

Weather Resilience and Climate Change Adaptation (WRCCA)

Summary of Regional plans for 2024–2029

Extreme weather and climate change is one of the biggest challenges facing the railway today. Over the five years to 2029, we will invest around £2.8bn in activities* and technology that will help it better cope with extreme weather and climate change, which will help deliver a more reliable and better performing railway.

Extreme weather is becoming more common, and it's increasing the chances of our critical coping thresholds being exceeded. The extreme weather of the past year that has seen an unprecedented 14 named storms, has taken its toll on our railway – with experts predicting more of the same to come. We are responding to that challenge with a huge investment in making our railway more resilient and better performing for rail users during such events.

We can never completely 'weatherproof' our railway, but we can be better prepared and mitigate the worst that Mother Nature throws at us, now, and into the future, to keep passengers and services safe and moving.

Around 90 % of our assets are as they were when they were installed before the year 2000. They haven't been designed to contend with the aggressive weather we're now experiencing, or that's forecast for the future due to climate change.

Flooding and heavy rainfall, extreme temperatures, strong winds and sea level rise cause the greatest disruption to the railway. For example, the July 2022 heatwave saw a 40-50 % drop in train performance and £30m revenue loss in a week. We need to make changes to become more resilient if we're to make sure we can keep providing safe and reliable train services both now and in the future.

Delivering environmental sustainability and making the railway more resilient to extreme weather and climate change are priorities for both the UK and Scottish Governments and is one of the key ambitions in our Environment and Sustainability Strategy. Our funders recognise that more frequent and extreme weather conditions will impact our ability to run the railway safely and on time over the next investment period (Control Period 7 – CP7) and in future control periods. Improving our resilience to extreme weather and minimising its impact on performance is also a key priority for our customers, as identified in the Transport Focus survey we completed in Summer 2022. The network-wide survey of 15,000 passengers on their priorities has informed our planning for CP7.

Our Regions have developed Weather Resilience and Climate Change Adaptation Plans for the next five years (2024–2029). These identify the risks to our assets and outline how we're developing our understanding of them. We'll use them to make informed decisions on actions and investment to improve our resilience during CP7, and longer term.

We've developed our CP7 plans to support the delivery of our two funders' and our stakeholders' key priorities. They therefore include interventions that mean we can minimise and adapt to the impact of extreme weather and climate change, and put in place schemes that make our business more sustainable.

While we can't be certain of how often we'll see extreme weather in the future, we do know that the physical processes involved will make our assets degrade faster. We expect it to become increasingly challenging to keep pace with the frequency and intensity of extreme weather events, which will be a significant factor in future control period planning.

This summary of our plans aims to provide a high-level overview of the key risks and actions we're taking over the period 2024–2029. The detailed plans are available on the [climate change adaptation](#) page of our website.

*Resilience activities includes core renewals and maintenance that will deliver primary weather resilience benefits.

CP7 WRCCA Plans National Summary



Our network

We own, repair and develop the railway infrastructure in England, Scotland and Wales. That's 20,000 miles of track, 30,000 bridges, tunnels and viaducts and the thousands of signals, level crossings and stations. We manage 20 of the country's largest stations, while all the rest – over 2,500 – are run by the train operating companies.

Our regions experience different microclimates at different times of year, creating challenging conditions and sometimes making it difficult for the railway to operate.

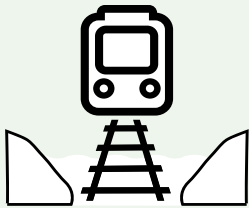
The impacts of weather patterns on our railway will be made worse by future changes in climate, which will mean warmer, wetter winters and hotter, drier summers.

Our key climate risks

Rainfall, rising sea levels



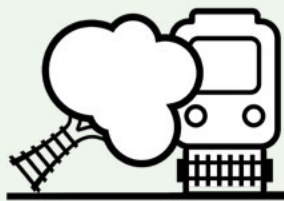
Erosion, floods & subsidence



High winds



Rolling stock and assets damaged



Temperature rise



Track buckling, soil desiccation



Key impacts

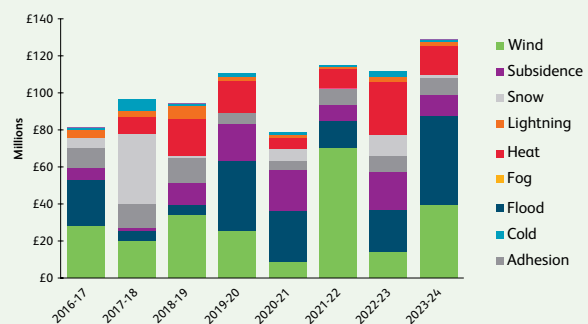
Flooding, made worse by wetter winters and sea level rise, leads to standing or flowing water, which damages assets and blocks the path of trains.

Subsidence happens when landslips, rockfalls and sinkholes damage the track bed.

