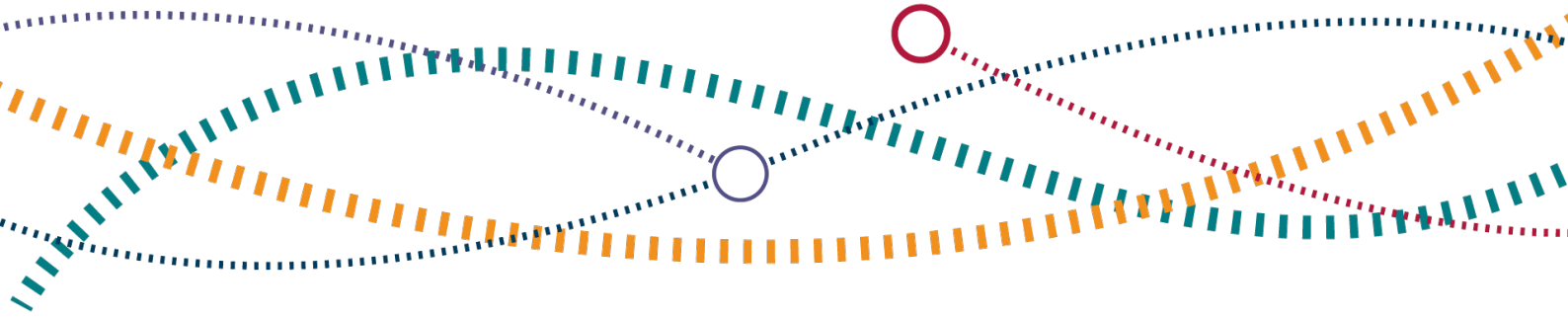
OFFICE OF RAIL AND ROAD

Network Rail Management of Lineside Buildings

Targeted Assurance Review

21 July 2023



Contents

Executive Summary

There are over 16,000 Lineside Buildings that currently or previously supported the railway network. More than 10,000 of them, which are of various construction forms, house equipment or personnel essential for operation of the railway. It is vital that Lineside Buildings are proactively maintained with clear understanding of their asset conditions and behaviours to protect both equipment and workforce who access and occupy them.

Through regular engagement with Network Rail, we became concerned about its management of Lineside Buildings which were not examined according to its standards. We undertook this Targeted Assurance Review to understand the compliance position and approach to examinations adopted by each region and to assess the corresponding impacts on the maturity of understanding assets and delivery of life-cycle activities.

Key Findings

Key findings identified from this review are:

- NR standard visual examinations requirements are less well understood by the regions, causing variable approaches to examinations and inconsistent capture of asset data.
- Due to a lack of up-to-date asset data and understanding of asset degradation over time, most regions were unable to demonstrate a robust risk-based approach at the start of this TAR to address their detailed examination backlogs (i.e. a non-compliance with NR standards).
- Examples collected in this review indicated significant opportunities to influence life cycle cost have been missed at the early phase of projects to reduce downstream costs, increase reliability and safety of Lineside Buildings.
- The challenges to gain access to work on operational Lineside Buildings have been compounded by regional reactive approaches to renewal investment. There is also a lack of a collaborative approach between projects and asset owners during the early phase of asset creation.
- There were limited examples demonstrating how regions strike the balance between the reuse and retrofit of Lineside Buildings versus demolition and new build, and their approaches to rationalise Lineside Building asset group. The practice being adopted to deliver Lineside Buildings could lead to a strategic risk in maintaining increasing

numbers of LSBs made redundant by projects and could impose challenges to apply circular economy principles to move towards net zero.

In summary, it is necessary for regions to establish a coherent long-term strategy for the sustainable management of Lineside Buildings, whilst improving their asset knowledge and understanding of risks arising from various types of buildings. The strategy should embed whole-life view and system-performance concept. There are also opportunities to benefit from a greater awareness of different needs and values of each asset discipline and coordinated approach at the early phase of life cycle at region level.

Recommendations

This review has made two recommendations to all regions and Technical Authority. ORR will maintain a close scrutiny of progress against strategies in each region through CP7.

Recommendation 1

Each region should establish a long-term asset management strategy to explain how it delivers life-cycle activities to make improvement in management of Lineside Buildings. The strategy should include timebound plans of actions such as proposed changes to be implemented during CP7 and towards PR28.

Specific considerations should be given to the findings identified in this report regarding:

- Examination approach and a regime to capture high quality asset data;
- Understanding of system behaviours of different types of Lineside Buildings;
- Risk evaluations; and
- Inter-disciplinary approach to deliver a life-cycle balanced system solution.

All regions are required to adhere to its recovery plan for examinations, with continuous review of data collected from examinations and regular reporting of their delivery progress to NR Central Function.

Recommendation 2

Technical Authority should undertake an independent assurance or engineering verification over regions' asset management strategies to ensure regions' approaches align with central policy asset objectives and are compliant with NR standard requirements.

1. Introduction

1.1 Purpose

1. The purpose of this Targeted Assurance Review (TAR) is to obtain assurance from Network Rail that:

    - it is adequately delivering life-cycle management, including of examinations and evaluations, of Lineside Buildings; and
    - a sustainable plan for future control periods is being developed for the asset group.

1.2 Background

2. In the Operational Property portfolio, there are more than 16,000 Lineside Buildings (LSBs) that currently or previously supported the network. More than 10,000 of them house equipment or personnel essential for operation of the railway and are categorised as “Critical” by Network Rail.

3. In 2021, Network Rail was fined after pleading guilty to an offence under the Health and Safety at Work Act, for failing to protect the safety of staff following an incident at Godinton substation in Kent at the end of 2018. It was found that Network Rail failed to maintain the condition of the building, which led to serious injury to a Network Rail employee.

4. Network Rail is required to achieve and comply with the timescales for Operational Property structures examinations and evaluation as stated in its Standard NR/L3/CIV/006. This requirement relates to Network License paragraphs 5.7 and 5.8. The information maintained under these conditions must be accurate and readily accessible.

5. There is increasing concern about Network Rail's management of Lineside Buildings, which were not examined in-depth before the Standard NR/L3/CIV/006 was updated in 2019. This concern centres around overall safety, operation and building-resilience. There is limited visibility to ORR of the regions’ route maps or glide paths for delivery of compliant examinations; and how associated risks to network operations are being mitigated and controlled to ensure safe and reliable operations. Additionally, according to the Network Rail Technical Authority Control Period 7 (CP7) policy, nearly 50% of staffed LSBs are in poor condition. One of Network Rail’s objectives is to reduce LSBs in the poor category to 25% by the end of CP7.

6. Failure to complete the examination process at the required intervals may result in faults being undetected or detected but not assessed by a competent person. Lack of understanding of the assets such as ages, condition, degradation, performance and risk profile will consequently introduce uncertainty into the railway system and impact on the ability to plan maintenance and renewal activities and develop a sustainable plan that balances investment over time.

1.3 Objectives

7. The objectives of this Targeted Assurance Review (TAR) are to:

- Understand the regions' strategies, roadmaps and delivery plans of Lineside Buildings examinations for compliance with Network Rail Standards;
- Assess the maturity of regions' understanding of LSB asset groups and criticality for work prioritisation;
- Assess the regions' approaches that are being and are to be implemented to deliver life cycle activities for LSBs in current and future control periods;
- Assess the associated impacts on planning interventions and long-term sustainability; and
- Obtain assurance that there is a "Line of Sight" or alignment between region's approach to monitoring condition and performance of Lineside Buildings. This is essential to inform strategies, work plans and asset policy for consistent management of top-down and bottom-up risks.

8. The above will be synthesised to inform whether Network Rail is adequately planning and delivering life-cycle management, as well as its readiness to plan works required in the Lineside Building asset group for CP7 and beyond alongside any financial or funding risks.

2. Assurance Approach

2.1 Scope

9. This scope of this TAR is limited to structural and fabric elements of Lineside Buildings (LSBs) asset group in the Operational Property portfolio.

10. This TAR focuses on Network Rail's approach, process and delivery of lifecycle activities for LSBs through evidence collection and assessments of the following areas.

- Compliance status and examination programmes for LSBs;
- Regions' current approaches and decision-making process for planning and delivery of examinations and interventions for LSBs;
- Regions' CP6 planned works for LSBs and associated delivery status; and
- Regions' approach for the management of LSBs and key outputs expected to be delivered in CP7 and beyond.

