Guidance for Climate Resilient Nature Delivery

Summary

2026

West Midlands Combined Authority

Greener Together

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1. Summary

1.1 Introduction and aims of this guidance

Climate change is driving escalating and increasingly complex risks to biodiversity, ecosystems and the services they provide to society. These risks are particularly acute in urbanised and post-industrial regions such as the West Midlands, where historic land-use change, habitat fragmentation, pollution, invasive species and recreational pressures interact with intensifying climate hazards. This guidance supports delivery partners by setting out how to embed climate resilience and adaptation within nature recovery action across the WMCA region.

The guidance contains:

- An overview of the nature and climate baseline in the West Midlands
- A climate change risk assessment for the Local Nature Recovery Strategy (LNRS) priority habitats and species
- An assessment of current and future risks facing Areas of Particular Importance for Biodiversity (APIBs)
- Principles and potential actions to embed climate resilience into LNRS delivery action
- A practical tool to help LNRS delivery partners identify most relevant actions

This summary provides an overview, the technical report should be consulted for greater detail.

The guidance forms part of a wider strategic framework that includes the West Midlands Local Nature Recovery Strategy (LNRS)[1], the WMCA Climate Adaptation Report[2], and the Nature Delivery Plan (2026–2029[3]). Together, these strategies aim to halt biodiversity loss, strengthen ecological networks, and ensure nature plays a central role in adapting to climate change and delivering wider environmental, social and economic benefits.

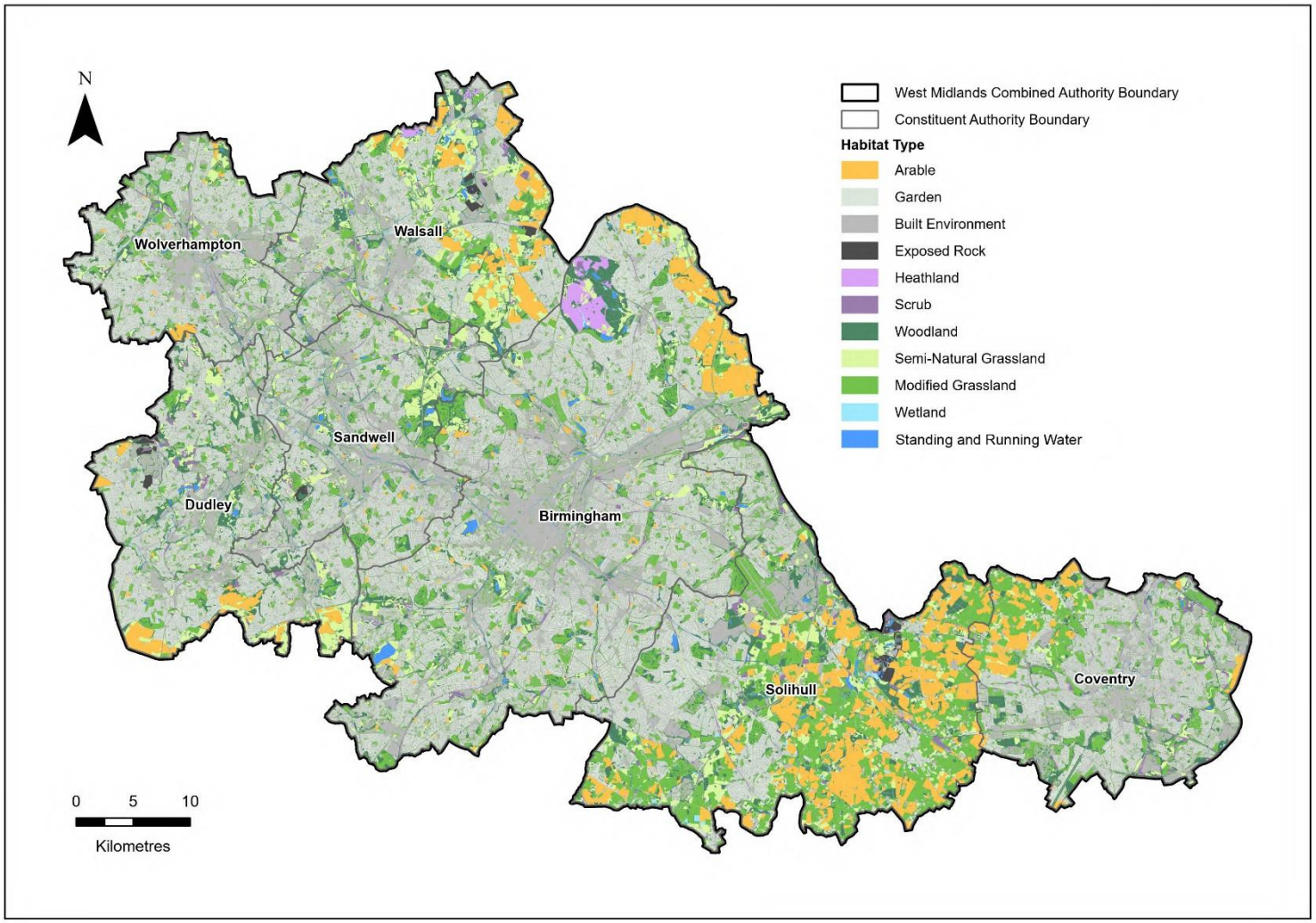
[1] West Midlands Local Nature Recovery Strategy. Available at: https://www.wmca.org.uk/documents/environment-energy/west-midlands-local-nature-recovery-strategy-2025/
[2] West Midlands Combined Authority Climate Adaptation Report. Available at: https://www.wmca.org.uk/media/f43agd3u/wmca-climate-adaptation-report-arp4-submission.pdf
[3] West Midlands Nature Delivery Plan 2026-29. Available at: https://www.wmca.org.uk/documents/environment-energy/west-midlands-nature-delivery-plan-2026-29/

