



Turning recommendations into reality: all things weather extremes



Clare Brint, Principal Programme Engineer Clare.Brint@networkrail.co.uk

My background

- *BSc Geology* 1996 (Cork, Ireland)
- 2 years working with an Eng. Geologist (Cork)
- *MSc Engineering Geology* 1999 (Leeds, UK)
- 9 years working with a Consulting Engineer 1999-2009 (Glasgow & York)
- 15 years with Geotech Asset Management Team Network Rail, 2009-2023 (York)
- 2 years in “Carmont / Weather Recommendations Team”, Network Rail, 2023 to date (York)
- CGeol (Chartered Geologist) 2010
- Registered Ground Engineering Specialist 2016

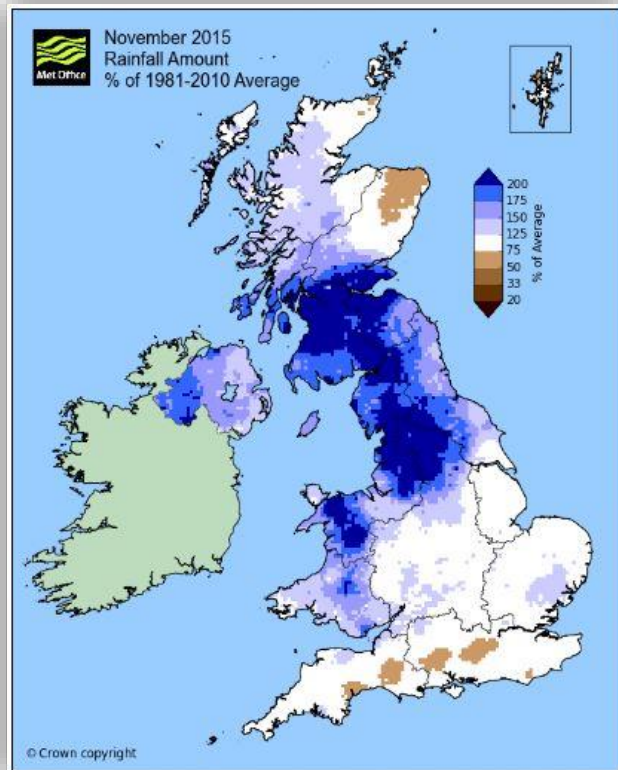


Railway Earthworks Asset Management

- The railway runs on embankments and through cuttings for much of its length
- The infrastructure was constructed in the middle to end of the 19th Century
- We manage these assets through examinations, evaluations and an ongoing works programme of renewal, refurbishment and maintenance.
- We also react when incidents occur and manage the repair of landslips or damage due to flooding

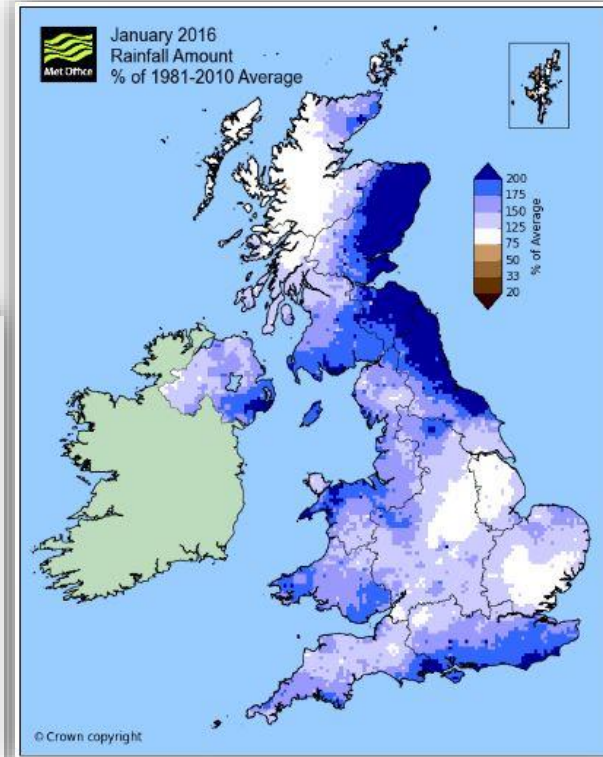
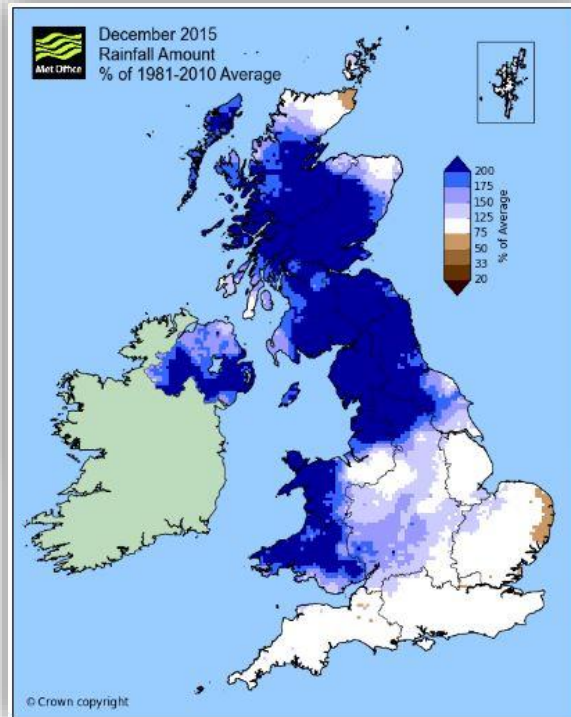


One wet Christmas & New Year 2015/16



November 2015

December 2015



January 2016

'Nightmare' flooding hits York after rivers overflow

27 December 2015

f t e Share



Hundreds of people in York are being evacuated as "nightmare" flooding continues to batter parts of northern England.

Storms Desmond and Eva flooded 16,000 homes in England

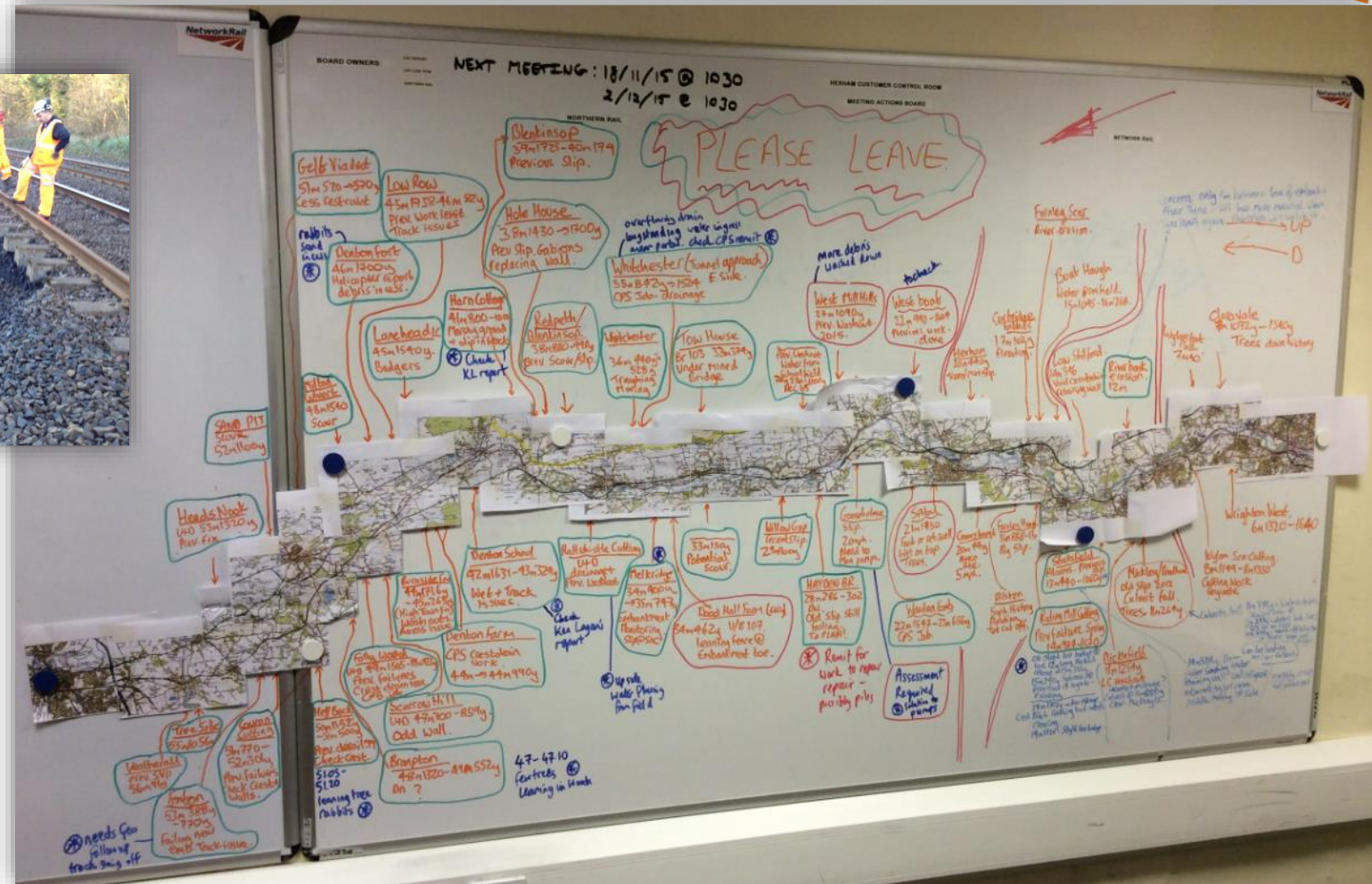
5 January 2016

f t e Share



About 16,000 houses in England were flooded during the wettest December in a century, Environment Secretary Elizabeth Truss has told MPs.

One wet Christmas & New Year 2015/16



Carmont: Fatal derailment, 12 August 2020



Three of the Immediate responses (from my perspective) (1)

Eastern Region Geotech Response

Site Inspections: 920 No. cutting assets (223 No. sites) considered to be at highest risk were visited between 13th & 18th August 2020

Progress against plan for Site Inspections 14/08/2020 to 18/08/2020

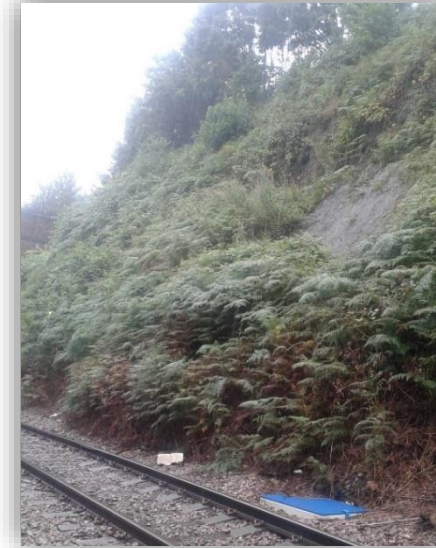
Region	Total	Friday	Saturday	Sunday	Monday	Tuesday
Original Plan	223	13	56	52	50	52
Refined Plan	223	20	40	57	37	57
Actual	202	9	40	120	33	19

Specialist Inspections: 415 No. cutting assets (117 No. sites) with similar characteristics to Carmont were visited by Geotechnical Specialists between 19th and 28th August 2020

Progress against plan for Specialist Inspections 19/08/2020 to 28/08/2020

	Wed	Thurs	Fri	Sat	Sun	Mon	Tues	Wed	Thurs	Fri	Total
	19/08	20/08	21/08	22/08	23/08	24/08	25/08	26/08	27/08	28/08	
Plan	0	2	3	10	19	20	26	20	12	5	117
Actual	0	2	4	18	14	24	23	15	12	5	117

Issues arising: 20 No. locations with issues were identified through these visits including one landslip requiring a speed restriction & renewal works; some more minor issues such as cracking, fallen rocks, partially blocked crest ditches, and damaged drainage, all of which were addressed by the Geotech Route teams.