2.2 Methodology

11. The TAR is consolidated into two main parts:

- Collect asset policy, objectives and requirement from Technical Authority (TA) and the above information from Buildings Asset Management teams. This includes Request for Information (RFI) to both TA and five regions, and follow-up interviews with regions.
- ORR's assessment of the information above – this identifies any good practices and lessons learned. Recommendations will be made for improvements, where necessary.

3. Findings

12. The findings in this section have been collated from our engagement with the five regions through the RFI and follow-up interviews. The full list of questions included in the Phase 1 RFI to Technical Authority and regions can be found from Appendix A & Appendix B respectively.

3.1 Network Rail's categorisation of Lineside Buildings

13. Network Rail categorises Lineside Buildings into two main categories, "Critical" or "Non-Critical". Consistent responses from all five regions to our RFI indicated that:

    - "Critical Lineside Building" is classified primarily based on its criticality to the operation railway; and
    - any buildings that indirectly support the operation of railway such as stores, P-way huts, cabins are classified as "Non-Critical".

14. Only Wales and Western region responded explicitly that Critical Lineside Buildings are further sub-categorised into "occupied" or "non-occupied". The region confirmed that non-operational but permanently occupied Lineside Buildings are also classified as "Critical".

15. Technical Authority also clarified that originally the Operational Property Asset System (OPAS) database categorised Lineside Buildings (LSBs) as Occupied: Critical LSB, Unoccupied: LSB. The logic being that from a property perspective, risk to occupants rather than an operational railway is considered critical. Technical Authority added that it attempted to clarify that a Lineside Building could be "Critical" because it is occupied; or it is critical to the operation railway when standard NR/L3/CIV/006 was updated in 2019.

16. It is important to identify Lineside Buildings which are critical to the operation of the railway. However, sight must not be lost of any permanently occupied Lineside Buildings that do not provide direct support to the operation of the railway. Regions should ensure any permanently occupied Lineside Buildings are given the same attention as an occupied building to safeguard those working in the buildings.

3.2 Asset inventory

17. At the start of this review, a number of regions such as North West & Central, Southern, and Wales and Western were still undertaking data cleansing and site verification exercises. Most regions indicated that they have been using the “Lineside Building Mobile Application” tool developed by Technical Authority to accelerate the data cleansing process and support identification of Lineside Buildings on site.

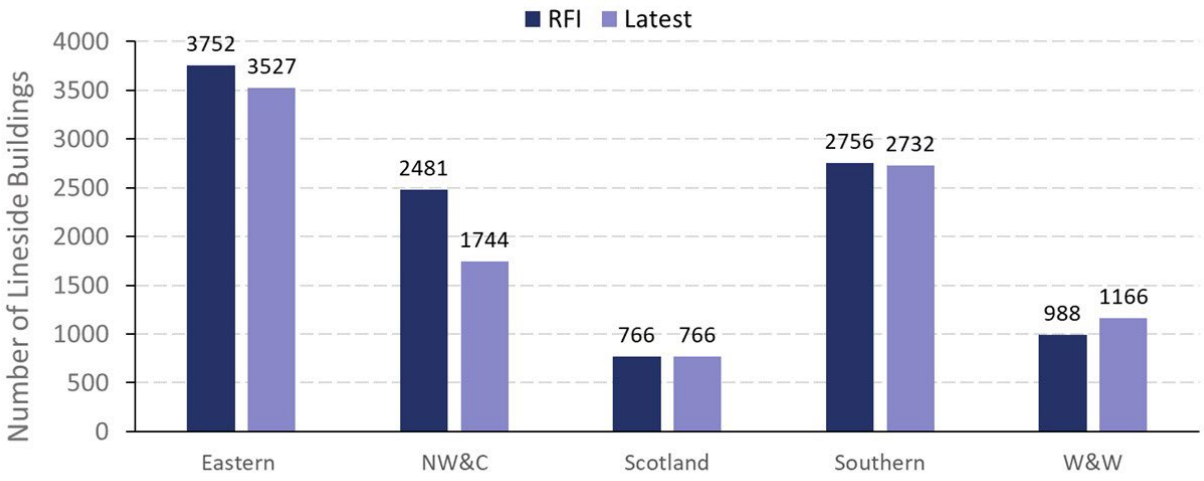
18. Evidence collected showed that the number of Critical Lineside Buildings in some regions has been refined throughout this review (Figure 3.1). This indicates that some regions were not able to maintain quality of data in their asset inventory records in the past, which resulted in duplicated or incomplete data.

19. We understand from the regions in the interviews that this is because either:

    - The planned demolition works of redundant Lineside Buildings were occasionally descoped at the later stage of Capital Delivery projects; or
    - Some new Lineside Buildings introduced by project teams were not handed over to asset owners (i.e. Regional Asset Managers) through the Network Rail defined Asset Management Plan (AMP) process.

    The associated influence on asset management will be discussed later (paragraph 62) in this report.

Figure 3.1 Changes in the number of Critical Lineside Buildings by regions throughout this TAR



3.3 Approach to examinations

3.3.1 Understanding of requirements & the impacts

20. Network Rail Standard NR/L3/CIV/006/03A[1] outlines the baseline examination requirements. A 5-yearly detailed examination and annual visual examination shall be undertaken for Critical Lineside Buildings. For visual examinations of Critical Lineside Buildings, the standard states that:

    "The Regional Asset Manager (RAM) shall undertake examinations unless through consultation with other parties that have examined the site or via maintenance activities, comparable condition information has been obtained and the RAM (B/C) is satisfied further examination is not necessary."

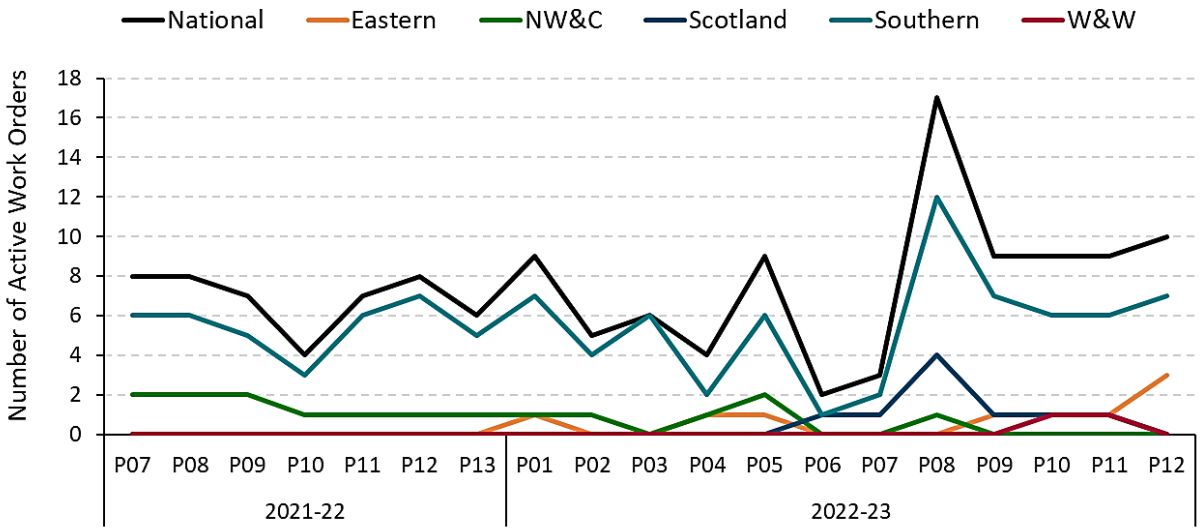
21. Technical Authority clarified that the intention of the above note is to provide flexibility to regions on the methodology used to collect asset data through visual examinations. While all regions are cognisant of the examination frequency requirements in their RFI responses, this review identified that varied approaches to visual examinations have been adopted by regions for Critical Lineside Buildings. We found that the requirement of "comparable condition information" is less well understood by all regions. During the initial interviews, most regions were unable to coherently explain how the requirement is met.

22. In the initial interviews, all regions responded that they have been using the assurance reports of "Active work orders of High-voltage (HV) wet sites" issued by Technical Authority (TA) as a key source of information to support their decision-making about examination prioritisation and management of works arising from faults (Figure 3.2). This assurance report is produced daily based on water leakage faults reported by frontline workforce at Lineside Buildings housing high-voltage (HV) equipment.

