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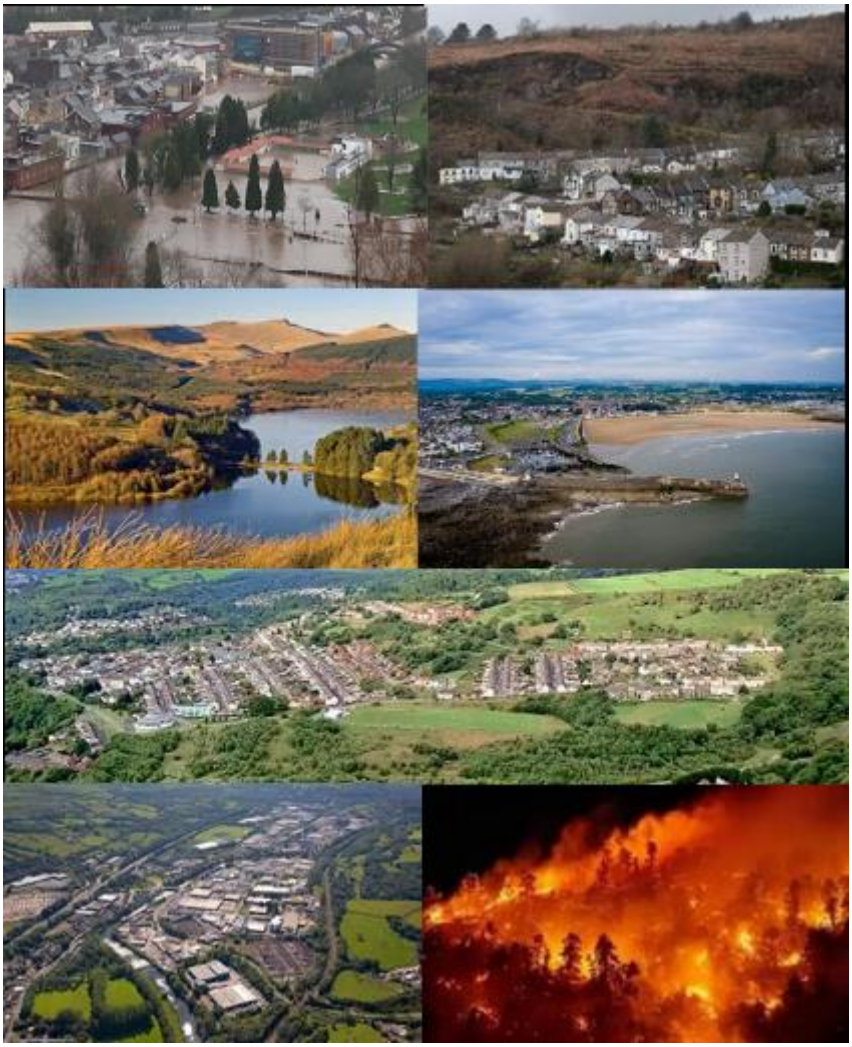
CWM TAF MORGANNWG
CLIMATE CHANGE RISK ASSESSMENT



NOVEMBER 2024

Commissioned by:

Cwm Taf Morgannwg Public Services Board

CWM TAF MORGANNWG

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INTRODUCTION & BACKGROUND

a) Dr. Alan Netherwood (Netherwood Sustainable Futures)[1] and Dafydd Thomas (Well-being Planner)[2] were commissioned in March 2024 to undertake a climate change risk assessment (CCRA) for the Cwm Taf Morgannwg (CTM) area, by the Cwm Taf Morgannwg Public Services Board (PSB). The area comprises three local authorities, Bridgend County Borough Council, Merthyr Tydfil County Borough Council, Rhondda Cynon Taf County Borough Council.

b) The aim of this commission was to

- explore how combinations of climate risks resulting from increasingly impactful, and frequent severe weather events might affect the landscape, infrastructure, services, assets and diverse communities across CTM
- to understand the cumulative effects of a changing climate on CTM, and to begin to understand what issues may arise and where
- to identify priorities for forward planning for climate risk across CTM, to inform partners' approaches to climate adaptation

c) The aim of this localised approach was to utilise available documentary evidence and data, understand current approaches to forward planning for climate risk, and to gain insights of local experts and decision makers to build up a nuanced picture of climate risk across the CTM area. This work was undertaken between March and October 2024.

d) This is an independent report from the authors, to the PSB, informed by a wide range of opinion, evidence and data provided by contributors. It is important to note that this commission is for the production of a *climate change risk assessment for* the use of the PSB and partners to plan forward. The commission is not to produce a *climate adaptation plan*, but instead, the recommendations in this report can be used to support partners' thinking on future climate adaptation activity.

e) The CCRA has been funded through the Bridgend Resilient Communities Fund, via the UK Government's Shared Prosperity Fund, and contributions from PSB partners set aside to support the Board's work.

f) This report provides an overview of the work undertaken describing the approach taken; the evidence gathered; how this evidence has been used to engage with key partners throughout the CCRA, and detail on 11 (eleven) climate risks, which the authors believe the PSB and partners should prioritise for their forward planning. Recommendations are also made for continued work by the PSB on climate risk assessment going forward.

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[1] Dr. Alan Netherwood is the author of Wales Climate Risk Assessment CCRA3 and supported the UK Climate Change Committee on the UK-wide Climate Risk Assessment in 2022. He has worked with Pembrokeshire PSB to undertake a county-wide CCRA and Adaptation Strategy, with Denbighshire Council on CCRA in Social Services and is currently working with Powys PSB on their CCRA. He has run a 3-year Climate Leadership Programme for WLGA; including approaches to climate risk; has supported Public Health Wales on their Climate Change Routemap; and worked for WG on the Wales-wide Climate Adaptation Planning. Alan has also worked with RNLI, Bluestone National Park Resort and Ministry of Defence amongst others on their strategic programmes for climate risk He is also a leading academic in Wales on climate change as an Honorary Research Fellow in Cardiff University, focusing on climate change governance – how institutions organise themselves to address climate risk and adaptation. https://uk.linkedin.com/in/dr-alan-netherwood-074184a

[2] Dafydd Thomas of **Well-being Planner** has 25 years of experience working across Wales in participative techniques to evaluate interventions, develop projects and implement change. Much of this work involves engaging groups, business, and individuals to inform public service delivery, working for local authorities, public agencies, charities, and government. As a first language Welsh speaker, he is an experienced facilitator and qualitative researcher. Dafydd has supported client's work in as diverse as: poverty and employment' climate adaptation; education; marine renewable energy; nature recovery; adult social services; foundational economy; citizen's assemblies; futures; tourism; natural health services; housing and post-Covid planning.

g) The report on the CCRA is structured as follows:

h) The Climate Change Committee's Climate Change Risk Assessment 3 [3]sets out, at the broadest level, the changes in climate that we can expect by mid-century (two decades away) from projections of climate change. This includes for Cwm Taf Morgannwg, warmer and wetter winters; hotter and drier summers; high variability of extreme weather and increased exposure to weather-related hazards: such as flooding, heatwaves, storm damage and wildfire. The aim of this climate change risk assessment is to explore the potential impact of combined and cumulative risks resulting from these changes in CTM's communities, their implications for public services and other sectors.

i) The Met Office (2024) have recently produced a tool enabling local authorities to produce online report on future climate projections[4] – these are available for Bridgend, Merthyr Tydfil and Rhondda Cynon Taff. These are available for free and provide technical data on projections of temperature rise and rainfall up to 2080, depending on different emissions scenarios. (see Appendix, 8, 9 and 10 for screenshots of reports for each area.) These are useful as part of the evidence and the 'scene setting'

[3] https://www.ukclimaterisk.org/ See Appendix 3

[4] https://climatedataportal.metoffice.gov.uk/pages/lacs See Appendices 8, 9, 10

for a CCRA, but in themselves say little about the potential ripple effect of these changes in Cwm Taf Morgannwg, strategically, operationally, for its public services, or in its communities.

j) CCRA3 provides UK and Wales based evidence of 61 risks that need to be managed. The risks are shown in Appendix 3 . The risk analysis focuses on where, for UK and Welsh Governments, more action was needed by them, what risks needed further investigation, where current action should be sustained and which risks required just a 'watching brief'. The 61 risk categories in CCRA3 have been inherited from multiple national governments and are designed for UK and Wales level risk management. They are therefore (in the consultants' experience) often difficult to apply when considering local impacts. Nevertheless, they provide a good *starting point* for considering climate risk in Cwm Taf Morgannwg and have been used as an initial 'frame' to engage local experts in considering combinations and locations of climate risk across CTM.

k) CCRA3 – Wales Summary[5] (Netherwood 2022) highlights the importance of public services recognising that repeated incidents of severe weather will become more frequent, intense and potentially impactful as the climate changes. Public services planning needs to take account of the cumulative effects of these more frequent impacts on the key infrastructure it relies upon, community resilience, strategic planning, business continuity planning, as well as the operational considerations in responding to repeated severe weather incidents. Impacts will be felt differently in different places and may combine and cascade depending on local contexts. This CCRA seeks to develop a picture of potential cumulative impacts of combined risks specific to CTM, rather than generic statements about which risks are most important to address.

l) It is recognised that the CTM area has suffered from repeated, intense flooding in recent years. The frequency and intensity of this flooding is highly likely to increase given climate projections in coming decades. NRW and other bodies have developed detailed programmes, evidence and strategy to address this issue. For this CCRA we were keen to explore the risks for public services and communities *from* this flooding – its consequences in localities. We were keen to understand views on flooding's interaction with other key risks, for example, on infrastructure; landscape; nature conservation, and service provision to build up a picture of the risks arising from flooding in a post-industrial landscape. Increased flooding is only one aspect of climate risk – a significant one - but its consequences can play out differently in different communities, on different assets and for different services – increasing vulnerability.

m) The backdrops to this assessment are both short and medium-term resource constraints on public funding. These constraints will profoundly affect the public and other sectors across CTM for the foreseeable future, there is less available resource to meet service demand and less capacity to plan forward for issues such as climate change. There is no additional funding for addressing climate risks. This financial situation is a challenge for the PSB and its partners - how can they address climate risk *within* existing resources in a coherent and coordinated way across the diverse set of communities, landscapes and services in Cwm Taf Morgannwg?

n) This CCRA seeks to enable the PSB and partners to better understand public services, communities and institutional implications of climate risk for CTM and its partnerships. This approach should enable the PSB and partners to identify specific adaptation responses to address the risks identified in this report.

o) The report has been framed as a tool to support the PSB's organisations and partners to engage with internal and external audiences. It is hoped this resource will enable partners' greater recognition to climate risk through their core work, and to funders .

p) The recently published Welsh Government Climate Adaptation Strategy for Wales (October 2024) will, over its duration, explore public bodies' reporting on climate adaptation planning across Wales as part of WGs powers under the Climate Change Act (2008). This will potentially compel PSB partners to

[5] https://www.ukclimaterisk.org/wp-content/uploads/2021/06/CCRA-Evidence-Report-Wales-Summary-Final.pdf

undertake a climate risk assessment for their organisations and to support a strategic response to this issue through its partnerships. This work on climate risk management should enable the partners to respond to any new reporting duties, and to influence the requirements made of them under this duty.

Participants in the CCRA were able to share their thoughts about the challenge of climate risk to CTM.

"The valleys were not developed with climate change in mind"

"Climate risks will affect how all public services are delivered. Co-ordinated action is needed if we don't ALL work together, we will fail dismally."

"It's a collective responsibility managing multiple risks with interdependencies that also need to be managed"

"We need stakeholders' awareness of scale and nature of potential impacts… an analysis to visualise the potential future landscape / scenario for a particular location and discuss potential measures to prepare"

"An already dynamic landscape that's changing because of climate change. But because of what's happened to it in the past, it makes the future really unpredictable."

"Proactive work needs to be done, otherwise we're constantly reacting in unpredictable ways at an unpredictable and unmanageable cost to the public purse."

"A systemic response is needed to understand the implications of each risk and responses required through service planning"

"This is hugely interdisciplinary, collaboration is essential, people are keen to work together and help shape this."

"All organisations are going to have to adapt . We need better understanding of inter-reliance and interrelationships"

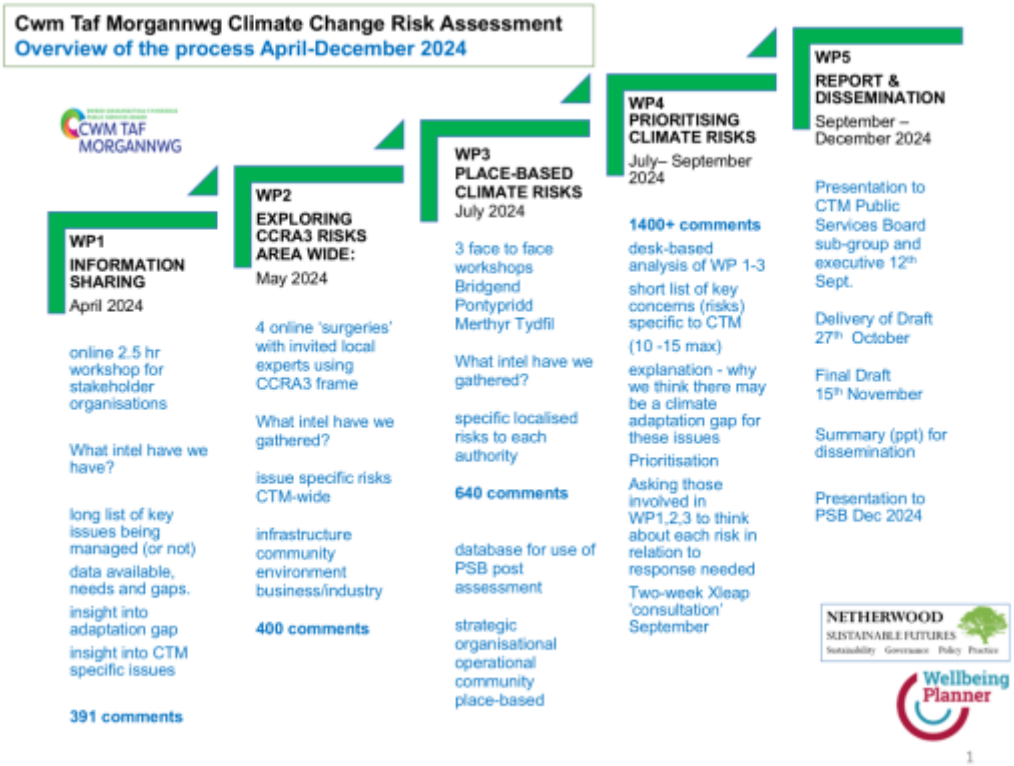
"We need leadership that understands the issues at various levels.to plan at all levels and across the different time spans. strategies aren't joined up; siloes exist; resources are a challenge as are competing agendas at a service level."

SECTION 1:

CLIMATE CHANGE RISK ASSESSMENT: APPROACH

a) This section outlines the approach taken to gather as much local information as possible about how multiple climate risks might play out across Cwm Taf Morgannwg – building up a picture of combined risks in 'place.' An emphasis was placed on gathering available quantitative and qualitative data by engaging with key institutions and local experts from the outset and through a series of work packages (WP1-5) which are described below. In all, the approach has engaged 221 individuals exploring climate risk over 6 months from 33 organisations, including PSB partners, representative bodies for the business and third sector, local councillors, emergency planners, community groups and residents. (See Appendix 1 for participant organisations). The diagram below provides an overview of the process.

b) WP1 – Information Sharing A 2.5hr online workshop in April 2024 provided space and structure for stakeholders to explore key climate risks identified in the UK and Wales CCRA3 reports; reflect on these risks in the CTM context; share relevant activity they perceived to be addressing climate risk in CTM, and explore data sources and knowledge gaps and locations where risk may combine to increase exposure to risk and vulnerability. This interactive workshop engaged 65 individuals representing a range of interest from public, community, third and private sectors. Data was gathered using Xleap software, generating 391 comments. The information gathered[6] included long lists of concerns and issues that attendees felt ought to be addressed in relation to climate risk, relevant strategies, and signposts to relevant data. The workshop emphasised the scale and complexity of climate risk in this locality. This workshop was a first 'sieve' of available information and helped to identify documentary sources of information and additional individuals to engage in the CCRA – many of these were followed up individually by the consultants. This information also helped to frame the discussion in WP2 (below).



c) WP2 – Exploring CCRA3 Risks CTM-Wide Four themed 2.5 hr online 'surgeries' were delivered in May 2024 on infrastructure; community; natural environment, and business and industry.

