



North West & Central
Engineering and Asset Management
Permanent Way



S&C Asset Management

S&C -Route Asset management and scoping perspectives

Chris Bibby, Regional Engineer P-Way

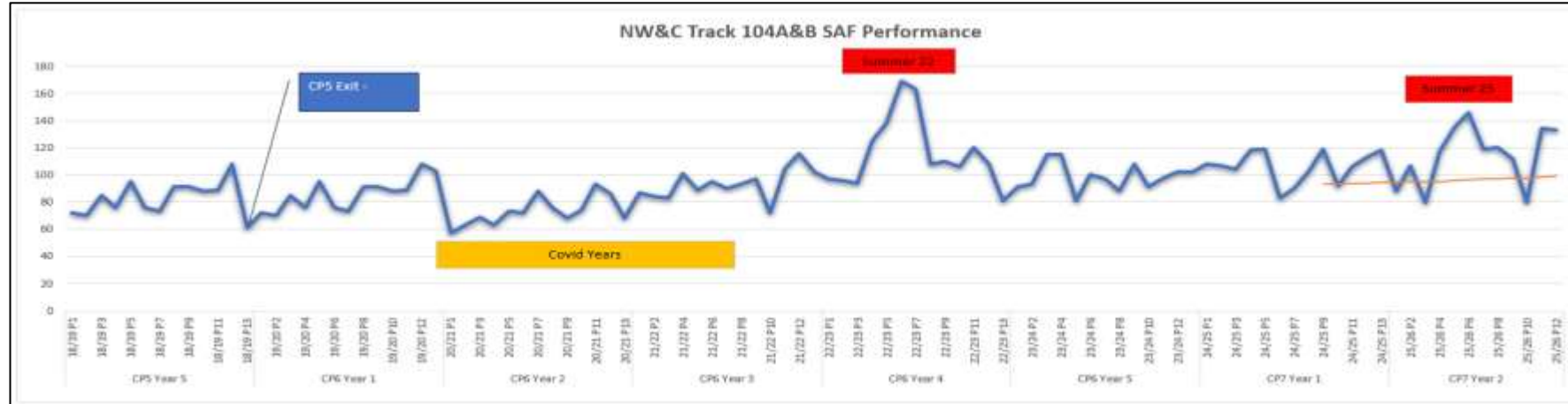


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Safety & Engineering Directorate

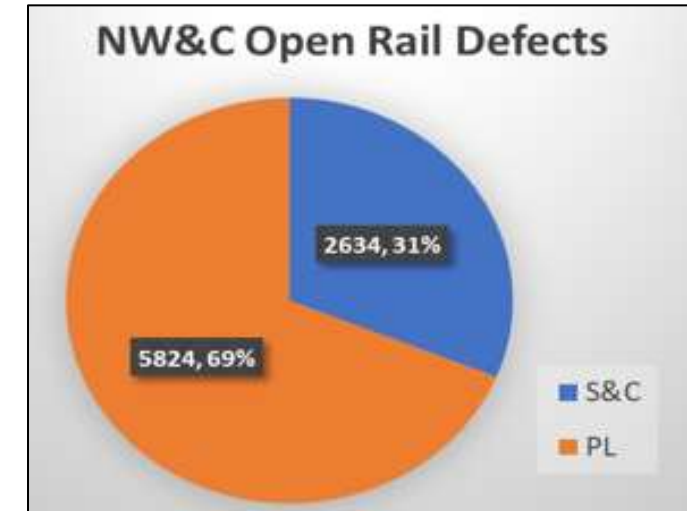
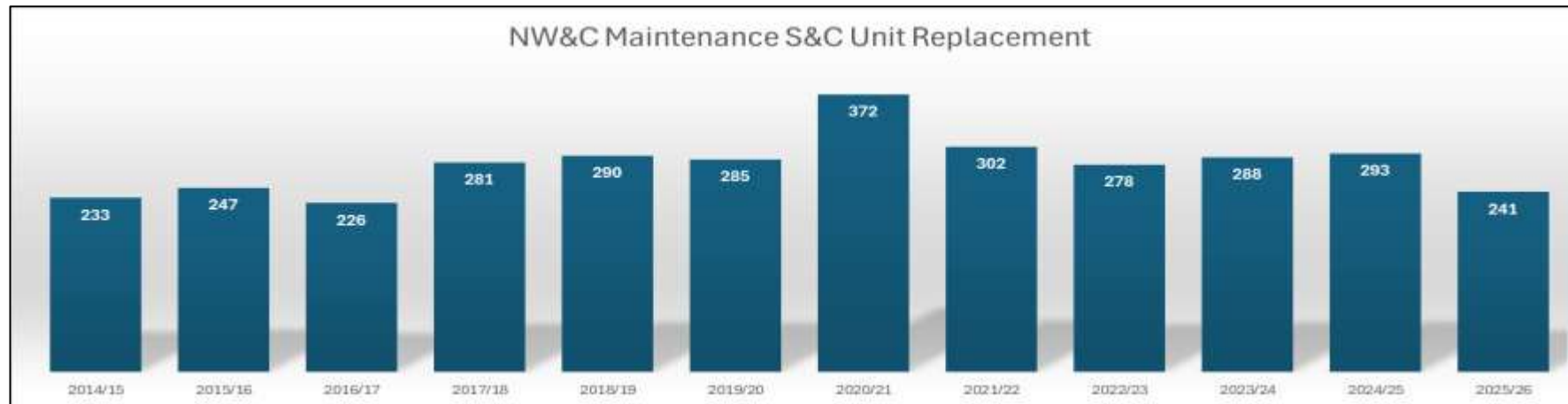
Slide 1

