



THE PWI

Powering Success: Electrification and Building the Future

Overhead Line Renewals and Maintenance –
An Asset Management Perspective

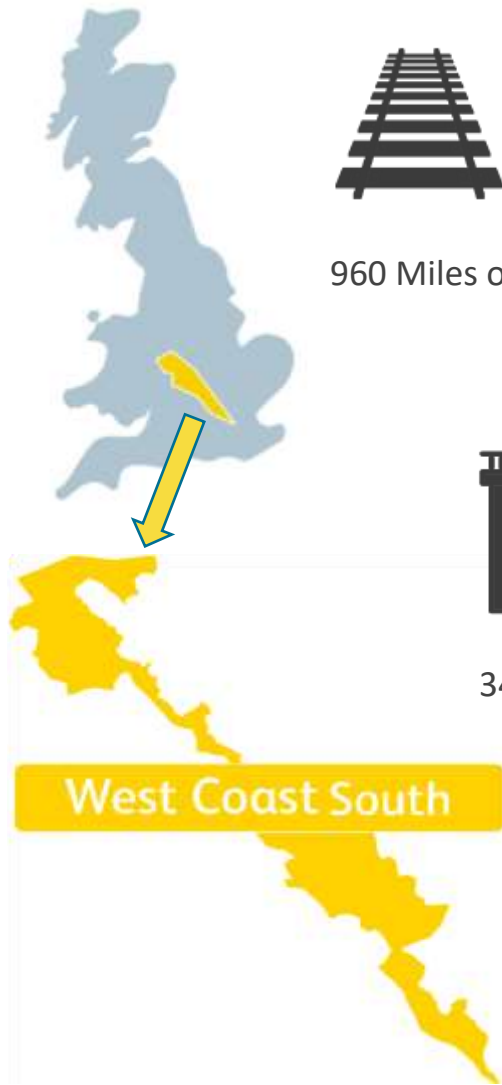
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Overhead Line Renewals and Maintenance – An Asset Management Perspective

Ellen Wintle, Infrastructure Director – West Coast South Route, Network Rail
PWI Electrification Seminar July 2024

Introduction



960 Miles of Track



1,089 S&C Units



1,695 Signals



39 Level Crossings



834 Electrified Miles



25,580 Drainage Assets



34 Tunnels



352 Over Bridges



426 Under Bridges



1,182 Retaining Walls



1,534 Earthwork Assets



78 Stations



39 MDUs &
Welfare units



8,184,129
Passenger Journeys
per period



1,696,784
Train Miles
per period

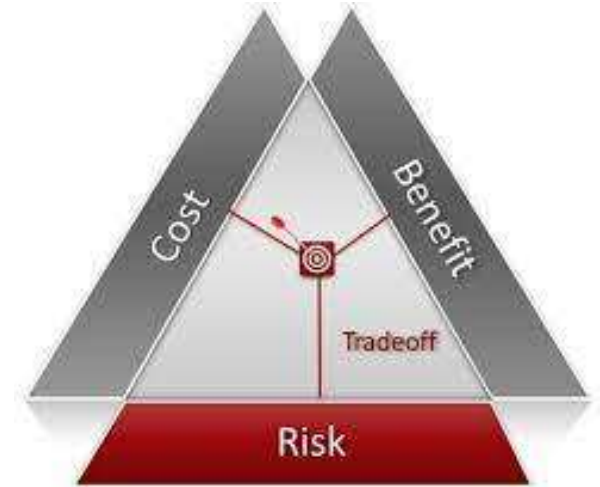


2,047 Staff

- The OLE Asset Management challenge for CP7
- Asset Management decision making
- Specific challenges for OLE
- Opportunities and technology
- How far we have come....



Asset management is the balancing of costs, risk and performance to achieve an organisation's objectives.



- Network Rail is funded for a 5-year control period to deliver commitments including on safety, performance and asset sustainability.
- The CP7 settlement for 2024 – 2029 recognises the wider financial challenges for the country
- There are huge expectations across the whole industry to deliver more and better for less.



Expenditure
Operations £4.4bn
Support £5.3bn
Maintenance £12.6bn
Renewals £19.3bn
Industry costs & rates £2.0bn
Risk funding £1.8bn

Competing Priorities for an Infrastructure Director.....