Three of the Immediate responses (from my perspective) (2)



Ops Guidance Note

- **Operational Guidance:** for Route Control staff in response to calls they may receive during periods of adverse or extreme weather incidents (September 2020)
- **Introduction of Operational Route Sections (ORS):** Routes were split into different Operational Route Sections to allow Route Control to apply any safety restrictions to specific geographic areas

Later incorporated into NR/L2/OPS/021 standard and supporting modules

Ref:	NR/OPS/GN/012
Issue:	01
Date:	11 September 2020
Compliance date:	11 September 2020

Specification

Network Rail Operational Guidance to Route Control during periods of adverse / extreme rainfall

Approvals

Content approved by:


 Tony Raine, Operations Principles and Standards Expert

Content approved by:


 Paul Ashton, Professional Head Operations

Approved for publication by:


 John Winniffrith, Senior Standards & Controls Specialist

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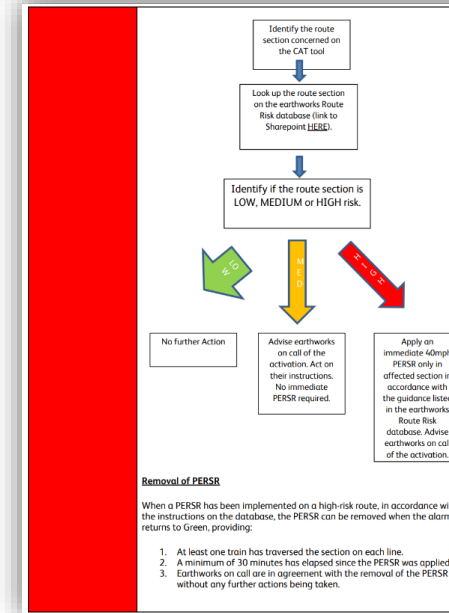
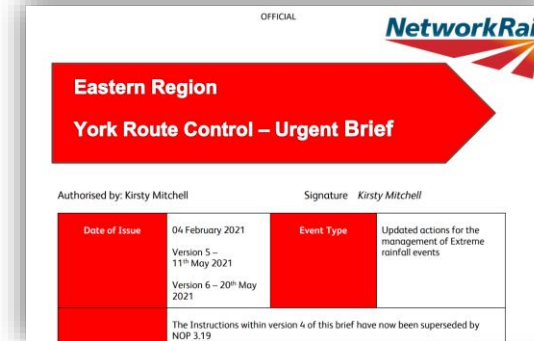
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Three of the Immediate responses (from my perspective) (3)

Development of the Convective Alerting Tool

- **Convective Alerting Tool (CAT):** Accelerated development of a tactical convective alert system already being trialled, introduced for use for Spring / Summer 2021 Convective season
- **Earthwork “sprint”:** Geotech team derived national thresholds for 3 hour rainfall accumulations (Sept. 2020)
- **Operational Route Sections:** Operational Route Sections were risk assessed by the Geotech Team
- **CAT Precautionary Speed Restrictions:** A process was developed to allow the Control teams impose precautionary speed restrictions in response to the alerts

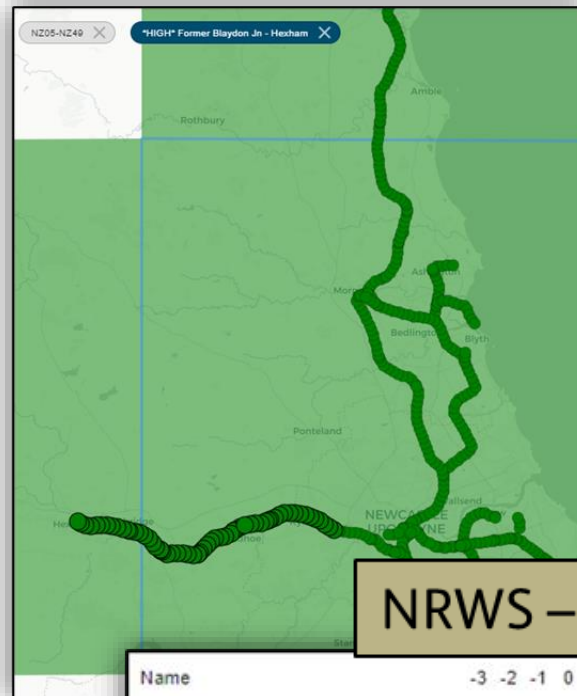


Name	-3	-2	-1	0	+1	+2	+3
Chinley North Jn - New Mills Central							
Station inc. New Mills South Jn							
[HIGH] 80mph							
New Mills Central Station - Marple							
Station [HIGH] 60mph							
Cheadle Hulme Station - Macclesfield							
Hibel Road HIGH 110mph (EPS)							
Disley Midland Tunnel Hazel Grove							
Bore - Hazel Grove High Level Jn							
[HIGH] 90mph							
Hazel Grove Station - Furness Vale							
Station [HIGH] 50mph							

Use of CAT tool 2021/22

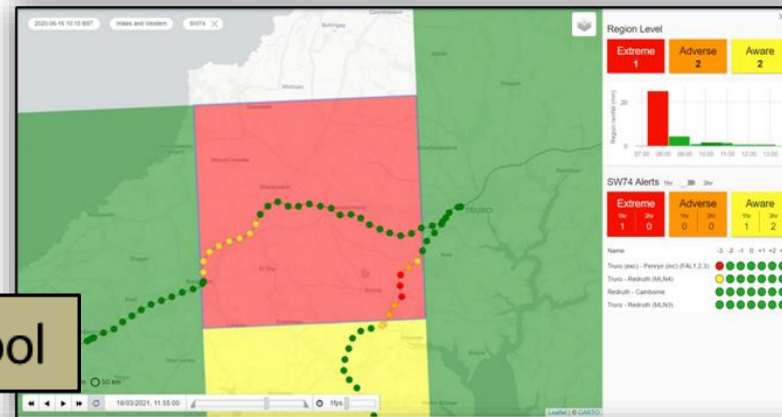
Convective Rainfall

High Risk Operational Route Sections (ORS) have been identified and where Convective rainfall is forecast using the Convective Alerting Tool (CAT), speed restrictions are imposed by Control until after the event.



NRWS – CAT Tool

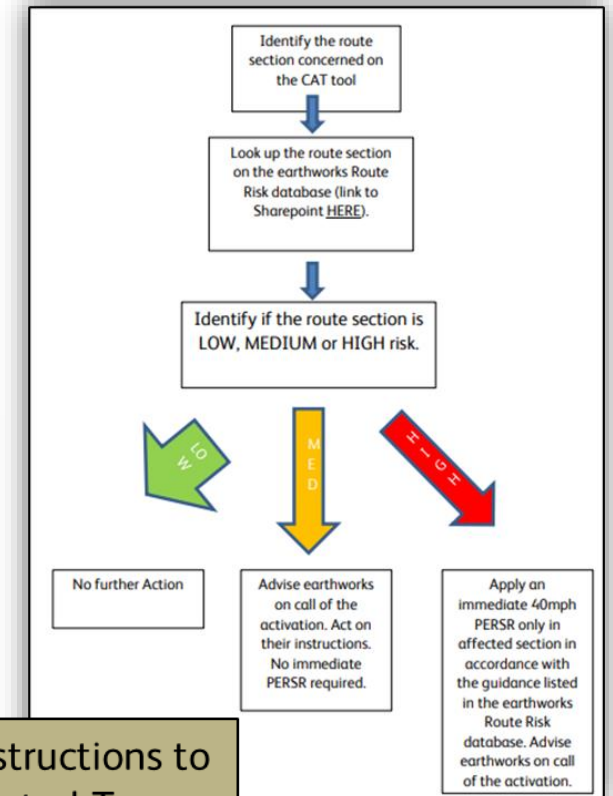
Name	-3	-2	-1	0	+1	+2	+3
HIGH Former Blaydon Jn - Hexham	●	●	●	●	●	●	●
HIGH Killingworth LC - Dam Dykes LC	●	●	●	●	●	●	●
HIGH King Edward Bridge South Jn - Former Blaydon Jn	●	●	●	●	●	●	●
MED Ferryhill South Jn - Newcastle West Jn	●	●	●	●	●	●	●
MED Stockton Cut Jn - Sunderland South Jn	●	●	●	●	●	●	●
Ashington Jn - Butterwell Opencast	●	●	●	●	●	●	●
Bedlington North Jn - Route Boundary	●	●	●	●	●	●	●



Removal of PERSR

When a PERSR has been implemented on a high-risk route, in accordance with the instructions on the database, the PERSR can be removed when the alarm returns to Green, providing:

1. At least one train has traversed the section on each line.
2. A minimum of 30 minutes has elapsed since the PERSR was applied.
3. Earthworks on call are in agreement with the removal of the PERSR without any further actions being taken.



Instructions to Control Teams

Incident at Bradway (12/06/2023)

Incident 2680556

7 12/06/2023 22:35 - Low Risk Route - No further action required. PERSR can be removed on the Down line.

EMCC still to be advised.

6 12/06/2023 22:21 Sheffield Sub ROC SSM advised the restriction can be removed on the Up line.

10 12/06/2023 19:22 ##NRWS CAT Extreme Alert END - 1-hourly Threshold
ISSUE: 2023-06-12 19:15:00
ROUTE: North and East

1 HOURLY

LOCATION: *HIGH* Tapton Jn - Dore Station Jn ELR & MILEAGE: TJC1 (147.0625 to 154.1131)

8 12/06/2023 19:03 Incident superseded by landslip incident at Bradway. Incident 2680578 refers.

5 12/06/2023 18:57 Tyrell message issued

4 12/06/2023 18:44 EMCC SSM advised of same.

3 12/06/2023 18:37 Sheffield Sub ROC SSM advised and will advise drivers to go at no more than 40mph between Tapton Jn and Dore station Jn.

1 12/06/2023 18:35 ##NRWS CAT Extreme Alert - 1-hourly Threshold Breached
ISSUE: 2023-06-12 18:15:00
ROUTE: North and East

1 HOURLY

LOCATION: *HIGH* Tapton Jn - Dore Station Jn TRIGGER VALUE: 31.4 ELR & MILEAGE: TJC1 (147.0625 to 154.1131)

CAT extreme alert on a “high risk” ORS, 40mph speed restriction instructed at 18.37

Landslip reported at 19.03



Incident 2680578

3 12/06/2023 19:10 L3 Senior Ops Manager advised.

48 12/06/2023 19:08 On-call Earthworks Engineer advised.

2 12/06/2023 19:08 Senior Manager On Call

10 12/06/2023 19:06 TRC and SIC advised

9 12/06/2023 19:05 Sheffield SUB ROC SSM advises that they have received a report from the driver of 1R78 14:56 NORWICH to LVPOOL LS advises of a possible landslip 200 yards on approach to S47 signal. The same driver also advises that as they were leaving Bradway tunnel there was fast flowing water with the potential to dislodge ballast. Job Stopped

6 12/06/2023 19:03 EMCC SSM advises that they have received an emergency alarm from Sheffield SUB ROC. Currently unknown why. 1Y28 18:17 NOTTINGHAM to LEEDS stands

19.09

Receive call from Control regarding reports of a landslip to the south of Bradway Tunnel, Dronfield and standing water to the north of the tunnel EMR train reported they struck debris at the south end and all lines were currently short
CAT Alert triggered so linespeed was 40mph as opposed to 90mph

Four investigations / reports following Carmont



Weather Advisory Task Force,
Dame Julia Slingo (*DJS*) (Feb
2021)

Review of Earthworks
Management, Lord Robert
Mair (*LRM*) (Feb 2021)

Rail Accident Investigation
Branch (*RAIB*) (Mar 2022)

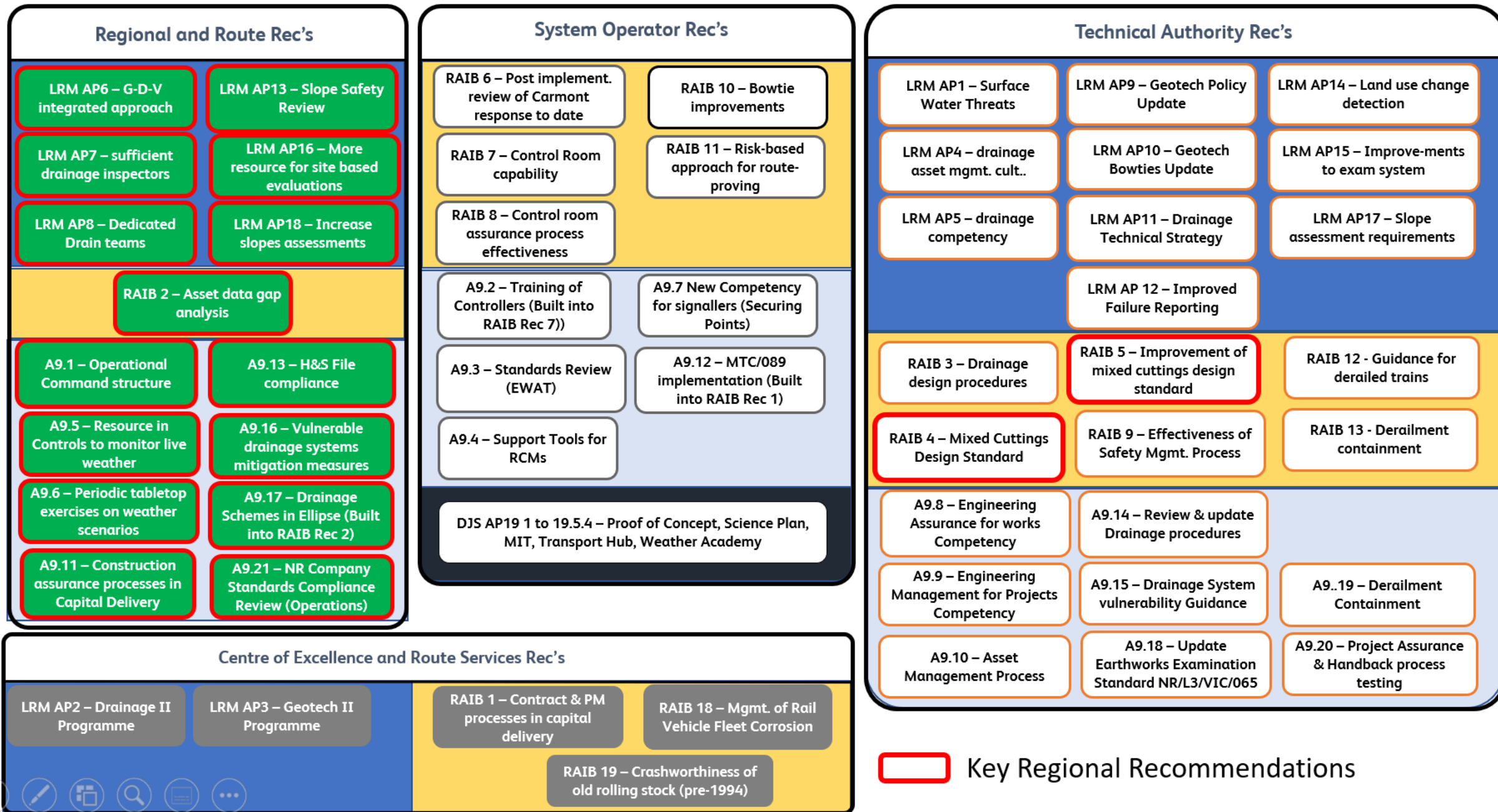
Network Rail Level 3
Investigation (*NR L3*) (Jan
2022)