NW&C Problem Statement

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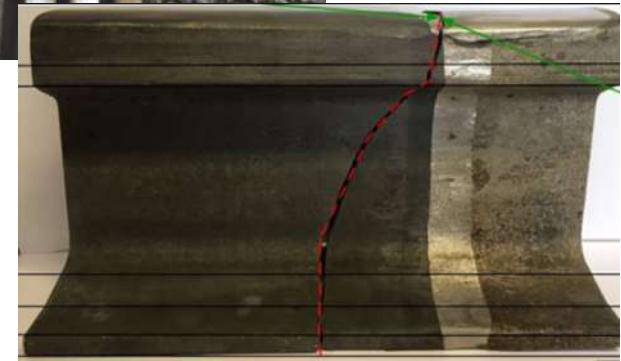
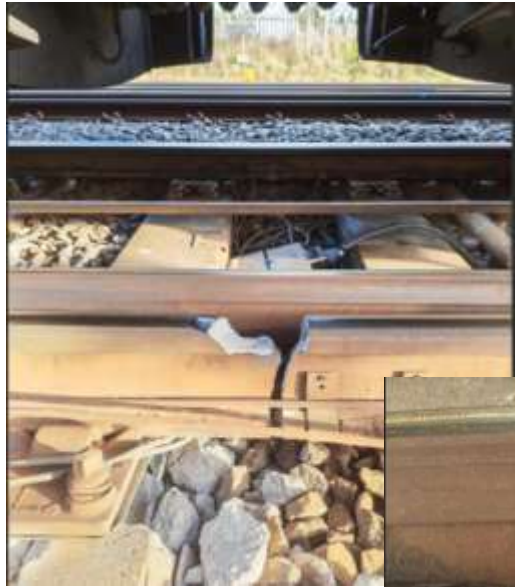
NW&C Service Affecting Failure (SAF) performance



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NW&C S&C Incidents

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Asset management requirements



- Designs that support whole-life value
- Compliance with standards or clear deviation justification
- Designed in maintainability
- Built in risk mitigation
- High quality installation
- Resilience and performance benefits
- Clear documentation and asset information
- Commitment to continuous improvement



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In Summary: Switches & Crossings must be safe, reliable, maintainable, and cost-effective across their entire lifecycle

Boots off Ballast:

Transforming How We Inspect, Maintain, and Operate the Railway

Dr Sin Sin Hsu

Regional Engineer

18th March 2026

The Case for Change:

- Cost, effectiveness and efficiency issues from traditional inspections
- Pressure for higher availability and reliability of our infrastructure



A simpler, better, greener railway.

Vision & Objectives – Technology-enabled Maintenance and Renewals



- Reduce unnecessary trackside working
- **Technology-enabled inspections**
- Data-driven decision making
- Safety + efficiency improvements
- Alignment with evolving national standards

Technology Enablers Overview

- **AIVR / AI** (Video + AI-based inspection)
- **UGMS** for geometry, rail defects and rough-ride insights
- **RBM** (Risk-Based Maintenance) framework
- **Remote condition monitoring** (sensors, smart assets)
- **Integrated digital platforms** for decision support
- Future opportunities (e.g., drones, robotics, automation)



Technology Applications

AIVR/ AI Track Use Cases

FFV

- Planning of Work
- Vegetation inspection
- Site survey for scoping renewals
- Wetbeds
- Low ballast sites
- Scrap rails

