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

FINAL REPORT

Simon Lane

Director

Rail Advisory Services Pty Ltd

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Executive Summary

On the basis of the response from Network Rail to the Interim Report in November 2022 and the pattern of response to several other significant reports provided to Network Rail in recent years it would seem likely that many of the findings and recommendations of this Report will not be acted upon. Why does Network Rail appear to be so deaf to external review?

At its heart is the significant contrast between the Network Rail Boards 2021 Risk Appetite statement and the findings of this and several other reports. There is very little evidence that Network Rail has any appetite to be either 'best in class or open to learning and adopting new approaches to work' even when this and other reports have identified that Network Rail's managers do not meet Guidelines from the Office of Rail Regulator (ORR) requirements in a number of areas. Those Guidelines are designed 'help organisations, including Network Rail, to comply with the health and safety law in a sensible and proportionate way'.

The summer of 2022 was characterised by many 'own-goals' which this review has exposed with Network Rail having imposed many grossly disproportionate restrictions based on poorly considered, out of date rules, operating procedures and guidance. Some of these have been amended which will make a big difference in summer 2023 but the development of more sophisticated trigger points is a work in progress. The emerging Gross Disproportionality Factor model would appear to provide a strong and logical way forward.

The Interim Report proposed that Network Rail's summer readiness should be based on three scenarios to enable managers to assess risks and how they will be mitigated to inform preprepared Train Operating plans for each Route. The scenario-based framework can be used for planning how to handle other 'extreme' weather events since these can be judged to be foreseeable risks.

The scenario planning for summer 2023 has assisted Network Rail Directors at HQ, Region and Route level to be more systematic, proactive and disciplined in the approach to identifying and mitigating the risks to inform what train services are to be operated in hot weather.

The scenarios chosen for 2023 are for forecast ambient temperatures of 38, 40 and 42^{o}C. An impressive amount of work has been done in each Region and Route, which when combined with the improved engineering standards and the consequential guidelines and instructions, should result in a much higher level of performance and service provision than in July 2023 with one provisor.

The Report reveals that the UK Rail Industry appeared to be badly under prepared for hot weather in 2022 particularly in the light of safety critical research, notably the 2006 Rail Safety and Standards Board (RSSB) regarding the management of passengers on stranded trains in hot weather. As at May 2023 there are anecdotes emerging that several passenger train fleets in the UK quickly result in unsafe conditions if those trains were to lose power on hot days and were to become stranded. On such trains it has been reported that passenger's lives can become at risk withing 30 minutes at temperatures over 30^{o}C. It begs the question of the RSSB's lack of guidance or instruction regarding this obvious risk which has been known about sine the research was issued in 2006, 17 years ago.

Regulation 22 of The Railways and Guided Systems (Safety) Regulations (ROGS) requires industry partners to collaborate to manage risk which involve multiple parties and competence of operations staff. It certainly applies to the management of stranded trains in hot weather. Not only were these obligations not complied with, but they were found to be largely unknown by almost all O&M Managers met despite those legal obligations having been in place since 2006. It is questionable as to whether the failure to handle stranded passenger trains in hot weather is purely with the Train

Operating Companies who have responsibility for their operations or whether this risk, since it is well known, also sits with Network Rail.

The Report found that the embedded culture in Network Rail, 'a culture that is driven by a compliance driven approach' reduces expectations, accountability and the approach to being customer led to their lowest point of acceptability. This not only manifests itself with poor service outcomes but contributes to having under developed management systems relating to Quality, Asset Management, Business Continuity etc but also to the appetite to learn, innovate and improve.

The Report has exposed the lack of clear accountability for the setting of standards, rules and procedures so far as train operations are concerned. The lack of clarity about the role of the Technical Authority compared to Operations Standards is bizarre with the Operations Standards imposing restrictions on train movement in several weather scenarios which are far greater than those supported by the Heads of Asset standards – The basis on which Operations Standards restrictions are imposed is unclear. This Report recommends a way forward.

The ORR 2016 Guidelines Developing and Maintaining Staff Competence help to ensure that organisations comply with the health and safety law in a sensible and proportionate way. If an organisation such as Network Rail chooses not to comply with the guidance they must still comply with the law by some other equally effective means. Network Rail's recent insistence that the findings of the Interim Report (November 2022) regarding the competence of staff (RSP1) is in some ways more troubling since a late check found that the earlier findings were not only correct but that the organisation was still struggling to get acceptance from Route Directors that it was up to them to comply with the legal requirement, as the employing managers, rather than to waiting for an HQ tick-list.

While passengers suffered, in many cases over-severely in summer 2022, freight was treated, at best, as a third cousin with almost all freight services suspended despite the significant role they play in the national logistics networks. The Report makes both short- and medium-term recommendations on how this critical sector can be better served in the future. It is not clear (May 2023) that Network Rail is more advanced than it was in 2022 on this matter.

Context

1. In July 2022 the UK experienced two exceptional hot days after which the CEO of Network Rail appointed independent experts, via an Extreme Heat Task Force (EHTF), to review Network Rail's approach and management of its Network with the intent that it could strengthen its organisational arrangements to deliver improved outcomes in future years.
2. The EHTF's primary objective is to identify, based on international best practice, practical steps the railway can take to improve its resilience in very high temperatures for the benefit of passengers and freight customers.
3. This report has considered good and established practice in other Rail jurisdictions which provide a basis for comparison with Network Rail while also providing useful references for Network Rail on how to achieve better outcomes in the future.
4. This Final Report looks beyond heat to consider the wider implications of adverse weather and of the way Network Rail plans and manages Train Services during adverse weather, building on the approach highlighted from other Reports. These Report provide an assessment of how Network Rail plans and responds to other external expert advice, including extreme weather. These Reports include:
    a. The 2022 Weather Advisory Task Force (WATF)
    b. The 2021 Rail Resilience Programme (RRP).
5. In considering the findings of other reports this report is not intended to stand alone as another independent review but is intended to draw key lessons from related reviews to help establish a practical roadmap which builds on their findings, to help Network Rail to improve.
6. This Report provides a set of recommendations which enable the delivery of both passenger and freight services to be markedly improved in adverse weather, particularly hot weather over the next few years while also enabling the risks associated with adverse weather to be integrated into a broader resilience management system where risks associated with bad weather are not seen as Special Events but are normalised within a proactive, systematic risk identification and mitigation system.

Structure of the Report

7. The Interim Report provided in November 2022 provided significant detail on what had been discovered during a series of interviews and discussions with Network Rail and other international Rail organisations.
8. This report has not sought to repeat that content but has selected specific information which has helped to shape the key findings and the recommendations.
9. As such, this Report is much more forward facing with an emphasis on recommendations to enable Network Rail to improve its performance not only in hot weather but in all extreme weather events.
10. This Report looks at four distinct elements.
    a. Network Rail's Culture ('How things are done here') which demonstrates the appetite for both risk and excellence.
    b. How Network Rail Manages its activities
    c. How Network Rail sets Standards and Instructions – where does the authority really sit?
    d. How Network Rail approaches planning for key events and activities.
11. Each element in the Report is in three sections.
    a. The key evidence from Network Rail documents and discussions
    b. A comparison with proven 'best' practice in comparative jurisdictions.
    c. Key findings
    d. Recommendations
12. The recommendations are set in three timeframes.
    a. For May 2023 in preparation for summer 2023 (no significant changes from November 2022 Interim Report so Network Rail have had the time)
    b. December 2023 and February 2024 in preparation for a much better basis for trigger points and consequential restrictions for summer 2024
    c. For summer 2025 where a significant lee time is required. Do not leave these to GBR – Network Rail needs these changes asap.

Introduction

13. During the summer of 2022 when the UK experienced record temperatures on two days in particular the UK rail network experienced a high level of failures, with some line closures and reduction in train services, particularly in the freight sector.
14. This review considers the factors that underpinned the operational planning and response to those failures and the associated management decisions with the intention of drawing lessons that can enable Network Rail to enjoy a much higher level of asset availability and train service performance when similar conditions recur.
15. The starting point for the review considers the legislative obligations on rail managers in the UK regarding the identification and mitigation of risk. In this introduction best practice Guiding Principles from the world's best performing railways is also considered as are the underlying themes that have emerged from a number of significant inquiries undertaken for Network Rail and the UK Rail Industry more generally. Together these provide insights into how well placed Network Rail seems in terms of it's culture, its propensity to proactively identify and mitigate risk and its record in acting upon external reports.
16. The 1974 Health and Safety at Work Act (HASAWA) establishes the minimum requirements for O&M Managers.
    a. To proactively and systematically identify and mitigate risk and to reduce the potential consequences to as low as reasonably practicable, (ALARP).
    b. Consequently, it follows that Managers need to be able to demonstrate that they have identified risks and developed mitigation plans. To do that requires, as a first step that they understand both performance and conditions.
    c. In that sense the management of adverse weather should be considered, particularly after the events of the last three years, as foreseeable. Logically this challenges managers to find a way of operating train services more effectively in such conditions enabling customers to enjoy the benefits of the public investment of the network.
17. Best Practice Guiding Principles – from Singapore.
    a. This reviewer based his career around getting a deeper understanding of two of the key Guiding Principles which underpin sustainable excellence. These are:
        i. The systematic and proactive identification and mitigation of risk.
        ii. When in any doubt, always do what the Customer wants.
        iii. <u>Note</u>
            1. There is no specific reference to safety here. There are multiple sources of risk all of which must be mitigated to sustain excellence by O&M managers.
            2. If the risks are not mitigated and the customer's needs not met then management have failed. There is no permission or authority to fail the customer.
18. The Network Rail Board Risk Appetite 2021
    a. This sets down some very significant expectations on NR Managers approach to risk:
        i. That the Company wants to be seen as best in class and respected across industry.
        ii. That Network Rail is open to new approaches and will work across industry to 'build back better'.

iii. Where risks are poorly understood NR will be cautious about making any decisions that could negatively impact on train performance for passenger and freight users.
iv. Note:
1. There is no reference or requirement to being over cautious.