[6] See Appendix 2. Documentation reviewed related to each risk

Each workshop engaged local experts who could contribute local and location specific knowledge to inform the CCRA, and explored 61 specific risks emerging from the UK and Wales CCRA3 in the CTM context (See for a list of the 61 risks). To develop discussion about how these may play out in CTM, a brief summary was provided for each risk, and attendees were invited to discuss "*which specific areas, locations and groups in Cwm Taf Morgannwg may be most significantly affected by the risk?*" Data was gathered using Xleap software with 106 participants across the four workshops, generating 400 comments. These surgeries were a second 'sieve' of available information and helped to identify specific and detailed views on risk and further documentary sources of information. The information generated in these surgeries helped to frame the discussion in WP3 (below).

d) WP3 - Place-based Climate Risks Three face-to-face 2 hr workshops were delivered in July 2024, one in Bridgend, one in Merthyr Tydfil, and one in Pontypridd. The aims of these sessions were to engage interested individuals in the data gathered so far, and to explore specific places and locations where infrastructure, communities, people, assets, businesses or sites may be vulnerable to repeated, cumulative impacts of climate change. These workshops helped to sense check findings within each local authority area. The consultants also undertook field work to familiarise themselves with the sites, assets and communities identified in the CCRA up to this point.

Data was gathered using Xleap software with 50 people across the three workshops generating 640 comments. Participants were also encouraged to use maps to identify and mark specific locations that were of concern. This third localised 'sieve' provided testimony from communities becoming increasingly affected by severe weather impacts, providingfurther evidence for the need of a coordinated response to multiple climate risks at a local level.

e) WP4 -Prioritising Climate Risks WP1-3 provided a wealth of local information (1400+ comments) on how participants viewed climate risks across the Cwm Taf Morgannwg area. It has been clear that throughout the process of engagement, individuals have been learning from each other as they have explored climate risks, and as a consequence capacity has been increased within CTM on work on this issue.

The CCRA produced 1400 contributions from agencies, organisations, local experts and the community. The authors have analysed these contributions into 4 categories; *strategic* – CTM-wide issues that need to be managed at scale across CTM, *institutional* – those focused on the way organisations respond to climate risk, *operational* - those issues that public and other services will have to deal with more as a consequence of climate change, and *community* - risks as they will be experienced by communities. This analysis has helped to inform the advice provided in this CCRA.

In addition to this the analysis recorded *locational risks* where particular risks, or combinations of risks were seen to be likely to occur. This information was compiled in a spreadsheet on Microsoft Excel as a resource for continued use by the PSB in managing climate risk. A summary table is provided in Appendix 4 showing the risks identified under these themes. Additional support was provided by Bridgend and Rhondda Cynon Taf Councils to develop simple maps to communicate locations identified in the face-to-face workshops. This is shown in Appendix 6.

The consultants then undertook analysis to triangulate the data, with documentary evidence and their own insights to derive a short list of key risks, which they felt needed to be tackled by the PSB and partners as a matter of urgency 2025-2030.

A CTM Public Services Board meeting in September 2024 provided an opportunity to engage senior leaders to discuss these priorities. A categorisation exercise was suggested – that enabled partners to reflect on levels of response to these risks using **Gold, Silver** and **Bronze** categorisation[7], This was

[7] A summary of the categories is as follows: A more detailed description is provided in Appendix 7
Gold – managing this climate risk should be given the highest priority by leadership across the PSB organisations and approached as being of high likelihood and significant impact across CTM.

sent out to all who had engaged in the CCRA, inviting views on how each risk should be approached. Responses were collected using Xleap software over a two-week period. This was an attempt to understand views of the risk management response required to inform the PSBs approach to climate adaptation. The response to this exercise (18 responses) was mixed, with no clear indication of prioritisation in the Gold, Silver and Bronze categories (most came out as Silver). However, the exercise did provide further insight on respondents' views on each individual risk and what work is required going forward. The Gold, Silver, Bronze categorisation could be used by the PSB in their forward climate adaptation planning.

As a result of the analysis of data from WP1-4, the consultants were able to focus on which areas of risk they recommend are the most important for Cwm Taf Morgannwg PSB (and partners) to work to build climate resilience in coming years . These should be the focus of climate adaptation going forward.

We suggested that **all are significant and important priorities** to address to build climate resilience.[8]

Priority Climate Risks for Cwm Taf Morgannwg

A. Post-industrial landscape – multiple risks at scale
B. Climate resilient communities
C. Infrastructural pinch points
D. Transport Infrastructure (road, rail, bridge)
E. Wildfire management
F. Asset management
G. Social care and health provision
H. Maintaining utilities (energy, water, sewerage, food, ICT)
I. Nature conservation management
J. Institutional responses to climate risk
K. Resources and finance for climate adaptation

These risks are explored in more detail in Section 2 of this report.

It is recommended that the PSB do not ignore or forget about the other strategic, institutional, operational and community level risks identified in Appendix 4. Participants felt these were important enough to raise, and the PSB should also consider this information to inform their adaptation response 2025-30.

f) WP5 – Report & Dissemination – A draft version of this report was provided to the PSBs CCRA working group on 28th October 2024. A final report was provided on 18th November. The report was presented to Cwm Taf Morgannwg Public Services Board in January 2025.

Silver - managing this risks should be an area of new collaboration by clusters of organisations and approached as being of high likelihood and significant impact across CTM.
Bronze -managing this climate risk requires an enhanced approach by individual organisations and is focused on operational adaptation.

[8] Post-Industrial Landscape - Cumulative Risk; Existential Risk To Communities; Infrastructural Pinch Points; Transport Infrastructure (Road, Rail, Bridge); Wildfire Management; Asset Management; Social Care And Health Provision; Maintaining Utilities; Nature Conservation; Institutional Capacity; Complacency; Public Sector Costs; Management Capacity; Reorganising Existing Resources.

The bulk of this report focuses on the 11 priority climate risks above.

Section 2 of the report aims to

- summarise the nature of each risk;
- what the specific concerns are;
- the potential impact in different localities across CTM;
- key issues to manage across CTM, and
- the benefits of acting on this issue over the next five years

This approach to presentation of the risks mirrors that of the UK and Wales CCRA3 reports.

SECTION 2 :

PRIORITY CLIMATE RISKS FOR CWM TAF MORGANNWG

A. POST-INDUSTRIAL LANDSCAPE

Description of risk

CTM's unique post-industrial landscape is likely to be increasingly vulnerable to multiple risks resulting from a changed climate. This includes cumulative risks on specific places and assets across the area: from ground subsidence; changes in hydrology; slope stability; altering levels of minewater; soil water content; shrinkage and heave of soils; potential dispersed pollution from industrial sites; historic landfill and tips; surface water,river and ground water flooding, and impacts on housing condition; transport networks including railway track and road surfaces, and buried infrastructure (electrical cables, sewage and gas and water pipelines). For CTM, due to its industrial legacy, ground movement, sink holes and impacts of mine workings should be of major concern. The highest levels of poverty and deprivation in CTM are frequently co-located with the most challenging physical post-industrial landscapes. Climate risks in CTM are a socio-economic issue and addressing these risks, at scale, should be viewed as a social justice issue, and not solely as an operational issue. Discussions in these CCRA highlighted areas where partners need to develop their approach to this issue in a coordinated and strategic way are:

- Address the knowledge gap in relation to how climate risk will increase in areas of the landscape that are already vulnerable to severe weather effects
  - on likely significant risks from subterranean infrastructures;
  - on sink hole and shaft collapse caused by increased rainfall/drying out;
  - of the effect of minewater rebound - groundwater raised levels - coming to the surface in unknown and unpredictable way, and
  - risk of increased rainfall resulting in higher groundwater flows, natural fractures and mine workings impacting flood risk and slope stability.

- Understand the scale of potential landslip, coal tip and slope stability issues impacting on infrastructure, assets, access, pollution and well-being of residents (there are 200 coal tip sites of C&D category across CTM)[9] It is recognised that the condition of these sites are monitored regularly – however, the service implications of their failure, or multiple failures needs to be considered in ongoing work for CTM
- The potential service demand should events occur which seriously undermine multiple sites due to repeated and cumulative severe weather (emergency response, health services, mental health, infrastructural repair, slow burn service demand)
- Understand the potential impact of climate change on housing condition, of fabric of housing, but also living conditions (damp) and fuel poverty – including the major risk of slope instability and surface water flooding in communities in the steep valleys in CTM
- Understand the potential of landslip impact on infrastructure - national grid cables, water supply main, foul water/sewage and cycleways and footways
- Estimate the financial risks of managing the climate effects on a post-industrial landscapes at scale – and the institutional and finance capacity to respond
- Address the potential for lock-in of risks from new development of infrastructural investment underplaying climate risks in design and function over their time of use
- Develop a proactive strategic approach to manage a complex problem without collaborative/regional guidance

The complexity and scale of these potential impacts across CTM presents a major strategic problem for partners- who often work reactively to address these types of problems within their own organisational remits – or through emergency planning responses to individual events. How can they organise themselves to understand the scale, location and nature of likely impacts at a *strategic scale* in a post-industrial

[9] Category C and D Coal Tip Maps were used in the WP2 and 3 to develop discussions on this issue

landscape affecting a high proportion of their communities and population – to develop effective plans for managing risks as they become more frequent and widespread in a changing climate, over time? CTM needs to develop a pro-active strategic approach to this climate risk.

The review of documentation in this CCRA[10] suggests that current systems are approaching this issue reactively, within silos, for individual issues (coal tip monitoring, transport network management, hydrology) and many current strategies, plans and programmes underplay / ignore / discount the scale of potential risk from climate risk in a post-industrial landscape. This needs addressing by the institutions within the PSB and their partners.

Participants were invited to indicate where they thought climate risks may impact on the post-industrial landscape, and in their opinion, cause particular problems for well-being. This was to try and understand the spatial aspects of this risk, as a precursor for more detailed work which will needed to be undertaken by partners on vulnerability in specific locations, as part of their approach to climate adaptation.

Both East and West of Merthyr Tydfil County Borough were seen as major concerns for coal tip/slope resilience and slurry run-off; the potential for landslip causing infrastructural damage was highlighted for Mynydd Yr Eglwys, Blaencwm, Pontsarn, Mountain Ash, Hirwaun, Quakers Yard Viaduct ,the River Cynon Culvert and Treforest; concerns were expressed about the potential for landfill and tips at Rhigos, Bwlch and Porth, and dispersed pollution from contaminated land at Laleston, Newbridge, Ogmore Vale, and at Brofiscin and Maerdy due to contaminated land at head of catchment (quarries and chemical tips).

Key issues for managing the risk CTM-wide

The following recommendations are made by the authors on activity needed to manage this risk across CTM 2025-30

1) gathering, mapping, understanding and interpreting data on likely risks in different locations will be essential to plan strategically going forward;
2) further exploring the sufficiency of existing plans, strategies, programmes and projects to deal with scale and complexity of the issues raised by this risk;
3) sharing intelligence with neighbouring authorities also managing a post-industrial landscape will provide opportunities to learn from each other;
4) communicating the scale of the challenge to Welsh Government and engaging with key partners, utilities/Coal Authority/landowners;
5) exploring the financial costs for managing climate risks in a post-industrial landscape and communicating these to UK, Welsh Government and WLGA, and
6) risk analysis informing service redesign and reform in the public sector.

Benefits of further action to manage this risk in the next five years

Public bodies and their partners will have a clear understanding of the likely scale and impact of climate risk in CTM's post-industrial landscape. Evidence would be used to plan forward for management of risks in areas of high vulnerability. Resources would be targeted strategically to manage risks proactively to support communities at risk, and the infrastructure and assets that support their well-being. Partners in CTM would be able to build a business case to government for proactive investment of resources in managing these risks. Public services will be being developed to better serve communities in CTM to manage and thrive in a changing climate.

[10] See Appendix 2 for documentation reviewed during this CCRA related to this risk

B. CLIMATE RESILIENT COMMUNITIES

Description of risk

Climate risks will impact on different communities across Cwm Taf Morgannwg in different ways, depending on their characteristics, location, infrastructure, topography, natural and built assets and demographic make-up. This diversity means that managing risks at a community level, over time, is inherently complex - where people and households will become increasingly exposed to more frequent severe weather and its consequences – surface water, river and ground water flooding, storm damage, wildfire, prolonged heat, drought – as well as broader risks to the infrastructure and services that they rely on, including food and access to services. CTM's diversity from its uplands, river valleys, lowlands and coast means that climate risks will be experienced in diverse ways within its communities

The CCRA explored this issue in WP1, 2, and 3 – focusing on the 'challenge' for communities across CTM – those that will be able to continually bounce back as the climate changes and effects are felt, others that will need support to plan for and cope in a new normal, and others that will be increasingly compromised – with changes to landscape, hydrology, slope stability and other factors undermining people's ability to keep living in that location. For each of these categories of community, public services and third sector services will need to be designed to support residents and businesses through this change.

While Natural Resources WalesFlood Risk Management Plan already identifies communities at high risk of flooding, both now and in the future,[11] there is a need to develop our understanding of combinations of climate risks in different places rather than focusing on a single issue. How might flooding, increased rainfall and more frequent wildfire impact on contaminated land / spoil / slopes and infrastructure around a village or town? How might consistent infrastructure failure affect food access and retail businesses in the upper valleys? How might the loss of food crops, impact on livestock productivity due to changes in seasonality impact on fragile farm businesses in rural communities across CTM? This type of analysis and information will be important to help to build climate resilient communities across CTM.

For some of the most vulnerable communities in CMT, the cumulative and combined risks from climate change, repeated flooding and changes in groundwater levels may compromise the continued safety of residents. This may mean abandonment of communities in coming years. Public services and the private and community sectors will increasingly need to develop evidence, services and skills to support these communities. For communities at severe risk - institutional capacity and skills for communication, facilitation and forward planning will be needed. This is a collective risk and challenge for public services across Wales.

The review of documentation in this CCRA[12] suggests that although NRW are approaching flood risk management proactively, (within resource constraints) many current strategies, plans and programmes in CTM underplay / ignore / discount the scale of potential risk of *combined* climate risks to communities from climate change resulting from flooding. Repeated, cumulative flooding, and its combinations with other risks will need to be better understood across CTM, to manage them effectively, at scale. The recently published National Infrastructure Commission' report *Building resilience to flooding in Wales by 2050 (2024)* highlights the need to take a broader, more holistic and less technocratic approach to this issue than at present.

[11] NRW National and South-Central Flood Risk Management Plans and Strategic Environmental Assessments.(2023)

Aberdare (RCT)
Glyntaff (RCT)
Hirwaun (RCT)
Merthyr Tydfil (MTCBC)
Mountain Ash (RCT)
Nantgarw (RCT
Pencoed (Bridgend)
Pontyclun (RCT)
Pontypridd (RCT)
Rhondda (RCT)
Rhydyfelin (RCT)
Taff's Well (RCT)
Treforest (RCT)
Treorchy (RCT)
Troedyrhiw (MTCBC)

[12] See Appendix 2 for documentation reviewed during this CCRA related to this risk

Participants were invited to indicate where they thought climate risks may impact on specific communities and in their opinion, cause particular problems for well-being. This was to try and understand the spatial aspects of this risk, as a precursor for more detailed work, which will needed to be undertaken by partners on vulnerability in specific locations, as part of their approach to climate adaptation. Participants focused on the need to develop a better understanding of

- the communities at **existential risk,** not just from flooding, but combined risks from changes to hydrology, slope stability, tip stability, mine and subterranean infrastructure etc. What is the scale of the problem, where and how do we plan public services with this in mind?
- the cumulative impacts of climate change on **isolated communities** with limited access, vulnerable residents and issues around accessing services, for example, Pontsticill, Bedlinog, Ty Cwm, Nant Gwyn, Fiddler's Elbow, Evanstown, Aberfan, Abercanaid
- climate impact effects on CTM's rural and **agricultural communities** and their ability to manage land, livestock and landscape for example Pontyrtha, Merthyr Vale, Bedlinog, Trelewis, Coity.
- the cumulative impacts of repeated severe weather on **housing stock and local infrastructure** across CTM, for example Caerau, Evanstown, Troedyrhiw, Nantymoel, Cwmfelin, Merthyr Vale.
- impacts on **business resilience** (clean up, insurance, supply chain, location, food supply) up and down the Valley retail 'strips' and in CTMs town centres

These examples illustrate that communities in CTM are not 'homogenous' and further detailed work will be needed to understand the specific nature of how individual communities might be affected by combinations of climate risks. Engagement with communities will be an important aspect of understanding risk and building resilience. Partners should seek opportunities to build dialogue with communities about this climate risk through existing mechanisms such as town centre regeneration and place planning.

