West Midlands Combined Authority

Climate Adaptation Report

Submission to the fourth round of adaptation reporting (ARP4)

Abstract

This document is the West Midland Combined Authority's (WMCA's) climate adaptation report, submitted to the Department for Environment, Food & Rural Affairs (Defra) under the fourth round of climate adaptation reporting and the first pilot round of local authority reporting in 2024.

West Midlands Combined Authority | Greener Together

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1. Background

1.1 Report purpose

This report is the West Midlands Combined Authority's (WMCA) submission to the Department for Environment Food and Rural Affairs' (Defra's) pilot round of local authority adaptation reporting under the national adaptation reporting power (ARP). This is the fourth round of adaptation reporting (ARP4) and the first time local and combined authorities have been invited to report on their respective climate risks and adaptation action plans.

The objectives of the fourth round of adaptation reporting are to:

- Support the integration of climate change risk management into the work of reporting organisations
- Build understanding of the level of preparedness of key sectors to climate change, at a sectoral and national level, and inform other parts of the government's statutory cycle for climate adaptation, including Climate Change Risk Assessments (CCRAs) and National Adaptation Programmes (NAPs)

The Local Authority Pilot will also assess how effective reporting is for local authorities and what value it adds.

While other reporting organisations may be building on their submissions from previous rounds, this report is the first of its kind for the WMCA.

To ensure this exercise is both manageable and completed to a high standard, the WMCA has been selective in what falls within the scope of its climate risk assessments and subsequent action planning (see section 2.1.1 for the scope). Policy areas and activities that fall outside of this streamlined scope might still have the potential to be used as levers for adaptation promotion and delivery (both within and outside of the WMCA). Actions related to these areas have already been included in the WMCA's original internal Climate Adaptation Plan 2024 and have been captured in this report's final chapter (Chapter 4: WMCA levers to promote and mainstream climate adaptation).

All actions need to be proportionate and pursued in line with the appetite of risk owners. The adaptation actions outlined in this report are aspirations that WMCA teams will work towards over the next five years. Respective teams will need to identify new funding sources and secure additional resources to deliver the aspirations within this report, through the business planning process. The ability to secure funding for the development of these actions also sits within a context of public sector budget constraints.

1.2 About us

Established by the 2016 West Midlands Combined Authority Order, the West Midlands Combined Authority (WMCA) is a partnership of 18 local authorities working together to move powers from Whitehall to the West Midlands and its locally elected politicians, who know this region best. Headed by Richard Parker, the Mayor of the West Midlands, the WMCA has seven constituent authorities (Birmingham, Coventry, Dudley, Sandwell, Solihull, Walsall, and Wolverhampton) with full voting rights, eleven non-constituent authorities with reduced voting rights and other observer authorities.

The WMCA works collaboratively on many projects to deliver a shared vision of a more prosperous, fairer, greener, and healthier West Midlands. The organisation's work is already bringing big benefits in the way the WMCA keep people moving on the region's roads, rail and tram systems, the work underway to build homes on derelict sites to protect green spaces, with innovative work on future transport systems and 5G and plans to tackle the climate change and ecological emergencies.

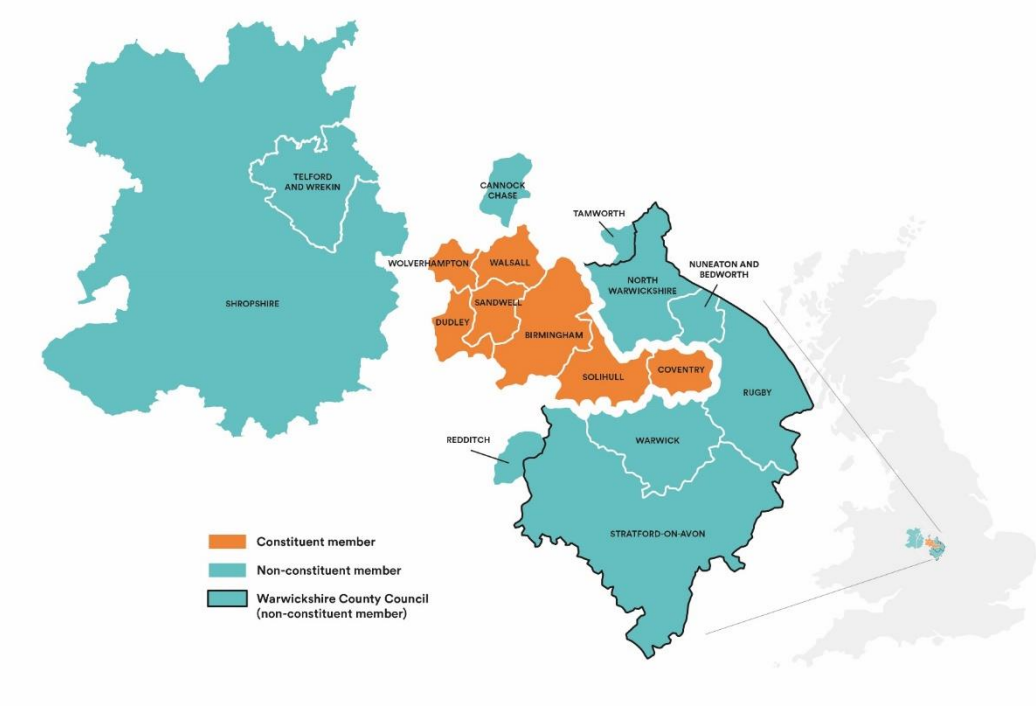


Figure 1 - Constituent and non-constituent members of WMCA

1.2.1 What is a combined authority?

- Combined authorities are created by groups of local authorities to work together to address shared challenges at a regional level.
- They primarily work at a strategic level across the region, with greater scale than local authorities and more local knowledge than central government.
- They don't have to be led by a mayor, but mayoral combined authorities typically have more powers and funding.
- Not every area has a combined authority.
- Across England, there are currently eleven combined authorities.

1.2.2 What does the WMCA do?

The WMCA's activities centre around three activity types:

1) Deliver: in some areas the WMCA are responsible for delivering and commissioning services, such as the regional transport system, the Local Nature Recovery Strategy and the provision of adult skills.

2) Enable: in other areas, the WMCA convene and guide the work of partners, including developing an economic strategy to support regional businesses, unlocking sites for housing and regeneration schemes and coordination of air quality behaviour change activity.

3) Influence: the WMCA also play an advocacy role, amplifying the voice of partners in the region to solve shared challenges and secure new resources or powers.

1.2.3 WMCA staff, resource and facilities

The WMCA employs around 900 staff and has its offices in central Birmingham. A significant proportion of the WMCA's workforce follow a hybrid working pattern, splitting time between the office (primarily 16 Summer Lane, Birmingham) and their homes. Owing to the WMCA's role as a transport authority, some staff are based at bus stations and interchanges throughout the WMCA area.

1.3 WMCA's climate governance, strategy and funding

The WMCA is governed by its board of elected members (WMCA Board) and board of executive officers.

Following the Mayoral elections of May 2024, the WMCA reviewed and updated its governance system with the introduction of six new panels which provide support and guidance in relation to one off issue that require additional expert support or to provide input into high profile matters that are due for consideration at a public meeting such as WMCA or Investment Board.

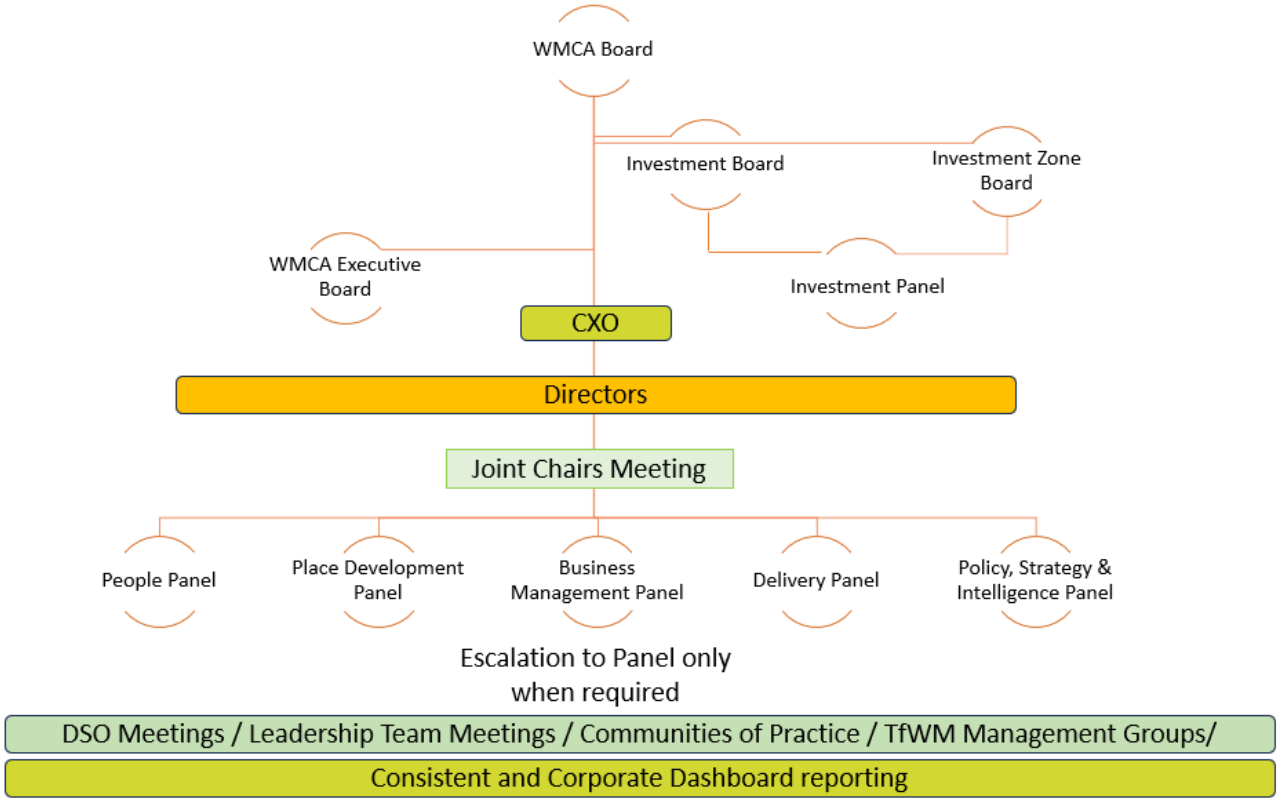


Figure 2 WMCA Governance Structure

1.3.1 Funding mechanisms

The WMCA receives funding from numerous sources. Its constituent and non-constituent members pay membership fees each year. The WMCA also draws revenue from sources such as the Adult Education Budget, Transport Levy, transport grants from the Department for Transport, land grants, and devolution grants as part of the current devolution deal.

The Integrated Settlement, a cornerstone of the WMCA's trailblazer deeper devolution deal announced during the 2023 Spring Budget, represents a fundamental shift in the region's funding mechanism from central government. Instead of fragmented, short-term grants, the Integrated Settlement consolidates funding for five key functions: local transport, adult skills, housing and regeneration, local growth and place, and retrofitting of buildings, in the first instance.

The WMCA will function akin to a government department, receiving a multi-year settlement with greater flexibility and strategic responsibility over spending. This shift empowers local decision-making, enabling the WMCA Board to craft 'functional' strategies guiding fund allocation over the medium term. Concurrently, local authorities will devise place-based strategies integrating the Integrated Settlement with other funding sources to drive inclusive growth in targeted areas. The consolidated funding approach allows for a collaborative, long-term strategy to address complex regional issues.

1.3.2 Annual Business Plan

The WMCA's Annual Business Plan sets out the organisation's key priorities for the year ahead. In the plan's 2023/24 iteration, boosting climate resilience is specifically referenced as part of Aim 4 of the Annual Business Plan. Delivering the WMCA's Climate Adaptation Plan is listed as a high-level deliverable under this. By approving the WMCA's Adaptation Plan as well as this report, the organisation's executive leadership team have signalled a clear willingness to ramp up work to adapt to climate change.

1.3.3 Corporate risk management

The WMCA recognises that it cannot be wholly risk-averse if it is to be successful. This is especially true in relation to the WMCA's innovation and development functions. Nonetheless, the WMCA also recognises that effective risk management must be embedded into all planning and decision-making processes. Failure to correctly identify and manage risk appropriately and proportionately could result in the WMCA not achieving its objectives, leading to significant reputational damage and affect relationships with local authority partners and UK Government.

Therefore, the WMCA has a dedicated Risk Team and applies its Risk Management Framework (RMF) to all employees and contractors of any business area, directorate, project, or programme. The CEO and Section 73 Officer are ultimately accountable for the creation, maintenance, and implementation of the RMF.

The WMCA classifies risks in a risk scoring matrix by multiplying likelihood and impact scores. This matrix has allowed the WMCA to identify which business areas have a greater risk appetite than others and set target score ranges accordingly. For example, whilst the WMCA has a very low tolerance to any risk that may impact legal or regulatory requirements, it is open to higher levels of risk associated with programme development and innovation opportunities. Once risks have been assessed, the RMF recognises four risk management response strategies, known as the 4Ts, and these are:

- Tolerate – Accepting the risk, taking no further mitigating action. Can only be applied when the risk is within appetite.

Where the risk currently exceeds the risk appetite:

- Treat – Cost-effective controls or mitigations are used to reduce the risk to an acceptable level.
- Transfer – All or some of the risk is transferred to a 3rd party by means of insurance, contract or in some cases by joint venture or alliance.
- Terminate – Level of risk is not acceptable to the WMCA, and no further cost-effective mitigation is possible. It means ceasing the activity generating the risk.

The WMCA's Corporate Risk Scoring Matrix (Figure 3) is structured slightly differently to Defra's template for ARP4, but they follow the same system of scoring likelihood and impact. This enables the results to be reconciled in instances where they differ.

Likelihood						
	5 Very high	5	10	15	20	25
	4 High	4	8	12	16	20
	3 Medium	3	6	9	12	15
	2 Low	2	4	6	8	10
	1 Very low	1	2	3	4	5
		1 Minimal	2 Minor	3 Significant	4 Major	5 Critical
		Impact				

Figure 3 WMCA Corporate Risk Scoring Matrix

1.3.4 Governance of climate adaptation

The WMCA's Climate Adaptation work programme sits within its wider Environment programme, which falls within the Strategy, Economy and Net Zero (SENZ) directorate of WMCA.

WMCA's adaptation workstream seeks to:

ensure that the WMCA area understands its vulnerability to climate related risks and both people and organisations are taking steps to become more climate resilient.

The Climate Adaptation Project Officer coordinates the development and delivery of the WMCA's climate adaptation programme, climate adaptation reporting and the internal WMCA Climate Adaptation Plan. The plan spans WMCA teams in terms of content and ownership. Actions within the plan are owned and led by policy area leads with support, as appropriate, from the Climate Adaptation Project Officer. This model mimics the national approach to climate adaptation planning, whereby national adaptation programmes are coordinated by Defra with respective sections developed and owned by relevant government departments.

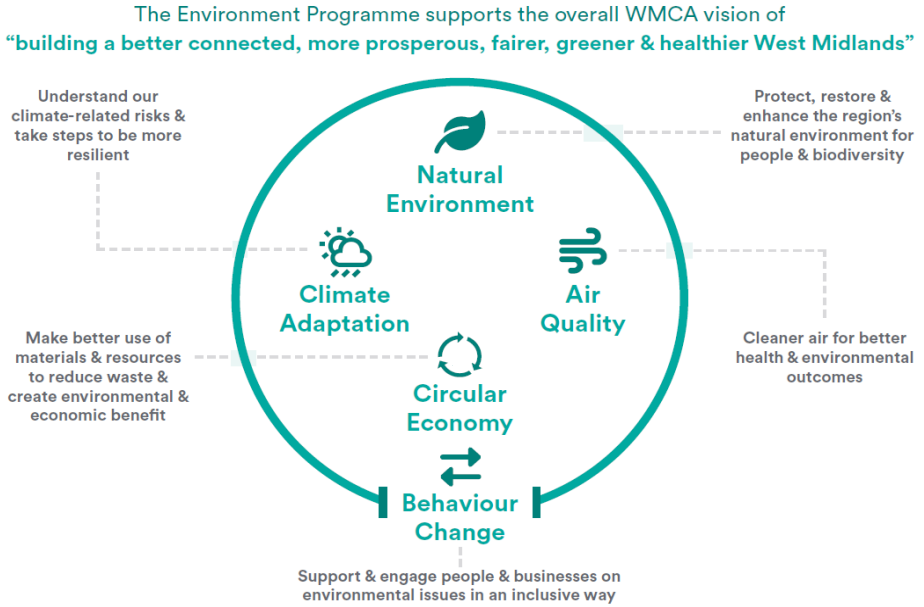


Figure 4 WMCA Environment Programme Overview

2. WMCA Climate Risk Assessment & Action Planning

2.1 Methodology

As part of the voluntary local authority pilot for the fourth round of adaptation reporting, the WMCA's Climate Risk Assessment and Adaptation Action Plan builds on Defra's guidance and enriches it with WMCA's corporate risk management guidance, scientific evidence from climate projections, engagement with local insights, expertise within WMCA and subject matter experts in climate adaptation from consultants AtkinsRéalis and Sustainability West Midlands (SWM). A full methodology technical note is provided in Appendix 2.

2.1.1 Risk Assessment Scope

The scope of this risk assessment is focused on climate risks facing the WMCA's organisational functions, as opposed to the risks facing the region, its stakeholders, residents, economy and environment.

The scope of WMCA's response to ARP4 includes functions, assets and service areas that the WMCA have ***direct, devolved responsibility for*** and may be at a ***physical, tangible risk*** from climate impacts. To select items that fall within scope, the Environment Team firstly screened the WMCA's statutory functions and work areas relevant to this scope. The Adaptation Officer then engaged with colleagues across the organisation to refine this list and reach out to relevant teams emerging from the screening process.

Due to interdependencies with external partners and infrastructure and subsequent cascading impacts, the WMCA have also identified several indirect risks, for which they need to actively collaborate with external partners to manage. The climate risks that the WMCA face have been assessed and reported against select work areas within the organisation's directorates. See Table 1 for the items that fall within scope for this exercise.

Directorate	Function, Asset or Service
Communications	Events and communications
Employment, Skills, Health & Communities	Adult education provision
Finance & Business Hub	Facilities & Workplace Services Human Resources Health & Safety Procurement Corporate Risk Management Business Continuity
Housing, Property & Regeneration	Strategic Asset Management
Law, Governance & Audit	WMCA governance and decision-making processes
Strategy, Economy & Net Zero	Air Quality programme Local Net Zero Accelerator (LNZA) programme, including Net Zero Neighbourhood demonstrators Research, Intelligence & Inclusive Growth
Transport for West Midlands	Transport asset management: bus stops and stations, cycle hire, park & ride West Midlands Metro Regional Transport Coordination Centre Key Route Network Coordination Traffic signalling CCTV provision for traffic monitoring and public transport hubs Transport information provision Swift ticketing infrastructure Transport scheme design and delivery Transport policy and planning Transport data and insights Digital and data provision and IT services Integrated Transport Services

Table 1 - Directorates and associated function, asset or service within scope of ARP reporting

2.1.2 Climate projections

The world's climate is changing due to global carbon emissions. In 2023 the United Nations Environment Programme (UNEP) announced that current climate pledges put the world on track for 2.5-2.9C of global warming by the end of the century. In Oct 2024, a more recent UN report stated that if only **current policies are implemented**, global warming could reach up to **3.1C by 2100**.[1]

The earth's temperature is rising, bringing with it changes to the climate and to weather patterns. The West Midlands is going to see warmer, wetter winters, hotter, drier summers and more extreme weather events. These new weather events aren't what the region is used and unless the WMCA and partners start adapting to these new conditions, the impacts of climate change could prevent the achievement of regional goals and the delivery of WMCA work programmes.

For this report the following scenarios and time horizons have been assessed, in line with Defra's guidance:

- '**2025':** present-day (near-term)
- **'2050 +2°C':** mid-century (medium-term) – a 2°C rise (+2°C by end of century (EoC))
- **'2100 +2°C**': end of century (long-term) – a 2°C rise (+2°C by EoC)
- **'2100 +4°C**': end of century (long-term) – a 4°C rise (+4°C by EoC)

Climate stripes and mapping were produced using the Met Office's UK Climate Projections 18 (UKCP18) projections to define future climate risk magnitude and likelihood and the Climate Risk Indicators portal[2] was used to understand risk at the local authority level, to represent spatial variation across the West Midlands. A selection of climate mapping and stripes is presented below, with further outputs in Appendix 1.

[1] United Nations Environment Programme (UNEP), *Emissions Gap Report 2024 | UNEP - UN Environment Programme*
[2] Climate Risk Indicators (uk-cri.org)

Table 2 below sets out a selection of risk indicator values for each scenario averaged across the WMCA's seven constituent local authorities. Climate projections can provide a clear indicator of future risk likelihood, including the chance of occurrence within a given year, or frequency of occurrence. For example:

- **Amber heat health alerts** signify increased health and safety risks associated with **high temperatures**, are set to increase in likelihood from unlikely to occur (18% chance per year, likelihood score of 2) to likely to occur (61% chance per year, likelihood score of 4).

Definition: *Met Office heatwaves are defined as at least three consecutive days with daily maximum temperatures ≥ 26°C (≥ 27°C for Birmingham)*

- **Winter rainfall events** are also projected to become heavier, with 1-day and 5-day **extreme rainfall events** set to increase by approximately 25% and 20% respectively under the +4°C scenario, increasing the risk of flooding.

Projections of the magnitude of events (e.g. length of heatwaves and maximum temperatures reached), combined with local understanding of assets and operations, can be used to determine impact scores. See Appendix 4 for more information on the risk scoring matrix used throughout this exercise.

The indicators in Table 2 on the next page have been extracted from the UK Climate Risk Indicator Portal (UKCRI). These risk indicators have been further visualised in Figures 5, 6 and 7.

Climate risk indicator	Frequency and magnitude			
	Current risk	**2050, +2°C End of Century**	**2100, +2°C End of Century**	**2100, +4°C End of Century**
Heatwaves [3] *Events per year*	Heatwaves are highly likely (59% chance), with 1 event per year (likelihood score of 4), lasting 4.9 days	Heatwaves are highly likely (70% chance), with ~1.3 events per year (likelihood score of 4), lasting 5.2 days	Heatwaves are highly likely (76% chance), with ~1.4 events per year, (likelihood score of 4), lasting 5.1 days	Heatwaves are almost certain to occur, with ~3 events per year (likelihood score of 5), lasting 11 days
Amber Heat Health Alert[4] *Average % chance per year*	18% chance per year (likelihood score of 2), 1.8 days duration	25% chance per year (likelihood score of 2), 2.1 days duration	26% chance per year (likelihood score of 3), 2.3 days duration	61% chance per year (likelihood score of 4), 3.8 days duration
Adverse rail conditions and road melt risk *Average days per year*	Rail – 31 days Road – 17 days per year	Rail – 31 days Road – 21 days per year	Rail – 32 days Road – 22 days per year	Rail – 44 days Road – 42 days per year
Total winter rainfall *Average % change per year*	Winter rainfall 1.3% higher than baseline (1981-2010)	Winter rainfall 3% higher than baseline	Winter rainfall 4.4% higher than baseline	Winter rainfall is 12% higher than baseline, resulting in higher winter flows and greater river and groundwater
Winter storms and heavy rainfall[5] 1 in 20-year and 1 in 100-year return periods	*1-day precipitation* 20 year = 26mm 100 year = 33mm	*1-day precipitation* 20 year = 27mm 100 year = 35mm	*1-day precipitation* 20 year = 30mm 100 year = 37mm	*1-day precipitation* 20 year = 33mm 100 year = 41mm
	5-day precipitation 20 year = 55mm 100 year = 64mm	*5-day precipitation* 20 year = 57mm 100 year = 67mm	*5-day precipitation* 20 year = 61mm 100 year = 72mm	*5-day precipitation* 20 year = 67mm 100 year = 77mm

Table 2 - Summary of climate risk indicators as visualised in Figures 5, 6 & 7.

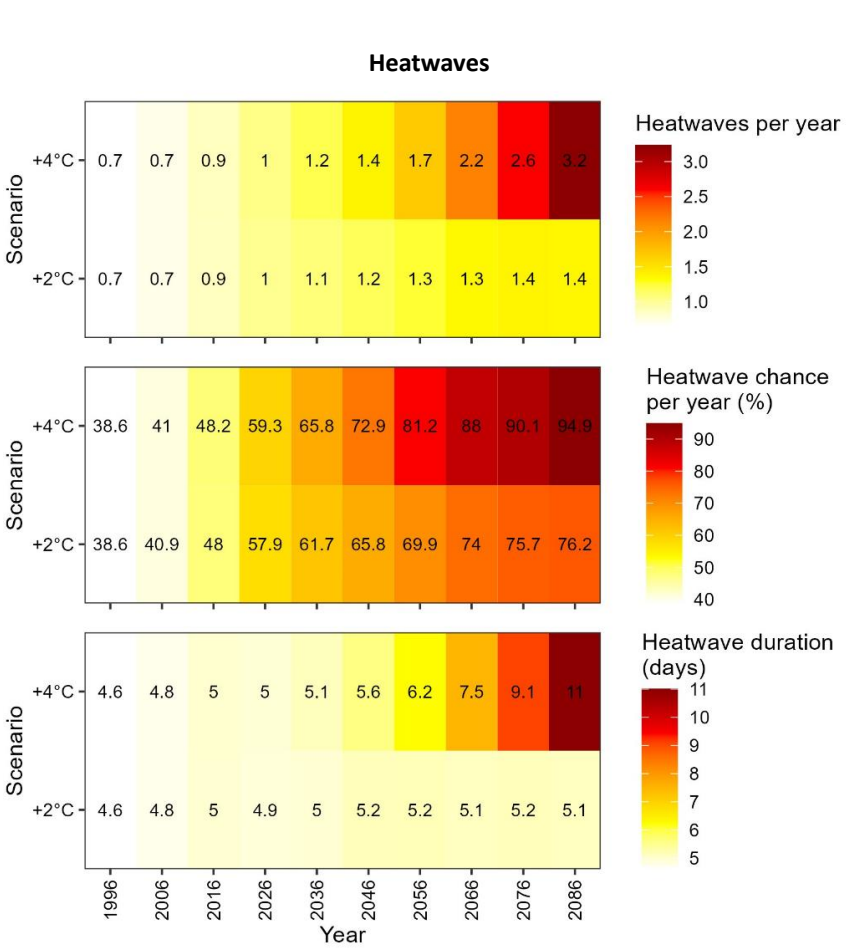
[3] A heatwave event is defined for the West Midlands as maximum temperatures above 27°C for at least three days" Changing climate risk in the UK: A multi-sectoral analysis using policy-relevant indicators

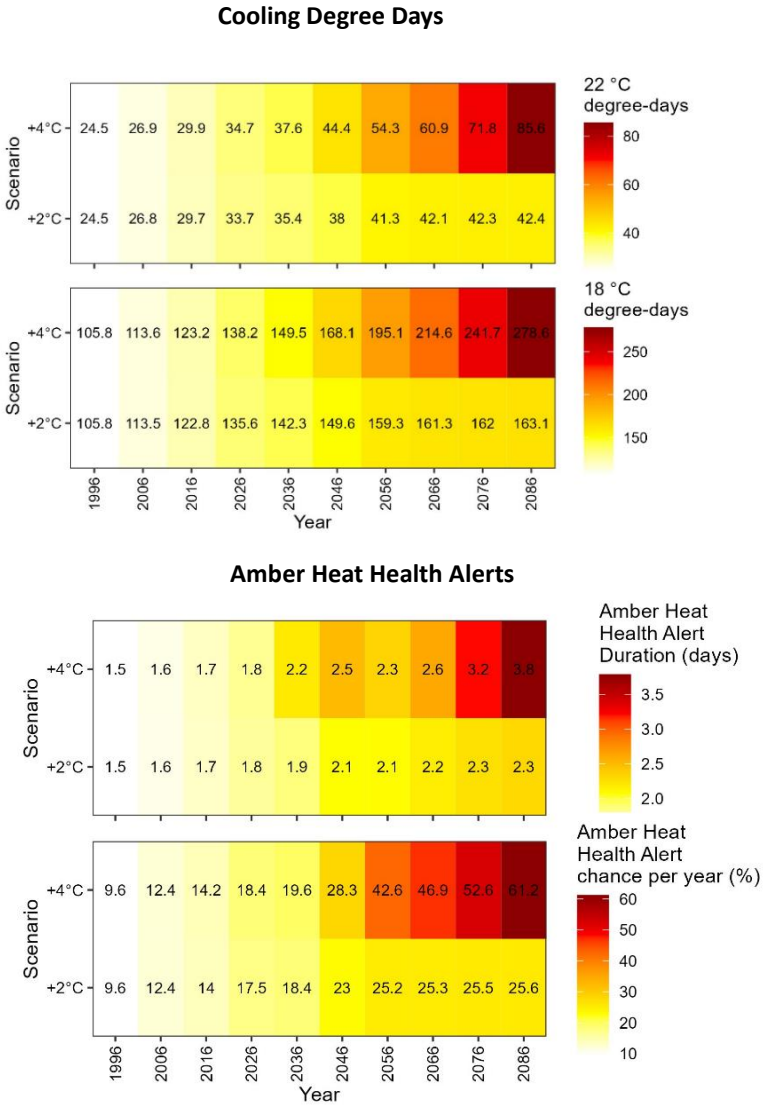
[4] An amber alert means that weather impacts are likely to be felt across the whole health service and health impacts across the wider population Heat-Health Alerts issued by UKHSA and the Met Office - GOV.UK (www.gov.uk)

[5] Derived from UKCP18 probabilistic projections of climate extremes, based on 25km grid over Birmingham (x,y coordinates 412500, 287500).

