OFFICE OF RAIL AND ROAD

UK NSA Annual Safety Report 2016

September 2017

Contents

A. Introduction

A.1. The purpose, scope and other addressees of the report

1. The purpose of this Report is to comply with Article 18 of the Railway Safety Directive. This requires all National Safety Authorities (NSAs) to publish an annual safety report. The report covers the UK NSA's activities from 1 January to 31 December 2016.

2. In the UK, the role of NSA is shared between the Office of Rail and Road (ORR) and the Department for Infrastructure (DfI). ORR is responsible for England, Scotland and Wales, collectively known as Great Britain (GB), and DfI is responsible for Northern Ireland (NI). ORR represents DfI in relations with the European Railway Agency (the Agency) and therefore this report covers the UK as a whole. There is a separate section covering DfI's activities in Northern Ireland (see section I). The Common Safety Indicator (CSI) data has been aggregated at UK level and includes data for the mainline network in Great Britain and Northern Ireland.

3. As well as being the UK NSA, ORR is in addition the economic Regulatory Body (RB) and competition authority for the mainline infrastructure manager (IM), Network Rail. It is also the licencing authority for track access on the rail network for railway undertakings (RUs), known as Train Operating Companies (TOCs) for passenger services and Freight Operating Companies (FOCs) for freight services.

4. The scope of this report is the entire UK mainline railway system (including the high speed line between London St Pancras and the Channel Tunnel (HS1)), and covers both 1435mm (GB) and 1600mm (NI) gauge networks. Mirroring the scope of UK implementation of the Railway Safety Directive, the report does not cover metros, tramways and other light rail systems, or infrastructure that is functionally separate from the rest of the UK mainline network.

5. The report does not cover the Channel Tunnel which has a separate NSA known as the Intergovernmental Commission (IGC). The IGC produces a separate annual report to the Agency. As of 2016, ORR along with its French counterpart ARAF is responsible for regulating access to the Channel Tunnel.

6. As well as the Agency, this report will be made available via ORR's website to the UK Department for Transport (DfT), the Railways Accident Investigation Branch (the UK's NIB), the Railway Safety and Standards Board (RSSB), RUs, IMs, entities in charge of maintenance (ECMs), passenger associations (Transport Focus and London Travel Watch), notified bodies (NoBos) and designated bodies (DeBos).

A.2. Possible significant organisational changes affecting the NSA

7. During 2016 there were no significant organisational changes made by ORR. A new CEO was appointed on a permanent basis in January 2017.

B. Overall Safety Performance and Strategy

B.1. Main conclusions on the reporting year

8. For the UK, there are three main sets of trajectories and targets that are used to measure safety risk:

- The mainline railway industry produces a Strategic Safety Plan(SSP)
- The Agency sets National Reference Values (NRVs) in the context of Common Safety Targets (CSTs)
- The UK government sets targets for risk reduction in the High-Level Output Specification (HLOS) for 5-year control periods (CP).

9. The reporting cycle for the UK is dictated by 5-year control periods, which are part of the government High-Level Output Specification (HLOS). The current Control Period (CP5) started on 1 April 2014 and runs until 31 March 2019.

10. The UK government has not set targets for risk reduction in CP5. Instead they have explicitly funded certain areas to achieve further risk reduction, such as level crossings and track worker safety.

Strategic Safety Plan

11. The SSP is a joint statement by UK IMs and RUs responsible for Britain's mainline rail network, setting out an agreed industry approach to managing safety. The SSP follows the Control Period cycle.

12. In the Plan, fifteen trajectories have been developed which describe the industry's ambitions in nine identified key risk areas and identify actions that are being undertaken to achieve them.

13. The fifteen trajectories are:

1. Passenger slips, trips and falls in stations
2. Train crew injuries on board trains
3. Signals Passed At Danger (SPADs)
4. Risk to infrastructure workers
5. Station staff slips, trips and falls
6. Train accidents due to infrastructure failure
7. Trespass
8. Assaults on passengers
9. Assaults on train crew
10. Assaults on station staff

11. Public behaviour on level crossings
12. Vandalism
13. Passenger injuries on board trains
14. Passenger accidents at the platform-train interface (PTI)
15. Train accidents due to rolling stock failure

National Reference Values (NRVs) and Common Safety Targets (CSTs)

14. The Railway Safety Directive states the requirement for Member States to ensure that safety is generally maintained and, where reasonably practicable, continuously improved. The Agency has developed CSTs and NRVs to monitor the safety performance of Member States.

15. Data for 2016, as outlined in this report, indicate that UK's safety performance continues to be at an acceptable level in all measured NRV categories.