Structures



Earthworks



Buildings



Off Track



Track



Signalling



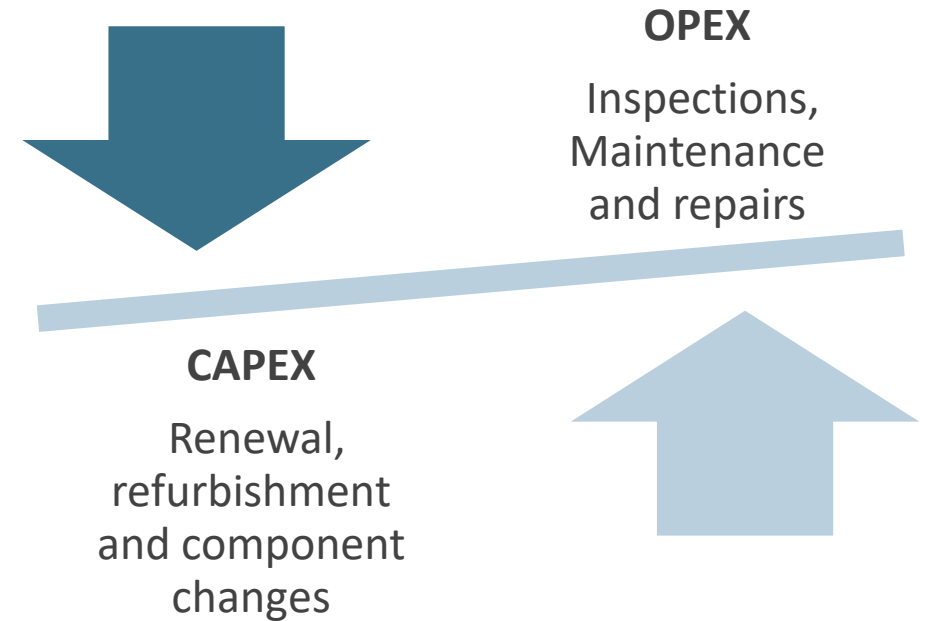
OLE



P&D



- An Asset Management strategy needs to consider a variety of interventions for example:
 - Renewals – Full or partial wire run renewals
 - Refurbishments – components or assemblies
 - Reactive Repairs
 - Inspection and Maintenance activities
 - Removal
- The policy NR/L1/ELP/27000 gives guidance for the various asset types.
- Route asset managers and engineers need to balance requirements of the policy, local operational demands and competing risks within the funding available



Renew, Refurb or Maintain - How do we decide?

What needs to be considered?

- safety requirements
 - age of the asset and it's remaining life
 - wire run category – line speed / pan passages
 - route section and asset criticality
 - operational impact of failure – critical locations
 - lowest whole life cost intervention
 - what the can industry afford.....
-
- CP7 seeks to maximise the funding available over a greater asset base... so a key theme this control period is greater life extension works and campaign changes with less full wire run renewals

Line Type	Line Cat	Linespeed (mph)		Pantograph Passage	
		Min	Max	Min	Max
High Speed	1	100	125	90	100+
	2	100	125	10	90
Slow Speed	3	40	100	90	100+
	4	40	100	10	90
Other	5	5	40	0	10

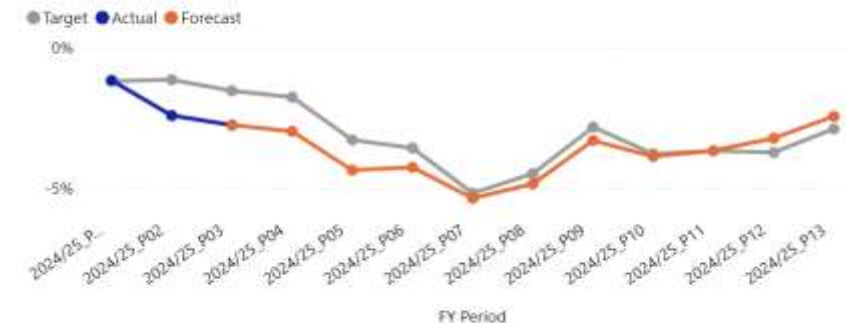
Table 2 – Line Categorisation Chart

$$RL_{wr} = 1 - \frac{Eff\ Age}{ATL}$$

Electrical Power

Composite Reliability Index - AC traction power failures, DC traction power failures and Non traction operational power supply failures

Improvement on Baseline



Failures - Periodic Trend

Actual Forecast Target

Common challenges for renewals and maintenance

- **Engineering Access**
 - Midweek access; Contingency for handback ; Any Line Open working,
- **Improvements to safety**
 - Reduction of Red Zone; working under live, isolation and earthing
- **Labour, Materials and plant costs**
 - Significant increases in costs in maintenance and renewals
- **Availability of Resources**
 - Critical resources in Network Rail and supply chain
- **Not getting it right first time**
 - Repeat visits; asset failures; snagging
- **Asset data**
 - Handover from projects; completeness and accuracy



Ways of working for inspections and maintenance....

- The way we inspect has changed for both ground level (foot) patrols and high-level intrusive inspections
- Legislation and standards have changed to improve safety:
 - Removal of zone working, foot patrols in line blockages or at night in darkness
 - HGV licenses for the machine operators; on track plant operations (POS) and Any Line Open working
 - Reducing working under live, isolation for on tracking / travel and supporting other disciplines with isolations
 - Setting up worksites and isolations, more staff required for putting out boards, switching and earthing
 - Working at height, ability to access all equipment from the basket



Access to track is a premium
- a 5 or 6 hour possession
may only allow 2-3 hours
machine working time

Risk Based Maintenance – targeting our interventions



Reduction in number of high-level inspections in a year allows for more inspection time per wire run which leads to more reliable assets



Maintenance teams can concentrate on removing high risk defects on the rail infrastructure which leads to a more reliable railway



Reduction in low level inspections allows for faster response times to breaker ops. Breaker ops are one of the biggest causes of rail disruption. Data analysis has shown that a faster response leads to easier identification of the root cause



Create more time to thoroughly investigate issues highlighted by using the emerging technologies such as AIVR, Drones, PANDAS, OLE StAT etc.



