Maintaining a "Dry Spine"

The importance of weather resilience to the railway network

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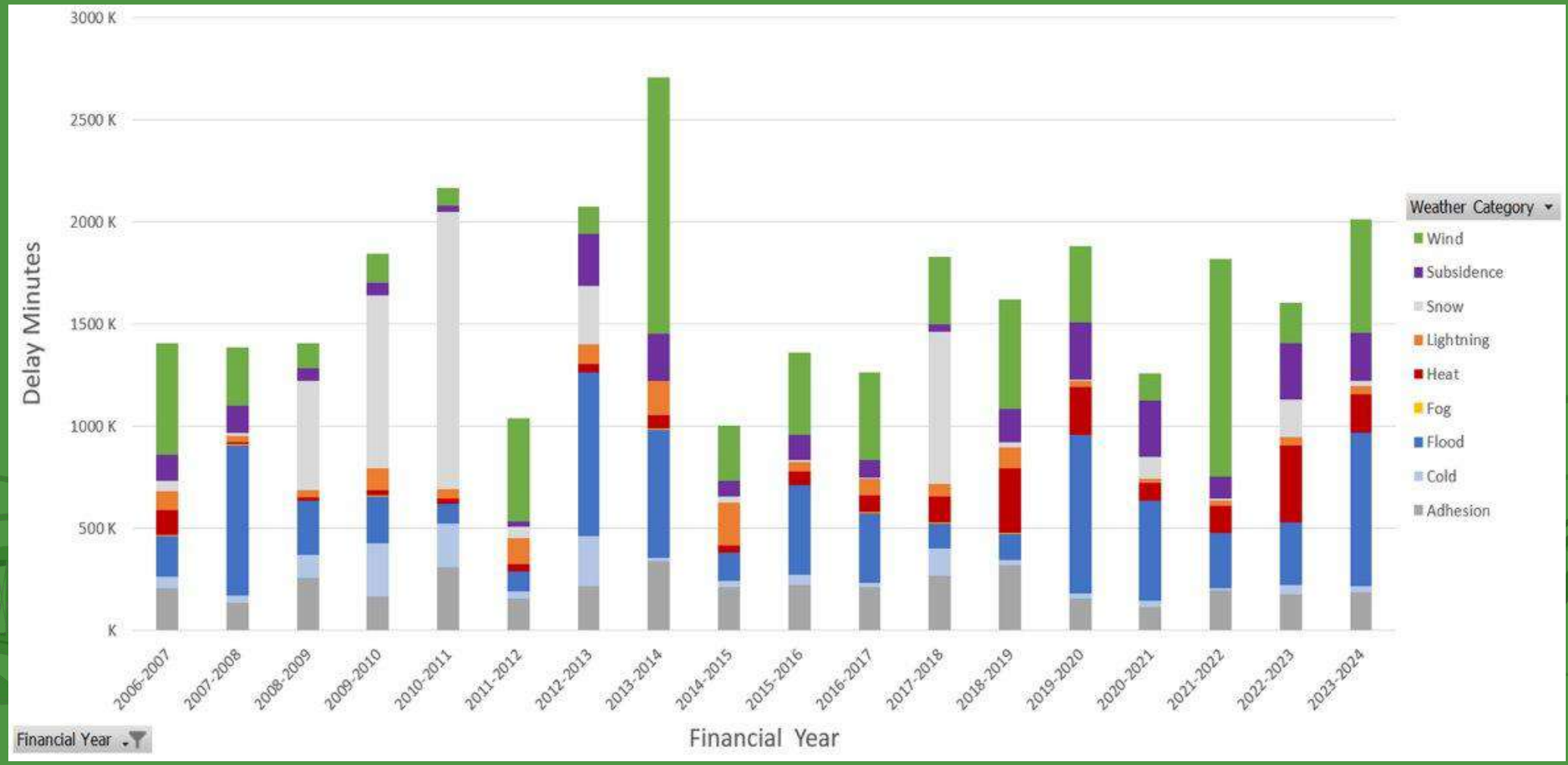
Why are projects focussing on weather resilience so important to the railway?