19. The 2021 Rail Resilience Programme (RRP) for the Rail Industry
    a. This report provides a useful framework to assess NR's approach to the systematic, proactive identification and management of risks which is relevant in that weather events and their likely consequences are foreseeable.
    b. While the RRP focused on Emergency Management it identified many issues which are pertinent to the planning and handling of extreme weather events.
    c. It provides a high-quality structured assessment of 'how we do things here'; Network Rail's culture, which casts light on shortcomings which prevent NR management from sustaining high performance in all key areas of its business including the management of extreme weather events, operational competence and 'combat readiness' for handling degraded and emergency situations.
    d. A critical shortcoming of the RRP's findings however is that it proposes that a standard NR approach is required to deal with various challenges. The specific recommendations suggest that Line Managers should wait, that the template with which they will be asked to comply is coming. There are two serious unintended consequences with this approach:
        i. Compliance with new templates will emerge as part of the ongoing work. This reinforces a common weakness that compliance is the job rather than the legal requirement of O&M managers to systematically and proactively identify and mitigate risk – a common 'this is how we do things here' (NR's culture) theme that emerged during this review.
        ii. The findings inference that one can wait because the template is coming encourages managers to turn their brains off now and later because a template will be provided. This in turn reduces the likelihood that the outcome will be owned.
        iii. Note:
            1. This Report has concluded that this RRP recommendation suits Network Rail's existing culture but is very much at odds with cultures in high performing railways.
    e. The RRP does find, however, that 'little and often' actions by Line Managers is preferable to using prescribed templated. By encouraging local proactive actions in respect to identified risks encourages ownership, innovation (there is always a better way) and establishes a commitment to learning, improving and continuous improvement – an essential element of sustainable high performance.
        i. Note:
            1. This seems to contradict the RRP recommendation referred to in paragraph 20. (d) above.
    f. The Rail Resilience Project considers three themes and several sub elements where this review substantiated areas of concern which impact on the planning and management of daily operations and maintenance but particularly in extreme weather conditions.

These themes were:

i. Foundations
    1. This element identified 4 elements of which one is particularly relevant to this review, governance which it describes as 'patchy, inconsistent and sometimes poor oversight'.
    2. Note:
        a. This RRP finding is supported by this review, restricts Network Rail's managers in the effective proactive identification and effective mitigation of risks, in this case related to extreme weather.

ii. Planning and Resources identified three elements of which are particularly relevant to this review. They are anticipation, assessment and prevention.
    1. The RRP states that 'anticipation is the bedrock of prevention'.
        a. The RRP report found that 'risk management is not being used effectively to drive prevention' which is at odds with the basic requirement of all O&M managers, to systematically and proactively identify and mitigate risks, a key requirement of the 1974 HASAWA an subsequent legislation.
    2. Planning for response and recovery.
        a. Testing and exercising is 'often ad hoc and infrequent' despite being in a state of high readiness for degraded and emergency modes of operation are required under legislation (HASAWA 1974, ROGS 2006)
    3. Embedding learning and improvement
        a. The findings of this Report are in line with the RRP findings, 'that there is 'little or no effective sharing or learning'.
        b. The RRP report found that the approach is piecemeal and ad hoc as opposed to being component parts of an integrated management system'.
        c. Similarly, this Report, like the RRP also found that 'the challenge (in respect to the systematic, proactive identification and mitigation of risk) is undertaken and seen as a compliance burden as opposed to being a core activity'.
        d. Not surprisingly this Report strongly supports the RRP finding that 'It is incumbent on the industry to take action to address the issues raised', requiring the organisational challenges to be addressed.
        e. Note:
            i. During this review it was common for Network Rail managers to explain that so many things are difficult, appealing for sympathy to the view that little can be done to address major challenges.
    4. Nine RRP recommendations emerged.
        a. Of the nine recommendations seven were due to have been fully implemented within 12 months, by August 2022 with two by August 2023.
        b. It is reported that 'progress has been disappointing' which reflects findings from other Independent Reports, including

those conducted by VA Rail and AD Little who found that previous findings and recommendations have not been acted on, something that was confirmed in several of the discussions with Route Directors – 'that's how we are in NR'. e. The Weather Advisory Task Force (WATF).

20. The 2022 Weather Advisory Taskforce
    a. Like the Board's Risk Appetite, the RRP and the WATF also provides deep insights into 'how we do things here' and contains observations and recommendations which inform the findings and recommendations from this report.
    b. This Report has tried to draw out the key themes of the WATF which significantly impact on Network Rail's willingness and appetite to learn and improve their planning and implementation of alternative arrangements in extreme weather with this Report being particularly concerned with hot weather.
    c. The findings of this report attempt to bring the WATF findings to life so far as they apply to the preparations and delivery of train services in extreme weather conditions.
    d. WATF Recommendations 2: Re the search for appropriate thresholds and triggers
        i. The WATF noted that the prescription of control measures from the Centre (NR HQ) do not recognise that local based managers have a much better understanding of the risks and are best placed to develop and implement mitigation measures – leaving aside that it is their legal obligation to do so.
        ii. This is supported by the various studies by James Reason and in the 1998 Piper Alpha, 1987 Kings Cross Fire, 2006 Nimrod Explosion inquiries.
        iii. Together these findings are at odds with the RRP finding in paragraph 20(d) above.
    e. WATF Recommendation 3: Use of digital technologies to revolutionise how risks are identified and mitigated.
        i. Compared to other Rail Networks in Sydney, Melbourne but particularly Singapore the extent and use of Condition monitoring – extent, frequency, identification and mitigation of precursor events is relatively poor.
        ii. It does however present a great opportunity to significantly improve the understanding of asset condition, performance, risks and the need to intervene pre loss of control events.
    f. WATF Recommendation 4: Reference to Highway England
        i. This finding provides an interesting reference for NR's adopted Specific Control Measures in windy conditions which are reportedly not based on an engineering assessment.
        ii. Similarly, there is no reference in Network Rail's current Regulations to the approach that Highway England take to the regulation of speed on Motorways in the same conditions.
    g. WATF Recommendation 5:
        i. It recommends that Network Rail build a professional competence to transform the culture of decision making.
        ii. NOTE:
            1. Issues of appetite, accountability and empowerment arise.
            2. As the AD Little Report did, it raises the question of the role of the Centre, the extent to which Route Directors are to be held to account for their legal obligation to 'proactively and systematically identify and mitigate risk'.

3. The uncertainty at Route level whether they are accountable for their risk identification and management, or whether their obligation to comply with pre-determined Control Measures seems to be a source of confusion.
4. In respect to the Boards Risk Appetite, innovation and the freedom to learn and adopt there appears to be significant uncertainty.

21. How do these references inform the reviewer?
    a. Unfortunately, these reports demonstrate that Network Rail is not characterised by a having a systematic and proactive approach to the identification and mitigation of risk which is at odds with the requirements of UK legislation. Instead, its culture (way of doing things/thinking about risk) is heavily biased towards compliance which mitigates against. innovation and improvement. The RRP found that 'anticipation, the "bedrock of prevention" is not being used effectively' yet the 1974 Health and Safety at Work Act demands it. This Report supports the findings of these other reports.
    b. With reference to the Guiding Principles there is little evidence that 'doing what the customers want', passengers or freight forwarders, is seen to be a priority for many Network Rail managers. This Report finds that both passenger and particularly freight services were not a significant priority for Network Rail managers during the two days of extreme heat.
    c. This Report finds that Network Rail's management does not comply with the Network Rail Board's Risk Appetite that 'it wants to be seen as best in class and is open to new approaches'. These other reports, particularly the lack of progress with accepted recommendations finds that Network Rail is not open to new approaches to solve challenges or is keen to adopt recommended actions to move towards being 'best in class'.
    d. When risks are 'poorly understood the Board's risk appetite requires its managers to cautious but what is seen from the evidence is that Network Rail acts in a grossly disproportionate way often imposing restrictions during weather events which are not only not science or engineering based but are not supported by the long history of how the Network and the Trains performed when the infrastructure had less resilience.
    e. The WATF makes reference to the need for appropriate thresholds and triggers for the introduction of restrictions. In the summer of 2022, many of Network Rail's trigger points and consequential restrictions have been shown to have been grossly disproportionate. So much for 'best in class'.
    f. The WATF recommended the need to build a professional competence to transform the culture of decision making. The Interim Report made recommendations to this effect in November 2022 – there is no sign that Network Rail intend to act on this critical area.
    g. The RRP describes Governance as 'patchy, inconsistent and sometimes poor'. This Report found that the need for a well-structured Plan Do Study Act system was not only not in place but was not seen as a priority by Network Rai Managers. The lack of Management System Certification attests to this. Network Rail must be one of the few large asset dominated organisations in the world, certainly in Rail, that has almost no ISO 55,001 accreditation. This is indicative of the detachment from what 'best in class' looks like – The high performing railways in Hong Kong and Singapore, for example, have been accredited for many years.
    h. The RRP also found that there was 'little or no effective sharing of lessons learned' and found that the approach to learning and improvement was 'piecemeal'. This was

supported by many Network Rail managers during the discussions held as part of this review.

i. It is not surprising then that what was observed in these earlier Reports has manifested itself again in this Report. The recommended dates for the action plan which emerged from the Interim Report and were presented to the Network Rail Executive Team meeting on 10th January look to being missed – in line with many other Reports.
j. Network Rail would appear to have an entrenched cultural problem and does not appear receptive to change.

Terms of Reference

22. How railways in hot countries set operating mitigations when temperature thresholds are exceeded including speed thresholds and service thinning requirements.
23. How different parts of Network Rail approached the decision to run or suspend services.
24. What was done to prepare the industry for the days of extreme heat 10 days in advance.
25. How the risk to passengers is assessed for trains trapped without power.
26. How freight trains should be managed and prioritised during extreme weather days and when the Network is dealing with major disruption over multiple days.
27. How contingency plans for extreme weather in other countries are created, resourced and maintained as timetables change.
28. The requirements for Route Proving after Line closures before service resumption.
29. Advice relating to command-and-control management of train operations in seriously degraded operations.
30. Advice regarding the level of readiness and competence of operations staff to handle seriously degraded rail operations.

