, natural greening, roof reflectivity, permeable paving and rainwater harvesting to reduce freshwater use. Design guidelines should be produced for large capital investment projects, which set out how to use regionally specific climate projections and adaptation options.	✓?			✓?	✓	✓	✓✓	✓?
53.	Ensure home retrofit programmes that are required alongside the delivery of Net Zero targets integrate adaptation measures where possible, such as installation	✓?			✓?	✓	✓	✓✓	✓?

	of water efficiency measures, shading options, better ventilation to reduce the overheating risk and to improve indoor air quality, etc.								
54.	Conduct an assessment of all schools in the West Midlands, prioritising special schools where the most vulnerable children attend, to identify which are most at risk of flooding and overheating and identify the most suitable measures for adaptation, such as site-level flood resilience, green infrastructure/SUDS, water efficiency measures etc.	✓?			✓?	✓	✓	✓✓	✓?
55.	Conduct an assessment of all prisons in the West Midlands to ascertain which are most likely to be at risk from overheating and flood risk, and identify the most suitable measures for adaptation.	✓?			✓?	✓		✓✓	✓?
56.	Build on the National Trusts' climate change mapping exercise to ascertain which heritage-sensitive areas in the region are most at risk of negative impacts from climate change and set out options for adaptation. Align discussions with Historic England's approach to adaptation under their mandatory ARP requirement.	✓?			✓?	✓	✓	✓	✓?
57.	Engage with national partners to annually update the Climate Just tool, provide further training sessions on the tool and encourage its use to identify locations where the greatest climate vulnerabilities are likely to occur and examples of good practice.				✓			✓✓	
58.	Establish community resilience programmes in areas where climate risks and demographic vulnerabilities intersect, to ensure these areas are better prepared for more frequent and intense extreme weather events (flooding, heatwaves, storms), and can respond and recover more effectively.						✓	✓✓	
59.	Rollout advice and guidance on what to do if residents are affected by an extreme weather event (e.g. flood, heatwave etc.), and provide resilience kits (for example) to							✓✓	

	homes, prioritising communities such as those outlined above, so that they can respond quicker in the event of extreme weather.								
60.	Build on and scale-up existing plans to reduce air pollution in the region, such as through initiatives including the Birmingham Clean Air Zone and the WM-Air Programme, factoring in the impact that climate change could have on this progress.	✓	✓	✓	✓✓	✓	✓	✓✓	✓
61.	Monitor changes in vector-borne diseases as a result of climate change to provide more accurate advice on where and when the likely hotspots in the region will be, and what to do if affected.					✓	✓	✓✓	
62.	Ensure monitoring of food safety and security as a result of climate change, especially hotter conditions, is taking place.		✓?				✓	✓✓	
63.	Take advantage of longer, drier summers by promoting the multiple health benefits of using our outdoor green spaces. Develop promotional material to encourage a greater number of users, while balancing this with the provision of advice and resources to prevent degradation.	✓?		✓?	✓?	✓?	✓	✓✓	
	Business and Industry								
64.	Run an engagement programme with SMEs to encourage them to prepare for a future with more flooding, water scarcity and overheating. Re-launch the Business Resilience Healthcheck Tool to support this.						✓✓		
65.	Provide advice and guidance to businesses on how to operate in heatwave conditions. Priority should be on employee health and wellbeing, especially in businesses that require manual labour and outdoor working, with guidance extended to include dress code and working at home options.	✓?					✓✓	✓✓	✓?

66.	Ensure as many businesses as possible, especially those in flood vulnerable areas, sign up to the EA flood warnings service.				✓		✓✓	✓	
67.	Continue the funding and rollout of strategic flood defence schemes and ensure that any business premises that are not protected by such schemes, but that are still vulnerable to an increasing flood risk, are prioritised for site-level flood protection measures.				✓		✓✓	✓	
68.	Ensure there is a requirement for all new commercial developments to include a SUDS. Ensure the guidance builds on existing resources, is based on best practice and includes case studies.	✓			✓	✓✓	✓✓	✓	
69.	Ensure the large-scale conversion of brownfield sites across the region integrate adaptation measures, such as natural flood alleviation, SUDS and greening initiatives that benefit climate adaptation, and ensuring all new builds contain rigorous climate resilient standards. Where such sites are not suitable for development, consider wetland conversion.	✓?	✓		✓	✓	✓✓	✓	
70.	Collate existing mapping, or undertake new mapping, of industrial sites that are likely to be at risk of flooding and where, should flooding occur, there is a greater likelihood of this floodwater becoming polluted. This will enable tailored flood alleviation responses to take place at high-risk sites.				✓✓		✓✓	✓	
71.	Build on existing water saving programmes and new Government measures and expand to all West Midlands' businesses to raise awareness of simple, cost-effective measures that all employers can take to reduce their water usage. Establish a consistent message across the whole region (i.e. ensure Severn Trent and South Staffordshire Water collaborate).	✓✓	✓		✓		✓✓	✓	✓
72.	Promote and encourage uptake of ISO 14090:2019 that will allow businesses to commit to and demonstrate progress	✓			✓	✓	✓✓	✓	

	on adaptation. Integrate this with the development of a new business pledge, similar to that of the West Midlands Net Zero Business Pledge, but instead for climate adaptation.								
73.	Ensure climate adaptation and resilience is embedded into refreshes of LEP Strategic Economic Plans or equivalent documents that set out regional investment plans, demonstrating integration of adaptation solutions into new investment projects.	✓?		✓?	✓?	✓	✓✓		
74.	Provide funding and acceleration opportunities for SMEs to develop adaptation solutions (technologies or processes) that could be used to help with climate adaptation responses, in a similar way to opportunities that are provided to SMEs for developing Net Zero innovations.						✓✓		
75.	Enhance more sustainable procurement practices being considered by public sector bodies for the purposes of Net Zero to ensure that these practices are also building in a greater resilience to climate change.	✓?	✓?				✓✓		
76.	Capitalise on local food and growing initiatives to reduce the need to import food from countries where there may be an increase in food safety, availability and quality due to climate change.	✓	✓✓		✓	✓?	✓	✓✓	

-END-