Key issues for managing risk CTM-wide

The following recommendations are made by the authors on activity needed to manage this risk across CTM 2025-30

1) to build a clearer picture of climate risk to individual communities across CTM from multiple climate impacts in 'place' – with an urgent focus on *combined climate risks* to those communities already deemed to at risk from flooding – or those thought to be at existential risk as a result of the likely impacts of climate change;
2) to understand which communities will need the most support to manage and adapt to changes in climate, given their characteristics, circumstances and locations and target resources to support them: to inform service delivery to these communities and to inform forward planning for support; to inform local, regional and national policy, in relation to existential risks to communities;
3) to understand the skills required for managing existential risk to communities from climate change and build this into service planning and communication with the public;
4) making climate risk and climate adaptation a priority in considering town plans, place plans, place shaping activity through regeneration and planning activity;
5) giving the residents voice and agency in managing change, to ensure concerns are heard, responded to and better decisions are made, and
6) involving communities at risk in a wider discussion about the future where the tone / intent is positive and proactive to build resilience , rather than reactive and calamitous.

Benefits of further action to manage this risk in the next five years

Partners in CTM would have worked together to identify the locations and communities that are at most risk from multiple climate impacts – providing an understanding of the scale of risk and the response needs to support these communities as the climate changes. Climate risk will be considered in more detail in forward planning and development of specific communities and services provided to the community. Partners in CTM would be able to influence regional and national policy to support communities for proactive investment of resources in managing change in these communities.

Ynysybwl residents were able to share their experience of the effects of changes to local conditions.

"Ynysybwl has 16 properties flooded to a height of 2m during Storm Dennis. It's been categorised as risk to life. We've created a flood action group the National Flood Forum are also involved.

NRW have just released a strategic outline case (after 4 years) given us two options: build a wall 2m height in front of the properties removing one of the roads from the village.

(The other alternative is to demolish the properties). Everything needs to be finished by 2029 - subject to WG funding. No flood alert system. No barrier at all."

"The community is self-organising on WhatsApp. We can't get insurance (or only expensive insurance); the value of the property is basically zero. Residents are stuck.

A lot of the owners have rented the properties - so now have lots of transient tenants – its changed the dynamic of the community.

Four of the houses haven't been filled since Storm Dennis. The local group is trying to get the council and NRW to make a quicker decision."

Natural Resources Wales work on this issue is available here https://ymgynghori.cyfoethnaturiol.cymru/south-central-wales/managing-flood-risk-in-ynysybwl/

C INFRASTRUCTURAL PINCH POINTS

Description of risk

This CCRA has highlighted the strategic risk of 'pinch points' particularly in CTM's steep valleys, throughout RCT and Merthyr and northern parts of Bridgend County Borough. These are pinch points, where essential infrastructural (energy water, sewage, roads, rail, and information technology are co-located, sometimes integrated (for example, pipes and cables on bridges, or IT and road infrastructure) and may be particularly vulnerable to combined failure as a result of multiple climate risks. This infrastructure may be both above and below ground. Many of CTMs communities are linear due to the topography and particular locations, river crossings 'house' different types of essential infrastructure.

As the climate changes, combined increases in repeated flooding, subsidence, erosion, scour, landslip and wildfire in these locations, and subsequent failure or 'outages' on a regular basis, are likely to have profound impacts on communities, businesses and residents reliant on this infrastructure – if these risks are not planned for. The various impacts in the post-industrial landscape discussed in Risk A are also likely to influence the resilience of this co- located infrastructure.

Exploring the resilience of this infrastructure to change will be essential to manage and respond to future climate risks occurring in these specific locations. The management of these assets is often carried out by multiple agencies. It will be important to ensure agencies such as NRW, Dwr Cymru, power distributors, energy network providers, IT providers, highways engineers, local authorities and rail companies share their knowledge about vulnerability and exposure to combined climate risks as they become more frequent in these locations. Increasing understanding, sharing of information and proactive management of combined risks for assets between organisations in these locations, will be increasingly important going forward.

While utility and transport companies are required to report on their corporate adaptation plans to the UK Government under the UK Climate Change Act 2008, we suggest that CTM PSB explore the extent to which these corporate approaches are influencing key infrastructure at these pinch points with utility and transport companies *within* CTM. These bodies will be independently managing their own infrastructure and planning forward. These independent approaches are likely to exacerbate risk. Participants suggest that infrastructure funding streams do not require either integrated approach with other providers or require an assessment of multiple climate risks on bids for infrastructure. This is a weakness in the 'system' that needs to be communicated to Welsh Government. The review of documentation in this CCRA[13] suggests that many current strategies, plans and programmes in CTM assume that key infrastructure will be resilient to climate change. A strong recommendation from this CCRA is that the PSB partners organisation and across CTM explore with those that manage key infrastructure whether this is the case.

It is highly likely that managing this risk will need more collaboration within CTM but also cross-boundary, between neighbouring local authorities to map vulnerabilities, understand risks at these pinch points and respond to them. Part of this risk is the potential of the approach of Corporate Joint Committees (for CTM, Cardiff Capital Region) currently working on Strategic Development, Transport and Energy Plans, underplay or discount these locational risks in their forward planning. This needs addressing by the institutions involved in the CJC and their partners.

Participants were invited to indicate where they thought multiple and cascading risks to co-located infrastructure might cause particular problems for well-being. This was to try and understand the spatial aspects of this risk, as a precursor for more detailed work which will needed to be undertaken by partners on vulnerability in specific locations, as part of their approach to climate adaptation. The following locations were felt to be vulnerable to multiple infrastructure failures. Further investigation should explore vulnerbailities of co-located infrastructure in these and similar locations (see below).

[13] See Appendix 2 for documentation reviewed during this CCRA related to this risk

Pontypridd	Rhondda Fawr
Hawthorn	Rhondda Fach
Upper Boat	Treorchy
Taffs Well	Porth
Nantgarw	Bettws and Llangeinor
Treherbert	Ogmore, Garw, Lynfi Valleys
Aberdare	Broadland and Whiterock

CCRA3 advocates a whole system approach to consider climate risk to infrastructure networks to manage cumulative and cascading climate risks. Focusing on climate risk management at these 'pinch points' is, in the authors' opinion, an essential part of building climate resilience in CTM.

Key issues for managing risk CTM-wide

The following recommendations are made by the authors on activity needed to manage this risk across CTM 2025-30

1) Mapping interrelationships between essential infrastructure between organisations responsible for their management, maintenance, development and planning forward;
2) Public bodies that engage with these infrastructure providers, and those that provide and maintain infrastructure themselves need to develop discourse on this issue with relevant utility and transport and IT providers to explore vulnerability and resilience;
3) Examining the sufficiency of existing approaches to deal with combined, repeated and cumulative risk at these pinch points will be essential to properly understand what adaptation is required, over and above current approaches, and
4) Developing an overall strategic picture of infrastructural risk rather than dealing with climate resilience in silos or on an asset-by asset basis.

Benefits of further action to manage this risk in the next five years

Partners in CTM would have worked together to identify the co-located and interdependent infrastructure at most risk from multiple climate impacts. This would provide an understanding of the scale of risk and the response needed to maintain and climate-proof infrastructure in these locations. Climate risk will be considered in more detail in forward planning, maintenance and development of co-located infrastructure. Partners in CTM would be able to build a business case to government and infrastructure partners for proactive investment in infrastructure to cope and function in a changing climate.

D. TRANSPORT INFRASTRUCTURE: ROAD, RAIL AND BRIDGES

Description of risk

Road, bridge and rail assets are highly likely to be increasingly compromised by combinations of climate risks in different locations across CTM in coming decades. Changes in ground conditions; subsidence; changes in hydrology; slope stability; slippage; altering levels of mine water; soil water content; shrinkage and heave of soils; treefall; potential dispersed pollution from industrial sites; undermining of historic landfill and tips; surface water and river flooding; storm damage from high winds, and wildfire will all play a part. The effect of climate change on adjacent tree condition is also seen as a significant risk to slopes and embankment failure and continued disruption. These changes are likely to increasingly affect road surfaces and foundations and their associated drainage and cables, above ground assets, bridges footings and structure, and rail lines foundations, overhead infrastructure and bridges -as climate change takes effect. A major unknown for CTMs transport network is the legacy of the areas' industry – the effects of subterranean work and mine workings on land and hydrology. As discussed in Risk C, buried infrastructure (electrical cables, sewage and gas and water pipelines) will also be affected by impacts on the transport network. This risks to transport networks is a profound and urgent strategic risk for well-being in CTM complicated by the following factors:

- current systems for investment, maintenance and evidence gathering to address climate risk to the transport network are undeveloped and are urgently needed at national, regional and local levels – to support work on this in CTM

- for the rail network – Transport for Wales cite knowledge gaps, unavailable data and complications of land ownership, liabilities and management as issues which exacerbate the risk to their assets– many lines run over coal fields and there is a decadal backlog in vegetation management on the rail network[14]

- the high risk of bridge erosion due to CTMs hydrology - increased flow, scour, sediment transport and debris reducing riverbed levels Limited monitoring and funding exacerbate this risk

- the low profile of climate risks to the road network s in national, regional and local policy guiding the transport networks' maintenance, investment, funding and development - with a subsequent a risk of lock-in if future risks are not considered given the long lifetime of these assets

- the potential for priorities to be driven by incidents and not risk. Adaptation through long-term planning is perceived by local experts to be essential

CTMs public services, communities, businesses, residents, and visitors rely on a functioning and resilient transport network. The topography of CTM means this is especially important to maintain well-being in geographically isolated communities where access to services, employment and goods is heavily reliant on single routes in and out of the community. Roads (and rail) are juxtaposed with steep valley sides and in some cases, spoil tips.

The review of documentation in this CCRA[15] suggests that many current strategies, plans and programmes in CTM assume that key transport infrastructure will be resilient to climate change. Analysing the overall vulnerability of the transport network at a strategic scale is central to understanding and planning this climate risk in CTM. Efforts should be concentrated on joint work between transport infrastructure providers to understand the complex vulnerbailities to the network from a post -industrial landscape, being impacted by climate change.

[14] This CCRA has taken into account the work outlined in TfW Climate Adaptation & Resilience Plan https://tfw.wales/sites/default/files/2023-05/CARP_ENG.pdf and TfW have contributed throughout the CCRA.

[15] See Appendix 2 for documentation reviewed during this CCRA related to this risk

Participants were invited to indicate where they thought climate risks may impact on transport infrastructure and in their opinion, cause particular problems for well-being. This was to try and understand the spatial aspects of this risk, as a precursor for more detailed work which will needed to be undertaken by partners on vulnerability in specific locations, as part of their approach to climate adaptation. They suggested vulnerabilities at Quakers Yard Viaduct and River Cynon Bridge through increased flow, scour and debris; vulnerability of rail infrastructure at Merthyr Tydfil, Mountain Ash, Cwmbach, Troedyrhiw, Trehafod, and rail and road infrastructure between Pontypridd and Porth; culvert blockages at Cwmbach causing flooding of the railway and industrial estate, and wildfire causing road slippage on Maerdy Mountain. These examples illustrate the types of location specific impacts that are likely to occur more frequently across CTM as the climate changes.

Key issues for managing risk CTM-wide

The following recommendations are made by the authors on activity needed to manage this risk across CTM 2025-30

1) establishing a detailed understanding of how multiple climate risks might affect the road and bridge and rail network – from surface and river flooding, compromised slopes, tree fall, subsidence, tip instability, scour etc. producing a 'picture' of the scale of the problem;
2) communicating and exploring the implications of this 'picture' within the system which determines road, bridge and rail maintenance, development, investment and funding – with partners and government – to identify how the 'system' needs to adapt to support a functioning transport network in a changing climate[16];
3) factoring in multiple climate risks to capital works for road, bridge rail and investment to avoid 'lock in' of future climate risks, and
4) exploring the financial costs for managing climate risks to the transport network in CTM and communicating these through leaders to UK, Welsh Government and WLGA.

Benefits of further action to manage this risk in the next five years

Transport partners in CTM would have worked together to identify critical parts of the transport network that are likely to be compromised by multiple climate risks. This would provide an understanding of the scale of risk and the response needed to maintain and climate-proof transport networks in a continually changing climate. This evidence can be used to influence partners, partnerships and funders to raise the profile, urgency and response to this risk in their strategic, organisational and operational activity. Work in this area would put CTM partners at the vanguard of dealing with this risk in Wales.

[16] examining the sufficiency of existing approaches to deal with combined, repeated and cumulative on the transport network will be essential to properly understand what adaptation is required, over and above current approaches.

E: WILDFIRE MANAGEMENT

Description of risk

A combination of warmer conditions, more frequent prolonged periods of heat and change in rainfall and wind patterns are predicted by CCRA3[17] to increase wildfire risk as a direct result of changing natural conditions (not solely as result of deliberately induced wildfires). Wildfires can occur across woodland, grassland (heath and moor), and peatland and have ripple effects on tip and slope stability, water quality, infrastructure, air quality and human health from particulates in the air, during and in the aftermath of wildfire and direct threat to life. Put simply – a consequence of climate change is that there is likely to be larger areas of drier 'fuel' as a result of longer periods of hot weather, without the rainfall and growing periods for new vegetation which reduces the risk of wildfire. Wildfire's impact is likely to be significant for CTM's natural areas – affecting community safety, water quality from run-off, air quality and damaging biodiversity. CTM has large areas of land that may be increasingly susceptible to wildfire whatever its cause. Some of this is public sector estate, but other areas are privately owned or common land. The close proximity of communities in the valleys and elsewhere to areas which may experience wildfire should be of major concern as the climate continues to change. Alongside threat to life, there should be concern about the health impacts of wildfire (air quality and mental health) across CTMs communities.

For CTM, a particular issue is the impact of wildfire in a post-industrial landscape, especially wildfire taking vegetation off its steep slopes and spoil tips. Vegetation acts as a natural anchor of both soil and spoil. If this vegetation is removed, high rainfall can affect soils stability and wash material across adjacent land and into water courses. CTM is no different. Alongside the immediate risks to community safety, this ripple effect has the potential to risk human health from contaminants and affect water quality and biodiversity along CTMs watercourses. Wildfire is already impacting on road infrastructure in CTM (see below). The effect of wildfire needs to be one of the factors that is considered in CTM's work on ensuring the resilience of its infrastructure, in place planning (see Risk C) and asset management (See Risk F).

At present a major focus of Fire Authorities across Wales is to prevent deliberately caused wildfires through a range of education initiatives, work strategically with partners on the ground to establish fire breaks on site, and work at landscape levels to address wildfire risk. NRW who manage the forest estate in CTM understand the level of threat from wildfire to this asset is likely to increase significantly given the topography, hydrology, species mix and soil conditions particular to this area.

The key message from this CCRA is that the scale and volume and intensity of wildfire incidents in is likely to increase significantly in coming years as a result of climate change. A key question for partners is how to meet the challenges of this shift, given the current focus, resource constraints and low profile of climate risk in strategic approaches to wildfire management. Is what partners are doing now enough to prepare for this significant problem in coming decades? A pervasive view in discussions as part of this CCRA is that urgent new collaborative policy and action is needed on this issue. The review of documentation in this CCRA[18] suggests that current systems are approaching this issue reactively, within silos, and many current strategies, plans and programmes underplay / ignore / discount the scale of potential wildfire to their aims and objectives.

Participants were invited to indicate where in CTM, in their opinion might be at risk from multiple and cascading risks from wildfire. This was to try and understand the spatial aspects of this risk, as a precursor for more detailed work which will be needed by partners as part of their approach to climate adaptation. They suggested existing vulnerabilities at Rhondda Fach / Fawr and Upper Maesteg, Rhigos / Maerdy Mountains (slope slippage and road closure) Penrhys, Rhondda Fawr/Fach, Blaengarw. The following were

[17] See https://www.ukclimaterisk.org/wp-content/uploads/2021/06/UK-Wildfires-and-their-Climate-Challenges.pdf

[18] See Appendix 2 for documentation reviewed during this CCRA related to this risk

perceived be particularly high-risk wildfire areas Ystrad, Penrhys, Tylorstown, Llwynypia, Brynheulog and throughout the Rhondda, Cynon and Bridgend Valleys. The potential impact on A465 and other routes were seen to need exploration.