Comment on Terms of Reference

31. With the exception of how railways in hot countries set mitigations when temperature thresholds are exceeded all the other points in the Terms of Reference (TOR) consider how Network Rail plans and prepares for foreseeable extreme events of which hot weather is just one.
32. While the temperatures in the UK on the 19th and 20th July 2022 were extreme and at a record in some parts of the UK that Network Rail was found to be seriously wanting in each of the other areas of the TOR is indicative of an organisation whose readiness to anticipate, prepare, plan and deliver anything other than the normal appears to be poor.
33. Some of this 'poorness' is due to legal non-compliance over a number of years while others reflect non-action on earlier independent reports.
34. The challenge to Rail O&M managers is to find a way of operating train services safely. That the closure of main line (ECML) is now regarded as having been unnecessary and disproportionate is instructive regarding the mindset of the decision makers on those days.
35. That the most senior management became involved in the review of Operating Plans only 10 days before the hot days was too little too late. Their Regional and Route Managers had failed to Plan and so were not well placed to manage what unfolded.
36. This report considers that the cultural factors had at least an equal bearing on what occurred compared to other professional shortcomings.

Culture

1. Introduction
    a. This section considers whether and how Network Rail's culture contributed to the underperformance of Network Rail in July 2022.
    b. 'The way we do things here', the prevailing culture and the underlying assumptions and practices shape the power of what Barry Turner, an American Sociologist referred to as the organisational incubation period in his book Man Made Decisions (1978). His principal assertion is that companies use their long-established approach to risk identification and mitigation to define themselves: to not see things which are abnormal and to ignore the warning signs that things are not as they should be.
    c. In her book about the 1986 Challenger accident, Diane Vaughan, an American Sociologist wrote about the concept of 'the normalisation of deviance'. In NASA's case she was concerned that 'middle managers, the seasoned professionals couldn't get heard if the message didn't fit. The relevant question is to the extent to which this is true in Network Rail and how that shaped the approach and the outcomes on the hot days in July 2022.
    d. In his findings in respect to the Piper Alpha accident 1988 Lord Cullen stated that if a loss of control event (delay, loss of production, accident, breakdown) occurred on your watch it was because the management had failed in its design and implementation of sufficient risk identification and control measures. A high bar but it captures the essence of what high performance O&M management requires. Do Network Rail's senior leaders accept this philosophy?
    e. What this points to is the question to National Rail's leaders is the extent to which its managers have been conditioned to 'not see things, to ignore the warning signs' in respect to their planning for extreme weather based on how they had been conditioned to think by a series of latent factors and the refusal or not to provide resources/support for other risk mitigating challenges.
    f. These points, and the subsequent findings suggest that the primary driver of the underperformance of Network Rail in July 2022 was driven by cultural factors.
2. A comparison with proven 'best' practice in comparative jurisdictions.
    a. The Sydney and London Olympic experiences provide a useful comparison in terms of the ability of rail managers to proactively identify and mitigate risk. In Sydney's case it required several thousands of rail people to display significant personal and professional leadership. While the mission in both cases was compelling it was the engagement of multiple layers of insights and experience that enabled the impossible to be made possible.
    b. In London's case there were zero outstanding critical OHL faults. It has become normal to have over 300 now. How has this been allowed to happen? What signal has that given to the respective Network Rail managers that this level of latent risk is acceptable?
        i. NOTE: Significant progress has been made to reduce the number of critical OHL faults for summer 2023.
    c. In Singapore's most reliable metro line there were approximately 21 delays over 5 minutes per year in 2013 to 2016. A review identified that of 42 delays over two years the specific area of risk that resulted in the delay 38 should have been avoided. They accepted the challenge set by Lord Cullen and changed from being a reactive organisation to a heavily proactive one. The number of delays per year between 2017 and 2021 averaged one and a half. It was a mindset/cultural change rather than technical – same as the Olympic experiences.

d. In respect to overhead line equipment failures discussions with rail maintenance managers in Australia (Melbourne, NSW, Queensland and Western Australia) Network Rail and Singapore revealed unanimity that all overhead line related delays were due to either poor installation or inadequate maintenance. Yet in the summer of 2022 Network Rail's ECML and GWML had several high-profile failures. On the ECML the areas of great risk are well known (Biggleswade/Hitchin) so how come they had repeated failures?

3. The evidence from Network Rail documents and discussions
    a. This report has highlighted a number of key cultural features and drivers:
        i. The lack of knowledge and compliance with the requirements of the Regulation 22 of the 2006 ROGS, the Guidance from the ORR in 2016 regarding competence and the RSSB research regarding stranded passenger trains in hot weather from 2006.
        ii. The lack of implementation of findings from accepted external reports.
        iii. The lack of resources, both time and equipment to enable Planned Maintenance engineers to conduct their tasks.
        iv. The increase in the number of tolerable critical outstanding electrical faults in the last decade.
        v. The quality of the Weather Plans were described as bland in December 2022 yet the Weather Plans had been an are of focus for a number of years. They proved to be of little practical value in July 2022. While it easy to point the finger at the Weather Directorate the 'bland' plans came from the Regions and Routes – not the Directorate's fault.
    b. These illustrate the underlying mindset, the conditions in the 'incubation period'. The seasoned professionals know that Network Rail does not intend to be the 'best in class' or to enable them to do a great job – it won't give them the resources.
4. Key findings
    a. <u>Network Rail cannot be described as a high-performance organisation.</u>
        i. The matrix below from Without Delay (Lane 2022) provides a useful reference for three contrasting Rail organisation cultural categories.

DENIAL/RECKLESSNESS	ADMINISTRATIVE/NEGLIGENT	HIGH PERFORMANCE
Risks are obvious to a reasonable person	Risks are obvious to a skilled person	Risks are not obvious
A clear breach of duty	Failure to recognise a risk that should have been recognised	Almost unforeseeable
No meaningful investigations	Only seek primary cause	Investigations are deep
New ideas are actively discouraged	New ideas are seen as presenting problems	New ideas are welcomed
Managers do not want to know about problems	Reluctance to raise emerging risks	A belief that bad things are likely to happen
Managers have given up	Casual acceptance/Learned Helplessness	Strong proactive approach to risk identification and mitigation
Bad things frequently happen	Bad things that happen are due to known areas of risk	Bad things are very rare
Not Willing or Able	**Willing but not able**	**Willing and able**

ii. An analysis of the underlying forces and associated risks that significantly contributed to Network Rail's underperformance in the extreme weather in July 2022 were almost all 'obvious to a skilled person'. The category above described as Administrative/Negligent characterises Network Rail well. Certainly, there is little under High Performance that does.

b. Network Rail managers do not typically meet the Network Rail Board's stated Risk Appetite requirements.
    i. Network Rail's managers seem to be more concerned with compliance with minimum requirements than the 'systematic and proactive identification and mitigation of risk to the lowest level of reasonable practicality'.
c. There is confusion about the accountabilities of Regional/Routes versus the Central Technical and Engineering functions.
    i. This emerged through many of the discussions. What is the freedom to act in the Regions and Routes? What risks and challenges are the Regions and Routes responsible for identifying and mitigating without reference to another party within Network Rail.
    ii. It is unclear not only in the Regions/Routes but within the Central functions.
d. That maintenance managers do not have sufficient resources (time and equipment) to plan and conduct Planned Maintenance regimes.
    i. A core duty of Network Rail as defined in Part A of its Licence Condition in section 3 requires Network Rail to 'ensure that it has the resources it needs so that it can carry out its core duties. This section questions whether Network Rail meets this requirement.
    ii. That Network Rail does not provide sufficient resources to conduct a full Planned Maintenance regime for their assets demonstrates Network Rail's lack of appetite to grasp the challenges of responsible stewardship. It sets the tone.
    iii. Similarly, if maintenance managers do not have access to modern, reliable condition monitoring equipment which is now a standard feature in high performing railways the responsible managers come to believe that Network Rail's Board and executive do not have the ambition to be as good as the 'best in class' railways.
    iv. If the Regions/Routes do not have access to deploy modern asset diagnostic condition monitoring equipment it provides a cultural pointer that Network Rail does not want to resource its managers to be anywhere near 'best in class'. There is a huge amount of off-the-shelf kit available for all asset classes.
    v. That Regions and Routes are having to wait for the HQ organisation to procure and provide them with a service allows Regional/Route Directors to hide behind the HQ cloak.
    vi. In the highest performing Rail organisations, the local Asset Directors have sufficient equipment and systems to manage their assets. The local decision making about the procurement and deployment of these sophisticated pieces of kit encourages ownership, innovation and improvement. Importantly it also enables Regional/Route Directors to accept full accountabilities for all the outcomes rather than the current blurred system where 'mother decides what and when they can have sophisticated kit.

e. Network Rail does not appear to meet the requirements of Regulation 22 of the 2006 ROGS.
    i. The requirements were found to be largely unknown regarding Regulation 22 of the 2006 ROGS which compels all industry parties to collaborate on areas of risk which require multi-organisation action again reinforces the sense that the current lack of action in this vital area is acceptable. The lack of access and use of train mounted condition monitoring data for whatever reason manifests this.
    ii. There is a great deal of on-train data being collected by TOCs regarding both track and OHL systems. It seems too convenient to claim, as some in Network Rail have, that the industry structure makes obtaining the data and information very difficult. Presumably that was why the Regulation was written into the 2006 ROGS.
    iii. That Network Rail managers are largely unaware of the obligation and that who is accountability for leading the collaboration activity indicates a lack of training and leadership, both cultural factors.
f. Network Rail's Weather Plans do not include any reference to the RSSB 2006 research regarding the handling of passengers stranded on trains in high ambient temperatures.
    i. It would seem to be negligent that the research is not only unknown but does not form a part of the pre summer readiness plans to ensure that Network Rail and the Train Operating Companies are in a state of high readiness to handle such an occurrence.
g. Network Rail does not meet the 2016 ORR Guidelines on Competence
    i. As with the ongoing non-compliance with Regulation 20 of the 2006 ROGS and the 2006 Guidelines on stranded passenger this noncompliance suggest that the Managers are not educated about their requirements. Untrained senior managers is an 'own-goal'.
h. Network Rail appears to be an inward looking, very conservative organisation.
    i. Its managers seem more concerned with avoiding any personal exposure to blame than doing what is best for the passenger or freight operator.