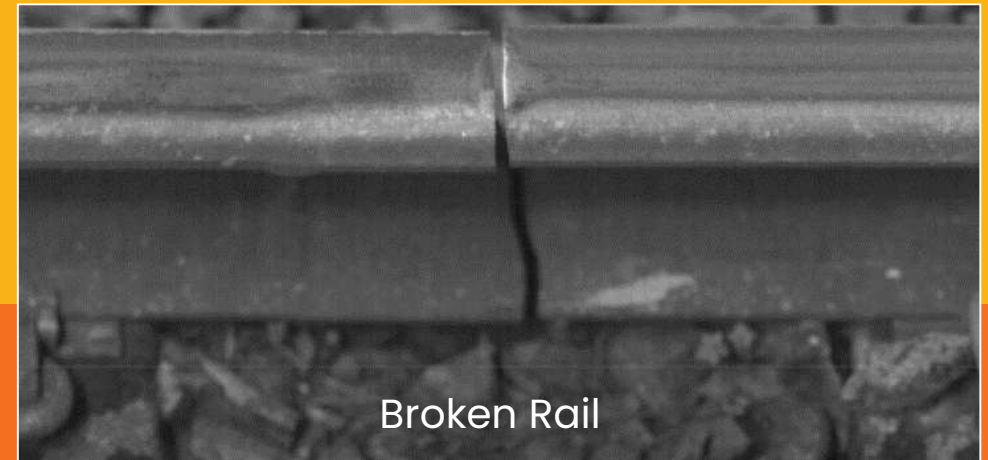
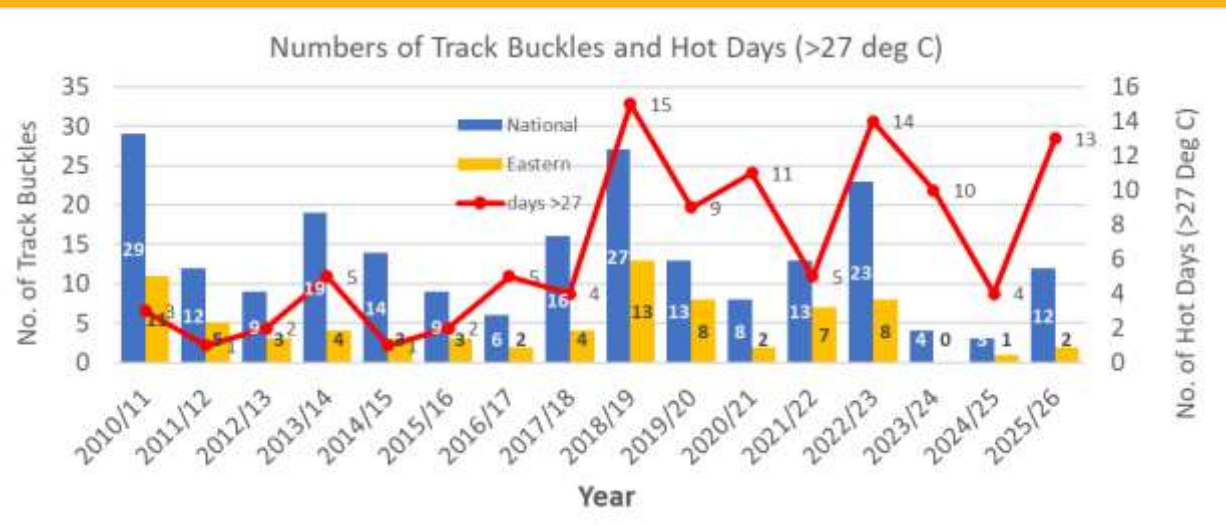
Downwards Facing Cameras

- Basic Visual Inspection of plain line track, S&Cs, obsolete fastenings, Pre79 rails
- Supervisor's Visual Inspections
- Seasonal inspection of IBJs, adjustment switches
- UTU suspect verification
- Effectiveness of Lubrication
- Rail head contamination
- Broken/cracked rail detection



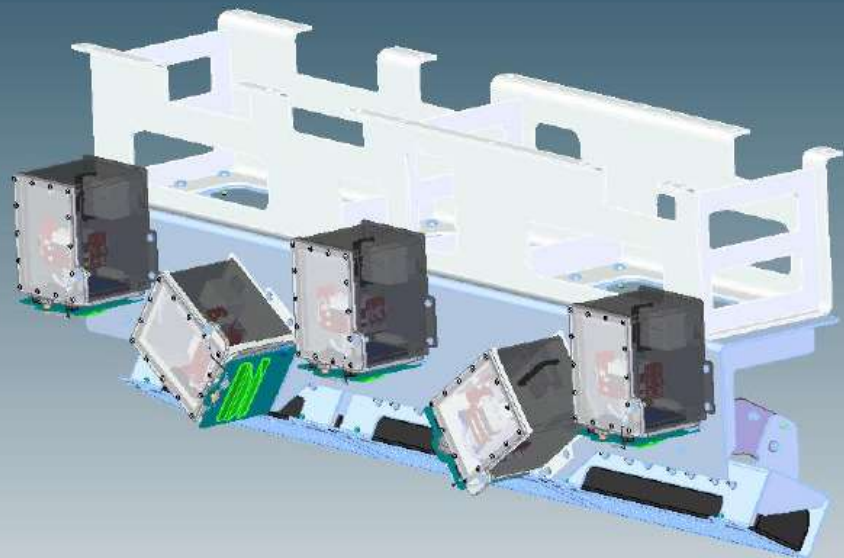
AI Benefits – Hot Weather & Rail Defect Detection

- AI developed by Eastern and its suppliers has delivered strong hot-weather performance for the past three years – outperforming all other regions except Scotland, which experienced no extreme temperatures.
- AI developed by Eastern and its suppliers has identified more than 70 broken fishplates and broken rails nationally.