1.2 Nature in the West Midlands: baseline conditions

Despite its urban character, the West Midlands supports a diverse range of habitats. The WMCA State of Nature Report identifies eleven main habitat types across the region: arable land, gardens, built environment, brownfield and exposed rock, heathland, scrub, woodland, semi-natural grassland, modified grassland, wetlands, standing and running water. While urban and residential land uses dominate, these habitats collectively support biodiversity and provide essential ecosystem services.

Many habitats occur as small, fragmented patches, which limits their ability to support viable species populations and reduces their adaptive capacity to climate change. Fragmentation is particularly important in the context of climate change, as species often need to shift distribution, disperse, or recolonise habitat following extreme events.

Figure 1: Overview of the WMCA region showing the distribution of broad habitat types[4]



[4] West Midlands State of Nature Report. Available at: https://cloudcdn.wmca.org.uk/documents/wmca/pdf/wmca-state-of-nature-report-reduced.pdf

1.3 West Midlands Local Nature Recovery Strategy

The LNRS contains ten priorities, across three main themes: nature recovery, delivering wider environmental benefits, and enabling delivery for nature recovery. Within each priority, several actions have been identified. Most actions are mapped, showing the areas of existing habitat to be maintained and improved, and areas where actions will deliver the greatest benefit for nature recovery. The LNRS identifies APIBs that represent the most ecologically valuable areas within the LNRS. They include statutory and non-statutory designated sites, as well as irreplaceable habitats.

Embedding climate resilience into LNRS delivery is essential to achieving durable, cost-effective and socially beneficial outcomes. This guidance focuses on those LNRS priorities and actions most sensitive to climate risks, recognising that climate impacts and appropriate responses will vary spatially across the region.

1.4 Current and future climate hazards

Continued greenhouse gas emissions globally are driving changes in climatic conditions and frequency of extreme weather events. The general trend across the region is that climate change is driving hotter, drier summers and warmer and wetter winters. The changes also increase risks of extreme events such as flooding, heatwaves and droughts.

This assessment considers the impacts of 2°C of warming, a low-emissions Representative Concentration Pathway (RCP) 2.6, by the 2050s. This is consistent with the WMCA climate adaptation plan and national planning. There is uncertainty in the degree of warming that may occur; however, the assessment is considered to be a plausible scenario.