5. Recommendations
    a. Network Rail's Board and senior executive should open itself up to challenge. June 2023
        i. It should look at the way it works, what it expects and is prepared to tolerate from its managers, many of whom appear to be untrained in understanding what good looks like.
    b. Clarify clear lines of accountability between the Regions/Routes and the Central Engineering and Operations function. June 2023
        i. There appears to be no clear lines of accountability between the Regions/Routes and the Central Engineering and Operations function. This needs to be resolved. This lack of clarity encourages Group Think and unnecessary risk aversion where the prevalent priority is to 'keep your head down below the parapet'.
    c. Network Rail needs to develop and promulgate a common set of Guiding Principles which underpin high performing utility type organisations. June 2023
        i. This would enable a shift away from a compliance, strongly risk adverse way of doing things to a stronger, customer focus set of outcomes. This requires clear accountability and boundaries with freedom to act, to innovate and improve.

d. Network Rail should actively lead collaboration with Industry partners regarding the requirements of Regulation 22 of the 2006 ROGS. June 2023
    i. Network Rail, in collaboration with the Operators and the Department of Transport, and perhaps the ORR, under the requirements of the ROGS, Regulation 22 should take the lead ensuring that they having access to information (data that has been analysed) regarding TOC held linear assets, particularly OLE and track.
    ii. Network Rail should clarify where the accountability for collaboration with TOCs and Rolling Stock Owners sits in respect to obtaining relevant data regarding train borne data and analysis for the OLE and track. It would make sense for this to be at Regional/Route level since the collaboration would seem to be regionally and/or route focused rather than a Network Rail Central function.
    iii. This collaboration should also include how stranded passenger trains in hot weather are to be managed.
e. This collaborations should address the embedded incapacity to conduct full Planned Maintenance programmes on all assets. December 2023
    i. As a matter of urgency, and in line with Part A, Section 3 of its Licence Conditions, Network Rail should lead the development and implementation of initiatives that enables the Maintenance Engineers sufficient time to conduct 100% of the required Planned Maintenance schedules.
    ii. The ongoing failure to do so provides its managers with the sign that being able to do the Planned Maintenance properly is not important. This is a cultural tone setter. Statements that this will be addressed by GB Railways in the future suggests that this challenge is too hard for Network Rail to address.
f. Delegate the procurement of condition monitoring equipment to the Regions/Routes. June 2023
    i. Network Rail should delegate the decisions regarding the procurement of new condition monitoring systems and equipment to the Regions/Routes. While this may create some duplication the benefits are likely to be exceeded with the ownership, accountability, innovation and improvement that follows.

Management

6. Introduction
    a. This section considers the effectiveness of specific issues including technical rather than cultural issues and how they contributed to the underperformance of Network Rail in July 2022.
7. A comparison with proven 'best' practice in comparative jurisdictions.
    a. The critical characteristics of the highest performing railways are as follows:
        i. All the senior managers meet an established qualifications and experience criteria that shows that they are well qualified to meet the accountabilities required. This provides the proven ability to provide both technical and professional guidance and leadership. - Typically to be a Regional/Route Engineering Director one would need to be a chartered engineer in the relevant discipline and have a minimum of 10 years management experience in a relevant field, not necessarily in Rail. A nominated deputy would also need to be a chartered engineers but only have a minimum of five years relevant management experience.
        ii. That accountabilities throughout the organisation is clear and aligned to the skills and experience of the post holders.
        iii. That risk identification and mitigation is delegated to include the key production leaders, front line supervisors.
        iv. That the senior management see a key role as ensuring that their teams have the resources and equipment to deliver best-in-class outcomes. This internal partnership dynamic is essential to strong organisational alignment.
        v. The organisation should have accredited management system accreditation in Safety, Quality, Environment, Asset, Competence and Business Continuity Systems. This reduces the personality dependence within organisations that are able to focus on improving internal processes and systems on an ongoing business.
        vi. The organisation should have relevant and proven Plan Do Study Act methods are entrenched enabling the organisation to be able to manage the challenges of prediction, anticipation and proactivity across all relevant parts of the business. These PDSA frameworks provide a basis for assurance and improvement in a controlled systematic way.
        vii. The organisational Procedures should be subject to 'skeptical' review and both desktop and in-field validation which systematically tests the effectiveness of all work methods including O&M Procedures ensuring that procedures define the most effective method of working and that there are no gaps between what is written and approved and what is being done in the field.
8. The evidence from Network Rail documents and discussions
    a. The Use of Third Part Reviews by NR Centre.
        i. In Recent years NR Operations at the 'centre' have sought advice from third parties on various matters including:
            1. Hot weather readiness by VA Rail, 2019
            2. Operations Competence by AD Little re RSP1, 2022
            3. Command and Control Structures by Winder Phillips, 2021.

ii. In the cases of VA Rail and AD Little they found that earlier recommendations had not been acted upon which the review found to be a common characteristic in respect to investigations and recommendations within NR.
iii. In the case of each of the reports Route Directors and Route Operations Directors reported that they were not familiar with the reports, if they had heard of them at all, which seemed to be surprising since the legal obligations, particularly in respect of Operations Competence and Command and Control Structures clearly lie with the Routes, not with the Centre.
iv. What this demonstrates is that NR Operations Centre are aware of common weaknesses in existing arrangements and practices but that the lack of sharing prevents the Route Directors from taking systematic and proactive action to mitigate the risks, even from having the opportunity for reflection and the development of steps to close the gaps.
v. This imbalance between how the Operations Centre sees itself and the legal obligations in the HASAWA, ROGS etc which puts the obligations with Line Managers is inconsistent with the Regional Structure put in place since 2018.
vi. The review found that rather than being reactive in the post weather event investigations that the focus would be better focused considered on how the same event would be managed more effectively next time, how would the Route Plans be enhanced.

9. Key findings
    a. <u>No awareness of the Network Rail Board's Risk Appetite</u>
        i. None of the Operations Directors, Route Directors or Regional Managing Directors interviewed were familiar with the 2021 Board's Risk Appetite. With such secrecy how can the document have any value?
    b. <u>A lack of clarity about who set's the rules regarding what restrictions need to be imposed during adverse weather.</u>
        i. During the review it became clear was the lack of clarity as to who or what part of the organisation sets the rules which govern train movement.
        ii. The Technical Authority includes the Heads of Engineering disciplines who set limits regarding safe operations including trigger points for speed restrictions. The Operations Standards team also set trigger points for introducing speed restrictions which in all cases are more restrictive than those issued by the Technical Authority but without explaining any basis for their rules.
        iii. The Operations Standards team also authorise local managers to impose more restrictive measures. These managers make Structured Expert Judgements, SEJs.
        iv. Having two or even three sources of final authority does not fit with an analysis that all train movement is taking place within an integrated engineering system yet seemingly unqualified people are setting the limits of safe working without any reference to the relevant asset experts.
    c. <u>A lack of clarity regarding the accountability and freedom to act between the Regions/Routes and Central functions.</u>
        i. As found by AD Little, and found during many discussions there is currently significant ambiguity between the roles and the consequential accountabilities, including freedom to act, between the Centre, the Regions and Routes regarding the Universal Obligations in respect to Operations, including Operations planning, and Maintenance of the railways.

ii. These Universal Obligations, consistent with the various pieces of legislations include the following:
    1. To be able to demonstrate an understanding of performance and asset conditions.
    2. To be able to demonstrate that all relevant risks have been identified in respect to safety, finance, reliability, environmental etc.
    3. To be able to demonstrate that there are resourced plans to mitigate the risks.
iii. NOTE: These Obligations cannot be met at the Centre and can only be done at Regional and Route level. The Centre does however have an important supporting and coordination role between Regions but does not have a key role in respect of the Universal Obligations.
iv. It is only at the Regional and Route level that the different risk profiles of the Regions and Routes can be managed. There are so many regional variations and associated risk profiles across the UK Network, far too many for the Centre to be trying to be 'in control'.

d. A lack of Management System Certification or any intent to obtain it.
    i. Network Rail, with the exception of the Southern Region, have almost no management system accreditation which compares very poorly with almost any other asset rich company from the Utility or Rail sectors in many countries. This manifests itself with poor, unstructured, as-hoc management of change arrangements and a high dependence on personalities.
e. The need for a KPI framework to measure the level of schedule 8 payments incurred by Regional/Route Directors due to 'own goal' restrictions due to their failure to control manageable risks.
    i. For example, if due to the lack of vegetation clearance a speed restriction is imposed in windy weather the Regional/Route Director should be held to account for their non-action.
    ii. Another might be if the Region/Route decide to impose a speed restriction during forecast rainfall when the TA's Rules do not support it but due to poor drainage management the speed restriction is necessary.
    iii. Presumably all new speed restrictions are registered in the National Operations Centre. Their causation should inform the decision as to whether the restriction is due to a Regional/Route loss of control.
f. A lack of senior management qualifications and/or experience to handle the accountabilities of the roles.
    i. Network Rail has allowed many senior positions to be occupied by non-accredited managers. For example, non-Chartered Engineers have been allowed to occupy jobs such as Route Engineering Directors without having Chartered status. Consequently, it is not clear that the post holders have the requisite qualifications and experience to be able to discharge their duties, a key requirement of the HSE's Ensuring the Safety of Britain's Railways and the 1990s Safety Case Regulations.
g. A lack of familiarity or understanding of the Universal Obligations of O&M Managers
    i. Many Network Rail Managers were found to be unfamiliar with the Universal Obligations of Rail O&M Managers, including Asset Managers which are derived from the UK Legislative requirements including the 1974 Health and Safety at

Work Act, the 1990's Safety Case Regulations and the 2006 ROGS, all of which only define the 1974 Act requirements in more detail.