Figure 5 – Heat related UK Climate Risk Indicator Portal climate stripes for the West Midlands[6]

These striped charts demonstrate the increasing likelihood of heatwaves, cooling degree days and heat health alerts over 10-year periods for two global warming scenarios. These use a 30-year temporal average – for example, 2056 is the mid-point for 2041-2070. The values are the median average over a 30-year period and averaged across the West Midlands authorities.

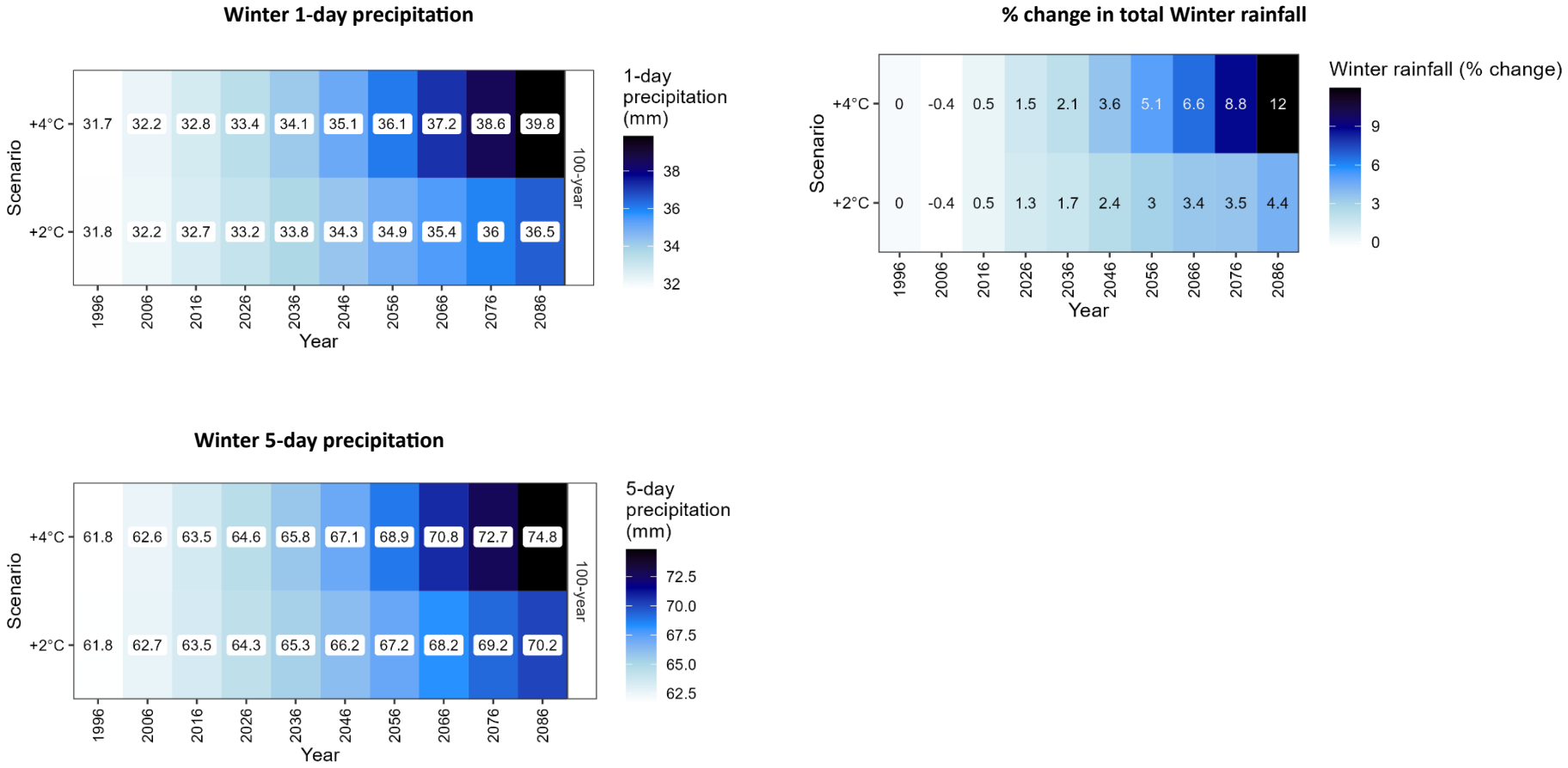




[6] Climate Risk Indicators (uk-cri.org)

Figure 6 – Rainfall related UK Climate Risk Indicators Portal and UKCP18 derived climate stripes for the West Midlands[7]

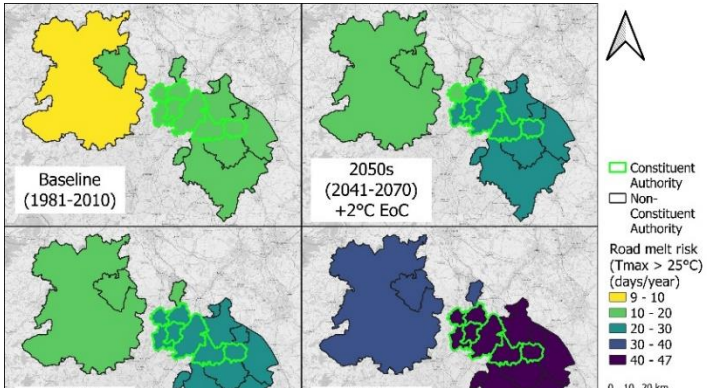
These striped charts help us visualise the increasing % change in Winter rainfall and daily winter precipitation rates between now until the end of the century for two global warming scenarios. These use a 30-year temporal average, for example, 2056 is the mid-point for 2041-2070. The values are the median average over a 30-year period and averaged across the West Midlands authorities.



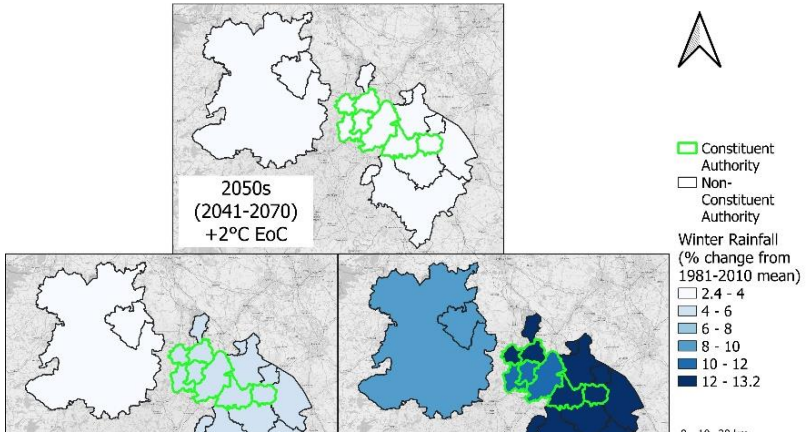
[7] Climate Risk Indicators (uk-cri.org)

Figure 7 - UK Climate Risk Indicator Portal mapping. Core constituent authorities are presented with a green border.[8]

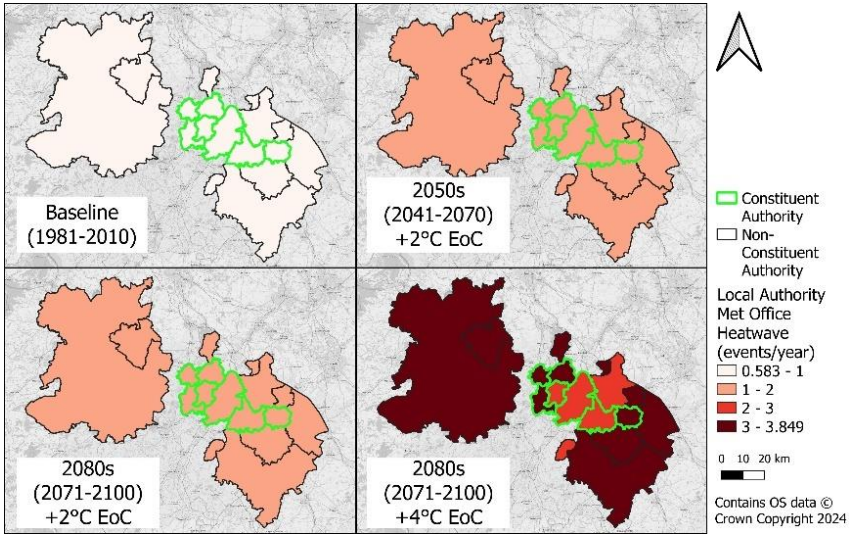
The series of maps use a 30-year temporal average e.g. 2056 is the mid-point for 2041-2070, to indicate values for a given period. The values are the median average over a 30-year period for each of the West Midland's core constituent authorities and non-constituent authorities.



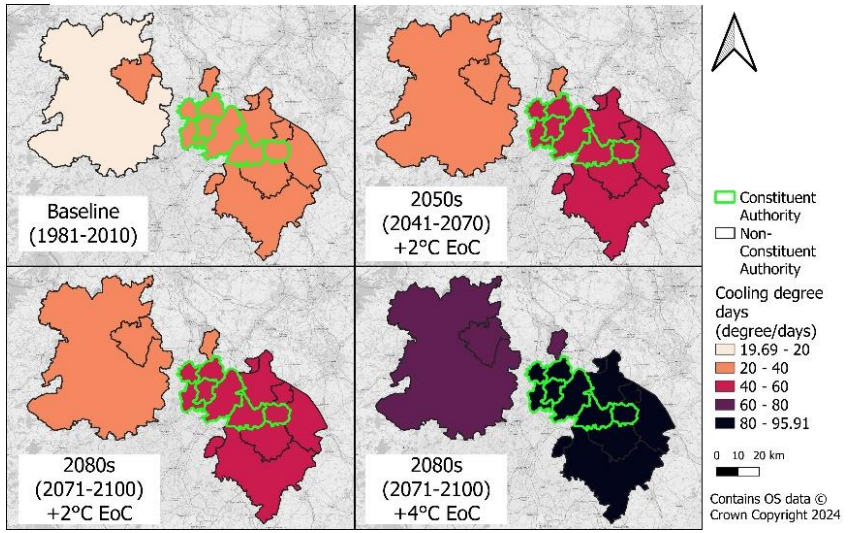
Maps showing an increase in number of days with road melt risk due to increases in temperature through to 2100.



Maps showing increases in average % change in annual Winter rainfall rates for a 30-year period through to 2100



Maps showing average number of heatwave events per year for a 30-year period through to 2100.



Maps showing an increase in number of cooling degree days per year through to 2100.

2.1.3 Stakeholder engagement

For each directorate/work area within scope, a Climate Risk Assessment and Adaptation Action Plan is presented, based on climate projections and internal stakeholder engagement capturing the organisation's local expertise. The Environment Team held five workshops centred around five themes (data and monitoring, enabling services, strategic and operational assets, strategy and environment, and wider transport functions) with attendees from relevant directorates to present climate risk assessment findings and gain insights and evidence on present day and future risk levels from climate hazards.

2.1.4 Risk scoring

A risk scoring matrix was used reconciling the WMCA's corporate risk scoring matrix and risk classification to Defra's template in agreement with the Corporate Risk Manager. The following risk matrix was used based on Defra's guidance (Table 3). Further detail on risk scoring categories is presented in the detailed methodology in Appendix 2. Each risk has been matched with the UK's 2022 Climate Change Risk Assessment listed risks; these are outlined in the directorate risk table with further details provided in Appendix 3.

		Impact				
		Minimal	Minor	Moderate	Major	Catastrophic
Likelihood	5. Almost Certain	5 / moderate	10 / major	15 / major	20 / severe	25 / severe
	4. Likely	4 / moderate	8 / moderate	12 / major	16 / major	20 / severe
	3. Possible	3 / minor	6 / moderate	9 / moderate	12 / major	15 / major
	2. Unlikely	2 / minor	4 / moderate	6 / moderate	8 / moderate	10 / major
	1. Highly Unlikely	1 / minor	2 / minor	3 / minor	4 / moderate	5 / moderate

Table 3 - Impact versus likelihood risk scoring matrix

2.1.5 Climate Adaptation Action Planning

Adaptation actions were identified from existing business plans and developed during the stakeholder engagement workshops; these are presented for each directorate.

Actions have been defined as 'current' (where delivery of current actions are ongoing) or 'planned' (those that teams have already committed to delivering). The WMCA recognise that current and planned actions will need to be continuously monitored and updated, and additional actions will need to be taken to increase the organisation's resilience to climate change. The WMCA have therefore also specified 'potential' actions.

There are four categories of adaptation actions as defined by Defra (1-4 below), which can be seen as a cycle of climate adaptation planning and implementation, with different stages reflecting the level of existing work on adaptation and climate risk assessment the organisation has carried out (see Figure 8). The cycle indicates the need for ongoing scoping and assessment of risks, including emerging and changing nature of risks as the impacts of future climate change transpire. Further, future changes in the social, political, legal and economic environment, further to implemented adaptation actions may change the WMCA's exposure and vulnerability to climate risks.

WMCA have proposed an additional type of action (see Figure 8), which focuses on building internal capability to adapt to climate change through integrating climate change risk management into the way the organisation operates, in line with Defra's second objective for this round of reporting. This action type encompasses all other action types, ensuring climate risk governance and risk management oversees all stages of risk assessment and adaptation. This also seeks to ensure climate risk monitoring and actions are embedded as a matter of business as usual by responsible staff across different parts of the WMCA.

0. Building internal adaptive capacity capability through integrating climate change into governance and risk management.
1. Scoping, monitoring and identifying impacts / risks.
2. Consideration of impacts, risks and likely actions with stakeholders.
3. Implementation of actions to address impacts / risks and maintain delivery of the organisation's functions.
4. Monitoring actions, evaluation against original plans, reassessment of risks, management system audit (against adaptation best practice).

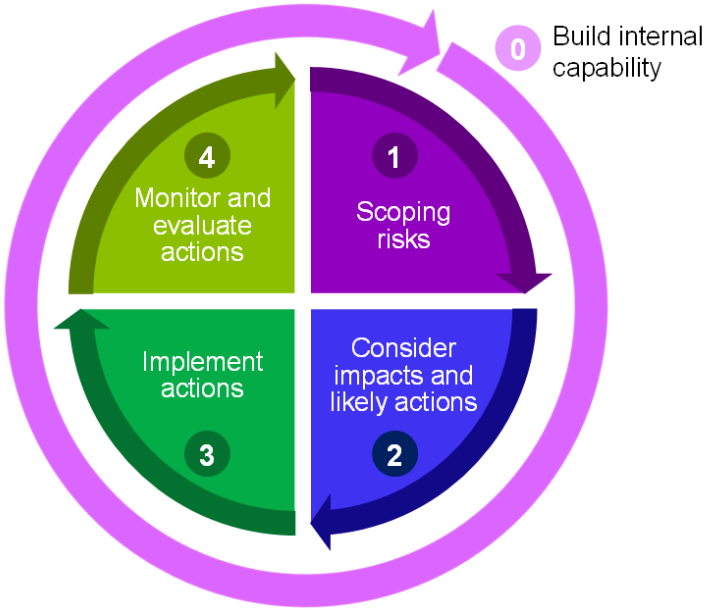


Figure 8 - Types of actions as part of the monitoring and evaluation framework.

2.2 Climate Risk Assessment & Adaptation Action Planning

This section presents climate risks and adaptation actions by directorate. During this process, the WMCA have identified actions to help manage climate risk, which sit across multiple directorates and should be at the forefront of operations and functions.

2.2.1 Core, cross-cutting actions

The following were identified as core actions, with further details provided on these actions within the directorate actions.

- **Embed future climate change risks into existing risk management processes** such as corporate risk assessments.
- **Communications campaign** to raise awareness of climate risks across WMCA functions and funding available to deliver on adaptation actions.
- **Future climate change scenarios** should be **embedded into the design of new assets/infrastructure**.
- **Disseminate Met Office and UKHSA warnings**, as part of the operational plan process, combined with protocols and guidance.
- **Develop protocols for response to extreme weather events** and disseminate them together with any weather warnings (e.g. protocol to work from home due to heatwave, with thermal comfort section from H&S guidance).
- **Skills and training for decision makers in the WMCA,** facilitating both proactive and long-term adaptive planning and short-term extreme event response.
- **Research and analysis to map vulnerability and assess impacts of climate change.** Project the 'numbers behind future climate change' (i.e. the number of staff, assets and/or operations at risk and associated costs if no action is taken versus effective adaptation).
- **Establish a monitoring and evaluation framework** to measure progress against actions every 5 years, with continuous ongoing review by risk owners.
- **Improve monitoring of present-day impacts** to understand and more accurately forecast how future impacts might be felt and inform business cases for climate adaptation measures today.

Actions are listed here as recommendations that have emerged from workshops with colleagues from relevant directorates and teams. Actions are assigned a 'status' which indicates the current level of commitment to taking each one forward. Actions labelled as 'potential' are presented as recommended options that relevant teams might opt to take forward in the next five years.

2.2.2 Communications

Introduction to the Directorate

The Communications Team works across the WMCA including with the Mayor of the West Midlands, engaging with staff, residents, local authorities, stakeholders and the UK Government. The directorate manages the WMCA's social media accounts, web presence, events, engagement and consultation, marketing, internal and external communications and media.

Responsibilities of the directorate

The directorate is the point of contact for all communications queries for all other directorates. Communications are responsible for ensuring high-quality content is shared both internally and externally and that WMCA's values are highlighted. External communications include the presentation of official external communication channels including the WMCA website, social media, media and newsletters.

What does climate resilience success look like?

- Communications and events services to be deliverable irrespective of climate change and associated hazards.
- Use of communications channels for teams to raise awareness of and disseminate climate resilience messaging.

Communications functions, services and assets in scope of this risk assessment and action planning exercise:

- Events and communications

Climate Risks

The top risks to Communications include the risk of being unable to access sites to reach equipment, venues and events and to be able to deliver internal and external communications, impacting the ability of Communications to deliver their functions (Table 4). This risk is currently moderate but is expected to increase to major under a +4°C warming scenario by 2100. All other risks, including the impact of extreme weather on outdoor events, loss of financial revenues from event cancellations and home working and online services interruptions, are expected to increase from a minor risk to a moderate risk by the end of the century without additional adaptation measures in place.

Table 4 – Risk narrative and scores for Communications directorate risks (Risk ID C).

Related national Climate Change Risk Assessment 3 (CCRA3) urgency score key: red = need more action; amber = further investigation; green = sustain current action/watching brief. If more than one CCRA3 risk is relevant, the highest urgency score is indicated. ARP4 risk score key: purple = severe (20-25); red = major (10-16); amber = moderate (4-9); green = minor (1-3).
Throughout the table, end of century is abbreviated to EoC.

Risk and impacts	Related national CCRA3 risk(s) and urgency score *See Appendix 3*	Climate driver										ARP4 risk score *Likelihood × Impact*				
		Acute							*Chronic*							
		Heatwave	*Frost, freeze/thaw*	*Heavy rainfall*	*Storm and high winds*	*Drought*	*Flood*	*Land movement*	*Temperature increase*	*Precipitation increase*	*Precipitation decrease*	*2025*	*2050 +2°C by EoC*	*2100 +2°C by EoC*	*2100 +4°C by EoC*	*2030 Target*
Risk C1. Outdoor and indoor events are not accessible. Extreme weather may impact outdoor and indoor events/sites/venues; they may be inaccessible to travel to and/or affect community, stakeholder and media engagement.	**H1, H3**	✓	✓	✓	✓		✓		✓	✓		*2 × 2* **4**	*3 × 2* **6**	*3 × 3* **9**	*4 × 3* **12**	*2 × 1* **2**
Risk C2. Loss of financial revenue due to events/engagements being cancelled. Insurance for events being cancelled due to extreme climate events is not currently in place.	**B4**	✓	✓	✓	✓	✓	✓	✓	✓	✓		*2 × 2* **4**	*3 × 2* **6**	*3 × 2* **6**	*4 × 2* **8**	*2 × 1* **2**
Risk C3. Home working and online services impacted by extreme weather. Disruption from storms or precipitation may impact home working, the ability to give internal staff updates and external transport updates **and** may impact webinars run by WMCA.	**I1**	✓	✓	✓	✓		✓	✓	✓	✓		*2 × 2* **4**	*3 × 2* **6**	*3 × 2* **6**	*4 × 2* **8**	*2 × 1* **2**
Risk C4. Team member/speaker/attendee that is part of an event/engagement/photocall may not be able to attend due to extreme weather. This risk also includes team members who may not be able to get to Summer Lane to enable external communications on network resilience to take place.	**B5**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	*2 × 2* **4**	*3 × 2* **6**	*3 × 2* **6**	*4 × 3* **12**	*2 × 1* **2**

Risk and impacts	Related national CCRA3 risk(s) and urgency score *See Appendix 3*	Climate driver										ARP4 risk score *Likelihood × Impact*				
		Acute							*Chronic*							
		Heatwave	*Frost, freeze/thaw*	*Heavy rainfall*	*Storm and high winds*	*Drought*	*Flood*	*Land movement*	*Temperature increase*	*Precipitation increase*	*Precipitation decrease*	*2025*	*2050 +2°C by EoC*	*2100 +2°C by EoC*	*2100 +4°C by EoC*	*2030 Target*
Risk C5. Public transport could be cancelled or severely reduced with impact on road network impacting events, engagement, project works and media calls. Team members will also have to manage internal and external communication to share transport information and internal updates.	**B6**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	*2 × 2* **4**	*3 × 2* **6**	*3 × 2* **6**	*4 × 2* **8**	*2 × 1* **2**

Managing the risk

Actions presented below for the Communications directorate outline several resilience measures required to mitigate against the above risks (Table 5). It is important that the WMCA consider these resilience measures and present the performance metrics they will use to monitor progress. Currently, contingencies for extreme weather are in place during events such as fleeces, waterproofs and marquee, however, key gaps remain in the resilience of events, data centres and power networks against extreme weather. Planned and potential actions aim to cover these gaps including contingency plans in place for events impacted by extreme weather including taking out insurance.

Table 5 – Actions to mitigate finance and business directorate risks (Risk ID C).

Category of actions key:

0 - *building internal adaptive capacity capability through integrating climate change into governance and risk management*
1 - *scoping, monitoring and identifying impacts / risks*
2 - *consideration of impacts, risks and likely actions with stakeholders*
3 - *implementation of actions to address impacts / risks and maintain delivery of the organisation's functions*
4 - *monitoring actions, evaluation against original plans, reassessment of risks, management system audit (against adaptation best practice)*

Status of actions key:

Completed/ongoing – actions that have been completed or are delivered on an ongoing basis.

Current – actions that are underway.

Planned – actions that have been planned for, with allocated resource or a route to delivery.

Potential – recommended actions that respective teams might choose to take forward, should risk appetite and capacity permit.

Risk ID	Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
C1, C2	Contingencies for weather in place during events (marquees, fleeces and waterproof jackets). 3 4	Completed	+ Contingencies provide protection from higher temperatures and moderate rainfall. - Does not provide protection from extreme weather such as extreme heat and heavy rainfall, especially for vulnerable groups.	Continue to monitor the need for greater levels of protection from extreme weather such as rescheduling events.
C2, C3, C4, C5	Introduce plans for the cancellation of events in case of sudden and unpredictable weather – check contracts for flexibility in case of need for sudden cancellations. Where possible, ensure that cancellation insurance is in place for events, especially outdoor events. 1	Potential	+ Prevents financial loss due to event cancellation due to weather events. - Cancellation insurance can be costly for smaller and medium-sized events. - Insurance and contracts may not allow for cancellation of contracts or claims to be made due to weather events.	Review if cancellation insurance can be put in place.
C1, C2, C3, C4, C5	Communications campaign to raise awareness of climate risks and funding available to deliver adaptation actions such as retrofitting buildings. 1	Potential	+ Promotes awareness across the organisation and external partners on key climate risks and funding opportunities. - Requires inputs from both the Communications Team and subject matter team which will require significant resourcing.	Communications campaign launched by *2027.*
C4,C5	Introduce contingency measures for events to go ahead. This includes back-up members / speakers / attendees and / or another date to reschedule the event to in the near future. Depending on the location of extreme weather, consider plans to continue events online. 1	Potential	+ Multiple options to continue events in the event of extreme weather.	Develop processes for contingency measures to ensure events can still go ahead and/or be rescheduled imminently *by 2027.*

2.2.3 Employment, Skills, Health & Communities (ESHC)

Introduction to the Directorate

The Employment, Skills, Health and Communities Directorate aims to ensure that every resident has the skills needed to find a good job and progress at work. The directorate is committed to working with local partners to ensure that all communities can benefit from inclusive growth.

Responsibilities of the Directorate

The Employment, Skills, Health, and Communities Directorate is responsible for driving an inclusive regional economy through policy leadership, commissioning and delivery of education and skills programmes and championing opportunities for good growth. This directorate is responsible for regional collaboration with local authorities, education providers, employers & businesses, government partners and agencies such as UK Research and Innovation, Department for Education and the Department for Work and Pensions.