23. It was found that certain regions have been heavily relying on this reporting to inform them about asset failure (e.g. water leakage from roof) and carry out reactive maintenance as a result of failure to return Lineside Building to its normal operating condition. We consider this reactive "fault and fix" approach would not necessarily prevent safety risks due to failures in the first place. We expect regions to adopt a higher hierarchy of risk control to lessen the likelihood of failure through proactive planned examinations and interventions.

[1] 'Examination of Operational Property Structures and Fabric, issue 3'

Figure 3.2 Monitoring of "Active work orders of High-voltage (HV) wet sites" captured in Network Rail Technical Authority Assurance Report

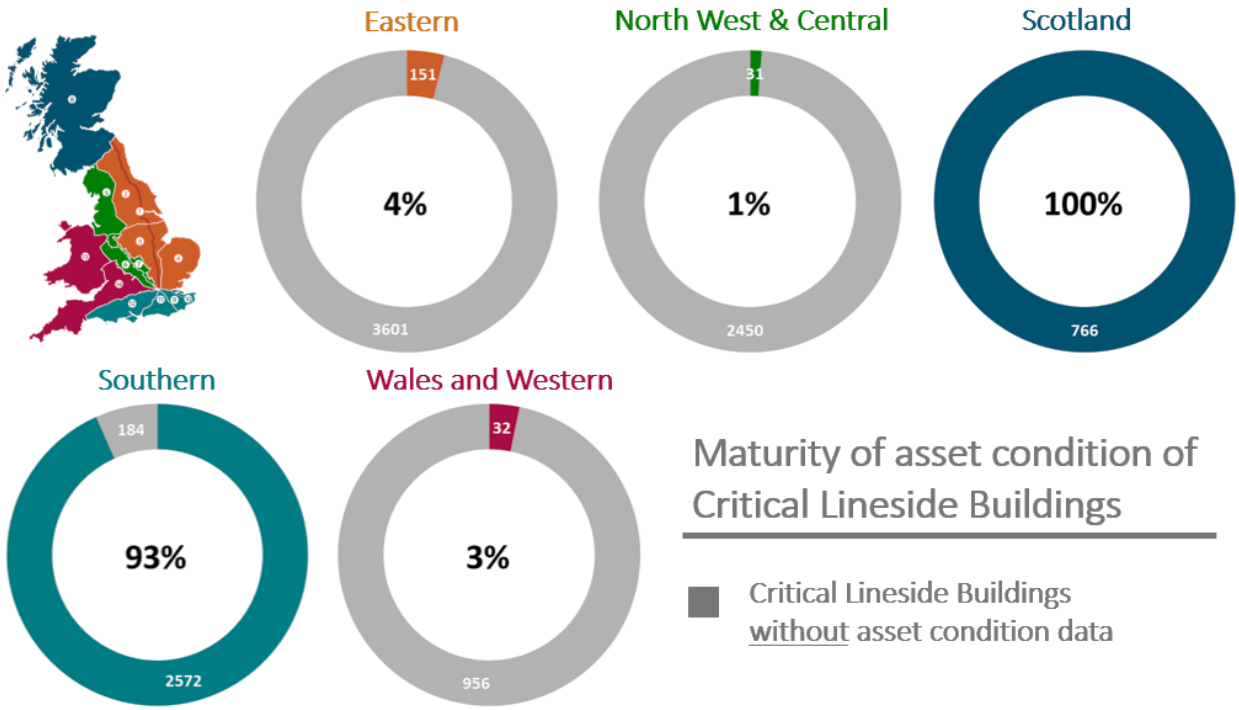


24. We also found that the lack of awareness of the "comparable condition information" requirement (paragraph 21) through visual examinations has impacted the quality or consistency of examinations undertaken, and consequently regions' maturity of understanding in asset conditions over time.

25. Figure 3.3 shows that, according to regions' responses to our RFI, almost 70% (c. 7200 in count) of Critical Lineside Buildings were <u>without</u> asset condition information at national level. We expect regions to take steps to improve their understanding of asset conditions, identify asset deteriorations and or defects through their ongoing examinations recovery programmes (paragraph 50), and take any required corrective actions in a preventative manner.

26. The data collected from our regular monitoring of NR's renewal profiles indicated that the lack of proactive monitoring of LSB conditions could have been impacting how regions' have been investing in Lineside Building throughout CP6 and business forecasting (paragraph 51). The changes in renewal profiles suggest that that most regions may have missed the optimal treatment-timing window to perform preventative intervention to restore their Lineside Buildings to a higher condition. This could consequently incur additional spending on reactive repairs when some Lineside Buildings start to deteriorate rapidly at later asset lifecycle.

Figure 3.3 Maturity of asset conditions (in %) of Critical Lineside Buildings by region, based on regions' responses to RFI



3.3.2 Region specific approach

Eastern and North West & Central

27. Both regions acknowledged in their responses to RFIs that annual visual examinations are to be undertaken for Critical Lineside Buildings. However, we found that only about 4% and 1% of Critical Lineside Buildings were with condition data in Eastern and North West & Central respectively (Figure 3.3). Their visual examination remits were not available at the initial interviews. Both regions were not able to articulate how "comparable condition" information is obtained through visual examinations in a consistent format.

28. Eastern confirmed that Critical Lineside Buildings with high-voltage (HV) equipment had all been inspected with no high-risk defects identified. In addition, it responded that its "Project Initiation Document" produced in 2009 aimed to provide a consistent approach to building fabric planned preventative maintenance (PPM) for the Operational Property portfolio in London North East (LNE) route before devolution. Eastern added that asset information has been collected since the development of the document. Nevertheless, at the RFI stage of this review, we did not see sufficient evidence of review of asset information performed by the region to inform their

decision making on prioritising sites for detailed examinations (paragraph 48). Similar issue was also found in North West & Central.

29. We expect all regions should review information collected in the past together with those collected from its ongoing visual and detailed examinations and used intelligently, for example condition of buildings over time would give indication of how the building is degrading and whether particular construction forms of buildings could be vulnerable and sensitive to external factors such as environmental changes.

30. Subsequent to our concerns raised about robustness of risk prioritisation, Eastern took further steps to accelerate, refine and finalise the visual examination remits, as part of its detailed examination recovery programme (Section 3.4). Similar approach was followed by North West & Central region. At the time of writing of this report, Eastern informed that its “enhanced visual examinations” had been completed and has started reviewing the outcomes of visual examinations.

Scotland

31. Scotland confirmed that its Building asset management (AM) team carries out planned site visual inspections quarterly as minimum for its Critical Lineside Buildings in conjunction with its in-house maintenance team, especially for those buildings that house high-risk equipment’s and need permit to access. In comparison, we found that Scotland has established a closer engagement with other asset disciplines when planning their access and inspections. This was reflected in its better consideration in saving additional isolation costs by aligning its examination (i.e. CEFA) contract with Electrification & Plant (E&P) Planned Preventative Maintenance activities.

32. Scotland responded that it aims to fulfil the Standard NR/L3/CIV/006 requirements of visual examinations with its “Process Documents”, which outlines the process to identify early defects of all types of LSBs and was briefed to Signalling & Telecom (S&T) and E&P disciplines. The region indicated that it currently relies on 5-yearly detailed examination to collect condition information of Critical Lineside Buildings and considered capturing asset condition data in visual examination to be “resource-driven” and challenging to its Operational Expenditure (OPEX).

33. Scotland provided further evidence that it has been using insulated pole and GO Pro cameras to collect video footages of high-voltage substations to monitor asset conditions as part of their visual examinations. The region explained defects are monitored and managed through RAM team site inspections undertaken quarterly for Critical Lineside Buildings and bi-weekly checklist report produced under maintenance contract for Non-Critical Lineside Buildings.

34. Data collected from the RFI indicated that the average condition of Scotland's Critical Lineside Buildings is "fair" with Percentage Asset Remaining Life (PARL) of 61%. We recommend that it is prudent for Scotland to perform a review of its current practice to record asset condition data through visual examinations to enable comparison and a closer monitoring of LSB deterioration over time.