The assessment considers a range of climate hazards and climate-related impacts:

- Rising average temperatures
- Extreme temperature and heatwaves
- Drought
- Extreme rainfall
- River and surface water flooding
- Storms and high wind events
- Ground instability

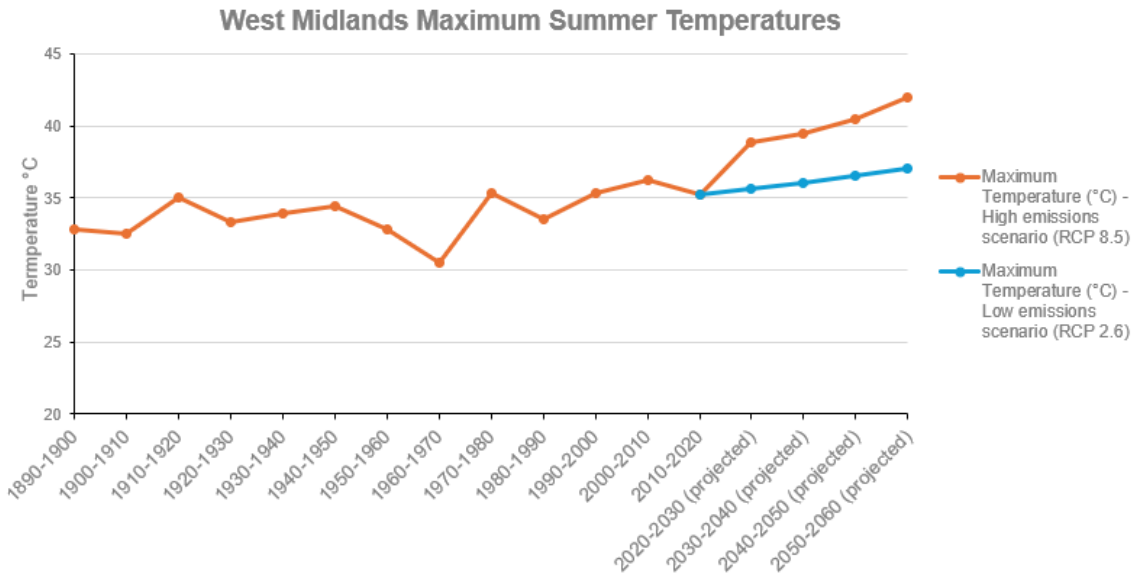


Figure 1: Historical and projected summer maximum temperatures for the West Midlands. Data source: UK Met Office (HadUK-Grid historical series and UKCP18 climate projection models).

By the 2050s, the West Midlands region is likely to experience an increase in average temperatures, with warming greatest during summer months. Average summer temperatures are projected to increase by several degrees warmer by mid-century, with maximum summer temperatures typically exceeding the mid-30s°C. By the 2050s, heatwaves are projected to become more frequent and with longer duration. Summer maximum temperatures are projected to increase from 34°C to 37°C under a low-emissions scenario, with potential to rise over 40°C under a high-emissions scenario (Figure 2).

Projections based on Met Office UKCP18 precipitation data show an upward trend in drought conditions. By the 2050s, the central estimate indicates that the proportion of time in drought is expected to roughly triple, rising to 18.8%. This reflects a substantial increase in the frequency and/or duration of drought events driven by changing precipitation patterns and higher evaporative demand.

Heavy rainfall events may intensify across all seasons with the most substantial increases in autumn and winter. This is accompanied by an increase in flood risk, both fluvial (river-based) and surface water.

There could be a small increase in the number and intensity of winter windstorms however climate models suggest this change is modest and there is currently still high uncertainty in future wind speeds due to the high variability of wind, which can change significantly day to day and between seasons. Ground movement remains a relevant climate risk, as shrink–swell behaviour and slope instability are strongly influenced by weather conditions such as prolonged drought, intense rainfall and rapid wetting–drying cycles, all of which are projected to become more frequent and severe over this period.