The Health and Communities Team work to reduce health inequalities and address the region's wider determinants of health. The Systems Change and Inclusion Team work to ensure inclusion by design. This includes the Race Equalities Taskforce which works to identify new ways to address inequalities as well as the Young Combined Authority, the Faith Strategic Partnership and the Inclusive Communities programmes.

What does climate resilience look like?

- Building resilience amongst the most vulnerable groups to cope with climate impacts.
- Preventing learning disruption due to poor preparation for extreme weather events. This ensures that residents have reliable, high-quality learning facilities.

ESHC functions, services and assets in scope of this risk assessment and action planning exercise:

- Adult education provision

Climate Risks

The greatest risk to adult education provision is class cancellations and health and safety risks for both workers and students due to extreme temperatures and heatwaves. Currently, this risk is moderate but will increase to a major risk by the end of the century under a +4°C warming scenario due to the projected increases in heatwave likelihood per year and duration (days). See Table 6 for more information on risks relevant to this directorate.

Related national Climate Change Risk Assessment 3 (CCRA3) urgency score key: red = need more action; amber = further investigation; green = sustain current action/watching brief. If more than one CCRA3 risk is relevant, the highest urgency score is indicated.
ARP4 risk score key: purple = severe (20-25); red = major (10-16); amber = moderate (4-9); green = minor (1-3).
Throughout the table, end of century is abbreviated to EoC.

Table 6 – Risk narrative and scores for Employment, Skills, Health and Communities directorate risks (Risk ID Em).

Risk and impacts	Related national CCRA3 risk(s) and urgency score *See Appendix 3*	Climate driver										ARP4 risk score *Likelihood × Impact*				
		Acute							*Chronic*			*2025*	*2050 +2°C by EoC*	*2100 +2°C by EoC*	*2100 +4°C by EoC*	*2030 Target*
		Heatwave	*Frost, freeze/thaw*	*Heavy rainfall*	*Storm and high winds*	*Drought*	*Flood*	*Land movement*	*Temperature increase*	*Precipitation increase*	*Precipitation decrease*					
Em01. Power Supply disruption to education. High winds or lightning may lead to local power supply and overhead power line disruption and impact utility networks, wires or telecommunications. For schools, this may cause disruption and impact students' ability to get to education venues. Similarly, hailstones may damage solar panels causing power supply disruption.	**I10**			✓	✓					✓		*2 × 2* **4**	*3 × 2* **6**	*4 × 2* **8**	*4 × 2* **8**	*2 × 1* **2**

Risk and impacts	Related national CCRA3 risk(s) and urgency score *See Appendix 3*	Climate driver									ARP4 risk score *Likelihood × Impact*				
		Acute						*Chronic*							
		Heatwave	*Frost, freeze/thaw*	*Heavy rainfall*	*Storm and high winds*	*Drought*	*Flood*	*Land movement*	*Temperature increase*	*Precipitation increase*	*Precipitation decrease*	*2025*	*2050 +2°C by EoC*	*2100 +2°C by EoC*	*2100 +4°C by EoC*	*2030 Target*
Em02. Class cancellations and health and safety risks due to extreme temperatures and heatwaves. Extreme heat and heatwaves will lead to class cancellations and health and safety risks to adult learners and workers especially those classified as vulnerable learners. This is due to poor facilities and a lack of adaptation measures, which could cause overheating and risks to learners and workers, putting them at risk of fainting, reducing cognitive ability and other health issues. This is particularly a prevalent risk for individuals aged 65+ and other vulnerable individuals. It could also lead to increased costs, which may prevent some education providers from staying in business or oblige WMCA to look at increasing funding rates, leading to less learning being delivered across the region.	**H1, B5**	✓		✓		✓						*3 × 2* **6**	*4 × 2* **8**	*4 × 3* **12**	*5 × 3* **15**	*3 × 1* **3**
Em03. Damage to education venues from flooding. Flooding may cause damage to venues. Persistent and recurrent floods will have an impact on benefits and outcomes for learners. If flooding or damage to venues persists for longer than a month, it may impact the WMCA's ability to deliver the skills grant.	**H3**			✓			✓			✓		*2 × 3* **6**	*3 × 3* **9**	*3 × 4* **12**	*3 × 4* **12**	*2 × 2* **4**

Managing the risks

While these climate risks are posed to the delivery of adult education in the West Midlands, the WMCA do not have any responsibility or role in supporting education providers to adapt to these risks. These will feature in their own business continuity plans as part of their college governance or Local Authority requirements in the case of Adult Education Services. Many of the adaptation actions required to manage climate risks would be the responsibility of the education provider via the Department of Education (DfE), who are themselves public bodies and dependent on government spend.

Though the WMCA is responsible for the investment of the region's Adult Skills Fund, this can only be spent in the delivery of skills programmes and no additional resource is available for capital investment to enable commissioned adult education providers to build adaptive capacity and learn about/manage these risks.

Actions provided in Table 7 are comprehensive to managing the risks outlined above. However, it is essential that the directorate and partners consider adaptation actions to education venues to minimise disruption and increase resilience to dealing with climate change.

Existing climate adaptation measures in place are presented as a case study below, highlighting success stories across the Employment, Skills, Health and Communities directorate.

Case study: Adult Education

The Challenge

Service continuity could be at risk if extreme weather events disrupted classes delivered by the Adult Education team for more than one term. The WMCA are also committed to supporting local communities to thrive, which cannot be achieved without the ability to understand, prepare for, respond to, and recover from the impacts of climate change.

What WMCA have done

Risk assessment plans for adult education provisions already cover climate-related risks including heavy rain and excessive heat, to ensure the health of students is not put under threat. Also, most courses can move class online/delay or suspend classes, if necessary, without significant disruption to course delivery.

Most significantly, however, adult education is being used as a tool for increasing knowledge and awareness in communities on climate-related risks such as flooding and excess heat, as well as broader sustainability topics such as gardening and sustainable thinking.

The direct and wider benefits

Adult education services very often target areas with high indices of multiple deprivation, audiences which are also most likely to be more affected by the impacts of climate change. The wider impacts of sustainable thinking go far beyond adapting to climate change, including improving community cohesion through courses and the various benefits to health and wellbeing from increased access to green spaces.

Case Study 1 - Adult education provision

Table 7 – Actions to mitigate Adult Education risks (Risk ID Em).

Category of actions key:
0 *- building internal adaptive capacity capability through integrating climate change into governance and risk management*
1 *- scoping, monitoring and identifying impacts / risks*
2 *- consideration of impacts, risks and likely actions with stakeholders*
3 *- implementation of actions to address impacts / risks and maintain delivery of the organisation's functions*
4 *- monitoring actions, evaluation against original plans, reassessment of risks, management system audit (against adaptation best practice)*

Status of actions key:
Completed/ongoing – actions that have been completed or are delivered on an ongoing basis.
Current – actions that are underway.
Planned – actions that have been planned for, with allocated resource or a route to delivery.
Potential – recommended actions that respective teams might choose to take forward, should risk appetite and capacity permit.

Risk ID	Action	Status	Benefits (+)/ Challenges (-)	Performance metric(s) and commitment(s)
All risks	Collaborate with adult education providers in the region to understand climate risks to their service provision, potential solutions and to expand their curriculums to include climate change adaptation and resilience. Review of Environment-led research and applicability to emerging skills provision. Feed into Defra the limitations on the WMCA's roles in climate adaptation for adult education and skills provision. 0 1	Potential	+ Learning and development for wider communities to understand their vulnerability and develop methods to be better prepared for climate change and capacity to adapt and/or recover. + Close gaps in knowledge, combat misinformation and build green skills + Supports conversations around climate action. + Increased resilience and reliable delivery of education programmes. - Dependent on national DfE strategy for climate adaptation across educational estates. - Dependent on additional resources and capacity from DfE for both WMCA and education providers. - Resourcing time taken to analyse other sources of data.	Submission of ARP report to include these strategic and resourcing challenges. Annual review of DfE strategy on climate adaptation.

2.2.4 Finance & Business Hub (F&BH)

Introduction to the Directorate

The Finance and Business Hub directorate comprises financial, commercial, HR, business continuity, procurement and corporate risk management teams and associated business partners.

Responsibilities of the directorate

The key responsibility of the Finance and Business directorate is to influence and support managers and senior leaders to achieve their business objectives. The responsibilities of key teams are as follows:

- **Procurement** – responsible for ensuring that WMCA complies with the Public Contract Regulations 2015 when carrying out its procurements of any value. Compliance with the Procurement Act 2023 will also come into effect from February 2025.
- **Risk** – supports the identification, mitigation and active management of risks within a framework to ensure there is thorough monitoring and escalation happens in a consistent and proportionate way.
- **Insurance** – managing organisational liabilities and reducing exposure to risk.
- **Commercial & Investment** – supports the development and implementation of the Combined Authority investment and commercial activities strategy that assists the WMCA's wider objectives across all Directorates.
- **Finance** – stewardship of public money and ensuring financial sustainability.
- **HR** – provides HR advice & support and gets the best from people from recruitment through to workforce planning within a strategic framework.
- **Business Planning** – working with colleagues to facilitate and develop a business plan that links the resources WMCA have, the activities WMCA do and the outcomes WMCA want to achieve.
- **Performance** – providing monitoring, analysis and reporting of progress against both corporate objectives and specific grant funds and focusing on 'metrics that matter' to support decision making.
- **Assurance & Appraisal** – ensures adherence to the Single Assurance Framework (SAF) as a system of internal control applied to projects and programmes receiving devolved funding.
- **Learning and Organisational Development** – ensuring the WMCA is a great place to work, and staff have the right skills and competencies for the future.

- **Facilities & HQ Management** – the management of WMCA offices in Summer Lane.

What does climate resilience success look like?

- A clear and standardised approach to climate risk management.
- Alignment of climate risks with WMCA's standard methodology for risk management.
- Inclusion of a key climate resilience activity in WMCA's Annual Business Plan.
- To have identified the opportunities to embed climate risk and adaptation considerations in future capital project processes.
- To have the financial implications of climate risks considered in project design, delivery and management.
- Protected health and safety of employees irrespective of climate hazards.

F&BH functions, services and assets in scope of this risk assessment and action planning exercise:

- Facilities & Workplace Services
- Human Resources
- Health & Safety
- Procurement
- Corporate Risk Management
- Business Continuity

Climate Risks

The top risks to the Finance and Business directorate centre around disruption to the supply chain and risks to health and safety. WMCA's supply chain is international, and the increased frequency of extreme weather events may cause disruption to procurement and have a significant impact on business function. The Health and Safety Team is committed to ensuring standards of safety and compliance are being maintained consistently across the organisation resulting in low to moderate present-day health and safety risks associated with extreme weather events. However, as climate change induces more frequent and higher magnitude extreme weather events, additional measures will

need to be put in place. Without further action, health and safety risks will become much more likely, with greater consequences. More information on the risks faced by the Finance and Business directorate is available in Table 8.

Table 8 – Risk narrative and scores for the Finance and Business Hub directorate risks (Risk ID Fb).

Related national Climate Change Risk Assessment 3 (CCRA3) urgency score key: red = need more action; amber = further investigation; green = sustain current action/watching brief. If more than one CCRA3 risk is relevant, the highest urgency score is indicated.
ARP4 risk score key: purple = severe (20-25); red = major (10-16); amber = moderate (4-9); green = minor (1-3).
Throughout the table, end of century is abbreviated to EoC.

Risk and impacts	Related national CCRA3 risk(s) and urgency score *See Appendix 3*	Climate driver										ARP4 risk score *Likelihood × Impact*				
		Acute							*Chronic*							
		Heatwave	*Frost, freeze/thaw*	*Heavy rainfall*	*Storm and high winds*	*Drought*	*Flood*	*Land movement*	*Temperature increase*	*Precipitation increase*	*Precipitation decrease*	*2025*	*2050 +2°C by EoC*	*2100 +2°C by EoC*	*2100 +4°C by EoC*	*2030 Target*
Risk Fb01. Supply chain disruption to procurement. Supply chain disruption due to adverse weather effects via land, air and sea resulting in scarcity of supply in production or inability to transport goods, subsequently causing delays in operations and delivery of schemes. The most critical equipment procured includes laptops, which can face extreme delays, leading to additional impacts of employee inability to access work systems and reduced productivity and deliverability.	**B6, B5, ID7**	✓	✓	✓	✓	✓	✓	✓				*3 × 4* **12**	*4 × 4* **16**	*4 × 5* **20**	*5 × 5* **25**	*3 × 3* **9**
Risk Fb02. Power supply disruption to procurement. Heatwaves, high winds or lightning may lead to local power supply and overhead power line disruption and impact utility networks, wires or telecommunications, leading to employee inability to access work systems and reduced productivity and deliverability.	**I1, B5**	✓		✓	✓		✓		✓			*3 × 2* **6**	*4 × 2* **8**	*4 × 2* **8**	*5 × 2* **10**	*3 × 1* **3**

Risk and impacts	Related national CCRA3 risk(s) and urgency score *See Appendix 3*	Climate driver									ARP4 risk score *Likelihood × Impact*				
		Acute							*Chronic*							
		Heatwave	*Frost, freeze/thaw*	*Heavy rainfall*	*Storm and high winds*	*Drought*	*Flood*	*Land movement*	*Temperature increase*	*Precipitation increase*	*Precipitation decrease*	*2025*	*2050 +2°C by EoC*	*2100 +2°C by EoC*	*2100 +4°C by EoC*	*2030 Target*
Risk Fb03. Access to finance, investment, insurance and access to capital. Increased exposure to physical climate risks resulting in reduced affordability of insurance, reduction in value of assets and rising capital costs.	**B4**	✓		✓	✓	✓	✓	✓	✓	✓	✓	*1 × 3* **3**	*2 × 3* **6**	*3 × 3* **9**	*4 × 4* **16**	*1 × 2* **2**
Risk Fb04. Heat stress to indoor workers. Poorly ventilated or climate controlled indoor spaces, including travelling to work on hot transport networks, could pose risks to workers increasing heat stress, which may lead to poor cognitive capabilities and lower productivity, dehydration, heat stroke and collapse. Hybrid working may reduce impacts for office workers but could exacerbate social inequalities and increase the risk for employees in poorly climate-controlled homes.	**H1, B5**	✓							✓			*4 × 2* **8**	*4 × 3* **12**	*4 × 4* **16**	*4 × 5* **20**	*3 × 2* **6**
Fb05. High temperatures risk to health and wellbeing of outdoor workers. Outdoor workers are more vulnerable to heat stress, which may lead to poor cognitive capabilities and lower productivity, dehydration, heat stroke and collapse. Poor air quality and associated health risks can also be associated with heatwaves. At the highest risk are those who provide intense physical work in direct exposure to sunlight and heat. Further heat stress risks are imposed to those who are required to wear personal protective equipment. Additional impacts include delays to the deliverability of schemes due to lower productivity or adapting working routines around high temperatures. Increased temperatures in winter can lead to reduced risks associated with cold weather.	**H1, H7, B5, H2**	✓							✓			*4 × 3* **12**	*4 × 4* **16**	*5 × 4* **20**	*5 × 5* **25**	*4 × 2* **8**

Risk and impacts	Related national CCRA3 risk(s) and urgency score *See Appendix 3*	Climate driver										ARP4 risk score *Likelihood × Impact*				
		Acute							*Chronic*							
		Heatwave	*Frost, freeze/thaw*	*Heavy rainfall*	*Storm and high winds*	*Drought*	*Flood*	*Land movement*	*Temperature increase*	*Precipitation increase*	*Precipitation decrease*	*2025*	*2050 +2°C by EoC*	*2100 +2°C by EoC*	*2100 +4°C by EoC*	*2030 Target*
Fb06. Storms and flooding risk to health and safety. Extreme weather events expose workers to various dangerous working conditions including the risk of severe injury or death from floodwaters, high winds when working at heights and falling debris during storm events, leading to delays to delivery of remedial works and impacts to project delivery to ensure safe working. Such extreme events can also have severe and long-term impacts on mental wellbeing and displacement, further disrupting access to employment, health and welfare services and wider facilities. Hybrid working may reduce impacts on office workers.	**H3**			✓	✓		✓				✓	*3 × 3* **9**	*3 × 4* **12**	*4 × 4* **16**	*4 × 5* **20**	*3 × 2* **6**
Fb07. Wider spread of pathogens and disease. Milder winters and hotter summers could see increased transmission of vector-borne diseases from ticks and mosquitoes, posing a significant health risk to employees. Increased contact with nature, including urban green spaces, due to warmer temperatures increases exposure to this risk.	**H8**		✓						✓			*2 × 2* **4**	*3 × 2* **6**	*3 × 2* **6**	*3 × 3* **9**	*3 × 2* **6**
Fb08 Personnel and business operations risks. Business operations and personnel are impacted by extreme weather, reducing the ability of the directorate to perform their responsibilities such as driving policy change and delivering enabling services.	**H3**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	*3 × 2* **6**	*4 × 2* **8**	*4 × 3* **12**	*4 × 4* **16**	*2 × 2* **4**
Fb09 Failure of critical equipment and mandatory power down of utilities. Electricity supply may be disrupted by 16 Summer Lane water pipes potentially bursting due to increases in flows or increases or decreases in temperatures, which may cause disruption to electrical infrastructure.	**B1**	✓	✓	✓	✓	✓	✓	✓		✓		*2 × 2* **4**	*3 × 2* **6**	*3 × 3* **9**	*3 × 4* **12**	*2 × 2* **4**

Risk and impacts	Related national CCRA3 risk(s) and urgency score *See Appendix 3*	Climate driver										ARP4 risk score *Likelihood × Impact*				
		Acute							*Chronic*							
		Heatwave	*Frost, freeze/thaw*	*Heavy rainfall*	*Storm and high winds*	*Drought*	*Flood*	*Land movement*	*Temperature increase*	*Precipitation increase*	*Precipitation decrease*	*2025*	*2050 +2°C by EoC*	*2100 +2°C by EoC*	*2100 +4°C by EoC*	*2030 Target*
Fb10. Disruption to office functions due to extreme weather. High temperatures, water scarcity and flooding may impact the function of key services such as offices, causing disruption to the function of the WMCA such as damage to data centres, ability of communication staff to perform their functions and subsequent impact on staff safety and data security.	**I1**	✓		✓		✓	✓		✓	✓	✓	*2 × 3* **6**	*3 × 3* **9**	*4 × 3* **12**	*4 × 3* **12**	*2 × 2* **4**
Fb11. Closure of Head Office due to extreme weather and other office spaces used by WMCA staff**.** Offices may not be able to function safely in extreme weather, preventing staff from accessing office space and facilities within. Head Office has backup power supply for critical IT services. Head Office does not have the capacity for all staff to come into the office if other offices close.	**B1**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	*2 × 2* **4**	*3 × 2* **6**	*4 × 2* **8**	*4 × 3* **12**	*2 × 2* **4**

Managing the risk

The Finance and Business Hub directorate has a wide range of adaptation actions proposed, in development and/or completed to address the risks faced by climate change (Table 9). The majority of these actions involve working with the Environment Team in the SENZ directorate to ensure that climate risk considerations and adaptation options are embedded in the support that they provide to the whole organisation in everyday processes, including overarching procurement policies, health and safety compliance, corporate and operational risk management, business continuity, facilities management and the dissemination of climate adaptation literacy and climate risk information.

The WMCA's annual business planning is coordinated and led by the Finance and Business Hub, the establishment and monitoring of the Climate Adaptation Action Plan is led by the Environment Team in the SENZ directorate. Nevertheless, the Environment Team is working with the Finance and Business Hub to integrate and apply climate information in the work of these enabling services.

Gaps remain in the consideration of climate risks in business continuity planning and ensuring the resilience of 16 Summer Lane against flooding and alternative ways of working are secured. The management of risks posed to 16 Summer Lane will align with wider asset management decisions, strategies and processes. Teams have proposed several potential and planned actions to ensure these gaps are plugged. A select number of existing climate adaptation measures currently in place are presented as case studies below, highlighting success stories across the Finance and Business Hub directorate.

Case study: Water and energy at Head Office (16 Summer Lane)

The Challenge

Utilities can be impacted by climate-related risks in a variety of ways. Global energy insecurity and water scarcity can increase prices, damage to infrastructure outside of WMCA's control can cause disruption to utilities e.g., power outages, and water supply restrictions on water usage could impact on the function of cooling systems for servers at 16 Summer Lane.

What WMCA have done

A range of water efficiency measures and management systems are in place at 16 Summer Lane, including smart water metering helping identify leaks, flow reducing valves on mains coming into the building, and using water tanks to hold excess water from mains to use as greywater (for toilets etc.).
16 Summer Lane has an on-site generator in case of a power outage.

The direct and wider benefits

Saving water and having water storage systems not only support resilience against climate change impacts, but also contribute to reducing the WMCA's carbon footprint by increasing their efficiencies.

Case Study 2 - Head Office water & energy use

Table 9 – Actions to mitigate finance and business directorate risks (Risk ID Fb).

Category of actions key:

0 - building internal adaptive capacity capability through integrating climate change into governance and risk management

1 - scoping, monitoring and identifying impacts / risks

2 - consideration of impacts, risks and likely actions with stakeholders

3 - implementation of actions to address impacts / risks and maintain delivery of the organisation's functions

4 - monitoring actions, evaluation against original plans, reassessment of risks, management system audit (against adaptation best practice)

Status of actions key:

Completed/ongoing – actions that have been completed or are delivered on an ongoing basis.

Current – actions that are underway.

Planned – actions that have been planned for, with allocated resource or a route to delivery.

Potential – recommended actions that respective teams might choose to take forward, should risk appetite and capacity permit.

Risk ID	Action (and category of action*)	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
Fb10, Fb11	16 Summer Lane offices have implemented measures to increase the resilience of the building including water tanks that hold water to use as greywater, planned maintenance, smart water metering to identify leaks, water efficiency measures, back-up generators for critical services. 3	Completed	+ A suite of measures is in place which provides resilience against water scarcity. - Resilience measures currently at 16 Summer Lane focus on drought and do not consider extreme heat or flooding.	Annual water consumption is published internally to monitor progress. Annual energy consumption is published internally to monitor progress.
All risks	Corporate risk management to work with the SENZ directorate to integrate the outputs from research and analysis - notably the WMCA's Climate Risk and Vulnerability mapping – in decision-making and risk assessment processes. See 4.2 Building Adaptive Capacity. 0 1	Current & Potential	+ Better understanding of financial risks from climate change. + Raises the case for early investment and adaptation to decision makers. - Resource, data and knowledge requirements (e.g. understanding triggers and tipping points, availability and certainty of data, costs to deliver research).	CRVA data incorporated in decision-making processes. Work with academic and industrial partners to improve understanding of exposure and vulnerability to climate change and quantify impacts where possible.
		Current	+ Reduced health and safety impacts.	Establish official channels of communication for disseminating Met

Risk ID	Action (and category of action*)	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
Fb04, Fb05, Fb06, Fb07, Fb08	**Disseminate Met Office and UKHSA warnings to internal and external stakeholders**, as part of the operational plan process, combined with protocols and guidance (see action below). Currently completed by business continuity and emergency planning to those who need to know about warnings the most. 1 *See also TfWM specific action for disseminating warnings to external partners in section 2.2.6.*		+ Single source of information (Met Office). - Coordination of weather warnings in different geographic areas.	Office weather warnings more widely across WMCA *by 2027*.
All risks	**Develop protocols for response to extreme weather events** and disseminate them together with any weather warnings (e.g. protocol to work from home due to heatwave, with thermal comfort section from H&S guidance). 3	Current	+ Minimises risks to health and safety and promotes wellbeing. - Exacerbated social inequalities for disadvantaged employees living in poorly climate-controlled buildings.	Develop protocols leading up to, during and following Met Office extreme weather warnings - to be incorporated into the WMCA's Safety Management System *by 2027*. Safety Management System to comply with *ISO 45001* which consider climate change and adaptations within arrangements. Promote relevant and useful information for employees to benefit from employee discounts for home equipment to help in such a circumstance as well as the details of the Employee Assistance Programme (EAP).
All risks	Ensure climate risks are embedded into corporate risk assessments either through strategic or operational risk management processes. 4	Planned	+ Ensures the board have oversight of climate risks, and that climate risks and adaptation responses are considered in all decisions, including financial decision-making processes. + Embedding in existing processes will ensure that defining risk has a common approach across the organisation. - Defining climate change risk into impact, likelihood categories can be	Climate risks are to be incorporated into the corporate risk management system *by 2026*. Future climate change risks included as a separate impact category *by 2026*.

Risk ID	Action (and category of action*)	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
			subjective when scored by different individuals.	
Fb01, Fb02, Fb03	**Develop a sustainable and ethical procurement policy** that takes into consideration climate risk, budget considerations for incident response and early warning notices within contracts for contingency planning. Require maintenance contracts to reflect additional demands due to climate change (e.g. frequency of inspections and maintenance regimes), keeping track of changes to legislation during contract period and minimise impact to assets. Conduct additional climate resilience checks on suppliers. 0 2 3	Potential	+ Increased redundancy in the supply chain increases resilience and minimises disruption. + Reduced financial impacts of incidents. + Reduced likelihood of damage. + Reduced carbon emissions. - Measures of resilience of suppliers may not be easily obtained. - Length of existing contracts (maximum 5 years). - Increased maintenance costs. - May need an understanding of triggers/experience of impacts to understand additional maintenance requirements (e.g. emerging risks).	Percentage of contracts including climate change considerations. *100% of maintenance contracts to consider impacts of climate change on service delivery by 2030.*
Fb03, All risks	**Investigate with the SENZ directorate insurance options.** 3	Potential	+ Earlier payment facilitates quicker and more effective response and recovery. + Can be complementary to indemnity insurance. - Additional premium costs.	Insurance secured for most material risks and most vulnerable assets and/or operations *by 2030.*
All Fb risks	**Promote and circulate emerging climate adaptation training for decision makers in the WMCA,** facilitating both proactive and long-term adaptive planning and short-term extreme event response. 0 4 (See *4.2.1 under Building Adaptive Capacity*)	Potential	+ Reduced health and safety impacts. + Climate informed business decision making leading to higher resilience. + Reduced damage and financial impact of incidents. + Lower risk of impacts to mental health from climate events.	Development of climate adaptation e-learning resources for officials (current undertaking for the Environment Team within SENZ) Number of staff trained in climate change adaptive planning and extreme weather response and decision making.

Risk ID	Action (and category of action*)	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
			+ Mitigate potential greater impacts to disadvantaged backgrounds. + Projects are designed to consider and withstand future climate scenarios. - Costs of training.	Ensure line managers in particular are trained in how best to support climate adaptation and respond to incidents.
Fb08, Fb09, Fb10, Fb11	**Climate risk and resilience embedded within business continuity plans.** 1	Potential	+ Business Continuity plans are a comprehensive, 'one-stop' plan which provides resilience details. - Covers many areas of resilience, it will need to be ensured that climate resilience is kept at the forefront of resilience measures alongside other priorities.	Climate risk integrated into Business Continuity Plans as a separate section *by 2026*.
Fb08, Fb09, Fb10, Fb11	**Flood risk to 16 Summer Lane needs to be evaluated** for the future, specifically basement flooding 1	Potential	+ Greater understanding of flood risk and provides planning for movement of infrastructure where necessary. - Ownership of basement land is complex and may require external collaboration to implement.	Complete a flood risk assessment in partnership with landlord *by 2025*. Identify vulnerable equipment stored in basements and create a plan to move this equipment *by 2026* if applicable.
Fb10, Fb11	Determine the **teams and key staff members who are essential** to have on site during an extreme weather event to maintain continuity. 1	Potential	+ Establishing plans provides greater awareness of which teams may be unable to perform their functions due to extreme weather. + Allows priority teams to be identified to ensure key functions and operations can continue. - Extreme weather events may impact all staff, and individual circumstances may prevent continuity of services in key functions and operations.	Plan in place *by 2026* outlining key priority teams to be in work and those who may need to be off work during and extreme weather event.

