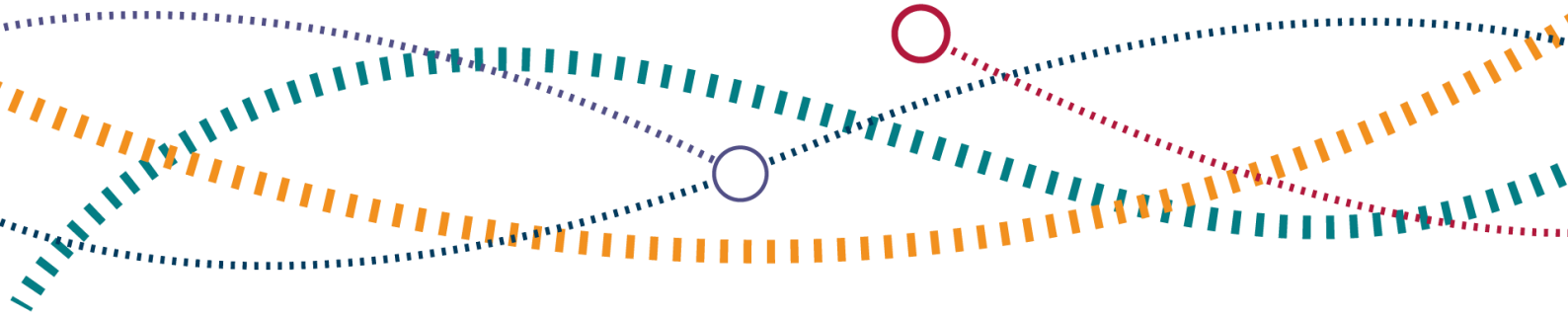
Metallic Structures Sustainability

Targeted Assurance Review

26 April 2023



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Acronyms and Abbreviations

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AFC	Approval for Construction
BCMI	Bridge Condition Marking Index
CEFA	Civils Examination Framework Agreement
CP6	Control Period 6 (April 2019 – March 2024)
CP7	Control Period 7 (April 2024 – March 2029)
CSAMS	Civils Strategic Asset Management Solution
DEAM	Director of Engineering and Asset Management
EA	Environment Agency
QLM	Quarterly Liaison Meeting
NC	Network Change
NR	Network Rail
NW&C	North West & Central
ORR	Office of Rail and Road
PLBE	Principal Load Bearing Element
PR18	Periodic Determination in 2018
PR23	Periodic Determination in 2023

Acronyms and Abbreviations	
RAM	Route / Region Asset Manager
RPP	Railway Planning and Performance
RSD	Railway Safety Directorate
SBP	Strategic Business Plan
TA	Technical Authority
TAR (Targeted Assurance Review)	Targeted Assurance Review
TNC	Technical Non-Compliance
W&W	Wales & Western

Executive Summary

At PR18 final determination, metallic structures were identified as assets with greater vulnerability to deterioration. In some regions, further funds were allocated to address their sustainability. Our final determination set out a requirement for Network Rail to develop a sustainable asset strategy for metallic structures for future control periods.

This Targeted Assurance Review (TAR) has been undertaken to understand Network Rail's progress in:

- developing a sustainable long-term strategy for metallic structures;
- delivery of sustainability schemes in this Control Period 6.

This review found that Network Rail's Technical Authority currently has a structures framework that sets out strategies and goals for the whole structure asset portfolio. However, a specific national sustainability policy has not been fully developed to address the greater vulnerability to deterioration of metallic structures in future control periods.

At regional level there is no evidence of specific strategy or goals to monitor metallic structures sustainability. We found it difficult to understand the regions' long-term visions and how they deal with the uncertainty of future intervention demands for metallic structures beyond CP7.

The review also found that regions were not able to quantify the impact on asset sustainability at the exit point of CP6 due to under-delivery or deferral of CP6 sustainability schemes, alongside the BAU renewal activities such strengthening, replacement, repair works, all that can have impacts on asset sustainability.

The development of a sustainable asset strategy for future control periods to adequately deliver the whole life management of metallic structures was one of the final determination requirements for Network Rail to deliver in CP6. ORR is concerned that this requirement has not yet been met and expects that a sustainable asset strategy is developed by the end of this Control Period (CP6).

