



Network  
Resilience

# **Resilience and Adaptation: Coping with More Intense and More Frequent Severe Weather – the Local, Regional and National Challenge**

John Lamb, Dr Hugh Deeming

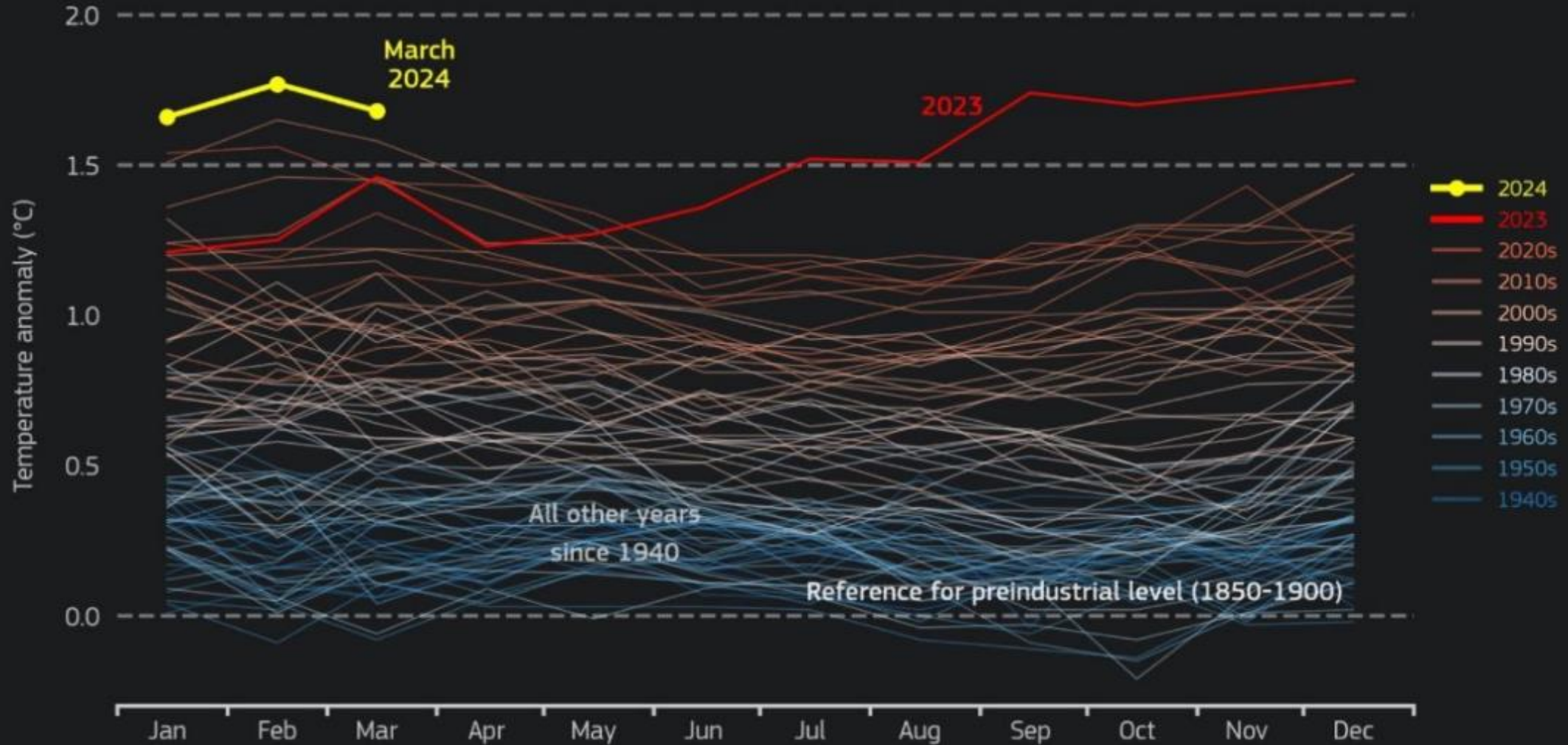
**SCOTS ANNUAL CONFERENCE  
CONNECTING OUR COMMUNITIES**

Fri 10<sup>th</sup> May 2024



# Monthly global surface air temperature anomalies

Data: ERA5 1940–2024 • Reference period: 1850–1900 • Credit: C3S/ECMWF



PROGRAMME OF THE  
EUROPEAN UNION



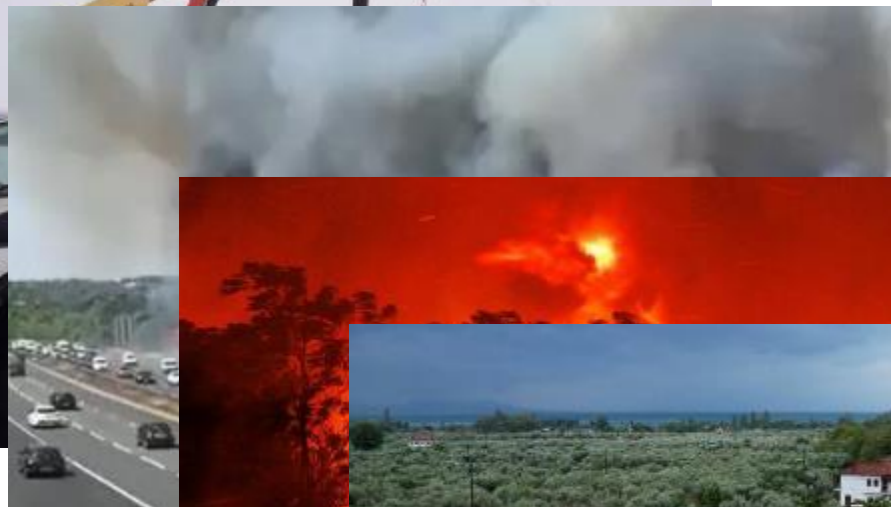