1.5 Climate change risk assessment methodology

1.5.1 Assessing current and future risks facing habitats and species listed in the West Midlands LNRS

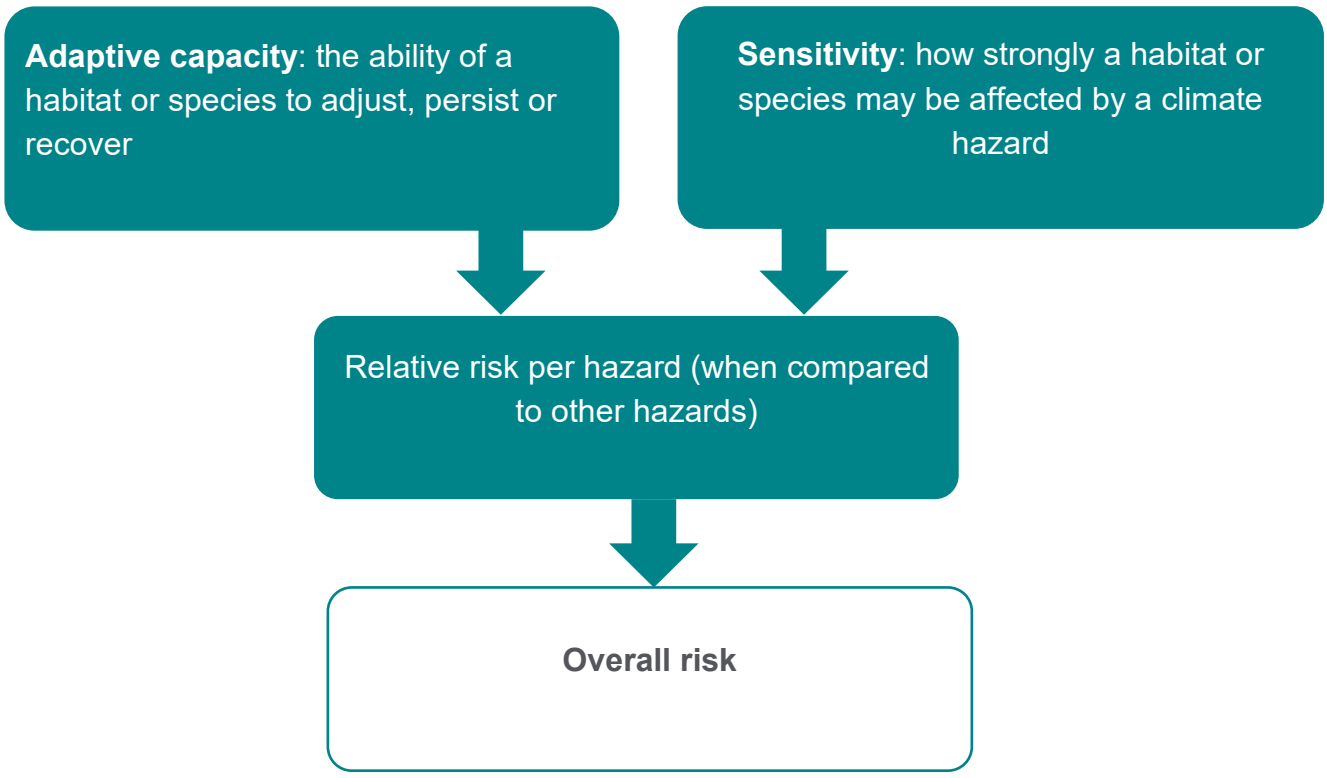
Priority habitats and species listed in the LNRS were assessed for vulnerability to climate hazards under current conditions and under a future where there has been 2°C of global warming by the 2050s.

Vulnerability was defined through two components:

Sensitivity: how strongly a habitat or species may be affected by a climate hazard

Adaptive capacity: the ability of a habitat or species to adjust, persist or recover

Scores for sensitivity and adaptive capacity were combined to produce relative risk ratings for each hazard. Overall risk ratings were found by calculating the mean risk across all hazards.



1.5.2 Assessing current and future risks facing APIBs

For APIBs, spatial datasets representing exposure to climate hazards were combined with habitat sensitivity to identify areas of higher and lower vulnerability.

This approach highlights where climate hazards and sensitive habitats coincide, and where cumulative pressures are most likely to occur.

1.6 Climate risks to habitats

Nearly all assessed habitats show increased climate risk by the 2050s. The magnitude of risk varies across habitat types, reflecting differences in adaptive capacity and sensitivity.

The results should be interpreted in the context of interacting and sequential climate hazards, rather than isolated events. In practice, habitats may be exposed to multiple climate hazards in close succession, reducing their capacity to recover between events and increasing vulnerability to subsequent pressures. While risk scores provide a consistent basis of comparison, this narrative recognises that prior stress can amplify impacts and drive higher real-world risk than any single hazard considered in isolation.

The overall risk posed by climate hazards is assessed to be highest for heathlands and wetlands, and there is greatest change in overall risk between the current and future scenarios for these habitats. Ancient and veteran trees, watercourses, riparian zones, wet woodlands and ponds are identified as being at medium risk overall in both the current and future scenarios, although pressures from certain climate hazards are anticipated to increase over time.