Given our findings, we require Network Rail to develop a strategy that can articulate its journey required to maintain sustainability of metallic structures. These include continuous monitoring of asset sustainability with development of targeting metrics and having deeper understanding of the outcomes of interventions on metallic structures through key performance indicator(s).

Recommendation 1: Sustainability Strategy and Plan

NR (Network Rail) to develop a robust and evidential strategy plan by the end of CP6 (Control Period 6). The strategy should include the development of appropriate leading indicators to monitor the process of strategy and allow measurement of impact of changes in renewal profile.

- Technical Authority (TA) will develop a national strategy that outlines the requirements to support regions to establish their long-term management strategy roadmap to sustain metallic structure condition.

Regions to develop the long-term management strategy roadmap and plan for metallic structures. The plan shall articulate their priorities, define targets measures, and set out the practical actions that regions will take over future control periods. Recommendation to be addressed by April 2024.

1. Introduction

1.1 Purpose

This Targeted Assurance Review (TAR) has been undertaken to obtain assurance that Network Rail is delivering the whole life management of metallic structures and that a sustainable strategy for future control periods is being developed by Network Rail.

This TAR will inform us of the current progress made by Network Rail in the development of its sustainable strategy for metallic structures. It will enhance our visibility into further funding requirements for this asset group under the structures portfolio and support our coming PR23 review.

1.2 Background

In our PR18 final determination[1], we considered that metallic structures sustainability should be addressed due to the greater vulnerability to deterioration. We noted Network Rail regions' concerns regarding their resources to adequately deliver the whole life management of metallic structures.

We therefore required Network Rail to develop a sustainable asset strategy for future control periods in CP6. In addition, we required that Network Rail continues to report average deck condition scores (i.e., Bridge Condition Marking Index) along with the principal load bearing elements (PLBEs to ORR).

Four regions were allocated additional renewals funding for asset sustainability schemes under structures portfolio in the CP6 settlement[2]. Some routes proposed allocation of funding specifically for metallic structures schemes (Table 1.1).

[1] Review of Network Rail's proposed costs supplementary document, https://www.orr.gov.uk/sites/default/files/om/pr18-final-determination-review-of-network-rails-proposed-costs.pdf

[2] https://www.orr.gov.uk/monitoring-regulation/rail/networks/network-rail/price-controls/pr18/publications/final-determination

Table 1.1 Additional asset sustainability schemes in CP6 settlement

Route/ Region	Scheme ID	Scheme Description	August 2018 allocation
LNE&EM / Eastern	LNE003	Structures - core works upgrade (including Tunnels)	£35.8m
LNW / NW&C	LNW04	Metallic Structures	£4.8m
South-East / Southern	SEA03	Reduced Metallic Structure Sustainability Package A	£20.7m
Western / W&W (Wales & Western)	RWES04	Structure interventions	£6.7m

1.3 Scope

This review targeted the structures asset management teams across the five regions. This TAR covers:

- Current condition of metallic structures;
- Delivery of CP6 workbank for metallic structures;
- Delivery of asset sustainability schemes of metallic structures for the additional funding allocated in CP6 settlement;
- Capability of metallic structures; and
- Progress made by Network Rail to develop its sustainable strategy for metallic structures to address the greater vulnerability to deterioration.

1.4 Assurance Approach

This assurance review was undertaken by gathering information and evidence. This was based on a formal Request for Information (RFI). Our approach was to create and distribute a set of questions based around the scope of areas identified in section 1.3.

The RFIs were sent to each region for completion. When the RFIs were returned we undertook a review to evaluate the responses.

Following our review of the RFI responses, the five regions were interviewed for further evidence and clarification.

Conclusions were drawn and recommendations made based on the above evaluations.

2. Findings

The findings in this section have been collated from our engagement with the Structures RAM teams through the RFI and interviews. The full list of questions included in the RFI can be found from Appendix A.

Key findings are presented in three sub-sections covering the following topics.

- Asset conditions and capabilities
- Delivery of CP6 renewals and asset sustainability schemes
- Sustainable asset strategy

2.1 Asset conditions and capabilities

Asset condition data were collected through RFI at the time of review. It was found that at national level, approximately 52% of metallic deck are either in poor condition or with poor PLBEs across the network.