99 No. Recommendations

55 No. Action Plans

Delivery of Action Plans split across System Operator, Technical Authority, Regions/Routes, Route Services

Carmont Action Plans on a page



The Weather Risk Task Force

- Formed in February 2021 (following the Carmont tragedy)
- Responsible for the national integrated plan to act on weather related recommendations
- Scope has more than doubled since the team was formed
- Successfully delivered key route improvements including new systems and training



Weather Risk Task Force - Scope

The Weather Risk Task Force has received ELT endorsement to incorporate the RAIB and L3 recommendations into its scope.

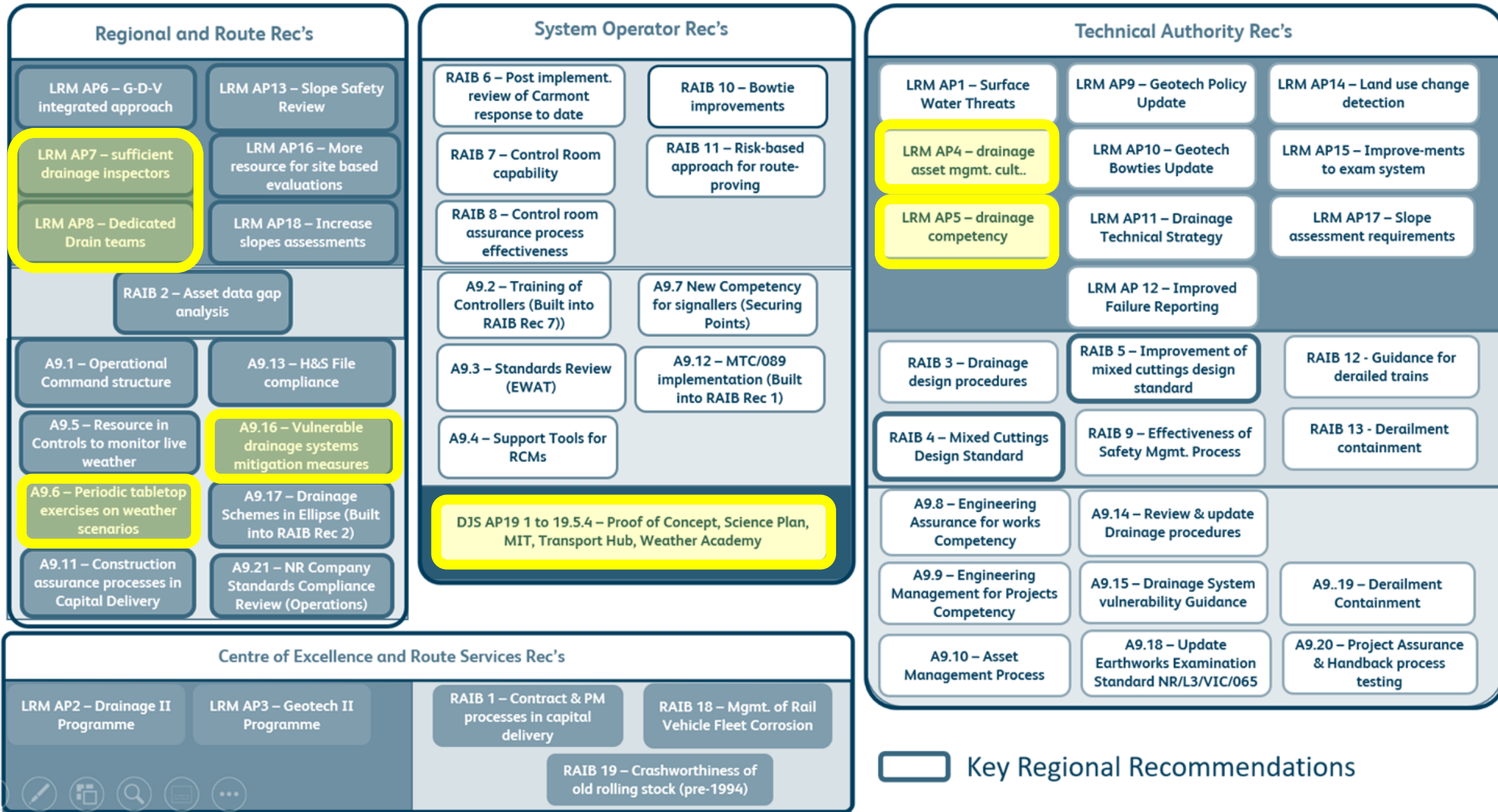
The Weather Risk Task Force will manage the recommendations as an integrated prioritised programme.



March 2021 - Dame Julia Slingo & Lord Robert Mair Recommendations: The Weather Risk Task Force was originally remitted to deliver and oversee the recommendations from Dame Julia Slingo and Lord Robert Mair.

April 2022 - RAIB and L3 Industry Recommendations: Network Rail and the wider industry have accepted the recommendations from RAIB and the industry investigation and delivering against their agreed action plans to meet these recommendations.

Carmont Action Plans on a page



Extreme Heat: Record breaking heatwave 18-19 July 2022



20 July 2022

“Network Rail has announced the launch of a new taskforce led by independent experts to investigate and make recommendations on how the railway can develop its approach to resilience during hot weather following this week’s unprecedented heatwave.”

Four reports following the Extreme Heat

EHTF Weather and Climate Change Report: March 2023

Julia Slingo, Former Met Office Chief Scientist (Lead)
 Paul Davies, Principal Fellow and Chief Meteorologist, Met Office
 Jason Lowe, Principal Fellow and Head of Climate Knowledge Integration and Mitigation Advice, Met Office
 Michael Eastman, Applied Scientist, Science for Impacts, Resilience and Adaptation, Met Office

The Operations Review into the management and performance of Network Rail during the extreme hot weather in the UK in July 2022. FINAL REPORT



What rail passengers need during extreme heat Customer experience and communications



2023

Extreme Heat Taskforce Final Engineering Report



REVIEWERS & AUTHORS
 Neil Andrew
 Peter Blakeman
 Peter Dearman
 Andrew Went
 Sir Douglas Oakervee CBE FREng
 31/08/2023

Reviewed by the Extreme Heat Review Group

June 2023

Simon Lane
 Director
 Rail Advisory Services Pty Ltd
 20th May 2023

Rail Advisory Services Pty Ltd – Network Rail's Management of the extreme heat in Summer 2022

transportfocus

EHTF Weather and Climate Change Report, Dame Julia Slingo (*DJS*) (Mar 2023)

Operations Review, Simon Lane (*SL*) (May 2023)

Transport Focus (*TF*) (June 2023)

Sir Doug Oakervee Engineering Report (*SDO*) (Aug 2023)

90 No. Recommendations

Delivery of Network Rail Action Plans split across System Operator, Technical Authority, Regions/Routes, Route Services

What do the reports tell us?

The key findings are:

1. Our **operational response** to extreme heat is too reactive. We need to pivot our thinking – using forecasts to identify risk, deciding the service we want to run and targeting our resources proactively (rather than reactively responding to asset failures after the event).
2. There are gaps in the capability of **Network Rail's engineers** that contribute to reduced asset resilience. Increasing our engineering and asset management oversight with better direction of maintenance activity will lead to better passenger outcomes.
3. We must continue building our **internal weather expertise/capability** and set rail specific thresholds for extreme heat based on the risk to our assets and the requirements of our passengers.
4. We can improve the quality and timeliness of the **information given to passengers** in advance of disruption and consider what further action we can take to improve their experience during disruption.



Extreme Heat Recommendations – on a page (all categories)

	Regional and Route				System Operator		Technical Authority				Route Services/ Comms/CFO
Accepted	SDO D&P 18 - Lineside Building Condition SDO OLE 2 - Managing Dilapidation SDO OLE 3 - OLE Maintenance Resources SDO D&P 6 - E&P Maintenance Resources				DJS 6.1 - Improved forecasting	SL Mgt 10.f - Control Centre Management	SDO Support 5 - Utilising research	SDO D&P 8 - A/C Energy Usage	SDO D&P 15 - HVAC Specification and Design	SDO OLE 7 - Access for OLE Maintenance	SDO Support 3 - Use of train borne data
					DJS 6.2 - Extreme Heat Scenario Planning	SL Plan 20.a - Performance and Freight Ops	SDO D&P 1 - RCM - Temperature	SDO D&P 10 - Temp Control Accountability	SDO OLE 1 - Compliance with standards - B10	SDO Track 9 - Using Data to Determine Speeds	SL Mgt 10.a - Risk Appetite
					DJS 6.4 - Customised seasonal forecasts	TF 4.3 - Information & Communication	SDO D&P 2 - Suitability of A/C Systems	SDO D&P 11 - Troughing Fire Resistance	SDO OLE 4 - Engineering Guiding Mind	SL S&I 15.b - Gross Disproportionality Factor Model (GDF)	SL Mgt 10.b - ISO accreditation
					DJS 6.5 - Climate change impact studies	TF 7 – Taking care of passengers	SDO D&P 3 – Energy Usage Savings	SDO D&P 14 - Risk of UPS Failure	SDO OLE 9 - Climate Driven Maintenance Regime	SL Culture 5.d - Industry collaboration	
Accept & Assign	SDO D&P 4 - Level Crossings Power Supplies	SDO Track 1 - Managing Track Buckles	SDO Track 10 - Remote Condition Monitoring	SL Plan 20.b – Forecast performance	DJS 6.3 - R&D, services programme and Academy	SL Culture 5.c - customer focussed Guiding Principles	SDO Track 2 - Wrong Side Failure Reporting	SDO Support 8 - UAV and Autonomous Inspection	SDO Support 2 - Prioritising Train Borne Monitoring		SDO OLE 6 - Asset Data
	SDO D&P 13 - Building & Structures inspection	SDO Track 3.2 - Engineering Competence	SDO Track 11 - Preventative Maintenance		SL Mgt 10.g - Hot weather Freight Operations Plan	TF 4.2.3 - Cooperation with Coach Industry	SDO Track 3.1 - Roles & responsibilities	SL S&I 15.f - Management of change			TF 6 – Influencing behaviour
	SDO OLE 8 - Summer Preparedness	SDO Track 5 - Mitigating Critical Rail Temperatures	SDO Track 12 - Timber Bearer Inspection		SL S&I 15.c – Review of trigger points	TF 7.2 - Station Improvements	SDO OLE 5 - Asset Stewardship	SL S&I 15.g - Maintenance backlogs			EHTF TF 6.2 Educational comms
	SDO Track 8 - Stability Risk	SDO Track 6 - Rail Stress Cat 1a/2 sites	SDO Track 13 - Track stability risk		SL Plan 20.d – Freight Operations Plan	TF 7.3 - Provisions	SDO Support 1 - Accountabilities for Asset Condition Info	SL S&I 15.h - Critical faults on electrical assets			EHTF TF 6.3 Behavioural Science
	SDO Support 6 - KRS Engineering Approach	SDO Track 7 - Timber Bearer Inspection	SDO Track 14 - Track Stability Risk		SDO Support 7 - Seasonal Preparedness	TF 7.4 - Staff Training	SDO Support 4 - Better Integration of Data/Information	SDO D&P 7 – Maintenance Accountability			
Non-NR	TF 7.1 - Cooling Systems	TF 7.2 - Station Improvements	TF 7.3 - Provisions	TF 7.4 - Staff Training	TF 8.1 - Wider Comms & Mgt	TF 8.2 - Ticket Refund	TF 8.3 - Unused Ticket Comp	TF 8.4 - Increasing Awareness on Refunds	TF 8.5 - Making it easier to claim	TF 8.6 - Complaints Handling	
Rejected	SDO D&P 9 - Rapid replacement of AC Units	SDO D&P 12 - Prioritising Building Assets	SL Culture 5.e - Maintenance Programmes	SL Culture 5f - condition monitoring equip.	SL Mgt 10.c - KPI impact of speed restrictions	TF 8.7 - Dealing with Consequences					