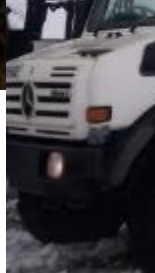
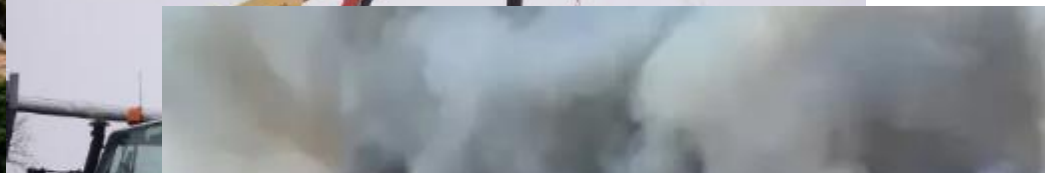
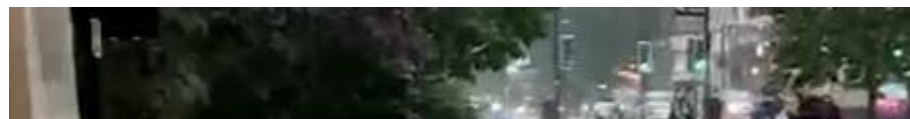


Emergency Preparedness, Response & Recovery:

Identifying lessons learned by UK highway  
sector from extreme-weather emergencies  
(2015-2020)



A report prepared for the Department for Transport and the Local Government  
Technical Advisers Group by: HD Research, Barnham, N. Yorks, LA2 7DL.





Data: Met Office (2022) and Marsh et al. (2016), HMG, Flood Resilience Review (2016)