New

In-Service Trains – AIVR & UGMS Deployment



LNER

HITACHI
Inspire the Next



AiVR

OneBigCircle



Case Studies & Results

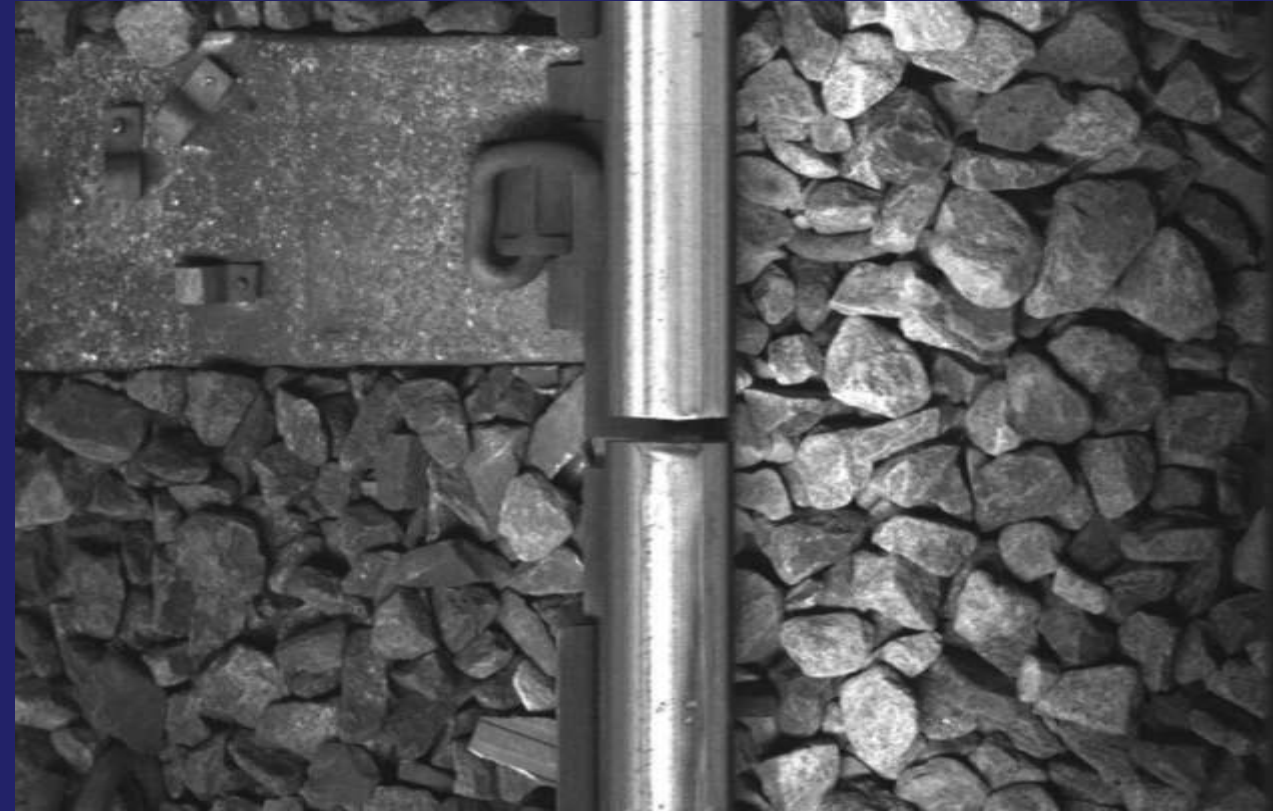
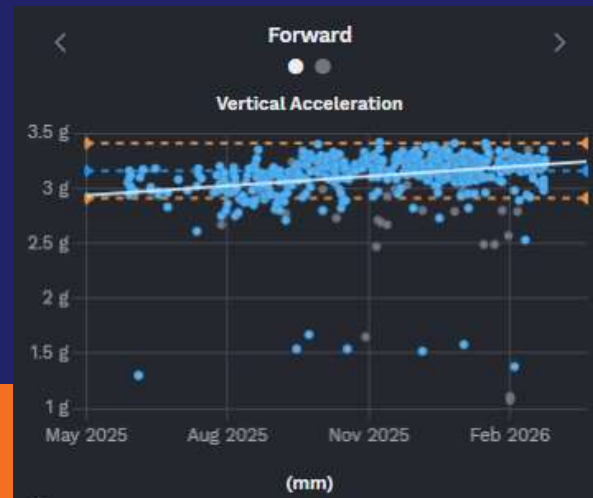
Hambleton South Broken Rail 15/02/2026



Recorded by the LNER 800 110 at 123mph

Vertical acceleration data from Class 800 trains showed the rail broke between:

- 20:11 13/02/26 **1.8g** and
- 06:31 14/02/26 **3.8g**



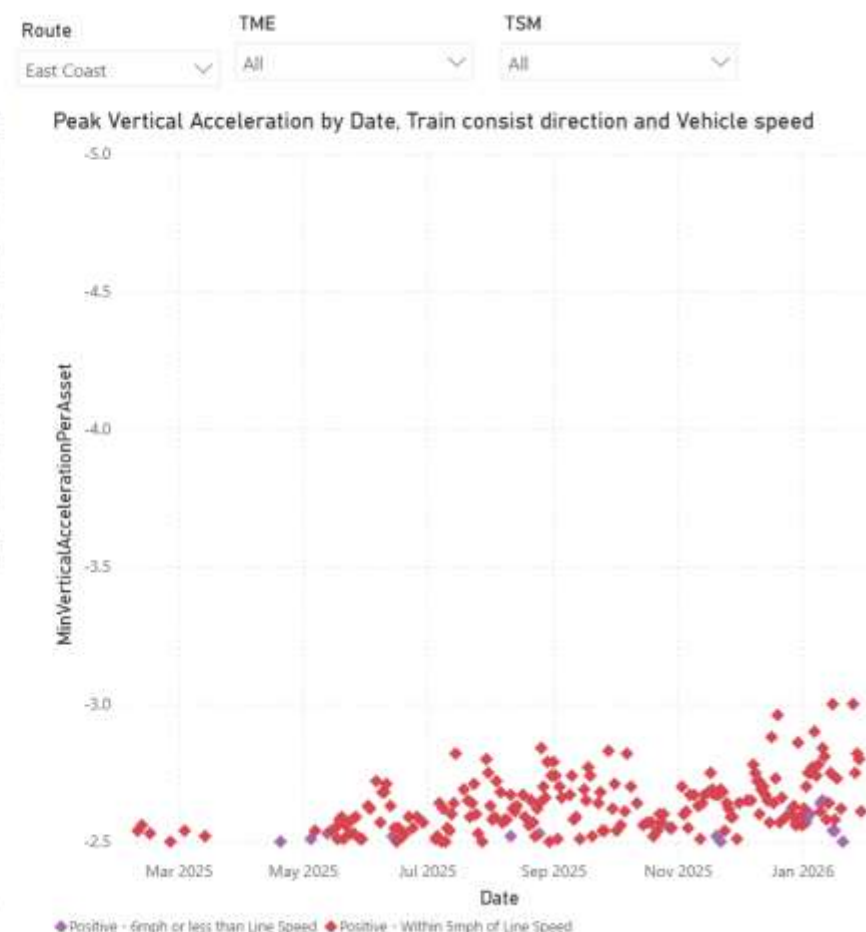
Example acceleration dashboard

A simpler, better, greener railway.

High-Force Sites Across ECML

Improving trend – P11
16 sites vs 43 sites in P1

Peak vertical acceleration in last 10 days	Asset	ELR	TRID	TME	Asset location (average mm/yyyy)	AIVR link
-3.89	Voiding, ECM1, 2100...	ECM1	2100	TME Hitchin	26.1153	https://view.aivr...
-3.50	Voiding, ECM1, 2100...	ECM1	2100	TME Hitchin	34.0788	https://view.aivr...
-3.46	862A pts nose	ECM5	1100	TME York (EC...	9.0935	https://view.aivr...
-3.44	2951A pts nose	ECM2	2100	TME York (EC...	169.0233	https://view.aivr...
-3.33	864A pts nose	ECM5	1100	TME York (EC...	9.1088	https://view.aivr...
-3.22	Voiding, ECM1, 2100...	ECM1	2100	TME Hitchin	21.0134	https://view.aivr...
-3.12	5614A pts nose	ECM1	1100	TME Hitchin	27.1440	https://view.aivr...
-3.11	Tempsford level cros...	ECM1	2100	TME Peterbor...	47.0842	https://view.aivr...
-3.09	2298B pts nose	ECM4	1150	TME York (EC...	183.1362	https://view.aivr...
-3.08	Voiding, ECM5, 1100...	ECM5	1100	TME York (EC...	4.0974	https://view.aivr...
-3.05	Voiding, ECM1, 2100...	ECM1	2100	TME Hitchin	14.1371	https://view.aivr...
-3.05	Voiding, ECM3, 1100...	ECM3	1100	TME York (EC...	170.0020	https://view.aivr...
-3.04	Voiding, ECM5, 1100...	ECM5	1100	TME York (EC...	16.0820	https://view.aivr...
-3.02	Voiding, ECM5, 2100...	ECM5	2100	TME York (EC...	8.0879	https://view.aivr...
-3.01	Bawtry 3A pts nose	ECM1	2100	TME Doncaster	148.1306	https://view.aivr...
-3.00	2153 pts nose	ECM1	1100	TME Doncaster	115.0472	https://view.aivr...
-3.89						



A simpler, better, greener railway.

- Detailed rail images
- Take a snapshot
- Place a bookmark
- Annotate
- Measure
- Content
- Image adjustment
- Widgets
- Search for location
- More cameras
- Sperry viewer
- Magnifying glass
- Open in Cordel

- + ^ Navigate Up
- v Navigate Down
- ▶ Play

Detailed Rail Images

☐ Automatic camera selection

Out of sync? ⓘ

1 2

0

Image adjustment sliders:

- Zoom: 100%
- Contrast: 50%
- Exposure: 50%

Navigation icons: Zoom in, Zoom out, Reset, Full screen, Close

High-force site photographed with exceptional clarity at 119 mph on 2nd Feb

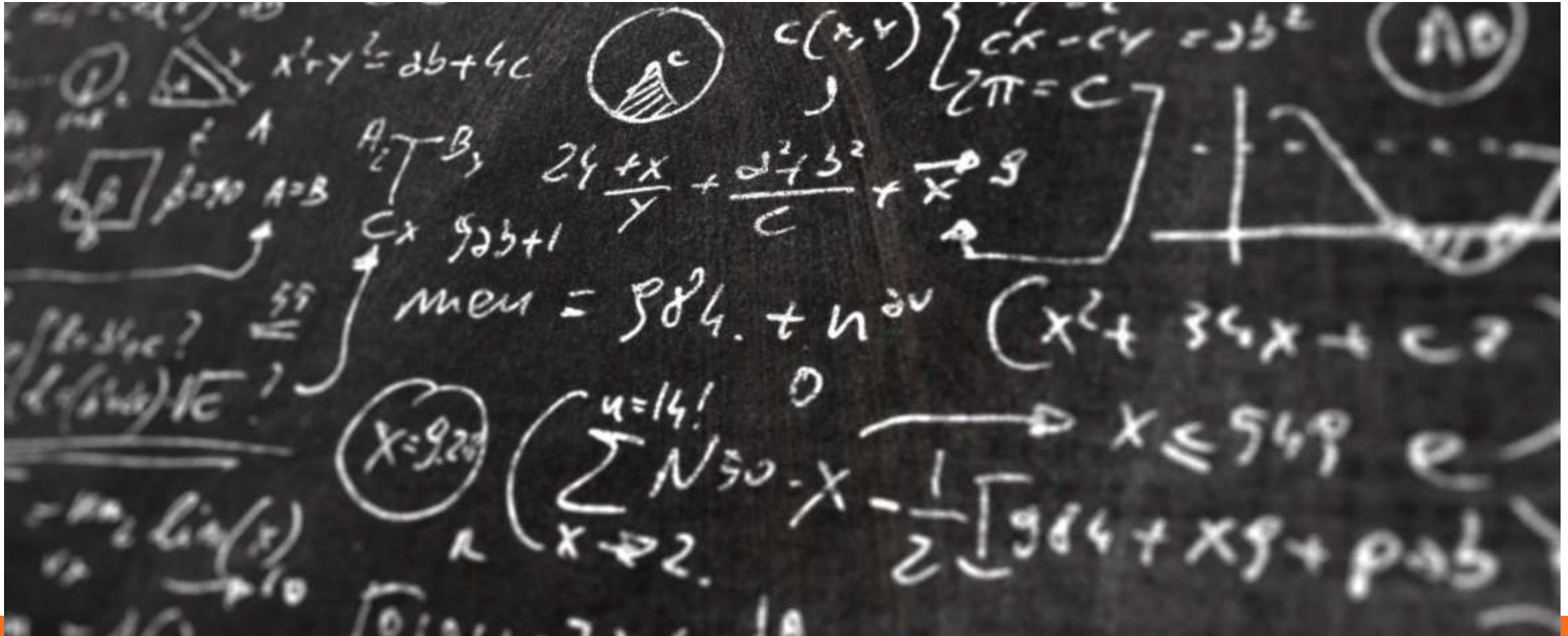
New Development – Detection of Poor Condition Crossings



Technology's Impact on Reliability: Highlights from Recent Case Studies

Incident	Site Name	Date	Detection method	Delay minutes	Comment	Condition of Site
Broken Rail	Tuxford East Coast	10/11/2025	Reported by Driver	6409	Site was severely damaged and required more than one shift to repair.	
Broken Rail	Cadwell North East Coast	18/12/2025	Technology detected high force site	1000+	High force triggered an inspection and the broken rail found. No damage to sleeper. Speed imposed. Rail replaced on the night with minimal disruption.	
Broken plates	Yaxley East Coast	05/01/2026	Reported by Driver	10,273	Severe disruption due to initial inspection leading to line closure and a delay to rectify fault from late running last train.	
Broken plate	Barnby Moor East Coast	12/01/2026	Technology detected high force site	0	High force triggered an inspection and broken plate found; rail was rectified on the night.	
Broken Plate	North & East	16/01/2026	Technology AI video detected	0	Maintenance depot informed by AI detection. Rail was rectified on the night.	

Innovation Pipeline – Other Innovative Activities



Continue with New Crossing Trials – Early 2026

Site	Pts	ELR	Track ID	Line Speed	Crossing
COG X					
Southall West	8179B	MLN1	2100	125	10.75
Huntingdon North Jnc	1148A	ECM1	1100	125	13 CCB
St. Neots South	1123A	ECM1	2100	125	13 MONO
UHPC					
Northallerton	888A	ECM5	2100	125	13 CCB
Northallerton	888B	ECM5	1100	125	13 CCB
Ranskill	2267	ECM1	2100	125	13 CCB
Huntingdon North Jnc	1148B	ECM1	2100	125	13 CCB



A simpler, better, greener railway.