Key issues for managing risk CTM -wide

The following recommendations are made by the authors on activity needed to manage this risk across CTM 2025-30

1) establishing a detailed understanding of how increases in scale, intensity and volume of wildfire incidents across CTM might affect: high risk communities; landscape; infrastructure; health and coal and spoil tips – including mapping of vulnerabilities;
2) communicating and exploring the implications of this 'picture' within the systems which determines community safety and infrastructural maintenance – to identify how the 'system' needs to adapt to address this issue – including funding streams;
3) factoring in wildfire as an increasing risk to management planning of forest, woodland, grassland, heathland, peatland areas and in work on place planning/town centre management and regeneration;
4) investment in grazing management to manage wildfire and biodiversity at scale across CTM;
5) exploring the increasing financial costs for managing wildfire risk within the public sector in a changing climate across the CTM area and using this evidence to communicate this through leaders to UK, Welsh Government and WLGA, and
6) CTM needs increased collaboration to manage wildfire at a strategic scale - proactive and long term rather than reactive and short term – this should inform the work of Wales Strategic Wildfire Group and Wales Wildfire Board.

Benefits of further action to manage this risk in the next five years

Partners in CTM would have worked together to identify the potential scale and location of wildfire risks caused by climate change, to communities, essential infrastructure, landscape and health. They will have identified both investment and resource needs to manage this risk as the climate continues to change. This evidence will have been used to influence partners, partnerships and funders to raise the profile, urgency and response to this risk in their strategic, organisational and operational activity.

F: ASSET MANAGEMENT

Description of risk

Partners in CTM and the PSB manage a wide range of assets in their property portfolios, including built assets, land assets and assets associated with the services that they provide. These assets need to be fit for purpose to deal with multiple risks from climate change including

- providing thermal comfort in higher temperatures to staff, the public and students within the asset and the impacts on the' fabric' of the asset;
- resilience to the cumulative impacts of increasing numbers of extreme weather events in coming decades (surface and river, flooding, storms and heatwaves), and
- and depending on their location the 'ripple' effects of these events the asset - slope stability, landslip, altering levels of minewater, soil water content, shrinkage and heave of soils, treefall, potential dispersed pollution from industrial sites, undermining of historic landfill and tips.

Asset management approaches across CTM have a key role in helping to manage (or exacerbate) these risks in coming decades. CCRA suggests a greater consideration is needed (on the 'location' of the asset and the 'kit' that this relies on in approaches to property management – the road, utilities, IT and the interdependencies between the asset and the systems that serve it. Will the asset in question continue to function in a changed climate?

The scale of impact is likely to be significant, needs to be better understood and planned for through asset management. CTM's understanding of the financial implications of managing asset portfolios in a changed climate also needs to be developed. Current work on service redesign, co-location, asset retention and disposal and community asset transfer need to factor in climate risk alongside other considerations in their suitability assessments and at a strategic level.

Repeated, cumulative impacts on assets from climate change will mean that CTMs partners thinking on climate change needs to move beyond business continuity, staff access and maintenance issues from individual severe weather events - to determining whether the location and function of the asset are 'climate-proof' in coming decades and what the change means for the assets' management.
A major area of focus on risk should be the schools' assets portfolio within the three local authorities - comprising over 200 schools in CTM – each will have its own locational risks to consider alongside the risks to building fabric and grounds. Increasing partners' understanding of this will help in forward planning and managing change, liabilities and risks.

Climate risk to non-public sector assets across CTM also needs to be better understood. CTMs social housing stock, 30 industrial estates, heritage partners' assets and privately owned contaminated land will all be affected by multiple risks. Impacts on these assets have wider ramifications for CTMs social, economic and cultural well-being. A key question for CTM's partnerships going forward is how to embed climate risk into asset management across sectors. Can the PSB and partners lead on developing effective approaches, which can be shared and replicated across sectors?

The review of documentation in this CCRA[19] suggests that current systems are approaching this issue reactively, within silos, and many current strategies, plans and programmes underplay / ignore / discount the scale of potential climate impact on assets. This needs addressing by the institutions within the PSB and their partners.

Participants were invited to indicate where in CTM that climate change may impact on asset management, andin their opinion, cause particular problems for well-being. This was to try and understand the spatial aspects of this risk, as a precursor for more detailed work which will need to be undertaken by partners on vulnerability in specific locations.

[19] See Appendix 2 for documentation reviewed during this CCRA related to this risk

In addition to the schools property portfolio, discussions in the CCRA also focused on the importance of Industrial estates and engaging private sector estate owners in relation to climate risk and business continuity. Examples of recent flooding had included Cwmbach Industrial Estate and Treforest Industrial Estate. Other key assets which were seen to be vulnerable to combination of risks were heritage sites, tourist attractions, access to waterfall country, and the resilience of the Porthcawl coastal path, and leisure facilities such as golf courses and sports pitches, ocial care and health provision assets were also seen as being vulnerable (this is picked up under Risk G.)

The review of documentation in this CCRA[20] suggests that current systems are approaching this issue reactively, within silos, and many current strategies, plans and programmes underplay /ignore / discount the scale of potential climate impact on assets. This needs addressing by the institutions within the PSB and their partners.

Key issues for managing the risk CTM wide

The following recommendations are made by the authors on activity needed to manage this risk across CTM 2025-30

1) developing an enhanced approach to asset management to include climate risk appropriately – to include risks to the location, surroundings and systems that the asset relies on (road, utilities, IT) – to influence asset management strategy and decision making;
2) evaluating climate risk to the schools property portfolio of 200 schools across CTM – to understand diverse locational risks to inform forward planning;
3) communicating effective approaches to climate risk management in property/asset management across sectors and engaging industrial estate and culture/historic asset managers to develop practice, and
4) exploring the increasing financial costs for managing climate risk to properties in a changing climate across the CTM area and using this evidence to communicate this through leaders to UK, Welsh Government and WLGA.

Benefits of further action to manage this risk in the next five years

Decision making and forward planning on asset/property management across CTM will have considered multiple climate risks, reducing potential exposure and vulnerability to risk in each asset and location. A collective aim will be that assets and property will be fit for purpose and function in a changing climate. This approach will minimise risks to service users, staff, students, local communities and in doing so , reduce liabilities and build climate resilience across CTM.

[20] See Appendix 2 for documentation reviewed during this CCRA related to this risk

G:SOCIAL CARE AND HEALTH PROVISION

Description of risk

Social care and health services in CTM will need to be planned so that they meet people's needs in a changed and changing climate. This provision is reliant on other services run by the Councils, and external agencies to ensure that the systems they rely on (energy, transport, IT and water) are resilient to climate risks. Partners' approaches to climate risk have a knock-on effect on the ability of others to deliver these services.

As discussed in previous sections, forward planning for climate change will need to consider the potential cumulative impacts of repeated, impactful, severe weather events on CTM. This may increase service demand (for example to mental health or emergency health services), compromise assets where services are delivered, such as care home, hospitals, clinics and health hubs, as well as effect service users in their homes. This CCRA suggests that the risk is more than maintaining business continuity in individual severe weather events, but a systemic shift to deliver services in a changed and continually changing climate.

CTM partners will need to make sure that the hubs, care homes, residences, hospitals, treatment centres and other assets where they deliver services can continue to function in a changed climate. This will include the temporary accommodation which is used as part of emergency response.
A major focus of discussion in this CCRA has been the short, medium and long-term social care and health needs that may occur from an increased frequency of severely impactful weather events in CTM. This is particularly in relation to landslips and surface water flooding, sinkholes and dispersed pollution from mine water and contaminated land .

While immediate emergency response will be managed by the Local Resilience Forum, there is a major concern that the aftermath of these events will stretch social and health care services – with a slow burn of demand over an extended period. Staff skills, morale, capacity and burnout to support potentially increasing numbers of vulnerable service users has also been raised as a risk. These scenarios are more likely in a changed climate. CTM partners will need to work together to plan forward for post- emergency responses – and impact on service demand.

Other key issues discussed in this CCRA regarding this risk have been

- challenges for all health care settings to supply chain disruption, providing thermal comfort, maintaining access for professional services;
- maintaining road access to CTMs hospitals and other health facilities due to repeated surface water flooding , wildfire, subsidence and landslip;
- cumulative impacts on business continuity in hospitals and other health facilities;
- cumulative impacts business continuity in care homes, residential facilities and day centres;
- temporary accommodation – vulnerability of multiple locations;
- Air Quality Management Areas – the effect of extended high temperature events on air quality;
- increases in respiratory problems due to repeated overheating and wildfire, and mental health support for climate anxiety and disaster response;
- increase low level ozone and particulates in Air Quality Management Areas in repeated, long-lasting heatwaves (for example in Llanharan, Pontyclun Bridgend, Aberdare and others);
- the switch from fuel poverty for heating to cooling;
- impacts on housing conditions – damp in older housing stock;
- climate risk impacting on environmental health; waste; pest populations, and
- how partners address climate risk through the relationships with care agencies and care homes through which they commission services.

The review of documentation in this CCRA[21] suggests that current systems are approaching this issue reactively, within silos, and many current strategies, plans and programmes underplay / ignore / discount the scale of potential climate impact on social and health care. This needs addressing by the institutions within the PSB and their partners.

The challenge and risk for partners in CTM is their ability to alter strategic, business and operational planning to account for these changes. Current approaches to forward planning need to be developed to integrate climate risks effectively. An immediate priority for the PSB should be to undertake detailed mapping with available data to inform their understanding of the scale of this problem; to identify specific locations which are vulnerable, to identify knowledge gaps and ways to gather evidence on this issue.

Key issues for managing risk CTM wide

The following recommendations are made by the authors on activity needed to manage this risk across CTM 2025-30

1) the need for a multi-agency approach to assess and manage potential climate risk to social care and health services across CTM;
2) the CTM Regional Partnership Board is seen as a critical player in developing evidence and response in relation to increased service demand; asset vulnerability; location of services; partnership working and commissioning services.; and financial impact;
3) a preferred approach from those involved in the CCRA would be to address this as a new and distinct area of collaboration – given the scale and complexity of the risk -with new commitments required from partners – despite budgetary constraints, and
4) establishing a detailed understanding of how CTM partners would deliver services over the short, medium and long term should repeated or multiple high impact severe weather events occur - and what this would mean for service planning.

Providing recommendations to WLGA, PHW, NHS Wales, Welsh Government and UK Government on ways in which the 'system' can support adaptation planning to address this risk.

Benefits of further action to manage this risk in the next five years

Social care and health partners will have a clearer understanding of how multiple risks are likely to affect demand for services, impact on services users, the assets where they deliver services, and the inter-reliance they have with other services. This information will provide evidence for decision making on design, location, and the nature of services to ensure they are robust and function in a changed and changing climate. Partners will be better prepared for the scale of demand likely to result from repeated, emergency incidents at scale across CTM. This will inform future strategic and financial planning and engagement with WLGA, Welsh Government, NHS Cymru and Public Health Wales.

[21] See Appendix 2 for documentation reviewed during this CCRA related to this risk

H: MAINTAINING UTILITIES (WATER, ENERGY, FOOD AND ICT)

Description of Risk

Throughout this CCRA,the issue of maintaining utilities across CTM to serve the needs of its communities, businesses and public services has been raised as an area of key concern. Discussions have focused not just on the Infrastructural Pinch Points discussed (see Risk C), or the utilities around vital Assets (See Risk G), but more specifically about the long-term viability of energy networks, water/sewerage networks, food networks and information technology networks, and their ability to function and meet people's needs as the climate changes. There is much concern about maintaining energy, water / sewerage disposal services, IT and food supply to the linear and isolated communities in and around CTM's valleys and coast, especially if essential infrastructure is repeatedly compromised due to climate change. Using the UK and Wales CCRA3 Framework, a number of potential vulnerabilities have been discussed in this CCRA including:

- The resilience of ageing **water and sewerage infrastructure** and the reliance in some parts of CTM on private water supply. It is clear that long-term climate projections undertaken by Dwr Cymru inform their maintenance and capital investment plans for the water and sewerage network; that drought planning is undertaken with NRW ; that mapping of vulnerabilities of connections is still to be undertaken, and there are endemic problems with the sewerage infrastructure across CTM (see pervious comment on backing up of sewerage due to flat infrastructure in flood events). In view of the above, CTM's partners should develop discourse with Dwr Cymru, with support from NRW on the vulnerability of specific areas in CTM, should water infrastructure be repeatedly compromised. What might be compromised, where? What can communities, businesses and service deliverers expect in CTM specifically, regarding water supply and sewage disposal in coming decades, as the climate changes?

- The vulnerability of **energy infrastructure** above and below ground to multiple climate impacts from flooding, drying, landslip, storm, and wind damage and subsidence and the potential disruption to supply to homes and businesses. It is clear that both Regional and Local Energy Planning has been undertaken with the support of Wales Energy Service (WES), but there is a lack of clarity on how climate risk is being factored into the energy network discussions as a result of this work and through Cardiff Capital Region. In view of the above, CTM's partners should develop discourse with WES and Cardiff Capital Region, and energy providers on exactly which areas in CTM would be most affected, should energy infrastructure repeatedly affected, what might be compromised, where? What can communities, businesses and service deliverers expect in CTM, specifically regarding energy business continuity in coming decades, as the climate changes?

- the vulnerability of supply chains to repeated transport disruption affecting **food distribution** to supermarkets and smaller food retailers and the ability **food producers** to maintain outputs, supplies and markets. This is a major knowledge gap and an area for investigation for the PSB. Food supply networks across the UK are seen to be becoming increasingly fragile due to both international and UK production and supply issues. It is recommended that the PSB engage with supermarket chains, food producers, food distributors and retailers to explore food resilience at present, and explore the potential effects of repeated, impactful severe weather on networks, supplies, and delivery in the context of CTM's communities. This is a strategic risk from climate change that is not 'owned' by any given institution – but a collaborative analysis is vital to support climate resilience.

- **Information and Communications Technology** ICT is critical to the operation of wider infrastructure networks as well as underpinning business activities, access to key services, and wider communication. For CTM, like other locations, this includes digital infrastructure, data centres, base stations and network connections. Risks to CTM's ICT networks are likely to be from power loss; inability to access affected sites; damage to cables and fibre on bridges; storm and ice damage to overhead cables; damage from wind-blown debris (including trees), and impact on other utilities supporting ICT facilities. The key issues here is that these types of impacts will become more frequent as the climate changes, with an increasing chance of ICT networks being compromised so resilience needs to be built in to ICT network planning. Understanding of ICT network vulnerabilities CTM wide is likely to be inhibited by

commercial and security sensitivities. Nevertheless, the PSB and partners explore the climate resilience of their own ICT services to the multiple assets they serve, and also explore this issue with network providers, from those providing commissioned services and suppliers.

A strengthening and growing reliance on electricity and digital infrastructure for transport, communication and service delivery makes explorations of these risks with a climate risk lens, urgent for public services and well-being across CTM.

Participants were invited to indicate where they thought climate risks may impact on utilities provision and in their opinion, cause particular problems for well-being. This was to try and understand the spatial aspects of this risk, as a precursor for more detailed work, which will need to be undertaken by partners on vulnerability in specific locations, as part of their approach to climate adaptation. Participants concerns focused on:

- **Reservoirs,** including Pontsticilll and Pontsarn with the potential of climate risks inhibiting business continuity for South Wales water supply (access for chemicals). Concerns were also expressed about access to site, overtopping, and flood risk for Pontsticilll, Dolygaer. Pentwyn. Pengarridw.Lluest Wen, Castell Nos Llyn Fawr , Penrhycellin, Southerndown.

- Vulnerability of **piping, cables, ducting, water and sewage infrastructure** throughout CTM **–** often in conjunction with roads and bridges, and the potential for repeated cumulative impacts from more frequent severe weather, and increased costs to 'bounce back.' Merthyr Tydfil, Georgetown and Morlais Castle were given as examples of locations. Treharris and Cwm Clydach Hydro power schemes were also cited as being vulnerable to increasing sediment load and debris. Similarly, Trehafod Water pumping station, and the potential impact of both flood and drought on its operation

- The fragility of **food supply networks**, to households, businesses and retailers in the Merthyr, Rhondda Cynon Taff and north Bridgend valleys

Clearly, more work will be needed by the PSB to understand the vulnerability / resilience of utilities across CTM. This should be a major focus of partners work 2025-30.

The review of documentation in this CCRA[22] suggests that current systems are approaching this issue reactively, within silos, and many current strategies, plans and programmes underplay/ignore/discount the scale of potential climate impact on utilities. This needs addressing by the institutions within the PSB and their partners.