Less inspections during the days leads to more training time for staff which will improve productivity, increase efficiency and help staff retain their skill and knowledge

SPEAR - Integrated access planning

Objective

- Lowest cost of access and impact to passenger journeys and revenue
- Increase efficiency in project delivery whilst reducing disruption

How

- Identify integration opportunities - clusters of work into a single Engineering Access
- Integration workshop across Network Rail teams – Route Engineers, Capital Delivery and Access/Planning
- Use Strategic Planning Engineering Access Reform (SPEAR) for analysis

Benefits

- Better, more effective use of access – lower project cost, less disruption
- Schedule 4 savings
- Higher customer satisfaction from our TOC, FOCs & Passengers

Integration Opportunities

Job	Access Requirement	Schedule 4 cost	Comments
Worcester canopy work	TBC		
Shugborough tunnel works	N/A		Efficiencies will come from reduction in overall shifts as the normal access hole is 10hrs on a Saturday night only
PLTR Cymrufields	20 hours	£715,884.10 (assuming Sunday)	
PLTR Easenhall	20 hours	£715,884.10 (assuming Sunday)	
WD DLP Brixham	20 hours	£715,884.10 (assuming Sunday)	
Off back - do vag	N/A		Efficiencies will come from reduction in overall shifts as the normal access hole is 10hrs on a Saturday night only
Drainage Cymru Up (over 12hrs/10hrs - 1,010)	6.5 days	£8,767,586.75 (assuming 7 days)	

Seasonality Analysis



High Level Summary

Option	Schedule 4 cost	Integrated schedule 4 savings	Passenger journeys impacted	Passenger revenue	Socioeconomic impact
Option 1: Stafford to Newcastle 9 day blockade July 2025	£7,767,041.60	£13,821,500	218,483	£9,600,000	£8,200,000
Option 2: Stafford to Rugby 9 day blockade July 2025	£7,767,041.60	£17,734,300	227,234	£9,900,000	£8,400,000
Option 3: Stafford to Rugby 8 day blockade May 2025	£7,767,041.60	£17,734,300	158,123	£6,800,000	£5,810,000
No integration total costs (blockade plus other jobs delivered at a separate time)	£25,501,361.60	£0	598,770	£27,300,000	£23,260,000

New OLE should be designed to allow it to be worked on in line with the route maintenance and operations strategy - and risks identified and eliminated or reduced

A few examples of designing for maintenance:

- Ability to access to equipment from the MEWP
- Location of road rail access points for maintainers
- OLE switches in positions of safety, close to access points
- Earthing points coincident with worksite limits
- Wire height and tolerances for future adjustment
- Clearances to structures and other equipment!!!!



Managing health and safety in construction

Construction (Design and Management) Regulations 2015

Guidance on Regulations



L153
Published 2015

The Construction (Design and Management) Regulations 2015 (CDM 2015) came into force on 6 April 2015, replacing CDM 2007. This publication provides guidance on the legal requirements for CDM 2015 and is available to help anyone with duties under the Regulations. It describes:

- the law that applies to the whole construction process on all construction projects, from concept to completion, and
- what each dutyholder must do to comply with the law to ensure projects are carried out in a way that secures health and safety.

Some Technologies available to support OLE Asset Management

OLEt

Geometry, forces & acceleration



PANDAS V

Monitoring pantograph acceleration



SurvAL

Monitoring geometry and defects through video processing



Cordel

Uses train mounted LiDAR and AI to measure geometry



AiVR

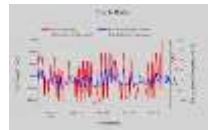
NETWORK-WIDE

Visually display data from trains, Strc identification, OLE broken dropper detection, birds nest detection, & BWA monitoring



HASTECC tension system RCM

Remote monitoring of tension system (BWA, Tensorex C+ & Fixed termination)



Corona camera

Identification of insulator defects



Panbot

Pantograph condition monitoring



Panmon

Pantograph condition monitoring



NMT & EMV

NETWORK-WIDE

Geometry & wire wear



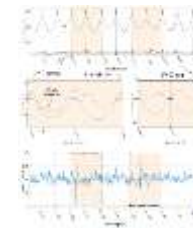
Thermal imaging

Inspecting booster transformers, points heating, switches using the helicopter



OLESTAT

Advanced geometry analytics



Drones

Visual surveys, examinations



everyone home safe every day



MENTOR

NETWORK-WIDE

Contact force and acceleration



ALI

Asset Location Improvement. Improving and centrally storing location information for OLE assets

To make a difference – we must maximise the use of technology...



So how do we come together as the industry...

By working together....we all play a part in moving our industry forward – whatever our roles!



Value for Money – renewals and maintenance



Efficient use of track access



Innovation and technology



Design with maintenance and operations in mind



Collaborate and work together

We have come a long way....

From this..



To this....



Together, we must keep driving forwards



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THE PWI

THANK YOU

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