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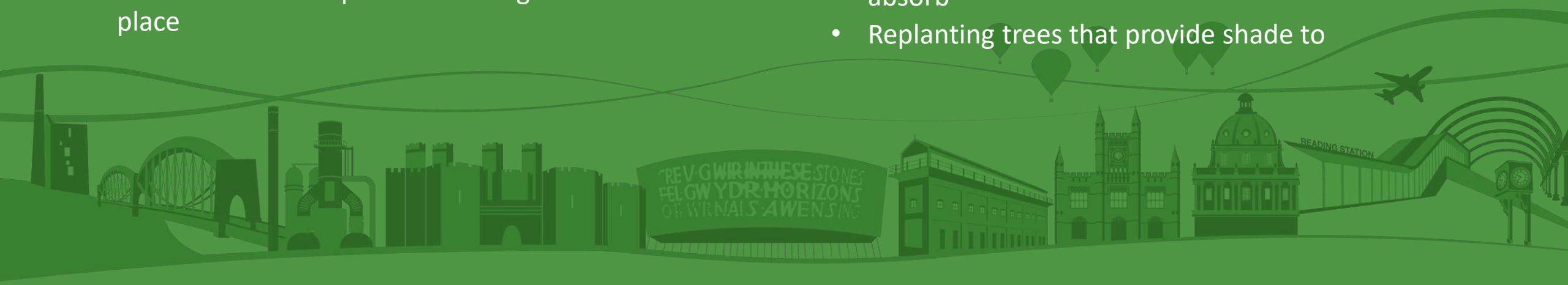
How can we adapt to be more resilient to the changing climate?

- Emergency timetables with reduced services – keeps passengers and freight moving but less stranded trains and staff
- Increase the use of remote monitoring equipment and ensure robust processes and governance in place
- Better and more strategic investment in our maintenance of lineside assets e.g. vegetation
- Restressing the rails to withstand higher heat
- Painting the rails white to reflect heat rather than absorb
- Replanting trees that provide shade to



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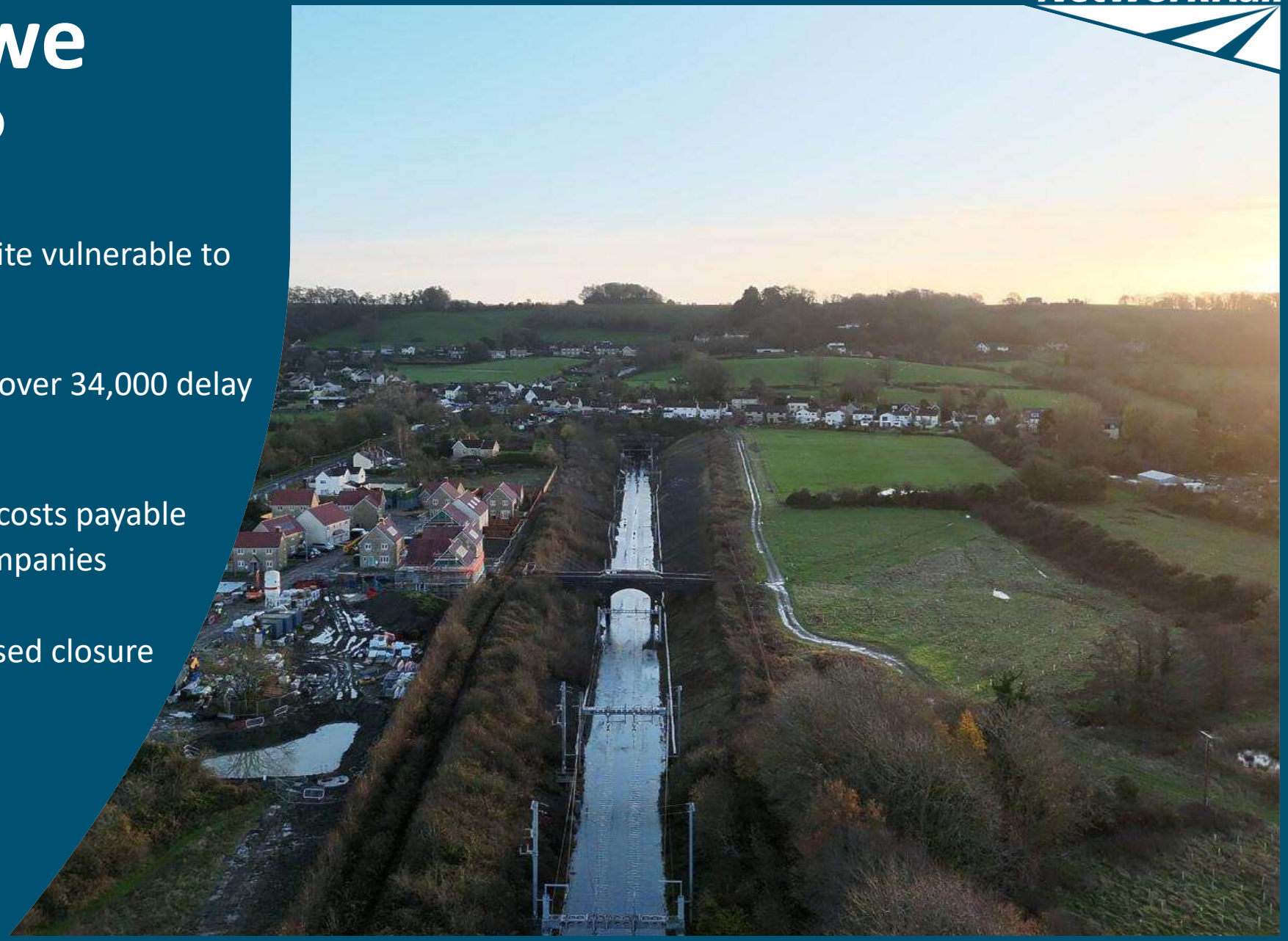
What have we been doing?