Southern

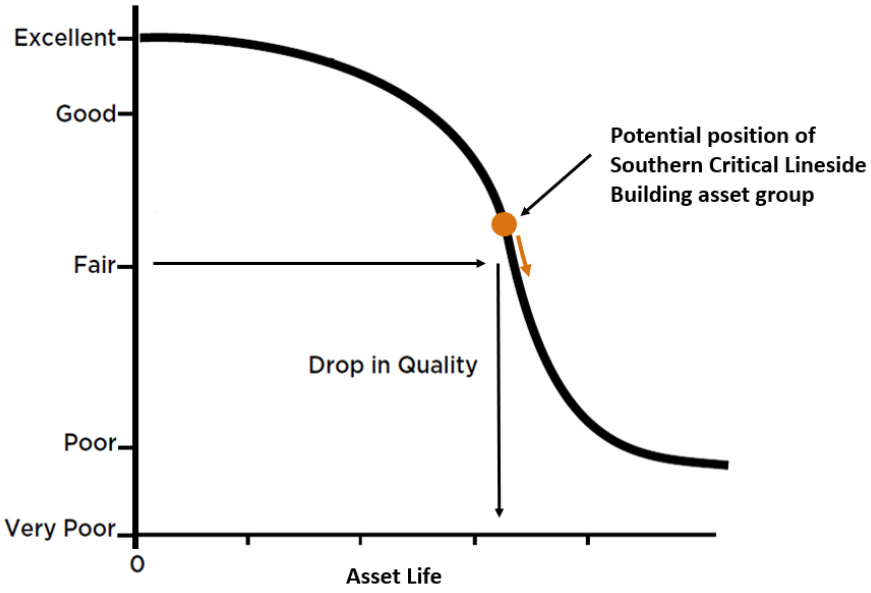
35. Southern responded that it has been undertaking annual visual examinations for all types of Lineside Buildings. The region is cognisant of its risk profile due to high number (c.1000) of LSBs with high-voltage equipment. This was reflected in its approach to detailed examinations that have been enhanced from every five years to annual basis for all types of LSBs, alongside implementation of humidity remote monitoring programme at c.500 Lineside Buildings in Kent and Sussex routes.

36. Data collected in RFI indicated that about 93% of its Critical Lineside Buildings in Southern are with condition data. While the region indicated that the average (weighted) condition score of Critical Lineside Buildings is in fair condition (with SSM score of 1.85 which is roughly equivalent to PARL of 51%), the average condition is at margin and would become poor without preventative interventions. In addition, we identified from Technical Authority assurance reports that the number of active work orders arising from high-voltage wet Lineside Buildings in Southern is still steadily high compared to the rest of network (Figure 3.2).

37. Southern indicated that it had started a programme for roofing of Lineside Buildings since CP4 to reduce the number of poor conditioned Lineside Building in Kent and Sussex routes. Despite the increase in its investment into Lineside Buildings throughout CP6 (paragraph 54) at region level, Southern still expected the number of poor-conditioned Lineside Buildings in Wessex route will increase.

38. Based on the evidence collected in this TAR, we considered that Lineside Buildings in Southern could have entered a stage with increasing rate of aging which has impacted asset integrity and resulted in relatively high number of faults (Figure 3.4). We are aware of region's implementation enhanced examination regime, including remote monitoring of humidity to stay on the top of water leakage events in Lineside Buildings, but these would not be sufficient to manage risks arising from rapid asset deterioration. Moreover, reactive repairs as a result of reported faults are not sustainable over time.

Figure 3.4 A situation of asst deterioration that this review considered Southern would have been experiencing



39. It is vital for Southern to gain a more comprehensive understanding of asset deteriorations. We expect the region to exercise particular care in reviewing effectiveness of its current approach and performance of Critical Lineside Buildings with output and asset stewardship measures collected to date, such as asset condition, expenditures, reported faults or failure rates etc. Based on outcomes of the above review, the region should develop a long-term time-bound asset management strategy that covers its long-term vision, targets of achievement and tangible actions required, including long-term investment, to address asset deteriorations in a proactive manner.

40. Towards the end of this review, Southern has been drafting its asset management strategy of Lineside Buildings. We expect all regions should consider the findings from this TAR to inform and establish their management strategy and plan for Lineside Buildings, as part of the recommendation made in this report.

Wales and Western

41. Wales and Western indicated that they did not have many critical Lineside Buildings with HV equipment at the initial interview. However, following our close monitoring of the region's examination recovery plan development and the supports given by Technical Authority to identify assets, its number of Critical LSBs has increased by 18%. In our opinion, the region under-estimated its portfolio size and potentially the associated risks.

42. We raised our concerns that Wales and Western has been behind in terms of putting a plan to address their detailed examination backlog. This resulted in us escalating the issue with NR senior management during this TAR. At the time of writing of this report, we are continuing to monitor the region to ensure sufficient progress made to implement its risk mitigation plan endorsed by Technical Authority.

43. Overall, we are aware that the updates of Network Rail Standard in 2019 provide flexibility to regions in the methodology used to collect asset data through visual examinations. Nevertheless, we found that regions' approach to visual examinations were not sufficiently robust and comprehensive to obtain "comparable condition information" as part of NR standard requirement.

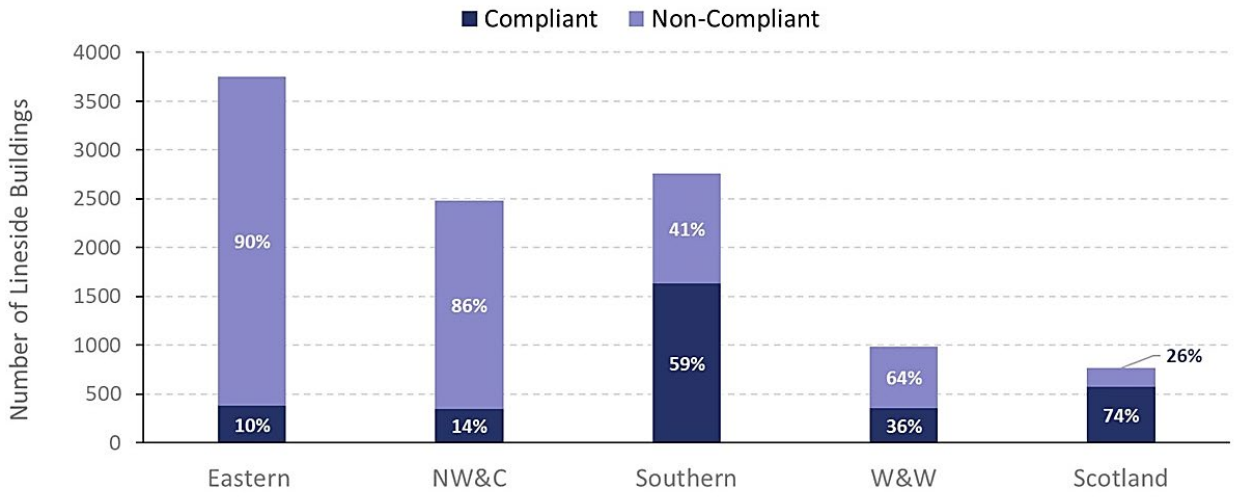
44. Given the likely application of the flexibility allowed in the current NR standards discussed above (paragraph 21), we expect each region to develop a clear asset management strategy for Lineside Buildings. This is to provide assurance that decisions made by regions on maintenance and renewal (M&R) investment are sound, structured and supported by:

- high quality asset knowledge of active and potential threats to asset integrity;
- risk evaluation; and
- a clear understanding of what ways different building construction forms can fail to fulfil its functions and associated causes and which existing forms are prone to systematic building failures.

3.4 Examination compliance position

45. The evidence collected during RFI stage of this TAR has brought our concerns about regional compliance status of examinations. We identified that all five regions were having backlogs of detailed examinations for Critical Lineside Buildings (Figure 3.5).

Figure 3.5 Compliance status of detailed examinations for Critical Lineside Buildings by regions at RFI stage



46. We therefore have implemented close monitoring of all regions to ensure all necessary steps taken by regions to address its detailed examination backlogs. These include their applications to Technical Authority for NR internal Temporary Variation (TV) which covers, but is not limited to, a time-bound recovery programme and a robust plan to manage associated risks arising from backlog. Scotland was the first region which approached Technical Authority for TV application.

47. During our monitoring, we looked into regions' approach to risk-prioritise their building sites for detailed examinations. Most regions indicated that they were adopting "risk-based" approach to eliminate their examination backlogs with the following sources of information to support their decision making in prioritisation of sites.

- Technical Authority assurance report of "Active work orders of High-voltage wet sites" (paragraph 22);
- Faults raised by other disciplines;
- Electrification & Plant asset data in Ellipse asset management system showing equipment housed; and
- Knowledge of asset management team with respect to conditions.