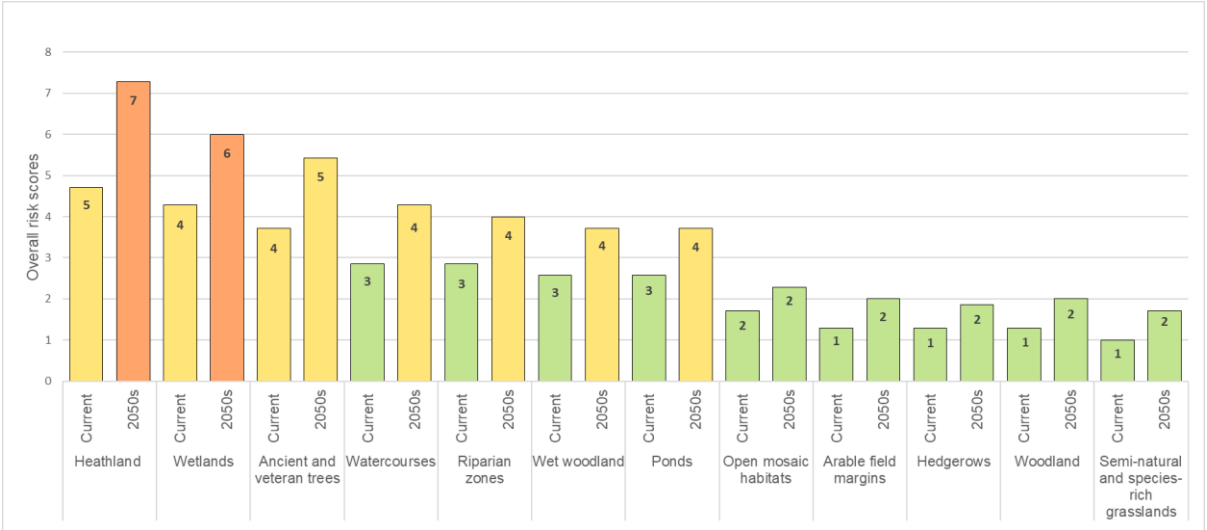


Figure 2: Current and future overall climate risk rating by habitat

1.6.1 Highest-risk habitats

Heathlands

The climate risk to heathlands by the 2050s increases substantially compared to the baseline due to rising temperatures, heatwaves, drought and wildfire potential. Drier lowland heaths typically occur on shallow, free draining soils with limited moisture retention, making them highly sensitive to prolonged dry and hot conditions, while wetter heathland areas are more closely linked to soil moisture and hydrological regimes and may be vulnerable to changes in seasonal rainfall patterns and evapotranspiration. Fragmentation and small patch size outside Sutton Park reduce adaptive capacity. Smaller habitat areas are able to support fewer individuals, and their distribution offers fewer opportunities for species to move between suitable habitats. This can increase vulnerability if small populations cannot recover following impacts from climate hazards.

Wetlands

Wetlands are highly sensitive to drying during droughts and heatwaves, with the potential for loss of habitat extent and changes in species composition with a reduction in the number of specialist wetland species present. More frequent and intense flooding events may cause degradation through sedimentation and changes to water quality. Climatic changes may also exacerbate pressures resulting from the spread of invasive non-native species.

1.6.2 Medium-risk habitats

Ancient and veteran trees

Ancient and veteran trees may be susceptible to storm and high winds, which are predicted to increase in number and intensity, especially during the winter. In strong winds, trees may be damaged, with branch loss and crown damage possible, and sometimes uprooting of an entire tree. Features of ancient and veteran trees such as decaying wood and hollow stem may make them more susceptible to damage when high winds occur.

Watercourses

Increasing temperatures heighten risks of eutrophication, algal blooms and deteriorating water quality. In addition, a reduction in dissolved oxygen concentrations may negatively affect fish and other aquatic species. Severe drought, expected to become more frequent by the 2050s, may lower water levels and concentrate pollutants, as well as exacerbating sedimentation.

1.6.3 Lower-risk habitats

Woodlands, hedgerows, semi-natural grasslands and open mosaic habitats generally show lower overall risk due to overall higher adaptive capacity.