One key strategically important site vulnerable to flooding is Chipping Sodbury.

The winter of 2023-2024 caused over 34,000 delay minutes due to flooding

This amounted to £7mil in delay costs payable to train and freight operating companies

The worst period of flooding caused closure for 8 days.



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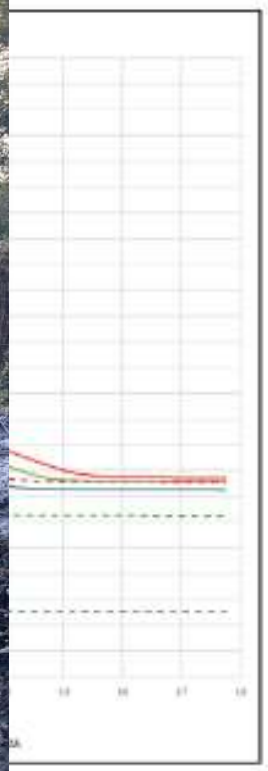
Phase 0

Targeted investment at this key site undertaking key maintenance and refurbishment work

- 35 ton of material cleared from track drainage system
- Remote monitoring installed around the site both off-track and on-track including drainage, track and E&P assets
- Lagoon pumping configuration altered to ensure correct usage of pumps
- Drainage reconfigured to ensure all water collected correctly in system and outfalls into lagoon
- Located and raised catchpits throughout

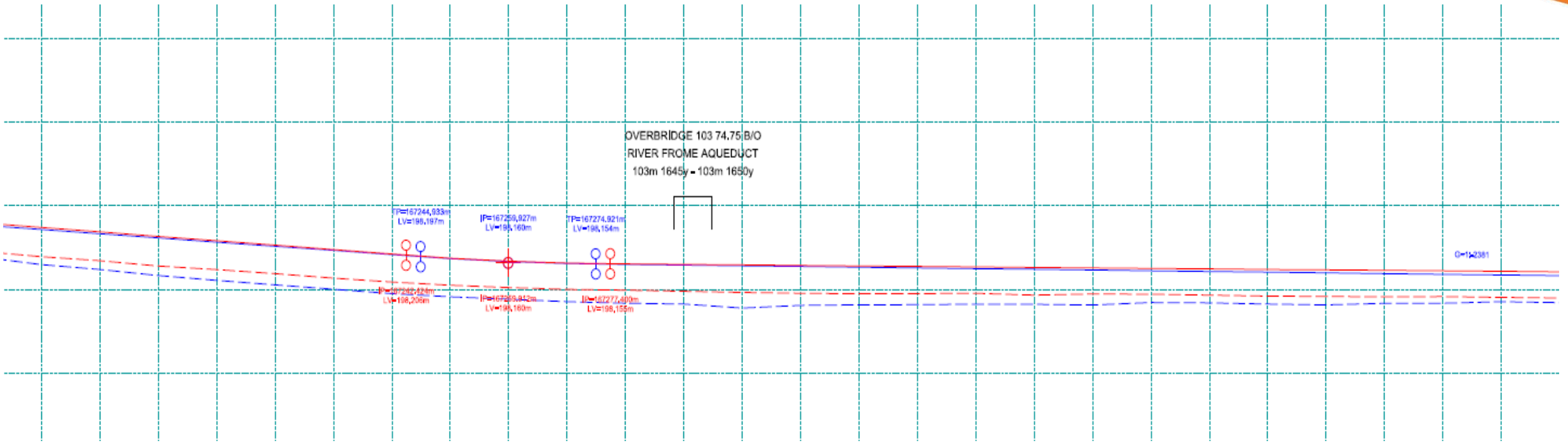
Phase 1

Activity	Result
Flood Modelling to better understand the flood mechanics of the site	Undertaking simple vegetation and siltation management of streams and storage lagoons increased fluvial flood resilience from 1-in-50 to 1-in-100yr events