Risk ID	Action (and category of action*)	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
Fb10, Fb11	**Staff engagement on business continuity**, including discussions around options and alternative ways of working. 2	Potential	+ Staff awareness of business continuity helps to promote responsible behaviours around extreme weather events and a changing climate.	Webinars and e-bulletins produced on business continuity plans *by 2026*. Training modules produced *by 2026* on business continuity for key teams which are needed to ensure core functions can continue.

2.2.5 Housing, Property & Regeneration (HPR)

Introduction to the Directorate

The Housing, Property and Regeneration (HPR) directorate has secured funding from Government to enhance delivery and unlock investment across the West Midlands housing and land portfolio, providing support for housing and regeneration works directly with local authorities and other partners across the West Midlands. The directorate help to develop policy solutions for housing including Help to Own and support local plans and master planning, providing expertise and unlocking land to turn sites into new homes, jobs and communities.

Responsibilities of the Directorate

The Directorate's responsibilities include:

- Setting an investment and delivery strategy to unlock housing and employment delivery on brownfield sites in the pursuit of inclusive growth.
- Attracting new and deploying existing public and private investment and expertise to support the delivery of inclusive growth.
- Building new and strengthening existing partnerships and relationships with investors, government, and other public sector organisations.
- Delivering affordable and social homes, the West Midlands Strategic Place Partnership, the high street and town centres programme development, private rented sector initiatives, Homes for the Future design and delivery of the Social Housing Decency Fund.
- The homelessness prevention team sit within the WMCA's Housing, Property and Regeneration function and work to design out homelessness through its collaborative model.

What does climate resilience look like?

- To have housing stock and neighbourhoods that are fit for purpose under warmer wetter winters, hotter, drier summers, and more extreme weather.
- Durability and whole life-cycle - choice of materials that withstand future climates and do not require as much maintenance/replacement.
- WMCA-owned assets and future acquisitions to be resilient to future severe weather conditions.

HPR functions, services and assets in scope of this risk assessment and action planning exercise:

- Management of strategic assets and land

Climate Risks

One risk was identified for the Housing, Property and Regeneration directorate, reputational risk due to the impact of a changing climate on housing stock and sites across the region, reducing the ability for the directorate to perform their responsibilities such as driving policy change and unlocking sites for development. Currently, this risk is minor but increases to a moderate risk by the end of the century under a +4°C warming scenario due to the projected increases in heatwave likelihood, winter rainfall and summer water scarcity, and resulting cascading impacts. See Table 10 for more information on risks relevant to the remit assessed for this directorate.

The costs of managing property and land assets held by WMCA, both in HPR and across the wider WMCA, may increase because of the need to mitigate the impacts of climate change. Furthermore, as noted in the below table, any adverse impact on the value of the sites and other property assets held by WMCA could impact on potential disposal values and the strength of the WMCA Balance Sheet as the values of those assets reduce.

Table 10 – Risk narrative and scores for House, Property & Regeneration directorate risks (Risk ID Hp).

Related national Climate Change Risk Assessment 3 (CCRA3) urgency score key: red = need more action; amber = further investigation; green = sustain current action/watching brief. If more than one CCRA3 risk is relevant, the highest urgency score is indicated.
ARP4 risk score key: purple = severe (20-25); red = major (10-16); amber = moderate (4-9); green = minor (1-3).
Throughout the table, end of century is abbreviated to EoC.

Risk and impacts	Related national CCRA3 risk(s) and urgency score *See Appendix 3*	Climate driver										ARP4 risk score *Likelihood × Impact*				
		Acute							*Chronic*							
		Heatwave	*Frost, freeze/thaw*	*Heavy rainfall*	*Storm and high winds*	*Drought*	*Flood*	*Land movement*	*Temperature increase*	*Precipitation increase*	*Precipitation decrease*	*2025*	*2050 +2°C by EoC*	*2100 +2°C by EoC*	*2100 +4°C by EoC*	*2030 Target*
Hp01. Reputational risk of climate impacts on housing stock and sites across the region. Designated sites for unlocking may be adversely impacted by extreme weather preventing the directorate from achieving its function of unlocking sites for regeneration.	**B4**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	*2 × 2* **4**	*3 × 2* **6**	*4 × 2* **8**	*4 × 3* **12**	*2 × 2* **4**
Hp02. Risks of damage to assets and land owned and managed by the WMCA. Damage to building fabric from extreme weather events or longer spells of heavy rainfall could reduce the usability of the asset. Sites owned and managed by the WMCA, outside of 16 Summer Lane, might reduce in their value or in their insurability due to increasing exposure to climate impacts. The extent of the risk depends on geographical location of the site and the WMCA's use of it.	**H5**			✓	✓	✓	✓	✓	✓	✓	✓	*2 × 2* **4**	*3 × 2* **6**	*4 × 2* **8**	*4 × 3* **12**	*2 × 2* **4**

Managing the risk

Actions are presented in the below table (Tabel 11) to mitigate climate risks for the Housing, Property and Regeneration directorate. It is vital that the directorate prepare and implement these actions to ensure the resilience of the directorate into the future. Currently, actions are being taken to manage climate risks including reviewing existing climate adaptation standards in buildings such as BREEAM and alignment with the WMCA Environment Plan on climate adaptation solutions.

Table 11 – Actions to mitigate Housing, Property & Regeneration directorate risks (Risk ID Hp).

Category of actions key:
0 - *building internal adaptive capacity capability through integrating climate change into governance and risk management*
1 - *scoping, monitoring and identifying impacts / risks*
2 - *consideration of impacts, risks and likely actions with stakeholders*
3 - *implementation of actions to address impacts / risks and maintain delivery of the organisation's functions*
4 - *monitoring actions, evaluation against original plans, reassessment of risks, management system audit (against adaptation best practice)*

Status of actions key:
Completed/ongoing – actions that have been completed or are delivered on an ongoing basis.
Current – actions that are underway.
Planned – actions that have been planned for, with allocated resource or a route to delivery.
Potential – recommended actions that respective teams might choose to take forward, should risk appetite and capacity permit.

Risk ID	Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
Hp01, Hp02	As per the WMCA Environment Plan, review risks to housing, property and regeneration directorate managed strategic assets from extreme weather and climate change. Develop actions to minimise any potential impacts. Identify potential climate adaptation solutions for each 'high risk' asset, their likely	Planned	+ Identified solutions can be evaluated for potential implementation, improving the resilience of strategic assets. + Better understanding of high-risk assets. - Time and resources required for evaluating potential solutions. It will be important to understand the cost of this activity and ensure the WMCA are able to deliver value for money from this activity.	Complete annual asset risk assessments to strategic assets starting *in 2025.*

Risk ID	Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
	cost, timeframe of installation and feasibility. 3			
Hp01, Tr06, Tr07, Tr08	Inclusion of climate risks and adaptation measures within systems mapping systems and policies under the Corporate Land and Property Strategy, in collaboration with TfWM asset managers. 0 2	Potential	+ Enhanced risk management and decision-making improving long-term resilience. + Supports cost-efficiencies. + Demonstrates commitment to climate risk management and improved confidence from stakeholders. - High upfront costs for data collection, analysis and resourcing. It will be important to understand the cost of this activity and ensure the WMCA are able to deliver value for money from this activity. - Uncertainty in climate data may add to the complexity of decision-making and planning.	Climate change risks included in the Risk and Compliance Policy under the Corporate Land and Property Strategy *by 2026*.

2.2.6 Law, Governance & Audit

Introduction to and responsibilities of the Directorate

The Law, Governance & Audit directorate lead the legal, governance and auditing processes within the WMCA. The Governance and Scrutiny team are responsible for ensuring that meetings of the WMCA's formal boards and committees are conducted in the manner required by both national legislation and the organisation's constitution; this includes overseeing the Overview and Scrutiny work of the WMCA and supporting internal governance panels. The Audit and Information Governance team provide the internal audit function for the authority, and are responsible for information governance, including freedom of information requests. The legal team provides legal advice to all directorates within the authority.

What does climate resilience look like?

- For governance processes to be carried out smoothly and without disruption, irrespective of climate change.
- To ensure WMCA are not liable for any impacts of climate change that could have been avoided had sufficient adaptation measures been implemented.

HPR functions, services and assets in scope of this risk assessment and action planning exercise:

- WMCA governance and decision-making processes

Climate risks

The key climate risk facing the Law and Governance directorate is the disruption to decision making processes which typically must occur in person and cannot be transferred to hybrid settings. If venues (such as council headquarters) become inaccessible due to severe and extreme weather conditions, local and regional decision making may be delayed if contingency plans and online alternative systems are not available.

Table 12 – Risk narrative and scores for Law, Governance and Auditing (Risk ID Lg).

Related national Climate Change Risk Assessment 3 (CCRA3) urgency score key: red = need more action; amber = further investigation; green = sustain current action/watching brief. If more than one CCRA3 risk is relevant, the highest urgency score is indicated. ARP4 risk score key: purple = severe (20-25); red = major (10-16); amber = moderate (4-9); green = minor (1-3). Throughout the table, end of century is abbreviated to EoC.

Risk and impacts	Related national CCRA3 risk(s) and urgency score *See Appendix 3*	Climate driver										ARP4 risk score *Likelihood × Impact*				
		Acute							*Chronic*							
		Heatwave	*Frost, freeze/thaw*	*Heavy rainfall*	*Storm and high winds*	*Drought*	*Flood*	*Land movement*	*Temperature increase*	*Precipitation increase*	*Precipitation decrease*	*2025*	*2050 +2°C by EoC*	*2100 +2°C by EoC*	*2100 +4°C by EoC*	*2030 Target*
Lg01. Disruption and delays to decision making processes. Delays and disruptions to key decision making due to reduced access to in-person meetings and venues. Meetings are currently required to be quorate, though emergency legislation was activated during the COVID-19 pandemic to enable online decision-making. The government is currently consulting on whether to reintroduce provision for remote/hybrid meetings.	**H1, H3, H5**	✓	✓	✓	✓		✓		✓	✓		*2 × 2* **4**	*3 × 2* **6**	*3 × 3* **9**	*4 × 3* **12**	*2 × 1* **2**

Managing the risks

Table 13 – Risk narrative and scores for Law, Governance and Auditing (Risk ID Lg).

Category of actions key:
0 *- building internal adaptive capacity capability through integrating climate change into governance and risk management*
1 *- scoping, monitoring and identifying impacts / risks*
2 *- consideration of impacts, risks and likely actions with stakeholders*
3 *- implementation of actions to address impacts / risks and maintain delivery of the organisation's functions*
4 *- monitoring actions, evaluation against original plans, reassessment of risks, management system audit (against adaptation best practice)*

Status of actions key:
Completed/ongoing – actions that have been completed or are delivered on an ongoing basis.
Current – actions that are underway.
Planned – actions that have been planned for, with allocated resource or a route to delivery.
Potential – recommended actions that respective teams might choose to take forward, should risk appetite and capacity permit.

Risk ID	Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
LG01	Governance team to consider any emerging legislation on hybrid meetings following the government consultation, and if provisions are introduced, consider how these might be used within the combined authority. Develop contingency plans for meetings/ decision making in locations of high climate risk. 2 3	Potential	+ Key meetings and decision-making processes can go ahead despite increasing severe and extreme weather patterns. - Legislation and constitutional factors determine where and how key decision-making meetings should occur. Contingency plans may be constrained by these factors.	Governance venues are reviewed for climate risk and present-day impacts *by end-2025*. Contingency plans are developed for governance venues that are in high climate risk areas *by end-2026*.

2.2.7 Strategy, Economy & Net Zero (SENZ)

Introduction to the Directorate

The directorate is engaged in multiple programmes addressing social, economic, environmental and health inequalities as well as leading the region's shift to a zero-carbon region by 2041.

- Research, Intelligence and Inclusive Growth team, work to ensure that the WMCA is equipped with the right evidence, at the right time, to make the right decisions. This programme aims to create a thriving regional research ecosystem and bring consistent and reusable data together.
- Policy and Integration team, lead negotiations for the deeper devolution deal, the Integrated Settlement and implement the Public Affairs Strategy to advance the region's interests and platform.
- Culture, Creative Industries and Digital team, are engaged in developing and bringing together the impact and potential of cultural, creative and tech sectors to lead citizen well-being, improved prospects for all and civic pride in the region.
- Economic Policy and Partnerships team, lead on overall economic policy and partnerships across WMCA, in order to drive up business growth and productivity across every corner of the region. This includes delivery of the West Midlands Plan for Growth and leading the development of the Investment Zones.
- Economic Development and Delivery team, mobilise and deliver against the economic growth and productivity of the region. This includes holding overall responsibility for the regional business support ecosystem, Business Growth West Midlands.
- The Environment Team work to enhance the natural environment, improve air quality, boost climate resilience and keep materials and resources in use for as long as possible. The Environment Team is split into four distinct themes, with a cross-cutting theme of behaviour change. The distinct themes are natural environment, circular economy, air quality and climate adaptation.
- Energy Capital is the regional energy partnership for the West Midlands that brings the public, private and third-party sectors together to deliver place-based energy solutions, with programmes of work focused on domestic retrofit, net zero neighborhood and local area energy planning. Energy Capital work together to reduce carbon emissions to net zero.

SENZ functions, services and assets in scope of this risk assessment and action planning exercise:

- Delivery of the air quality sensor network
- Delivery of local net zero retrofit schemes
- Delivery of Inclusive Growth
- Delivery of the WMCA Outcomes Framework and accurate and reliable monitoring of key outcomes

SENZ work areas that are not at a physical, material risk from climate change but do have the potential to promote climate adaptation more broadly are outlined in Chapter 4.

What does climate resilience look like for work areas in the scope of this risk assessment?

Net Zero Carbon Retrofit

- To have homes that are comfortable and liveable all year round.
- To install and support net zero retrofit interventions that are (cost and resource) effective now and under future climates.
- To have retrofitted properties that are adaptable to changing climates in terms of repair-ability, replacement and maintenance of parts.
- To have resilience measures/support that is affordable.

Environment

- For the West Midlands air quality sensor network to function well and collect accurate and reliable data irrespective of climate change and severe weather patterns.

Research and Intelligence; Inclusive Growth and Social Value

- Consideration and understanding of how health, social and economic inequalities arising from disproportionate climate impacts can be addressed by research, intelligence, analysis and data in line with inclusive growth fundamentals.
- Understanding of the climate impacts on research, intelligence, analysis and data including improved access to zero carbon data sources, skills, analytical tools, and products, uninterrupted by the impacts of climate change.
- To achieve inclusive growth outcomes despite the potential effects of climate change.

Climate Risks

The top risks to the SENZ work areas assessed in this exercise include the widening of existing inequalities, particularly affecting vulnerable communities due to a wide range of climate hazards. This will also impact multiple directorates across the WMCA as a cross-cutting risk. Additionally, risks such as delays to the implementation of retrofit solutions (from increased influxes of requests) and extreme weather preventing implementation are also major risks to this directorate, which is impacted by multiple climate drivers including heatwaves, heavy rainfall and flooding. On the other hand, there is a risk that retrofit requirements may be perceived to no longer be needed due to projected increases in temperatures and heatwaves, posing a major risk to this directorate by the end of the century in a +4°C warming scenario. All risks identified for the Strategy, Economy and Net Zero directorate are outlined in Table 14.

Table 14 – Risk narrative and scores for Strategy, Economy and Net Zero directorate risks (Risk ID Se).

Related national Climate Change Risk Assessment 3 (CCRA3) urgency score key: red = need more action; amber = further investigation; green = sustain current action/watching brief. If more than one CCRA3 risk is relevant, the highest urgency score is indicated.
ARP4 risk score key: purple = severe (20-25); red = major (10-16); amber = moderate (4-9); green = minor (1-3).
Throughout the table, end of century is abbreviated to EoC.

Risk and impacts	Related national CCRA3 risk(s) and urgency score *See Appendix 3*	Climate driver										ARP4 risk score *Likelihood × Impact*				
		Acute							*Chronic*							
		Heatwave	*Frost, freeze/thaw*	*Heavy rainfall*	*Storm and high winds*	*Drought*	*Flood*	*Land movement*	*Temperature increase*	*Precipitation increase*	*Precipitation decrease*	*2025*	*2050 +2°C by EoC*	*2100 +2°C by EoC*	*2100 +4°C by EoC*	*2030 Target*
Risk Se01. Damage to data sensors and loss of data collection. Extreme high temperatures, heavy precipitation and high winds and storms damage air quality sensors impacting function or leading to loss of data collected. Data sensors may also be impacted by higher moisture levels caused by heavy rainfall and flooding, limiting the capacity to record and transmit reliable data, specifically for air quality levels. Some sensors (like Air Quality) will be covered by warranty periods, but these will not last out until the 2050s/end of the century. This will have a cascading impact on risk Se3.	**I13**	✓	✓	✓	✓		✓	✓	✓	✓		*2 × 2* **4**	*2 × 2* **4**	*3 × 2* **6**	*3 × 3* **9**	*1 × 2* **2**

Risk and impacts	Related national CCRA3 risk(s) and urgency score *See Appendix 3*	Climate driver										ARP4 risk score *Likelihood × Impact*				
		Acute							*Chronic*			*2025*	*2050 +2°C by EoC*	*2100 +2°C by EoC*	*2100 +4°C by EoC*	*2030 Target*
		Heatwave	*Frost, freeze/thaw*	*Heavy rainfall*	*Storm and high winds*	*Drought*	*Flood*	*Land movement*	*Temperature increase*	*Precipitation increase*	*Precipitation decrease*					
Risk Se02. Inequalities are exacerbated, impacting vulnerable communities. Changes in climate will exacerbate inequalities, particularly for communities that are defined as vulnerable (e.g. lower-income households, elderly, disabled, outdoor workers and those with medical conditions etc.), due to fewer resources and reduced capacity to adapt and/ or recover from climate impacts. This is an interdependent risk that will impact the delivery outcomes of multiple directorates across WMCA.	**H1, H2, H3**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	*3 × 3* **9**	*3 × 4* **12**	*4 × 4* **16**	*4 × 5* **20**	*3 × 2* **6**
Risk Se03. Achievement of outcomes framework. The outcomes framework relies on data collated from data sensors and centres (see risk Se1). Due to the potential of exceeded thresholds or damage to centres, there could be a knock-on effect on loss of data and therefore the ability to achieve objectives goals and principles held in the Outcomes framework. This may influence the reputation and potential to receive funding for WMCA (see also risk Fb3).	**I13, B4**	✓	✓	✓	✓		✓	✓	✓	✓		*2 × 3* **6**	*2 × 3* **6**	*3 × 3* **9**	*3 × 4* **12**	*1 × 3* **3**
Risk Se04. Retrofit solutions are implemented in a way that does not account for higher temperatures leading to maladaptation. Deep retrofit to homes may trap heat inside buildings following prolonged heatwaves leading to sustained overheating, and subsequent health and wellbeing impacts. Higher average temperatures may decrease the need for retrofit measures over time and increase the need to reverse retrofits, leaving residents or other funders paying for a service that is no longer utilised well. This may mean that the expected revenue stream is lower than originally anticipated, with a reduced financial return for the homeowner. Some financial/legal risks could emerge for the WMCA and LAs depending on the structure of a regional finance fund for retrofit, however, this structure is not yet established. These risks would need to be mitigated in any future funding agreements	**H1,H2**	✓							✓			*2 × 3* **6**	*3 × 3* **6**	*4 × 3* **12**	*4 × 4* **16**	*2 × 2* **4**

Risk and impacts	Related national CCRA3 risk(s) and urgency score *See Appendix 3*	Climate driver										ARP4 risk score *Likelihood × Impact*				
		Acute							*Chronic*							
		Heatwave	*Frost, freeze/thaw*	*Heavy rainfall*	*Storm and high winds*	*Drought*	*Flood*	*Land movement*	*Temperature increase*	*Precipitation increase*	*Precipitation decrease*	*2025*	*2050 +2°C by EoC*	*2100 +2°C by EoC*	*2100 +4°C by EoC*	*2030 Target*
Risk Se05. Damage to retrofit measures from extreme weather, impacting net zero neighbourhood assets. Increases in heavy rainfall, lead to increased risk in river and/or surface water flooding risk, with potential to damage retrofit measures (e.g. insulation damage from water exposure). Other extreme weather hazards may also damage retrofit measures, impacting net zero neighbourhood assets, reducing the trust in the retrofit schemes, and damaging relationships with locals.	**H5**			✓	✓		✓	✓		✓		*2 × 3* **6**	*2 × 3* **6**	*3 × 3* **9**	*3 × 4* **12**	*2 × 2* **4**
Risk Se06. Green infrastructure damage and subsequent risk to intended outcomes. Heavy rainfall, flooding and drought cause significant and irreparable damage to community green infrastructure assets, which can cause societal impacts such as restricted use and access to such spaces. This could also lead to increased capital spend on repairing green infrastructure.	**H3**					✓	✓	✓	✓	✓		*1 × 3* **3**	*2 × 3* **6**	*3 × 3* **9**	*3 × 4* **12**	*1 × 3* **3**
Risk Se07. Delays in retrofit delivery and repairs. Increases in storms and high winds may increase requests for retrofits. An increased influx of retrofit requirements may cause delays due to the inability to deliver all retrofits in a timely manner. Simultaneously, extreme weather could cause unsafe working conditions causing delays in delivering retrofit measures.	**H1,H6**	✓	✓	✓	✓		✓		✓	✓		*3 × 3* **9**	*3 × 3* **9**	*3 × 4* **12**	*4 × 4* **16**	*3 × 2* **6**

Risk and impacts	Related national CCRA3 risk(s) and urgency score *See Appendix 3*	Climate driver									ARP4 risk score *Likelihood × Impact*				
		Acute							*Chronic*						
		Heatwave	*Frost, freeze/thaw*	*Heavy rainfall*	*Storm and high winds*	*Drought*	*Flood*	*Land movement*	*Temperature increase*	*Precipitation increase*	*Precipitation decrease*	*2025*	*2050 +2°C by EoC*	*2100 +2°C by EoC*	*2100 +4°C by EoC*	*2030 Target*
Risk Se08 Retrofit perceived as not needed. Due to increases in summer temperatures and overheating of homes can lead to retrofit requirements to be perceived as no longer needed. Much of the WMCA's Integrated Settlement spending for net zero retrofit will depend upon local uptake of measures for their homes. This risk my impact that level of uptake.	**H6b**	✓							✓			*2 × 3* **6**	*3 × 3* **9**	*4 × 3* **12**	*4 × 4* **16**	*2 × 2* **4**
Indirect risks																
Risk Se09. Disruption to energy supplies and infrastructure. Increases in flooding due to heavy rainfall, changes in land and soil and overheating from increased temperatures can impact the supply of energy and energy networks. This could lead to further cascading failures across infrastructure networks impacting WMCA operations. This is an indirect risk to the WMCA and not something the directorat**e** have responsibility for managing. Nevertheless, it would impact the successful decarbonisation and electrification of the West Midlands energy systems as well as the transition to SMARTer infrastructure.	**I1**	✓		✓	✓		✓	✓	✓	✓		*3 × 2* **6**	*4 × 2* **8**	*4 × 3* **12**	*4 × 4* **16**	*2 × 2* **4**
Risk Se10. Reduced water availability for generation plants. Changes in temperature and precipitation can lead to reduced water availability and/or water scarcity at generation plants, reducing the amount of power generation operating WMCA's operations. This is an indirect risk to the WMCA and not something the directorate have responsibility for managing. Nevertheless, it would impact the successful decarbonisation and electrification of the West Midlands energy systems as well as the transition to SMARTer infrastructure.	**I9**	✓				✓			✓		✓	*2 × 3* **6**	*3 × 3* **9**	*4 × 3* **12**	*4 × 4* **16**	*2 × 2* **4**

Risk and impacts	Related national CCRA3 risk(s) and urgency score *See Appendix 3*	Climate driver									ARP4 risk score *Likelihood × Impact*				
		Acute							*Chronic*						
		Heatwave	*Frost, freeze/thaw*	*Heavy rainfall*	*Storm and high winds*	*Drought*	*Flood*	*Land movement*	*Temperature increase*	*Precipitation increase*	*Precipitation decrease*	*2025*	*2050 +2°C by EoC*	*2100 +2°C by EoC*	*2100 +4°C by EoC*	*2030 Target*
Risk Se11. Changing and unpredictable energy demand. Increases in temperatures could reduce the need for heating in winter but increase the need for cooling and air conditioning unit installations across the region, including in WMCA offices and other facilities.	**H6b**	✓							✓			*3 × 2* **6**	*3 × 3* **9**	*4 × 3* **12**	*5 × 3* **15**	*2 × 2* **4**

Managing the Risk

The actions below are wide ranging and focus on various areas of the strategy, economy and net zero directorate sub-teams. It is important that the directorate consider planning additional potential activities in Table 15 to ensure the resilience of this directorate. Currently, the directorate is undertaking research to review due diligence processes required to further engage with local partners, researching climate risks in social value procurement and lived experience from climate risks. More action is needed to implement 'planned' actions and for key decision makers to discuss, agree and implement several proposed 'potential' actions to close key gaps in improving the resilience of digital and data servers, introduce green infrastructure pilots and integrate climate risk into retrofit assessments.

Case study: The Inclusive Growth Framework

The Challenge

Traditional metrics of economic vitality such as growth, jobs, and trade do not tell us who is involved in creating growth, who is (and isn't) benefiting from that growth, or which social and environmental outcomes (good and bad) result from that growth. When this comes to climate change adaptation, it means that metrics of economic success and growth do not account for how an activity reduces, or contributes to, vulnerability or exposure to climate change impacts.

What WMCA have done

The Inclusive Growth Framework produced by the WMCA translates inclusive growth from an intellectual concept into a reality that can be put into practice to build a fairer, greener and better-connected region. There are seven Inclusive Growth Fundamentals within this framework, and two overarching fundamentals that are considered within all of these, one of which is Climate Resilience.

Direct benefits

Including Climate Resilience as an Inclusive Growth Outcome means that the framework helps ensure that any projects or functions in the WMCA take climate change into consideration.

Future/Next Steps

There is much work to be done to better support teams to consider climate change risks and impacts in projects, and the Inclusive Growth team are already working to produce specific metrics around climate change vulnerability and exposure that increases their ability to embed climate resilience into strategic priorities for the region, as well as improving guidance for new projects and future planning across the WMCA's responsibilities.

Case Study 3 - Climate Adaptation in the Inclusive Growth Framework

Case study: Net Zero Neighbourhoods

The Challenge

Without planning for a future climate and the impacts that come with this, these projects are at risk of not being able to successfully support resilient communities.

What WMCA have done

The Net Zero Neighbourhoods (NZNs) schemes are a holistic approach to neighbourhood-scale transitions, focusing on retrofit, low carbon travel, green space interventions and local, low carbon electricity generation. Co-production and engagement with citizens through co-design is pivotal to this scheme and unique to each project.

Future/next steps

As a result of engagement with the Environment Team during the development of this report, the NZN Team are now looking to produce climate change risk assessments for some of their NZNs to ensure any planned interventions are suitable for future climate scenarios. They also see climate-related events and adaptation as a potential avenue to support engagement work in the neighbourhoods, for example if a community has already experienced a flood or struggled with extreme heat, then this can act as a conversation starter for a potential NZN project.