Key issues for managing risk CTM wide

The following recommendations are made by the authors on activity needed to manage this risk across CTM 2025-30:

1. PSB discourse with Wales Energy Service and Cardiff Capital Region, and energy providers on which areas in CTM would be most affected, should energy infrastructure be repeatedly affected; what might be compromised where; how can climate resilience be built into future capital works and investment?
2. PSB discourse with Dwr Cymru, with support from NRW on the vulnerability of specific areas in CTM. Should water / sewerage infrastructure be repeatedly compromised? What might be compromised, where? How can climate resilience be built in to future capital works and investment?
3. PSB and public sector engagement with supermarket chains, food producers, food distributors and retailers to explore food resilience at present, and explore the potential effects of repeated, impactful severe weather on networks, supplies and delivery supporting CTM's communities.

[22] See Appendix 2 for documentation reviewed during this CCRA related to this risk

4. PSB and partners explore the climate resilience of their own ICT services to the multiple assets they serve, and also explore this issue with network providers, from those providing commissioned services and suppliers.

Benefits of further action to manage this risk in the next five years

Increasing understanding of climate vulnerabilities of networks for energy, water, sewerage services, food and information technology across CTM will enable partners to target resources, management practices and investment to reduce vulnerabilities emerging from a changing climate. Developing discourse between different sectors with water, energy, food, IT providers will help to inform forward planning from multiple perspectives, identify solutions that work and build new relationships to tackle climate risk.

I: NATURE CONSERVATION MANAGEMENT

Description of risk

This CCRA has considered a wide range of potential risks from climate change to the natural environment (see list in Appendix 3) focusing on terrestrial, aquatic, coastal and marine habitats and species, soils and landscape. This has included discussion of designated nature conservation sites and their management, and current approaches to climate risk in CTM's approach to nature recovery, and maintaining and enhancing biodiversity. This work has also considered likely impacts on both forestry and agriculture, and the likely impact of a wide range of pest, pathogens and disease. Previous sections on the Post-Industrial Landscape (Risk A) and Wildfire (Risk E) have highlighted the critical role that the natural environment plays in stabilising slopes and spoil tips, reducing run-off and maintaining water quality and quantity in CTM.

The following risks have been highlighted in these discussions:

- severe weather events, high rainfall, flooding and wildfire reducing slope and spoil / coal tip stability;
- soil loss and mineralisation (washing out organic matter) of soils caused by increased rainfall and run-off;
- dispersed pollution contaminating land and sediments with negative effects on biodiversity;
- drying out of peat landscapes at scale across upland areas and the scale or re-wetting required;
- reduced river and stream flow impacting on aquatic habitats and species;
- impacts on forestry production due to soil loss and changes in local hydrology;
- deterioration in the condition of designated sites (SSSIs, Local Nature Reserves etc.) and the loss of characteristics leading to their designation;
- deterioration of peat, woodland and grassland habitats from increased wildfire;
- loss of coastal habitat from cumulative impacts of severe storms and tidal surges including Merthyr Mawr and Kenfig sites along the Bridgend coast. Sea level rise will also impact on coastal habitat and dune habitat;
- deterioration of the potential for ecological networks role to maintain/enhance biodiversity;
- managing invasive species along river corridors (Himalayan Balsam and Japanese Knotweed) ,Piri Piri Burr and Sea Buckthorn at Merthyr Mawr) Oak Processionary Moth in woodland;
- impacts on key species of biodiversity value including butterflies, orchids, arctic alpine species, salmon and otter, and
- river habitats deteriorating due to rising water temperature and lack of shade from trees along riverbanks.

The CCRA suggests that the risk of climate impacts such as these, need a far higher profile than at present, in work on nature recovery and biodiversity across all ecosystems in CTM. Management plans for individual areas of nature conservation interest and woodland management will need to factor in multiple climate risks to vegetation, soils, hydrology and species to ensure their ecological or production value is maintained.
The review of documentation in this CCRA[23] suggests that current systems are approaching this issue reactively, within silos, and many current strategies, plans and programmes underplay / ignore / discount the scale of potential impacts of climate change on nature conservation management across CTM.

There is already a knowledge gap in the condition of many protected sites at present. Partners will need to focus on which sites are likely to be most vulnerable to change. Much the same as in asset management, effects will be location specific. It will be important to consider impacts to the site itself, but also the potential knock-on effects should the site deteriorate – on flood risk, soil loss, or contamination (where nature is 'locking' in contaminants caused through mining and processing in soils and vegetation).

[23] See Appendix 2 for documentation reviewed during this CCRA related to this risk

Participants were invited to indicate where they thought climate risks may impact on nature conservation management and cause particular problems for nature recovery and well-being. This was to try and understand the spatial aspects of this risk, as a precursor for more detailed work which will need to be undertaken by partners on vulnerability in specific locations, as part of their approach to climate adaptation. Participants concerns focused on the impact of surface water flooding caused by poor woodland management across CTM; the effect of storm frequency and coastal change impacting on dune stability, hydrology and biodiversity - Kenfig Dunes and Merthyr Mawr, and the potential of coastal erosion and wildfire at Rest Bay and Locks Common Porthcawl (LNR).

The review of documentation in this CCRA[24] suggests that current systems are approaching this issue reactively, within silos, and many current strategies, plans and programmes underplay / ignore/ discount the scale of potential climate on nature conservation. This needs addressing by the institutions within the PSB and their partners.

Key issues for managing this risk CTM wide

The following recommendations are made by the authors on activity needed to manage this risk across CTM 2025-30:

1) Approaches to landscape, designated sites and habitat management in CTM will need to increasingly factor in climate impacts on habitat condition, wildfire, hydrological changes and connectivity in their objectives and delivery.
2) Current approaches to forward planning for individual assets need to be developed at all levels to integrate climate risks. This includes identification of the most sensitive nature conservation sites and an assessment of which need intervention and resources required to manage their change.
3) Increased collaboration to manage wildfire at a strategic scale - proactive long-term approach rather than a reactive, short-term response.
4) Complacency on the existing diversity and mosaic of habitats providing inherent resilience to climate change. Climate risk in is a serious threat to nature recovery and increase biodiversity loss.
5) Integrated thinking by the relevant public and third sector partners alongside landowners and communities. There are opportunities for new approaches, responding at scale (such as Healthy Hillside Project) and through the Sustainable Farming Scheme (agricultural payments) Public Authority Section 6 Biodiversity Duty, and Place-making/Place shaping work responding to Planning Policy Wales, and across the public sectors' asset management (See Risk F)

Benefits of further action to manage this risk in the next five years

Partners involved in managing CTM's landscape, nature conservation interests and land managers will have a clear idea of which locations are most vulnerable to multiple climate risks. Management plans for these sites will have incorporated climate risk management into their objectives, delivery, and resource requirements will have been identified. Asset managers in public bodies will understand the role of natural assets in helping to manage climate risk around and on their assets and across their property portfolio (See Risk F).

[24] See Appendix 2 for documentation reviewed during this CCRA related to this risk

J: INSTITUTIONAL RESPONSE

Description of risk

One of the key findings of this CCRA is that institutions' approaches, views and leadership on climate change are an inherent part of each of the risks explored above.

Having reviewed a plethora of corporate, strategic, management and operational plans as part of this CCRA[25], and listened to contributors, we have found that climate risk has little or no profile in many plans that are critical to the way public services are delivered, and that will shape development across CTM in coming years.

The majority of institutions engaged in the CCRA do not currently have whole organisation approaches to climate risk. We suggest that much work is needed in CTM to develop capacity to explore the complexity of climate risk across traditional silos and partnerships,and to integrate this issue properly into the work of the public sector and its partners. Collaborative work on this complex, multi-scale and multi-faceted issue may be inhibited or supported by the following:

- each institutions' capacity to think broadly about climate risk in locations and across systems, and across their portfolios of work and responsibilities rather than be reductionist and focus on single issues;
- the institutions ability to be reflective about the sufficiency of their current approaches to tackle climate risk – to focus on gaps in terms of scale and what is needed, rather than what already 'fits' the issue and is going well;
- institutions ability to address key climate risk issues as strategic level at scale rather than focus on SINGLE sites or single operations as a piecemeal response;
- the understanding and skills of leaders, managers, officers and partners to think broadly about how their service may need to change to deliver services and well-being for residents in a changed and continually changing climate;
- approaches to evidence gathering on climate risk focusing on places and locations rather than the issue only;
- the profile of climate risk and adaptation in corporate and management plans - limiting input, evidence gathering and the development of appropriate management responses, and
- shifting intelligence *sharing* between organisations and within organisations to map, assess and manage potential risks, *to interpreting* this to affect change on the ground.

We suggest, having helped partners in CTM to develop this picture of climate risk,that Institutions' current approaches to manage climate risk are insufficient to deal with the scale and complexity of how climate change is likely to play out in communities across CTM. Leaders will need to challenge, support and scrutinise management approaches to integrate climate risk and avoid complacency that current /past/traditional approaches will suffice to adapt to climate change.

A major challenge for institutions is the scale and range of specific management issues they will need to address as part of climate adaptation: infrastructural investment; service planning; evidence gathering; business case development; operational works; outreach to delivery partners; locational responses, and place planning for a changed climate. An effective measure of the success of climate adaptation would be whether these management activities have changed to address climate risk on the ground. As a result of this management activity, has CTM become more climate resilient?

As climate risk increases in coming decades, public services, managers and partners will need to become increasingly skilled in understanding the inter-relationships between different climate impacts and their own

[25] See Appendix 2 for documentation reviewed during this CCRA related to this risk

portfolios of work and spheres of influence. Placing climate risk management as a key management outcome across public services would enable forward planning with climate risk in mind.

The review of documentation in this CCRA[26] suggests that current systems are approaching climate risk reactively, within silos, and many current strategies, plans and programmes underplay / ignore / discount the scale of potential climate impact on assets. This needs addressing by the institutions within the PSB and their partners.

Key issues for managing risk CTM wide

The following steps are suggested by the authors for **each institution** involved in this CCRA to increase their organisation's capacity to work on this issue.[27]

1. Increase the profile of climate risk in institutions' strategies, plans, programmes and projects, including asset management; regeneration; place planning; social services; nature recovery; commissioning and procurement; business and service planning, and performance and reporting. A corporate plan commitment would be the first step to ensure this happens, and that climate adaptation is seen by decision–makers as a core part of existing functions.

2. Increase leadership and managerial capacity to understand the relevance of climate risks to their portfolios of work. Not just literacy on the issue, but how potential risks may affect their responsibilities, asking leaders to identify their own leadership roles in different arenas and to act on their own leadership response.

3. Use this CCRA as a framework to explore and identify the institutions' role on climate risk and adaptation at strategic, organisational, partnership, operational and community levels. Communicate the institutions' role on climate risk and adaptation internally across functions, and externally in partnerships, and in collaborative arenas.

4. Report on climate adaptation activity in annual reports and reports to Welsh Government, funders and in regional and local partnerships (even though at this stage this is not a requirement).

5. These are broad 'asks' of each institution – these principles also apply to smaller organisations, programmes and projects at multiple scales.

Benefits of further action to manage this risk in the next five years

Consideration of climate risk and adaptation will have increased *as part* of the core activities of institutions and their partners across CTM. Climate resilience will be a specific outcome *alongside* other outcomes of their strategy, plans, programmes, and projects. Scrutiny of partners' approaches to this activity will show *how, what* and *where* climate resilience has been achieved.

[26] See Appendix 2 for documentation reviewed during this CCRA related to this risk

[27] These suggestions are informed by NSFs work for WLGA engaging 300+ leaders, senior managers and managers in the WLGAS Climate Leadership Programme 2022-2024, work with senior leaders across the UK and research on climate change governance at Cardiff University.

K: RESOURCES AND FINANCE

Description of risk

The backdrop to this assessment has both short and medium-term resource constraints on public funding. These constraints will profoundly affect the public and other sectors across CTM for the foreseeable future. There is less available resource to meet service demand, and less capacity to plan forward for issues such as climate change. There is no additional funding for addressing climate risks.

This financial situation is a challenge for the PSB and its partners - how can they address climate risk *within* existing resources in a coherent and coordinated way across the diverse set of communities, landscapes and services provided in Cwm Taf Morgannwg? There are two aspect of this risk – overcoming potential inertia due to the lack of designated funds at an organisation level; and the knowledge gap around adaptation costs at a community and strategic level. Work over the next 5 years needs to be undertaken to tackle both aspects of this risk.

At an **organisational level:**

- The CCRA has identified that climate risk needs to be treated at an organisational and partnership level as core work. This will mean local members, senior managers and financial managers need to identify innovative ways to utilise existing resources and skills within and between their organisations, to address these shared climate risks;
- Annual Service and Business Planning is one way to approach this – utilising this CCRA to identify how existing work programmes can be 'tweaked' by service teams to better integrate climate risk into what they already plan to do –for example, asset management, or social services commissioning; or developing a place plan;
- There may be opportunities for service managers to use this CCRA to build the business case internally for undertaking new survey work or seeking funding from Welsh Government or partners to jointly fund monitoring, condition surveys or scenario planning;
- Many suggestions in the 'Key Issues to manage CTM-wide' sections may be low cost if organisations jointly fund further detailed risk assessment work. Staff costs will be the main issue in developing discourse, for example on utilities resilience;
- Some organisations already have governance arrangements in place for decarbonisation, for example, Climate Change Boards or Climate Change Working Groups. This CCRA can be used to focus their work to raise the profile of risk and potential resource requirements for adaptive activity (e.g. new planting regimes, and asset retention for flood risk management);
- Placing climate risk and adaptation as a regular agenda item for Senior Leadership Team/ Cabinet/ Executive can also help to highlight specific resource requirements to support adaptation, and
- Requiring approaches to climate risk and adaptation from service providers who are bidding for contracts, being commissioned or being asked to design development is also one option – to actively explore whether there are additional costs of climate adaptation.

At a **strategic level**, the additional costs of managing climate risks in coming decades needs urgent attention including;

- clean up and 'bounce back' for communities from increasing, frequent, impactful severe weather, and increasing demands on emergency planning;
- the costs of increased service demand and capital works if climate risks compromise, assets, infrastructure spoil tips and river embankments, are unknown but likely to be significant;
- the costs of investment in the transport network (road, rail and bridges) to cope and develop resilience;
- short, medium, long-term costs of increased service demand for social and health services managing the aftermath of repeated emergency situations;
- the costs of increased maintenance and liability from public sector assets compromised by cumulative impacts of climate change, and

- the costs of developing the right skills for staff and volunteers to support communities that may become untenable needs serious consideration.

The list of potential additional costs from managing the consequences of climate change is overwhelming – especially given the financial outlook for public sector funding. However, this CCRA strongly suggests that CTM's partners should begin to develop their understanding of these costs to inform their discourse with Welsh Government, UK Government and other funders.

Key issues for managing risk CTM wide

The following recommendations are made by the authors on activity needed to manage this risk across CTM 2025-30:

1) identify a small number of scenarios (based on the CCRA) to explore the cost implications to public services in CTM if particular climate risks combine and impact in specific locations – the pinch points discussed in Risk C or in locations where old mine workings may impact on a particular community. (See Risk A and Risk B)

2) develop shared approaches to commissioning services that include climate risk management as part of the requirements. (not just emergency planning and business continuity)

3) develop discourse with the PSB, Regional Partnership Board, PSB, Cardiff Capital Region, Corporate Joint Committee, WLGA, Welsh Government, academia, and others to fund research into the financial impact of climate risk on CTM's public services.

4) CTM institutions working together to identify ways to integrate climate risk into existing approaches to service planning and delivery – way of progressing climate adaptation at no/low cost.

5) Partners work on this agenda needs to influence funding systems. Partners should use evidence gathered from the above activity to discuss options and new ways of financing climate adaption on the ground with Welsh Government, WLGA and other funders.

Benefits of further action to manage this risk in the next five years

Partners will have a clearer idea how to deliver climate adaptation despite resource constraints. Collaborative work on climate risk will have delivered new evidence, understanding and on the ground climate adaptation as part of their core work and existing budgets. Individual institutions will understand how service demand may affect service delivery in a changed climate and begin to plan for this in service reform, and discussions with service delivery partners. Scenario work will have identified strategic costs of climate risk management and adaptation for specific locations and specific issues, to develop a broader debate on financing climate adaptation across for CTM with Welsh Government, WLGA and other funders.