Phase 1

Activity	Result
Flood Modelling to better understand the flood mechanics of the site	Undertaking simple vegetation and siltation management of streams and storage lagoons increased fluvial flood resilience from 1-in-50 to 1-in-100yr events
Track lift of up-to 250mm across an 800 yard section of track	Moves the railway out of the flood zone



- Normal track lift is in the region of 10 to 20mm. However not that common with no other scheme in the country planned to undertake a track lift
- The dotted lines indicate old height and solid lines the new height.
- More than 50% of flooding last few winters has seen the blue dotted line experience flooding but not the red dotted line

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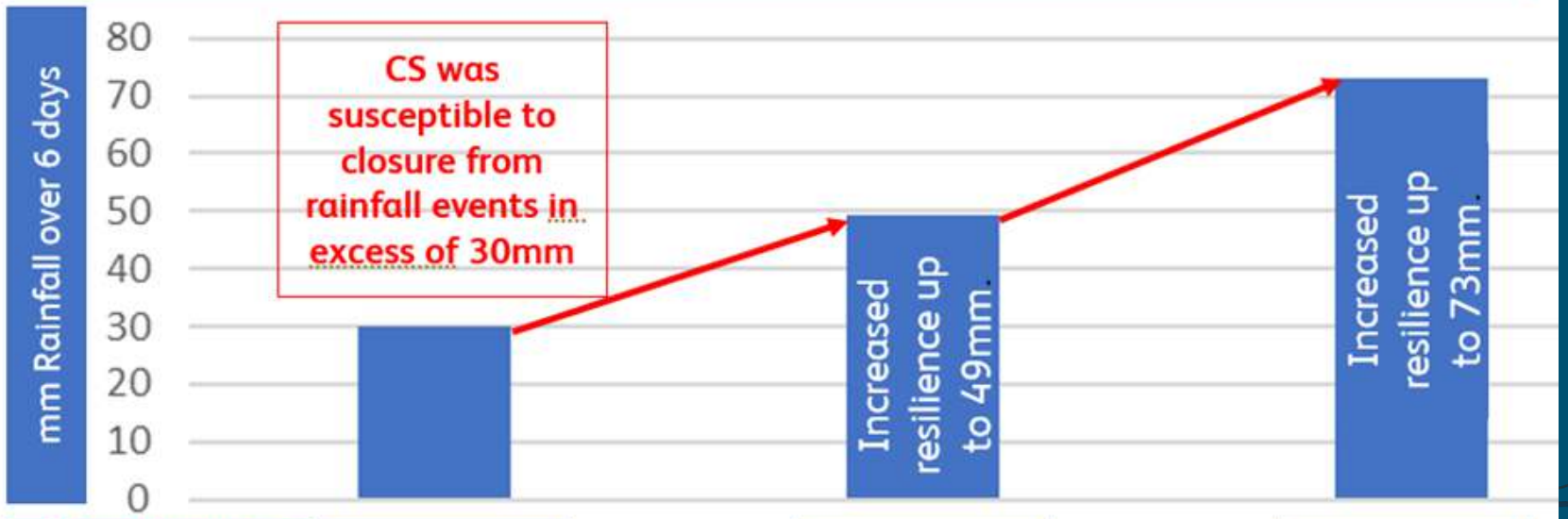
Increase in resilience for volume of rainfall totals at Chipping Sodbury.

Graph depicts the increasing rainfall totals that the railway is resilient to, meaning that fewer and fewer events will lead to performance-impacting flooding.



Potential minuets saved from resilience works:

43964

Based on winter rainfall data 2020-25 for events under 73mm for cumulative 6 day period prior to flood incident.

Pre resilience interventions

Phase 0 works (Drainage)

Phase 1 works (Track Lift)

Works are planned for the end of CP7 year 2 on the off track watercourses that will enhance the system further, modelling shows that the works will increase the capacity from a 1in50 to 1in100 event.