Figure 2.1 Metallic Deck Condition - National

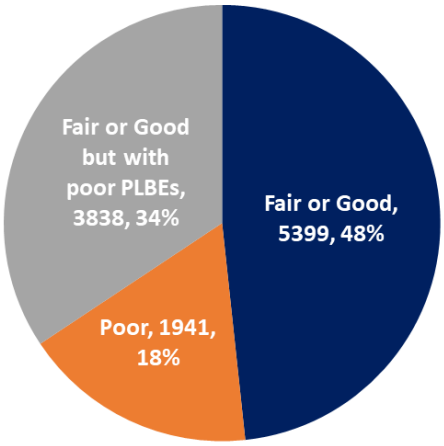
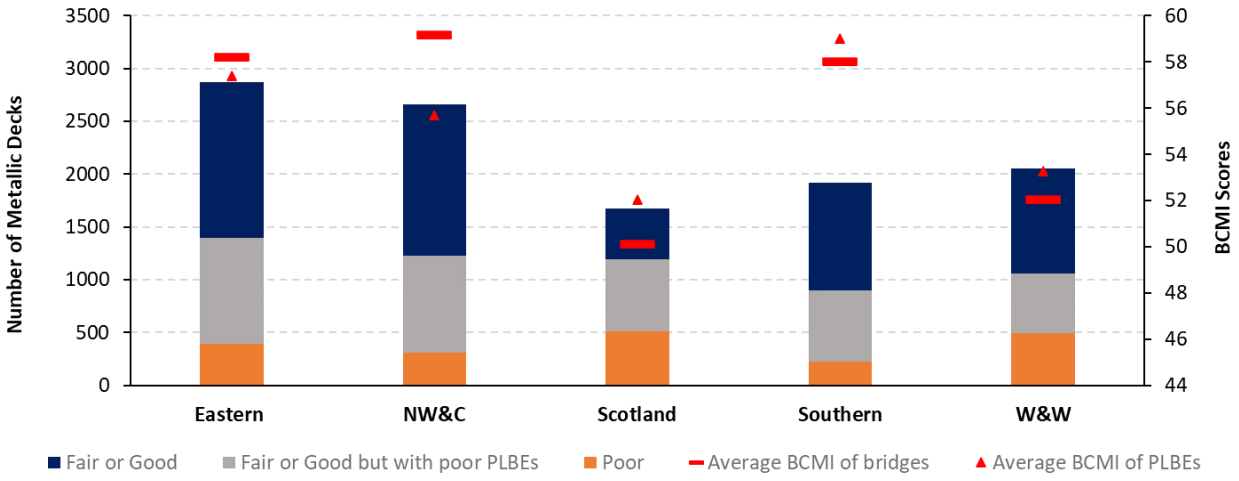


Figure 2.2 indicates that Eastern has the highest number (1395) of metallic decks in poor condition or with poor PLBEs. Eastern stated that the number of metallic bridges in poor condition and those classed as fair condition is increasing.

Approximately one-third of the metallic decks in Scotland are in poor condition or with poor PLBEs. Scotland's average BCMI score of PLBEs is the lowest among all the regions. Scotland is the only region which did not allocate additional renewals fundings for metallic

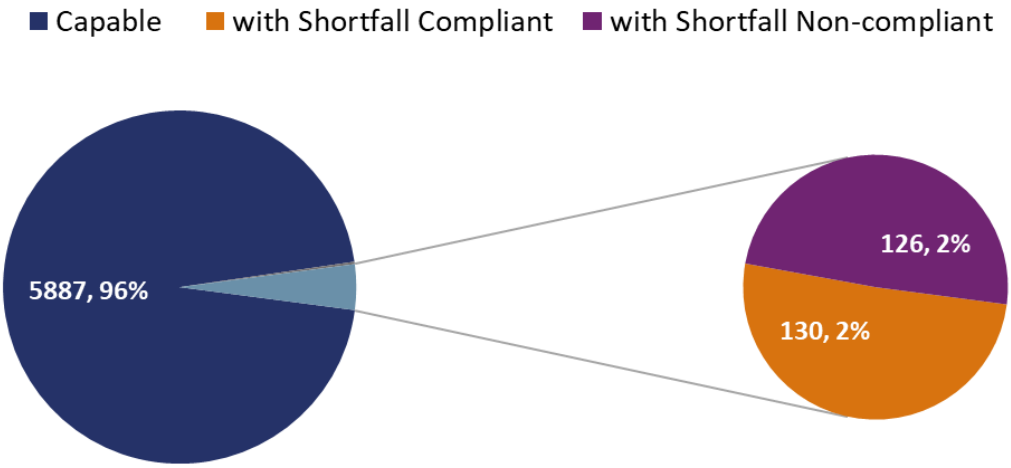
structures sustainability schemes in CP6 settlement, which will be discussed further in section 2.2