Significant accidents

16. The UK railway industry uses the RSSB Safety Risk Model to model the risk from Potentially Higher-Risk Train Accidents (PHRTA). PHRTAs comprise the types of train accident that have the greatest potential to result in higher numbers of casualties, although the majority result in few or no injuries.

17. PHRTAs comprise train derailments, train collisions (excluding roll backs), trains striking buffer stops, trains striking road vehicles at level crossings, trains running into road vehicles not at level crossings (with no derailment), train explosions, and trains being struck by large falling objects.

18. In 2016, there were 16 PHRTAs, a significant decline from 2015 (267). The Rail Accident Investigation Body (RAIB) investigated four of these incidents. A list of the PHRTAs can be found in Annex C.

Table 1

PHRTA Category	Number
Collisions with road vehicles not at level crossings	3
Collisions with road vehicles at level crossings	4

Derailments	4
Buffer stop collisions	2
Collisions between trains	3
Trains struck by large falling objects	0

B.2. National safety strategy, programmes and initiatives.

19. The scope of this report is the UK mainline network. It focuses therefore on the ORR safety strategy, programmes and initiatives in relation to Network Rail and the mainline freight and passenger railway undertakings.

20. ORR has teams of inspectors allocated to different areas of the railway network:

- The mainline Infrastructure Manager (Network Rail) and associated suppliers and contractors. Each Network Rail route has a team of inspectors assigned to it. There is also a national team that deals with issues, such as level crossings, that are relevant to all routes.
- Passenger Railway Undertakings
- Freight Railway Undertakings, metros, trams and heritage railways
- Transport for London (TfL). This team covers London Underground, the Docklands Light Railway and some commuter rail services (TfL Rail and London Overground)
- A central regulation team covering human factors, occupational health & safety and railway safety policy. The team also provides the UK secretariat to the IGC and CTSA which provide support to the head and members of the UK delegations.

ORR strategy

21. ORR is strategic in how health and safety on Britain's railways are regulated. ORR's key approach is to deliver a safe railway where the health and safety management is cost effective and performance is amongst the best in the world.

22. ORR's health and safety strategy covers 12 key areas:

1. Health and safety management

2. Industry staff competence and human failure
3. Management of change
4. Level crossings
5. Interface system safety
6. Infrastructure asset safety
7. Rolling stock asset management
8. Workforce safety
9. Occupational health
10. The Evolution of train control
11. Health and Safety by Design
12. Leadership and culture

23. The contents of each chapter can be found on our website:

http://orr.gov.uk/rail/health-and-safety/health-and-safety-strategy/our-strategic-risk-chapters

B.3. Review of the previous year

24. This section looks at the following areas:

- Summary of mainline network
- Infrastructure Manager
- Passenger Railway Undertakings
- Freight Railway Undertakings
- Occupational Health
- Overall mainline health and safety risk management maturity

25. Safety performance on the mainline railway in 2016 remained broadly consistent with previous years as evidenced by the RSSB Precursor Indicator Model. Passenger safety remained very good, with the lowest level of harm to passengers and public ever seen on Britain's mainline trains and stations, when data is normalised (i.e. considering the rise in passenger journeys). However, there were several significant structural and earthwork failures that could have resulted in more serious train accidents.

26. Mainline passenger and public harm on trains and at stations was at one of the lowest levels in the last 10 years during 2016. Overall normalised harm (i.e. considering rise in passenger journeys) for train journeys was at its lowest level ever for 2016.

27. However, in overall terms, Network Rail's rate of improvement in asset safety has plateaued and some assets are vulnerable to failure in poor weather, especially earthworks and structures. The deferral of renewals has also increased pressure on

maintenance and inspection through which the risk has to be managed. These processes are heavily reliant on human intervention, which should always be the last line of defence.

28. Combined with the evidence of inconsistent frontline implementation of standards which ORR inspectors have identified on numerous occasions, these indicators give strong evidence of the vulnerability of the IM's improved safety management record of recent years. The issue of deferred renewals will also need to be addressed in the years ahead to ensure the situation is not allowed to worsen.

29. ORR continues to implement its Occupational Health Programme to encourage the railway industry to manage health risks. An additional focus by ORR is on safety by design, not only with major railway projects such as High Speed 2, but also with current railway operators, by monitoring to ensure that the right resource and focus on whole life risk management are embedded into a project at the early stages. Evidence shows that this is a highly cost effective approach to risk management.