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How to ensure we keep passengers and freight moving

Each of the 5 regions in Network Rail have broken down their lines and categorised their importance.

There isn’t enough capital to make every line of route as robust as required to manage extreme weather.

Therefore certain sections have been prioritised

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Levels of resilience for climate adaptation

Resilience category
Resist
Rapid recovery
Bounce Back
Repair
Close

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Railway

Rapid Adaptation Pathways Workshop Outputs
Section: Reading to Wooton Bassett Junction

Western Route

NetworkRail

Map of the Workshop Section

The map of the workshop section shows the extents of the workshop section the major stations that the line connects and the desired level of resilience

Overview

Location: Steam Museum 28.01.25

Section: MLN1 Reading to Wootton Bassett Junction

Section characteristics: major operational corridor serving long-distance intercity services to South Wales and the South West, as well as local Thames Valley and freight traffic. It supports high passenger volumes into London and regional hubs like Swindon and Bristol. The route passes through low-lying areas, making it vulnerable to climate risks such as flooding, particularly around the Thames Valley and river crossings

Section risks:

- 46,988 delay minutes and £5,826,526 in SRcost
- Flooding
- High Wind
- Heat

Workshop Outputs

Climate Change Risks

Workshop Intervention Options

Heat	Earthworks	Pluvial & Fluvial Flooding	Storms & High Winds	Other
Use whole system monitors	Identify all earthwork assets	Stadley is a problem area, investigate	De-veg DDD trees	Route control centers
Re-veg for shade	Seasonal maintenance programmes	RCM at prone sites	Educate 3rd parties of risk	Trespassing is an issue
Use EWAT for heat	Driver training for fault spotting	Make use of reservoirs such as the one in Chipping Sodbury	OLE damage in high winds	Use drones to monitor and investigate issues
Switch Diamond slow speeds means less impact	Monitor badger activity	Catchment wide analysis		Engage with new developments to manage risks
	Reinforce clay embankments	Re-development of Didcot parkway		
		Canal draining		

Example of lagoon at Chipping Sodbury

Flooding at Wooton Basset

P.E.S.T.L.E Drivers

Through the workshop process we looked the Political Economic, Social, Technological, Legal and Environmental drivers for the particular section of railway. These drivers are important to understand the current and future requirements of the railway in this particular section of railway. The results of the P.E.S.T.L.E drivers are presented below:

Political	Economic	Social	Technological	Legal	Environment
VIPs Commuting	High passenger revenue	Social tickets events	ETCS	3rd party lines/ neighbours	Sustainability and biodiversity
Millions of passengers use it yearly	Track access charges	High demand school travel	Network capacity digital tool	Railways act 1993	Decarbonisation
Link to Wales	Tourism heavy	High population area	Machine learning	Insurance claims	Wildlife corridor
Freight traffic growth	Links 2 capital cities	Supports employment	UK Monitoring	Compensation	Habitat management
High reputational damage	GVA of service	Tourism	R&D Technology and resilience	Access agreements	Noise pollution
				Endangered species	Environmental incidents

Levels of Resilience for the RAPA Section

For each section of the railway the level of resilience of has determined through conversations with the route director. The options opposed through the workshop will aim to achieve this level:

RESIST	Desired level of resilience and currently performing at this level
RAPID RECOVERY	Will not be considered for this section.
ROBUSTNESS	Will not be considered for this section.
REDUNDANCY	Will not be considered for this section.
EXPOSE	Will not be considered for this section.

Risk Score and Shortlist Sites for Full Adaptation Pathways

The workshop outputs have been processed by the adaptation pathways team and presented in the outputs diagram. The following sites have been shortlisted thanks to the information shared at this workshop:

Stadley

Didcot Parkway

These sites will now be progressed to a Local Adaptation Pathways Assessment where we will look at the risks posed in detail to identify options to adapt these sections over time.

Each major to major station in Wales and Western has gone through a rapid adaptation pathway workshop

These have been attended by internal teams such as asset managers, maintenance teams, operations and control and also external stakeholders where the railway impacts them

We've identified current risks and any risks that could come apparent with hotter drier summers, or colder wetter winters to ensure all risks have been considered

Network rails funding is broken down into 5 year control periods. We currently sit in the second year of control period 7.

From next financial year, we start the planning for control period 8.

The map highlights where funding will be prioritised to ensure we keep the "Dry Spine".

That means certain lines that are classed as least operationally important could have larger scale renewals effectively banned as this is not correct prioritisation of tax payers money.

Thank you

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