Figure 2.2 Metallic Deck Condition & Average BCMI Scores of Metallic Bridges and PLBEs by regions (Higher BCMI and PLBE scores represent better condition)



In terms of asset capability, we found that there are 256 (4%) metallic bridges with capability shortfall across the network (Figure 2.3). Half of these metallic bridges with capability shortfall were found to be non-compliant with Network Rail Standard NR/L2/CIV/035 MOD01[3] with respect to intervention timescales set out in NR standard.

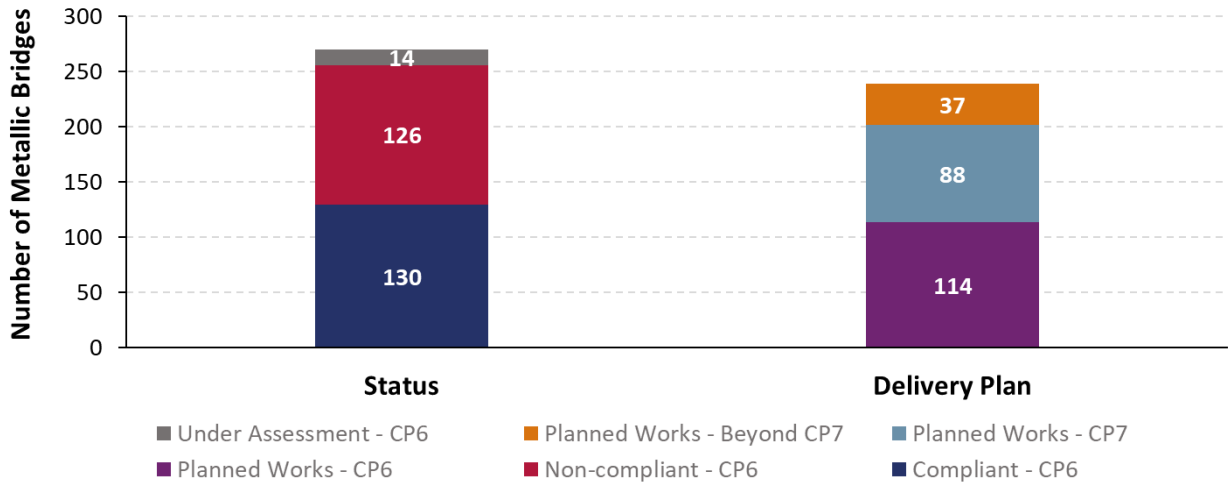
Figure 2.3 Metallic Bridges Capability at National Level



[3] 'Management of Structural Assessment, NR/L2/CIV/035 MOD01 issue 2'

We found that regions have planned interventions to address 79% of these metallic bridges with capability shortfall for either CP6 or CP7 (Figure 2.4). The remaining 21% of metallic bridges with capability shortfall have planned interventions beyond CP7. None of the regions provided a long-term programme for these works.

Figure 2.4 Interventions Planned for Metallic Bridges with Capability Shortfall - National



We have concerns that the number of metallic bridges with capacity shortfall could increase. There are a significant number of metallic bridges in Eastern entering into their next 18-yearly assessment cycle and some metallic bridges in Scotland are still under Level 2 structural capability assessment at the time of interview.

While Eastern indicated its awareness of the main risk drivers, which are intolerable condition or bridge capability, for its renewal plan, we found that the region is primarily focusing on planning its assessment programme. Eastern was not able to articulate its plan to mitigate the identified risks arising from condition or capability for future control periods. It was unable to do this through defining its risk appetite (i.e. the level of risk that region is prepared to accept in pursuit of its objective or overall risk it wants to work to) and better understanding of the risk profile of metallic structures asset group.