30. ORR has identified four key challenges facing the railway sector:

- Maintaining safe and sustainable assets: Management of civil assets is a high priority for ORR. This is because of the age of the portfolio and its susceptibility to rapid deterioration in adverse weather. Initiating failure mechanisms are often difficult or impossible to detect by visual inspection and some of the work that Network Rail planned to carry out has been deferred because of funding constraints.
- Managing change: As well as growth continuing in some parts of the sector, 2016 saw a number of new franchises awarded that will lead to an increase in the number of services, as well as new rolling stock. This increases the inherent risk that duty holders need to cooperate to mitigate. One of the ways of achieving this is through the introduction of new technology and working practices. However, it is imperative that these changes are managed well.
- Culture and occupational health: Although ORR sees pockets of excellence, the sector still has some way to go in developing its overall safety culture and management of health to achieve widespread excellence. Evidence shows that focussing on improving the health of the workforce not only leads to a more engaged workforce, but also to a stronger culture and a more efficient business.
- Safety by design: As new strategic assets are introduced - whether a major infrastructure project, a rolling stock project or smaller enhancements - it is vital that the critical principles of excellent Safety by Design are employed by the sector. In some instances, ORR has seen that this has not been the case and therefore, to help the sector, we have refreshed our Strategic Risk Chapter on the subject and included it in our Principles and Guidance documents.

Infrastructure Manager - Network Rail

Management Maturity

31. Network Rail is the main focus of ORR's regulation as it is the infrastructure manager of the mainline network.

32. ORR uses the outputs from its inspections and investigations to inform judgements about how mature Network Rail's management systems are. This is done in a structured way by using Risk Management Maturity Model (RM3) criteria to highlight strengths and weaknesses in Network Rail's Safety Management System (SMS).

33. This is the fifth year ORR has used RM3 to evaluate Network Rail's management maturity (in line with the five-year cycle of its ROGS Safety Authorisation). Whilst there have been some fluctuations over the years there has been no substantive change; nine categories have remained unchanged at "managed" level and four at "standardised".

34. ORR has seen several potentially serious incidents over the year. Some of these were caused by factors related to Network Rail's management of its aging infrastructure.

35. The lack of improvement in Network Rail's risk management maturity, allied with the stalled improvements in performance indicators, give the strongest illustration yet of the potential vulnerability of its safety management record of recent years. ORR will continue working to secure targeted improvements, particularly in assurance activities, in order to promote more reliable and sustainable risk control.

Infrastructure worker safety risk

36. There was one workforce fatality – in a road traffic accident in June 2016.

37. Network Rail's focus on road driving safety has secured a steady reduction in road traffic offences. Yet, at the same time, the number of road traffic accidents has increased. Network Rail's work continues to review its Life Saving Rules and to better understand the root causes of this apparently contradictory trend.

38. ORR has used a balanced approach in its worker safety scrutiny during 2016, recognising that it would not be helpful to be too intrusive or prescriptive in assessing the renewed attempts to improve worker safety. Network Rail is allowed to get on with reviewing the lessons learned from the failed initiative and in repairing its relationships with its staff and their representatives. ORR has monitored this process and provided advice as required.

39. ORR welcomes the more cautious, incremental approach enshrined in the latest edition of the Network Rail's standard procedure - 'the Safety of People working on or near the line'. Efforts to regularise procedures across the network, including those parts that adopted PDSW without problems, are endorsed. ORR supports the attempt to retain a

single, accountable role for site safety and to involve that person in work planning and a permit to work system. It is more realistic to let Delivery Units decide for themselves their degree of readiness and appropriate timescales to proceed with change.

Level crossings

40. The harm caused by and from level crossings to their users and railway operations represents about 8% of overall system harm (excluding railways suicides). This has reduced gradually since 2010 following consistent focus by ORR, the industry and investment by the Government.

41. Since 2009-10, Network Rail has closed over 1,000 crossings.

42. 2016 showed that despite progress to reduce risk at level crossings vigilance must be maintained to make further improvement. Network Rail closed 67 crossings and downgraded seven during the year, yet it still missed its overall annual target for risk reduction. This reflects the importance of managing risks effectively at each crossing, as well as the increasing difficulty in securing level crossing closures.

43. ORR's main inspection programme in 2016 focused on risk control arrangements at whistle board crossings. A total of 128 crossings were inspected across all routes. ORR found that:

- the quality of asset information was generally better than in the first year this work was undertaken.
- the sounding of train horns formed an unreliable warning – it was not always done, and when the horn was sounded it was not always at the correct location to give sufficient warning to crossing users.
- Network Rail's risk assessments are improving – but the aspirations of local managers to improve risk control such as introducing additional warning technologies are frustrated by resource and slow industry processes.
- whistle boards should be provided on both approaches to crossings – even where train approach sighting are sufficient – because it is a natural human instinct to expect to hear a warning when approaching from either direction.
- consideration of additional risk during the 'night time quiet period' (NTQP) did not lead to additional local risk control measures.

44. Network Rail recognised the significance of its growing intelligence of greater crossing usage than originally thought during the Night Time Quiet Period (NTQP) and as a result showed good leadership to secure industry adoption of an enhanced NTQP.