Heat affects our electrical components and leads to rails buckling, meaning we have to impose temporary speed restrictions.

Wind from storms can bring a range of objects onto our tracks, such as trees, trampolines, or roofs. This damages overhead lines, infrastructure and trains and blocks the tracks.

Cost of delays and cancellations (schedule 8)
Apr 2016–February 2024



Schedule 8 is a compensation scheme for train operators following unplanned disruption incidents on the railway. We monitor the impact of weather on the railway by recording schedule 8 cost and delay minutes from a range of weather incidents.

Effects of our top 3 weather risks on performance (2006–2024)

Wind

Schedule 8 costs: £382.8m

Delay minutes: 7.4m



Flood

Schedule 8 costs: £316.2m

Delay minutes: 6.8m



Subsidence

Schedule 8 costs: £144m

Delay minutes: 4.4m



CP7 WRCCA Plans National Summary

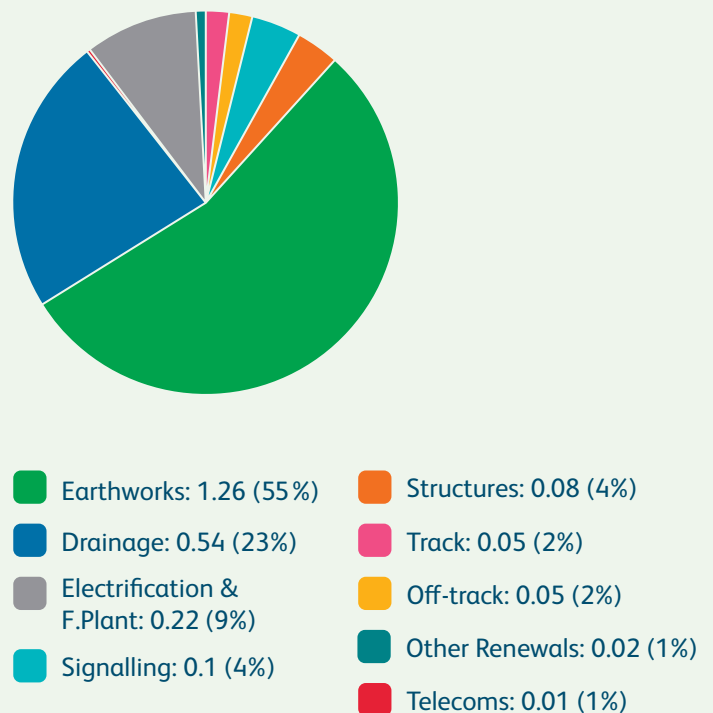
Our CP7 delivery plans identify around £2.8bn expenditure in activities with primary resilience benefits

Actions included in the regional weather and climate change plans include developing long-term climate change adaptation pathways strategies, risk assessment, analysis, and remote monitoring systems, among other non-asset-related activities. Reflected also is the planned maintenance and renewals to our railway, where the planned activity will bring better resilience to extreme weather and climate change as a primary benefit. This in turn consists of:

- **Pure weather resilience activity** – that is, activities undertaken solely to make our railway more resilient to extreme weather
- **Business as usual activities with weather resilience benefits** – that is, activities driven by poor asset condition and extreme weather and climate change challenges, so that the work improves both the asset’s condition and its weather resilience

Our CP7 delivery plans identify around £2.8b of expenditure in activities with primary resilience benefits. This includes maintaining and renewing drainage and earthworks systems in response to the Mair and Slingo recommendations, improving our coastal defences, and making some targeted resilience improvements within track and overhead electrical equipment renewals schemes.

Investment with primary resilience benefit by asset class (£billions)



£2.8bn expenditure on primary resilience activities and strategic weather and climate resilience projects in CP7 (millions)

Region/ Function	Wales & Western	Southern	Eastern	North West & Central	Scotland	National Functions
Other weather and climate resilience (e.g. strategy, tools, taskforce)	38	152	5	157	4	112
Asset activities with primary resilience benefit	409	627	409	524	352	N/A
TOTAL	447	779	414	681	356	112

Notes

- ‘Other’ spend covers development of adaptation pathways strategies, research and development, tools, technology, monitoring etc. This is a minimum figure as work in many areas will be carried out as business as usual which isn’t captured at planning stage. Some investment in the weather risk taskforce is captured here and some elsewhere in CP7 investment plans.
- The difference in investment in assets by region reflects where investment takes place. For example in higher proportion of investment in earthworks and drainage captures results in higher primary resilience benefit than for example investment in track.



Eastern Region CP7 Weather Resilience and Climate Change Adaption (WRCCA) Plan Summary

This document summarises Eastern Region’s key climate risks, their impacts and a strategic overview of how we intend to mitigate these through our CP7 weather resilience and climate change adaptation plans.



Our region

We’re the largest region on the network, with four routes: Anglia, East Coast, East Midlands and North & East.