SECTION 3:
SUMMARY COMMENTS

The previous Section has described eleven key areas of climate risks to Cwm Taf Morgannwg, that need urgent attention 2025-30 and beyond. This CCRA has 'lifted the lid' on a wide range of risks highly likely to result, combine and accumulate as the climate changes in CTM in coming decades.

This analysis of climate risk has deliberately moved away from considering single issue risks in isolation from each other, and focused instead on how multiple risks may manifest themselves 'on the ground' and combine to compromise well-being and public service delivery. All 11 risks should be considered as high priority and are CTM-wide:

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A. Post-industrial landscape – multiple risks at scale;
B. Climate resilient communities;
C. Infrastructural pinch points;
D. Transport Infrastructure (road, rail, bridge);
E. Wildfire management;
F. Asset management;
G. Social care and health provision;
H. Maintaining utilities (energy, water, sewerage, food, ICT);
I. Nature conservation;
J. Institutional responses to climate risk, and
K. Resources and finance for climate adaptation

This CCRA serves as a basis for further, much more detailed work by partners to identify ways in which these risks can be tackled through the core work that they deliver – through climate adaptation. Section 2 identifies 41 issues for partners to consider in the management of the 11 risks CTM wide. These signpost the type, scale and granularity of activity that could form the basis of a climate adaptation strategy for CTM. The CCRA has also spelt out the benefits that further work on each risk would provide to build climate resilience.

It is recommended that the following next steps are considered by the PSB and partners to respond to the CCRA and develop their adaptation planning. For each of the 11 risks

- exploring, together the **sufficiency of current systems** in place to manage the risk in terms of scale, frequency of impact, further evidence needed and resource requirements, to create a business case for adaptation;
- informing this discussion through **detailed mapping** of risks using available data, identifying knowledge gaps, and where possible gathering new data to build evidence where there are gaps in knowledge;
- identifying the **enhanced approaches required to manage the risks** and the responsibilities of public organisations and others within the CTM 'system';
- identifying **specific short/ medium/ long-term actions** that are meaningful and at the appropriate scale, to manage the risk, collectively and within individual organisations, and
- providing **strategic leadership** through Executive/Cabinet/Committee, senior leadership teams and Boards to challenge existing systems, identify specific interventions that build climate resilience and support this activity with resources to deliver the necessary adaptation.

APPENDIX 1 – Organisations contributing to the CCRA

Awen
Bridgend Association of Voluntary Organisations
Big Ideas Wales
Bannau Brycheiniog National Park
Bridgend College
Bridgend County Council
Business Wales
CADW
Coleg y Cymoedd
Cwm Taf Morgannwg Public Services Board
Cwm Taf Morgannwg University Health Board
Dwr Cymru/Welsh Water
Federation of Small Businesses
Farming Union Wales
Interlink RCT
Llanharan Community Development Project
Local Partnerships
Merthyr Tydfil County Borough Council
Merthyr Valleys Homes
National Grid
National Health Service
Natural Resources Wales
Plantlife
Rhondda Cynon Taff Climate Action Network
Rhondda Cynon Taf County Borough Council
Red Cross
Sustainable Wales
South Wales Fire and Rescue Service
South Wales Police
Transport for Wales
Voluntary Action Merthyr Tydfil
Welsh Government
Wildlife Trust of South and West Wales

The CCRA has contributions from 221 individuals exploring climate risk over 6 months.

33 organisations were involved, including PSB partners, representative bodies for the business and third sectors, local councillors, community groups and residents.

The Councils provide particular support with 46 contributors from Bridgend; 28 from Rhondda Cynon Taf and 10 from Merthyr Tydfil.

Thankyou from Alan and Dafydd to all who took part.

APPENDIX 2 - Documentation reviewed related to each risk

the following documents and websites have been used to support the analysis within the CCRA – these resources were reviewed and informed the commentary in this report . the letter in brackets indicate where, in particular, they supported the authors thinking on each risk.

Bannau Brycheiniog National Park Authority Local Development Plan 2007-2024 (A-K)
Bannau Brycheiniog National Park Authority Supplementary Planning Guidance 2007 onwards (website) (A-K)
Bridgend Active Travel Overview Map 2015 (D)
Bridgend CBC Air Quality Management Progress Report 2024 (G)
Bridgend CBC Biodiversity Section 6 Duty Plan 2022-25 (I)
Bridgend CBC Corporate Plan 2023-28 (J)
Bridgend CBC County Borough Profile 2018 (B)
Bridgend CBC Economic Strategy for Bridgend County Borough 2022-32 (B)
Bridgend CBC Housing Support Programme Strategy 2022-26 (B)
Bridgend CBC Local Area Energy Plan 2021 (C)
Bridgend CBC Local Development Plan 2018-33 & Supplementary Planning Guidance (A-K)
Bridgend CBC Local Flood Consequence Assessment 2020 (A-K)
Bridgend CBC Local Transport Plan 2015-30 (B, C, D)
Bridgend CBC Medium Term Financial Strategy 23-27 (K)
Bridgend CBC Porthcawl Waterfront Place-making Strategy 2022 (B, F)
Bridgend CBC Town Centre Regeneration Master Plan 2021 (B, F)
Bridgend Local Biodiversity Action Plan 2014 (E, I)
Capital Capita – Cardiff City Region Project Hub (website) (A,C)
Cardiff Metropolitan University: How resilient are buildings in the UK and Wales to the challenges associated with a changing climate? Practical recommendations for risk-based adaptation. 2022 9B, F)
CHERISH: Climate Change and Coastal Heritage EU Funded Project (website) (C,F I)
Climate Change Committee CCRA3 Technical Report: Chapter 3 Natural Environment and Assets 2021 (A-K)
Climate Change Committee CCRA3 Technical Report: Chapter 4 Infrastructure 2021 (A-K)
Climate Change Committee CCRA3 Technical Report: Chapter 5 Health, Communities and Built Environment 2021 (A-K)
Climate Change Committee CCRA3 Technical Report: Chapter 6 Business and Industry 2021 (A-K)
Climate Change Committee: Evidence for the third UK Climate Change Risk Assessment (CCRA3) Summary for Wales. Netherwood, A 2022 (A-K)
Cwm Taf Morgannwg Regional Partnership Board: Area Plan 2023-28 (G, F, J)
Cwm Taf Morgannwg Regional Partnership Board: Progress Report 2023 (G, F, J)

Cwm Taf Morgannwg University Health Board: As an Anchor Organisation – Corporate Plan 2022-25 (J)
Cwm Taf Morgannwg University Health Board: Integrated Medium-Term Plan 2023-26 (J)
Cwm Taf Morgannwg Well-being Assessment 2022 (A-K)
Cwm Taf Morgannwg Well-being Plan 2023-28 (A-K)
Datamap Wales: A,B,C,D disused Coal Tips in Wales (2024) (A)
Datamap Wales: Communities at Risk Register 2024 (A, B, G)
Dwr Cymru Drought Plan 2020 (B, H, I)
Dwr Cymru: Water Resources Management Plan 2024 (B, H, I)
Historic Environment and Climate Change in Wales Sector Adaptation Plan 2020 (F, I)
Merthyr Town Centre Master Plan 2020-35 (B, F, H)
Merthyr Tydfil Air Quality Progress Report 2023 (G)
Merthyr Tydfil CBC Biodiversity Section 6 Duty Report 2023 (I, J)
Merthyr Tydfil CBC Corporate Asset Management Plan 2023-38 (F)
Merthyr Tydfil CBC Corporate Plan 2023-28 (J)
Merthyr Tydfil CBC Housing Support Programme Strategy 2022-26 (B, F0
Merthyr Tydfil CBC Local Area Energy Plan 2023 (C, H)
Merthyr Tydfil CBC Local Data Profile - Department of Levelling Up Housing and Communities 2024 (A-K)
Merthyr Tydfil CBC Local Development Plan 2016-31 & Supplementary Planning Guidance (A-K)
Merthyr Tydfil CBC Local Economic Vision 2020-35 (A-K)
Merthyr Tydfil CBC Local Flood Risk Management Strategy 2024 (A-K)
Merthyr Tydfil CBC Medium Term Financial Plan 2024-27 (J)
Merthyr Tydfil Nature Recovery Action Plan 2019 -24 (E, I)
Met Office: UK Climate Data Portal: Profiles for Bridgend CBC, Merthyr Tydfil CBC, Rhondda Cynon Taf CBC (A-K)
Mountain Ash Cross Valley Link (website) (C, D)
National Infrastructure Commission Building Resilience to Flooding in Wales by 2050 Report 2024 (A-K)
Natural Resources Wales Marine Area Statement 2022 (I)
Natural Resources Wales National and South-Central Flood Risk Management Plans and Strategic Environmental Assessments 2023-29 (A-K)
Natural Resources Wales National Flood Asset Database (website) (A-K)
Natural Resources Wales South Central Wales Area Statement 2022 (E, I)
Natural Resources Wales (2020) Advice on locations where Coastal Adaptation measures may affect Coastal Access over the lifetime of the Shoreline Management Plans Report No: 435 Author Name: Dewey, N., Lockhart, E., Ringwood, O.(B, I)
Natural Resources Wales Forest Resource Plan Llanwynno 2018 (E, I)
Natural Resources Wales Forest Resource Plan: Brecon Beacons Central 2018 (E, I)
Natural Resources Wales Forest Resource Plan: Gethin, Merthyr Vale and Allen 2016 (E, I)
Natural Resources Wales National Peatland Action Programme. Year 4 Report 2023-24 (E, I)
Natural Resources Wales NRW State of Environment Report SONAAR 2020 (A-K)
Natural Resources Wales: LANDMAP Landscape & a Changing Climate Report Berry, R., Dwyer, J., Gaskell, P., Lake, J., Powell, J. and Young I. NRW Report No: 314, 278 pp, Natural Resources Wales, Bangor. 2019 (A, E, I)
Public Health Wales (2023) Edmonds, N. and Green, L. (2023)Climate Change in Wales: Health Impact Assessment: Technical Report, Public Health Wales NHS Trust (B, G)
Red Cross Every time it rains Report 2023 (B, G)
Red-cross Prepare for emergencies Advice (website) (B, G)
Rhondda Cynon Taf CBC Adult Care: Social Service Plan 2024 (B, G)
Rhondda Cynon Taf CBC Air Quality Progress Report 2023 (B, G)
Rhondda Cynon Taf CBC Corporate Asset Management Plan 2024-30 (Draft) 2024 (F)
Rhondda Cynon Taf CBC Corporate Plan 2024-30 (J)
Rhondda Cynon Taf CBC Draft Tree & Woodland Strategy 2022-32 (E, I)
Rhondda Cynon Taf CBC Local Development Plan 2022-37 & Supplementary Planning Guidance (website) (A-K)
Rhondda Cynon Taf CBC Local Flood Strategy & Action Plan 2015 (A-K)
Rhondda Cynon Taf CBC Local Housing Strategy 2020-24 (B, F)
Rhondda Cynon Taf CBC Medium Term Financial Plan 2024-27 (K)
Rhondda Cynon Taf CBC RCT Invest Programme Major Projects (website) (C, F, K)
Rhondda Cynon Taf Nature Recovery Plan: Action for Nature 2024 (E, I)
Severn Estuary Coastal Group Shoreline Management Plan South Wales Coast 2010 and SMP Review (website) (B, C)
Social Care Wales: Approaches to Community Resilience 2018 (B, G)
South East Wales Corporate Joint Committee (website) (A-K)
South East Wales Corporate Joint Committee. Update Report on Regional Transport Plan 2024 (C, D)
South East Wales Resilience Forum: Community Risk Register (website) (A-K)
Technical Advice Note 15: Development, Flooding and Coastal erosion. 2021 (A-K)
Transport for Wales: Climate Resilience & Action Plan 2023-28 (B, C, F)
UK Climate Risk Telecoms and ICT Sector Briefing 2021 (B, H)
UK Climate Risk: Agriculture and Food Sector Briefing 2021 (B, h)
UK Climate Risk: Business Sector Briefing 2021 (B, J)
UK Climate Risk: Cultural Heritage Sector Briefing 2021(F, I)
UK Climate Risk: Energy Sector Briefing 2021 (C, H)
UK Climate Risk: Flooding and Coastal Change Sector Briefing 2021 (A-K)
UK Climate Risk: Freshwater Habitats Sector Briefing 2021 (I)
UK Climate Risk: Health and Social Care Sector Briefing 2021 (G)

UK Climate Risk: High temperatures Sector Briefing 2021 (B, G)
UK Climate Risk: Housing Sector Briefing 2021 (B, F)
UK Climate Risk: Land Use Sector Briefing 2021 (A-K)
UK Climate Risk: Marine & Coastal Sector Briefing 2021 (B, I)
UK Climate Risk: Terrestrial Biodiversity Sector Briefing 2021 (I, H)
UK Climate Risk: Transport Sector Briefing 2021 (D)
UK Climate Risk: Water Sector Briefing 2021 (C, H)
UK Climate Risk; Wildfire Sector Briefing 2021 €
UK Health Security Agency Health Effects of Climate Change(HECC) in the UK:(G, H)
Wales Infrastructure Investment Plan – Project Pipeline (website)
Wales Resilience Forum (website) (A-K)
Welsh Government Air Quality in Wales Report 2022 (G)
Welsh Government Coal Tip Safety Report: Law Commission 2022 (A, B, C, G)
Welsh Government Coal Tip Safety White Paper 2022 (A, B, C, G)
Welsh Government Environmental Principles Governance and Biodiversity Targets White Paper 2024 (I)
Welsh Government: Sustainable Schools for learning business case guidance (2022) (F)

Key questions to explore as part of climate adaptation planning going forward are whether these plans and activities are sufficient to manage the climate risks identified in the CCRA. What needs to change in these plans and activities to address the 11 risks?

APPENDIX 3: Risk categories from CCRA3

These are the 61 risks categories from CCRA that were explored during the 4 'surgeries' in WP2. They provide a useful framework to begin to explore climate risks locally https://www.ukclimaterisk.org/wp-content/uploads/2021/06/CCRA-Evidence-Report-Wales-Summary-Final.pdf

NATURAL ENVIRONMENT	**INFRASTRUCTURE**
N1. Terrestrial species and habitats	I1. Infrastructure networks (water, energy, transport, ICT)
N2. Terrestrial species and habitats pests, pathogens, invasive species)	I2. Infrastructure services (river and surface flooding)
N4. Soils	I3. Infrastructure services (coastal flooding/erosion)
N7. Agriculture (pests, pathogens, invasive species)	I4. Bridges and pipelines (flooding/erosion)
N8. Forestry	I5. Transport networks (slope &embankments)
N10. Aquifers and agricultural land	I6. Hydroelectric generation (river flow)
N11. Freshwater species and habitats	I7. Subterranean and surface infrastructure
N12. Freshwater species and habitats (pests, pathogens, invasive species)	I8. Public water supplies (water availability)
N14. Marine species, habitats and fisheries	I9. Energy generation (water availability)
N16. Marine species and habitats (pests, pathogens, invasive species)	I10. Energy (infrastructural damage)
N5. Natural carbon stores, carbon sequestration and greenhouse gas (GHG) emissions	I11. Offshore infrastructure
N6. Agricultural and forestry productivity	I12. Transport (infrastructural damage)
N17. Coastal species and habitats	I13. Digital (infrastructural damage)
N18. Landscape character	
Opportunities	**COMMUNITY &HEALTH**
N3. New species	H1. Health and wellbeing (higher temperature)
N9. Agricultural and forestry productivity	H3. People, communities and buildings
N13. Freshwater species and habitats	H4. Viability of coastal communities
N15. Marine species, habitats and fisheries	H5. Building fabric
	H7. Health and wellbeing (air quality)
	H8. Health (Vector borne disease)
INTERNATIONAL	H9. Food safety and food security
ID1. Food availability, safety, and quality	H10. Health (water quality and supply)
ID3. Migration to the UK and effects on the UKs interests overseas	H11. Cultural heritage
ID4. The UKs international interests and responsibilities	H12. Health and social care delivery
ID5. Changes to international governance affecting the UK	H13. Education and prison services
ID7. International trade routes	Opportunities
ID8. Risk to the UK Financial Sector from climate change overseas	H6. Household energy demand (reduction)
ID9. Risks to Public Health from Overseas	H2. Health and wellbeing (higher temperature)
ID10. Risk multiplication to the UK	
ID2. UK food availability and exports	
ID6. Increased trade for the UK	**BUSINESS &INDUSTRY**
	B1. Flooding of business sites
	B2. Coastal business locations and infrastructure
	B3. Business production processes
	B4. Business access to finance, investment and insurance
	B5. Reduced employee productivity in businesses
	B6. Disruption to business supply chains and distribution networks
	B7. Changes in demand for goods and services

APPENDIX 4: Repeated themes raised in the CCRA WP1-3

The CCRA produced 1400 contributions from agencies, organisations, local experts, and the community. These have been analysed and the following strategic, institutional, operational and community risks were raised repeatedly in WP1-3 – these are the emerging themes from the CCRA. This analysis has placed these contributions into 4 categories: *Strategic* – CTM-wide issues that the authors believe need to be working on. *Institutional* – those focused on the way organisations respond to climate risk.*Operational* – those issues that public and other services will have to deal with more as a consequence of climate change, and *Community* –risks as they will be experienced by communities. This analysis has helped to inform the advice provided in this CCRA.