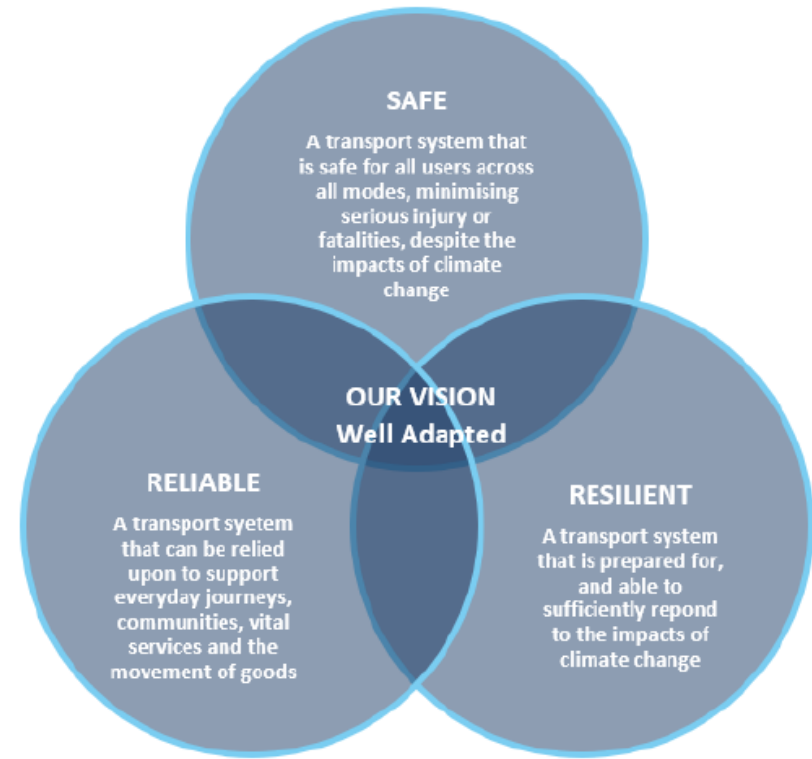


*Extreme weather contingencies need to  
become Business as Usual*

# Transport Scotland's Approach to Climate Change Adaptation and Resilience

“Scotland’s transport infrastructure and networks are fundamental to our nation’s communities, businesses and visitors. **They offer critical connections** between people and places, and are vital in providing access to essential services, such as healthcare.

The importance of our transport systems **cannot be overstated**, particularly as they are susceptible to variations in Scotland’s weather systems.”



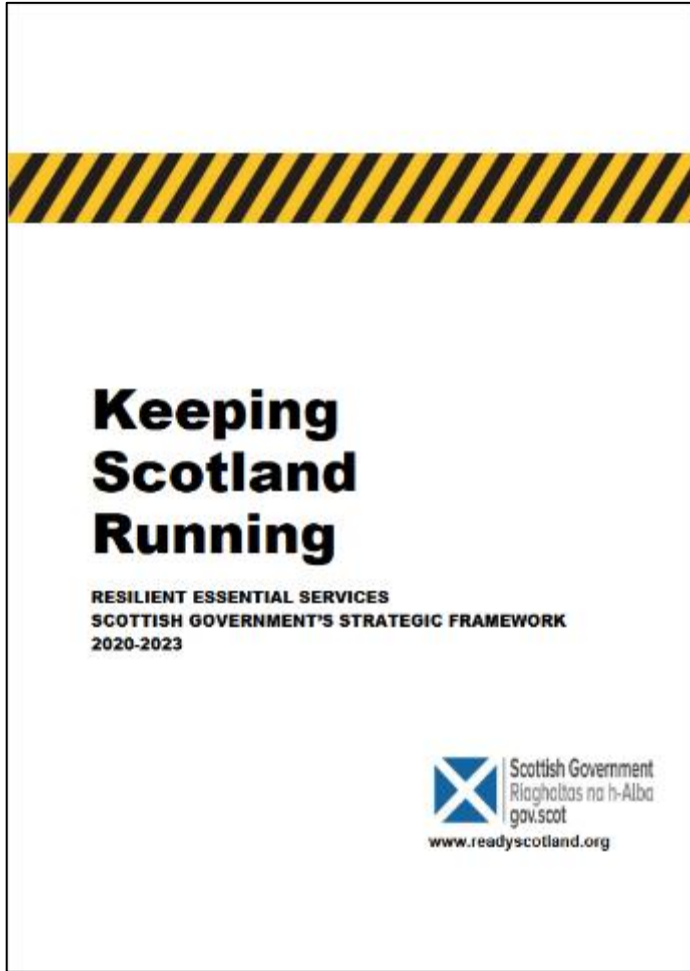


# Highways as 'Community Lifelines'



- “Lifelines are the most **fundamental services** in the community that, **when stabilized**, enable all other aspects of society to function
- Lifelines are the **integrated network** of assets, services, and capabilities that are used day-to-day to support the recurring needs of the community
- When disrupted, **decisive intervention** (e.g., rapid service re-establishment or employment of contingency response solutions) is required to stabilize the incident”