7.5mm crossing pad trials – 6 sites

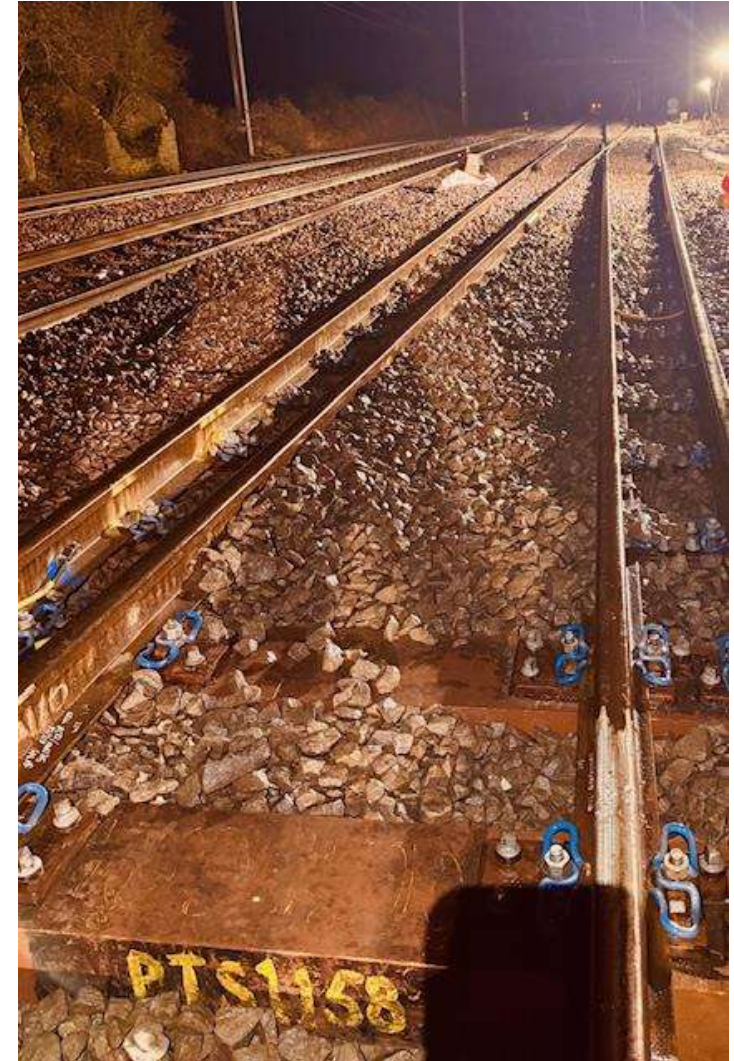
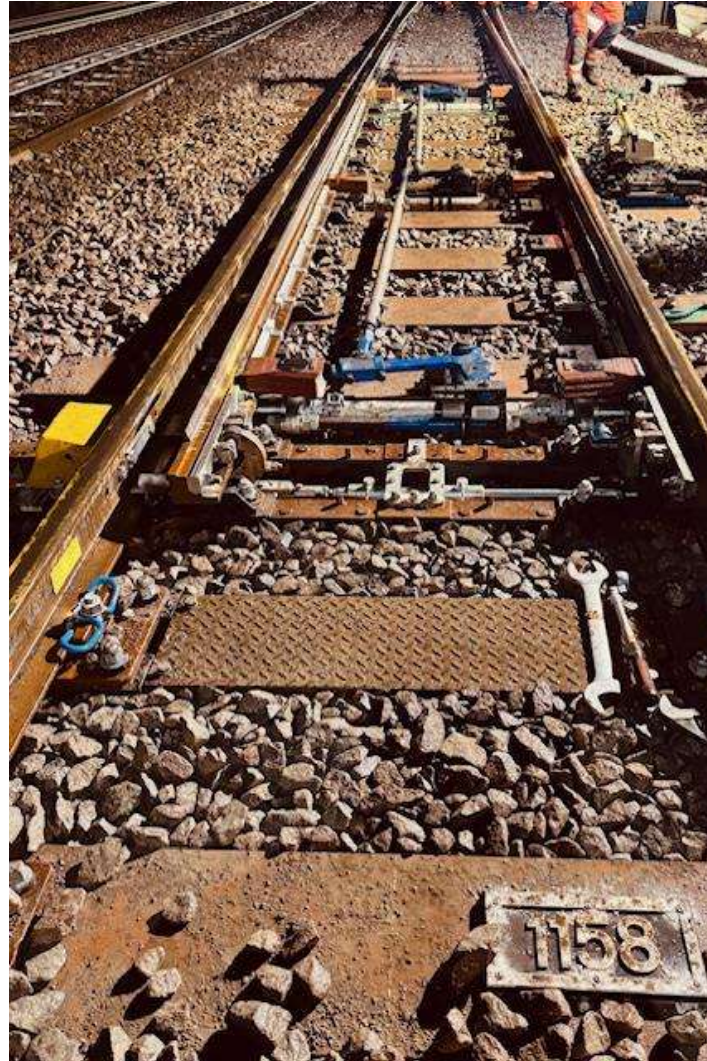
- Target installation in 2026

Location	Kings Norton		East Cowton		Ranskill	
Point No	793A	793B	1120A	1120B	2266	2267
ELR	BAG2	BAG2	ECM5	ECM5	ECM1	ECM1
Track Cat	Cat 1	Cat 1	Cat 1A	Cat 1A	Cat 1A	Cat 1A
Speed (mph)	90	90	125	125	125	125