h. A lack of established Plan Do Study Act (PDSA) Systems in many Production Units (Routes)
    i. Part F, section 22 of Network Rail's Licence requires 'Network Rail to have best practice corporate governance arrangements'. While this may well be met at Board level this Review found that it does not appear to be in place at Route or 'service management' (Route) level.
    ii. Network Rail managers at Route level have typically 40 'red balls' or critical areas of production or risk to keep under control. As with any sophisticated system this requires a highly disciplined, structured management system to enable managers to become aware where as area of risk is emerging, to enable the management designed control measures to be adjusted to prevent a 'loss of control' event.
    iii. These KPI areas of risk generally fall under safety/environmental, service quality/maintenance delivery, finance and people/competence/alignment.
    iv. That such a system is not well established across the Routes makes it inevitable that 'loss of control' events occur and that management has a reactive, catch up philosophy rather than an anticipatory, proactive one.
    v. The lack of Quality, Asset and Business Continuity ISO management system certification, which is very unusual for large asset organisations, is a weakness not found in many similar organisations in the developed world.

i. A lack of familiarity or compliance with obligations regarding operational competence, particularly RSP1.
    i. The Operations Directors, Route Directors and Regional Managing Directors interviewed were not familiar with the requirements of the 2016 Office of Rail Regulators RSP1 nor were they able to explain what they were doing in respect of ensuring there was ongoing assessment of competence or assurance of high levels of readiness for managing degraded or emergency scenarios. It would seem that the Network Rail Board was misled in 2021 regarding the action being taken to manage this legal non-compliance issue.

j. A lack of familiarity with or compliance with the RSSB 2006 Research into the management of passengers on stranded trains in high ambient temperatures.
    i. The Operations Directors, Route Directors and Regional Managing Directors interviewed were not familiar, with very few exceptions, with the Research or content and had not, partly as a consequence, considered how this obvious risk should be managed in a pre-planned way.
    ii. In 2006 RSSB facilitated research to estimate the expected change in conditions on a disabled train devoid of power with no means of controlling internal conditions. ESR Technologies were engaged to conduct the research on RSSB's behalf.
    iii. A key objective was to identify the point at which it becomes intolerable for passengers to remain inside the train. The three key measurements were in regard to temperature, humidity and CO 2 concentrations.
    iv. While the findings varied depending on aspects of rolling stock design and ambient conditions some key 'rules of thumb' emerged. They are:
        1. There is a significant risk to passengers at or above 33^{o}C.

2. Conditions become intolerable from between 35 to 50 minutes on 158s, and 90 minutes on 365s with other Rolling Stock falling between these ranges.

v. Has anything changed since 2006? The RSSB research has guided the design of new Rolling Stock, much of which has both electric and diesel power sources but with many exceptions.

vi. What has not happened? There does not appear to be any operational plans on how the RSSB 'limits' of between 25 and 90 minutes are to be met across the Network. That there has not been a major accident as a consequence of passengers being stranded on trains in hot weather is not a sufficient reason to assume that all is well.

vii. The Regional and Route Plans on summer readiness are silent on this risk although the risk is known about and has been quantified. The ROGS 2006, Regulation 22 obliges all industry partners to collaborate around the mitigation of risk where the risk needs to be managed by multiple parties.

viii. It would seem reasonable for Network Rail to lead this collaboration as the Network Owner, particularly in respect of this risk where the risk owner would appear to be the Train Operating COmpanies. It is not clear where in Network Rail does this responsibility lie. With the Regions/Routes would seem to be the most logical since that is where the risk control measures would need to be developed and managed.

k. <u>Was the suspension of all freight services in England and Wales on the hot days the best Network Rail could do?</u>

i. During extreme weather it is reasonable that service densities are reduced in line with public warnings – all part of the Standard Weather Operating Plans.

ii. It would seem reasonable that a National Freight Operations Plan also be available and ready for implementation to protect the critical national freight flows concentrated to and from the major container ports. Typically, these are freightliner services which often feed into critical nationally significant logistics flows.

iii. These flows differ from the mineral/raw material flows which tend to focus on transferring from bulk stores close to the source to others close to their market. They tend not to be time critical.

iv. The suspension of almost all freight services during the hot days in July 2022 provides the freight forwarding industry with evidence that Rail can not always be trusted since it was treated as such a low priority by Network Rail.

v. During the review Network Rail managers explained that developing and implementing such a Plan would not be easy. This reviewer is not sympathetic to that response. The customers, and the nation demands it. This is of greater significance when considered in the context of the increasing frequency of extreme weather events and the need for Rail to play a growing role in the nation's land transport tasks.

l. <u>A lack of familiarity or compliance with the ROGS 2006, Regulation 22, a legal obligation</u>

i. The Operations Directors, Route Directors and Regional Managing Directors interviewed were not familiar with the Regulation which obliges all industry partners to collaborate around the mitigation of risk where the risk needs to be managed by multiple parties.

m. Control Centre Management
    i. In February 2021 Winder-Phillips delivered a high-quality report with many recommendations and examples of relevant good practice regarding Control Room management.
    ii. This review found that not only was the report's existence almost unknown outside Operations HQ but no action plans regarding the findings had been drawn up or implemented. After 18 months! Is this a management or cultural failure?
n. Situational Awareness
    i. As with the security threat levels, if Network Rail used a similar system regarding operating conditions, then it would be both possible and useful to align all staff around the need to take much more care during periods of high-risk than under normal or low-risk conditions.
    ii. For Operations staff, whenever any degraded mode is being used when train movements are bypassing the normal designed control system the staff involved should be aware that the associated risks are very high and extra care should be taken.
    iii. The October 2021 Salisbury train crash, a weather-related accident, is likely to have been avoided if Network Rail, having failed to apply the required control measure (sandite every 24 hours) had put in place a compensatory control measure in the affected area. That they had not would appear to be a cultural or latent failure rather than an active failure. The underpinning understanding of why the control measure was required was missing, hence no action when the circumstance arose. Another management competence challenge.

10. Recommendations
    a. Network Rail's Risk Appetite – December 2023
        i. Train the Network Rail Management Group, including all direct repots to Regional and Route Directors, in the Board's Risk Appetite and what that means for them.
    b. Create and implement a three-year programme for ISO accreditation. December 2023
        i. All Central Functions, Regional and Route management units should need to be accredited for Quality (ISO 9001), Asset Management (ISO 55001), Competence (ISO 45001) and Business Continuity (ISO 22301).
        ii. The Quality System would ensure that a Plan Do Study Act systems become established.
    c. Create a KPI framework to hold Regional/Route Directors accountable for the impact of speed restrictions caused by their loss of control of their assets. December 2023
        i. Where, for example, A Region/Route decides to implement speed restrictions because they have not managed vegetation clearance in advance (an area which has reportedly been neglected over a 20-year period) the respective Regional MD should be held to account.
        ii. Similarly, if a decision is made to implement more severe restrictions in extreme weather, than the TA has issued, the Regional MD should be held to account.
    d. Clarify the extent to which the Regions/Routes are fully accountable for outcomes. June 2023

i. This includes the provision of resources for their teams to deliver 'best-in-class', sustainable outcomes including Planned Maintenance delivery and PM backlog build ups.

e. Train the Network Rail Management Group. December 2023
   i. This includes all direct reports to Regional and Route Directors in the following:
      1. Universal obligations of O&M Managers by 30th September 2023.
      2. The requirements of the Guidelines re RSP1
      3. Stranded Passengers
      4. ROGS 2006, Regulation 22
   ii. This would require Network Rail to be very clear about where the accountability for compliance sits. As Lord Cullen, James Reason and others have written – as close to those who have to deal with the unintended consequence of not having a high readiness plan in place the better.
   iii. This requires a full compliance plan. Not later than 30 June 2023.

f. Control Centre Management – June 2023
   i. Require a formal Route response to the recommendations of the Winder-Phillips Report on Control Centre Management.

g. Ensure that a hot weather Freight Operations Plan is in place for summer 2023. June 2023
   i. This should be based on a Strategic Freight Plan in hot weather to protect all the major logistical flows, typically Freightliner services, perhaps treating those trains as Class One during extreme weather.

h. Establish a minimum skills and experience criteria for all Network Rail O&M leadership roles. December 2023
   i. There is also a need to ensure that candidates meet them or have a formal pathway to achieve it.
   ii. This should inform the content of any training and induction programme for any newly appointed manager including Regional MD and Route Directors
   iii. By 30th September 2023

i. Introduce a Situational Awareness programme for Operations Directors, Managers and supervisors - June 2023.

Standards and Instructions

11. Introduction
    a. This section considers whether Network Rail's internal Standards and Instructions contributed to the underperformance of Network Rail in July 2022.
12. A comparison with proven 'best' practice in comparative jurisdictions.
    a. The best-in-class O&M standards and instructions are found where there is an acceptance that these documents are intended to prescribe a safe and effective methods of work that is commensurate with the risks in any given environment.
    b. The universal O&M challenge defines highlights three segments of the challenge.
        i. Asset design and condition.
        ii. Operating/Maintenance Rules, Procedures and Instructions
        iii. Competence/Readiness and alignment of the people.
    c. O&M Managers are highly aware of the common failures within Rail organisations is that 'holes' open up overtime in each segment where conditions, knowledge and practice change making the written risk control measures less effective. These holes typically manifest themselves with the following:
        i. Asset Maintenance procedures no longer reflect the changing condition of the assets and/or systems.
        ii. With the changing risk profile, the Rules, Procedures and Instructions are no longer aligned to the risks.
        iii. People take short cuts which become accepted despite being different from the written procedure – the two-railway syndrome emerges where the practice is different from the Rule.
        iv. People forget the Rules/Procedures etc and 'guessing' becomes prevalent. In degraded and emergency modes keeping to the letter of Instructions is particularly important because of their relative complexity and their multi-party implementation requirements.
    d. The best-in-class O&M Organisations have well, established processes that ensure the following:
        i. Clear ownership of each Rule, Procedure, Instruction.
        ii. Ownership requires planned action to ensure that all the Procedural interfaces are kept intact – as one change is made all associated changes are made.
        iii. That any change is properly and systematically communicated to everybody who needs to know and understand. Depending on the significance of the change staff may be:
            1. Informed via circular.
            2. Briefed and tested to ensure understanding of the change and the reason for the change.
            3. Formal re-training and assessment of the change.
        iv. That every six years every Rule, Procedure, Instruction is subject to a multi-party desk to and in-field validation involving users to ensure that what is written and practiced are the same and that any changes that emerge (safer or mor efficient) can be made in a controlled manner.
        v. Any change in any Procedure is subject to formal Modification Control since changes in any Rule, Procedure or Instruction reflects a change in the management designed risk control measures aimed at addressing existing or anticipated 'holes in the cheese'.

vi. Formal Modification Control should be applied to changes in the following areas:
    1. Asset Configuration.
    2. Asset/System Planned Maintenance Procedures including scope and/or frequency.
    3. Rules, Procedures and/or Work Instructions
    4. Competence assurance activities
    5. Organisational changes of accountabilities and responsibilities
    6. Selection, training and/or assessment regimes
vii. The fundamental point here is that such a regime is senior management led and that discipline and resources are required. It should be possible for one validation exercise per month to be undertaken by each senior manager over a three-year cycle.
viii. NOTE: Such a system would have prevented some of the own-goal failures by Network Rail which contributed to poor performance in July 2022 particularly where different requirements were no longer aligned with each other and where obvious opportunities to update and improve requirements had not been made.
ix. All of the above steps are enshrined in SBS Transit's O&M operations in Singapore.