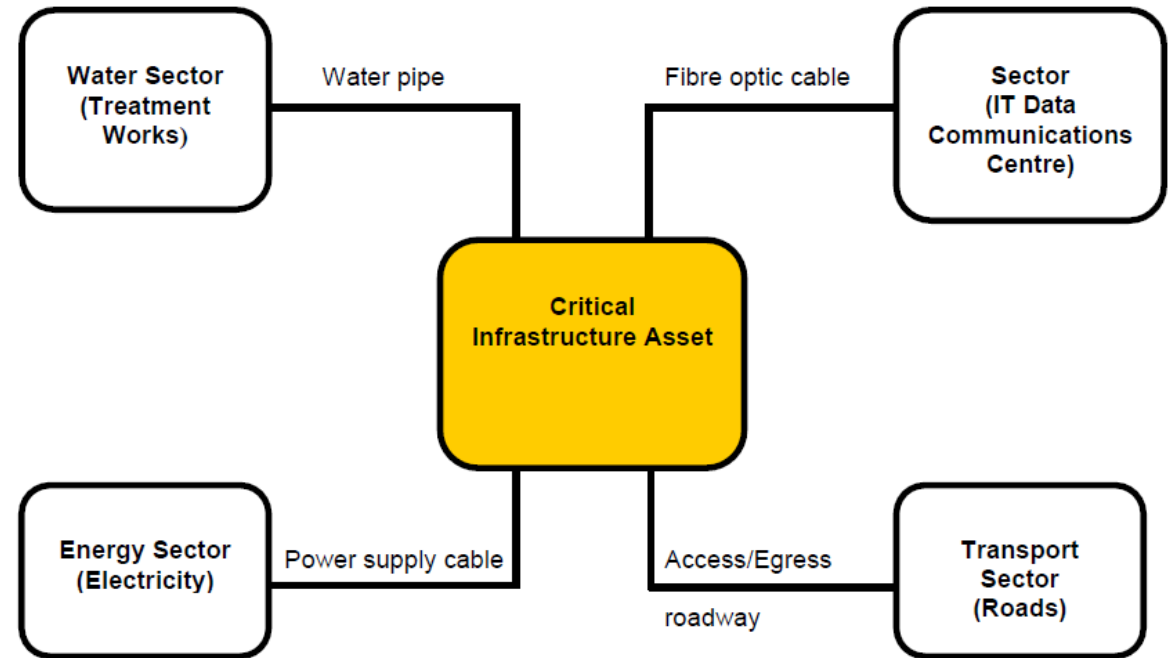




## KEEPING SCOTLAND RUNNING

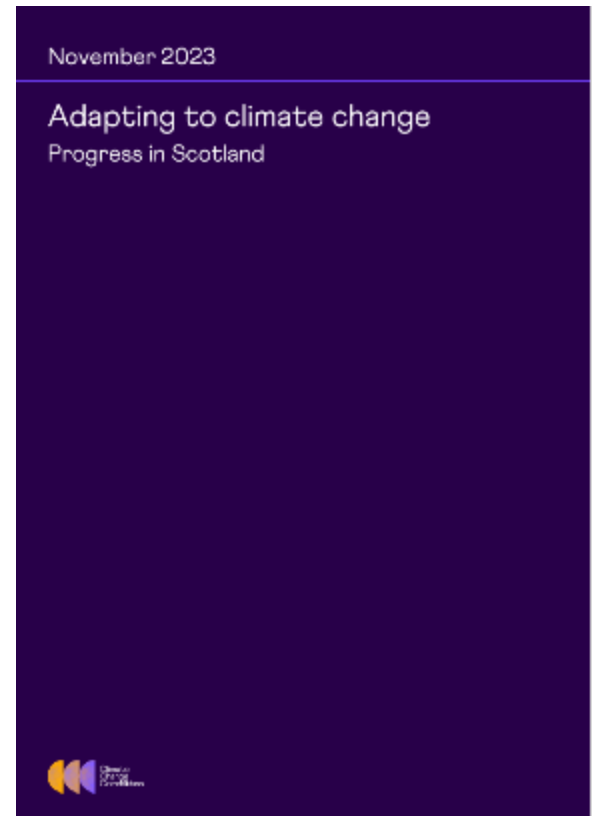
Annex C

### Example of Physical Dependencies



# Adapting to climate change – Progress in Scotland

- (ii) Policy and planning progress
  - There are **insufficient policies and plans** in place to ensure the reliability of **local roads** in a changing climate:
  - **Local areas need guidance on how to consider climate adaptation and resilience in their transport strategies and plans.** Transport Scotland's ACCAR does not consider local roads. While many local transport plans mention climate resilience and adaptation, **there is no consistency** in whether and how these plans outline preparations for future climate impacts.





# INTEROPERABILITY



**Interoperability:** The extent to which organisations can work together coherently as a matter of routine.

JESIP (2021)