Case Study 4 - Net Zero Neighbourhoods

Table 15 - Actions to mitigate Strategy, Economy and Net Zero directorate risks (Risk ID Se).

Category of actions key:
0 *- building internal adaptive capacity capability through integrating climate change into governance and risk management*
1 *- scoping, monitoring and identifying impacts / risks*
2 *- consideration of impacts, risks and likely actions with stakeholders*
3 *- implementation of actions to address impacts / risks and maintain delivery of the organisation's functions*
4 *- monitoring actions, evaluation against original plans, reassessment of risks, management system audit (against adaptation best practice)*

Status of actions key:
Completed/ongoing – actions that have been completed or are delivered on an ongoing basis.
Current – actions that are underway.
Planned – actions that have been planned for, with allocated resource or a route to delivery.
Potential – recommended actions that respective teams might choose to take forward, should risk appetite and capacity permit.

Risk ID	Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
Se02	Research the lived experiences of extreme weather in the region, using areas of social and hazard vulnerability, identified by the climate risk and vulnerability assessment. 1	Current	+ Understanding individuals' lived experiences results in better services and outcomes. + Ability to propose adaptation actions to reduce impacts from lived experiences. - Challenging to create metrics to measure lived experiences. - Maladaptation actions resulting in numerous inequalities.	Climate risk and vulnerability assessment undertaken, and report write up, along with dissemination and adaptation actions to minimise the vulnerability of individuals and reduce impacts experienced in lived experiences. Completion of an updated CRVA *by 2030* to measure progress.
Se02, Se03	Identify how climate risk and adaptation measures can be incorporated into Inclusive Growth, the Inclusive Growth Framework, the Implementation Toolkit and the Single Assurance Framework process. 0 1 2	Current	+ Implementation activities relating to climate resilience are easily identifiable in the Inclusive Growth Framework. + Climate resilience drives forward social, economic and environmental benefits to the wider West Midlands population contributing to inclusive growth.	*Quarterly* meetings are to be held between the Inclusive Growth team and the Climate team to discuss the incorporation of climate risks. Training sessions are to be held between the Inclusive Growth team and run by the Climate team.

Risk ID	Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
Se02, Se03	Review due diligence processes required to further engage with local research partners and universities, academic partners etc. This can enable further circulation of adaptation research with the WMCA Research and Intelligence Community of Practice (RICOP) and the Economic Intelligence Research Group (EIRG), articulating the links between outputs and policy areas. 1 2	Planned	+ A holistic and better understanding of current and future climate risks with awareness of new research + Learning how universities are building climate resilience and sharing best practice - Due diligence processes may be laborious and time consuming leading to a lack of engagement. - Outputs and policy areas may not align well.	*Quarterly* circulation of adaptation research produced by the Climate Team as an online bulletin.
Se03	Identify how climate adaptation considerations can be included in the development of the WMCA's Outcomes Framework. Ensure climate adaptation considerations are embedded across the WMCA Outcomes Framework to ensure funding across all areas (skills, transport, housing) considers climate adaptation goals. 0 1 2	Planned	+ Climate adaptation and resilience are treated as a priority. + Climate adaptation is embedded across the framework to enhance other service areas. + Potential for further funding with added value and benefit from projects and programmes. - Goals of service areas which do not include climate resilience are neglected.	Measure and monitor adaptation outcomes against skills, transport, housing and regeneration, local growth and place, and retrofit areas. Check Integrated Settlement Programme Business Cases to see which areas/ interventions have considered climate adaptation/ resilience. Ensure climate adaptation and resilience are considered as part of business continuity/ requirements planning for developing a longer-term Digital & Data solution to managing outcomes.
Se04, Se05, Se07, Se08	Integration of climate risk into retrofit assessments. Review examples of retrofit assessments where climate impacts are cited to understand how retrofit and specific retrofit requirements can in turn reduce various climate risks. Incorporate climate risk questions into retrofit assessments to understand which retrofits are best placed were. 0 2	Planned	+ Climate risk data will provide useful insights to understand the efficacy of retrofit solutions. + Cost, carbon saved and effort could be included to provide decision-making criteria to best place retrofit solutions. - Unused climate risk data. - Effort and funding are required. - Climate risks and retrofit solutions may not be applicable to West Midlands.	Review of retrofit assessment where climate impacts cited completed *by 2025*. Climate risk questions/assessments added to retrofit assessments *by 2025*.
Se04, Se05,	Develop a climate change adaptation checklist for WMCA-funded retrofit projects, identifying what	Planned	+ Maladaptation avoided + Clear adaptation measures and climate risks are identified from the outset.	Complete climate change adaptation checklists including climate risk factors and

Risk ID	Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
Se07, Se08	climate risk factors and adaptation measures need to be considered in all retrofit programmes. 2		- Further effort and resources may be required to complete - Measuring action from adaptation checklists may prove difficult	adaptation measures and report on these for WMCA retrofit projects *by 2026*.
Se09, Se11	Work with National Grid Electricity Distribution existing vulnerability to infer vulnerability points for West Midlands. 2	Planned	+ Establish a partnership with National Grid to find opportunities to reduce the vulnerability of energy network	Completion of a database of key vulnerable energy infrastructure to various relevant climate hazards *by 2030*.
Se09, Se11	Incorporate climate risk and adaptation consideration in Energy Capital's emerging heat network programme, considering infrastructure risks and cooling demand needs, the likely impact and transition needs to deliver additional demand. 0 2	Planned	+ Preparation for future climate change and changing energy demand. + Ability to adapt infrastructure appropriately according to risks.	Update documentation associated with the Energy Capital's emerging heat programme *by 2027*.
Se10	Embed Seven Trent Water's free water efficiency measures into the requirements for WMCA funding. 2	Planned	+ Increases water efficiency of users to promote sustainable water usage + Improves awareness of residents of measures available - May not be applicable for all WMCA funded projects	Report on number of free water efficiency measures embedded into retrofitted properties.
Se04, Se05	Model overheating risk based on retrofit solutions, housing typologies and the properties' surroundings. This will help understand the health impacts from sustained overheating with the combined impact of projected temperature increases. 2	Potential	+ Insights from overheating risk could reduce inequalities that may arise in vulnerable communities. + Maladaptation in retrofit is avoided. + Further understanding of how increased temperatures may impact certain retrofit solutions, tailoring solutions based on housing typology and surrounding area, focussing investment. - Effort and funding are required. - Data required on West Midlands housing typologies and classification of surroundings. - Project management capacity required.	Complete overheating assessment of different housing typologies, procuring subject matter experts to model building overheating *by 2026*.
Se04, Se05	Research how other countries that are experiencing the West Midlands' future climate (under a 2050 and 2100 timeframe under various climate warming	Potential	+ Best practice shared to implement effective retrofit solutions fit for the WMCA's future climate.	Review of other combined and local authorities' pilot ARP submissions and existing Climate Risk Assessments to

Risk ID	Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
	scenarios) are retrofitting to be more resilient and liveable. Implement best practice retrofit solution measures into net zero activity. 2		+ Exemplary retrofit solutions will contribute to net zero activity. - Maladaptation is avoided through tried and tested adaptation actions. - Tailoring of adaptation actions must be required to the West Midlands conurbation area and relevant infrastructure design. - Uncertainty around some climate projections (e.g. wind). - Project management capacity required.	understand retrofit solutions across the UK *by 2026*.
Se06	Introduction of green infrastructure pilots across West Midlands as part of net zero neighbourhood designs such as tree planting, SuDS and green roofs to consider the lifecycle and resources, skills and processes required to implement green infrastructure. Review existing and damaged green infrastructure to consider where to place green infrastructure and what types of green infrastructure to implement based on climate risk. 1 2	Potential	+ Better understanding of processes impacting green infrastructure + Better place green infrastructure based on climate risks + Use investment in a strategic and efficient manner + Reduces river and surface water flood risks + Enhances community facilities and encourages social interaction + Improves local communities' health and wellbeing + Improved biodiversity and air quality - Further green infrastructure may be seen as poor investment choices by communities. - Maladaptation may lead to spatial inequities if green infrastructure is inadequately planned.	Develop a planning support system to assess the decision making for green infrastructure planning. Continual monitoring and evaluation through measurable indicators of green infrastructure projects.
Hp01	Review of existing standards for new builds and requirements for contractors to meet high standards such as BREEAM adaptation credits. 1	Potential	+ Support increased understanding of the level of resilience housing projects should be designed to.	To have clear climate resilience design standards that are embedded in decision-making when unlocking sites for development and working with partners through to delivery *by 2026*.

Risk ID	Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
			- Increased costs relating to resources and time for engagement. - Increased complexity of managing communications (e.g. managing responsibilities, specifications and collaboration between multiple suppliers).	

2.2.8 Transport for West Midlands (TfWM)

Introduction to the Directorate

Transport for West Midlands (TfWM) is the Local Transport Authority (LTA) for the West Midlands metropolitan area. TfWM have a duty to prepare the West Midlands Local Transport Plan (LTP) and deliver it with Local Authorities. TfWM work alongside bus and train operators, run and own the West Midlands Metro, and run the Swift smartcard ticket system. TfWM coordinate the region's City Region Sustainable Transport Settlement (CRSTS) funding which includes funding for local authority maintenance responsibilities. TfWM also support and facilitate the delivery of the Mayor's concurrent statutory powers to improve road safety across the region's road network and manage the Regional Transport Coordination Centre[9]. There are eight teams within the TfWM directorate, each responsible for a different aspect of the transport network (Figure 9).

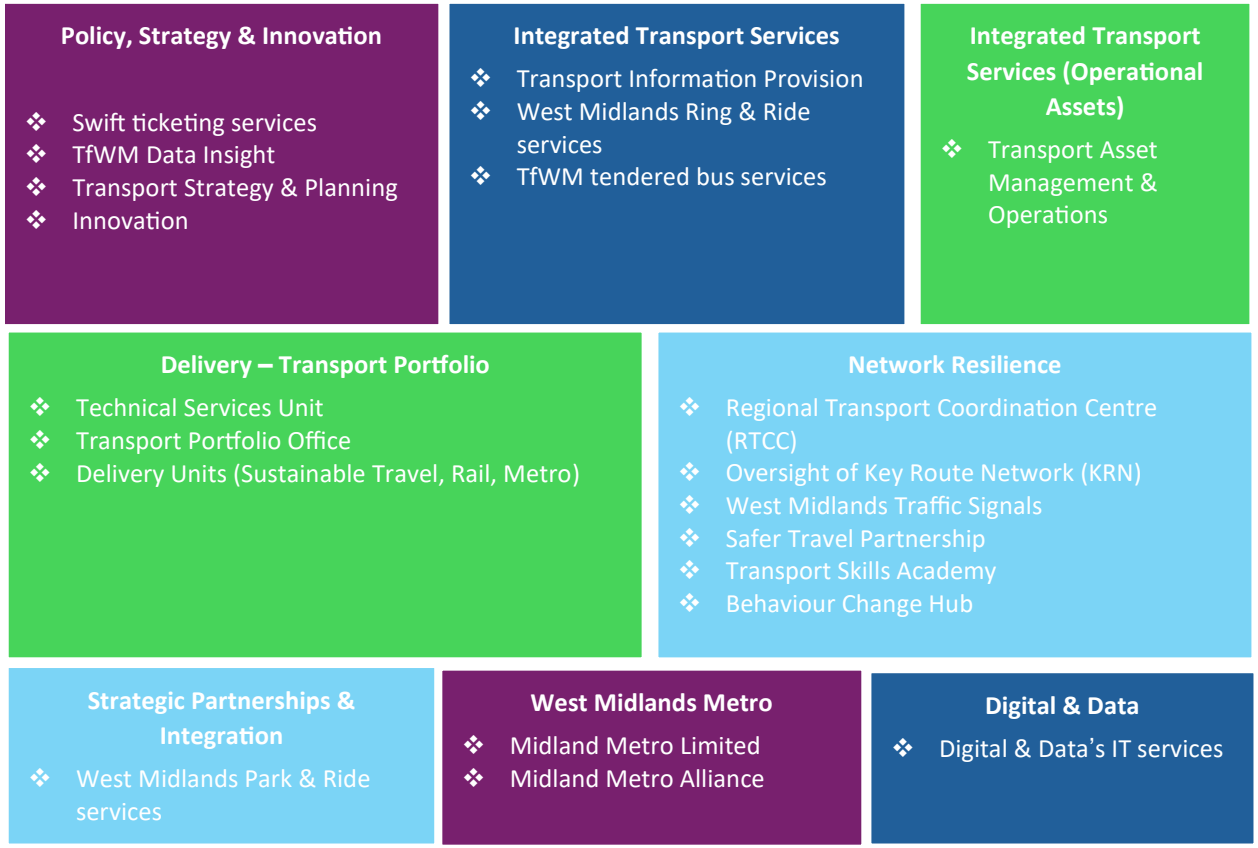


Figure 9 - TfWM teams

[9] TfWM (2024) Who we are

Responsibilities of the directorate

TfWM has responsibility for setting local transport policy, securing investment, scheme development and delivery, and some operational services across WMCA[10] (including Ring & Ride and West Midlands Metro). If the decision to reform bus service delivery and introduce franchising is made, then WMCA will also be responsible for overseeing the operations of bus services in the West Midlands. Climate change has the potential to impact the directorate's ability to carry out its responsibilities through, for example, physical damage to infrastructure and assets that TfWM manage directly, increasing exposure to extreme weather conditions affecting both staff and users, disruptions to supply chains and utility supplies, and changes in service demand. TfWM are also responsible for managing the regional transport budget. Increasing costs of maintenance and the need to mitigate risks will have implications on how this budget is spent and the ability to invest in and support improvements across the network.

Tackling the climate emergency is one of the five motives for change within the West Midlands Local Transport Plan. The vision is to "create safe, reliable and affordable connections for everyone that are healthy, sustainable and efficient"[11]. Achieving this vision will require the transport system to evolve and adapt to meet the needs of the people, places and environment that interact with it and will be supported by six Big Moves. If successful, the Big Move to a 'safe, efficient and reliable network' will provide a transport system that is 'well maintained and more resilient to extreme weather events'[11]. The Big Move sets out the need for the LTP to consider how climate adaptation is embedded throughout transport planning, delivery and operations.

What does climate resilience look like?

- To foster an iterative and agile approach to the climate adaptation of West Midlands transport that matures as internal, and partner, adaptive capacity grows.
- To have a transport network that runs safely and with minimised disruption, keeping people and businesses connected in all future climate scenarios.
- To have clear definitions of climate risks and 'levels' of risk that trigger action.
- To have robust plans in place that proactively plan for and respond to a range of climate impacts.

[10] WMCA (2024) Transport for West Midlands
[11] TfWM (2023) Local Transport Plan

TfWM functions, services and assets in scope of this risk assessment and action planning exercise:

- Transport asset management: bus stops and stations, cycle hire, park & ride
- West Midlands Metro
- Regional Transport Coordination Centre
- Key Route Network Coordination
- Traffic signalling
- CCTV provision for traffic monitoring and public transport hubs
- Transport information provision
- Swift ticketing infrastructure
- Transport scheme design and delivery
- Transport policy and planning
- Transport data and insights
- Digital and data provision and IT services
- Integrated Transport Services

Climate Risks

TfWM faces both direct risks, where impacts affect provision of services directly under TfWM's control, as well as indirect risks, such as damage to transport infrastructure that TfWM are not responsible for, but that impacts the WMCA's goal of providing a reliable transport system in the West Midlands. The top direct risks to TfWM involve damage to critical assets and / or infrastructure such as metro signals and signage, tracks, illuminated signals, and metro overhead line equipment that could have significant impacts on operational continuity. Indirect risks include changes to visibility, travel patterns and accessibility that could impact TfWM's ability to deliver against its responsibility of maintaining a reliable transport service. Changes to both direct and indirect risks may be driven by extreme temperatures, heavy rainfall and flooding, storms and high winds, and land movement.

There will also be a greater requirement for TfWM to support LAs in developing and implementing climate resilient solutions and innovations where TfWM do not have responsibility for the assets that are at risk but are dependent on other transport partners, adding pressure to the resources and budgets of TfWM and partners. Given the current funding climate this could result in difficult decisions on how to invest in the region's transport system; being able to improve connectivity with new infrastructure and services or increasingly focusing on ensuring existing infrastructure and services can continue to operate. More information on the risks faced by the TfWM directorate is available in Table 16 - these are split into direct and indirect risks.

Table 16 – Risk narrative and scores for Transport for West Midlands (TfWM) directorate risks (Risk ID Tr).

Related national Climate Change Risk Assessment 3 (CCRA3) urgency score key: red = need more action; amber = further investigation; green = sustain current action/watching brief. If more than one CCRA3 risk is relevant, the highest urgency score is indicated.
ARP4 risk score key: purple = severe (20-25); red = major (10-16); amber = moderate (4-9); green = minor (1-3).
Throughout the table, end of century is abbreviated to EoC.

Risk and impacts	Related national CCRA3 risk(s) and urgency score *See Appendix 3*	Climate driver										ARP Risk Score *Likelihood × Impact*				
		Acute							*Chronic*							
		Heatwave	*Frost, freeze/thaw*	*Heavy rainfall*	*Storm and high winds*	*Drought*	*Flood*	*Land movement*	*Temperature increase*	*Precipitation increase*	*Precipitation decrease*	*2025*	*2050 +2°C by EoC*	*2100 +2°C by EoC*	*2100 +4°C by EoC*	*2030 Target*
Direct risks																
Risk Tr01. Damage to transport infrastructure and assets. Damage to transport infrastructure and assets including track deformation, illuminated signals and signage, detachment of Metro overhead line, electrical issues/outages, ground system, wayside equipment, embankments and retaining walls could have significant impacts on operations. Damage to building fabric and exposure to historical issues (e.g. leaky roof) may also result, such as to bus stations, depots, shelters and the provision of real time information. This could lead to temporary service disruption and reputational impacts.	**I1, I13, I12, I2, I5, H5**	✓	✓	✓	✓		✓	✓				*3 × 3* **9**	*4 × 3* **12**	*4 × 3* **12**	*4 × 5* **20**	*3 × 2* **6**
Risk Tr02. Disruption to ticket purchasing. Damage to ticket vending machines, parking machines and/or loss of connection to servers that enable online ticket purchasing. Effects may include reputational impacts and increased capital costs for asset repair/replacement.	**I13**	✓	✓	✓	✓		✓					*2 × 3* **6**	*2 × 3* **6**	*3 × 3* **9**	*4 × 3* **12**	*2 × 1* **2**
Risk Tr03. Greater requirement to provide solutions and funding for climate resilient innovation. WMCA have a role in providing funding to LAs for maintenance of highways and assets. There are currently no agreed approaches to how innovative climate resilient designs and operations (e.g. to signals) could or should be built into the region's transport investments. However, in addition to the existing maintenance backlog, the need to innovate to respond to climate impacts could lead to even greater pressure being put on budgets to find solutions potentially resulting in changes to investment priorities.	**I12**	✓	✓	✓	✓		✓	✓				*2 × 3* **6**	*3 × 3* **9**	*3 × 3* **9**	*4 × 3* **12**	*2 × 2* **4**

Risk and impacts	Related national CCRA3 risk(s) and urgency score *See Appendix 3*	Climate driver – Acute: Heatwave	Frost, freeze/thaw	Heavy rainfall	Storm and high winds	Drought	Flood	Land movement	Climate driver – Chronic: Temperature increase	Precipitation increase	Precipitation decrease	*ARP Risk Score* Likelihood × Impact: 2025	2050 +2°C by EoC	2100 +2°C by EoC	2100 +4°C by EoC	2030 Target
Risk Tr04. Extreme weather damage and disruption to data storage facilities, sensors and CCTV (including the Summer Lane data centre, traffic signalling data and air quality sensors) may impact the quality and quantity of data collected and available for use. Poor quality data will inhibit the ability to assess the performance of schemes (e.g. air quality) and may have reputational impacts. Damage to CCTV by extreme weather prevents accurate real time information from being used by partners including WMCA, LAs and the police.	**I13**	✓	✓	✓	✓							2 × 2 **4**	2 × 2 **4**	3 × 2 **6**	3 × 2 **6**	1 × 2 **2**
Risk Tr05. Risk to delivery programmes. Risk to delivery programmes due to heavy rainfall pooling at construction sites, extreme heat impacting the health and safety of workers and high winds causing falling debris. Extreme weather events that impact the main road network can also impact deliveries to construction sites or contracts making their way to work - causing delays.	**I1, I12, B6, B1, B5**	✓		✓	✓		✓					2 × 2 **4**	3 × 3 **9**	4 × 3 **12**	4 × 3 **12**	2 × 2 **4**
Indirect risks																
Risk Tr06. Risk to service patronage from extreme weather. Extreme weather such as extreme heat, flooding, storms / high winds could impact the reliability of services, preventing people from travelling and impacting revenue and service viability. This would have a knock-on impact on accessibility of public transport and wider socio-economic impacts.	**H3, I5, I12**	✓		✓	✓		✓					2 x 3 **6**	3 × 3 **9**	4 × 3 **12**	4 × 3 **12**	2 × 2 **4**
Risk Tr07. Impacts to accessibility. Service accessibility may be reduced by surface water and storm damage, which could place access routes temporarily out of use and have significant impacts on vulnerable communities (e.g. with high levels of elderly or disabled people).	**H5**		✓	✓	✓		✓	✓				2 × 3 **6**	3 × 3 **9**	4 × 3 **12**	4 × 3 **12**	2 × 2 **4**
Risk Tr08. Risk to road safety from changes to visibility and road conditions during extreme weather events and damage to infrastructure from high temperatures and flooding. Changing travel patterns resulting from climate change may also impact road safety.	**I12, H1, H3**	✓	✓	✓	✓		✓	✓				2 x 2 **4**	3 x 5 **15**	3 x 5 **15**	4 x 5 **20**	2 x 2 **4**

Managing the risk

TfWM has a wide range of adaptation actions currently proposed, in development and/or completed to address the risks posed by climate change (Table 17). The recommended actions are broad and span multiple stages of adaptation action including scoping of risks, consideration of actions with stakeholders, implementation and monitoring. A large proportion of the actions relate to establishing an evidence base of the key risks, vulnerabilities and impacts (physical and economic) climate change may influence, as well as identifying best practices and collaborating with key partners and stakeholders to coordinate adaptation efforts. There is also good progress in implementing specific climate adaptation actions such as Sustainable Drainage Systems (SuDS), attenuation tanks, dual-power supplies and secondary access locations for critical systems.

A select number of existing climate adaptation measures currently in place are presented as case studies below, highlighting success stories across the TfWM directorate.

There are opportunities to strengthen climate adaptation efforts across more climate hazards, for example, identifying actions to manage thermal comfort on the different transport modalities during extreme temperature events. It is anticipated that as the evidence base is developed, and reviews of technical designs are completed, the adaptation efforts will naturally shift further towards the implementation and monitoring of actions.

In some cases, continued development and evolution of technologies and improvements to customer experience may reduce the risks e.g. in the future there could be a significant reduction in the use of ticket machines across the public transport system. However, there would continue to be risks to wider systems that online/cloud-based systems rely on. The transport sector itself is likely to continue to change and responsibilities for infrastructure and services could change over time - e.g. because of a decision to move to bus franchising. TfWM will continue to review the identified risks and update them as and when necessary to reflect changing circumstances.

Case study: Transport – Real time monitoring and response

The Challenge

Transport for West Midlands (TfWM) need real time information for effective delivery of their services. If extreme weather causes damage to any part of the transport network, the team need to be able to detect this, identify the location of the damage, and communicate any disruptions to customers.

What WMCA have done

Drones are used to see the transport network from above and provide real time information to various stakeholders. TfWM have a Fix It app where the public can report issues with bus stops and park & rides. The bus service utilises a Real Time Information System which collates information on what has happened in recent weeks/months or in similar extreme events, using this to predict live timetabling e.g., when a bus is likely to arrive.

TfWM provide communications to internal and external stakeholders when there are weather warnings from UKHSA and Met Office. They do this via all their channels including the TfWM app and website, where they also share early warning information to help people plan in advance should travel be disrupted. Other examples of communications include issuing ad hoc alerts and advice around cycle hire via their app when it is particularly hot or cold.

Direct benefits

As well as covering a large distance in a short time, the option of using drones means that information can be collected even when people cannot access a site, for example due to flooding. Providing up-to-date information with customers, as well as providing a platform for customers to constructively report incidents, are extremely valuable actions for maintaining positive relationships as well as keeping everyone safe during climate-related extremes.

Case Study 5 - Real time transport monitoring

Case study: Digital IT Systems at Head Office (16 Summer Lane)

The Challenge

Recording and monitoring assets such as CCTV and Regional Transport Coordination Centre (RTCC) systems need to be accessed physically to achieve their function. Physical data and digital servers are vulnerable to physical damage from all climate hazards; overheating, water damage from flooding, or damage from wind or debris during heavy rain or a storm event.

What WMCA have done

There is a secondary location to access the WMCA's monitoring systems, which can be used if 16 Summer Lane cannot be accessed, for example flooding internally in the property or of the road accessing Summer Lane.

The direct and wider benefits

Increased resilience of data collection and monitoring systems, and IT systems, meaning that extreme weather is less likely to impact on day-to-day operations.

Future/next steps

The main data and digital servers at 16 Summer Lane are being migrated away from physical servers on-site to cloud-based servers.

Case Study 6 - WMCA's secondary location

Case study: Winter Service Maintenance for Transport

The Challenge

During extreme weather events such as heavy rain, storms, or cold snaps over the winter there can be severe impacts on roads and therefore people using the transport network in the West Midlands. This can include increased incidents on the roads during extreme weather (flooding, ice) as well as damage to roads from flooding, fallen trees and debris.

What WMCA have done

The winter service maintenance group contains representation from all the Local Authorities and runs from October to March. The Met Office provide them with weather forecasts (daily and long-term to about a month) for forward planning and delivery of preventative action. Whilst Highways and winter service maintenance are generally the responsibility of Local Authorities, the WMCA attend this group and provide some funding streams.

Future/next steps

There are considerations being made for having a similar structure for more than only the winter period, considering the impact that rising temperatures and heatwaves can have on road networks and the increasing incidences of storms in the summer months. The group are working with National Highways more strategically going forward, and although work to this date has focused mostly on reactive planning, the contacts within the WMCA and the LAs within the winter service maintenance group are the key players to be involved in more proactive planning for climate change adaptation.

Case Study 7 - Winter Service Maintenance for Transport

Table 17 - Actions to mitigate TfWM directorate risks (Risk ID Tr). ***See Appendix 5 for further information on the sequencing of actions.***

Category of actions key:
0 *- building internal adaptive capacity capability through integrating climate change into governance and risk management*
1 *- scoping, monitoring and identifying impacts / risks*
2 *- consideration of impacts, risks and likely actions with stakeholders*
3 *- implementation of actions to address impacts / risks and maintain delivery of the organisation's functions*
4 *- monitoring actions, evaluation against original plans, reassessment of risks, management system audit (against adaptation best practice)*

Status of actions key:
Completed/ongoing – actions that have been completed or are delivered on an ongoing basis.
Current – actions that are underway.
Planned – actions that have been planned for, with allocated resource or a route to delivery.
Potential – recommended actions that respective teams might choose to take forward, should risk appetite and capacity permit.