13. The evidence from Network Rail documents and discussions
    a. <u>Out of date Track Standards in high temperatures</u>
        i. The Track Management Instruction re TSRs in hot weather: NR/L2/TRK/001/Mod 14.
            1. Firstly, this document is based on the 1993 BR Track Management Handbook a set of Temporary Speed Restrictions (TSRs) are imposed when the ambient temperature reaches certain thresholds. While the trigger points for imposing the TSRs has increased in time the 2021 Mod 14 version does not reflect the significant improvement in track strength and stability with improved ballast depth, concrete sleepers and heavier rails.
            2. This review has found that in the detail of Mod 14 no TSRs should have been imposed in July 2022 for CEN 60 track of for CEN 56 track until the ambient/rail temperature reached 41/59^{o}C. For CEN 60 tracks the TSR trigger point is 44/63^{o}C which were not reached in July 2022.
            3. <u>Note:</u>
                a. As referred to under culture, these findings were obvious to a skilled person yet had not been included in the 2021 update of Mod 14.
            4. Of course, if there are other local factors which require a TSR in hot weather then the track condition, if maintained at standard.
            5. Note:
                a. If the TSRs are intended to reduce lateral forces then the velocity of the train provides a reasonable rule of thumb for the reduction. Going from 60mph to 20 mph for a two degree increase in temperature would appear to be disproportionate at the highest temperatures.
            6. Even with the change in trigger point for 2023 to 41^{o}C for 2023 having the first reduction in speed to 60/30 appears to be a very big step for a

relatively small increase in ambient/rail temperature. A more gradual change would benefit both passenger and freight operations.

7. Note:
    a. A speed reduction from 125 mph to 90 mph reduces the vertical and horizontal forces being applied by a moving train by 50%. It raises a question regarding the science/engineering behind the specified speed restrictions at the defined trigger points. Are Network Rail's standards a reflection of detailed studies or just an evolution from British Rail's 1990s standards?
8. Note:
    a. In Network Rail's mindset there seems to be a fixation that at a rail temperature of 60^{o} something awful suddenly occurs, assuming that the rail temperature is 1: 1.5 of the ambient temperature. In summer 2022 that ratio was found to be 1: 1.6 or even 1: 1.7 suggesting that there is no cliff edge at a rail temperature of 60^{o}C.

b. Out of date OHL Systems Standards in high temperatures.
    i. The 2022 Requirement
        1. Unlike for Track there is no equivalent NR/L2/TRK/001/Mod 14 although a new Guideline has been issued for application in summer 2023 in which the safe ambient temperature limit has been raises from 38^{o}C to 42^{o}. ii.
        2. The Director M&EE expressed his difficulty recognising that there are many different designs and configuration states, all at different points in their life cycle. The same as for Track but this has not prevented that function from having a single 'hammer to crack the nut' so to speak.
    ii. A new rule for summer 2023.
        1. The Director M&EE has declared that the OLE can cope with an ambient temperature of 42^{o}C without the need for any speed restrictions, up from a trigger point of 38^{o}C in 2022

c. A significant backlog re Planned Maintenance
    i. What has also emerged during the review is that a significant backlog in Planned Maintenance has been allowed to build up – NR Management's choice, which impacts on the vulnerability of those assets.
    ii. Note:
        1. There was universal acceptance from National Rail and many other non-UK based OHL engineers that the OHL asset only fails when an 'own goal' has been committed, where either the installation or maintenance has not been done correctly.
    iii. Note:
        1. It should be noted that since the 19th July 2022 when ECML was closed by NR as a preventative measure there have been at least three major failures of the OHL system on ECML resulting in Line closures. It suggests that the ECML problems are not so much related to the hot weather but a failure to properly maintain the OHL assets over a long period of time.

d. The number of outstanding critical faults has been allowed to increase in recent years.
    i. It was noted that as part of the London Olympic preparations zero outstanding critical defects or faults was achieved yet in October 2022 there were 672 critical faults outstanding.
    ii. This is one of those leading cultural indicators.
e. Disproportionate Speed Restrictions in high Winds Control Measure in Ops 21, now superseded by Ops 45.
    i. Ops 45 requires that when wind gusts exceed 60mph or forecast of mean speeds over 50mph requires a TSR of 50mph in the forecast area. It also requires suspension of all services when there are gusts over 90 mph.
    ii. The Director M&EE has informed this review that there is no need for any speed restrictions to be imposed in any section of OLE until wind speeds exceed 70 mph. This includes reference to the pantograph/OLE interface.
    iii. The Director M&EE has also informed this review that 'except for debris we could look at pushing the wind speed limit for OLE to 90mph'.
    iv. The document NR Weather Control Operations Standards does not detail the associated risks which require these prescribed measures. As such, the so-called Standard does not appear to be based on detailed calculations but on 'rules of thumb'. Nor do they provide any historical case studies what showed how the railway performed in these conditions.
    v. The rain related speed restrictions in Ops 45 appear to be equally over restrictive as those associated with both heat and wind.
f. The appetite to impose increasingly severe speed restrictions or to cease operations has, apparently increased without explanation.
    i. Customers and NR managers both report that 'we often shut now when we never would have back in the day'. What is the basis for these triggers? Why are the triggers 60mph and 50mph? Where is the Safety Case for this new Policy and Instruction?
    ii. The design, testing and commissioning of all rolling stock considers the stability of trains in high winds. These records are available for interested eyes and should inform the development of speed restrictions in high winds.
    iii. Where is the safety case for the Ops 45 instructions? The new approach implies that what was done in yesteryear was dangerous. Where is the evidence?
    iv. NR could be using Wind Tunnel simulation and testing to assess the impact of the stability of trains running at different speeds. This is used in Australia. The use of such testing is not uncommon in Rail and Air in many countries.
    v. On 27th February 2022 Network Rail closed the Great Western Main Line between 1200 and 1800 due to high winds in reaction to large quantities of debris being blown onto the railway. The MD of First Great Western disagreed with the decision citing that the M4 and Heathrow remained open. How does this fit with the WATF recommendation for Network Rail to align its weather restrictions with Highways England?

14. Key findings
    a. A number of philosophical, cultural, tone-setting issues have arisen during the review. They shape the real rather than the documented appetite of Network Rail's Board and senior executive. They include:
        i. Network Rail's apparent acceptance that having a significant backlog of Planned Maintenance is allowable. This review finds that it should only be allowed as

part of an approved trial to adjust the PM scope and frequency. Does NR accept that allowing a backlog of PM is an own goal?

ii. Network Rail's apparent acceptance that the growth in the number of outstanding critical faults is in line with its appetite and allocation of resources.

iii. What is NRs Appetite for major failures of their OHL Systems? Does NR accept the Installation and PM Hypothesis?

iv. Does NR accept the inevitability of loss of control events not caused by external events such as tree related debris? Does NR accept that they are responsible for identifying and managing vegetation related risks in and close to the corridor? If so, does it accept that related speed restrictions are own goals, where the Route Director has failed to identify and mitigate the risk?

b. <u>The gross disproportionality of the speed restriction regime in summer 2022 for track and OLE.</u>

i. The Speed Restrictions imposed on the Network during the hot weather in July 2022 have been shown to have been grossly disproportionate. In response, for Track Network Rail have removed the trigger for 90/45 speed restrictions at 36^{o}C with the first heat related trigger point now being at 41^{o}C.

ii. For the Overhead Line assets (OLE), the revised instruction is that there is no need for any heat related speed restrictions until the ambient temperature has reached 41^{o}C, rather than 38^{o}C in 2022.

c. <u>The lack of clarity regarding who sets the rules in Network Rail</u>

i. A key finding is that the Technical Authority set trigger points and speed restrictions based on a combination of custom and practice and some revised engineering assessments. The Operations Standards unit, via Ops 45 also set trigger points and speed restrictions which are more restrictive than those laid out by the TA. The basis of either the qualifications, the risk identification or the appropriateness of the restriction/mitigation measure is unclear.

ii. The current regime, certainly as far as the Operations Standards is concerned, does not seem to recognise that trains are running on an engineering base which should mean that Speed Restrictions are based on Engineering rules.

d. <u>The Gross Disproportionality Factor Model (GDF)</u>

i. The development of Network Rail's Gross Disproportionality Factor model appears to provide a high-quality and risk-based approach. It uses science and engineering calculations to define what is 'reasonably practicable' to determine what speed restrictions should be imposed in given weather related circumstances. An early example shows that the GDF would have required a Temporary Speed Restriction (TSR) of 40 mph whereas current practice would have resulted in a TSR of 60 mph.

e. <u>The lack of structured, disciplined review and management of change</u>

i. This review identified some inconsistencies between the Engineering and Operations Standards which highlights to lack of discipline with either structured periodic review and any subsequent management of change. This lack of discipline with management systems is dealt with under the Management Section.

ii. This review found that while the details of Mod 14 had been updated in 2021 yet the required TSRs had not. Nor has OPS 21's Table eleven, (since abolished and replaced with Ops 45) which had a back-to-back TSR requirement driven by Mod 14. Table 11 was used by Network Operations in 2022 but had been out of

date since the changes were made in Mod 14. Very poor management of change discipline. As such the vast majority of TSRs applied in summer 2022 were not required.

iii. This 'own goal' reflects on the failure to update both Mod 14 and Ops 21 as the underpinning engineering requirements changed. It reflects a lack of effective management of change and internal challenge and understanding of the nuances of the drivers of the restrictions.

f. <u>The Restrictions on Freight Trains in hot weather look to be out of date and overly restrictive.</u>

i. The uniform 45/90 and 60/30 speed restrictions that require freight trains during hot weather to operate at speeds 50% below passenger trains taking no account of the improvement in bogie design over the past 30 years. The 50% rule of thumb looks lazy and out of date.