**Interoperability:** a shared system of technology and teamwork built upon trust, identification, goals, communication, and flexibility.

Power, *et al.* (2023)

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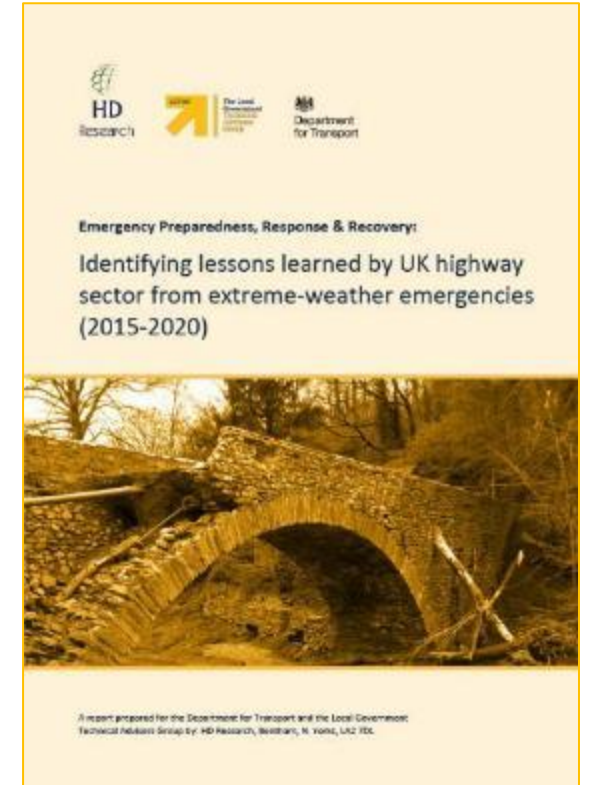
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Power, *et al.* (2023)



# Key recommendations from extreme-weather review

- The critical importance of **Suitably Qualified, Experienced and Empowered People** in delivering Highways emergency management.
- The need for consistent **Rapid Impact Assessment**
- For **Mutual Aid** contingencies to be developed **on a regional / national basis**, and in conjunction with the private sector.



*Extreme weather contingencies need to  
become Business as Usual*

***BUT***

*...to do this fairly, we need an evidence base*



*How do we improve our situational awareness of the challenges we are facing...*

- *As a council?*
- *As a sector?*
- *As a multi-agency partner in UK Resilience™?*