Infrastructure risks

45. Civils and drainage: Management of civil assets is a high priority for ORR, because of the age of the portfolio and its susceptibility to rapid deterioration in adverse weather.

Furthermore, initiating failure mechanisms are often hard or impossible to detect by visual inspection. Finally, much of the work that Network Rail planned to carry out over the next two control periods has been deferred because of funding constraints.

46. The importance of these assets is emphasised by their presence in many of the elements of Network Rail's Train Accident Risk Reduction Programme elements and not all were delivered in 2016. The achievement of the Civils Strategic Asset Management Solution (CSAMS) caused significant delay and the failure to deliver its national roll-out had a knock-on effect on several other initiatives.

47. Targets for high-risk scour sites risk reduction measures were met. Drainage volumes, however, were not. These had been identified as delivering potential train accident risk reduction, but were not achieved in a majority of routes.

48. The Precursor Indicator Model (PIM) figures for both structures and earthworks are both on an improving trajectory – reflecting fewer incidents, largely as a result of more benign weather. However, a number of incidents provided graphic illustration of the potential for catastrophic consequences – and the vulnerability of some of the controls and mitigations. There is no room for complacency in Network Rail's management of the entirely foreseeable risks associated with this group of assets.

49. Supervision activities found that:

- The management of risk associated with deferred renewals of structures and earthworks renewals varied from route to route. No immediate significant concerns were identified from ORR site visits, but it was shown that Network Rail must improve the standard of its recording of the rationale for deferring a renewal and identifying mitigation measures.
- Although some progress was made, there were still gaps in Network Rail's asset knowledge, particularly in the field of drainage. However, work to complete the identification of all earthworks assets was completed.
- We told Network Rail that our investigations of a number of landslip incidents revealed too many barriers between asset disciplines, whose collective shared knowledge could have delivered more effective control of risk.
- Investigation of the derailment at Watford junction tunnel on 16 September 2016 revealed a weakness in Network Rail's arrangements for responding to short-notice notification of adverse or extreme weather. Steps are being taken to address this matter, and should also be considered by other routes.
- Several incidents during the year have demonstrated the potential impact of third-party activities on the safe operation of the railway. Network Rail, and the wider railway industry, needs to consider how best to minimise third-party risks.

Track

50. Trends in performance indicators show a mixed and sometimes complex picture for 2016. Track geometry and fault measures all still show an improvement, but some rates of improvement have slowed, or even begun to deteriorate. Broken rails, for example, show an improved trend in 2016 compared to 2015, but have not matched the 'best ever' levels from 2014. If immediate action level defects are included in the total – then the trend is once more at historically best ever levels.

51. Repeat twist faults have deteriorated over the last year. However, most routes show improving trends in new twist faults, and some of the 'repeat' twist faults may have reported an anomaly. ORR has escalated its concerns about management of repeat track geometry faults and has required Network Rail to show route and national improvement plans.

52. ORR inspections observed that:

- there was a clear and systematic process for measuring and monitoring track geometry, but robustness of delivery could be improved, especially the management of the output of track recording vehicles.
- In respect of the assurance-related follow-up and escalated track geometry management concerns, ORR had more productive engagement with staff in the central technical authority of Network Rail, but it became harder to secure plans from routes
- good progress with tubular stretcher bars fitment. Year-end saw an out-performance, achieving 1,948 point ends against a target of 1,850.
- Delays in the implementation of Plain Line Pattern Recognition (PLPR) and Eddy Current testing for rolling contact fatigue
- Business Critical Rules rollout was limited in its impact and future implementation lacks ambition. The programme never attracted the priority, funding and resourcing required to be effective
- Lagging of the role-based competence rollout. Without its full deployment Network Rail struggled to demonstrate that its competence management system (especially for Track Maintenance Engineers) was as effective as it should be
- Extensive inspections across all routes of deferred track renewals showed that there was not a demonstrably consistent means to manage the impact of deferrals. ORR found no evidence of immediate safety risk, but it was not always clear that the effects of deferral had been assessed fully, or appropriate interim mitigations identified and implemented. ORR made a number of recommendations for improvement.

Electrical safety

53. At a senior level within Network Rail, and particularly within its Safety, Technical and Engineering Directorate, there is a clear acknowledgement of and commitment to securing better compliance with the law and improved control of risks.

54. None of this is without significant challenge – the legacy infrastructure pre-dates most of the significant legislation and was not designed to comply; new electrification schemes have to be fitted on to existing infrastructure such as platforms, bridges and level crossings.

55. Supervision activities revealed a mixed picture of maturity in relation to the management of risks from electrical assets.