Key

Operations

Engineering & Asset Management

Communications & Passenger

Linked to another recommendation

Extreme Heat Recommendations – on a page (all categories)

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	SDO D&P 6 - E&P Maintenance Resources				DJS 6.5 - Climate change impact studies	TF 7 – Taking care of passengers	SDO D&P 3 – Energy Usage Savings	SDO D&P 14 - Risk of UPS Failure	SDO OLE 9 - Climate Driven Maintenance Regime	SL Culture 5.d - Industry collaboration										
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	SDO D&P 13 - Building & Structures inspection							SL Mgt 10.g - Hot weather Freight Operations Plan	TF 4.2.3 - Cooperation with Coach Industry	SDO Track 3.1 - Roles & responsibilities	SL S&I 15.f - Management of change		TF 6 – Influencing behaviour							
	SDO OLE 8 - Summer Preparedness							SL S&I 15.c – Review of trigger points	TF 7.2 - Station Improvements	SDO OLE 5 - Asset Stewardship	SL S&I 15.g - Maintenance backlogs		EHTF TF 6.2 Educational comms							
	SDO Track 8 - Stability Risk							SL Plan 20.d – Freight Operations Plan	TF 7.3 - Provisions	SDO Support 1 - Accountabilities for Asset Condition Info	SL S&I 15.h - Critical faults on electrical assets		EHTF TF 6.3 Behavioural Science							
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Key

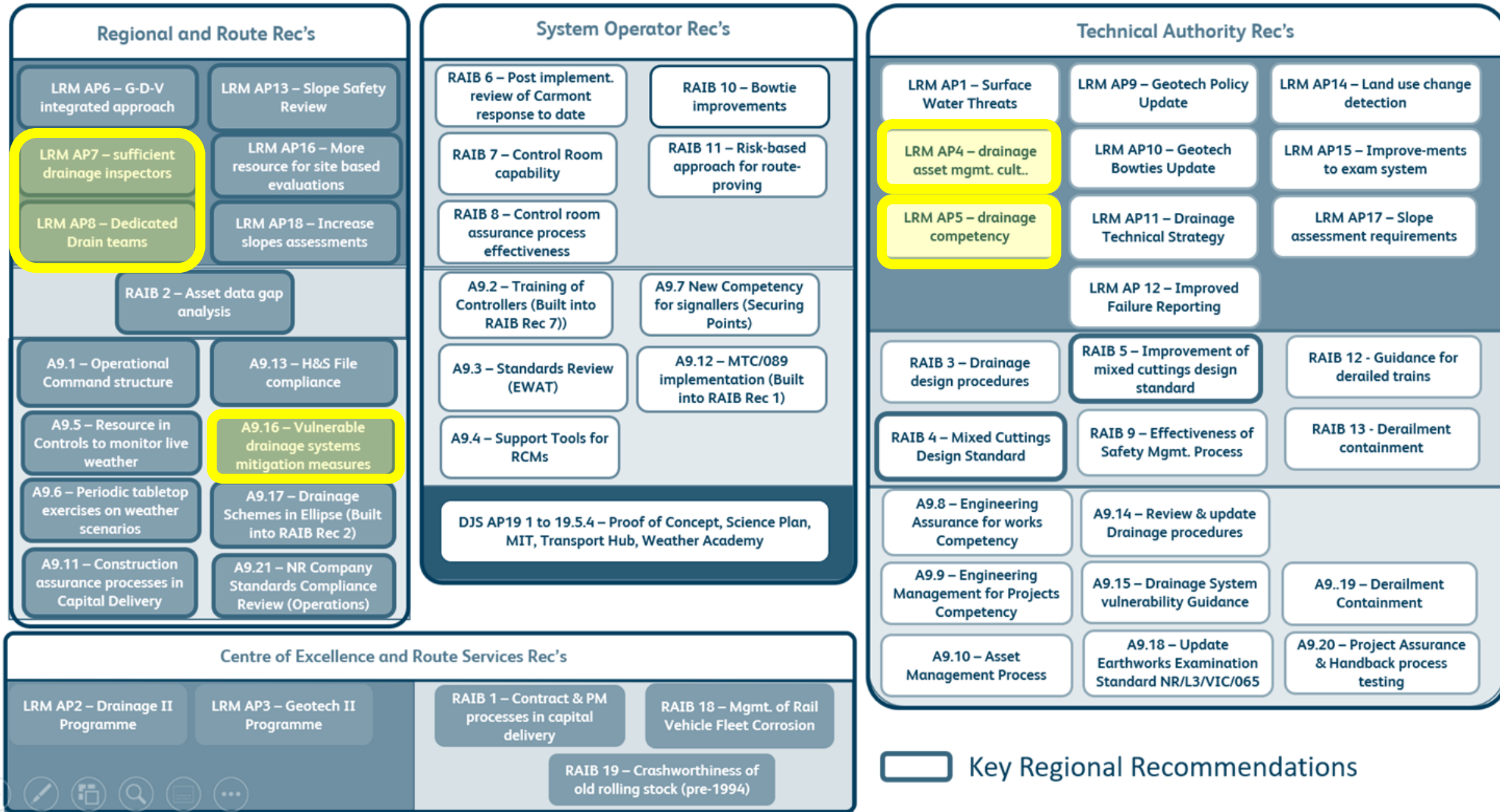
Operations

Engineering & Asset Management

Communications & Passenger

Linked to another recommendation

Carmont Action Plans on a page



LRM AP4 – Drainage Asset Management Culture

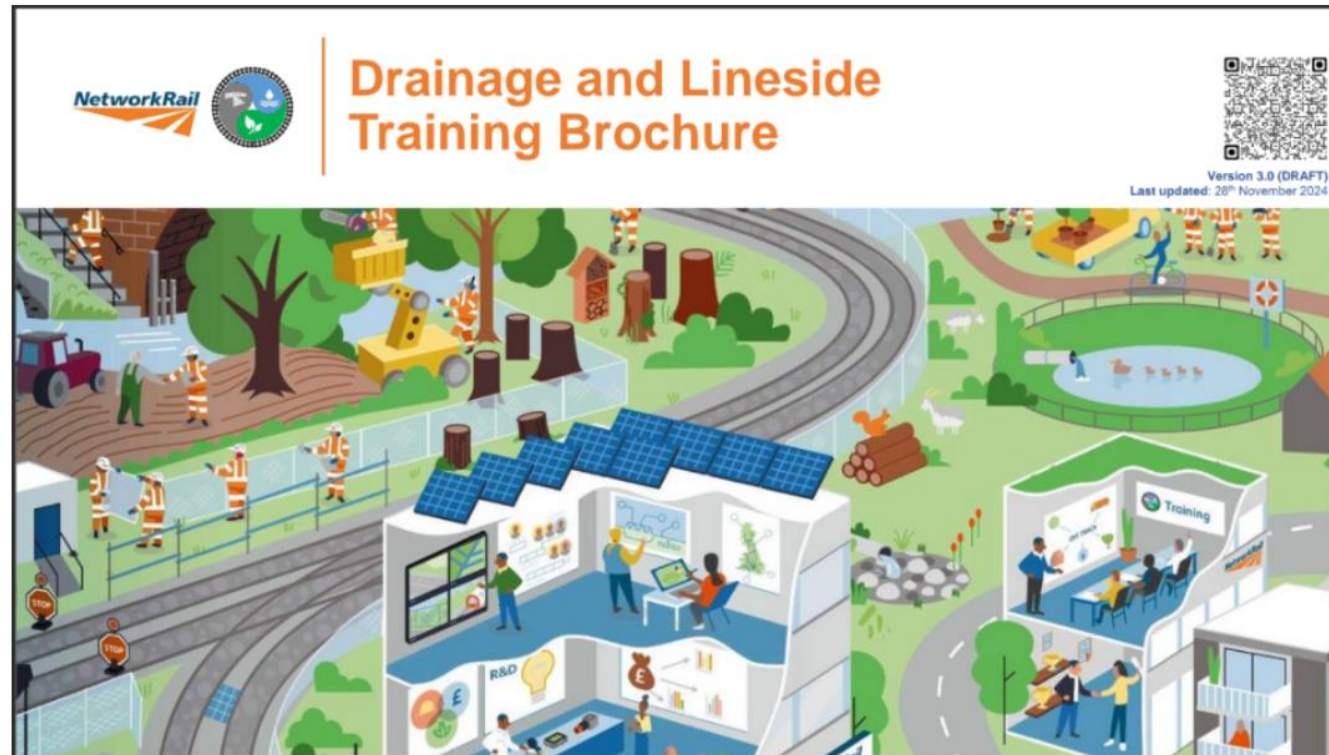


LRM AP5 – Drainage Competency



Drainage & Lineside Training Programme: Overview

31 new training courses are being developed to upskill the D&L community to proficiency level 2 in the **NR/L2/CIV/1000/01** professional competences. These include **13 e-learning** and **18 face-to-face training courses**.



For more information, including the full training brochure, please visit our [Drainage & Lineside Training SharePoint page](#).

LRM AP5 – Drainage Competency

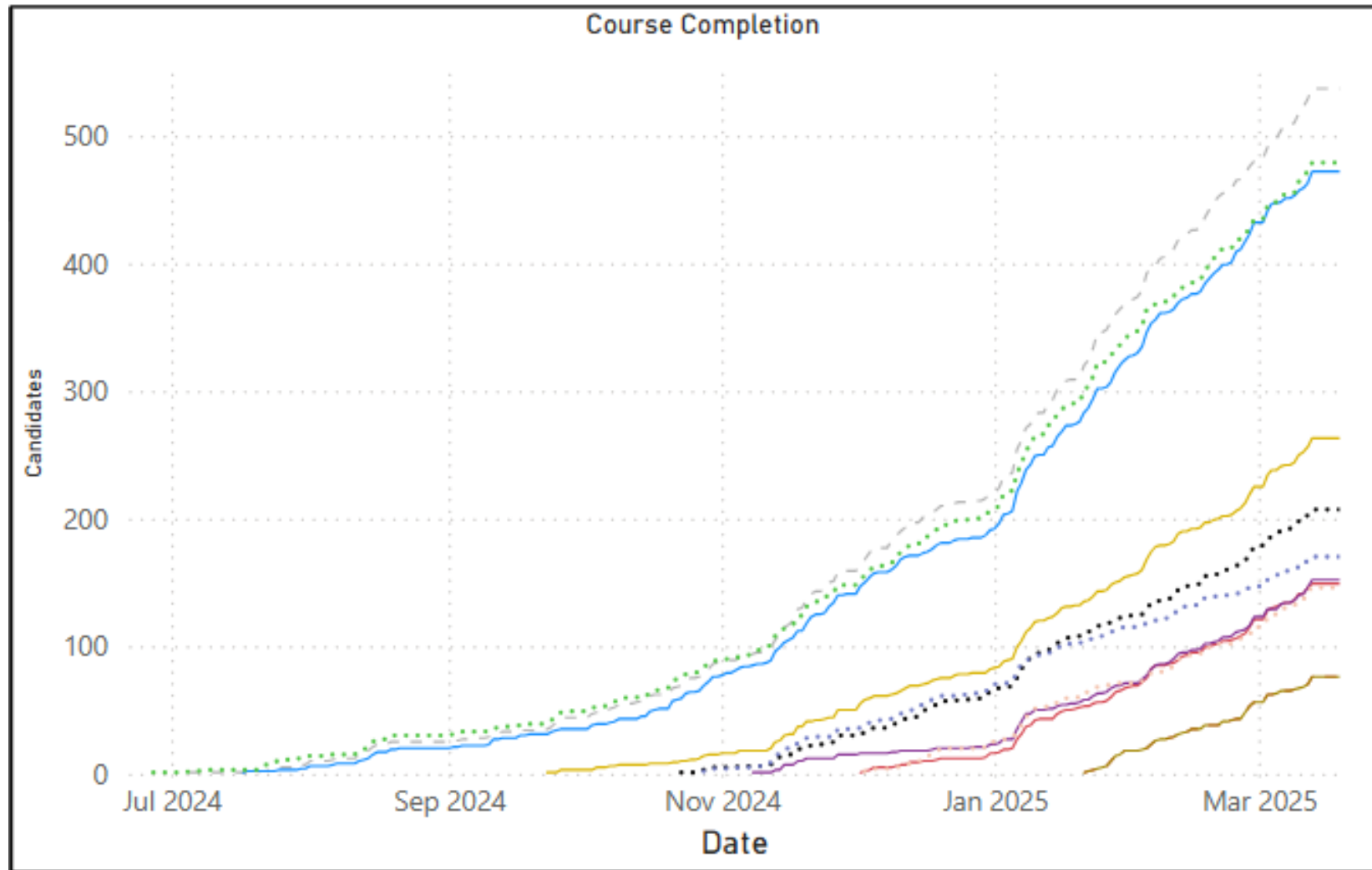
All 13 new eLearning courses are now live!