48. However, we found that the described approaches were generally at high-level and decision to prioritise sites for their detailed examinations not fully informed due to lack of asset conditions collected to date identified earlier (Figure 3.3). We had concerns whether the described information sources would be sufficient and

proportionate to the level of risks. We therefore requested regions to take a proactive and accelerated approach to identify sites that need urgent attentions and potential corrective actions rather than heavily relying on reactive fault reporting.

49. Eastern subsequently had a more advanced discussion with Technical Authority during its application for a TV against NR Standards. As part of its risk mitigation measures, with NR Technical Authority's assurance, Eastern put an additional programme in place to perform "enhanced" visual examinations (VEs) for its Critical Lineside Building sites in parallel with other detailed examination being taken place. The region also implemented an instant electronic reporting system to review visual examination results and respond more efficiently. Its review of VE outcomes will then be used to support prioritisation of detailed examination sites. Eastern was due to complete its VE programme by the end of Year 4 (i.e. March 2023), which was informed as completed at the time of writing of this report.

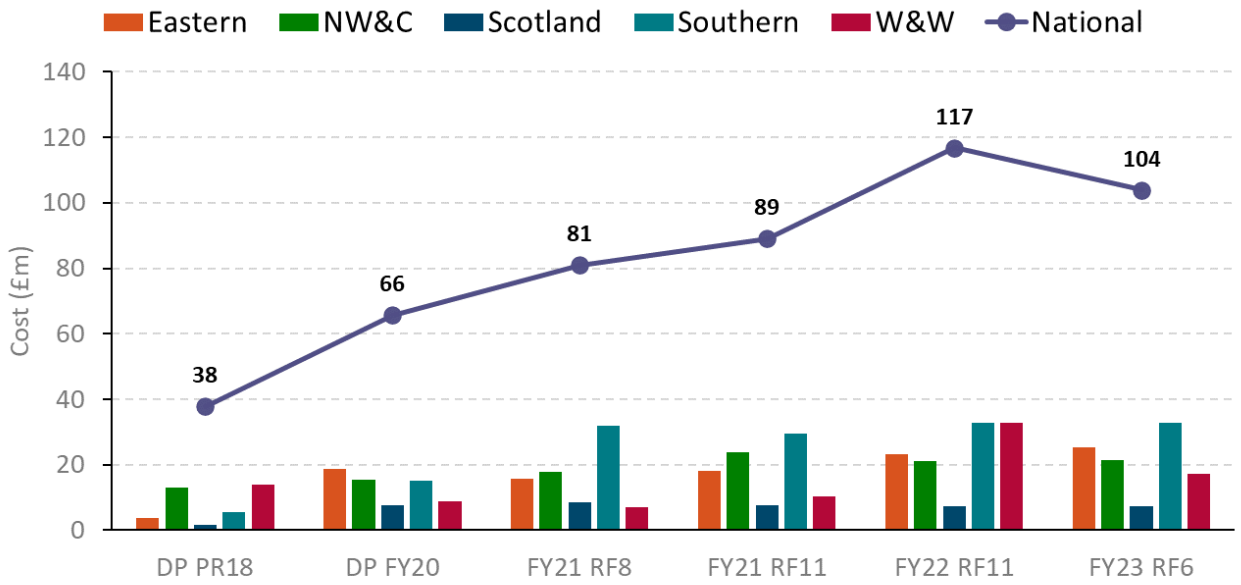
50. Both North West & Central and Wales and Western were adopting a similar approach to Eastern to support prioritisation process. All regions, following our close monitoring during this review, had established a time-bound recovery programme for their Critical Lineside Building detailed examinations. We require all regions to adhere to their recovery plans, with continuous review of data collected from examinations and regular reporting of their delivery progress to NR Central Function (i.e. Technical Authority).

3.5 Getting a whole life view

3.5.1 Approach to renewal planning and delivery

51. Based on the data collected from our regular monitoring of Network Rail rolling forecast (RF) of renewal plans (Figure 3.6), we identified that the renewal profile of Lineside Buildings in the Financial Year 2022-23 (FY23) Rolling Forecast (RF6) has increased by 175% when compared to the delivery plans submitted in Periodic Review 2018 (PR18). As part of this TAR, we gathered details of interventions delivered by regions during CP6.

Figure 3.6 Changes of C6 renewal profile for Lineside Buildings



52. In the interviews, we found that vast majority of CP6 interventions undertaken by regions for Lineside Building are refurbishment and/or minor works - either reactive or planned repairs. Types of interventions vary across regions, which could be local renewals, repair or water-proofing application to existing roof, improvement to heating and ventilation system, upgrade to LED lighting, repairs of doors and windows etc. Overall, there have been very limited full renewals undertaken to date in CP6.

53. In comparison, only Scotland confirmed that it has a defined workbank for Lineside Buildings for CP6, which was reflected by its steady spending throughout CP6 (Figure 3.6). Scotland also responded that its CP7 plan being prepared at the time of interview would be able to achieve NR Central Asset Policy objective to reduce the number of poor conditioned Lineside Buildings by the end of CP7. A good practice of cross-working was identified in Scotland Building Asset Management team, which has been participating in the review of regional signalling strategy and working collaboratively with S&T asset disciplines to plan its Lineside Buildings renewal schemes.

54. Southern has invested considerably more than other regions throughout CP6 (Figure 3.6), but the region indicated that there was no clear-defined list of sites for the budget as most of the works undertaken in CP6 to date have been reactive.

55. Southern current understanding of asset life extension given by interventions, such as coated damp proof membrane, is based on (theoretical) design life specified by

manufacturers. However, asset life could have been impacted by operating environment ranging from extreme storms to birds pecking at membrane if preventative maintenance (including repairs) was not undertaken before the design life has been reached. As discussed earlier (paragraph 38 & 39), we expect Southern to take further steps to review effectiveness of its current asset management practice with output and stewardship measures and to identify impacts resulted from its potential concurrent rapid and non-linear degradation.

56. In the interviews, all regions indicated that gaining access to work on operational infrastructure as one of the key constraints to manage Lineside Buildings. However, we have not yet seen tangible action plan in place to seek for a better cross-disciplinary working in most regions. The challenges to undertake required interventions in a timely manner in an operating environment are further compounded by the reactive approach to CP6 renewal investment and business forecasting due to lack of asset condition data to date in most regions (paragraph 24, 25 & 26).

57. To maximise the opportunity to deliver required maintenance works efficiently (i.e. moving from reactive to proactive approach), regions are required to improve their asset knowledge through their ongoing examination recovery programme and gain a robust understanding of the potential failure modes of Lineside Buildings of various construction forms – this should form part of the inputs to the development of their long-term asset management strategy (paragraph 44) covering but not limited to advance planning of works, investment and the required access.

3.5.2 The need of system-based thinking

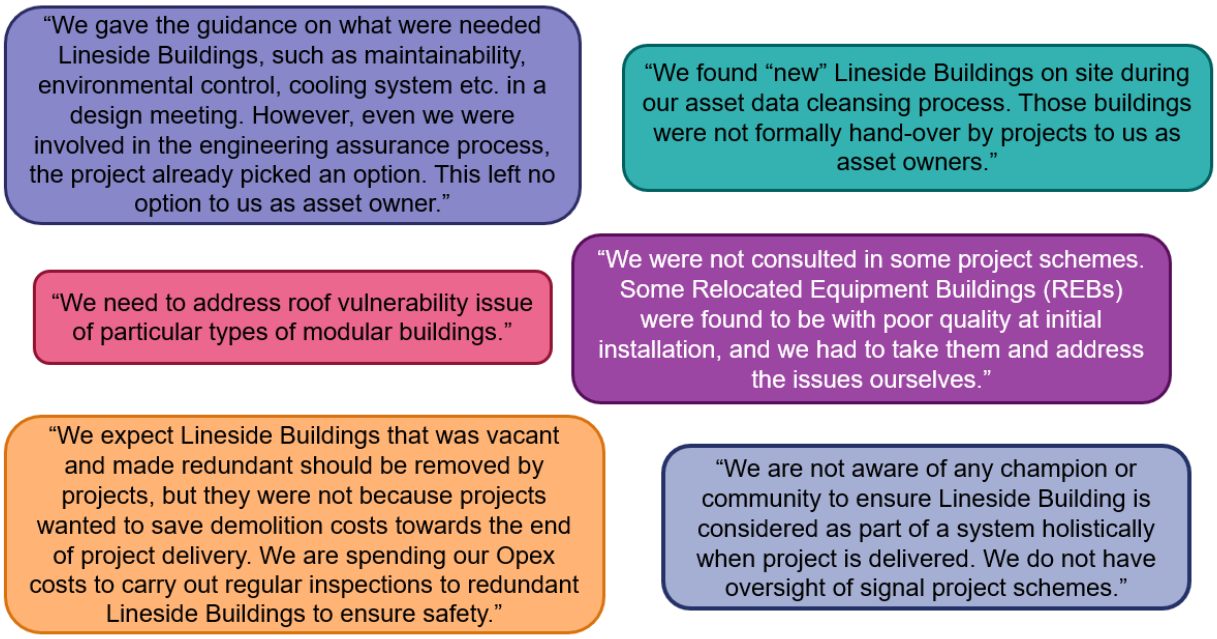
58. Following the Godinton substation incident in 2018, all Building RAMs indicated their cognisance of the impact of flat roof design on long term maintenance and operation of Lineside Buildings and the importance of effective roof drainage system.