Our topography and geology affect how weather and climate change impact us.

In the south, topography is low-lying, some of it below sea level, with softer geology. These areas are very vulnerable to flooding, which can happen after extended periods of rainfall or tidal surges and can remain a problem for some time. The area is also very vulnerable to desiccation during droughts.

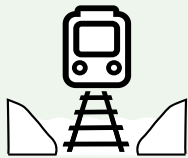
Further north, terrain is steeper and geology is more varied. This makes earthworks more vulnerable to convective rainfall and rock fall.

Our key climate risks

Prolonged, intense rainfall



Flooding



Storms and high winds



Rolling stock and assets damaged



Temperature rise



Tracks buckling, Overhead Line Equipment (OLE) impacts, soil desiccation



Key impacts

High winter rainfall increases flood risk and ground saturation. This damages assets such as embankments and cuttings.

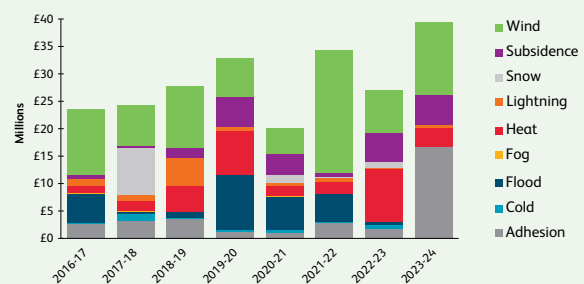
Strong winds becoming more frequent and an extended growing season mean greater risk of trees and branches falling onto the track and damaging trains and OLE (Overhead line equipment).

Heat increases the risk of track buckling and OLE problems, which means disruptive temporary speed restrictions.

Vegetation growth patterns change as weather patterns shift.

Failure to effectively manage these risks increases the likelihood of safety-critical incidents occurring.

Costs of delays and cancellations (schedule 8) April 2016 – February 2024



Schedule 8 is a compensation scheme for train operators following unplanned disruption incidents on the railway. We monitor the impact of weather on the railway by recording schedule 8 cost and delay minutes from a range of weather incidents.

Effects of our top 3 weather risks on performance (2006–2024)

Wind

Schedule 8 costs: £128.7m

Delay minutes: 2.0m



Flood

Schedule 8 costs: £65.8m

Delay minutes: 1.4m



Heat

Schedule 8 costs: £37.4m

Delay minutes: 0.59m





Eastern Region CP7 Weather Resilience and Climate Change Adaption (WRCCA) Plan Summary

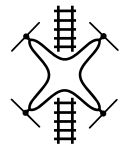
Our strategic approach to weather and climate resilience in CP7

Non asset-driven activities

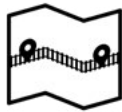
Solutions to minimise and mitigate weather impact on train services



Remote monitoring technology to support proactive decision-making in responding to weather events



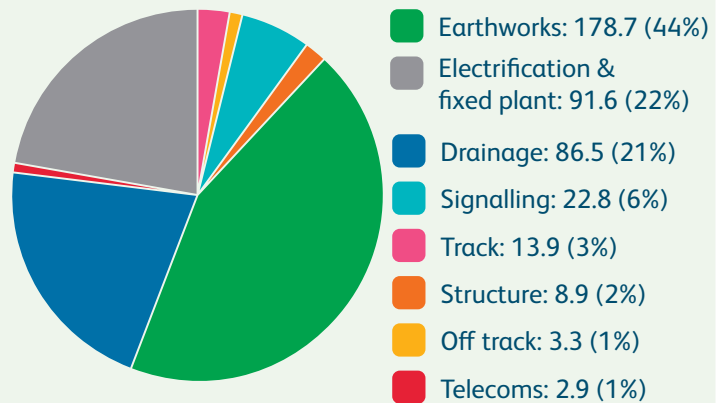
Prioritising high-risk locations for weather resilience investment



Directing investment and policy actions towards achieving longer-term climate resilience.



Investment with primary resilience benefit by asset class (£millions)



Key priorities for CP7

- We'll use our asset knowledge and weather forecasting to work with Train and Freight Operating Companies to deliver safe train service plans during bad weather
- We'll work on rapid recovery from the impacts of severe weather
- We'll improve our infrastructure to withstand current and future weather conditions.

What are we planning to deliver in CP7?

Risk	Action	Main benefit
All	Use modern standards and designs in project development	Better asset resilience
All	Deliver track renewals and drainage schemes together	
All	Invest in monitoring equipment	Better knowledge of long-term asset vulnerabilities, better failure prediction and failure detection
Precipitation	Targeted action for highest-risk earthworks (75 sites) and drainage assets	Flood risk mitigation
Precipitation	Protect bridges in locations vulnerable to high river flows and scour in storms	Better asset resilience
Heat	Renew and replace vulnerable jointed track	Adaptation to higher temperatures
Precipitation/storms	Flood management schemes with Environment Agency	Better resilience to heavy rain/storms
Wind/storms	Complete vegetation asset management surveys and deploy new risk model	Better asset knowledge, supporting well-informed investment decisions

The full plan is available on the Climate Change Adaptation page of Network Rail's [website](#)



North West and Central Region CP7 Weather Resilience and Climate Change Adaption (WRCCA) Plan Summary

This document summarises North West and Central Region’s key climate risks, their impacts and a strategic overview of how we intend to mitigate these through our CP7 weather resilience and climate change adaptation plans.