- Boundary Measures Design & Construction (L1)
- Boundary Measures Inspection & Maintenance (L1)
- Boundary Measures Rapid Response (L1+L2)
- Boundary Measures Tactical & Strategic Evaluation (L1)
- Drainage Design & Construction (L1)
- Drainage Inspection & Maintenance (L1)
- Drainage Rapid Response (L1+L2)
- Drainage Survey & Assessment (L1)
- Drainage Tactical & Strategic Evaluation (L1)
- Vegetation Inspection & Maintenance (L1)
- Vegetation Rapid Response (L1+L2)
- Vegetation Specification & Management (L1)
- Vegetation Tactical & Strategic Evaluation (L1)

12 face-to-face courses are now live, with the remaining 6 to come later in 2025

- Boundary Measures Inspection (L2) – **NOW LIVE**
- Boundary Measures Maintenance (L2) – **NOW LIVE**
- Boundary Measures Design (L2)
- Boundary Measures Construction (L2)
- Boundary Measures Tactical Evaluation (L2) – **NOW LIVE**
- Drainage Inspection (L2) – **NOW LIVE**
- Drainage Maintenance (L2) – **NOW LIVE**
- Drainage Design (L2)
- Drainage Construction (L2)
- Drainage Survey (L2)
- Drainage Assessment (L2)
- Drainage Tactical Evaluation (L2) – **NOW LIVE**
- Vegetation Inspection (L2) – **NOW LIVE**
- Vegetation Maintenance (L2) – **NOW LIVE**
- Vegetation Specification (L2) – **NOW LIVE**
- Vegetation Management (L2) – **NOW LIVE**
- Vegetation Tactical Evaluation (L2) – **NOW LIVE**
- Drainage & Lineside Strategic Evaluation (L2) – **NOW LIVE**

LRM AP5 – Drainage Training completed to date



- Boundary Inspection & Maintenance Lv1
- Boundary Construction & Design Level 1
- Boundary Rapid Response Lv 1 & 2
- Boundary Tactical & Strategic Evaluation Lv1
- Vegetation & Tree Inspection & Maintenance Lv1
- Vegetation Rapid Response Level 1 & 2
- Vegetation Specification & Management L1
- Vegetation Tactical & Strategic Evaluation L1
- Drainage Design & Construction Lv1
- Drainage Inspection & Maintenance Lv1
- Drainage Rapid Response Lv1 & 2
- Drainage Survey & Assessment Lv1
- Drainage Tactical & Strategic Evaluation Lv1

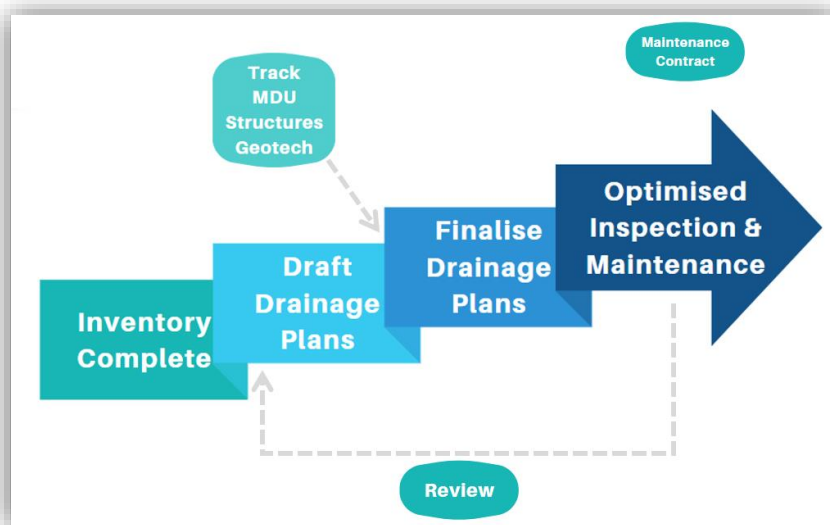
LRM AP7&8 Sufficient Dedicated Drainage Teams

- Dedicated drainage maintenance teams have been created across the business, a total of c.400 No. staff have been recruited over the past two years (or so).
- Eastern: In CP7 Year 1, full Risk-Based Inspection (RBI) and Risk-Based Maintenance (RBM) has been adopted by all Routes. Weekly reporting provides active tracking of delivery and quality of these activities.
- Staff training is ongoing

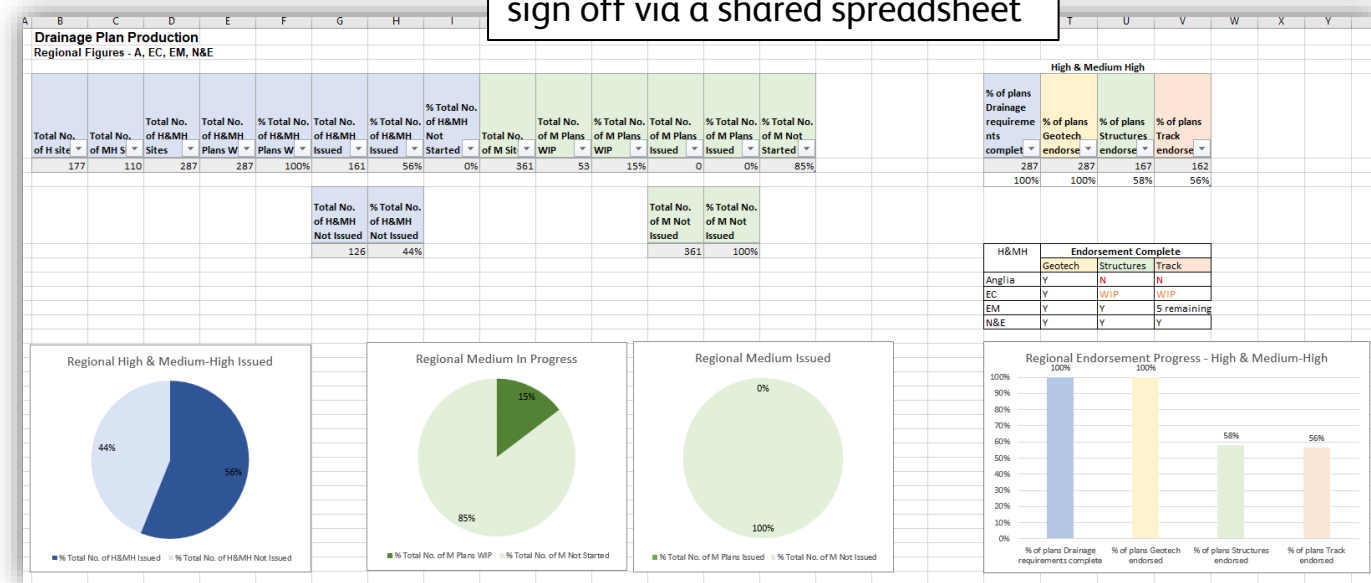


A9.16 vulnerable drainage systems mitigation measures

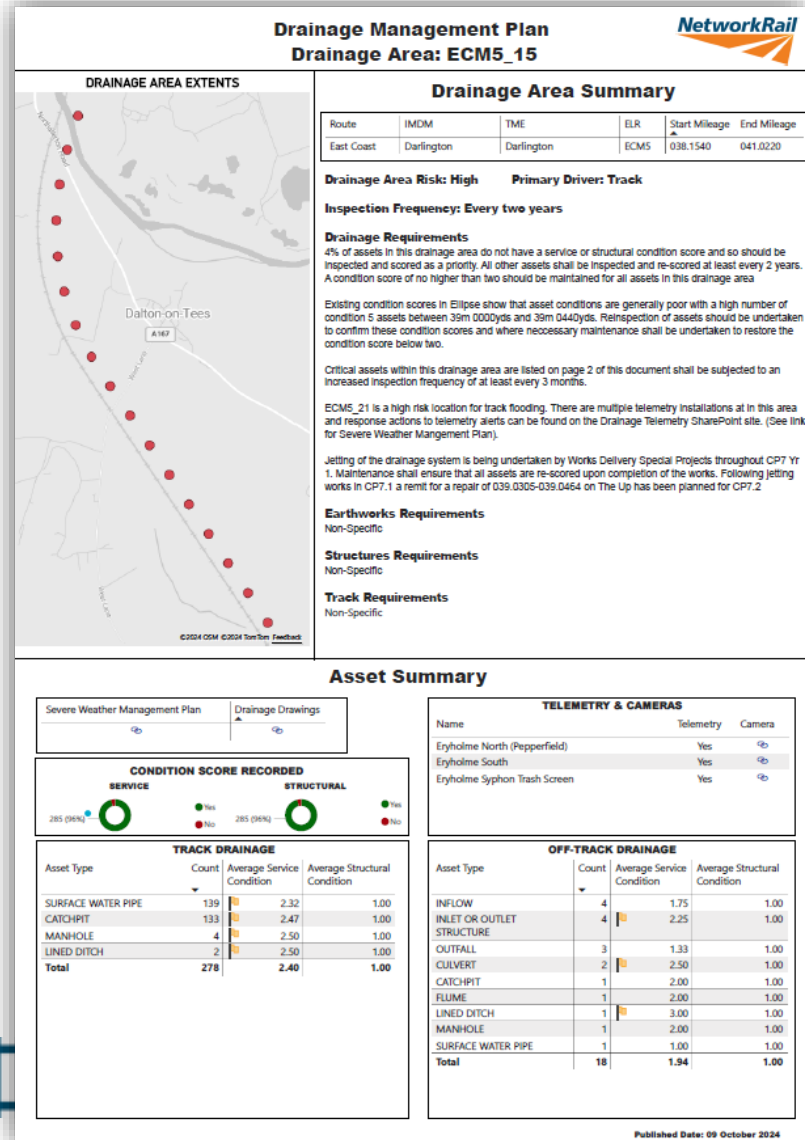
- “Eastern Region and Routes have addressed this recommendation through having a complete **drainage asset inventory**, development and preparation of **Drainage Plans** including agreed plans for inspection, maintenance, monitoring, assessment, refurbishment and / or renewal; prioritising the highest risk locations first which includes those High energy “At risk” systems with the potential for catastrophic failures.”



Tracking of plan production & sign off via a shared spreadsheet



Drainage Management Plans



Maintenance

CRITICAL ASSETS WITH INCREASED INSPECTION FREQUENCY

Asset	Start Mileage	End Mileage	Frequency of inspection	Frequency of maintenance
Downside crest drain and connection to Downside syphon chamber. Trash screen.	39.107	39.142	Every three months	Every six months
Upside syphon outfall (on private land)				
Syphon (Upside inflow and Downside outfall). Trash screens	40.005	40.005	Every three months	Every six months
Downside inflow at crest of cutting. Connection to Downside cess drain	40.0486	40.0486	Every three months	Every six months
Up and Downside track drainage outfall system	40.16	40.17	Every three months	Every six months

MAINTENANCE SCHEDULED TASKS

ELR	Mileage From	Mileage To	Asset Type	MST Description	MST Frequency (Days)	MST Units Required	MST Unit of Measurement	Standard Job Task Desc
ECM5	039.0000	041.0220	DB130 - DRAINAGE AREA	DRAINAGE SYSTEM CONDITION INSPECTION	728	2.13	MY	NR/L2/CIV/005/04
ECM5	039.0880	039.1100	DC100 - DRAINAGE - 1/8 MILE SECTION	DRAINAGE SYSTEM CONDITION INSPECTION	91	0.13	MY	NR/L2/CIV/005/04
ECM5	040.0000	040.0220	DC100 - DRAINAGE - 1/8 MILE SECTION	DRAINAGE SYSTEM CONDITION INSPECTION	91	0.13	MY	NR/L2/CIV/005/04
ECM5	040.0440	040.0660	DC100 - DRAINAGE - 1/8 MILE SECTION	DRAINAGE SYSTEM CONDITION INSPECTION	91	0.13	MY	NR/L2/CIV/005/04
ECM5	040.1540	041.0000	DC100 - DRAINAGE - 1/8 MILE SECTION	DRAINAGE SYSTEM CONDITION INSPECTION	91	0.13	MY	NR/L2/CIV/005/04

