Climate change adaptation and rail

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The Challenge – Asset portfolio

32,000 km track

29,000 bridges

600 tunnels
The Challenge – Asset portfolio

1300 footbridges

550 coastal, estuarine and river defences

22,000 culverts
16,000km earthworks
2500 stations
14,000 lineside buildings
500,000 signalling assets
The Challenge – Asset portfolio
The challenge – new and legacy assets
The Challenge – weather impacts
The Challenge - this month
The Challenge – wider system
The Challenge – Resistance?
The Challenge – Resilience and recovery?
The Challenge – climate & weather

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Our approach

- Increase knowledge
- Standards & specifications
- Vulnerability assessment
- Adaptive Capacity
- Strategy & policy

Increase resilience
Corporate aims

• What are we trying to achieve?

  – ‘A better railway for a better Britain’
  – ‘A railway fit for the future’
  – ‘…..a safe, efficient and reliable railway’
Corporate CCA strategy

Sustainable Development Strategy objectives include CCA:

• understand our current weather resilience, and seek to optimise resilience and enhance adaptation capability

• develop a thorough understanding of the potential impacts of climate change in terms of infrastructure performance, safety risks and costs

• embed climate change adaptation within our asset policies and investment decisions

• communicate the role the rail network plays in supporting weather and climate resilience across Great Britain, and support efforts to increase national resilience
CCA in NR - Governance

- Sustainable Business Strategy team
- Weather Resilience & Climate Change Adaptation steering group
- S&SD Integration group
- S&SD Executive and SHE Committee
- Corporate risk register
Vulnerability assessments

Internal weather and climate change studies

External research projects

• ‘Tomorrow’s Railway and Climate Change Adaptation’ (TRaCCA)
  • First TRaCCA assessment in 2010
  • Second programme of research 2013-2016
**TRaCCA findings**

**Heat and track buckle risk mngt**

- Number of heat watchman days and the frequency of speed restrictions
- By the 2040s, projected to increase by a factor of around **4 on average**, (2.5 to 7), South West

**Heat and track maintenance**

- The number of days with prevented track work due to unsuitable temperature conditions
- By the 2040s, projected to increase by **2.5 on average**, (1.5 to 3.5), Scotland
TRaCCA findings

Heat and staff

• The number of episodes of human heat stress

• By the 2040s, projected to increase by 5.5 (2 to 11), Wales

Heat and OLE

• For the lowest threshold (33°C)

• By the 2040s, projected to increase by 4 (1.5 to 7), Central England
**TRaCCA findings**

**Rainfall**

Fluvial (river) flooding

- The results point towards an increased risk of river flooding; however the magnitude of change remains uncertain.

Pluvial (surface water) flooding

- The results point towards an increased risk of surface flooding (a reduction cannot be ruled out), although the magnitude of change remains uncertain.
TRaCCA findings

Cold days

• By the 2040s, projected to decrease by around 45% on average (35% to 50%), North West
**Current work – TRaCCA**

- A Knowledge review and gap assessment
- An Overseas analogy study
- Assessing GIS-based evaluations of vulnerability
- System and sub-system modelling/vulnerability tool feasibility studies
- A change management programme
- An evaluation of metrics
- A study into the economics of the benefits of adaptation
- A review of priorities
Impact of climate change on business

- Detailed analysis of weather impacts on rail assets
- Improvements in decision support tools
- Stronger governance of weather and climate change resilience

But need to overcome;

- Uncertainty in climate projections
- Limited information on future extreme weather events
- Data availability from external sources
Future for CCA in Network Rail

• Corporate Environmental Management System
• S&SD Integration Plan
• All Routes to develop CCA plans
• Second Climate Change Adaptation report to government