*UKRLG Hazards Survey (2023-24)*

# Highways Resilience: Resilience Assumptions

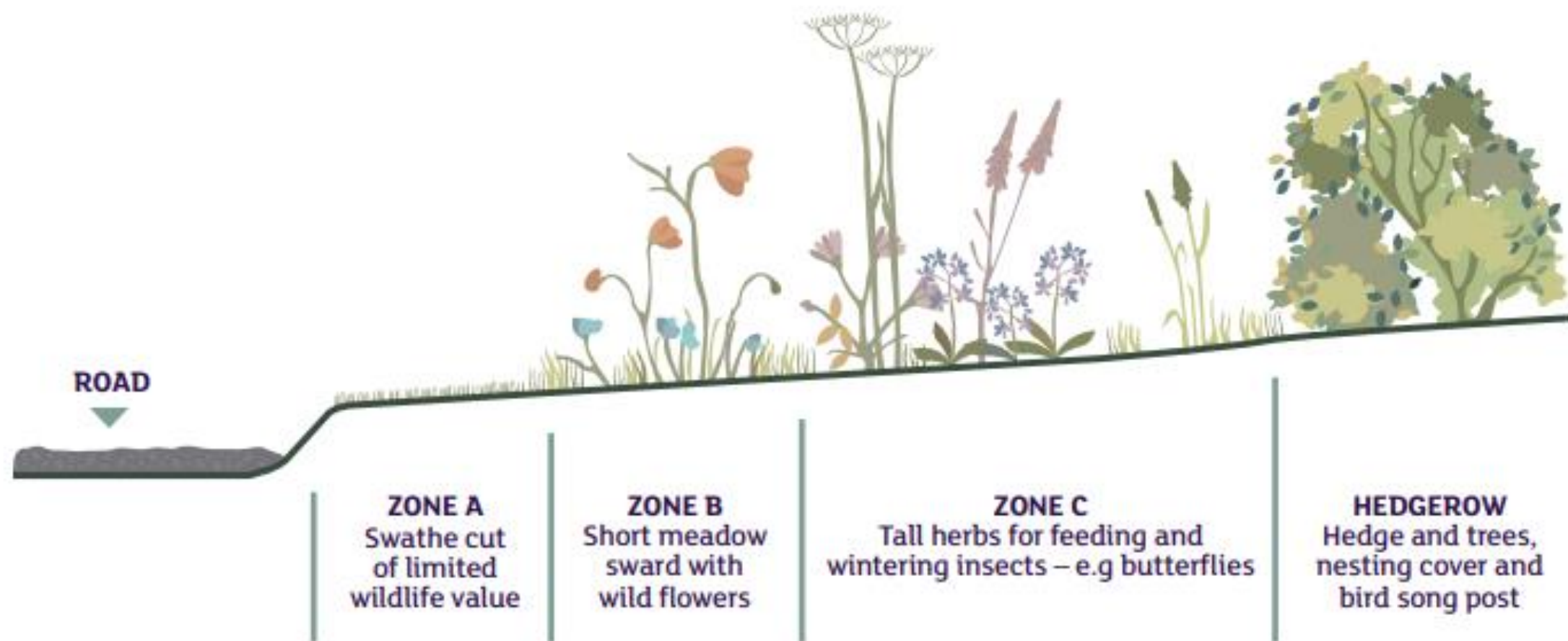
- You are Lifeline Infrastructure Operators
- You are responsible for *leading* the decision making in respect to, the stabilisation and recovery from impacts on lifeline road networks
- You need to be *Suitably Qualified, Experienced and Empowered* to manage **Major Incidents** as a key partner, in the delivery coordinated *multi-agency* response.
- To adapt and strengthen sector resilience effectively we need to be collecting and analysing consistent data on **all** BAU extreme weather risks

*So enough about the A & C  
Where is the  
'B'  
Biodiversity, Habitat, Ecology, water,*

# *Biodiversity, Habitat, Ecology, water, particulates*

- Highways are linear assets
  - Grass verge
  - Highway Hedges
  - Water flows from them onto our roads
  - Or from our Roads into the verges and drainage
- **Headline figures**
  - Over 300,000 miles of rural road verge in the UK
  - 700 species of wild flower grow on road verges – nearly 45% of our total flora
    - 97% of meadows destroyed since the 1930s, road verges are a vital refuge for pollinators and other wildlife
    - 20% drop in floral diversity due to poor management and nutrient pollution





Idealised management zones across the width of a roadside verge

# Rain Gardens and SUDS





# Scaled to fit – Local



# Key Take Aways

- This is not going to happen by itself
- UKRLG is a coalition of the willing
  - You are the person you have been waiting for
- We are not as ready as we think
  - Complete the DfT Hazard Survey
  - Seek out those areas where you think you have .... Or are going to have a problem
  - Do not use historic events as a basis for inaction
- Please join me, and support me in the UK ABC Board.
  - Ten hours a year
  - Make friends before you need them