Eastern Led FFU Bearer Trial Site (Medium Refurb) - Ferry Hill 22-23/02/25



First FFU NR60
MK 2 125mph
turnout –
Woodwalton
08/02/2026



IMPLEMENTATION ROADMAP

PHASE 1

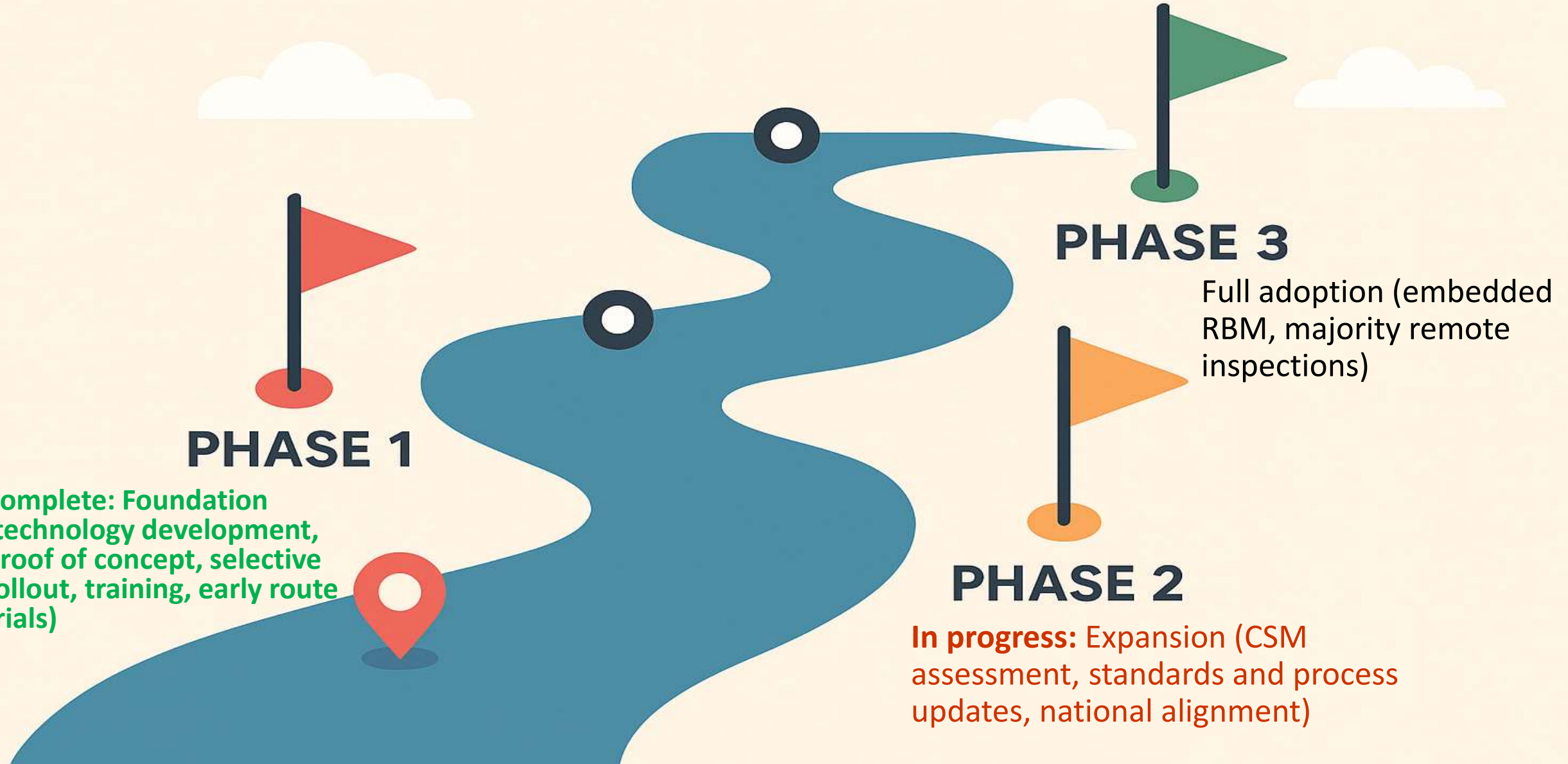
Complete: Foundation (technology development, proof of concept, selective rollout, training, early route trials)

PHASE 3

Full adoption (embedded RBM, majority remote inspections)

PHASE 2

In progress: Expansion (CSM assessment, standards and process updates, national alignment)



Operational Transformation & Challenges

A yellow starburst graphic with a black outline, containing the text "In progress".

In progress

Process changes

- Training, upskilling, and culture shift
- New workflows for engineers and maintainers
- Data integration and new reporting models
- Collaboration with safety and standards teams

Challenges

- Trade Union Consultation
- Fleet reliability constraints
- Data quality and integration gaps
- Standards updates required
- Cultural and behavioural adoption

Summary – Safer, Smarter, Greener Railway

Boots Off Ballast is more than a programme – it represents the future of a safer, smarter, greener approach to railway maintenance.

The benefits are clear:

- **Safety:** Reduced exposure of our workforce to trackside risk
- **Efficiency:** Productivity improved through targeted, insights-driven interventions
- **Quality:** Better defect detection enabling earlier, proactive maintenance
- **Sustainability:** Fewer site visits, reduced emissions, and optimisation of possessions
- **Value:** Lower long-term costs through smarter, condition-based strategies

To accelerate delivery and maximise these benefits, we want to work with suppliers, consultants and universities.