Strategic

Wildfire
Landslip
Post- industrial landscape:

- Coal-tip stability
- Subsidence
- Sink holes
- Shaft collapse
- Minewater
- Dispersed pollution

Road network resilience
Rail network resilience
Energy network resilience
Bridge network resilience
Water network resilience
Industrial estates
Social care
Health care
Infrastructural interdependencies
Nature recovery and biodiversity loss

Institutional

Staff capacity
Staff skills
Corporate planning
Business planning
Evidence gaps
Business continuity
Emergency Planning
Asset management
Intelligence sharing
Funding (bounce back)
Insurance
Place planning
Supply chain engagement
Funding integration
Complacency in existing systems
Reductionism

Operational

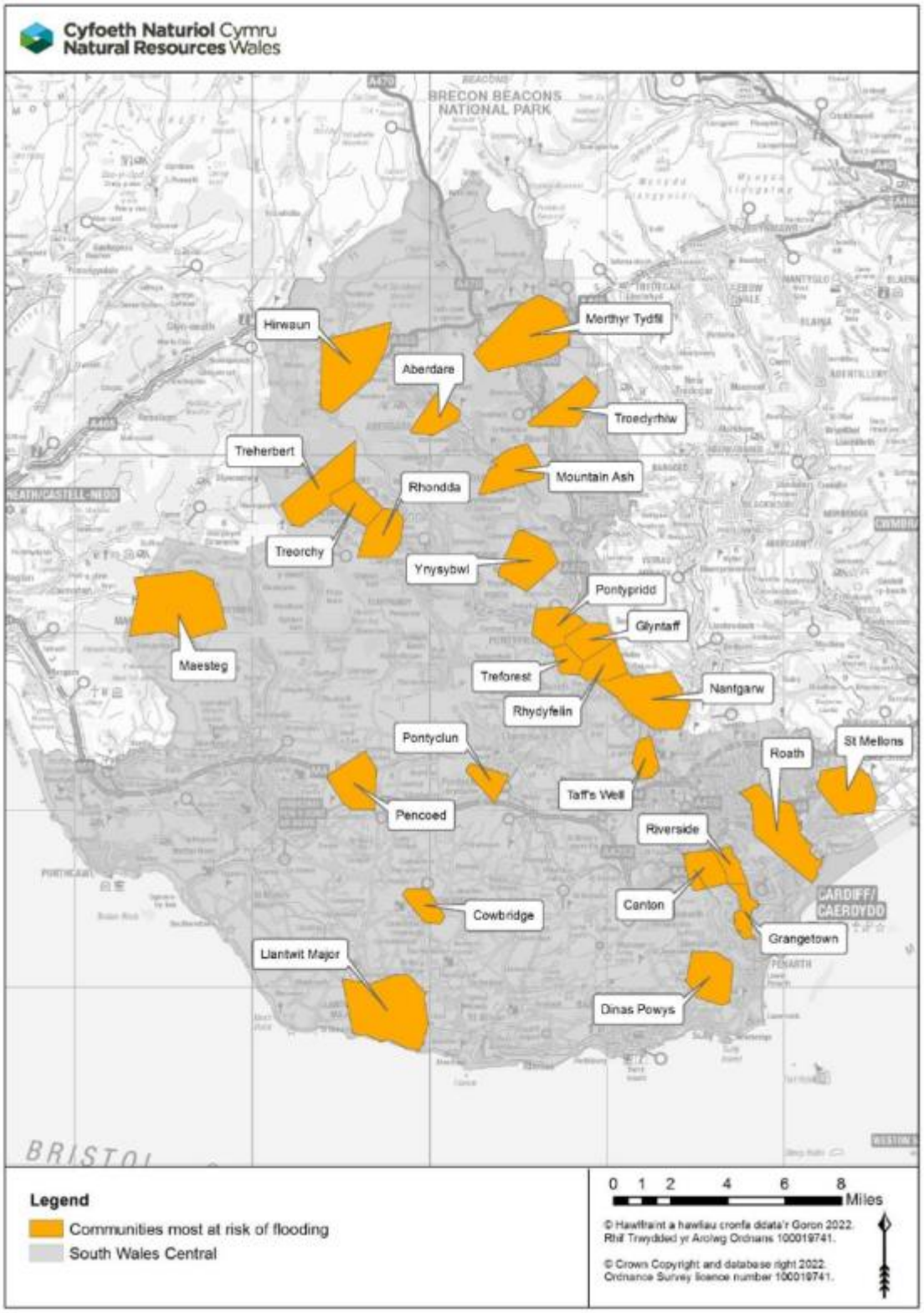
Access to deliver services
Thermal comfort
Schools Estate
Heritage/Cultural Assets
Reservoirs
Water Quality Housing Stock
Treefall
Subsidence
Sink holes
Shaft collapse
Minewater
Slope failure
Contaminated land
Building fabric
Drainage
Infrastructure maintenance (all types)
Wastewater
Landfill
Coal tip assessment
Care Homes
Domiciliary Care
Sewerage
Nature reserves
Sediment loading in rivers
Vegetation management
Forestry management
Soil loss
Grazing management
Habitat management
Pest control
Invasive species

Community

Pinch points from infrastructural failure
Drought
Air quality (wildfire and heat)
Exacerbating poverty
Post-event temporary accommodation
Fuel poverty
Food supply and distribution
Multiple severe weather event planning
Capacity to cope with repeated events
Road closures
Risk to life – landslip, wildfire, flooding
Agricultural production (livestock, crops)
Town Centre resilience
Isolated communities
Business resilience
Tourism offer

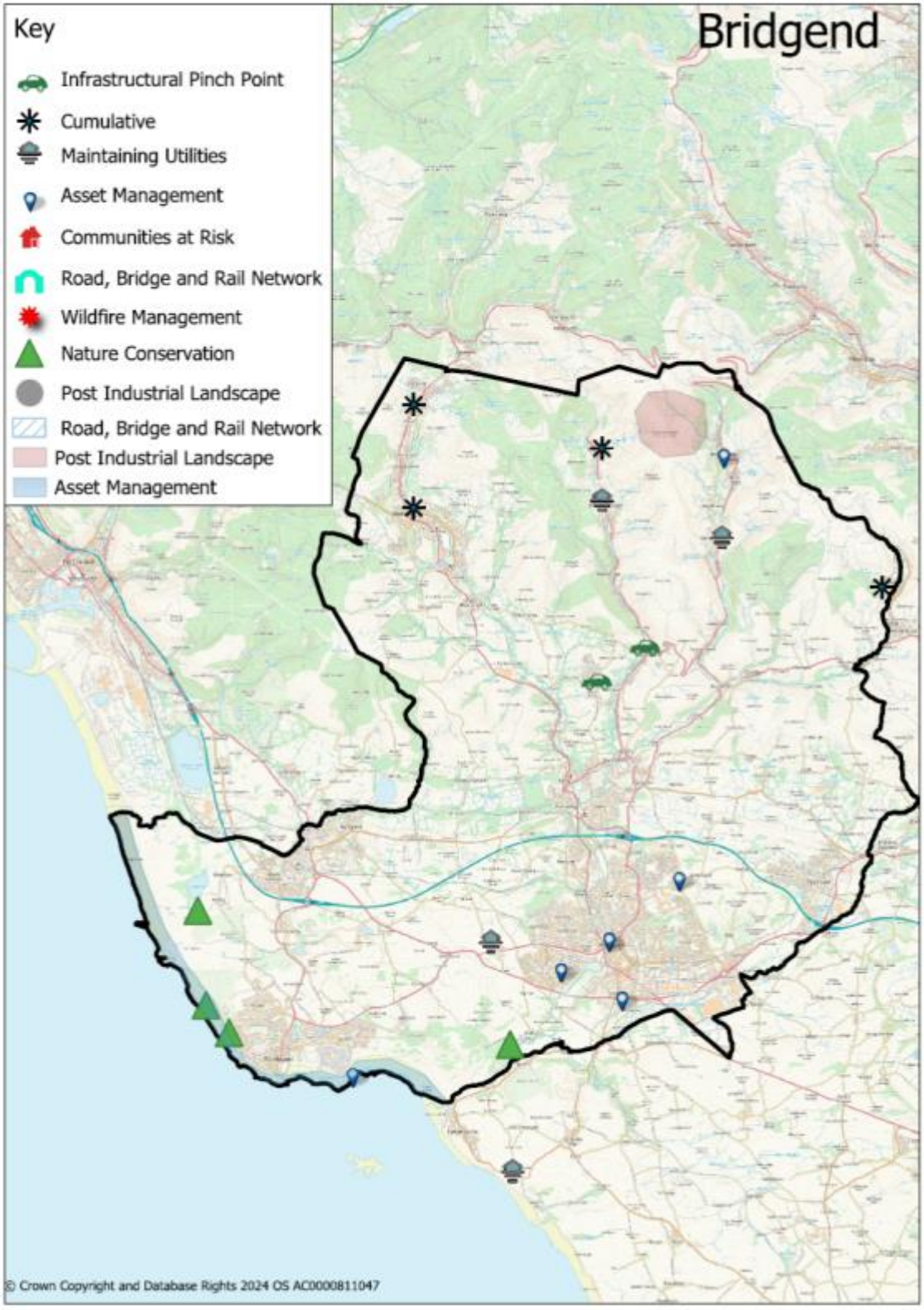
APPENDIX 5: NRW Flood Risk Map Covering the Cwm Taf Morgannwg Area

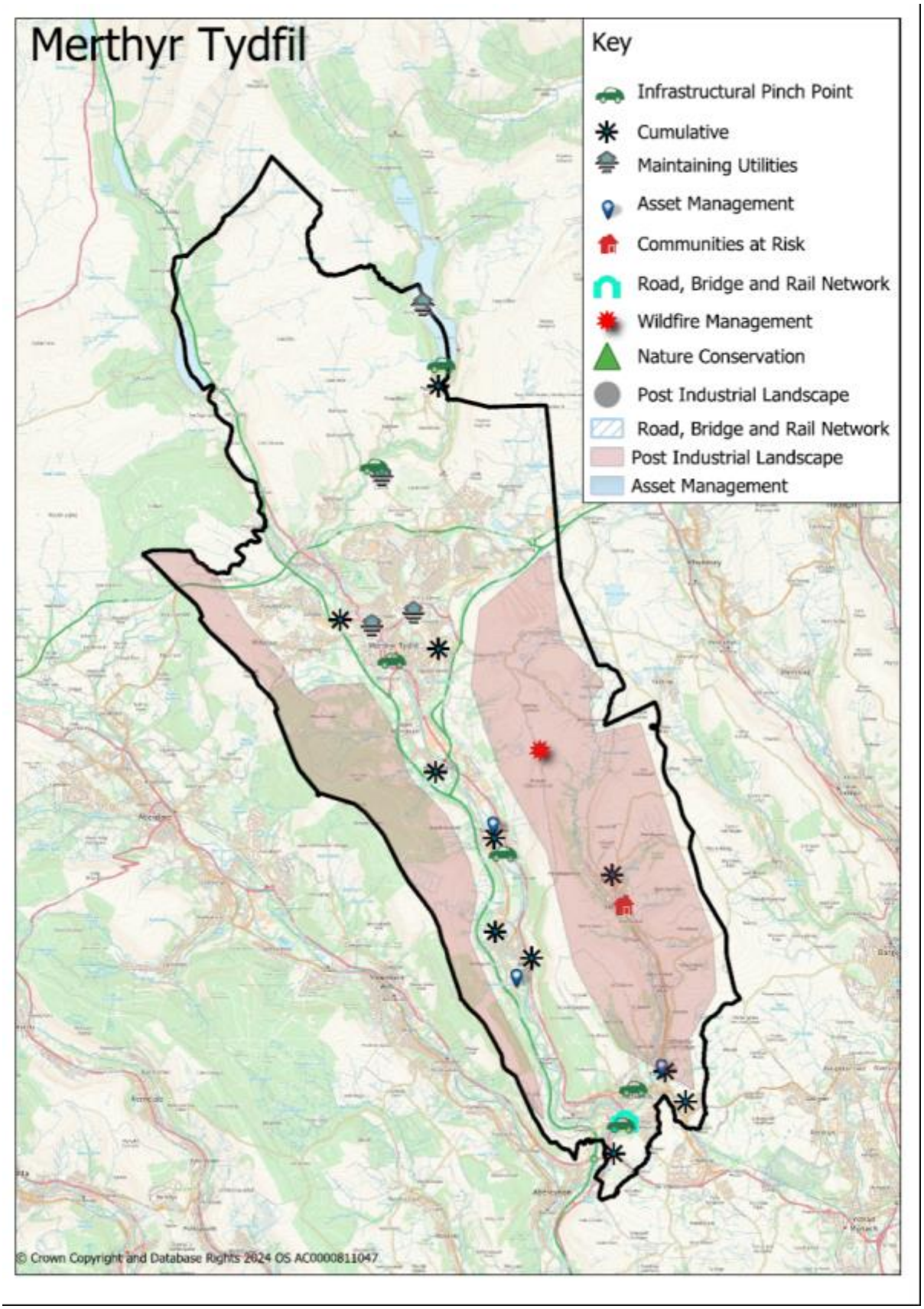
The following map appears in Natural Resources Wales Flood Risk Management Plan: South Central Wales Place



APPENDIX 6: Locations of Climate Risks – mapping local insights

The following map was produced by Rhondda Cynon Taff CBC to show the places and issues identified by participants in the face-to-face workshops in CTM. Further, more detailed mapping by the PSB will be a key response to this risk assessment