59. Nevertheless, most regions are focusing on how building components or building systems function individually. We note that Scotland demonstrated a better understanding of how selection of fabric products could make positive impact on system performance with its trial of “Lineside Building WRAP” innovation system developed by Technical Authority. The region has proven the trial to be successful in term of performance of both the building and equipment being housed under the extreme hot weather in 2022.

60. We are also aware of other ongoing works such as development of technical specifications in North West & Central and CP6 sustainability workbank in Anglia to

consider how the fabric and energy efficiency of Lineside buildings affects energy use. However, to date, we have not yet seen a clear overarching strategy at region level to consider Lineside Building as a holistic system. We would expect all regions to demonstrate a strategic approach to consider how materials, components, sub-system and building systems will perform individually and together to maintain safety and performance, including improve building resilience to extreme weather events.

Figure 3.7 Feedback collected from Building RAMs regarding early opportunity missed to influence life cycle cost



61. Various feedback collected from regions' Building RAMs (Figure 3.7) highlighted that "system thinking" was not consistently applied by project delivery teams to engineering design and management in repeated occasions.

    - Robustness, durability and resilience (including impact of installation quality) of Lineside Building were not adequately controlled or valued in design and/or construction stage by projects. This consequently impacted long-term maintenance and operation of buildings as well as reliability and safety of equipment inside.

    - Practice adopted by various project delivery teams was not considered to be participatory to enable interests of all stakeholders such as Building RAMs to be included explicitly in decision-making process.

62. We considered significant opportunities that can influence life cycle cost have been missed at early phase to reduce downstream costs and increase asset reliability and

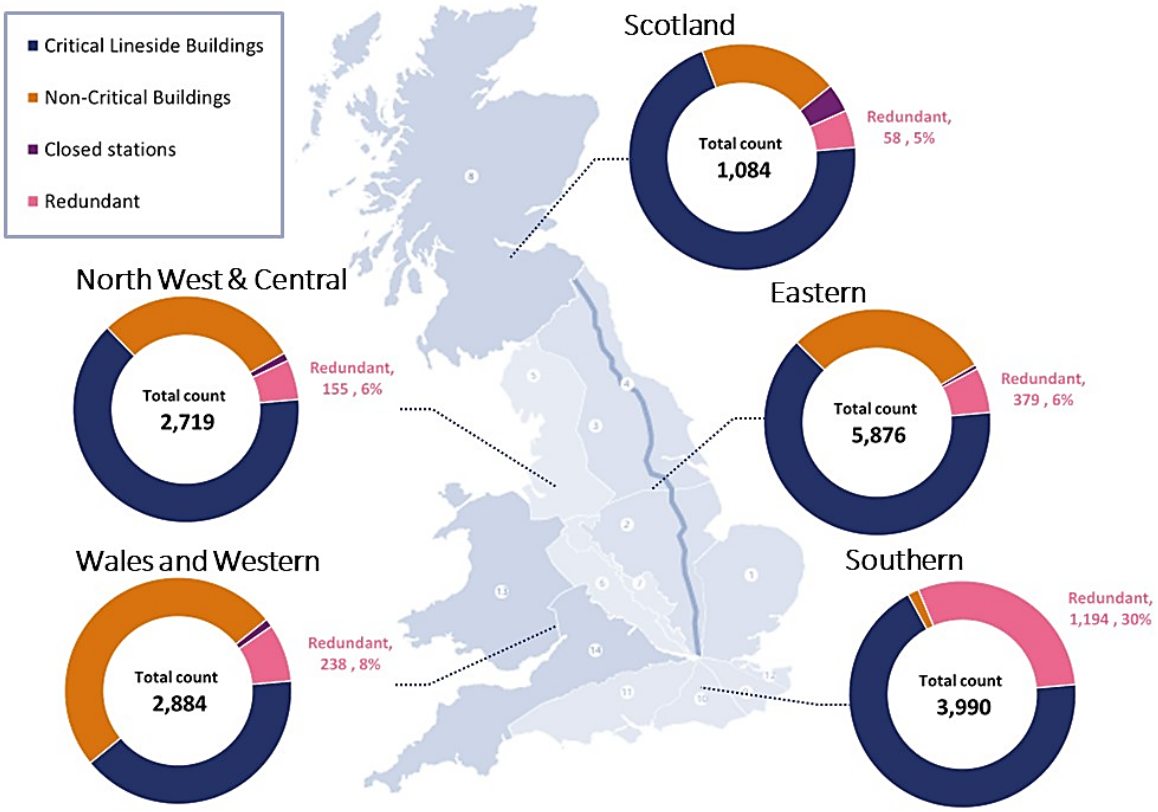
safety. For example, corrective maintenance workload and costs, which are incurred over the longest period of time, of Lineside Buildings could be significantly influenced by installation quality.

63. Alongside adherence to defined handover process after project completion, each region as a whole is required to have a greater awareness and understanding of different needs and values of each asset discipline when delivering life cycle activities. To ensure outcomes required by users and owners are delivered, we expect the leadership in each region should take steps to further promote integration of whole life view, for example with more design and construction attentions to asset operation and maintenance throughout life, and have “system thinking” embedded into decision-making process.

3.5.3 Asset rationalisation and disposal

64. According to the data provided by regions in RFI stage, about 12% (c.2024 in count) of Lineside Buildings across the network are classified by regions as “redundant buildings” which are not in use (Figure 3.8).

Figure 3.8 Number and distribution of redundant Lineside Buildings by region



65. In response to our questions around decommissioning strategy and asset rationalisation plan for Lineside Buildings, most regions indicated that their decommissioning approaches vary depending on the types of assets, for example whether it is listed buildings, and funding allocations.

66. All regions responded that re-commissioning, repurposing or demolition of redundant LSBs did not always happen. Therefore, redundant LSBs generally remain in mothballs with required maintenance implemented to maintain asset safe. For example, Southern indicated that about 60% of its redundant LSBs are concrete Lineside Huts[2] that are disused and usually not suitable to re-use for installation of new equipment. It was noted that the design of these Lineside Huts varies significantly, as does the nature of the construction materials used, and are in various stages of degradation.

67. All regions indicated that redundant LSBs, that cannot be re-used or re-purposed, could be demolished or removed as part of large-scale enhancement projects. However, occasionally constrained project funding could result in demolition works "descoped" by delivery teams towards the end of projects due to relatively high short-term demolition cost like Lineside Huts in Southern.

68. Regions' RAM teams added that project decisions were sometimes made without effective consultation. This has consequently put the asset management burden on building asset owners (i.e. to manage the new build LSBs and continue to maintain existing LSBs made redundant by projects). Eastern indicated that maintenance and operating costs being spent on redundant LSBs will be an area of focus for its routes.

69. On the other hand, regions presented some examples of how they consider future demand and stakeholder requirements when deciding to retain or remove redundant LSBs. Nevertheless, most regions indicated that they were exceptional examples.

    - Eastern engaged with other asset disciplines assessing future needs of Lineside Buildings in Northumberland Line project. This resulted in seven signal boxes made redundant. The region is working with signalling discipline to look at the feasibility of repurposing or removing of these signal boxes.

    - North West & Central engaged with its Property team and external stakeholders to repurpose redundant LSBs for accommodation use of

[2] Lineside Huts, such as P-way Huts (also known as Platelayer Huts) and Fog Huts, were designed to store the tools and equipment used by workers; and to provide those workers to shelter.

community use. An example was Cumwhinton Former Station Waiting room reused and retrofitted into holiday homes and apartment.