56. A very significant development was the production of a decision support tool to aid investment and renewal decisions. Network Rail intends to use this to secure greatly improved control of risk and legislative compliance for its legacy assets over the next three control periods (15 years). If left to condition-related renewal, this compliance process would take over a hundred years. ORR has endorsed the general approach described by Network Rail but has confirmed it would continue to scrutinise the detail of resulting plans.

57. Throughout 2016, ORR has monitored Network Rail's progress in delivering its electrical safety improvement plans. There are a number of strands to this programme, at varying stages of development. Some of the most important are 'Safer, Faster isolations' and 'Single Approach to Isolations'.

58. ORR continues to work with Network Rail to promote a better understanding of risk, so that proportionate decisions are made for new and legacy electrical infrastructure.

59. ORR is inspecting the efficacy of Life Saving Rules (LSRs) for electrical safety. The work is not yet complete, so we have not finally reported. However, ORR has communicated its interim finding that one rule, 'Test before earth' was well understood and adopted, but the other LSR 'Test before touch' rule was not observed at any of the ten isolations at the worksites we inspected. ORR has voiced its concerns on the management of this risk and will seek to secure improvements.

Passenger Railway Undertakings

Management Maturity

60. Passenger journeys travelled increased 0.8%. Passenger kilometres travelled increased 2.0%, however overall train kilometres travelled decreased 0.3% since 2015..

61. When compared to 2015, overall harm to passengers and public in stations and on trains decreased 16%. This was due to a reduction to five fatalities, down from nine last year.

62. ORR's safety inspectors have also worked alongside ORR colleagues dealing with wider regulatory and economic issues over this year, including engaging with Transport for Wales (regional transport authority) and the bidders for the forthcoming Wales & Borders franchise.

Station management, train dispatch and the platform train interface

63. High standards were identified in ORR inspections of station management, particularly regarding written systems, and it was found that where companies had migrated to electronic based competency management systems the quality of staff training and ongoing skills management was of a better standard than where reliance was still placed on paper-based systems. This may be due to competency assessments being recorded in real time that allows interaction with the individual being assessed. It was also noticeable that where electronic systems have been introduced there appears to be more use made of 'non-technical skills'.

64. Overall harm to passengers and the public at stations decreased 21% compared to 2015.

65. Over the year, ORR inspected a variety of platform dispatch methods, which included: guard self-dispatch; platform staff dispatch; driver only operation including look back, use of platform mirrors and also platform CCTV-mounted cameras. Throughout the year, as part of the on-going industrial disputes relating to driver-controlled operations (DCO), our inspections examined the arrangements for dispatch involving train-mounted camera equipment.

66. The inspections identified that risk assessments did not always capture all methods of dispatch and often did not consider the resource levels required to dispatch trains safely, particularly during peak periods. Further, the assessments were not always revised following changes at stations (e.g., where signalling changes had made platform signal sighting more problematic). A common issue within most of the companies related to the quality of investigations following incidents and the failure to identify the root cause accurately. This clearly has an impact on the ability of the companies to effectively address the failures and ensure similar issues do not arise in the future.

Rolling Stock Maintenance

67. No significant area of concern was identified in relation to rolling stock maintenance where inspection activity was undertaken. The companies were able to demonstrate a consistent approach to maintenance and good interfaces with external organisations, including Rolling Stock Operating Companies (ROSCOs) and third party suppliers. Areas of good practice included the use of IT to ensure that staff had up to date information of vehicle maintenance procedures, and long term planning of special events to ensure the availability of rolling stock.

68. Whilst interface arrangements with third party suppliers are improving, ORR is aware of continuing issues relating to sub-standard workmanship. It is, therefore, important that passenger RUs have the correct level of scrutiny to ensure work is undertaken to the requisite standard.

69. ORR inspections found areas of improvement at several depots in relation to worker safety issues; for example, enhance work at height and depot protection arrangements. This was particularly true when inspectors visited less modern depots, but duty holders have a responsibility to ensure effective control of these risks.

Safety certificate and franchising

70. The year saw a large number of safety certificate submissions and re-certifications, which is a legacy of the original five-year cycle whereby a large number of certificates were issued in a short period of time after the introduction of ROGS regulations. There were also a number of new franchises let and ORR assessed a total of 20 certificates/authorisations during the year.

71. ORR also worked closely with the UK ministry, the Department for Transport (DfT) to achieve better engagement throughout the franchising process in order that ORR's contributions were more effective to appropriate safety enhancements within new franchises.

National SPAD Strategy

72. Work continued on the development of a national Signal Passed at Danger (SPAD) strategy and will be presented in 2017 to an industry body - the Train Accident Risk Group (TARG) for their endorsement before it goes to System Safety Review Group (SSRG) and the Rail Safety and Standards Board (RSSB) board. This is the first of three stages. Stage one is to deliver the strategy.