Our region

NW&C has historically had to manage unpredictable wind, rain and heat when controlling our infrastructure and train signalling. Our railway runs from London Euston and Marylebone in the south through the Chilterns and West Midlands, the Northwest of England and Cumbria, before joining with Scotland at Gretna.

Some of the biggest risks in CP6 were strong winds, flooding and high temperatures. These caused the highest Schedule 8 delays and costs.

Our key climate risks

Increased temperatures



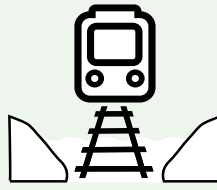
OLE sagging, track buckling
and soil desiccation



Intense rainfall



Flooding
and landslides



Sea level rise and erosion



Loss of land and
inoperable track



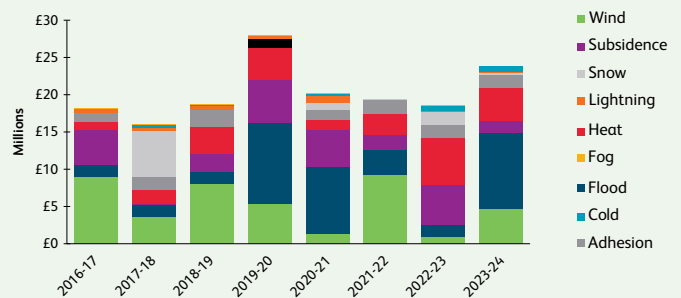
Key impacts

Strong winds and more frequent storms can bring trees on to the track, creating delays. Storms can also cause damage to OLE (Overhead line equipment) and in some cases trains.

More frequent **intense rainfall** can lead to flooding on tracks in coastal and river areas, and can cause embankment slumping, among other issues. This causes severe track and can cause train damage.

Higher temperatures can cause track buckling and OLE sagging, as well as overheating electrical equipment, leading to delays and cancellations.

Cost of delays and cancellations (schedule 8)
April 2016 – February 2024



Schedule 8 is a compensation scheme for train operators following unplanned disruption incidents on the railway. We monitor the impact of weather on the railway by recording schedule 8 cost and delay minutes from a range of weather incidents.

Effects of our top 3 weather risks on performance (2006–2024)

Wind

Schedule 8 costs: £71.2m

Delay minutes: 1.4m



Flood

Schedule 8 costs: £66.7m

Delay minutes: 1.6m



Heat

Schedule 8 costs: £30.7m

Delay minutes: 0.47m





North West and Central Region CP7 Weather Resilience and Climate Change Adaption (WRCCA) Plan Summary

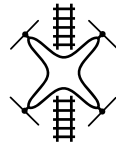
Our strategic approach to weather and climate resilience in CP7

Non asset-driven activities

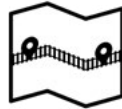
Solutions to minimise and mitigate the impacts of weather on train services i.e. enhanced weather forecasting



Remote monitoring technology to support proactive decision-making in responding to weather events



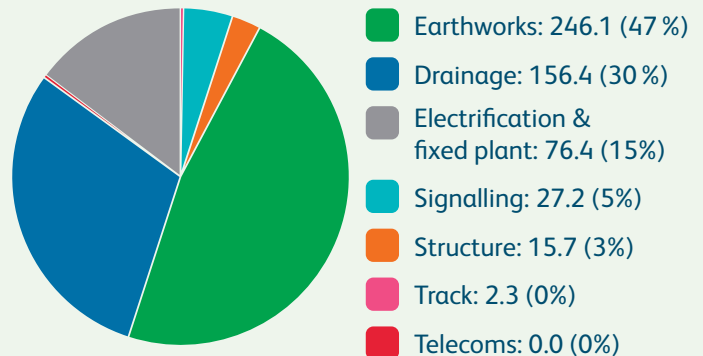
Prioritising high-risk locations for weather resilience investment



Directing investment and policy actions towards achieving longer-term climate resilience.



Investment with primary resilience benefit by asset class (£millions)



Collective priorities

Colleagues can help by considering climate change and adaptability when carrying out your day job.

For example:

- Conduct a climate risk assessment
- Implement proportionate climate risk controls
- Think big and act early when it comes to climate risk in renewals, maintenance and enhancements.

What are we planning to deliver in CP7?