15. Recommendations

a. <u>Clarifying where the authority for operating restrictions lies within Network Rail – December 2023</u>

i. Recognising that trains operate within an engineering system Network Rail should ensure that the Technical Authority is the only source of any operating restrictions based on asset design, condition or capability, not withstanding the right of a local manager to impose a restriction to mitigate a local risk as and when deemed necessary.

ii. The current practice of Operations issuing restrictions without having first identified the specific operating risk, what is required to meet the 'as low as reasonably practicable' test and the proposed mitigation should be stopped.

iii. A way forward should follow three steps.

1. Formalise the authority of the Technical Authority to set all the limits of safe operation and the trigger points for introducing speed restrictions.
2. Allow the Operations Standards team to issue Procedures regarding train movement in line with the TA or more restrictive only when a specific risk relating to train movement is identified which falls outside the TA's responsibility (difficult to think of one) and when the definition of 'reasonably practicable' is defined to underpin a Procedure.
3. Allow local managers to issue local limitations regarding train movement due to a specific and localised threat. Such limitations, if they are to remain in place for over 72 hours should be reviewed and authorised by the Regional Director of Engineering and Asset Management, DEAMs. Two issues arise here:
    a. On matters of safety local managers must feel able to take immediate action when they see fit.
    b. It is important that such actions should be subject to expert review and approval if they are to remain in place for longer than 72 hours.
4. Once approved these local restrictions should be registered with the TA.
5. Any permanent local restriction based on local asset conditions or configuration should be approved by the Regional DEAM and registered with the Technical Authority allowing peer review and challenge as

necessary. An example could be on the OLE in the Biggleswade area on the ECML where there are known asset configuration risks.

b. The Gross Disproportionality Factor Model (GDF) December 2023
    i. The GDF appears to provide a scientific and engineering risk-based framework for the Technical Authority to use to define a defendable definition of what is 'a reasonably practicable' response to a weather-related risk.
    ii. Network Rail should accelerate its development and deployment to enable its speed restrictions in extreme weather to be based on a uniform framework across Network Rail.
c. A detail in depth review of the basis of the trigger points and the consequential restrictions is required for all 'extreme' weather events. February 2024
    i. Track: changes since 2022
        1. It should be noted that for track the 2023 trigger point has been raised to 41 from 36^{o}C and the consequential speed restriction raised from 45/90 to 30/60.
    ii. OLE: Changes since 2022
        1. It should be noted that for OLE the Technical Authority have removed the 38^{o}C trigger point and raised it to 42^{o}C for summer 2023. Further analysis should be conducted to amend this trigger point and any consequential speed restriction.
        2. The Director M&EE, in discussion stated that 'except for debris we could look at pushing the wind speed limit for OLE to 90mph'.
    iii. Comment:
        1. While the 2022 trigger points and consequential restrictions have been changed, they appear to be based on what at first glance would appear 'to have been obvious to a skillful person' rather than based on an in-depth analysis of the current rules.
        2. A detail in depth review of the basis of the trigger points and the consequential restrictions is required for all 'extreme' weather events. The comments by the Director of M&EE above suggest that the Network Rail network has more resilience in it than the current trigger points and consequential restrictions imply.
        3. The GDF looks like a strong basis upon which to base such a review.
d. Freight: Review the basis of the severe speed restrictions that apply to freight trains. February 2024
    i. The initial heat related speed restriction for summer 2023 of 30/60 as an initial speed restriction contrasts with a 10km per hour speed restriction in NSW, Australia and should be reevaluated to see if a lesser first step speed restriction on modern track design could be adopted.
e. Freight: Recognise that there are many different types of freight trains. A single 'hammer to break the nut' looks to be disproportionate. February 2024
    i. All rail vehicles design, type approval and testing are subject to detailed analysis. These design features should dictate what if any restrictions should be imposed during hot weather and if any differential speed restrictions should apply to freight trains. This should be done on a fleet-by-fleet basis.
    ii. The existing Classification of Trains already recognises several classes of freight trains and, via TOPS allows specific restrictions to trains to be applied on a geographical basis.

f. Management of change – December 2023
    i. Network Rail should adopt a formal modification control procedure for changes to any engineering or operational instruction to ensure that any change is properly managed in other standards or instructions which interface with it. See paragraph 14 € above).
    ii. Network Rail should consider introducing a peer review process to ensure that further opportunities to improve standards and/or operating procedures such as those changed regarding track and OLE since 2022 can be done in a planned way on a proactive basis.
    iii. See best-in-class practice above in paragraph 12.d.
g. Approval to have Planned Maintenance backlogs. December 2023
    i. Any backlog in maintenance should be carefully tracked and managed within approved limits where those limits should be set by the TA. Any breaches of those limits should be regarded as 'own goals' by the Route Directors.
    ii. The TA should monitor performance.
h. Tolerance to have outstanding critical faults on electrical assets. December 2023
    i. Each Route should have a very low tolerable limit for such faults critical OHL faults. Reporting of critical faults above those limits should be regarded as 'own goals' by the Route Directors.

Planning

16. Introduction
    a. General themes that emerged from the various discussions during this initial review period was that:
        i. Pre summer preparedness in 2022 had been better than in previous years.
        ii. That, for the most part, the failures that were seen were in areas of risk that were well known in the various Route Organisations and that in many cases the performance of assets exceeded expectations.
        iii. A cultural feature that emerged in the review was the current tendency to react rather than to plan and prevent.
        iv. Extreme weather is now foreseeable in the UK in light of recent years' experience and the onset of significant climate change.
17. The evidence from Network Rail documents and discussions
    a. The general themes that emerged from the various discussions during this initial review period was that:
        i. Pre summer preparedness in 2022 had been better than in previous years.
        ii. That, for the most part, the failures that were seen were in areas of risk that were well known in the various Route Organisations and that in many cases the performance of assets exceeded expectations.
        iii. A cultural feature that emerged in the review was the tendency to react rather than to plan and prevent.
    b. Extreme weather is now foreseeable in the UK in light of recent years' experience and the onset of significant climate change. Since it is the O&M managers' job to be systematic and proactive in the identification and mitigation of risk (the universal obligation) it is reasonable for Routes to have scenario-based Plans for many of the foreseeable circumstances.
    c. In the various Routes the risks to assets are well known and understood for various scenarios. Since risks and known and mitigation plans are in place a move to prediction and forecasting of the effectiveness of management plans is well based.
    d. The use of a forward-looking prediction-based performance for given scenarios rather than a backward-looking approach.
    e. ECML: An example i. In July 2022 the ECML was closed on 19th July having conducted a series of risk assessments considering the forecast heat for that day. Subsequently discussions have revealed that this decision was an overreaction. Where is that learning documented? What will happen next time?
    f. WCML South: An example: On 19th July MML South closed between 1200 and 1800 in view of the forecast weather conditions ii. In discussions the Route Director suggested that, on reflection they would not close again. So where does that learning inform the predictive model?
18. A comparison with proven 'best' practice in comparative jurisdictions.
    a. SBS Transit, Singapore
        i. With SBS Transit, Singapore, since 2015 there has been a shift from a backward looking, reactive way of working, to a forward looking, predictive approach to O&M Management.
        ii. It took the legal requirement to systematically and proactively identify and mitigate risk as its central driver. Any loss of control event, such as a delay or

accident was considered to be a collective management failure -they had failed to identify and mitigate a foreseeable risk.

iii. It was this that drove the refinement of the Management System. A delay due to a missed risk or the failure to have successfully mitigated it was a case for learning – how was the risk identification and/or its control missed?

iv. As the corporate confidence grew out of the identification and mitigation of risks and the frequency of loss of control events dropped, almost to zero the focus shifted to prediction of future performance. That is what the customers want us to do – to be on top of our professional obligations, not to ever lose control.

v. It didn't cost much. The biggest challenge was mindset of the leaders. The challenge is cultural – what level of loss of control is tolerated?

b. MTM Melbourne

i. Since 1996, and more particularly after 2009 when the five-day weather forecast shows that the ambient temperature is to exceed 40^{o}C the Strategic Hot Weather Plan is used to plan the details of what service and supervisory changes will be made on the day(s) in question.

ii. The Plan is triggered on D-Day minus two enabling the planned staff and passenger communications plans to be put in place. The service plan is reduced and simplified to guarantee minimum frequencies on all lines.

iii. The Plan involves a doubling up of supervision in the Control Centre along geographical lines with other posts duties being split on the same basis.

iv. Staffing of key platforms is strengthened along with additional passenger communication processes to provide re-assurance and directions and train driver supervisors are on hand to supervise and guide drivers at all key changeover points. Similarly, asset teams are deployed into rapid response rather than Planned Maintenance activities.

v. Additional resources are found from back of house people who have been suitably trained for additional roles.

vi. The key feature is that the staff and passengers are familiar that given a foreseeable special event MTM have a well-developed plan. A hot day is another foreseeable special event, no different from many other Special Events throughout the year including sporting events, festivities etc.