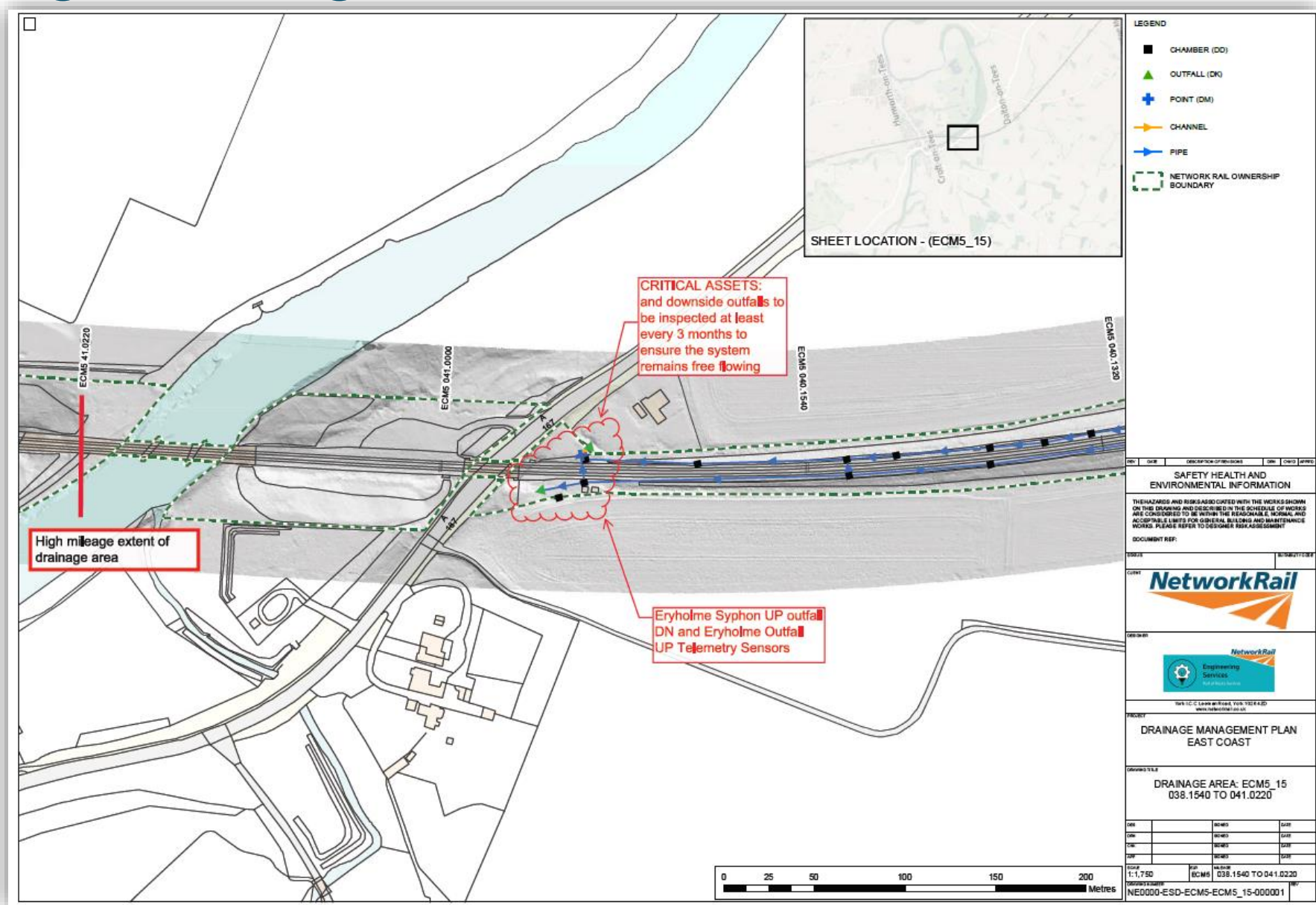
Are the MST's Currently set up sufficient to effectively manage drainage maintenance in this drainage area?

No

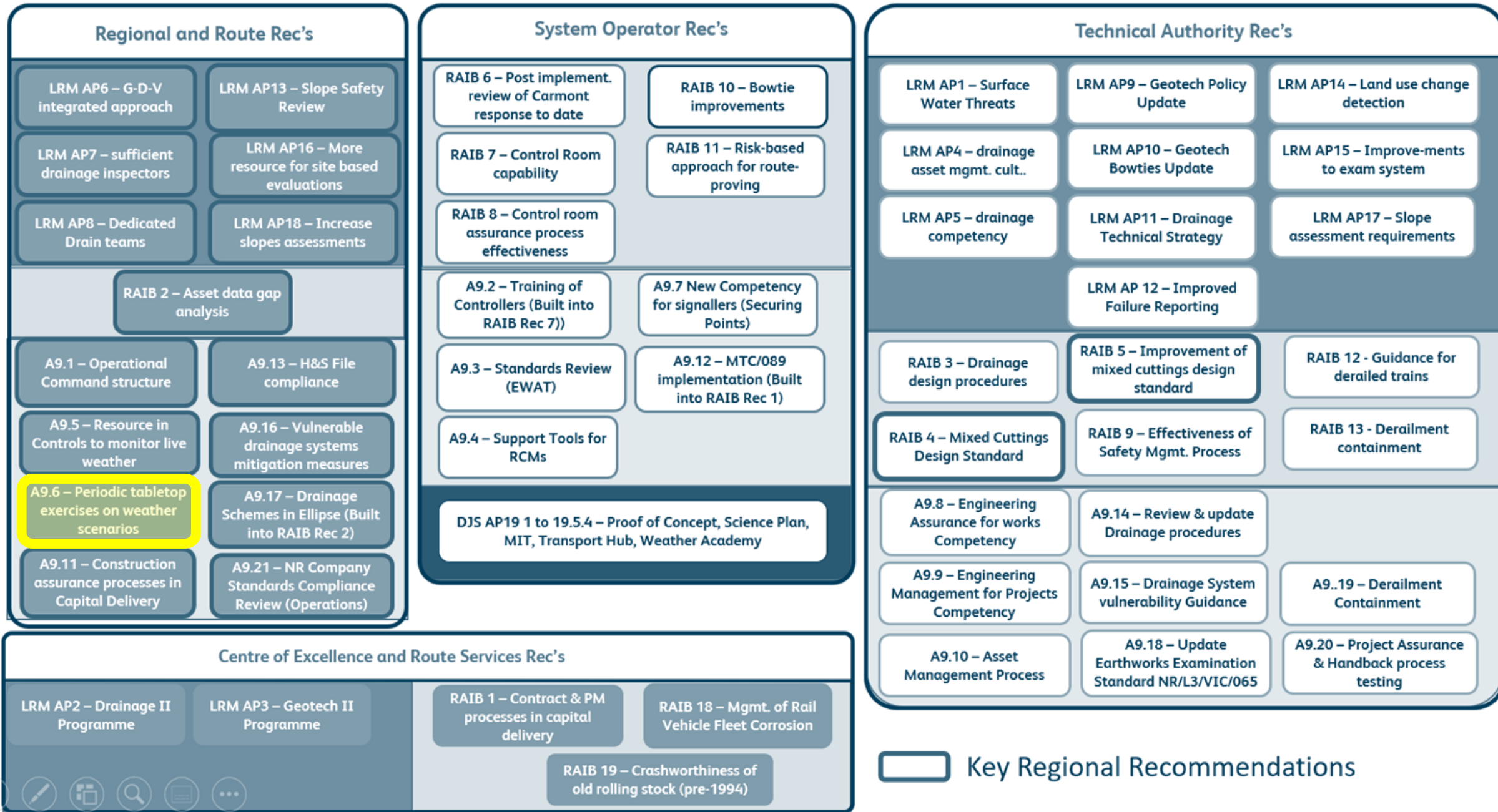
Published Date: 09 October 2024

Drainage Management Plans

OFFICIAL



Carmont Action Plans on a page



Tabletop exercises

Eastern ran its first ever regional emergency exercise on 27th February 2023 to simulate our responses to managing adverse and extreme weather through our existing route operational control arrangements.

A holistic approach was taken, aimed at identifying areas for improvement related to planning, resource allocation, management, and decision-making across our control centres during severe weather events such as flooding, high winds, storm surges, and train derailments.

The workshop included representation from TOC's, our National Operating Centre, Route Operational Controls from all routes, Asset Management and Legal.

Outcomes and next steps:

The workshop brought to light several areas for future improvements including:

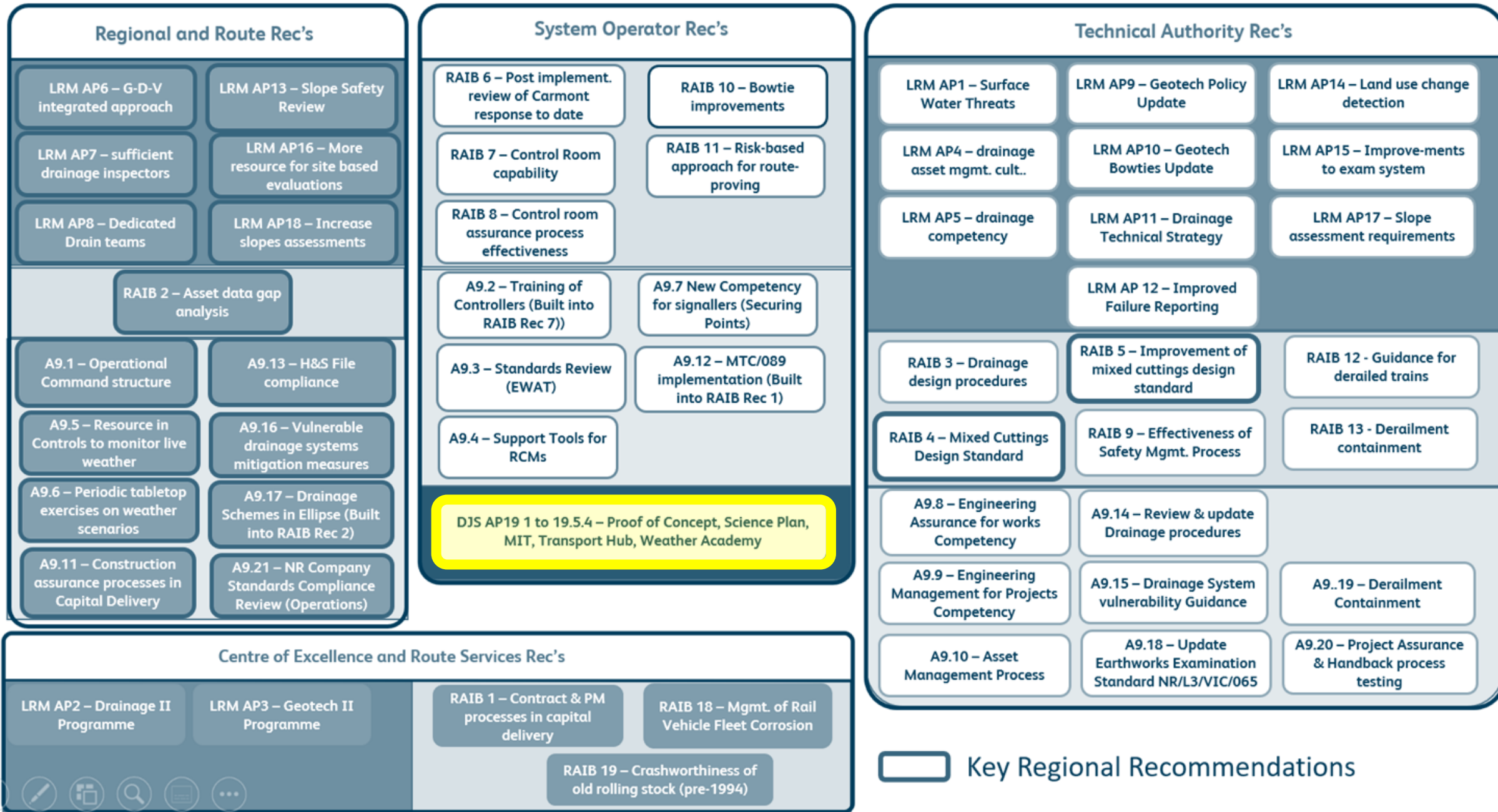
- A review of the EWAT process across routes.
- The need for the development of Integrated Weather Management Plans for each route.
- Identified gaps were identified in resources and the training of key staff (RIC and TIC competency particularly).
- The need for improved, timely and succinct communications between NR, TOC's and the media on our weather management plans in advance of and during storm events.

This is now an ongoing activity, using a bespoke tool called View360 where teams can create their own scenarios



Use of Media videos, news articles and live weather alerts to represent the reactive nature of a storm and the decisions required, including changing weather alerts and patterns leading up to, during and after the storm event.