Risk	Action	Main benefit
All	Long-term adaptation pathways to develop a climate ready railway	Better asset reliance
All	Climate change adaptation projects – on the ground	
All	Partnership approaches to climate resilience	Supports resilience
All	Knowledge and awareness raising	Better knowledge of climate and weather risk management
Storms/wind	Integrate our approach across our different infrastructure assets	Better storm resilience
Storms/precipitation	Appoint enough drainage inspectors	Better failure prediction
Precipitation	Dedicated drainage maintenance teams across all routes	Better track drainage reliability
Precipitation	Pilot trials of Proportionate Risk Response to Implementing Mitigating Speeds to Assets and Rail Operations Weather Service	Ensures we make the most effective response to each type of weather event

The full plan is available on the Climate Change Adaptation page of Network Rail's [website](#)



CP7 Climate Ready Plan for Scotlands Railway

This document summarises Scotland Region's key climate risks, their impacts and a strategic overview of how we intend to mitigate these through our CP7 weather resilience and climate change adaptation plans.



Our region

At over 1700 miles in length, and with 360 stations, our railway in Scotland covers a large geographical area, operating in a diverse range of landscapes and in an increasingly unpredictable climate.

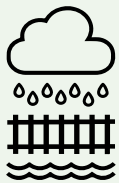
Scotland's topography is mixed; our railway cuts through the mountainous highlands, hilly lowlands, and along steep valley sides. Outside the urban Central Belt, much of it runs close to our stunning coastlines.

Without intervention, future changes in our climate will likely change the frequency and severity of many of the climate-related risks our railway is vulnerable to.

Our key climate risks

Prolonged, intense rainfall

↓
Flooding



High winds

↓
Tree fall



Snow and ice

↓
Points failure and poor rail adhesion



Key impacts

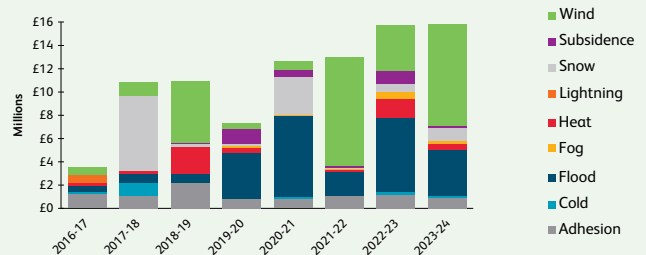
Leaf fall contaminates the track, leading to traction losing power or slipping. The main risks are signals passed at danger and station overruns.

Flooding, made worse by wetter winters and sea level rise, leads to standing or flowing water, which damages assets and blocks the path of trains.

Subsidence happens when landslips, rockfalls and sinkholes damage the trackbed.

Heat affects our electrical components and leads to rails buckling, meaning we have to impose temporary speed restrictions.

Cost of delays and cancellations (schedule 8) April 2016 – February 2024



Schedule 8 is a compensation scheme for train operators following unplanned disruption incidents on the railway. We monitor the impact of weather on the railway by recording schedule 8 cost and delay minutes from a range of weather incidents.

Effects of our top 3 weather risks on performance (2006–2024)

Wind

Schedule 8 costs: £45.9m

Delay minutes: 1.3m



Flood

Schedule 8 costs: £41.2m

Delay minutes: 1.1m



Snow

Schedule 8 costs: £22.5m

Delay minutes: 0.8m



CP7 Climate Ready Plan for Scotland's Railway

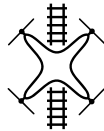
Our strategic approach to weather and climate resilience in CP7

Climate ready outcomes for CP7

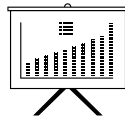
The decisions we make are based on a growing understanding of climate-related risk



A long-term adaptation and resilience strategy increasingly guides resilience investment



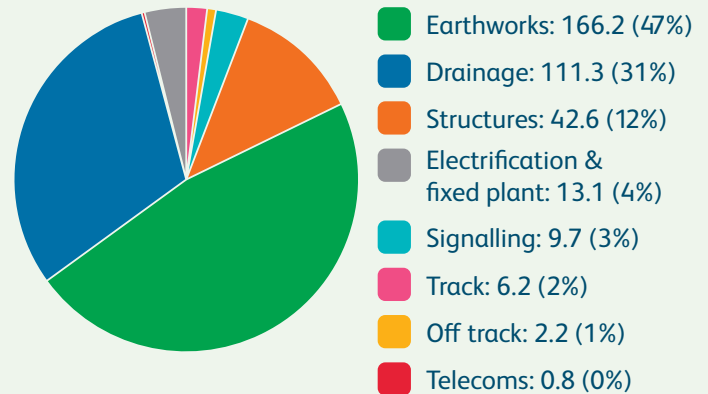
We're making our assets increasingly resilient to severe weather, as well as longer-term changes in climate



Our climate-ready journey is underpinned by a maturing level of risk, assurance, competence and data insights.