73. ORR has been working closely with the steering group and working groups to identify its key themes to achieve reductions in the number of incidents.

Change Management

74. ORR found some weaknesses in procedures to meet the requirements of railway-specific risk assessment legislation. There remains scope for improvement in identifying and managing changes relating to organisational structure and alterations at stations. Further action is also required to ensure that appropriate audit systems are in place for competence management when change management is reviewed.

75. Inspection work was carried out on the subject of change management in 2016. The findings of these inspections were mostly positive, with evidence of good practice seen in the areas of leadership, board governance, objective/target setting, record-keeping, change management, proactive monitoring arrangements and management review. In general, the most significant changes were seen to be around "managed safely". It was apparent that the best performers carried out effective post-implementation reviews to understand how well the change had been done and to learn lessons for future change processes.

Freight Railway Undertakings

76. In 2016, there was a reduction in traditional freight volumes, for example coal, whilst other types of traffic, such as intermodal and construction, recorded an increase in traffic levels. As a result, many freight RUs are adjusting their organisational structure to take into account the changes to freight traffic. It is important, therefore, that operators have robust change management arrangements in place to ensure that health and safety performance is maintained throughout organisational change.

77. A specially convened cross-industry working group continues to review the interaction of common factors that appear in many freight train derailments: sub-optimal track geometry (particularly track twist), wagon suspension sensitivity and asymmetrical loads.

78. The group is undertaking four key enabling activities to improve its understanding of risk and capability to identify and mitigate the factors that influence track/vehicle/load interaction. The first two enablers are complete initiating further work investigating solutions that could improve current control measures. A new load measurement system that measures wheel load and called GOTCHA is live at around 20 sites. Network Rail is assessing its capabilities to reliably and repeatedly identify imbalanced vehicles.

79. During 2016, ORR consolidated work with freight RUs that had been undertaken in 2015. ORR also renewed a number of safety certificates for freight RUs, using the intelligence gathered to inform the freight inspection work plan for 2017-18.

80. ORR inspectors, working with colleagues from the French National Safety Authority under the auspices of the Channel Tunnel Safety Authority, undertook a series of inspections focusing on the arrangements for pre-departure checks carried out by freight RUs operating international freight services. Inspectors found robust arrangements in place for the development and maintenance of staff competence but issued a number of recommendations in relation to monitoring of work carried out by contractors.

81. ORR continues to engage with the work of the cross-industry freight derailment working group and the National Freight Safety Group and Rail Freight Operators Group.

82. As well as supporting the work of the cross-industry freight derailment working group to improve risk control, ORR continues to urge the freight community to improve its risk controls with particular focus on load management; and Network Rail on improving its management of track.

Occupational health: train and freight operators

83. Despite progress in some areas in 2016, ORR continued to see a mismatch between the occupational health policies and procedures developed by Network Rail centrally and consistent delivery in the Network Rail Routes. Sample inspection activity at the passenger operator Arriva Rail North Ltd identified a number of actions for improvement but was

generally well managed when considering noise, hand arm vibration, hazardous substances, asbestos management, legionella and diesel exhaust emissions. Active monitoring, the introduction of health surveillance and the operation of a “close call” procedure proved to be particularly significant.

B.4. Focus areas for next year

84. ORR published its focus areas for next year as part of the Health & Safety Report 2016-17[1]. These include: maintaining safe and sustainable assets; managing change; culture and occupational health; safety by design.

85. ORR’s key strategic health and safety objectives as set out in the 2017-18 business plan[2] are: managing growth and change; maintaining and renewing the safe and sustainable infrastructure necessary for a safe railway; continuing to improve health management and overall safety culture. Key focus will be on:

- Maintaining and further developing the RM3 model through an enhanced governance board
- Publishing guidance on ‘fitness for work’ and respiratory mitigation measures
- Further refining ours strategic risk chapter and our risk ranking process to prioritise our regulatory interventions
- Refining our safety certification process to make it more risk-based and proportionate.

[1] http://orr.gov.uk/__data/assets/pdf_file/0020/25229/annual-health-and-safety-report-july-2017.pdf

[2] http://orr.gov.uk/__data/assets/pdf_file/0008/24587/business-plan-2017-18.pdf