- Southern has a couple of redundant S&T LSBs scoped to be demolished near to Southampton in Wessex route.
- Scotland removed some redundant signal boxes following engagement with Barrhead and East Kilbride line rail electrification enhancement projects.

70. In this review, we also sought to understand if there are any substandard or degrading redundant LSBs being retained that are providing excessive capacity than the portfolio needs, putting pressure on regional spend to maintain them or incurring unnecessary maintenance. Most regions responded that there would be a risk to asset management and indicated the needs of a long-term management strategy, especially for retention of listed redundant LSBs. However, we did not see examples of interim measures, such as restricting access, in place to support balance between costs and risks arising from redundant buildings. We are also aware that Technical Authority produced a design guidance on "Redundant Signal Box Strategy", but none of the regions referred to it during this review.

71. Overall, we did not see sufficient examples demonstrating how regions strike the balance between the reuse and retrofit of Lineside Buildings versus demolition and new build, and their approaches to rationalise Lineside Building asset group. The practice being adopted by regions and engagement between project team and asset owners (paragraph 61 to 63 and 67) could lead to a strategic risk to maintain increasing numbers of LSBs made redundant by projects and potentially impose challenges to apply circular economy principles to move towards net zero.

72. Deferring re-commissioning, repurposing or demolition decisions could, at times, be achieved if maintenance regimes are adjusted to manage potential failures or risks. We expect each region needs to be open and transparent with relevant stakeholders such as asset owners about such project decisions made, stating the reasons for the decision and what agreed measures will be deployed as effective as possible to:

- minimise long-term impact on maintenance requirement; and
- manage potential risks and opportunities of existing LSBs.

4. Conclusions

73. Lineside Buildings are crucial assets to support the railway network. More than half of them house equipment or personnel essential for operation of the railway. This TAR report provides an assurance review over Network Rail's management of its Lineside Buildings.

74. The evidence collected in this TAR has raised concerns around regional maturity of asset inventory, approach to examinations, compliance position against NR company standards and approach to manage life-cycle activities. We concluded that a clear "Line of Sight" between the approach to monitoring condition and performance of Lineside Buildings cannot be identified in most regions from this review. The key findings from this TAR are as follows.

Approach to examinations

75. Regular visual examinations undertaken between detailed examinations should provide an opportunity for examining engineers to inspect for any change in defects previously identified and record any new defects found. We found that regions were adopting varied approaches to visual examinations for Critical Lineside Buildings, as NR standard requirements were less well understood by regions. This has consequently impacted quality and consistency of examinations undertaken, maturity of understanding in asset degradation over time and how regions prioritised building sites for detailed examinations.

76. While we are aware that the opportunity allowed in the current NR standards to give flexibility to regions in the methodology used to collect asset data through visual examinations, the decision made by regions must be sound, structured and supported by high quality of asset knowledge and risk evaluations.

Examination compliance

77. All five regions were identified with backlogs of 5-yearly detailed examinations for their Critical Lineside Buildings during this TAR. Approaches to eliminate examination backlogs were found to be not sufficiently robust in most regions due to lack of data collected to date. Following our close monitoring, all regions have made further progress and improvement in their recovery programmes and risk mitigation measures with Technical Authority's assurance.

78. It is important for regions to adhere to their delivery plans, perform rolling review of asset information collected and apply analysis outcomes intelligently for risk

management and establishing a robust understanding of the potential failure modes of Lineside Buildings of various construction forms.

Approach to life-cycle activities

79. Consistent responses indicated that gaining access to work on operational infrastructure as one of the key constraints to deliver works for Lineside Buildings**.** However, this challenge has been further compounded by regional reactive approach to renewal investment and business forecasting due to lack of good quality of asset knowledge. The changes in renewal profiles throughout CP6 suggest that most regions could have missed the optimal treatment-timing window to perform preventative interventions to restore their Lineside Buildings to a higher condition. This could consequently incur additional spending on reactive repairs when some Lineside Buildings start to deteriorate rapidly at later asset lifecycle.

80. This TAR identified that Scotland has demonstrated a more proactive approach in renewal planning and a better cross-asset working practice. To maximise the opportunity to plan and deliver required maintenance works efficiently, regions are required to improve their asset knowledge through proactive examinations.

System-based thinking

81. The Godinton substation incident drives Building asset management teams' awareness of impact of vulnerable building design on maintenance and operation. However, our observation indicates that most regions have been focusing on how building components or systems function individually. We have not seen a clear overarching strategy at region level to consider Lineside Building as a holistic system. We included an example which highlighted a good understanding of how selection of fabric products could make positive impact on system performance in Scotland.

82. Feedback collected in this TAR also shows that "system thinking" was not consistently applied by project delivery teams to engineering design and management. Significant opportunities that can influence life cycle cost have been missed at early phase of projects, such as specifying and installing LSBs, to reduce avoidable downstream costs and increase asset reliability and safety.

Whole life view

83. Alongside other findings related to the delivery of life-cycle activities described above, there were not sufficient examples demonstrating how regions strike the balance between the reuse and retrofit of Lineside Buildings versus demolition and new build, and rationalisation of the Lineside Building asset group.

84. Deferring, re-commissioning, repurposing or demolition decisions could, at times, be achieved if maintenance regimes are adjusted to manage potential failures or risks. It is important that those decisions made by project delivery teams were open and transparent to ensure agreed measures will be deployed as effective as possible to minimise long-term impact on operation and maintenance and manage risks and opportunities of existing LSBs.

85. In summary, it is necessary for regions to establish a coherent long-term strategy for sustainable management of Lineside Buildings, whilst improving their asset knowledge and understanding of risks arising from various types of Lineside Buildings. The strategy should embed whole-life view and system-performance concept. There are also opportunities to benefit from a greater awareness of different needs and values of each asset discipline and coordinated approach at the early phase of life cycle at region level.

5. Recommendations

This review has made 2 recommendations. We intend to monitor Network Rail's progress and actions to address these recommendations.

Recommendation 1: Long-term asset management strategy

The intent of this recommendation is for Network Rail to have a clear strategy that supports a sustainable management of Lineside Building assets and ensures decisions made are sound, structured and risk-assessed.

Each region should establish a long-term asset management strategy to explain how it delivers life-cycle activities to make improvement in management of Lineside Buildings. The strategy should include timebound plans of actions such as proposed changes to be implemented during CP7 and towards PR28.

Specific considerations should be given to the findings identified in this report regarding:

- Examination approach and a regime to capture high quality asset data;
- Understanding of system behaviours of different types of Lineside Buildings;
- Risk evaluations; and
- Inter-disciplinary approach to deliver a life-cycle balanced system solution.

All regions are required to adhere to their recovery plans for examinations, with continuous review of data collected from examinations and regular reporting of their delivery progress to NR Central Function.

Owner: Regional DEAMs **Expected timescale: by the end of CP7 Year 1**

Recommendation 2: Independent assurance over regions' asset management strategy

The intent of this recommendation is to ensure a clear line-of-sight between Network Rail central policy or standards and regional approach in managing Lineside Buildings.

Technical Authority should undertake an independent assurance or engineering verification over regions' asset management strategies to ensure they align with central policy asset objectives and are compliant with NR standard requirements.

Owner: Technical Authority **Expected timescale: by the end of CP7 Year 2**

Glossary & Definitions

Glossary & Definitions	
ALE	The asset life expectancy (ALE) is defined in the Network Rail asset policy according to the type of asset and its average usage.
ARL	Asset Remaining Life (ARL) is obtained based on the physical inspection of an Operational Property asset.
ARS	Average risk score (ARS) is a score for impact on safety and performance in the event of failure. The score is calculated based on surveyor's inputs[3] into Operational Property Asset System (OPAS), following asset's annual inspection or detailed examination.
CEFA	Civil Examination Framework Agreement (CEFA).
CP	A control period (CP) is the period to which an access charges review (e.g. a periodic review) applies. Control periods are typically five years in length, but maybe shorter or longer depending on what the regulator decides as part of the review.
CP4	Control Period 4 (CP4) is from April 2009 to March 2014.
CP6	Control Period 6 (CP6) is from April 2019 to March 2024.
CP7	Control Period 7 (CP7) is from April 2024 to March 2029.
CRAM	Corporate Risk Assessment Matrix (CRAM) is a matrix which is referred in Network Rail Standard NR/L2/HAM/02001 to carry out risk assessment on four impact areas namely Safety / Health / Environment, Performance, Finance, Satisfaction & Reputation.