Carmont Action Plans on a page



DJS recommendations

Proof of Concept (completed)

- Exploiting advances in forecasting to improve operational safety and performance

Science Plan

- Research to improve our understanding of weather impact on different earthwork geologies

ROWS / ROWS+

- A new digital platform is being developed and delivered to replace the existing NRWS system, enabling a more transformational approach to how it uses weather forecasting data.

Weather Academy

- Development of a weather community that provides opportunities to learn, ask questions and share knowledge across Network Rail and industry



Proof of Concept (Completed)

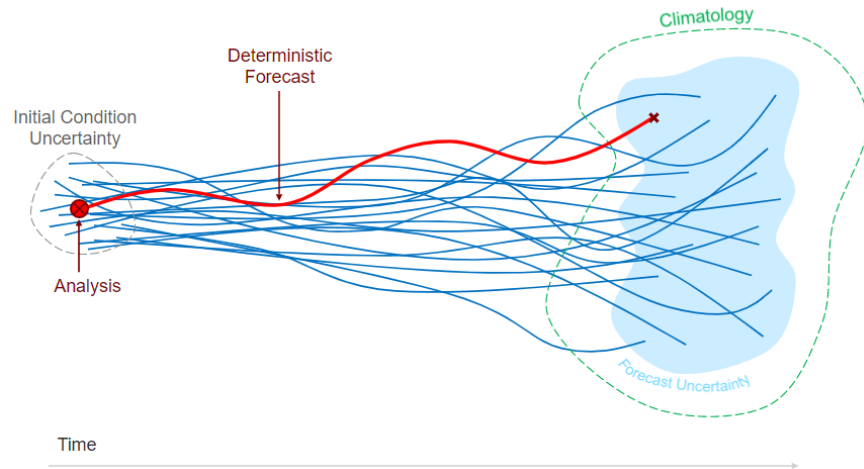


Figure 1: Ensemble forecasting schematic

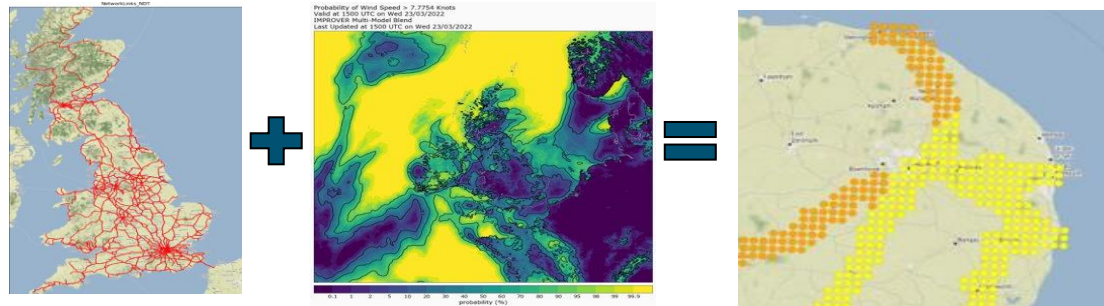


Figure 3: Network Rail route and IMPROVER forecast are combined to provide route specific forecasts

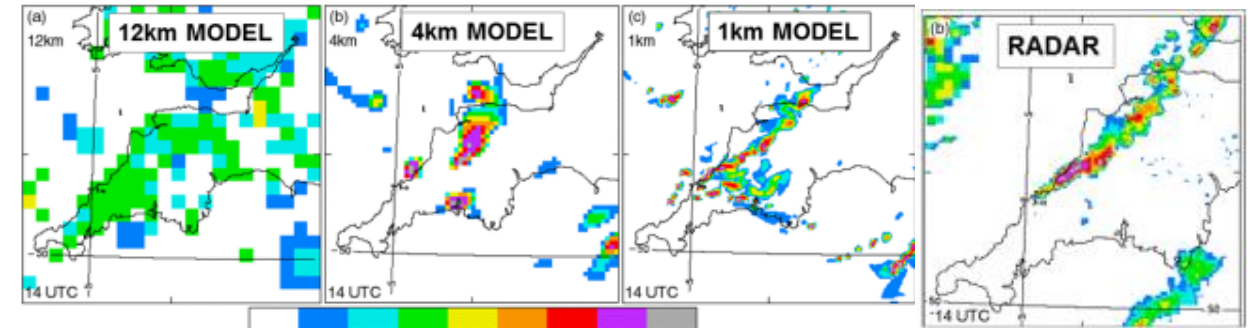


Figure 2: Km scale forecasting of the 2004 Boscastle floods compared to 4km, 10km and rainfall radar

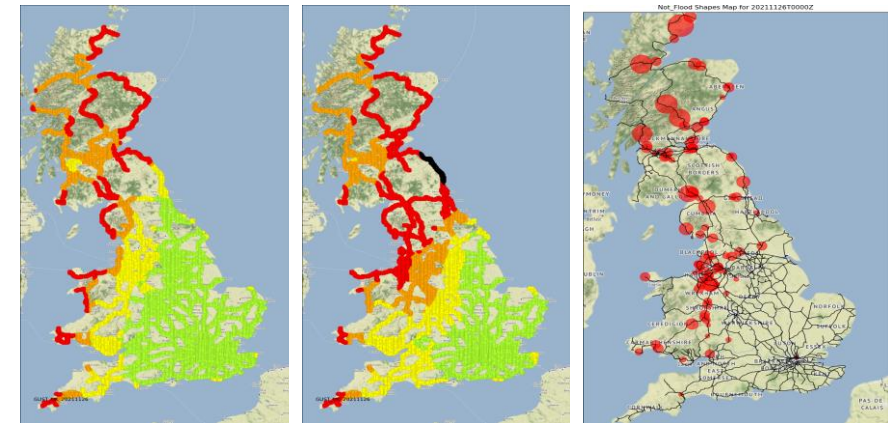


Figure 4: IMPROVER wind gust forecasts on the day preceding (left) and day of (centre) storm Arwen. NR non-flood weather related impacts on the 26th November 2021.

Science Plan (work is ongoing)



Pathway Data Inputs



Rainfall Radar Data 2km
(Observation)



MOGREPS-UK Ensemble
2.2km (Forecast)



Soil moisture deficit (SMD) data
MORECS system (40km
resolution) and UKCEH soil
property indicator (1km)



Locations of 190K earthwork
assets (cuttings and
embankments)



NR geological cohorts



CIV185 earthwork failure
database (for validation).

Different input data will give you a different result. The resolution of the weather observations and weather forecasts is important. Using a deterministic weather forecast only will affect outputs (binary) compared to using an ensemble (probabilistic).



Weather Academy (work is ongoing)



<https://railweatheracademy.co.uk/>

The screenshot shows the homepage of the Weather Academy website. At the top is the Network Rail logo. The navigation bar includes links for HOME, ABOUT (with a dropdown arrow), ARTICLES, LEARNING, TOOLS & RESOURCES (with a dropdown arrow), and a red LOGIN button. A search icon is on the right. The main banner features a background image of railway tracks and the text "Welcome to the Weather Hub". Below this, a white box contains the text: "The **Weather Hub** stores information and best practice about how we manage the impact of weather on the rail network." At the bottom of the banner are six weather-related icons: a snowflake, a cloud with rain, a sun, wind, a leaf, and a globe with a circular arrow. A red dropdown arrow is centered below the icons.



Weather Academy (work is ongoing)

How can the Hub help you learn?

The Weather Academy is here to help you and your teams learn more about extreme weather. Our aim is to help the industry be better aware and more prepared.

There are lots of ways to learn more. Take a look below:



[Videos](#)



[Virtual Lunch & Learns](#)



[E-learning Modules](#)



[Podcasts](#)



[News Articles](#)



[Events](#)



[Documents](#)



[Workshops](#)



WEATHER TYPE: CLIMATE CHANGE MEDIA: VIDEO

**Weather Academy Webinar:
Climate change risk and
adaptation planning**

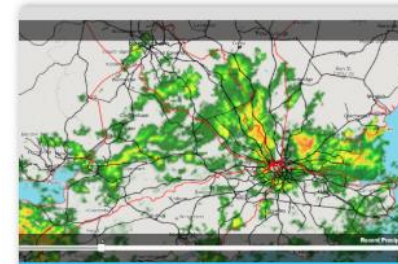
You must be [logged in](#) to view this content.



WEATHER TYPE: ADHESION MEDIA: LEARNING, VIDEO

**Weather Academy webinar:
Adhesion**

You must be [logged in](#) to view this content.



MEDIA: LEARNING, VIDEO

**Weather Academy webinar:
Network Rail Weather Services
(NRWS)**

You must be [logged in](#) to view this content.



WEATHER TYPE: HEAT MEDIA: LEARNING, VIDEO

**What factors influence hot rail
temperatures?**

You must be [logged in](#) to view this content.

Extreme Heat Recommendations – on a page (all categories)

	Regional and Route				System Operator		Technical Authority				Route Services/ Comms/CFO		
Accepted	SDO D&P 18 - Lineside Building Condition				DJS 6.1 - Improved forecasting	SL Mgt 10.f - Control Centre Management	SDO Support 5 - Utilising research	SDO D&P 8 - A/C Energy Usage	SDO D&P 15 - HVAC Specification and Design	SDO OLE 7 - Access for OLE Maintenance	SDO Support 3 - Use of train borne data		
	SDO OLE 2 - Managing Dilapidation				DJS 6.2 - Extreme Heat Scenario Planning	SL Plan 20.a - Performance and Freight Ops	SDO D&P 1 - RCM - Temperature	SDO D&P 10 - Temp Control Accountability	SDO OLE 1 - Compliance with standards - B10	SDO Track 9 - Using Data to Determine Speeds	SL Mgt 10.a - Risk Appetite		
	SDO OLE 3 - OLE Maintenance Resources				DJS 6.4 - Customised seasonal forecasts	TF 4.3 - Information & Communication	SDO D&P 2 - Suitability of A/C Systems	SDO D&P 11 - Troughing Fire Resistance	SDO OLE 4 - Engineering Guiding Mind	SL S&I 15.b - Gross Disproportionality Factor Model (GDF)	SL Mgt 10.b - ISO accreditation		
	SDO D&P 6 - E&P Maintenance Resources				DJS 6.5 - Climate change impact studies	TF 7 – Taking care of passengers	SDO D&P 3 – Energy Usage Savings	SDO D&P 14 - Risk of UPS Failure	SDO OLE 9 - Climate Driven Maintenance Regime	SL Culture 5.d - Industry collaboration			
Accept & Assign	SDO D&P 4 - Level Crossings Power Supplies				SDO Track 1 - Managing Track Buckles	SDO Track 10 - Remote Condition Monitoring	SL Plan 20.b – Forecast performance	DJS 6.3 - R&D, services programme and Academy	SL Culture 5.c - customer focussed Guiding Principles	SDO Track 2 - Wrong Side Failure Reporting	SDO Support 8 - UAV and Autonomous Inspection	SDO Support 2 - Prioritising Train Borne Monitoring	SDO OLE 6 - Asset Data
	SDO D&P 13 - Building & Structures inspection							SL Mgt 10.g - Hot weather Freight Operations Plan	TF 4.2.3 - Cooperation with Coach Industry	SDO Track 3.1 - Roles & responsibilities	SL S&I 15.f - Management of change		TF 6 – Influencing behaviour
	SDO OLE 8 - Summer Preparedness							SL S&I 15.c – Review of trigger points	TF 7.2 - Station Improvements	SDO OLE 5 - Asset Stewardship	SL S&I 15.g - Maintenance backlogs		EHTF TF 6.2 Educational comms
	SDO Track 8 - Stability Risk							SL Plan 20.d – Freight Operations Plan	TF 7.3 - Provisions	SDO Support 1 - Accountabilities for Asset Condition Info	SL S&I 15.h - Critical faults on electrical assets		EHTF TF 6.3 Behavioural Science
	SDO Support 6 - KRS Engineering Approach							SDO Support 7 - Seasonal Preparedness	TF 7.4 - Staff Training	SDO Support 4 - Better Integration of Data/Information	SDO D&P 7 – Maintenance Accountability		
	SDO Track 3.2 - Engineering Competence							SDO Track 11 - Preventative Maintenance					
Non-NR	TF 7.1 - Cooling Systems				TF 7.2 - Station Improvements	TF 7.3 - Provisions	TF 7.4 - Staff Training	TF 8.1 - Wider Comms & Mgt	TF 8.2 - Ticket Refund	TF 8.3 - Unused Ticket Comp	TF 8.4 - Increasing Awareness on Refunds	TF 8.5 - Making it easier to claim	TF 8.6 - Complaints Handling
	SDO D&P 9 - Rapid replacement of AC Units				SDO D&P 12 - Prioritising Building Assets	SL Culture 5.e - Maintenance Programmes	SL Culture 5f - condition monitoring equip.	SL Mgt 10.c - KPI impact of speed restrictions	TF 8.7 - Dealing with Consequences				

Key

Operations

Engineering & Asset Management

Communications & Passenger

Linked to another recommendation

SDO OLE 8 (Summer Preparedness)



Eastern

Ref: ER-CSTAN-006 v6
Date of issue: 07/03/2025
Location: Eastern Region



Eastern Region OLE Summer Preparedness – Technical Advice Note

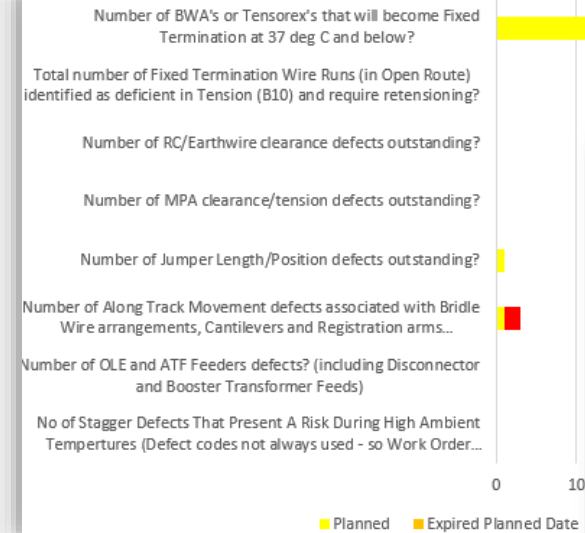
1. Overview

This Technical Advice Note should be read in conjunction with NR/L2/ELP/21090 - OLE Seasonal Preparation Response for Extreme Weather. This document requires specific enhanced maintenance activities to be undertaken in the lead up to summer, with the aim being to improve the safety and performance of the OLE asset during periods of high ambient temperatures.