Investment with primary resilience benefit by asset class (£millions)



Key priorities for CP7

- We'll deliver a revised approach to undertaking climate change risk assessments, and identify future vulnerable locations
- We'll put in place a long-term adaptation strategy, using the 'adaptation pathways' approach
- We'll enhance our approach to monitoring and assurance of the actions we are taking to improve the resilience of our railway.

What are we planning to deliver in CP7?

Risk	Action	Main benefit
All	Climate-ready plan: track and train under one climate change adaptation plan	More cohesive decision-making on climate change adaptation actions
Multiple	Wrapping high-voltage critical lineside buildings	Protects against water ingress and heat
Multiple	Track renewals (drainage, switches and crossings, plain line)	Resilience to track buckle/trackbed washout
Precipitation	Renewing embankments, soil and rock cuttings, including regrading or installing retaining structures	Reduces risk of earthworks failures following prolonged rainfall
Wind/storms	Tree and vegetation management to address hazardous trees and vegetation encroachment	Better safety and resilience during storms and the autumn leaf fall period
Wind/storms	Maintaining coastal and estuarine defences	Protects assets from erosion and scour
Heat	Replacing fixed-termination overhead lines equipment with an auto-tensioned set-up in the North Glasgow area	Heat resilience: less likely to sag
Heat	Conversion of aster track circuits to axle counters	Better heat and lightning resilience

The full plan is available on the Climate Change Adaptation page of Network Rail's [website](#)



Southern Region CP7 Weather Resilience and Climate Change Adaption (WRCCA)

This document summarises Southern Region’s key climate risks, their impacts and a strategic overview of how we intend to mitigate these through our CP7 weather resilience and climate change adaptation plans.



Our region

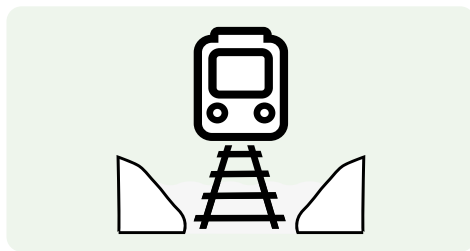
Southern region encompasses our Wessex, Sussex and Kent Routes, linking major towns and cities, including Bournemouth, Southampton, Portsmouth, Brighton, Canterbury, Ashford and Dover to each other and the capital, and support key freight routes from the Channel Tunnel and Folkstone to London and from Southampton to the Midlands. The region includes several coastal lines, passing through the undulating North and South Downs and the flood plains of the River Axe. Our Wessex route passes through the New Forest in Hampshire, which has a distinctive and varied microclimate with effects ranging from floods to wildfires. The geology and topography of our region makes parts of our routes vulnerable to sea level rise, coastal erosion, river flooding and embankment desiccation in hot weather.

Our key climate risks

Prolonged, intense rainfall



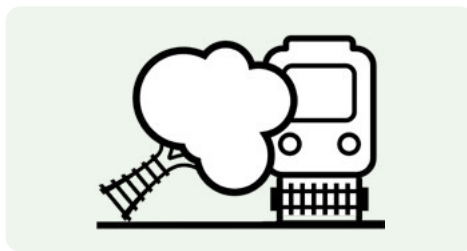
Subsidence and floods



High winds



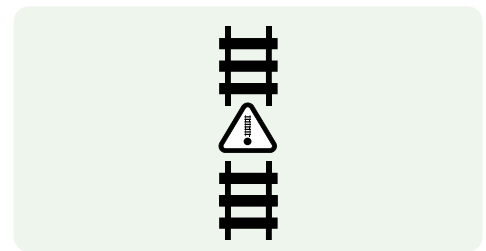
Rolling stock and assets damaged



Temperature rise



Track buckling, soil desiccation



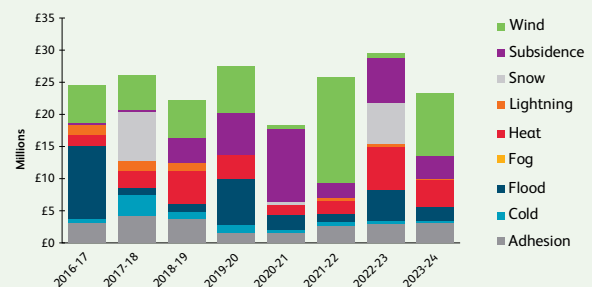
Key impacts

Strong winds have become our main cause of delay in the past five years, damaging our infrastructure by blowing vegetation and objects onto the tracks. They also damage sea defences surrounding our coastal lines and increase the rate of coastal erosion.

Subsidence of our earthworks has a major impact, with landslips occurring as our embankments are exposed to increased levels of precipitation and higher temperatures.

We introduce speed restrictions to keep everyone safe when this happens, but this leads to delays and cancellations.

Cost of delays and cancellations (schedule 8) April 2016 – February 2024



Schedule 8 is a compensation scheme for train operators following unplanned disruption incidents on the railway. We monitor the impact of weather on the railway by recording schedule 8 cost and delay minutes from a range of weather incidents.