19. Key findings

a. <u>Network Rail's Route and Regional Weather Plans were found to be bland.</u>

i. Network Rail's Weather Plans were found to not include some/several legal requirements such as the handling of passengers on stranded trains.

ii. Network Rail's Weather Plans were described by a senior Network Rail manager as being 'bland' with the possible exception of the Scotland Region.

iii. Since it is the O&M Managers' job to be systematic and proactive in the identification and mitigation of risk (the universal obligation) it is reasonable for Routes to have scenario-based Plans for many of the foreseeable circumstances.

iv. In the various Routes the risks to assets are well likely to be well known and understood for various scenarios. Since risks and known it seems reasonable that mitigation plans are in place a move to enable a shift to prediction and forecasting of the effectiveness of management plans post event.

v. The use of a forward-looking prediction-based performance for given scenarios rather than a traditional backward-looking approach is consistent with the legal

requirements of the 1974 HASAWA and the RRPs emphasis on anticipation rather than reaction.

b. <u>The need for a new approach for Route Proving after Line Closure</u>
    i. The 2022 Weather Plans did not consider how a reopening after closure would be managed. An omission.
    ii. Lessons from the July 2022 experience showed that since the likelihood of closure was well known 3 days before the events the short-term planning would have been enhanced by having detailed plans and resources deployed to enable the Route Proving time to be minimised.
    iii. The Regional Adverse Weather Plans that have been reviewed do not make any reference to Route Proving. In discussions Routes have admitted that they were ill prepared for any reopening after Line closures, something that is unlikely to be repeated.
    iv. ECML Route Directors suggested during a meeting in September 2022 that they would consider maintaining some slow train running as part of an ongoing Route Proving which could accelerate the reopening for Service Trains once the high-risk period had passed.
c. <u>No coherent Strategic Operations Plan to protect the major freight flows.</u>
    i. No strategic Operations Plan to protect the major freight flows particularly from the major ports.
    ii. No recognition that many freight flows are contained to specific routes. Instead, Freight trains were treated as a single matter in July 2022 with almost all services suspended everywhere. Similarly, the prescribed treatment of Freight trains regarding speed restrictions is based on the assumption that all freight trains have similar characteristics, which they have not had for over 30 years.
d. <u>Maintenance Managers are known not to have sufficient time to conduct Planned Maintenance on many assets.</u>
    i. A key requirement of the 1974 HASAWA and subsequent legislation is the need for senior managers to provide staff with the required resources to be able to take the necessary risk mitigation measures. For maintenance this includes sufficient time to conduct Preventative Maintenance in a planned way.
    ii. This review has identified that Network Rail's senior managers are aware that the Line Maintenance Managers do not have sufficient time to plan and conduct PM work which results in a very high ratio of Corrective Maintenance.
    iii. It is not uncommon for the PM/CM ratio to be 30/70% whereas good practice would be 70/30 or even 80/20. Despite this being known it has been left in the 'too hard' basket. Recklessness or Negligence? Definitely not a feature of high-performance.

20. Recommendations re Extreme Weather Preparedness
    a. <u>Introduction of Forecast Performance for summer 2023 based on three scenarios. May 2023</u>
        i. Since the asset risk profiles are well known by Route it is recommended that for each Route, for each Service Group or TOC, including for all major freight flows, a risk-based scenario on how the railway would be likely to perform in specified scenarios such as 38^{o}, 40^{o} or over 42^{o}C, winds above 40, 60 and 80mph and rainfall above the regional norms.
        ii. These scenario Plans should be the yardstick against which the Routes should be held accountable. Uncontrolled events due to risks not having been identified or

mitigated should be regarded as own goals; management failed to fulfill their universal obligation.

iii. The scenarios would provide a basis for proper third-party review (compared to the very late, and very ineffective reviews conducted prior to the 18th and 19th July.

b. These Plans should include the following:
    i. A risk register for each Asset Class including the planned mitigations.
    ii. The Operating Train Plan which can be picked off a shelf.
    iii. How any stranded trains will be managed when temperatures are above 33^{o}C.
    iv. A Route Proving Plan in the event a Line closure may be required.
    v. A public and staff communications plan.
    vi. A staff deployment plan to support any enhanced customer service support for the public.
    vii. Enhanced Command and Control arrangements including deployment of maintenance teams and equipment.
    viii. This should facilitate the development of Train Service Plans by TOC, by Route including the provision of Freight paths and the likely speeds etc.
    ix. These Plans could inform the discussions around the value of funding additional risk mitigation activities recognising the limited number of days that such conditions and train services are to be tolerated.
c. The benefits of this recommended approach:
    i. It stimulates ownership, innovation and focuses the accountability to having identified and mitigated the risks effectively.
    ii. It provides a clearer role for the Centre to test, verify and assist – a much more valuable role than trying to prescribe.
    iii. This approach would also provide a basis for scoring the Routes after extreme weather – with an emphasis on the effectiveness of the at-risk assets and their mitigation. The number of unexpected loss of control events would identify the relative effectiveness of the management effort. This recognises the need to move from a looking-back driven approach to a forward-looking, predictive approach.
d. <u>The need for a Strategic Freight Operations Plan for adverse weather conditions: May 2023</u>

Concluding Remarks

1. The challenge of the difference between the Board's appetite in respect to 'best in class' and 'open to new approaches' and the leading cultural indicators that suggest the Network Rail management doesn't really mean it. This obvious misalignment is of concern as is the apparent lack of progress on many recommendations from external reports.
2. There is a need to address the lack of clarity regarding the setting of trigger points and the consequential operating restrictions. This focus on the Technical Authority and the Operations Standards unit.
3. There is a need to address the lack of clarity re accountability between the Centre and the Regions/Routes, and even of the inconsistent roles, authority and accountabilities of the Regional DEAMS.
4. The lack of disciplined process regarding the management of change regarding Standards and Operating Instructions and that they do not seem to be challenged or validated on a set frequency are very surprising in a major railway.
5. That many Network Rail managers do not seem to be aware of, or comply with quite long-standing guidelines and requirements of RSSB research is concerning made more serious by the lack of awareness of common 'good practice' in many high performing railways.

People Interviewed during the review – Network Rail

Network Rail Executive Team

1. Andrew Haines, CEO, Network Rail
2. Martin Frobisher, Director Safety and Engineering
3. Jake Kelly, Group Director, Systems Operations

Central Functions

4. Martin Jones, Chief Engineer
5. Oliver Bratton, Director, Network Operations
6. Dr Ian Coleman, Principal Engineer
7. Gareth Evan, Technical Head Track
8. John Edgely, Chief Track Engineer
9. Phil Doughty, Technical Head OHE
10. Brian Tomlinson, Chief Systems Engineer
11. Denzil Collins
12. Brian Whitney, Dir Track
13. Brian Haddock, Weather Resilience Program Manager and Team of 6
14. Ian Prosser, Director Rail Safety
15. Thomas Desmond, Director Ops Capability
16. Emma Lowe, Ops Professional Development Office

Scotland

17. Alex Hynes, MD Scotland
18. Liam Sumpter, RD Scotland

London Midland

19. Tim Shoveller, MD NW and Central
20. James Dean, RD WCML South
21. Tara Scott, Infra Director, East Midlands

Western

22. Mike Gallop, MD, Western
23. Nick Millington, Act RD Wales, Borders and West
24. Jane Austin, DEAM, Wales and West

Eastern

25. Ellie Burrows, RD, Anglia (now SR MD)
26. Simon Milburn, Infra Dir, Anglia
27. David Davidson, Ops Dir, Anglia
28. Paul Rutter, RD, ECML
29. Sarah Reid, ex RD ECML
30. Sam MacDonald, Ops Director ECML
31. Simon Pumphrey, Infra Dir ECML

Southern

32. Sian Thomas, DEAM, Southern
33. Colum Cavanagh, Head of Track, Southern
34. Tim Leighton, Ops Director Sussex

People Interviewed during the review – Not Network Rail

1. Andrew Hall, RAIB
2. Sir Douglas Oakervee, EFT lead
3. Peter Dearman, EFT Engineering
4. Peter Bateman, EFT Engineering
5. Andrew Went, EFT Engineering
6. Neil Andrew, EFT Engineering
7. Julian Worth, Retired Freight Specialist
8. Adrian Caltieri, Retired Operations and Planning
9. Alan Chaplin, Retired, O&M and Rolling Stock Specialist
10. Mark Hopwood, MD First Great Western
11. Jon Wiseman, VA Rail
12. Maggie Simpson, Freight Association
13. Anthony Smith, Gary Dangerfield, Transport Focus
14. Dean Johnson, Rail Delivery Group

People Interviewed during the review – International.

<u>Australia</u>

1. Sydney, New South Wales
    a. Howard Collins, COO Transport for New South Wales
    b. Neil Holden, Civil Asset Management, Transport for NSW (TfNSW)
    c. Anthony Lee, Executive Engineering and Maintenance TfNSW
    d. Stuart Middleton, Head of Operations, Sydney Trains
    e. Richard Fullalove TfNSW
    f. Terry Niemeyer, TfNSW
    g. Stephen Scott, Operations and Planning, TfNSW
2. Melbourne, Victoria
    a. Warwick Horsley, Operations, MTM Melbourne
    b. Paul O'Halloran, Head of Assets and Engineering, MTM, Melbourne
    c. Norm Grady, Linear Asset specialist, Melbourne (retired)
    d. John Barry, Rolling Stock specialist, Melbourne (retired)
3. Perth, Western Australia
    a. Garry Taylor, Head of Safety, PTA, Western Australia

<u>Singapore</u>

4. Foo Jang Kae, Chief Engineer, SBS Transit, Singapore
5. Quek Chin Hock, Head of PWay and Structures, SBS Transit, Singapore
6. Leow Meng Fai, Head of Asset Management, Land Transport Authority, Singapore

<u>Saudi Arabia</u>

7. Perry Ramsey, Rail Advisor, Saudi Arabia

<u>Ontario, Canada</u>

8. Duwayne Williams, Head of Asset and Engineering, Metrolinx, Ontario