2.2 Delivery of CP6 renewals and asset sustainability schemes

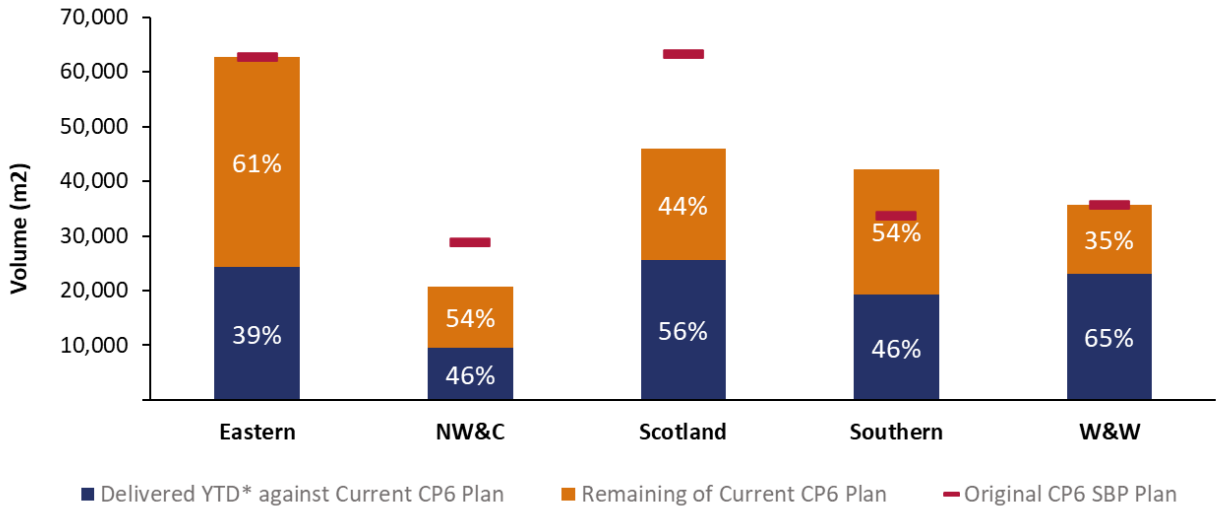
In our PR18 final determination, metallic structures were an asset group that should be addressed due to their greater vulnerability to deterioration. We sought assurance that regions have been undertaking their planned renewals and interventions in CP6 to prevent

further deterioration of metallic structures. In this review, we assessed regions' delivery performance of renewals for metallic structures against their Strategic Business Plans (SBPs) and asset sustainability schemes for metallic structures under the additional renewals funding allocated in CP6 settlement.

Eastern, Southern and W&W have the same delivery plan as their CP6 SBPs or intend to deliver more works than their SBPs for metallic structures. NW&C and Scotland have changed their renewals profiles with deferrals to CP7 or future control periods.

Towards the end of Year 3, only 46% of renewals for metallic structures have been delivered against the current CP6 plans nationally (Figure 2.5). In general, delivery of renewals has been lower than expected in most regions.

Figure 2.5 Metallic structure renewal delivery performance against CP6 plan



We found that only Southern and Eastern regions were able to provide clear breakdown of renewals of metallic structures into preventative maintenance interventions such as waterproofing or painting schemes in their core plans for asset sustainability.

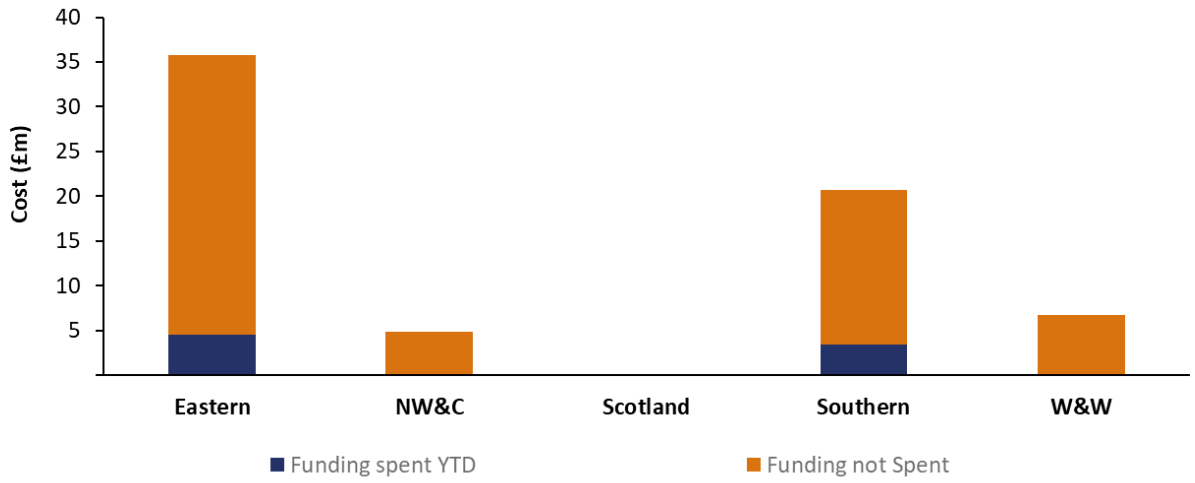
There has been significant underperformance in renewals in Eastern due to management of flood risk assessments required as part of the Environment Agency (EA) consent application and increased costs. It was suggested that Eastern should mitigate these delivery risks through more proactive engagement with EA alongside establishing a more sustainable and robust access strategy.