Effects of our top 3 weather risks on performance (2006–2024)

Wind

Schedule 8 costs: £92.0m

Delay minutes: 1.8m



Flood

Schedule 8 costs: £52.2m

Delay minutes: 0.9m



Subsidence

Schedule 8 costs: £49.2m

Delay minutes: 0.7m





Southern Region CP7 Weather Resilience and Climate Change Adaption (WRCCA)

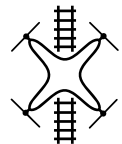
Our strategic approach to weather and climate resilience in CP7

Non asset-driven activities

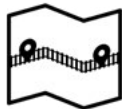
Solutions to minimise and mitigate the impacts of weather on train services



Remote monitoring technology to support proactive decision-making in responding to weather events



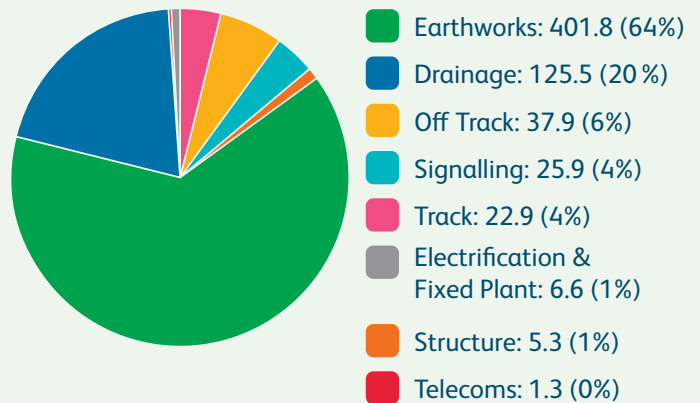
Prioritising high-risk locations for weather resilience investment



Directing investment and policy actions towards achieving longer-term climate resilience.



Investment with primary resilience benefit by asset class (£millions)



Key priorities for CP7

- We'll provide infrastructure that withstands the impacts of current and future weather conditions
- We'll increase investment in our lineside strategy to improve the management and resilience of earthworks, water and drainage
- We'll use asset knowledge and weather forecasting to work with Train and Freight Operating Companies to keep passenger and freight services safe during bad weather.

What are we planning to deliver in CP7?

Risk	Action	Main Benefit
All	Deliver track renewals and drainage schemes together to be more efficient	Better delivery of works and asset resilience
All	Develop and implement a robust assurance and risk assessment process	Better decision-making on risk and incident management
Precipitation	Flood management schemes in collaboration with Environment Agency and local authorities	Better resilience to heavy rain/storms
Precipitation	Continued installation of remote condition monitoring technology along our embankments	Better risk management of cuttings
Wind/Storms	Complete and manage hazardous tree surveys	Better tree risk management
Wind/Storms	On-train cameras on our MPVs to enable a real-time view of railhead contamination	Better understanding and management of adhesion issue
Heat	Better manage our track foundation	Better trackbed resilience
Heat	Renewal of timber switching and crossings layouts	Better track resilience

The full plan is available on the Climate Change Adaptation page of Network Rail's [website](#)



Wales and Western CP7 Weather Resilience and Climate Change Adaption (WRCCA) Plan Summary

This document summarises Wales and Western Region’s key climate risks, their impacts and a strategic overview of how we intend to mitigate these through our CP7 weather resilience and climate change adaptation plans.



Our region

The Wales and Western region is situated in the western most extents and coastal parts of mainland UK and boasts a variety of geographical, topographical, and climatic features. Our railway network extends from Holyhead in North Wales down to Penzance in southern Cornwall and into Paddington, London to the east. Our region also has the most coastal railway in the UK.

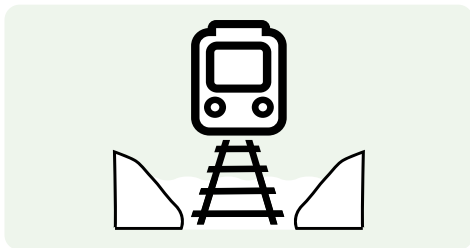
Climatically, our region experiences maritime and continental influences. Situated in close proximity to the Atlantic Ocean, the region benefits from the impact of the Gulf Stream, bringing in mild temperatures and moisture-rich air masses.

Its geographical location also exposes the area to the unpredictable nature of Atlantic weather systems, contributing to unpredictable and changeable weather patterns.