1.6.4 Climate risks to species

Species at highest risk by the 2050s include:

- Sutton Park mire vegetation
- Grassland fungi
- Water vole
- White-clawed crayfish

Invasive non-native species, which may spread more readily under warming conditions

Species with limited dispersal ability or narrow ecological requirements are particularly vulnerable. This vulnerability is exacerbated where a species' habitat is also already fragmented or limited in area.

1.6.5 Ecosystem services implications

Climate-driven habitat degradation has consequences beyond biodiversity loss. Key ecosystem service risks include:

- Reduced flood regulation as wetlands become degraded
- Declining water quality due to drought, sediment mobilisation and pollution during extreme rainfall
- Loss of carbon storage in degraded wetlands, heathlands and trees
- Reduced availability and quality of recreational green spaces

These impacts underline the importance of protecting and restoring resilient habitats as part of wider climate adaptation.

1.7 Climate risks to Areas of Particular Importance for Biodiversity

Across APIBs, the highest climate vulnerability occurs where sensitive habitats and high exposure coincide, resulting in cumulative impacts possible where habitats are highly vulnerable to multiple climate hazards. Climate change is projected to expand the extent of high-risk areas, increasing the importance of targeted, place-based resilience actions.

Water-dependent habitats consistently show high vulnerability. Ancient and veteran trees also exhibit high vulnerability across the region. Urban and semi-urban APIBs tend to have higher exposure due to heat island effects and constrained hydrology, while rural areas show lower exposure overall, except where highly sensitive habitats are present.