Southern has been delivering slightly less than expected, but it has delivered year-to-date preventative works as planned to maintain asset condition (i.e. avoid further decline in condition). Southern has aimed to deliver more volume of works for metallic structures than were planned in its CP6 plan. However, we noticed that remaining and extra renewals

are being back-end loaded in Year 4 and Year 5 of CP6. This causes some uncertainty around whether they will be completed in CP6.

Generally, Eastern and Southern have taken cognisance of the additional renewal funding given in CP6 settlement and have been tracking their deliveries of planned asset sustainability schemes for metallic structures. However, we found that only a few schemes have been delivered year to date (Figure 2.6).The majority of their planned schemes have been in the planning or development stage. It is questionable whether Eastern and Southern will be able to deliver their targets to make an improvement on asset sustainability of metallic structures by the end of CP6.

Figure 2.6 Spending status of the additional allocated renewal funding for asset sustainability schemes



Both NW&C and W&W claimed not to be aware of the additional renewals fundings for asset sustainability schemes given in CP6 settlement.

We found that NW&C has revised its renewal profile for metallic structures during CP6 Year 2. In our view, the tracking of changes in its renewal profiles is not robust enough. 10 out of 68 baseline schemes and 8 out of 18 emerging schemes have been removed from its plan due to uncertainty of development of schemes and high AFC cost affecting affordability.

While NW&C claim that the level of asset sustainability is forecasted to be the same as what was promised at the start of CP6, even if the total forecast volumes for CP6 will be below than original plan. However, we require further assurance on this point. All regions expressed concerns about effectiveness of using BCMI to measure outcomes of interventions on bridge condition. It is questionable whether regions can fully understand the impact of any changes made to their renewal profiles and deferrals on metallic

structures asset sustainability. We also consider the absence of long-term strategy setting out the overall direction to control and manage deterioration of metallic structures as one of the underlying factors.

The funding allocated under CP6 settlement to W&W was for the whole structures portfolio (Table 1.1). We found that this funding was not specifically allocated to metallic structure sustainability works. Instead, W&W confirmed that sustainability work schemes such as painting continued to be delivered in the first three years as part of its core plan. However, funding to perform these sustainability schemes for Year 4 and Year 5 of CP6 is not ring-fenced. In addition, there is potential deferrals of metallic structures renewals in the remainder of CP6 due to cost uncertainty.

As highlighted earlier in this report, Scotland did not specifically allocate additional renewal funding for metallic structures sustainability schemes in CP6 settlement, alongside one-third of metallic bridge decks in poor condition. We found that 59 schemes originally planned for metallic structures' sustainability in the business plan have been deferred to CP7 or beyond due to supply chain costs.

These schemes involve repairs and repainting as preventative works. As a result, the CP6 exit position of asset sustainability is unlikely to hit the forecast level due to removal of those sustainability schemes. However, Scotland is not able to reflect the associated impact through the overall BCMI as the number of schemes involved are small portion when compared to the size of whole asset group.

2.3 Sustainable asset strategy

In terms of regions' commitments to achieve asset sustainability of metallic structures in the long term, regions could not outline their pathway to address deterioration of metallic structures asset group with a clear setting out of targets, tangible steps, and full scope of works that they will take over the future control periods.