Merthyr Tydfil
Key
Infrastructural Pinch Point
Cumulative
Maintaining Utilities
Asset Management
Communities at Risk
Road, Bridge and Rail Network
Wildfire Management
Nature Conservation
Post Industrial Landscape
Road, Bridge and Rail Network
Post Industrial Landscape
Asset Management
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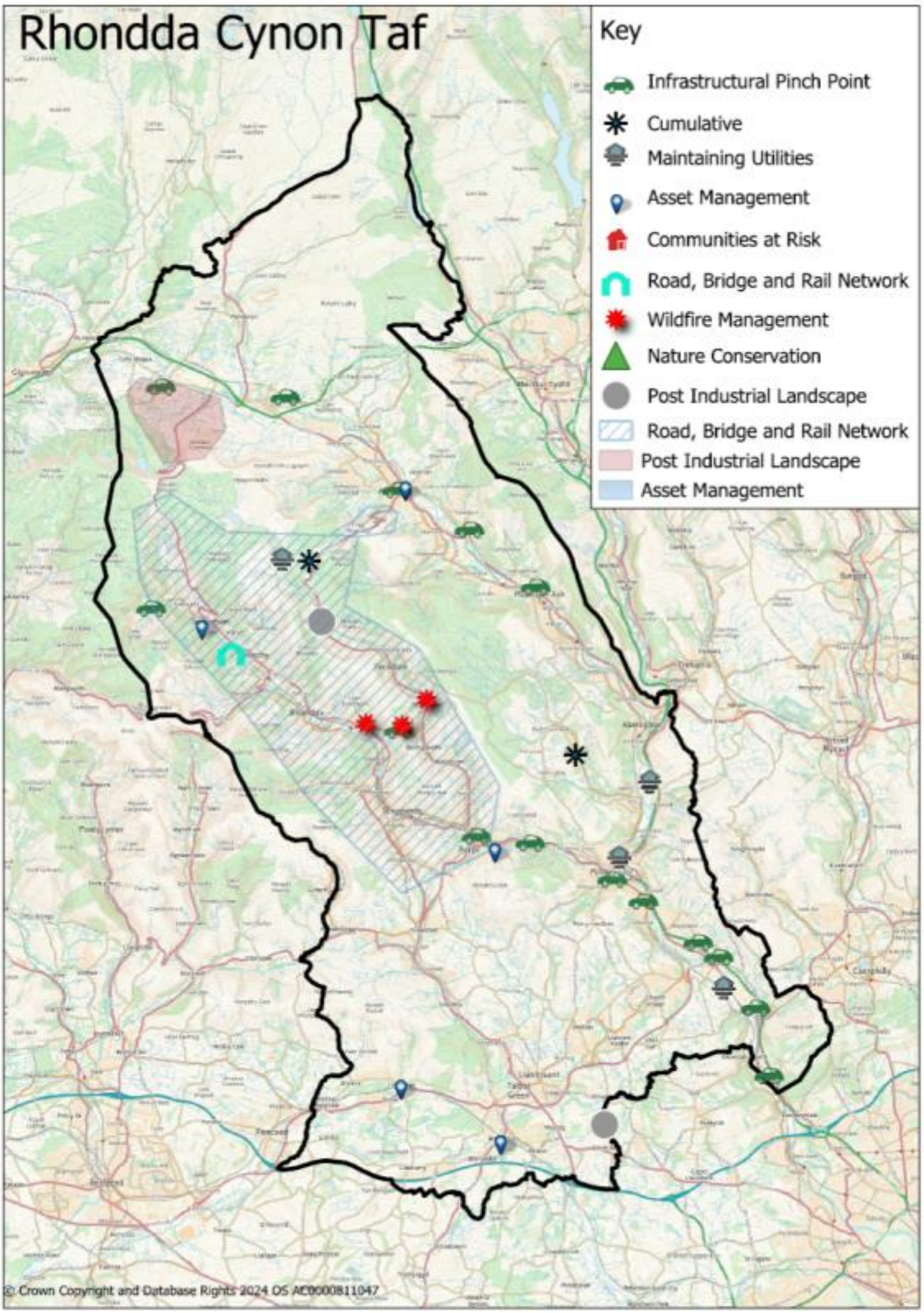
Rhondda Cynon Taf
Key
Infrastructural Pinch Point
Cumulative
Maintaining Utilities
Asset Management
Communities at Risk
Road, Bridge and Rail Network
Wildfire Management
Nature Conservation
Post Industrial Landscape
Road, Bridge and Rail Network
Post Industrial Landscape
Asset Management
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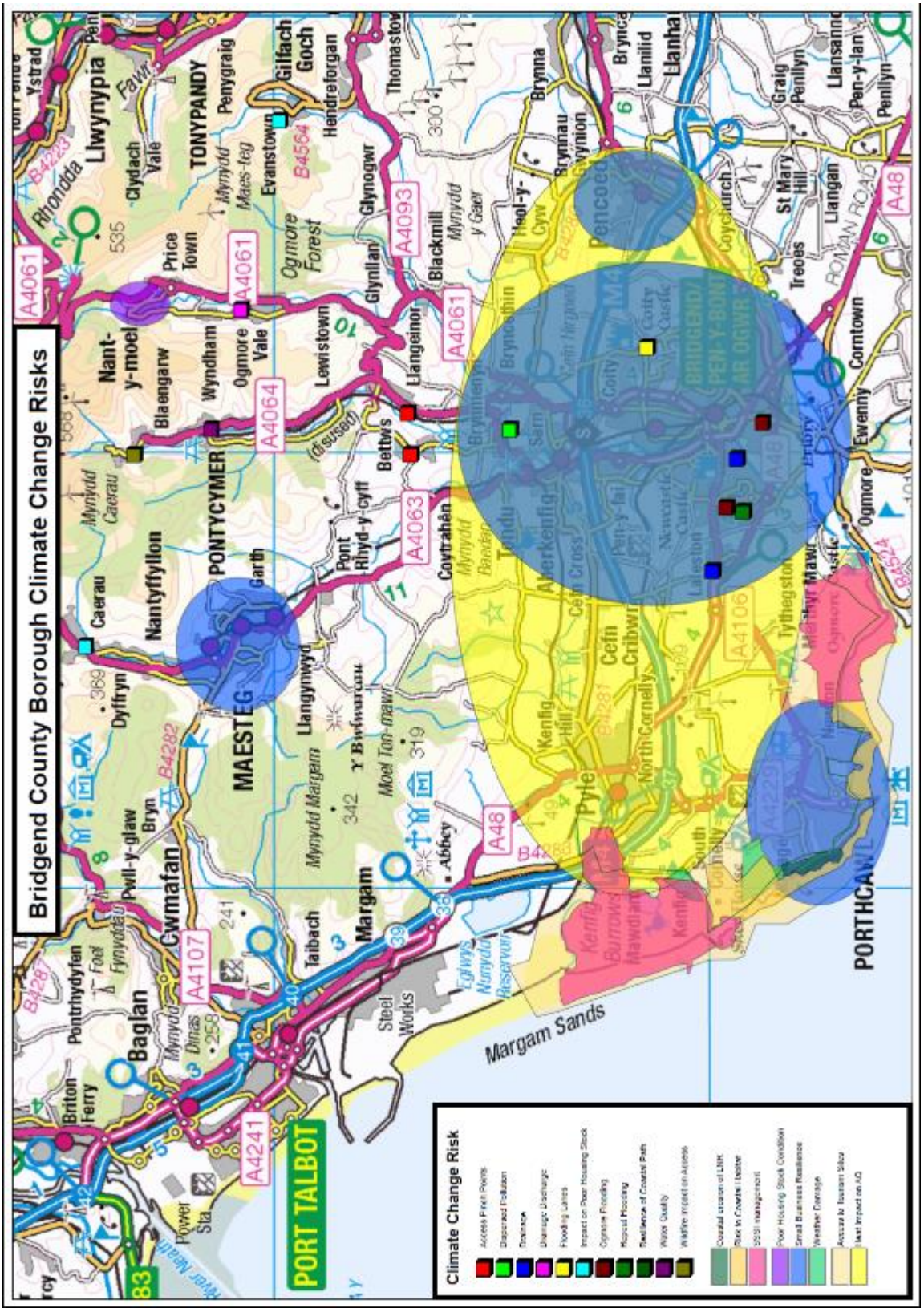
The following maps was produced by Bridgend CBC to show the places and issues identified within in their engagement on the CCRA . Further mapping will be a key response to this risk assessment – See Sections 2 and 3 of this report



APPENDIX 7: Gold, Silver Bronze Prioritisation Framework

The following categorisation was used offered as a tool to help participants respond to a prioritisation exercise (as described in Section 1 .5 of this report)

Gold – this climate risk should be given the **highest priority by leadership across the PSB partner organisations**. The risk should be approached as being of potential high likelihood and significant impact across Cwm Taf Morgannwg. Collaborative work needs to focus on building the evidence base of impact in different localities, understanding implications to service provision and planning for impact on adapted public services over the short, medium and long term. The PSB and its partners should integrate climate adaptation on this issue into strategic and business planning at strategic, organisational and operational levels. All PSB partners should take responsibility on managing this risk.

Silver – this climate risk should be approached as a **new area for collaboration** by clusters of PSB partners that have a key role in managing the risk. The risk should be approached as being of potential high likelihood and significant impact across Cwm Taf Morgannwg. New collaborative work by relevant organisations, over and above existing approaches, should focus on building the evidence base of impact in different localities, understanding implications to service provision and planning for impact on public services over the short, medium and long term. Specific partners should take on the responsibility of managing this risk and advising partners across Cwm Taff Morgannwg on methods of climate adaptation.

Bronze –an **enhanced approach to risk management by individual organisations** may be required to manage this issue. This risk should be approached as being of high likelihood and high impact and integrated into business planning and processes to deliver adaptation at an operational level to build climate resilience. This may necessitate as change in approach to evidence gathering, understanding implications to service provision and planning for impact on public services over the short, medium and long term. Partners should share information on effective practice to support management of this risk across organisations in different sectors in Cwm Taf Morgannwg.

APPENDIX 8: Met Office Climate Report for Bridgend (2024)

https://climatedataportal.metoffice.gov.uk/pages/lacs

Local climate changes

The table shows projected **changes in climate** for the Local Authority area for a number of Global Warming Levels (GWLs). In each case there is a central projection (the Median) and an uncertainty range (the Lower and Upper values are the 10th and 90th percentiles). Changes are relative to 1981-2000.

The underlying science is explained in the Scientific Detail (QR Code).

The map shows the Local Authority area. The overlaid grid shows the 12km grid boxes from the climate model used for these projections.

		0.6°C GWL Baseline 1981-2000	1.0°C GWL Recent Past 2001-2020	1.5°C GWL Paris Agreement	2°C GWL Guidance: Prepare	4°C GWL Guidance: Assess risks
	TEMPERATURE	°C	°C	°C change	°C change	°C change
	Summer Maximum Temperature	27.8 27.3 to 28.1	29.9 28.7 to 30.9	+3.0 +0.4 to +3.4	+3.4 +2.2 to +4.4	+6.9 +5.6 to +9.5
	Summer Average Temperature	15.2 15.2 to 15.2	16.3 15.8 to 16.7	+1.3 +0.9 to +2.0	+2.0 +1.4 to +2.6	+4.1 +3.5 to +5.0
	Winter Average Temperature	4.7 4.7 to 4.7	5.4 5.0 to 5.6	+0.9 +0.6 to +1.2	+1.3 +0.6 to +1.6	+2.6 +1.7 to +3.2
	Winter Minimum Temperature	-6.5 -6.8 to -5.9	-4.9 -6.3 to -3.8	+2.0 +1.0 to +2.6	+2.0 +1.1 to +3.6	+3.9 +2.6 to +5.1
	Annual Average Temperature	9.7 9.7 to 9.7	10.5 10.4 to 10.7	+1.0 +0.9 to +1.2	+1.5 +1.2 to +1.8	+3.2 +2.8 to +3.7
	PRECIPITATION	mm/day	mm/day	% change	% change	% change
	Summer Precipitation Rate	3.47 3.47 to 3.49	3.33 2.70 to 3.55	-8 -22 to -1	-13 -27 to -9	-36 -52 to -26
	Winter Precipitation Rate	5.43 5.41 to 5.45	5.78 5.35 to 6.59	+8 -2 to +19	+12 +3 to +16	+26 +22 to +36

Page 5

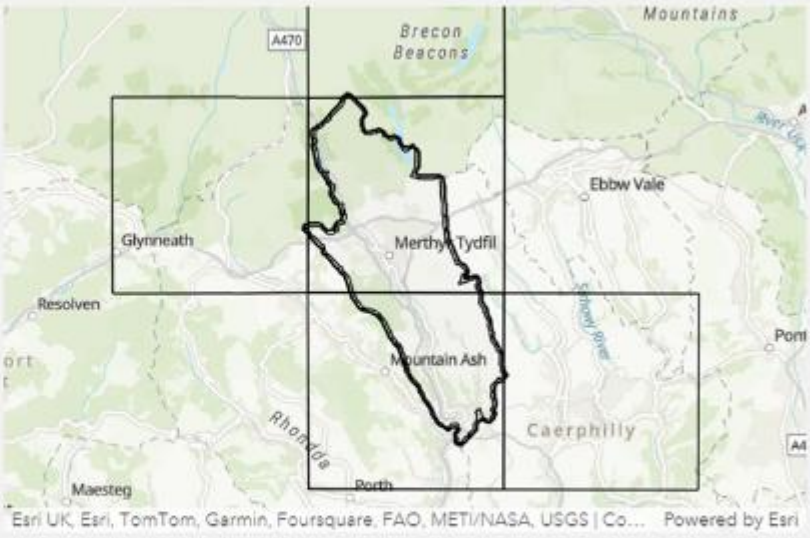
APPENDIX 9: Met Office Climate Report for Merthyr Tydfil (2024)

https://climatedataportal.metoffice.gov.uk/pages/lacs

Local climate changes

The table shows projected **changes in climate** for the Local Authority area for a number of Global Warming Levels (GWLs). In each case there is a central projection (the Median) and an uncertainty range (the Lower and Upper values are the 10th and 90th percentiles). Changes are relative to 1981-2000.

The underlying science is explained in the Scientific Detail (QR Code).



The map shows the Local Authority area. The overlaid grid shows the 12km grid boxes from the climate model used for these projections.

		0.6°C GWL Baseline 1981-2000	1.0°C GWL Recent Past 2001-2020	1.5°C GWL Paris Agreement	2°C GWL Guidance: Prepare	4°C GWL Guidance: Assess risks
	TEMPERATURE	°C	°C	°C change	°C change	°C change
	Summer Maximum Temperature	27.0 26.5 to 27.3	28.9 28.2 to 30.1	+3.1 +0.4 to +3.3	+3.4 +2.1 to +4.6	+6.9 +5.7 to +9.6
	Summer Average Temperature	14.2 14.2 to 14.2	15.3 14.8 to 15.7	+1.3 +0.9 to +2.1	+2.0 +1.5 to +2.6	+4.3 +3.6 to +5.3
	Winter Average Temperature	3.4 3.4 to 3.4	4.1 3.8 to 4.4	+1.0 +0.6 to +1.3	+1.3 +0.6 to +1.8	+2.7 +1.7 to +3.3
	Winter Minimum Temperature	-7.6 -8.2 to -7.1	-6.3 -7.2 to -5.2	+2.1 +1.0 to +3.1	+2.6 +1.4 to +3.4	+4.9 +3.5 to +6.5
	Annual Average Temperature	8.5 8.5 to 8.5	9.3 9.2 to 9.5	+1.1 +1.0 to +1.3	+1.6 +1.2 to +1.8	+3.3 +2.9 to +3.8
	PRECIPITATION	mm/day	mm/day	% change	% change	% change
	Summer Precipitation Rate	3.27 3.27 to 3.28	3.03 2.52 to 3.36	-11 -24 to -3	-16 -28 to -10	-41 -49 to -33
	Winter Precipitation Rate	6.48 6.45 to 6.52	6.89 6.41 to 7.59	+8 -2 to +18	+10 -3 to +16	+20 +13 to +29

APPENDIX 10: Met Office Climate Report for Rhondda Cynon Taf (2024)

https://climatedataportal.metoffice.gov.uk/pages/lacs

Local climate changes

5 9

The table shows projected **changes in climate** for the Local Authority area for a number of Global Warming Levels (GWLs). In each case there is a central projection (the Median) and an uncertainty range (the Lower and Upper values are the 10th and 90th percentiles). Changes are relative to 1981-2000.

The underlying science is explained in the Scientific Detail (QR Code).

The map shows the Local Authority area. The overlaid grid shows the 12km grid boxes from the climate model used for these projections.

		0.6°C GWL Baseline 1981-2000	1.0°C GWL Recent Past 2001-2020	1.5°C GWL Paris Agreement	2°C GWL Guidance: Prepare	4°C GWL Guidance: Assess risks
	TEMPERATURE	°C	°C	°C change	°C change	°C change
	Summer Maximum Temperature	27.6 27.0 to 27.9	29.6 28.7 to 30.8	+3.1 +0.4 to +3.3	+3.4 +2.2 to +4.5	+6.9 +5.7 to +9.7
	Summer Average Temperature	14.6 14.6 to 14.6	15.7 15.2 to 16.1	+1.3 +0.9 to +2.1	+2.0 +1.5 to +2.6	+4.2 +3.6 to +5.2
	Winter Average Temperature	3.9 3.9 to 3.9	4.6 4.2 to 4.9	+1.0 +0.6 to +1.2	+1.3 +0.6 to +1.7	+2.6 +1.7 to +3.3
	Winter Minimum Temperature	-7.3 -7.7 to -6.7	-6.0 -7.2 to -4.2	+1.8 +0.9 to +3.1	+2.3 +1.4 to +3.5	+4.4 +3.1 to +6.0
	Annual Average Temperature	9.0 9.0 to 9.0	9.7 9.6 to 9.9	□□□(tas_annu □□□(tas_a□□□(ta	□□□(tas_annu □□□(tas_a□□□(ta	□□□(tas_annu □□□(tas_a□□□(ta
	PRECIPITATION	mm/day	mm/day	% change	% change	% change
	Summer Precipitation Rate	3.72 3.71 to 3.73	3.52 2.87 to 3.81	□□□(pr_sumr □□□(pr_su□□□(pr	□□□(pr_sumr □□□(pr_su□□□(pr	□□□(pr_sumr □□□(pr_su□□□(pr
	Winter Precipitation Rate	6.84 6.81 to 6.87	7.30 6.80 to 8.17	□□□(pr_winte □□□(pr_wi□□□(pr	□□□(pr_winte □□□(pr_wi□□□(pr	□□□(pr_winte □□□(pr_wi□□□(pr