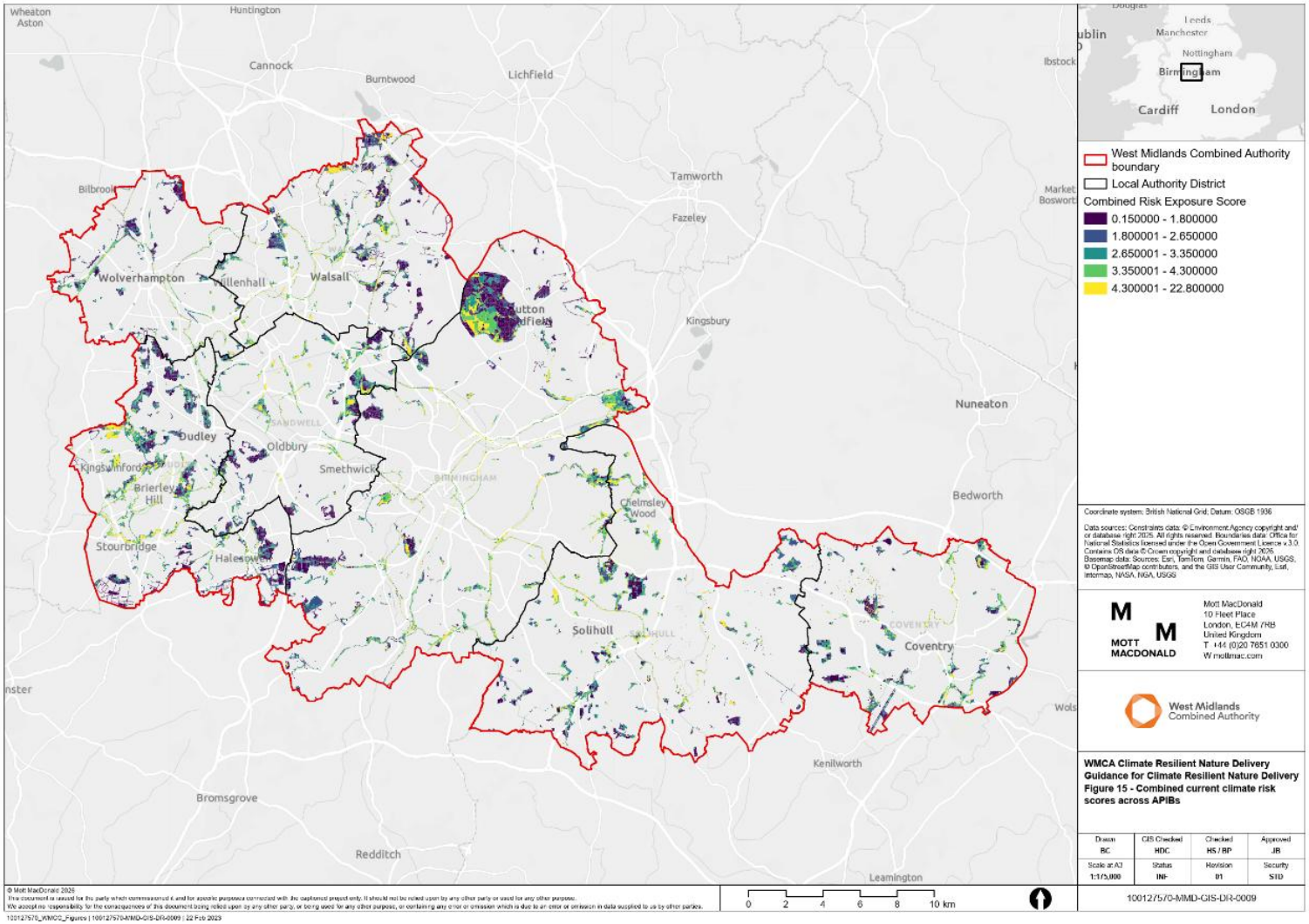


Figure 3: Combined current climate risk scores across APIBs

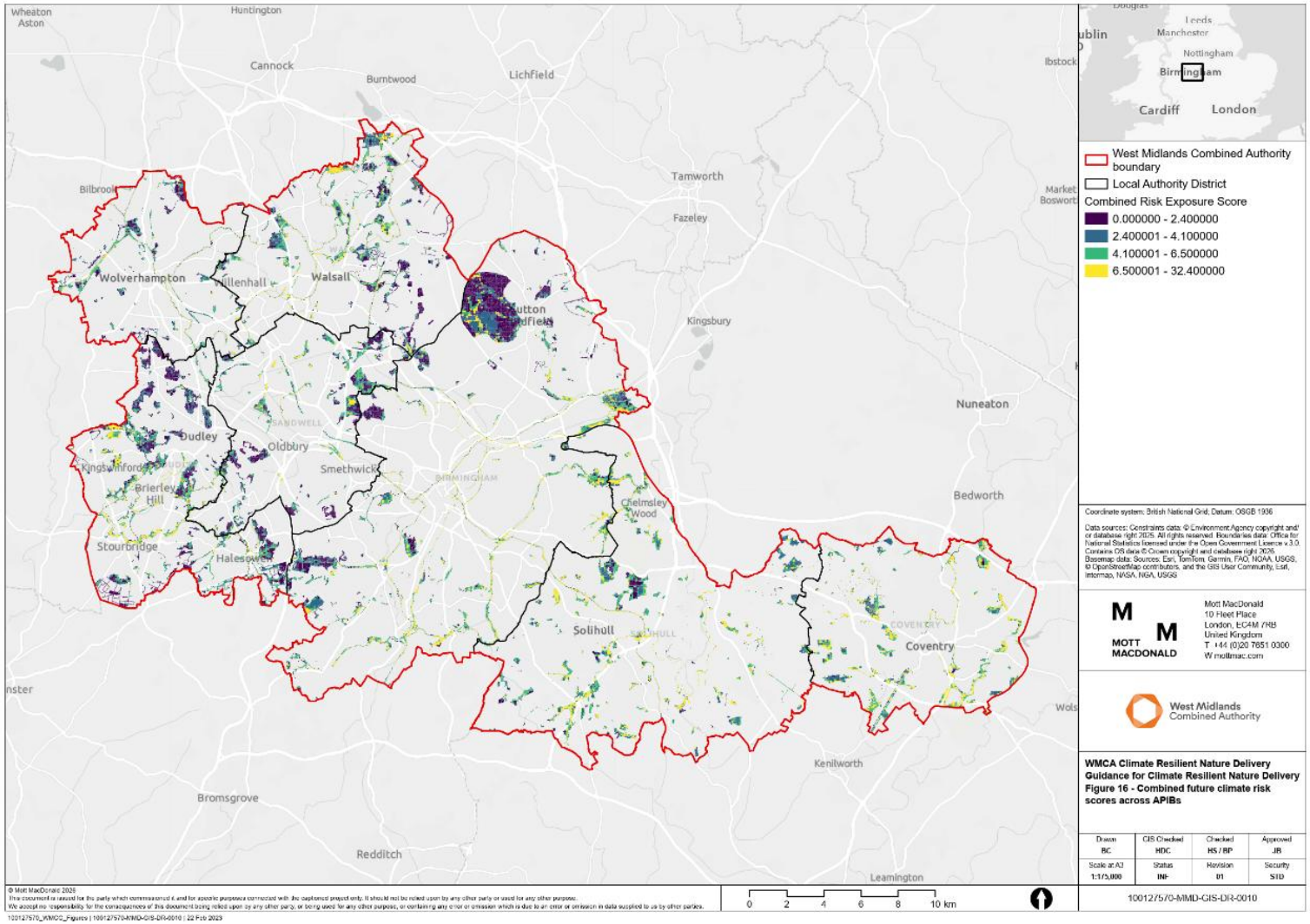


Figure 5: Combined future climate risk scores across APIBs

1.8 Embedding climate resilience in LNRS delivery

Climate-resilient nature recovery is underpinned by principles that ensure habitats and species can withstand and adapt to the pressures of a changing climate. A climate-resilient approach is also likely to deliver greater co-benefits. Restored habitats that are robust to climate impacts contribute to healthier ecosystems, improved connectivity and stronger ecosystem services.

Table 0-1: Key principles to embedding climate resilience in LNRS delivery action

Key principle	Description
Buffering climate extremes	Reduce the severity of drought, flooding, and other climate stress
Strengthening adaptive capacity	Enable habitats and species to adjust as risks evolve
Supporting ecological function	Maintain habitat function during climate volatility
Enhancing connectivity	Improve persistence and recovery pathways
Delivering co-benefits	Maximise social, environmental and ecosystem service benefits

To support the aims of the LNRS, actions to increase climate resilience should be taken within the mapped locations for LNRS priorities and actions, as well as within the APIBs. Actions beyond these areas will also benefit habitats and species and may deliver increased eco-system service benefits.

Effective resilience relies on integrating practical actions throughout the project delivery. Where this relates to enhancing or creating habitat it may include shaping landforms to reduce surface water flow, creating diverse habitat mosaics to increase structural diversity and ensuring natural protection from extreme weather events such as floods, droughts and heatwaves. During establishment and aftercare, it may include proactive planning for drought, flooding, pests and other risks, alongside actions that reduce non-climate stressors on newly created habitats. Longer-term, continuous monitoring and adaptive management can ensure that habitats remain

robust, functioning, and better able to cope with repeated climate stress and climate shocks.

1.9 Practical tools for landowners and LNRS delivery partners

Anticipating the climate risks most relevant to a habitat or site helps to inform resilience actions most likely to reduce the severity of impacts. A high-level climate assessment will provide a broad understanding of climate impacts upon habitats, allowing consideration of corresponding impacts to species populations. There are four main steps to the assessment:

- Establishing the climate baseline
- Assessing climate-related risks to habitats and species
- Identifying resilience actions
- Identifying opportunities for wider resilience and co-benefits

The practical tool contained in this guidance helps assess climate-related risks to habitats and species, and highlights resilience actions by habitat type and climate hazard that may lessen the impacts of climate change.

Within the practical tool, each habitat type present can be selected alongside the relevant LNRS action (which are in most cases focused on either habitat creation, or to maintain and enhance habitats). Using this information the tool provides an overview of climate vulnerability by hazard, and users can select hazards to generate a list of potentially relevant actions to increase climate resilience. These recommendations should be considered alongside the conditions of the site to determine which may be appropriate to implement.

1.10 Key findings and next steps

This assessment identifies the habitats and species, and locations, within the West Midlands which may be at greatest risk due to climate change. This includes habitats with a limited or fragmented distribution throughout the West Midlands, and those that require particularly specific environmental conditions, such as heathland and wetlands.

The LNRS sets out priorities for habitat conservation, enhancement and creation to preserve and improve the region’s biodiversity. By building climate resilience measures into LNRS delivery, it will help these habitats and the species they support to better withstand future climate risks.

As climate resilience measures are implemented across the West Midlands and other regions, new evidence will become available on what actions are most effective at improving the resilience of habitats to key climate risks. This evidence should be shared in order to improve understanding, particularly between LNRS delivery partners where local experience can inform adaptive habitat management. This could be achieved through establishment of a knowledge sharing hub where case studies of climate resilience actions can be shared, and potentially future updates to this report and associated practical tool.



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