All regions are focusing on Level 1 Policy intervention to address metallic bridges capability shortfall for their CP7 plans:

- Eastern and NW&C do not expect to undertake sustainability schemes such as painting or water-proofing schemes unless the capability of the asset is compromised.
- W&W has considered options of painting and waterproofing metallic structures sustainability for CP7, but we noticed that those options were removed from their

recent CP7 top-down plans. We therefore do not see evidence of strong commitment to address sustainability issue.

- Scotland will only deliver 52 sustainability schemes deferred from CP6 in CP7. We consider this would not be sufficient to address the high portion of poor metallic structures element in that region.
- Southern is ambitious to deliver the preventative sustainability schemes in CP7, but there is not enough assurance that those schemes will go ahead.

While all regions referred to funding constraints, none of the regions have undertaken scenario planning based on various levels of fundings to understand how funding envelopes would affect asset conditions of metallic bridges over time.

Only Southern has high confidence that asset conditions of metallic bridges would not decline by the end of CP6 provided works are delivered as planned. If the same level of sustainability works can be delivered in future control periods, the asset condition could be kept at the same level.

However, all regions do not have a comprehensive view of asset condition and how degradation of metallic structure assets will look like in CP7 and beyond. We consider that this is due to lack of effective metrics to quantify asset sustainability outcomes.

All regions commented that BCMI is not sensitive enough to measure condition outcomes post intervention. For example, BCMI measurement could include the condition of abutment which in some situations could govern the overall BCMI score of metallic bridge. Southern suggested that a granular metric such as improving painting scores could be developed to measure the outcomes. Nevertheless, there is lack of commitment from any regions to develop a granular metric due to resource limitations.

In conclusion, there has not been a long-range sustainable asset strategy developed by regions regarding its over direction to address the greater vulnerability to deterioration in CP7 and beyond.

3. Conclusions

- Network Rail Technical Authority currently has a structures framework that sets out strategies and goals for the whole structure asset portfolio. Specific guidance is available to regions to help understand and manage metallic structure conditions; however, a specific national sustainability policy has not been fully developed to address the greater vulnerability of metallic structures to deterioration.

- At regional level, there is a lack of specific strategy or goal set to monitor metallic structures sustainability. We found it difficult to understand a regions' long-term vision and how it would deal with uncertainty of future intervention demands for metallic structures beyond CP7. Overall, there has not been a long-range sustainable asset strategy developed by regions regarding its over direction to address the greater vulnerability to deterioration in CP7 and beyond.

- Most regions except Southern are under-delivering their planned CP6 sustainability schemes for metallic structures. However, regions were not able to quantify the impact on asset sustainability at exit level of CP6 due to under-delivery or deferral of CP6 sustainability schemes. This is alongside the BAU renewal activities such strengthening, replacement, repair works that can have impacts on asset sustainability.

4. Recommendation

Recommendation 1: Sustainability Strategy and Plan

NR (Network Rail) to develop a robust and evidential strategy plan by the end of CP6 (Control Period 6). The strategy should include the development of appropriate leading indicators to monitor the process of strategy and allow measurement of impact of changes in renewal profile.

- Technical Authority (TA) will develop a national strategy that outlines the requirements to support regions to establish their long-term management strategy roadmap to sustain metallic structure condition.

Regions to develop the long-term management strategy roadmap and plan for metallic structures. The plan shall articulate their priorities, define targets measures, and set out the practical actions that regions will take over future control periods. Recommendation to be addressed by April 2024.

Appendices

Appendix A – Request for Information (RFI) Questions

In Phase 1 of this review, we require Technical Authority and five regions to provide a written response to the following RFI questions.

RFI Question to Technical Authority

#	RFI Questions
1	Outline and describe the management strategy, strategic goals and objectives set for metallic structures for CP7 and beyond
2	What metrics are used to assess behaviour and criticality of metallic structures? What is the rationale behind the derivation?
3	What are performance requirements/outputs defined for metallic structures in CP6 and those set for CP7 and beyond? PLBE average, capability shortfall assets, average BCMI; what guidance does TA (Technical Authority) give to region to assess or monitor condition performance of metallic structures?
4	What are intervention options for metallic structures to manage asset sustainability over the next Control Period (CP7)? What are the associated intervention thresholds and what are the rationale behind the derivation of thresholds?
5	Is there any supporting tool available to help region's understanding of deterioration rates and mechanisms of metallic structures?