10. Weather-Related Critical Defects (WRCD's) - Ellipse

All WRCD's shall have the code 21090 entered within the **extended text** of the Ellipse work order. This is to aid with identifying, planning and reporting of such defects.

If any hot weather-related defect is discovered and is not described above use Ellipse Defect Code **HD10 - Hot Weather Miscellaneous Defect within Ellipse**.



SDO Track 1 (managing track buckles)

Track buckles occurred at locations where deficiencies had not been identified, were not in the CRT (Critical Rail Temperature) register and were therefore not mitigated.



Eastern-LTI-ER005v2
Regional Track Instruction
Regional Engineer [Track] Eastern
07th Feb 2023

Hot Weather deficiency assurance activity

1. Reason for issue

Eastern Region suffered 8 Buckles in 2022 of which only 1 was on the CRT register. There were various primary and secondary causes for the 8 Buckles, some of which are not robustly managed in normal day to day maintenance activities. This assurance activity seeks to mitigate these gaps.

Subject: Eastern CRT RAG Report 24/07/2024
Attachments: FullDownload.cvr (166.89 KB)

Eastern CRT RAG Report

This report highlights all Critical Rail Temperature sites over 20mph where operational impacts are predicted over the next 5 days due to the temperature forecast.

An interactive version of this report is available [here](#).

More information on how this report made is available [here](#).

The temperatures given are estimated rail temperatures based on predicted air temperature*1.5.

RAG Key:

RED = A High probability of an ESR being imposed
AMBER = A high probability of a watchperson being deployed*
GREEN = Currently no predicted operational risk

*If a site cannot be watched the site will require an ESR to be imposed.

East Midlands

TME	Location	ELR	TID	Mileage	Line Speed	CRT (M)	CRT (AMBER)	CRT (GREEN)	Mitigation Plan	Day 1 24/07	Day 2 25/07	Day 3 26/07	Day 4 27/07	Day 5 28/07
Bedford TME	Wymington	NYM	1200	60m180v - 60m200y	50mph	27	30	32	Review until transient period expires	RED	RED	RED	RED	RED
Leicester TME	Bardon Hill AA To Ciffe Hill 2A	KSL	2100	110m185y - 111m437y	40mph	28	31	34	Plan removal planned in week 20, replacing with CVR	RED	RED	RED	RED	RED

SL Plan 1 (Forecast Performance)

Paragraph 20 Recommendations re Extreme Weather Preparedness

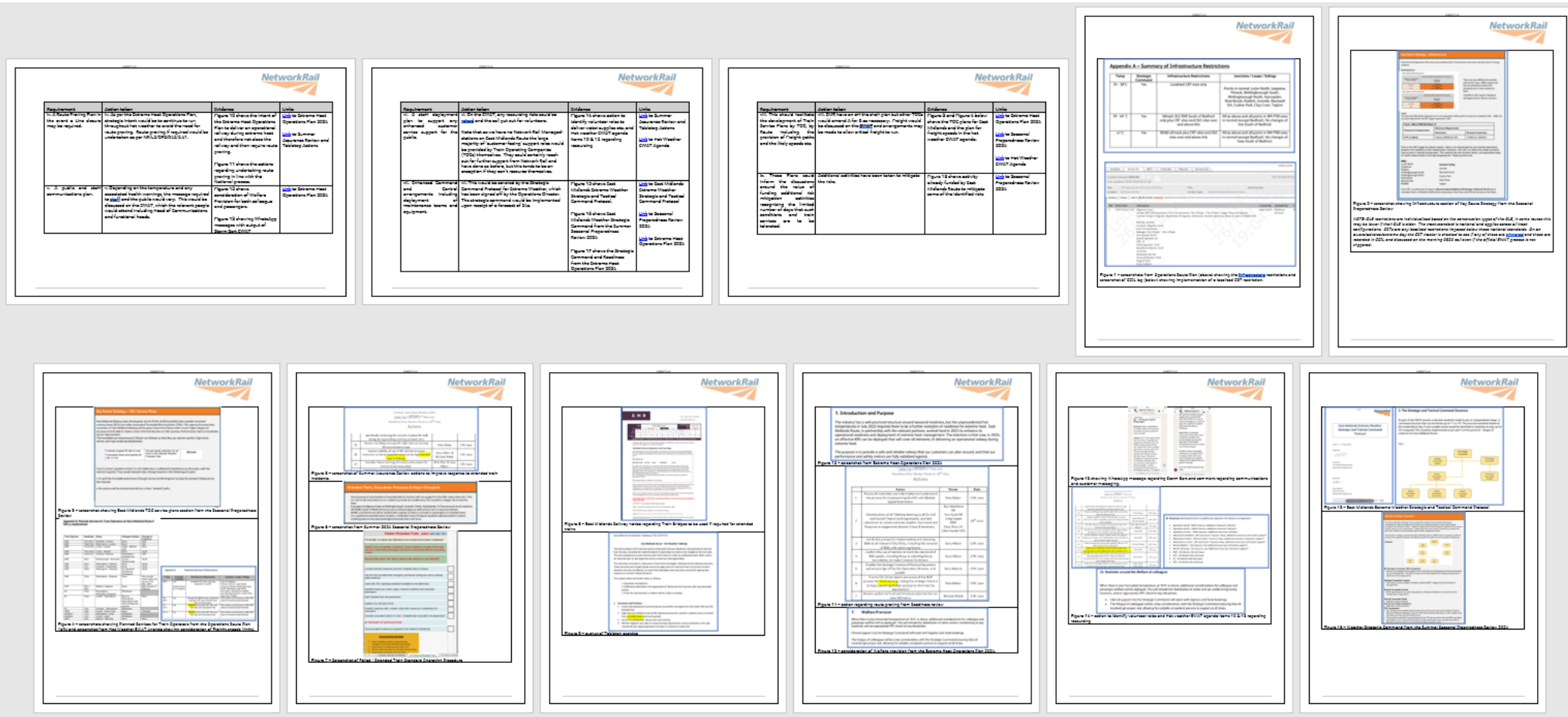
20.B These Plans should include the following:

- i. A risk register for each Asset Class including the planned mitigations.*
- ii. The Operating Train Plan which can be picked off a shelf.*
- iii. How any stranded trains will be managed when temperatures are above 33°C.*
- iv. A Route Proving Plan in the event a Line closure may be required.*
- v. A public and staff communications plan.*
- vi. A staff deployment plan to support any enhanced customer service support for the public.*
- vii. Enhanced Command and Control arrangements including deployment of maintenance teams and equipment.*
- viii. This should facilitate the development of Train Service Plans by TOC, by Route including the provision of Freight paths and the likely speeds etc.*
- ix. These Plans could inform the discussions around the value of funding additional risk mitigation activities recognising the limited number of days that such conditions and train services are to be tolerated.*



SL Plan 1 (Forecast Performance)

OFFICIAL





Weather Risk Task Force

We will run a safe, affordable and more reliable service for passengers during adverse and extreme weather

Coordinating whole system change



Building competence



Tools & data

Forecasting tools, sensors and live data



Comprehensive asset dataset



Planning & preparing for adverse weather

Coordinating with transport system



Increased readiness

Scenario testing & incident reviews
Research with universities

Integrated Asset Management

Life cycle asset management



Targeted maintenance & inspection

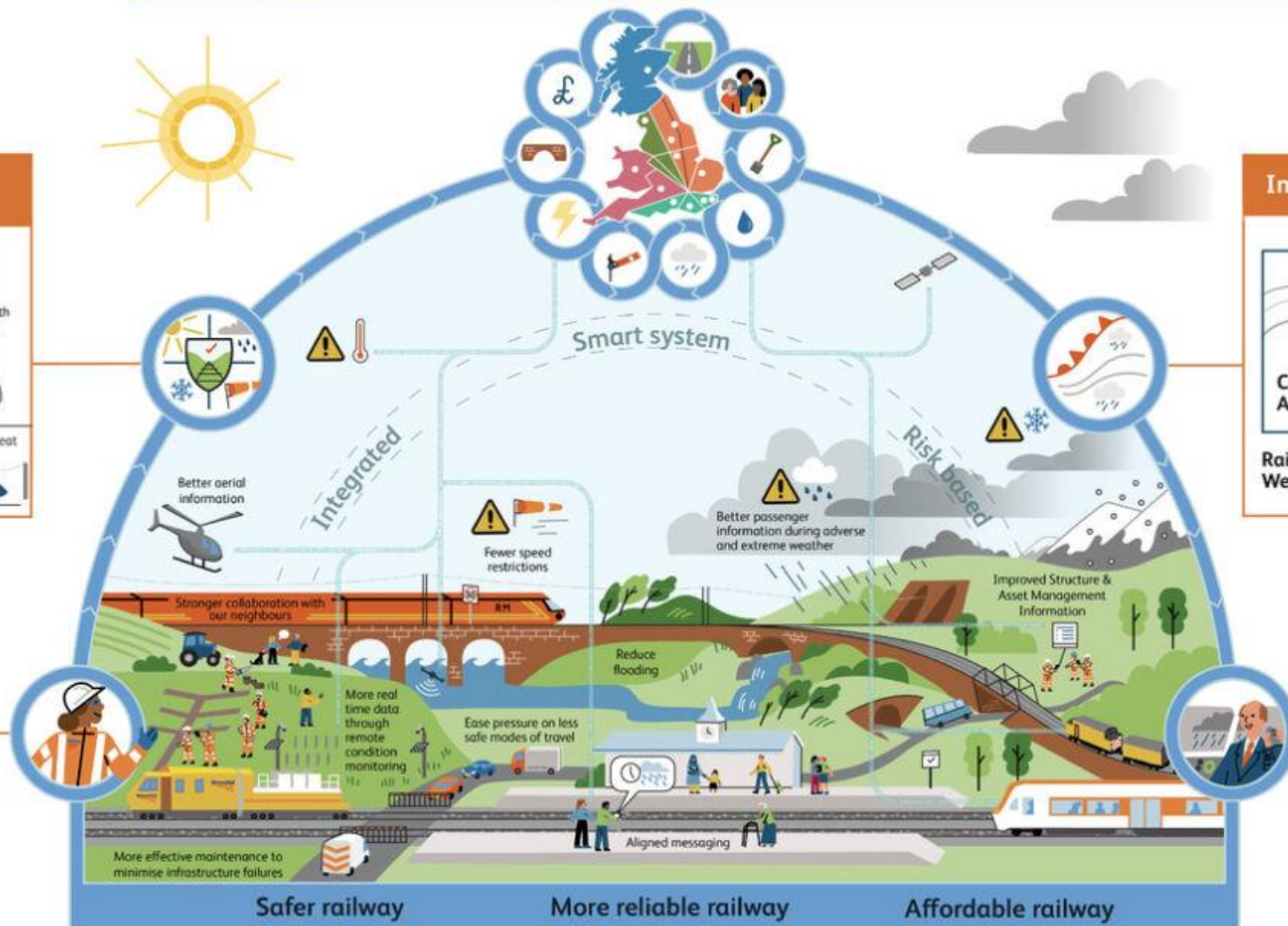
Asset information in the right hands

Clear understanding of our assets



Technology providing live data

Increased drainage & earthworks resources



Improved forecasting



Expert input for strategic decision making

Rail Operations Weather Service

Ready to act on forecasts

Risk-based operational decision making

Improved data enables confident, dynamic decisions

Targeted mitigations limit impact on network



Right people in the room