[3] Factors are defined in Network Rail Standard NR/L2/CIV/006/03G.

Glossary & Definitions	
CRI	Composite Reliability Index (CRI), also known as Building Reliability Index (BRI) in the Operational Property portfolio. CRI is measured by the total number of reactive faults requiring urgent intervention.
CSI	Composite Sustainability Index.
DEAM	Director of Engineering and Asset Management.
DUs	Delivery units (DUs) are Network Rail's maintenance teams based in geographic locations across its network.
E&P	Electrification and Plant.
FY	Financial Year.
HV	High-voltage.
LSB	Lineside Building.
NR	Network Rail.
OP	Operational Property (OP) is an asset portfolio comprised of five key building management models which are Stations (Managed Stations & Franchised Stations), Light Maintenance Depots, Maintenance Delivery Units, Route Services (Supply Chain Operation) and Lineside Buildings.
OPAS	Operational Property Asset System (OPAS) is a database where inventory and condition information on Operational Property assets are held.
OPEX	Operational Expenditure.
OPIs	Operational Property Inspections, also known as visual and/or detailed examinations.

Glossary & Definitions	
ORR	Office of Rail and Road.
PARL	The percentage of asset remaining life (PARL) is calculated by dividing the asset remaining life (ARL) by the asset life expectancy (ALE). Asset life expectancy is defined in Network Rail asset policy according to the type of asset and its average usage. PARL is used as measure of asset condition in Operational Property portfolio.
PPF	Putting Passengers First (PPF) is a programme announced by Network Rail in June 2019. The programme aims to support Network Rail's ambition to have the skills, culture and focus to put passengers and freight users at the core of everything it does.
PR18	The 2018 periodic review of Network Rail (relating to CP6)
PR23	The 2023 periodic review of Network Rail (relating to CP7).
RAM (B/C)	Region/ Route Asset Manager (Buildings/ Civil).
Region	Network Rail’s five operating regions – Eastern, North West & Central, Scotland, Southern and Wales and Western.
RF	Rolling forecast.
RFI	Request for Information.
RPP	Railway Planning and Performance.
SFO	Station Facility Operator.
SSM	Station Stewardship Measures.
S&T	Signalling & Telecom.

Glossary & Definitions	
TA	Technical Authority (TA) is a central business unit within Network Rail that, among other things, sets technical policies and standards for the routes, the System Operator and the wider rail industry.
TAR	Targeted Assurance Review.
TOCs	Train operating companies (TOCs) run the (passenger and freight) trains and services on the network. The representative body for the passenger operating companies is the Association of Train Operating Companies (ATOC).
TV	Temporary Variation (TV) is a Network Rail's internal process outlined in its Standard NR/L2/CSG/STP001/04 Issue 8 (04 June 2022). The part of Network Rail which does not comply with specified requirement in its standard for a predetermined period of time shall develop and implement an action plan to achieve full compliance with the requirement, include any interim measures to identify and control risks that might arise pending compliance; and monitor progress against the plan.
VE	Visual Examination.

Appendices

Appendix A - RFI Questions to Technical Authority

(1) Outline and describe the management strategy, strategic goals and objectives set for Lineside Buildings asset group for CP7 and beyond.

(2) What metrics are used to assess behaviour and criticality of Lineside Buildings? What is the rationale behind the derivation?

(3) a) What are performance requirements/outputs defined for Lineside Buildings in CP6 and those set for CP7 and beyond? For example, average percentage asset remaining life (PARL), capability etc.

b) What drives the differences between CP6 and CP7 if any?

(4) What guidance does TA give to region to assess or monitor condition performance of Lineside Buildings asset group? Please share the relevant document where available.

(5) a) What intervention options are available for Lineside Buildings to manage asset sustainability over the next Control Period (CP7)?

b) In the latest asset policy prepared for CP7, one of the quantitative targets is to reduce Lineside Building in Poor category to 25%.

- What are the associated intervention thresholds?
- what is the rationale behind the derivation of thresholds?

c) What considerations would Technical Authority advise regions to factor in when making decision on interventions for Lineside Buildings in CP7 to manage the portfolio sustainably (i.e. condition is sustained over future control periods)?

(6) Is there any supporting tool available to help region's understanding of deterioration rates and mechanisms of Lineside Buildings?

(7) Is there any guidance available for decommissioning strategy or asset rationalisation for Lineside Buildings asset group?

Appendix B - RFI Questions to regions

(1) Provide the current size and conditions (in percentage asset remaining life, PARL) of Lineside Building asset group in your regions.

Lineside Buildings (LSBs) Asset Group	Total Number (Counts)	Average Condition (PARL, %)
(a) Critical Lineside Buildings		
(b) Non-Critical Lineside Buildings		
(c) Redundant (i.e. perform no current function) Lineside Buildings		
(d) Closed stations (stations no longer in operational use) Lineside Buildings		
(e) Sites housing telecom assets such as GSMR, Fixed Telecom Network (FTN)		
Lineside Buildings (LSBs) in Poor/Very Poor Condition (i.e. PARL<45%)	Number (Counts)	
(f) Critical Lineside Buildings		
(g) Non-Critical Lineside Buildings		
(h) Redundant (i.e. perform no current function) Lineside Buildings		
(i) Closed stations (stations no longer in operational use) Lineside Buildings		
(j) Sites housing telecom assets such as GSMR, Fixed Telecom Network (FTN)		

(2) Explain what triggers or factors the region considers when classifying critical and non-critical Lineside Buildings?

(3) With reference to Strategic Business Plan (SBP) submitted at the start of CP6, provide the following in the table.

- Details (volumes, costs and number of assets involved) of Lineside Buildings' renewals expected to be delivered by the end of CP6; and
- Their current delivery status (i.e. volumes delivered to date).

Lineside Buildings (LSBs) types	Counts of LSBs planned with renewals	SBP CP6 Total Volumes (m^2)	Cost (£m)	Volumes delivered to date (m^2)
Critical LSBs				
Non-Critical LSBs				

(a) What factors or criteria triggered the above planned renewals for CP6?

(b) If there is underperformance (i.e. delivered below target volumes), provide (i) reasons; and (ii) details of recovery plan.

(4) Explain details of the examinations regime currently adopted by the region for both critical and non-critical Lineside Buildings. This should include, but not limited to,

- examination types,
- frequency,
- decision-making criteria etc.

(5) Provide current compliance status of Lineside Buildings examinations against Standard NR/L2/CIV/171 and NR/L3/CIV/006, and regions' glide paths for delivery of compliant examinations.

Lineside Buildings (LSBs) types	Visual Examinations*		Detailed Examinations*	
	Compliant	Non-Compliant	Compliant	Non-Compliant
(a) Count of **Critical** LSBs				

*as per requirement in NR Standard NR/L2/CIV/171 & NR/L3/CIV/006/3A.

Lineside Buildings (LSBs) types	Detailed Examinations planned in			
	CP6	CP7	Beyond CP7	No action
(b) Count of **Critical** LSBs				

Lineside Buildings (LSBs) types	With Visual Examinations	With Detailed Examinations
(c) Count of **Non-Critical** LSBs		

(6) Describe how region is developing a long-term plan in terms of evaluating work volumes, phasing and associated funding that are required for Lineside Buildings to deliver “steady state” (no overall decline in safety, appropriate level of asset sustainability and risk exposure is preserved across the network). Provide the following as minimum to explain.

(a) What is **region’s road map** (i.e. timeline - from start to completion) to achieve steady state for Lineside Buildings asset group?

(b) What is the **full scope of works** (i.e. number of assets and workbank volumes if available) that are required for Lineside Buildings to achieve “steady state”?

(c) Provide details of region's CP7 plan and workbank for identified Lineside Buildings that require interventions to deliver targets set out in CP7 asset policy. The plan and workbank should include the following. If plan cannot be provided, please explain why and advise when it will be available.

- The list of identified Lineside Buildings;
- Type of anticipated interventions required;
- Timescales for delivery; and
- Anticipated volumes and costs.

(d) What factors does the region consider when prioritising identified workbank for medium term (CP7) and planning works for long term (CP8 and beyond)? For

example any immediate works required to hold the asset condition until renewal is implemented.

(e) What maintenance approach does the region apply, in particular to manage and control further deterioration of Lineside Buildings?

(7) Explain any region's decommissioning strategy or asset rationalisation plan for Lineside Buildings.

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