Risk ID	Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
All risks	Establish and convene TfWM Adaptation Working Group. 0 1 2 3 4 *See 4.3.3 for a case study on the group.*	Completed/on going	+ Improved climate adaptation literacy and knowledge sharing enabling continuous improvement. + Resource optimization for executing actions. + Improved buy-in and support of initiatives. - Complex coordination to manage resources, responsibilities and maintain efficiency.	To have established a group of climate adaptation champions within TfWM who can raise awareness of, and integrate adaptation, into their work areas. Convene the group monthly and report to TfWM leadership *bi-annually*. To have established a mechanism for adaptation integration and delivery through sub-task and finish groups *by 2026*.
Tr07, Tr08	Establish a secondary location for accessing the Regional Transport Coordination Centre (RTCC) and closed-circuit television systems (CCTV). 3	Completed	+ Increased resilience of operational capabilities during extreme weather events. - Increased operational costs relating to maintenance of two locations.	Established.

Risk ID	Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
			- Greater complexity of management is required for coordinating two locations (e.g. managing resourcing and security).	
Tr01, Tr02, Tr04, Tr05, Tr07, Tr08	Disseminate weather warnings to external sector partners. 3	Completed/on going	+ Enables a prompt response to manage risks from extreme weather, improving health and safety and maintaining operations. + Fosters trust and transparency with stakeholders and customers. - Increased resource needs for managing and disseminating information. - Messaging would need to be balanced carefully with other communications to prevent desensitisation and warnings from being overlooked.	Through the Regional Transport Coordination Centre (RTCC),TfWM will continue disseminating Met Office and UKHSA data and weather warnings to transport partners.
Tr01, Tr02, Tr04	Continue the provision of dual-supply or back-up power (via onsite diesel generator and UPS batteries) for key equipment like the Summer Lane on-premises data centre and CCTV room. 0 3	Completed/on going	+ Contingency measures are in place in case of power supply disruption. + Multiple power options are available increasing resilience. + Most sensors are connected to the mains power supply. Some are solar powered with a backup battery. Any issues requiring backup power are rectified within three working days by the supplier ensuring resilience of operations and reliability of data. + Improved safety against risks relating to equipment failure. - Backup generators tend to be diesel powered and therefore not based on clean energy. - Increased costs relating to installation and maintenance. - Increased space requirements for back-up systems.	*Continue* to support the resilience of the on-site data centre with a reliable backup generator. When replacing the diesel generator, consider energy efficient alternatives *by 2030*.
All risks	Review of legislative frameworks. 1 4	Current	+ Clear identification of frameworks and policies that TfWM must comply with. + Supports identification of best practices throughout the planning, development and operational phases. - Upfront costs for information collection, analysis and resourcing.	Intelligence around policy levers and blockers that are available *by Spring 2025*.

Risk ID	Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
All risks	Powers and responsibilities mapping. 2 3	Current	+ Clear roles and responsibilities of TfWM and partners. + Economic savings if roles are defined to prevent duplication of responsibilities across TfWM and partners.	To have a clear idea of what falls in and out of scope for TfWM adaptation activity *by end-2025*.
			- Disparities in resource capacities and/or priorities may impact effectiveness.	
All risks	Convening with transport partners around climate adaptation. 2	Current	+ Improved collaboration and liaison with transport authorities (e.g. National Highways, DfT, Railways) to harmonise climate resilience commitments. + Transport/highways asset management plans (e.g. WMCA Delivery Plan) embedded in transport for LAs. + Capture actions for community and social value adaptation better. + Improved decision-making and resource allocation supporting long-term savings and promotion of sustainable practices. + Enhances awareness and education of climate change risks for designers and operators to increase the resilience of assets and continuity of operations.	To have established the sector partnerships needed to identify interdependencies and develop a shared vision for climate resilient transport *by Spring 2025*. Work with partners and suppliers to improve understanding of exposure and vulnerability to climate change and quantify impacts where possible.
			- Costs relating to the development and implementation of plans. - Increased complexity (e.g. integration of data from multiple sources).	
All risks	Interrogate the transport-specific Climate Risk & Vulnerability Assessment (CRVA) tool for risks to TfWM assets, schemes and services. 1 2 See *4.2 Building Adaptive Capacity*.	Current	+ Informed decision-making and planning. + Opportunity to be used in conjunction with the social and built environment CRVA tool. + Supports integration of climate resilience into designs and identification of adaptation costs that can be considered during the capital renewal budget spend.	To have an evolving climate risk mapping tool that is accessible to TfWM staff and partners so that they can prioritise transport networks and nodes for adaptation investment *by 2025*. To understand the climate vulnerability of TfWM's existing portfolio of assets and projects *by 2026*.
			- Upfront costs for data collection, analysis and resourcing. - Uncertainty in climate data may add to the complexity of decision-making and planning.	

Risk ID	Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
All risks	Engagement with and lobby DfT on technical standards for transport adaptation and the resources needed to implement them. 2	Current	+ Supports increased understanding of the level of resilience that products are designed for. + Supports communication and management of climate risks for future projects and within local council plans. + Increased resilience of product and supply chain. + Improved communication and transparency can foster stronger relationships and support innovative solutions. + Reduction in long-term costs associated with maintenance and repairs. - Increased costs relating to resources and time for engagement. - Increased complexity in managing communications (e.g. managing responsibilities, specifications and collaboration between multiple suppliers).	TfWM adaptation activity aligned with and contributes to best national practice.
All risks	Centre of Excellence for Decarbonisation of Road (which includes elements on climate adaptation). 1 2 3 4	Current	+ Includes activities on climate adaptation and resilience. + Establishment of an evidence base for materials selection that can support decision-making and investments. - Upfront costs for data collection, analysis and resourcing. - Uncertainty in climate data may add to the complexity of decision-making and planning.	To establish an evidence base on how materials will behave and withstand different weather patterns under future scenarios so that TfWM can advocate for and adopt improved, future-proofed standards for material selection *by 2028*.
Tr01, Tr04	Winter service maintenance group (October to March). 3	Current	+ Utilises Met Office forecasts to ensure efficiency of operations. + Best practice and forward planning shared. + Improved health and safety. + Improves asset lifespan and reduces costs relating to asset/infrastructure replacement. - Management and coordination complexities (e.g. requires increased collaboration with National Highways on climate adaptation). - Increased costs relating to resourcing and training requirements.	*Yearly* performance monitoring of assets/infrastructure. *Number of staff* trained in best practice/specific technology for maintenance.
Tr02	Annual maintenance of ticket machines. 3 4	Current	+ Routine reviews and maintenance enable proactive repair of any defects and wear and tear. + Improves asset lifespan and reduces costs relating to asset/infrastructure replacement.	*100%* of ticket machines reviewed annually.

Risk ID	Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
			- Increased costs relating to resourcing and training requirements.	
Tr02	Temperature sensors and alerts on all new ticket machines. 3	Current	+ Enables auto shutdown of sensors when out of operational range to reduce the risk of damage. + Improves asset lifespan and reduces costs relating to asset/infrastructure replacement. - Costs relating to installation and maintenance.	*100%* of new ticket machines fitted with temperature sensors and alerts by *mid-2025*.
All risks	Adopt West Midlands LTP which sets out high level principles for the need to consider climate adaptation in the planning, delivery and operation of the WM transport system. 3	Planned	+ Improved resilience to extreme weather and climate change. + Improved decision-making and service planning. + Supports cost efficient processes and resources. - Coordination complexities in managing multiple stakeholders and the community. - Reliant on and require public acceptance and engagement.	Actions in LTP implementation plan progressing in line with planned timeframe.
Tr03	Climate resilience collaboration with LAs. 2	Planned	+ Supports decision-making and efficient investment. + Potential to advance further using real-time information from monitoring drones. + Improved understanding of the types of options that could be used to support LAs (e.g. to improve traffic signals). + Can also be applied to cycle users e.g. setting specific warnings based on set climate parameters. + Supports the establishment of contingency plans. - Increased resource needs and cost to implement (e.g. may require trained staff).	Enhancing the existing network and reducing vulnerability to future scenarios by 2026.
Tr03	Enhance the transport-specific CRVA from a minimum viable product (mvp) to a more sophisticated tool. 1 See *5.4 for further detail.*	Planned	+ Supports informed decision-making and efficient investments. + Supports robust planning and investment. - Upfront costs for data collection, analysis and resourcing. - Uncertainty in climate data may add to the complexity of decision-making and planning.	To have a second iteration of the transport-CRVA that incorporates future climate scenarios and the socio-economic CRVA data *by end-2026*.

Risk ID	Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
All risks	Develop a methodology for assessing economic impacts from transport disruption. 1	Planned	+ Improved decision-making and service planning. + Evidence base to support possible funding applications. - High upfront costs for the development of methodology. May require trained staff/experts.	To have a methodology to calculate the economic costs of climate impacts without adaptation that informs the business case for adaptation activity *by 2028*.
Tr01, Tr02, Tr04	Transport life cycle costs methodology development. 1	Planned	+ Increased understanding of life cycle costs and sensitivities for assets/projects. + Improved understanding of asset/project resilience under different climate scenarios to support decision-making and planning. - Upfront costs for data collection, analysis and resourcing. - Uncertainty in climate data may add to the complexity of decision-making and planning.	A methodology to identify life cycle costs associated with different climate scenarios *by 2030*.
Tr01, Tr02, Tr04, Tr06, Tr07, Tr08	Consideration of future climate in design. 2	Planned	+ Future climate risks are currently considered throughout planning for new car parks. + Greater operational efficiency. + Improve asset lifespan. + Minimise costs for repair/replacement. - Future climate impacts are not included across all programmes currently. Future climate change scenarios should be embedded into the design of new assets/infrastructure. - Increased costs relating to greater complexity of planning and design.	*100% of* designs to include climate change risks and adaptation measures *by 2030.*
All risks	Included climate resilience in upcoming technical design review requirements and processes. 1 4	Planned	+ Support increased understanding of the level of resilience assets/infrastructure are designed to. + Supports communication and management of climate risks for future projects and within local council plans. - Increased costs relating to resources and time for engagement. - Increased complexity of managing communications (e.g. managing responsibilities, specifications and collaboration between multiple suppliers).	To have clear climate resilience design standards that are embedded in decision-making across TfWM, from policy and project design through to delivery *by 2026*. This will be one design review that covers different aspects of the design.
Tr03, Tr06,	Identification of where climate adaptation can be incorporated into behaviour change campaigns. 1 2 3	Planned	+ Improved literacy and awareness of climate adaptation and resilience. + Greater support of innovative solutions.	To have intelligence-informed behaviour change campaigns and transport information that drives climate resilience *by 2030*.

Risk ID	Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
Tr07, Tr08			- Increased costs associated with developing and implementing effective resources and training programmes. - Time required for training could increase pressures to time/resourcing for teams.	
Tr01, Tr02	Planning requirement for alarms to be triggered when a flood is occurring at Willenhall and Darlaston car parks. 3	Planned (under construction)	+ Improved health and safety from early warning. + Prevention of damage to vehicles and reduced costs for repairs. - High installation costs and costs for regular maintenance. - Increased training requirements for staff.	Alarms installed *at both car park sites by 2030.*
Tr01, Tr02 & Tr04	Where appropriate, migrate data storage from on premise data centre to cloud-based services. 3	Planned	+ Increased resilience to extreme weather and climate change. - Disruption to the internet may impact operational ability.	As per the *Digital & Data Strategy*, *continue* to move as much data as possible to cloud-based storage *where appropriate*, based on technical and cost-efficiency factors.
Tr01, Tr02, Tr04, Tr06, Tr07, Tr08	Real Time Information System provides updates to the transport system. 2 3	Potential	+ Improved customer satisfaction from reduced wait times and improved safety. + Improved decision-making and operational efficiency. + May support further research e.g. exploration of how Artificial intelligence (AI) can feed into enhancing response times and services + Opportunity to integrate weather data to enhance decision-making and operational efficiency. - Increased resource needs to ensure maintenance and updates. - Technical issues may lead to inaccurate data impacting customer satisfaction.	Real Time Information System established and operational *by 2035*. Integration of weather data to inform disruption of services *by 2035*.
Tr07, Tr08	Provision of rumble strips, or alternative solutions, in car parks to prevent cars sliding on ice. 3	Potential	+ Improved health and safety. + Cost-effective. + Minimal disruption to operations during installation. - Potential wear and tear on vehicles with repeated use.	Where appropriate, 100% of car parks installed with rumble strips *by 2030*.

Risk ID	Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
Tr01	Attenuation tanks or other sustainable drainage measures installed at car parks at risk of flooding. 3	Potential	+ Improved health and safety and reduced risk of damage to vehicles. + Reduced maintenance costs for managing flood damage. - Potential for large costs relating to installation and ongoing costs for maintenance of tanks.	Number of attenuation tanks installed. Completed at Longbridge. *90% of* car parks at high flood risk are installed with attenuation tanks or other sustainable drainage measures where conditions allow *by 2035*.
Tr01, Tr06, Tr07, Tr08	Functioning SuDS for the Metro System. 3	Potential	+ Increased resilience to flood events. + Co-benefits include improved water quality, biodiversity and aesthetic. - Regular maintenance is required to maintain effectiveness. - Potentially high CAPEX (design and build/installation), and OPEX (maintenance).	The number of SuDS features installed at strategic locations.
All risks	Data collection (e.g. bus patronage data, impacts to users from past events, delay length, behaviour modelling). 1	Potential	+ Improved decision-making and service planning. + Supports cost efficient processes and resources. + Evidence base to support possible funding applications. - Potential data privacy issues. - Complexity of managing large volumes of data may require trained personnel and software. - Initial costs to implement data collection systems. - May need to increase the innovation budget/working hours to support LAs. - Internal capacity required to analyse the collected data.	Data collection system established and operational *by 2035.*
Tr05	Inclusion of climate risk and mitigation planning as part of the delivery and construction of schemes. 0 1 2 3	Potential	+ Controls costs and schedules of schemes to ensure that delivery has been adapted for changing weather patterns. - The unpredictability of weather, localised issues (e.g. flooding), impacts of 3rd party assets (e.g. road network flooding impacting delivery of materials to sites).	Data capture on disruptions to delivery because of weather events to monitor any emerging patterns. Collaboration with the supply chain to ensure specific mitigation for extreme weather events.

Risk ID	Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
Tr01, Tr02 & Tr04 Se01, Se03	Working with the Data Insight and Research, Intelligence and Inclusive Growth teams, engage with suppliers around the location of data and cloud-based servers to ensure data safety and resilience are being considered with respect to climate change. Review what requirements can be put in the tender process to ensure cloud server suppliers are resilient to climate risks. 1 2	Potential	+ Understanding where data is held and therefore inherent risk of losing essential data. - Dependent on capacity of D&D team. - Large cloud providers have little flexibility in	Number of meetings with suppliers, *aiming for quarterly meetings*.

2.2.9 Interdependent risks

Interconnected risks can trigger cascading impacts, compromising the WMCA's operational effectiveness and adversely impacting the health and wellbeing of employees and vulnerable communities across the West Midlands. The WMCA have identified some interdependent risks between directorates and potential interacting impacts from external partners based on stakeholder engagement workshops with internal colleagues. A system diagram is presented below, demonstrating the complexity of interacting risks across WMCA operations and functions (Figure 10). Risk scoring for these interacting risks is outlined under each directorate's risk scoring in the preceding sections. The WMCA will aim to adapt to these interacting risks through cross directorate collaboration put into action through the comprehensive list of adaptation actions listed in preceding chapters for each directorate.

Key interdependent risks include:

- Impact of extreme weather on **power supply and network disruption:**
  - Power and network failures will have a subsequent impact on transport networks such as the metro, internet connectivity, delivery of adult education courses, the ability to work from home, the ability for communications to be sent, and lead to office closures.
  - Upstream interdependencies on power supply and networks will include external partners such as **British National Grid, UK Power Networks and internet providers.**
- **Disruption and damage to transport infrastructure** caused by extreme weather:
  - Transport disruption caused by extreme weather will have a knock-on impact on the ability for people to travel to offices, reduced patronage on services which in turn exacerbates inequalities for those who rely on public transport, and reputational impacts on the authority to deliver functions such as run the metro.
  - Upstream interdependencies for transport infrastructure will include external partners such as **the local authorities in the West Midlands, National Highways, Network Rail** and **local private bus companies.**
- **Physical and mental health are adversely impacted** by extreme weather
  - Extreme weather can have an adverse impact on physical and mental health, leading to lower levels of productivity and exacerbation of health inequalities across the West Midlands such as older people and those with pre-existing conditions.
  - Upstream interdependencies for physical and mental health impacts will include external partners such as **sub-contractor organisations** who work outside and will have downstream impacts on health services such as **GPs and the NHS.**

The WMCA recognise that this is not an exhaustive list of interdependencies facing the organisation nor the wider region. Therefore, more work needs to be done to better understand interdependencies, not just for WMCA services and functions but also regional systems.

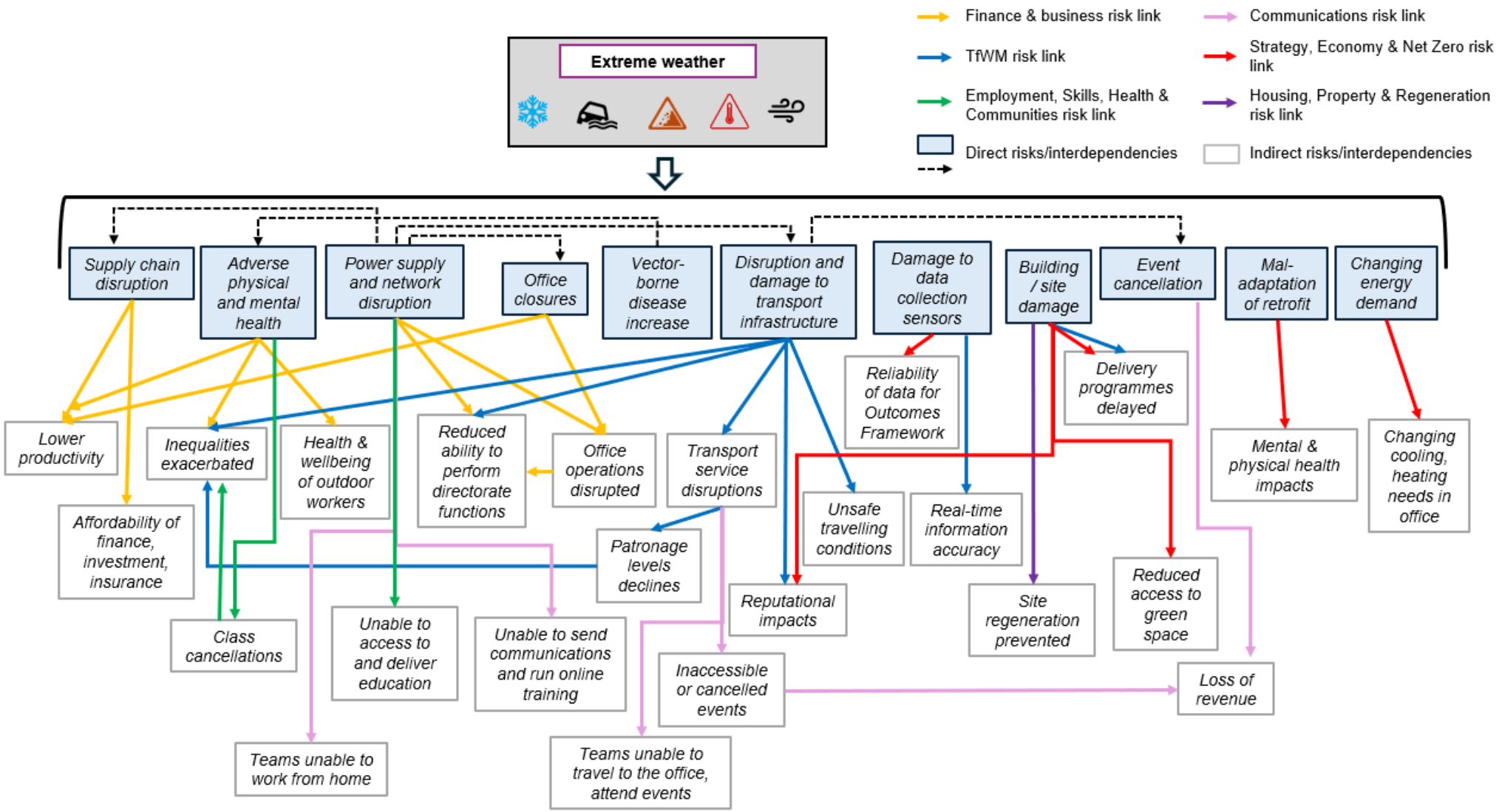


Figure 10 - Interdependent risks across directorates and external drivers

3. Monitoring and Evaluation Framework

Establishing a good monitoring framework is a vital component of climate adaptation, as it allows for ongoing assessment of the performance and effectiveness of adaptation actions. Alongside this report, the WMCA have produced an Excel spreadsheet setting out a monitoring and evaluation plan which includes the following:

Risks addressed	Implementation timetable
Category of action	Benefits and challenges
Definition of success	Metrics and indicators to assess performance of action
Business function	Residual risk score post actions, with justifications for scores
Risk/action owner	Interdependencies with other organisations and/or sectors

The monitoring and evaluation framework is set out in detail within the accompanying Excel spreadsheet 'Action log and monitoring' (Table 16 and Appendix 4). This covers all the above aspects of actions, setting out key timelines, dates and action owners. This report outlines details of the framework and provides further context on interdependencies and definitions of climate resilience success.

The monitoring and assessment framework provides a mechanism for effectively capturing adaptation actions as defined in this report. The monitoring and evaluation framework will be formally reviewed every five years, but it also serves as a database to continually track progress against actions including: understanding which actions to prioritise; assigning responsibilities for delivering and monitoring actions; identifying any gaps in the adaptation plan based on residual risk scores and/or emerging risks; and any barriers to address or collaborations required for successful implementation of actions.

Identifying interdependencies is also important due to the potential for cascading risks. Understanding interdependencies both internally and externally will support establishing partnerships to understand risk ownership and deliver actions collaboratively. Moreover, through understanding interdependencies, efficiencies can be realised through identifying and implementing actions that mitigate multiple risks. Similarly, there is an opportunity to realise synergies between climate resilience, delivering net zero, delivering sustainability objectives and other commitments.

	A	B	C	D	E	F	G	H	I	J	K
1	**Action logging and monitoring**										
2											
3											
4	Risk code	Actions to address risks (including ARP1-3 actions)	*Temporary column for tracking* Section of report/Directorate	Category of Action : *0 - building internal adaptive capacity capability through integrating climate change into governance and risk management* *1- scoping, monitoring and identifying impacts / risks* *2- consideration of impacts, risks and likely actions with stakeholders* *3 - implementation of actions to address impacts / risks and maintain delivery of the organisation's functions* *4 - monitoring actions, evaluation against original plans, reassessment of risks, management system audit (against adaptation best practice)* *(N.B. 1,2,& 4 are management system actions whilst 3 is more closely associated with the actions*	Monitoring and evaluation (what does success look like?)	Ownership/ business function	Risk owner **Include all owners if multiple risks associated with action**	Action owner **Multiple owners if multiple risks associated** **if managed externally see interdependencies column**	Implementation timetable	Status of actions (planned, current or completed)	Benefits/ challenges / barriers experienced (qua possible)
5											
6											
7	All Tr risks	Establishment of TfWM Adaptation Working Group.	Transport for West Midlands	0,1,2,3,4	An established group of climate adaptation champions within TfWM and established mechanisms for integrating adaptation.	TfWM	Policy, Strategy & Innovation	Policy, Strategy & Innovation	2026	Completed	+Improved climate adaptation literacy and know continuous improvement. +Resource optimisation for executing actions. +Improved buy-in and support of initiatives. -Complex coordination to manage resources, re maintain efficiency.
8	Tr07, Tr08	Establish secondary location for accessing Regional Transport Coordination Centre (RTCC) and closed-circuit television systems (CCTV).	Transport for West Midlands	3	An established secondary location for accessing the RTCC and CCTV systems.	TfWM	Network Resilience	Network Resilience	2030	Completed	+Increased resilience of operational capabilities events. -Increased operational costs relating to mainten -Greater complexity of management required for locations (e.g. managing resourcing and securit

The Climate Adaptation Project Officer will liaise with action leads on a bi-annual basis to review and document progress towards action completion and to identify barriers that may preventing actions from moving forwards. The scoring criteria used to monitor progress is outlined in Table 18 and reflects the scoring criteria used by the Climate Change Committee in their latest progress report on national adaptation action which was published in March 2023. Annual progress reports will be circulated with the WMCA's Executive Board of Directors. The reporting of risks and progress against adaptation actions will evolve over the next five years if the decision is made to add the 'failure to adapt to climate change' to the WMCA's strategic and operational risk registers.

Score	Criteria
Good progress	Indicators are moving in the right direction or being maintained at a high level.
Mixed progress	Scome indicators are moving in the right direction, others are stagnant at a low level or moving in the wrong direction.
Insufficient progress	Indicators are stagnant at a low level or are moving in the wrong direction.
Unable to evaluate	Limited or no available data.

Table 18 - Monitoring and Evaluation Scoring Criteria

Table 19 - Actions for monitoring and evaluation

Category of actions key:

0 - *building internal adaptive capacity capability through integrating climate change into governance and risk management*
1 - *scoping, monitoring and identifying impacts / risks*
2 - *consideration of impacts, risks and likely actions with stakeholders*
3 - *implementation of actions to address impacts / risks and maintain delivery of the organisation's functions*
4 - *monitoring actions, evaluation against original plans, reassessment of risks, management system audit (against adaptation best practice)*

Status of actions key:

Completed/ongoing – actions that have been completed or are delivered on an ongoing basis.
Current – actions that are underway.
Planned – actions that have been planned for, with allocated resource or a route to delivery.
Potential – recommended actions that respective teams might choose to take forward, should risk appetite and capacity permit.

Risk ID	Action (and category of action*)	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
All risks	**Evolve the monitoring and evaluation framework** to measure progress against actions every 5 years, with continuous ongoing review by risk owners. 4	Current	Ensures understanding of risk is up to date and delivery of schemes is prioritised, with accountability for performance.	Completed as part of ARP4. All risks should display a decreased or maintained same level of risk *by 2030 relative to 2025* following the implementation of adaptation actions.

3.1 Compliance with international standards (ISOs) on adaptation

WMCA have reviewed have applied the guidance provided by Defra, based on the various international standards (ISOs for climate adaptation.

ISO 14090

WMCA have aligned their approach with ISO 14090 by securing senior leadership approval of this report and engagement with the resourcing of the actions. The Environment Team plan to engage with senior leadership on the organisation's approach to climate risk management and integration with strategic and corporate risk management systems. WMCA have further complied with ISO 14090 by introducing an additional category of activity – 'building internal adaptive capacity'. This demonstrates the WMCA's commitment to using this first round of reporting to develop the enabling conditions required for strategic and coordinated climate adaptation delivery later down the line.

4. WMCA levers to promote and mainstream climate adaptation

4.1 Background

In March 2024 the WMCA produced an initial, internal Climate Adaptation Plan, which was approved by the Board of Executive Directors in May 2024. The purpose of the plan is to support workstreams across the organisation in understanding the climate risks that their remit might be exposed to and to identify the first steps needed to deliver appropriate adaptation action. The plan is a foundation for the work developed through this response to the fourth round of adaptation reporting, and outputs from this round of reporting (including this report) will build on this initial foundation.