Our key climate risks

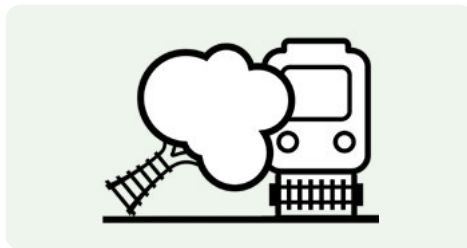
Prolonged, intense rainfall

↓
Flooding



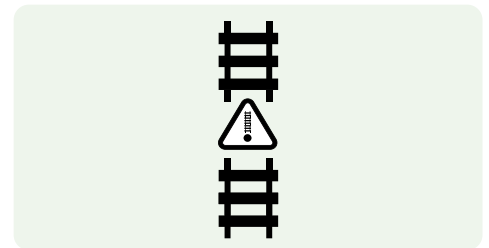
Storm and high winds

↓
Rolling stock and assets damaged



Sea level rise

↓
Flooding, debris



Key impacts

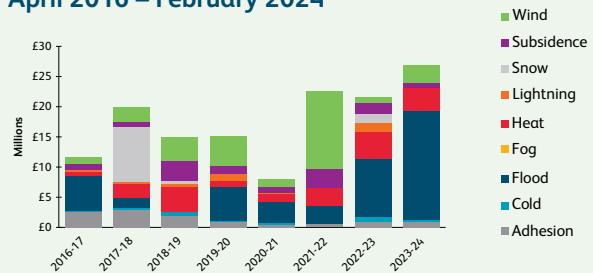
Increased rainfall raises flood risk in low-lying areas and coastal regions. This may make our embankments and cuttings more unstable.

Storms and strong winds are becoming more frequent and the growing season is extended due to temperature rise. This means greater risk of trees and branches falling onto the track and damaging OLE (Overhead line equipment).

Sea level rise increases the risk of overtopping on our coastal railways.

If we don’t manage these risks effectively, it’s more likely we’ll face safety-critical incidents.

Cost of delays and cancellations (schedule 8) April 2016 – February 2024



Schedule 8 is a compensation scheme for train operators following unplanned disruption incidents on the railway. We monitor the impact of weather on the railway by recording schedule 8 cost and delay minutes from a range of weather incidents.

Effects of our top 3 weather risks on performance (2006–2024)

Flood

Schedule 8 costs: £90.7m

Delay minutes: 1.7m



Wind

Schedule 8 costs: £44.9m

Delay minutes: 0.9m



Heat

Schedule 8 costs: £24.3m

Delay minutes: 0.4m





Wales and Western CP7 Weather Resilience and Climate Change Adaption (WRCCA) Plan Summary

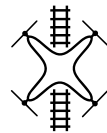
Our strategic approach to weather and climate resilience in CP7

Non asset-driven activities

Providing solutions to reduce damage to the railway after a weather event



Digital monitoring technology to support proactive decision-making in responding to weather events



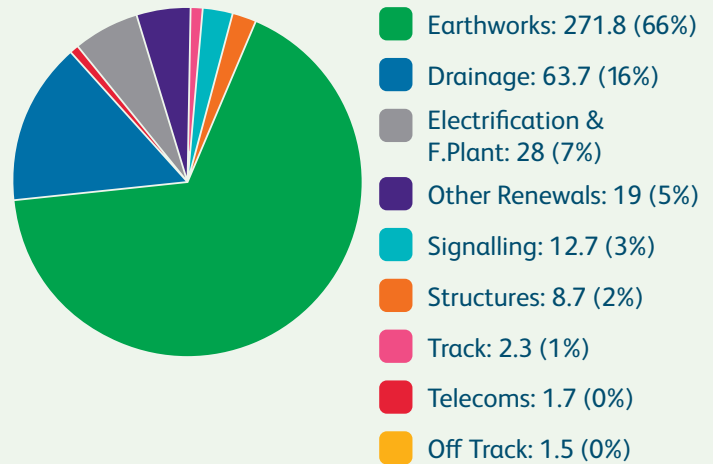
Directing investment and policy actions towards achieving climate resilience



Prioritising highest-risk route sections for adaptation pathways assessment and adaptation solutions.



Investment with primary resilience benefit by asset class (£millions)



- Our £19 million Standalone Resilience Budget (CP7) will fund pure resilience activities, directly addressing the impacts of weather on our region
- £1 million – Network Rail Design and Delivery to develop 14 initial projects, progressing six to completion
- We'll invest £18 million directly in delivering the six projects.

What are we planning to deliver in CP7?

Risk	Action	Main Benefit
All	Adaptation pathways delivery	Climate change impact management and mitigation across the region
All	Developing and delivering pure resilience schemes	Lower climate change impact on infrastructure
All	Remote condition/failure monitoring	Better understanding of railway vulnerability to weather and operational response
Flooding	Proactive telemetry of embankments in floodplains	Lower repair and delay costs
Flooding	Bridge scour mitigation	Better structural integrity
Flooding	Natural flood management	Sustainability and reduced expenditure
Flooding	Drainage and earthworks interventions	Lower weather-related failure
Flooding	Maintaining coastal defences	Resilience against coastal storm events
FloodingWind	Removing dead/diseased/dying trees	Better safety and performance, less damage to rolling stock