RFI Question to Regions

#	To	RFI Questions
6	All regions	Provide the current states of metallic bridges in your region Asset Count & Conditions (a) Total number of metallic bridges (b) What is the average BCMI of metallic bridges? (c) What is the average BCMI of PLBEs for metallic bridges? (d) Total number of metallic bridges in poor conditions (i.e. BCMI < 40) or with poor PLBEs? (e) Total number of metallic structures that needs interventions (i.e. Strengthening, renewal/replacement, repair, painting). (f) Total number of metallic bridges with Temporary Speed Restrictions (TSR) (g) How many of metallic bridges with TSRs (Temporary Speed Restrictions) are planned with works in CP6 and CP7? Bridge Capability (h) How many of metallic bridges are with capability shortfall (i.e. Assessed Category B to F)? Provide status of compliance against timescales against NR/L2/CIV/035 and details of planned works. (i) How many metallic bridges are having inadequate capability for any existing Heavy Axle Weights Permissions (HAWP)? Provide status of compliance against timescales against NR/L2/CIV/035 and details of planned works.
7	All regions	With reference to Strategic Business Plan (SBP) submitted to ORR at the start of CP6, what are the total volumes (in number of assets) expected to be delivered for metallic structures by the end of CP6? What are the current delivery statuses of metallic structures' renewals in CP6? What are remaining for the rest of CP6? Provide reasons for underperformance and details of recovery plan.
8	Eastern	According to CP6 settlement document, there is addition funding for asset sustainability scheme allocated to metallic structures.

#	To	RFI Questions
		Ref: Scheme ID LNE003 Structures - core works upgrade (including Tunnels) - £35.8m (a) Please confirm if there have been changes in the above additional funding arrangement. (b) What is the status of additional spending allocated to metallic structures? (c) What are the current delivery statuses of those additional works planned for metallic structures? d. What are remaining works to metallic structures for the rest of CP6?
8	NW&C	According to CP6 settlement document, there is addition funding for asset sustainability scheme allocated to metallic structures. Ref: Scheme ID LNW04 Metallic Structures - £4.8m (a) Please confirm if there have been changes in the above additional funding arrangement. (b) What is the status of additional spending allocated to metallic structures? (c) What are the current delivery status of those additional works planned for metallic structures? (d) What are remaining works to metallic structures for the rest of CP6?
8	Scotland	Has there been any additional funding and works allocated by the region to improve sustainability of metallic structures in CP6? If yes, (a) Provide details of additional fundings and planned works for metallic structures. (b) What is the current status of additional spending allocated to metallic structures? (c) What are the current delivery statuses of those additional works planned for metallic structures? (d) What are remaining works to metallic structures for the rest of CP6?
8	Southern	According to CP6 settlement document, there is addition funding for asset sustainability scheme allocated to metallic structures.

#	To	RFI Questions
		Ref: Scheme ID SEA03 Reduced Metallic Structure Sustainability Package A - £20.7m (a) Please confirm if there have been changes in the above additional funding arrangement. (b) What is the current status of additional spending allocated to metallic structures? (c) What are the current delivery statuses of those additional works planned for metallic structures? (d) What are remaining works to metallic structures for the rest of CP6?
8	W&W	According to CP6 settlement document, there is addition funding for asset sustainability scheme allocated to metallic structures. Ref: Scheme ID RWES04 Structure interventions - £6.7m (a) Please confirm if there have been changes in the above additional funding arrangement. (b) What is the current status of additional spending allocated to metallic structures? (c) What are the current delivery statuses of those additional works planned for metallic structures? (d) What are remaining works to metallic structures for the rest of CP6? a. Please confirm if there have been changes in the above additional funding arrangement.
9	All regions	Describe how region is and will be evaluating work volumes, phasing and associated funding needed to meet specific demand and performance targets for metallic structures. For example, (a) What is region's strategy of metallic structures for the future control periods? (b) Provide region's CP7 plan and workbank for identified metallic structures that require interventions. The plan and workbank should include the list of identified metallic structures, type of interventions required, timescales for delivery, estimated volumes and costs.

#	To	RFI Questions
		(c) What does region consider when prioritising identified workbank for short term (CP7) and long term (beyond CP7)? What are factored additionally in long-term plan? (d) What maintenance approach does the region apply, to manage and control further deterioration of metallic structures?

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