Within the initial Plan, there are some initiatives that will help to build the organisation's adaptive capacity, a critical stage of the WMCA's journey towards adaptation action (Figure 11).

This chapter summarises the actions that the WMCA already have in place for building adaptive capacity and mainstreaming climate adaptation through existing policy and delivery levers. These more strategic levers have not fallen within the scope of the climate risk assessment completed in this round of reporting but do have the potential for promoting adaptation both within the organisation and beyond.

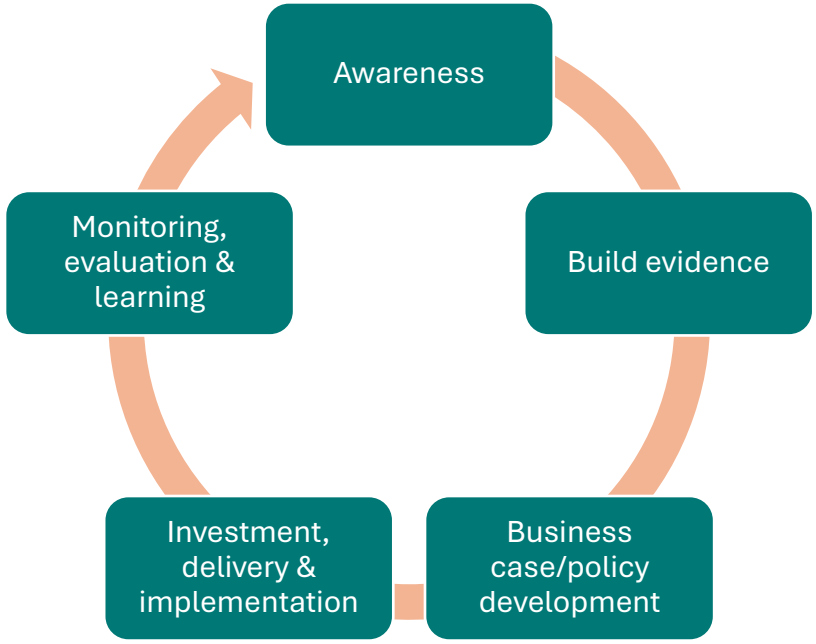


Figure 11 - WMCA Adaptive Capacity Building Cycle

4.2 Building adaptive capacity

Much of the WMCA's Climate Adaptation programme is focused on building the organisation's adaptive capacity and developing projects and resources that can build the adaptive capacity of partners in the region.

4.2.1 Climate Adaptation Literacy

The WMCA already run a range of awareness raising and literacy programmes, including Carbon Literacy Training and Air Quality Literacy. The Environment Team are currently developing projects that can raise awareness of climate adaptation and increase the literacy of public sector officials on the topic.

Table 20 - Adaptation Literacy Actions

Risk ID	Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
All risks	Climate adaptation literacy e-modules developed and will be released in 2025 to improve climate literacy across the WMCA and partner organisations.	Current	+ Greater climate literacy provides an opportunity for directorates to take greater ownership of their climate risks and actions. - Resourcing may present a blocker in the development of the e-modules alongside other commitments in terms of climate risk reporting.	Release of climate adaptation literacy e-module *by end-2025*. *Bi-annual updates to the literacy e-modules* to reflect changes in climate projections and innovations in adaptation options.
All risks	Develop a climate adaptation guide/checklist to inform policymakers, capital project managers and asset managers of the climate risk and adaptation considerations they can build into their policy/project design. This should include a summary of future climate scenarios, of relevant national standards and legislation already in place.	Planned	+ Policymakers and capital project designers know how to review their plans for climate risks and suggested adaptation solutions. - Not all sectors/work areas will be covered in great detail. - Respective teams will be required to develop more detailed standards/policy/guidance for their work areas.	Publish a policy and capital project guide to climate adaptation by *end-2025*.

4.2.2 Climate adaptation evidence base

Making the case for climate adaptation

Image 1 - Screenshot of the WMCA's guide to nature-based sustainable drainage

Case study: a guidance document on the benefits of nature-based sustainable drainage systems

In 2024, WMCA produced a guidance document on the use of nature-based sustainable drainage systems (NbSuDS). The document highlighted the multiple benefits that these nature-based solutions can bring about, and outlined the multiple planning regulations that NbSuDS can help developers to comply with. NbSuDS are a great example of how climate adaptation interventions can bring about multiple co-benefits, such as the provision of green space for communities and habitats for pollinators and other wildlife.

Case Study 8 - Guidance on Nature-based sustainable drainage systems

Case study: An Economic Impacts Assessment of Climate Change on the West Midlands

In 2024, WMCA commissioned experts from Paul Watkiss Associates and Sustainability West Midlands to investigate the current and projected economic impacts of climate change in the region. Three strands of analysis were completed:

1. The downscaling the results of two macro-economic studies to the WMCA area
2. A monetary valuation of regional climate risks
3. Costing three recent severe weather events in region.

This project contributes to a wider aim of building a substantial evidence base on the impacts of climate change in the region and make the case for adaptation delivery across a range of stakeholders. See the Executive Summary document here.

Case Study 9 - Economic impacts of climate change on the West Midlands

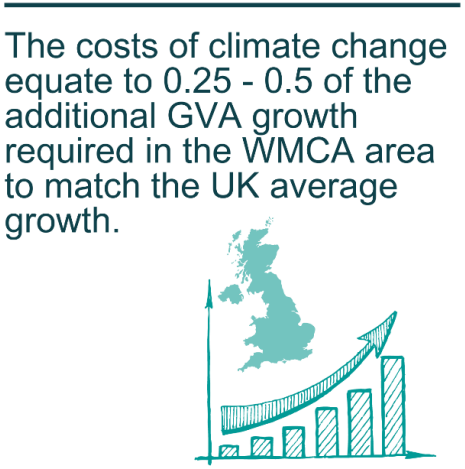


Image 2 - Infographic from the Executive Summary of the economic impacts assessment of climate change on the West Midlands economy

Climate risk and vulnerability mapping

Since October 2023 the WMCA have been working with the University of Birmingham to develop climate risk and vulnerability assessment (CRVA) mapping tools for the organisation's constituent authority area.

Case study: Climate Risk & Vulnerability Assessment (CRVA) for West Midlands transport

Each category of transport asset, from roads and railways to bus stops and depots, has been mapped in a transport vulnerability assessment.

Assets have been given a 'criticality score', and 'adjustment factors' have been added for particularly important use cases such as common bus routes. These scores have been combined with scores of vulnerability against different climate hazards (like high winds, temperatures and flooding)

This scoring provides estimates of where climate risks are likely to cause the biggest impact in the West Midlands for transport.

Case Study 10 - Transport Climate Risk & Vulnerability Assessment (CRVA)

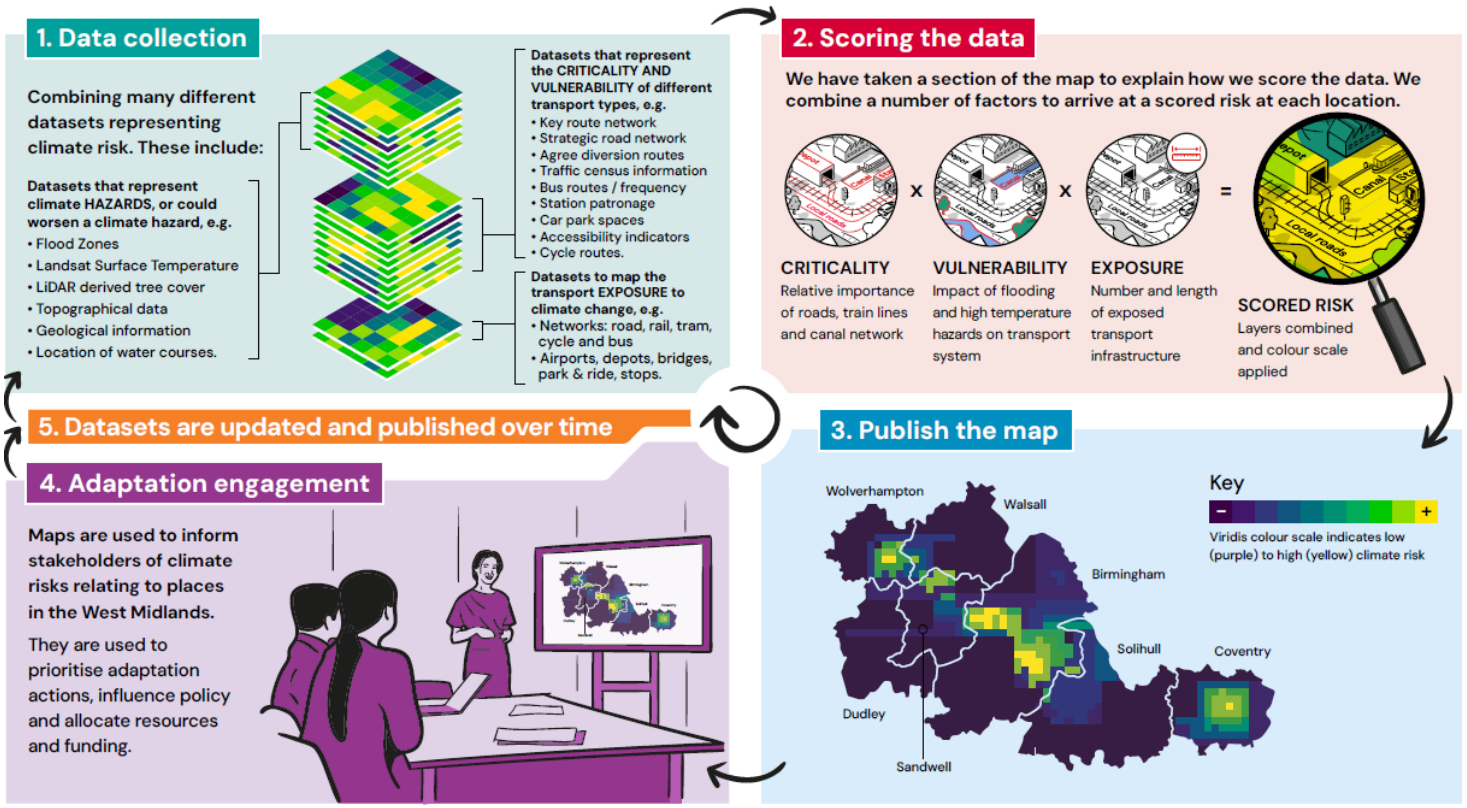


Figure 11 – Transport Climate Risk & Vulnerability Assessment Methodology

Case study: a West Midlands Socio-Economic Climate Risk & Vulnerability Assessment (CRVA)

The publicly available socio-economic mapping tool pulls together data relating to climate hazards, fourteen indicators of socio-economic vulnerability and population density across the WMCA area. These datasets are mapped, scored and combined to provide an overall risk and vulnerability scores for different areas.

The CRVA data has been published at lower super output area (LSOA) resolution to help users identify areas of hyperlocal high climate risk and the factors that contribute to this. The methodology document is available here.

Case Study 11 - Socio-economic Climate Risk & Vulnerability Assessment (CRVA)

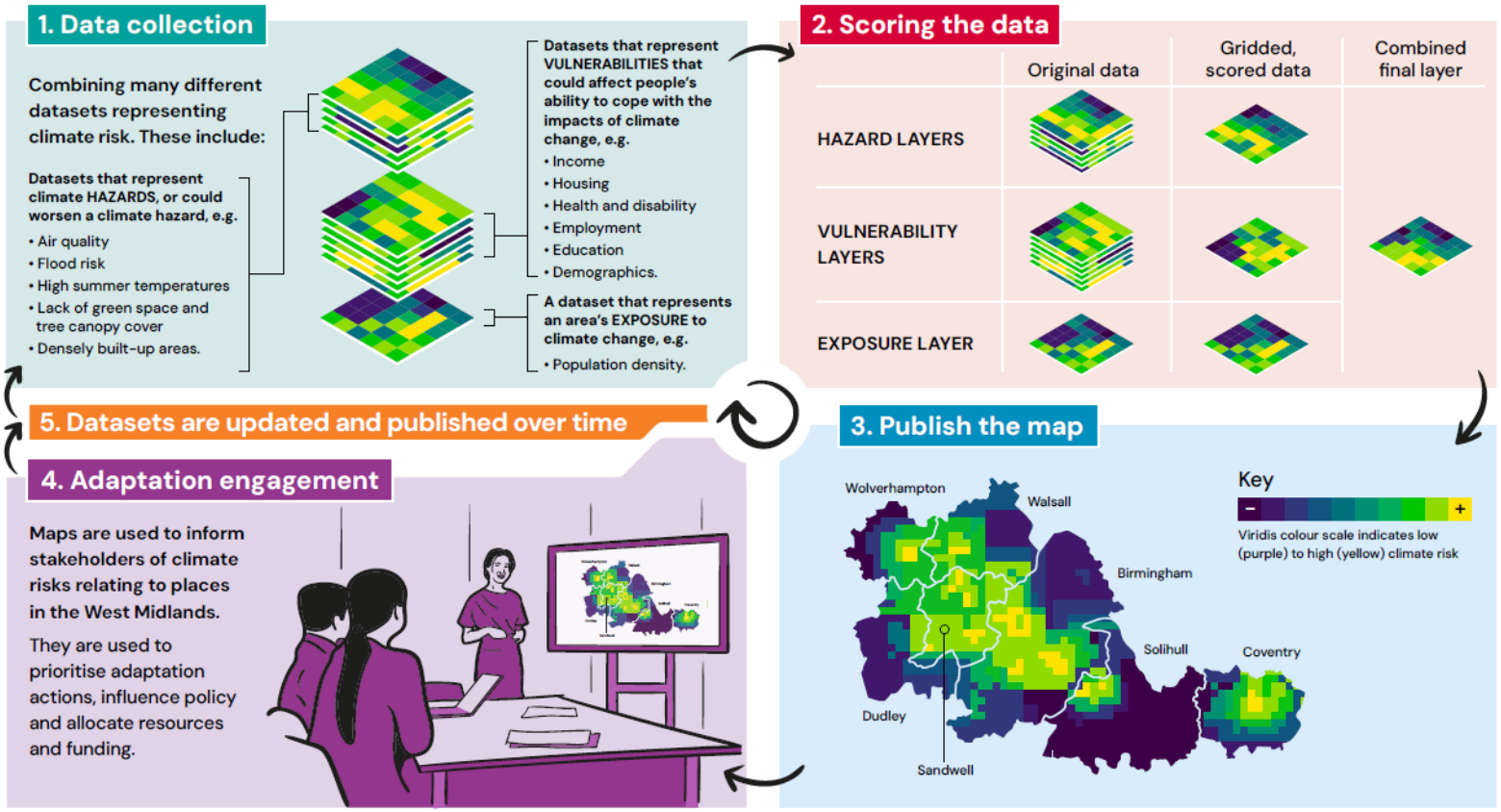


Figure 12 – Community Climate Risk & Vulnerability Assessment Methodology

Actions in Table 21 identify how the WMCA will enhance the initial CRVA tools presented in the previous two case studies (see Case Studies 10 & 11) which are considered minimum viable products. This will allow us to continue developing the evidence base to make a stronger social, environmental and commercial business case for climate adaptation projects and its integration with other programmes.

Table 21 - Evidence building actions

Risk ID	Action (and category of action*)	Status	Benefits (+)/ Challenges (-)	Performance metric(s) and commitment(s)
All risks	Develop a transport-focused Climate Risk and Vulnerability (CRVA) tool. 1 2	Current	+ Informed decision-making and planning. + Opportunity to be used in conjunction with the social and built environment CRVA tool. + Supports integration of climate resilience into designs and identification of adaptation costs that can be considered during the capital renewal budget spend.	To have an evolving climate risk mapping tool that is accessible to TfWM staff and partners so that they can prioritise transport networks and nodes for adaptation investment *by 2025*.
All risks	Develop an enhanced version of the socio-economic CRVA that covers: Future CRVA layers for heat and flood risk for different Representative Concentration Pathways (RCPs): RCP 2.6, RCP 4.5, and RCP 6.0. A model of present day and projected urban heat islands across the WMCA area. A methodology for mapping the health impacts of selected climate risks at the most granular resolution available. A methodology for mapping the economic impacts of selected climate risks at the most granular resolution available.	Planned	+ Informed decision-making and planning for long-term scenarios. + Greater understanding of the 'so what?' associated with climate risks. - Tied to research objectives rather than policy objectives. - Granular data may not be available to understand quantify impacts at the local level.	To have a second, enhanced version of both the transport and socio-economic climate risk and vulnerability assessment (CRVA) tools, publicly available by *end-2026*. To have case studies of decision-making that has accounted for the intelligence stemming from these tools by *end-2027*.
All risks	Research and analysis to map WMCA vulnerability and assess impacts and financial costs of climate change to the organisation.	Potential	+ Better understanding of financial risks from climate change. + Raises the case for early investment and adaptation to decision makers.	Work with academic and industrial partners to improve understanding of exposure and vulnerability to climate change and quantify impacts where possible.

Risk ID	Action (and category of action*)	Status	Benefits (+)/ Challenges (-)	Performance metric(s) and commitment(s)
	Project the 'numbers behind future climate change' (i.e. the number of staff, assets and/or operations at risks and associated financial costs if no action is taken versus effective adaptation).		- Dependent on capacity of staff from across the WMCA to develop this research. - Dependent on data covering past impacts being available.	

4.3 Mainstreaming adaptation across directorates

4.3.1 Employment, Skills, Health & Communities

The Health & Communities team publish annual Health of the Region reports and work to address four key challenge areas:

1. Improving outcomes for Black, Asian and Minority Ethnic communities
2. Tackling the wider determinants of health
3. Widening access to health and care
4. Enabling people-powered health

The WMCA's Systems Change and Inclusion team work to address key social challenges including:

- Addressing race inequalities
- Giving young people a voice in decision making
- Championing equality, diversity and inclusion
- Improving community engagement
- Developing approaches to social innovation

The WMCA recognise that each of these challenges will be exacerbated by climate impacts, if the organisation fails to adapt and increase regional climate resilience.

Table 22 - Mainstreaming adaptation: Employment, Skills, Health & Communities

Action (and category of action*)	**Status**	**Benefits (+)/ Challenges (-)**	**Performance metric(s) and commitment(s)**
Develop a climate adaptation and health evidence base for the West Midlands, including the development of a climate and health monitoring framework. Secure health partner buy-in to climate adaptation to be integrate with public health policies and interventions.	Planned	+ To have a baseline understand of how severe weather impacts health in the region. + To have a network of health partner stakeholders to engage and work with on climate adaptation.	A West Midlands framework for health and climate indicators is published by *end-2025*. Climate impacts are included in WMCA's *Health of the Region reports*.

Action (and category of action*)	Status	Benefits (+)/ Challenges (-)	Performance metric(s) and commitment(s)
		- Depends on data availability at the local scale. - Depends on health partner capacity and existing understanding of the topic.	
Run a workshop with the Faith Strategic Partnership Group to share the concept of adaptation and resilience and establish what their role might be.	Potential	+ Better understanding of financial risks from climate change. + Raises the case for early investment and adaptation to decision makers. - Capacity and appetite of faith groups to engage in this topic might be limited.	Hold two workshops with members of the Faith Strategic Partnership Group *by 2027*.
Engage the Young Combined Authority to increase their literacy on climate adaptation and better understand how climate change impacts young people.	Potential	+ Increase literacy and interest of young people to advocate for climate adaptation. + Increased understanding of climate impacts disproportionately facing young people. - Capacity and appetite for the YCA to engage in this topic might be limited. - The YCA is going through a change of structure which might delay engagement.	Hold at least one engagement session with the YCA on climate adaptation *by 2026*. Produce a one-pager summarising climate impacts on young people in the West Midlands *by 2027*.
Environment Team to work with Skills and Adult Education Team on 'green skills'. This collaboration would include skills provision and analysis relating to climate adaptation.	Potential	+ Skills gaps for adaptation delivery are identified. + Evidence base for adaptation skills provision is developed. - Dependent on data regarding existing skills gaps for green skills.	Produce a needs assessment and business case for increasing Environmental skills provision *by 2030*.

4.3.2 Housing, Property & Regeneration

The Housing, Property and Regeneration (HPR) directorate secure funding to support housing and regeneration schemes across the region. Funding is used to tackle barriers that impact delivery, to acquire land and building and to de-risk the regeneration of the region. The team help to develop policy solutions for housing including Help to Own and support local plans and master planning, providing expertise and unlocking land to turn sites into new homes, jobs and communities. Strategic Planning, Building and Fire Safety. Homes for the Future and Design and Social Value review all fall within the remit of HPR's Policy & Planning team. The table below outlines proposed actions for using HPR policy and strategy to mainstream climate adaptation.

From a broad financial point of view, if the crystallisation of HPR risks lead to increasing costs of undertaking housing development, there could be an impact on the ability of developers and others to deliver housing units. For WMCA, the funds available to fill viability gaps in development activity undertaken by housing developers and others that rely on WMCA Housing funding, it could reduce the number of housing units that can be delivered with existing and / or future Housing funding.

Table 23 - Mainstreaming adaptation: Housing, Property & Regeneration

Action (and category of action*)	Status	Benefits (+)/Challenges (-)	Performance metric(s) and commitment(s)
Increase the significance of climate resilience in the upcoming design charter update. Include reference to the West Midlands CRVA maps once ready, alongside other available evidence.	Planned	+ Developers understand what climate adaptation considerations could be designed into their schemes.	Include more detail on climate adaptation in the updated design charter *by 2027*. Signpost developers to climate risk and adaptation resources.
		- The Design Charter is a high-level document and acts as a guide rather than mandatory design features required.	

Work with the Environment Team to integrate climate risk considerations and climate adaptation policy into the emerging high streets programme and other policy developments.	Potential	+ Climate risk and adaptation are designed into policy developments from the outset instead of shoe-horned in retrospectively.	Climate risk assessments to be interwoven into all emerging HPR policies *by 2027*. Place-based HPR work to be reviewed in relation to CRVA scores and contributing factors.
Explore opportunities to work with Local Authority planning leads to embed climate adaptation and resilience outcomes in upcoming regional spatial plans that are likely to emerge from recent National Planning Policy Framework (NPPF) updates.	Potential	+ Spatial plans are designed to account for climate risk and improve place-based climate resilience. + Partners across different levels of government are engaged in spatial climate adaptation planning. - Dependent on sector capacity and appetite to engage on the topic. - Dependent on climate risk data being available at the appropriate resolution.	Meet *biannually* with the WMCA's Development Needs Group to improve adaptation literacy amongst LA planners and disseminate adaptation resources. Climate risk and hazard data sits within the wider bank of evidence informing spatial planning *by 2026*.
Explore opportunities to work with the built environment and insurance sectors to identify how climate risks might impact the insurability and affordability of properties in the region in the coming decades.	Potential	+ Improved affordability of housing across the West Midlands, irrespective of climate risk. + Opportunity to generate private finance in the region to support climate risk mitigation measures. - Dependent on WMCA capacity and connections with existing programmes. - Dependent on sector appetite and capacity to engage.	Develop a plan for engagement with appropriate sector partners by *end-2026*.

With the sector, identify what impact climate change might have on homelessness prevention and services.	Potential	+ Better understanding of climate risks to homeless people and services.	*Bi-annual* engagement with the homelessness sector on potential for adaptation activity. *Bi-annual* engagement with the homelessness sector to monitor impact of severe weather on services and outcomes.
		- Capacity and appetite for the sector to engage in this topic might be limited.	

4.3.3 Strategy, Economy & Net Zero

The WMCA's Climate Adaptation programme continues to develop the evidence base and policy guidance needed to build adaptive capacity both within the WMCA and across the wider region.

Environment

Climate adaptation is integrated across workstreams within the WMCA's Environment programme including Natural Capital, Behaviour Change and the Circular Economy.

In June 2023 WMCA was appointed by Defra as the Responsible Authority for delivering the Local Nature Recovery Strategy (LNRS) for the West Midlands. The Environment Team are also running a £1m Defra funded Local Investment in Natural Capital (LINC) programme, focused on building capacity and capability in local leaders and partners to attract private finance into natural capital projects.

Table 24 - Mainstreaming adaptation: Strategy, Economy & Net Zero

Action (and category of action*)	**Status**	**Benefits (+)/ Challenges (-)**	**Performance metric(s) and commitment(s)**
Incorporate climate adaptation and resilience as a 'wider environmental issue' to be captured as a priority within the West Midlands LNRS that is in development.	Current	+ Better understanding of climate risks facing nature recovery. + Raises the case for early investment and adaptation to decision makers. - Climate adaptation will be one priority amongst a range of priorities identified through the LNRS.	Work with academic and industrial partners to improve understanding of exposure and vulnerability to climate change and quantify impacts where possible.
Explore the potential to unlock private investment into nature-based solutions (NbS) and green infrastructure (GI) to achieve climate adaptation and resilience outcomes through the Local Investment in Natural Capital (LINC) programme.	Current	+ Closing of the adaptation finance gaps. + Streamlining work on adaptation financing. - Market for adaptation/resilience outcomes does not yet exist. - No saleable units currently exist for resilience outcomes.	Climate adaptation and resilience to be listed as a priority outcome within the LINC programme's project pipeline.

Case study: West Midlands Greener Together Citizens' Panels on Climate Adaptation

Throughout 2024, the Environment Team ran four climate adaptation-focused Greener Together Citizens' Panel sessions, bringing together 30 residents from across the region to deliberate and provide actions for us to take on in climate adaptation delivery.

The Panel sessions covered:

1. An introduction to climate change and its effects.
2. Climate adaptation projects
3. How can nature recovery help us to adapt?
4. How can we adapt the transport system for climate change?

Case Study 12 - Greener Together Citizens' Panel

Image 3 - West Midlands Greener Together Panel Membership for 2024

What the panel said: 10 key themes from Block 3

Looking across discussions block 3 sessions, the Panel tend to be *most* enthusiastic about climate adaptation measures when they:

1. Appear to be of good value with visible adaptation impacts
2. Offer co-benefits for the health of people as well as nature
3. Bring people closer to nature and improve access to green spaces
4. Have a transformative power for localities, improving how places look and feel and boosting local pride
5. Bring neighbours together
6. Avoid complexity and controversy, with fewer opportunities for plans to come unstuck along the way
7. Include an element of education and information-sharing that will help them land with the public
8. Engage people in decision-making rather than trying to impose change
9. Create sense of ownership involving local people in the work
10. Take account of fairness and protect people who most need support

Case study: West Midlands Natural Environment Summit

In October 2024 the Environment Team organised and hosted the first West Midlands Natural Environment Summit. This was an opportunity to explore and discuss the latest developments in natural environment policy and delivery, with a focus on nature for urban areas. The day covered three themes: nature for cities, nature finance and local delivery and capacity building.

An afternoon breakout session focused on nature-based solutions for urban challenges. With overheating, surface water flooding and the effects of storms being key climate risks facing urban areas in the West Midlands, the team were pleased to frame climate resilience as a key outcome that nature can help us achieve.

Case Study 13 - West Midlands Natural Environment Summit

Image 4 - Natural Environment Summit Panel Discussion

Energy Capital

Energy Capital is the regional energy partnership for the West Midlands that brings the public, private and third-party sectors together to deliver place-based energy solutions. Energy Capital are currently leading the refresh of the West Midlands Regional Energy Strategy.

Table 25 - Mainstreaming adaptation: Energy Capital

Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
Incorporate climate risk and adaptation consideration in Energy Capital's emerging heat network programme, considering infrastructure risks and cooling demand needs, the likely impact and transition needs to deliver additional demand.	Current	+ Preparation for future climate change and changing energy demand. + Ability to adapt infrastructure appropriately according to risks.	Update documentation associated with the Energy Capital's emerging heat programme *by 2026*.
Work with National Grid Electricity Distribution (NGED) existing vulnerability to infer vulnerability points for West Midlands.	Planned	+ Establish partnership with National Grid to find opportunities to reduce vulnerability of energy network - Not all system vulnerabilities may be identified through NGED	Completion of a database of key vulnerable energy infrastructure to various relevant climate hazards *by 2030*.
Incorporate the WMCA's CRVA into Energy Capital's emerging Local Area Energy Planning processes.	Planned	+ Net zero retrofit measures and area energy plans are reviewed for climate risks and opportunities for adaptation co-benefits. - Use cases of integrating CRVA data not fully developed and costed.	CRVA data is integrated into or signposted from in the LAEP+ platform *by 2026*.
Embed climate risk and adaptation considerations in Energy Capital's forthcoming regional energy strategy. Relevant sections of the strategy include: • Opportunities Beyond Net Zero • Metrics linked to aims	Planned	+ Risks to regional energy security include climate risks. + Climate resilient energy provision guides regional energy strategy as a key outcome.	Updated regional energy strategy includes climate resilience in publication *by 2026*.

Devolution and Integrated Settlement

As part of the development of the WMCA's Integrated Settlement, the WMCA are developing place-based strategies and a West Midlands Outcomes Framework to guide spending and monitor progress against key outcomes.

Table 26 - Mainstreaming adaptation: Devolution & Integrated Settlement

Action	Status	Benefits (+)/ Challenges (-)	Performance metric(s) and commitment(s)
Work with Defra and MHCLG on emerging opportunities for the devolution of climate adaptation responsibilities and resources.	Current/ ongoing	+ Increased regional capacity to drive climate adaptation policy and delivery. + WMCA have the authority to lead regional climate adaptation work. - As it stands, local authority partners have limited capacity to engage in this workstream.	Regular meeting with Defra officials and elected members regarding opportunities for a devolved role or pilot project.
Alongside other environmental priorities, ensure that climate risks and adaptation options are embedded in investment processes for Integrated Settlement spending.	Planned	+ Investment decisions are future proofed against climate risks. - Climate adaptation is one consideration amongst many priorities that investment decisions should consider. Capacity to consider these in a meaningful way may be limited.	Provision of guidance to decision-makers as part of Integrated Settlement process *by 2026*.

WMCA Economic Policy and Growth Plans

The WMCA's Plan for Growth outlines credible pathways for economic growth and job creation. It outlines eight economic clusters that have been identified as offering the region significant potential growth rates.

Table 27 - Mainstreaming adaptation: Economic Policy

Action	Status	Benefits (+) / Challenges (-)	Performance metric(s) and commitment(s)
Increase the literacy of the Plan for Growth cluster leads and cluster community on the topic of climate risks and climate adaptation. Work with cluster leads to develop climate adaptation plans for each cluster identified in the Plan for Growth. This can be extended to wider industrial sectors where appropriate, such as the night-time economy.	Current	+ Better understanding of financial risks from climate change. + Raises the case for early investment and adaptation to decision makers. - Cluster leads lack capacity and existing adaptation literacy to engage in the topic. - Cluster leads have competing priorities and climate adaptation is not one of them.	Hold engagement sessions with half of the cluster groups *by 2026*. Co-develop climate risk assessments for each cluster *by 2027*.
Environment Team to work with the Economy Team to integrate climate risk and adaptation considerations in all new and emerging economic policy developments. Conduct further research based on the initial findings of the economics study exploring climate impacts on the WM economy.	Potential	+ Prevents economic policy from locking in future climate risks. + Reduce impact of climate risks on economic outcomes like growth. - Lack practical adaptation solutions for businesses to adopt.	WMCA have already produced research to understand how much climate impacts might cost the region (GDP/£) without any climate adaptation action. Understand how much climate impacts might cost priority sectors without climate adaptation action *by 2026*.

4.3.4 Transport for West Midlands (TfWM)

The case studies below demonstrate the work already underway to mainstream climate adaptation and resilience into the work of TfWM.

Case study: West Midlands Local Transport Plan (LTP)

The LTP is statutory plan which WMCA has a duty to prepare and implement in collaboration with local authorities and other partners. In developing the LTP WMCA must have regard to relevant legislation and Government policies, and this includes climate change. In lieu of updated national guidance on LTPs, WMCA have started to include climate adaptation and resilience as key part of the new West Midlands LTP.

Recognising that the climate crisis will cause added pressure to be piled onto the transport system, Transport for West Midlands have incorporated climate adaptation into its Local Transport Plan. Creating a network that is resilient to extreme weather events is a part of one of the six 'big moves' that feed into the plan and establishes climate resilience as one of the plan's primary objectives.

Case Study 14 - Climate Resilience in the Local Transport Plan

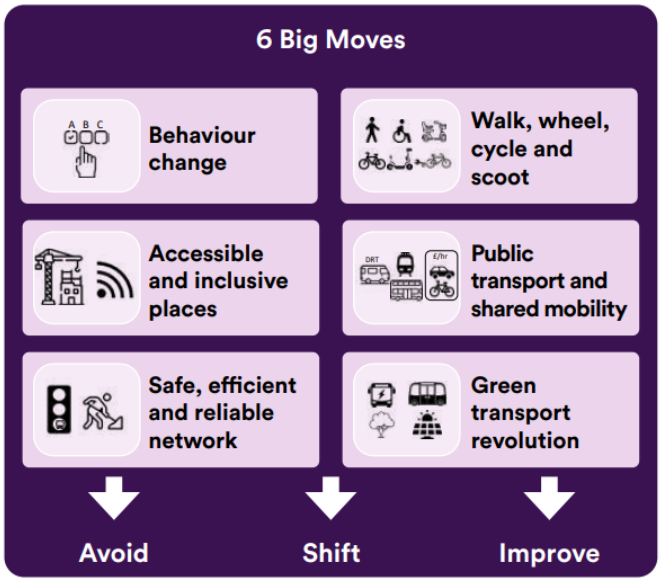


Figure 13 - West Midlands Local Transport Plan Big Moves

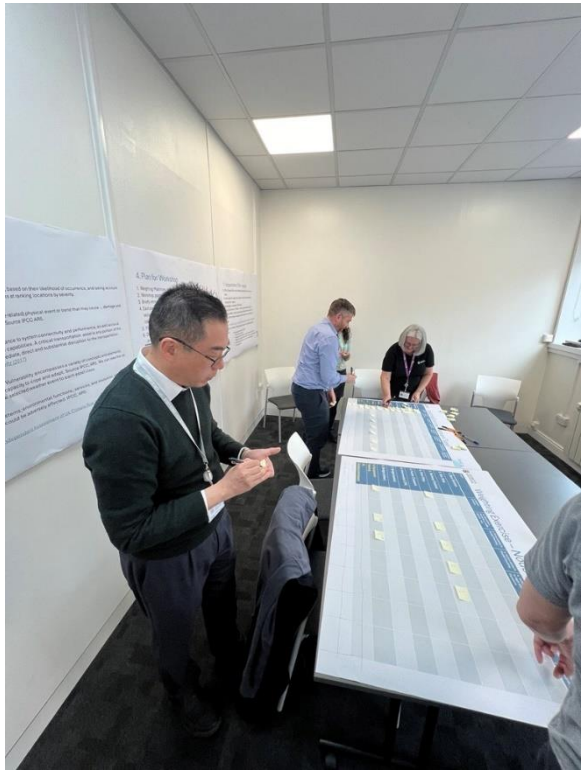


Image 5 - Transport CRVA scoring workshop

Image 6 - Transport CRVA scoring workshop

Case study: TfWM Transport & Adaptation working group

The working group enables climate risks and adaptation measures to be considered across each mode of transport and every type of work delivered by TfWM – from policy/project conception through to design, implementation, and delivery. It is an opportunity for colleagues to learn more about climate risks, bringing together climate-related information and transport expertise to better identify where the opportunities are to embed climate adaptation into existing and upcoming work.

The group meet monthly and have been divided into four sub-task and finish groups to push forward transport-related actions within this report. These task and finish groups include: (1) Roles, Responsibilities, Legislation & Policy, (2) Sector Convening, (3) CRVA & Evidence and (4) Adaptation Literacy & Behaviour Change.

Case Study 15 - TfWM's Transport & Adaptation working group

4.4 Building regional adaptive capacity

4.4.1 Community Capacity Building & Green Infrastructure Projects

Green infrastructure and the services provided by nature-based solutions are key to helping the region's urban landscape adapt and increase its resilience against climate impacts. Since 2021, the WMCA have been building community capacity through grant funding programmes.

Case study: Community Green Grant Programme

The WMCA delivered the Community Green Grants (CGG) programme between 2021 and 2024, awarding grants to community groups to:

+ Increase or improve green spaces close to where people live.
+ Connect people to nature, specifically communities with higher levels of multiple deprivation
+ Enhance the local environment (e.g., tree planting, increasing biodiversity)

For every £1 grant funding, projects returned on average £3.27 in net economic, social and environmental benefit to the WMCA area.

+ Projects improved green space access for 325,397 of the WMCA population.
+ 64,764 m^2 of habitat was created or improved through project delivery.
+ 61% of project budgets were spent locally within the WMCA area.
+ 7 FTE jobs were created.
+ 1,563 hours of training was delivered.
+ 148 new weekly hours of community volunteering created resulted from the delivery of the projects.

Case Study 16 - Community Green Grants

Image 7 - Ekho Collective in Dudley

Image 8 - Measuring tree characteristics & health in Birmingham Botanical Gardens

Image 9 - Climate adaptation workshops delivered by BME United in Wolverhampton

Case study: Community Environment Fund

£920k of grant funding available to support communities in delivering initiatives that improve the environment and people's lives. Small grants of up to £25,000 and large grants of up to £100,000 were awarded for projects under the following project themes:

- Natural environment – to protect, restore and enhance nature and wildlife.
- Access to green space – to provide better access to and community use of green space for health and wellbeing.
- **Climate adaptation – to make communities more resilient and prepared for the impacts of climate change.**
- Circular economy – to reduce waste and keep resources and materials in use for as long as possible.
- Environment awareness – to improve knowledge of environment issues and support behaviour change.

Funded projects with a climate adaptation focus include:

- **Birmingham Botanical Gardens** – a pilot research project to address the need to understand the impact of climate change on the tree canopy in Birmingham.
- **Holyhead Road Allotments** – transforming an area of the site that has become water-logged due to climate change, using more sustainable practices such as habitat creation, water conservation, raised beds alongside climate adaptation workshops for allotments holders and local gardeners.
- **BME United** – delivery of training to approximately 240 members of BME communities in Wolverhampton to enable them to be more resilient and prepared for the impacts of climate change.

Case Study 17 - Community Environment Fund

5. Appendices

Appendix 1 Climate projections

Assessing future climate risks: Heatwaves

Heatwaves will get longer and more frequent and more likely to occur within a given year.

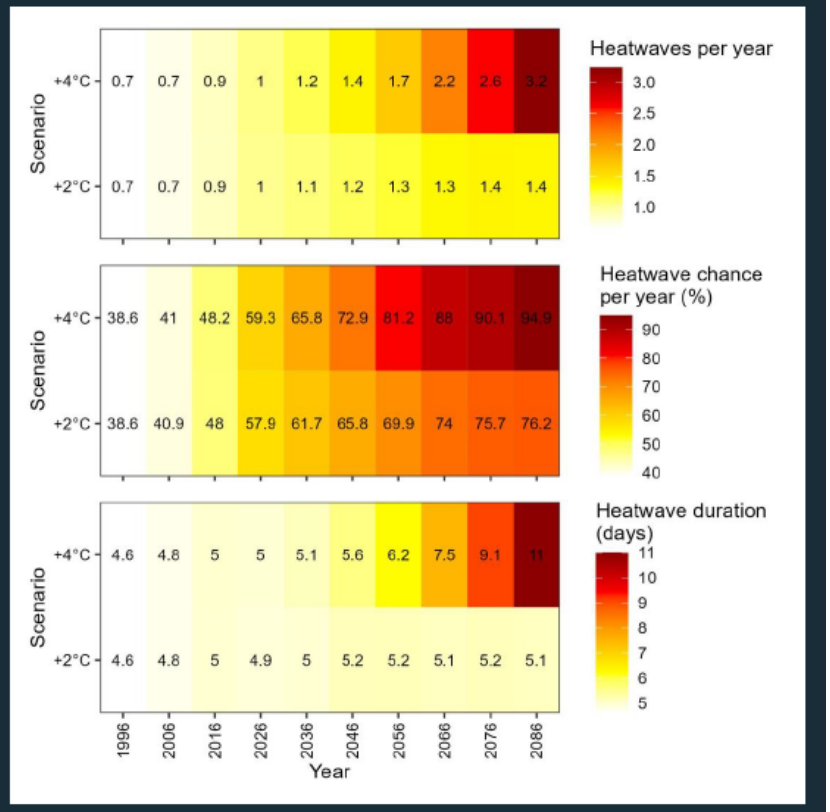
Climate projections can provide a clear indicator on future risk **likelihood**. On average across WMCA local authorities:

- **Current risk:** heatwaves are highly likely (59% chance), with 1 event per year *(likelihood score of 4)*
- **2050, +2°C EoC:** heatwaves are highly likely (70% chance), with ~1.3 events per year *(likelihood score of 4)*
- **2100, +2°C EoC:** heatwaves are highly likely (76% chance), with ~1.4 events per year, *(likelihood score of 4)*
- **2100, +4°C EoC:** heatwaves are almost certain to occur, with ~3 events per year *(likelihood score of 5)*

Climate projections can help us consider future **impacts**.

For example, how would a summer with 3 consecutive 11-day heatwaves compare to a summer with just 1 short 5-day heatwave? Depleted resources/overworked equipment, deteriorating assets, limited recovery time, H&S challenges to maintenance and repair.

- **Current risk:** heatwaves lasting 4.9 days
- **2050, +2°C EoC:** heatwaves lasting 5.2 days
- **2100, +2°C EoC:** heatwaves lasting 5.1 days
- **2100, +4°C EoC:** heatwaves lasting 11 days, multiple within year events likely



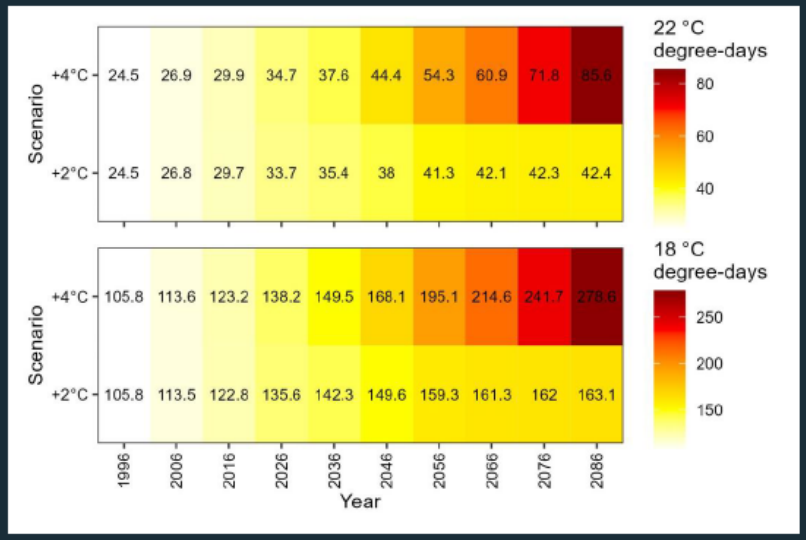
Met Office heatwaves are defined as at least three consecutive days with daily maximum temperatures ≥ 26°C (≥ 27°C for Birmingham) What is a heatwave? - Met Office

7 AtkinsRéalis Private & confidential

Cooling degree days

- **Current risk:** cooling required 34 days a year (22°C)
- **2050, +2°C EoC:** cooling required 41 days a year (22°C)
- **2100, +2°C EoC:** cooling required 42 days a year (22°C)
- **2100, +4°C EoC:** cooling required 86 days a year (22°C)

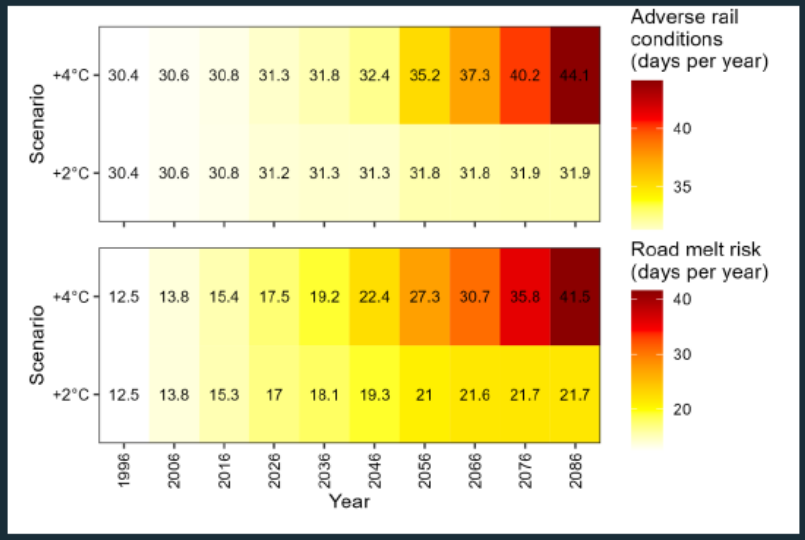
Cooling will be required for more days within the year.



Transport

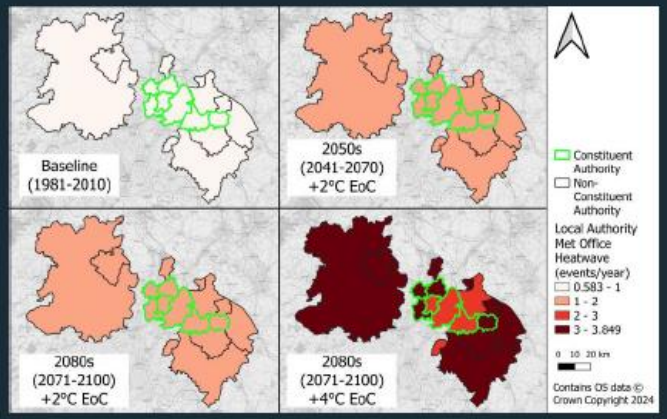
- **Current risk:** rail – 31 days, road – 17 days
- **2050, +2°C EoC:** rail – 31 days, road – 21 days
- **2100, +2°C EoC:** rail – 32 days, road – 22 days
- **2100, +4°C EoC:** rail – 44 days, road – 42 days

Rail and roads will be at higher risk from high temperatures.

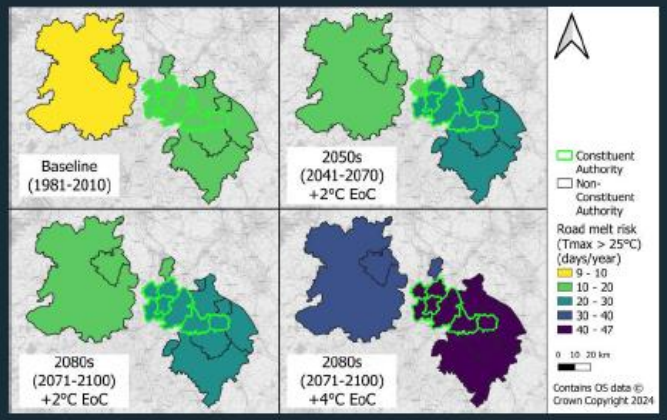


Future climate risks

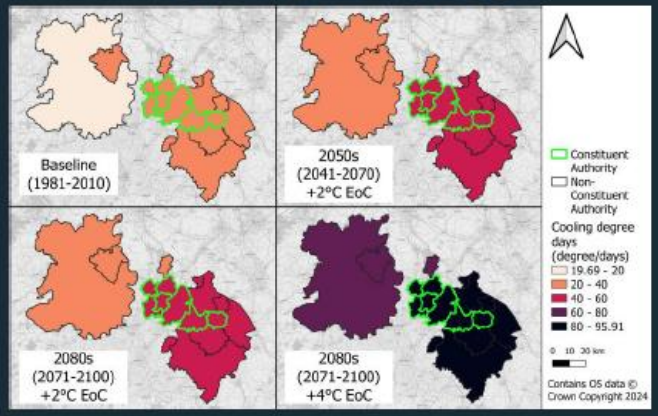
Met Office heatwave



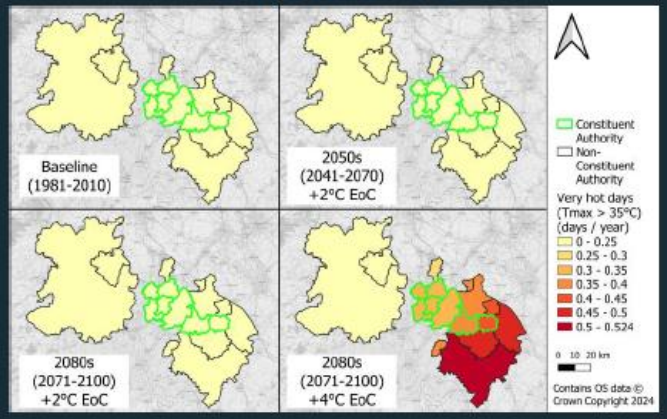
Road melt risk



Cooling degree days



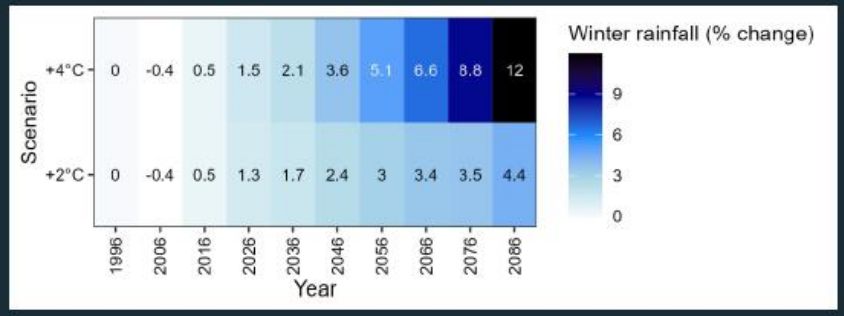
Very hot days



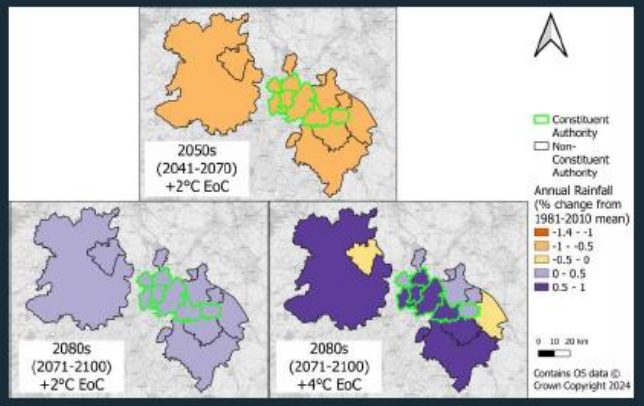
Future climate risks- winter rainfall & flooding

- **Current risk:** winter rainfall 1.3% higher than baseline (1981-2010)
- **2050, +2°C EoC:** winter rainfall 3% higher than baseline
- **2100, +2°C EoC:** winter rainfall 4.4% higher than baseline
- **2100, +4°C EoC:** winter rainfall 12% higher than baseline

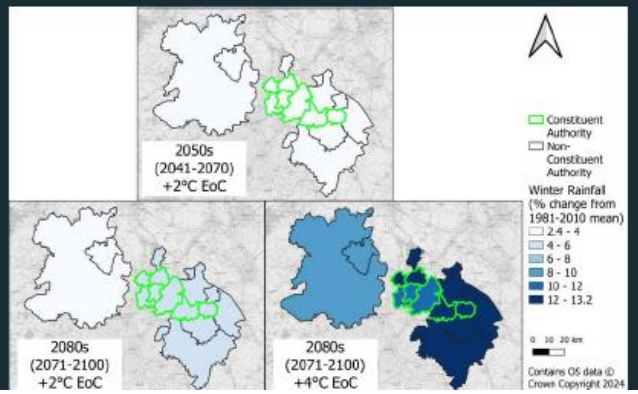
Annual rainfall totals may remain similar due to drier summers, but winter rainfall is projected to increase, with heavy rainfall events set to become more frequent, increasing the risk of flooding and ground movement. Flood risk may also increase due to landscape change (urbanization).



Annual % change in rainfall from 1981-2010



Winter % change in rainfall from 1981-2010



Potential impacts- Data & Monitoring

*Economic impact of **flooding** in the **West Midlands, Staffordshire, and Warwickshire***

Year and scenario based on current levels of adaptation	Expected Annual Damage from all flooding types (£) (direct and indirect)
Baseline (2018)	£75.0m
2050s +2°C by end of century	£98.3m (+31%)
2080s +2°C by end of century	£93.8m (+33%)
2080s +4°C by end of century	£114.3m (+52%)

Appendix 2 WMCA ARP reporting methodology

This document is available upon request by contacting environment@wmca.org.uk. Due to its size, it will be submitted to the Department for Environment, Food and Rural Affairs (Defra) as a separate document.

Appendix 3 Relevant national Climate Change Risk Assessment (CCRA) scores

The third Climate Change Risk Assessment (CCRA3) is the latest assessment of climate risks facing the UK. Each risk is scored and categorised. The CCRA3 risks listed below are those referenced throughout this report, which appear to correspond with the WMCA's organisational climate risks.

CCRA3 risk code	CCRA3 risk	National urgency rating
B1	Risks to business sites from flooding	More action needed
B6	Risks to business from disruption to supply chains and distribution networks	More action needed
H1	Risks to health and wellbeing from high temperatures	More action needed
H3	Risks to people, communities and buildings from river and surface flooding	More action needed
H4	Risks to people, communities and buildings from sea level rise	More action needed
H6	Risks and opportunities from winter and summer household energy demand	More action needed
H8	Risks to health from vector-borne diseases	More action needed
I1	Risks to infrastructure networks (water, energy, transport, ICT) from cascading failures	More action needed
I12	Risks to transport from high and low temperatures, high winds, lightning	More action needed
I2	Risks to infrastructure services from river, surface water and groundwater flooding	More action needed
I5	Risks to transport networks from slope and embankment failure	More action needed
ID7	Risks from climate change on international trade routes	More action needed
B5	Risks to business from reduced employee productivity due to infrastructure disruption and higher temperatures in working environments	Further investigation
H2	Opportunities for health and wellbeing from higher temperatures	Further investigation
H5	Risks to building fabric	Further investigation
H7	Risks to health and wellbeing from changes in air pollution and aeroallergens	Further investigation
I10	Risks to energy from high and low temperatures, high winds, lightning	Further investigation
I13	Risks to digital from high and low temperatures, high winds, lightning	Further investigation
B4	Risks to finance, investment and insurance including access to capital for businesses	Sustain current action

Appendix 4 Comprehensive risk assessment, action planning and action logging matrices

Due to its size, this appendix will be submitted to the Department for Environment, Food and Rural Affairs (Defra) as a separate document.

Appendix 5 TfWM Pert Chart of planned actions per task and finish group