C. Developments in Safety Performance

C.1. Detailed analysis of the latest recorded trends

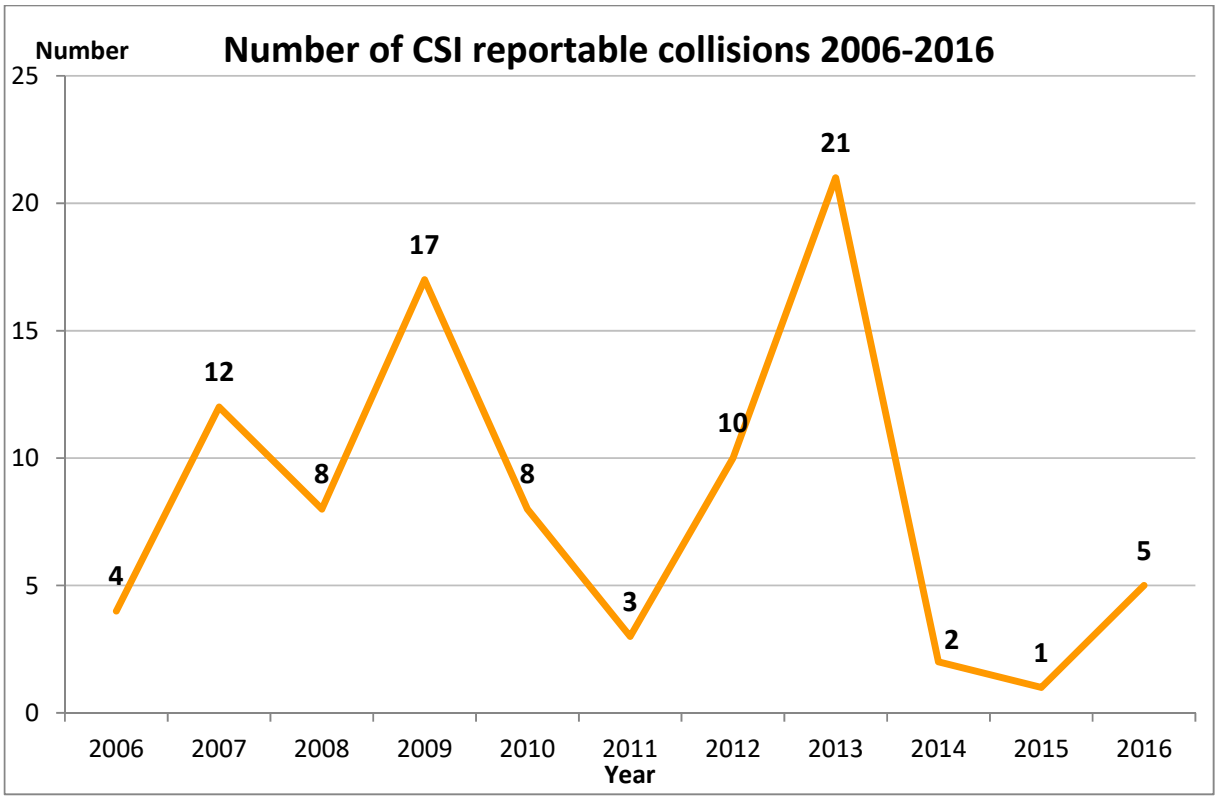
86. CSI data has been collected for 11 years. The scope of the statistics, the definitions applied and the data on CSIs are in Annex A.

87. In 2016, the total number of CSI reportable accidents was 52, an increase of 12 from 2015 and reversing a downward trend since 2010.

88. With the exception of 'accidents to persons caused by rolling-stock in motion', all CSI categories saw the number of incidents increase over the past year. There were two CSI reportable fires in rolling stock; there was a single collision incident with another vehicle. A graph and appropriate analysis is included for each of the six CSI categories where incidents were recorded in 2016:

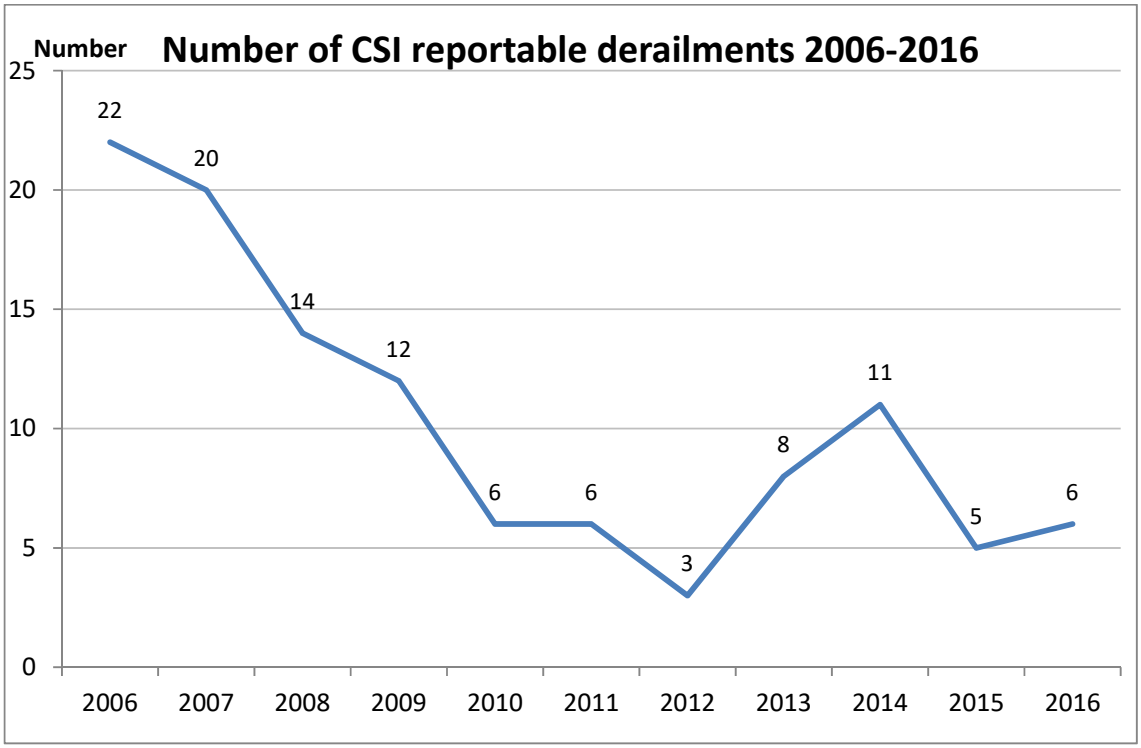
- Collisions
- Derailments
- Level crossing accidents
- Rolling stock in motion accidents
- Broken rails
- SPADs

CSI reportable collisions



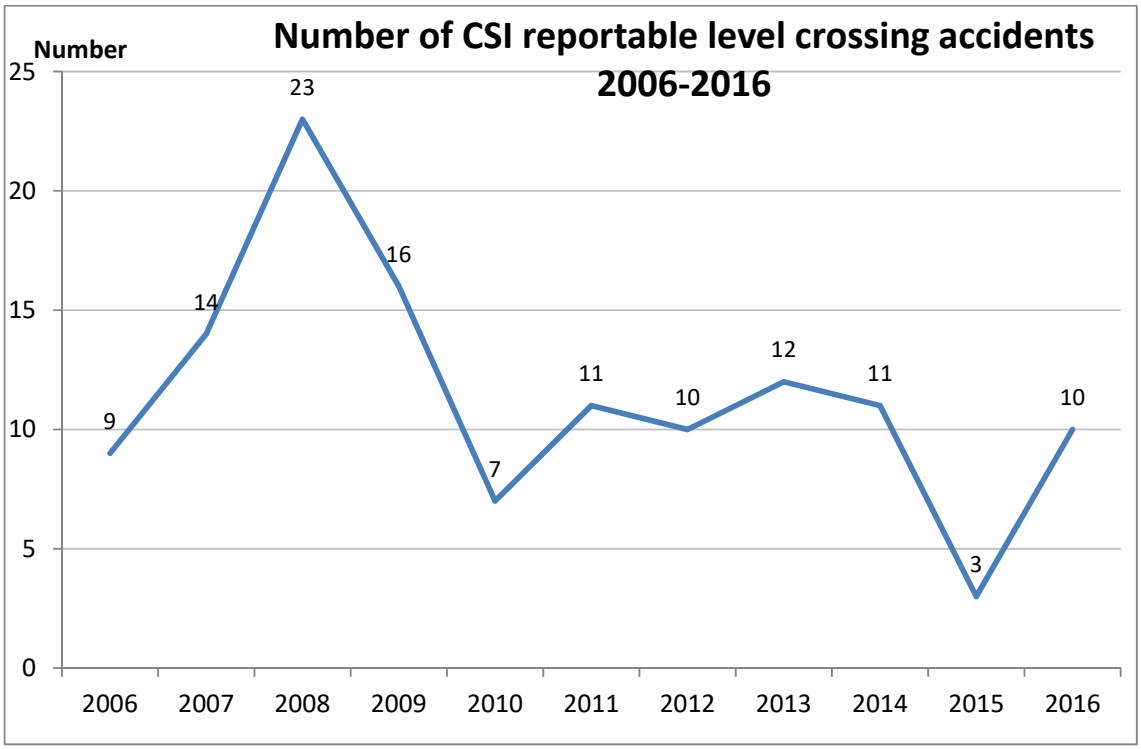
89. The number of CSI reportable collisions rose during 2016. It recorded its highest figure since 2013, although still a low figure by historical accounts.

CSI reportable derailments



90. In 2016, the number of derailments recorded increased from 5 to 6. As in 2015, none of the incidents resulted in a fatality or serious injury and the numbers remain low by historical averages. In the late 1990s there were typically 40-50 freight train derailments every year.

CSI reportable level crossing accidents

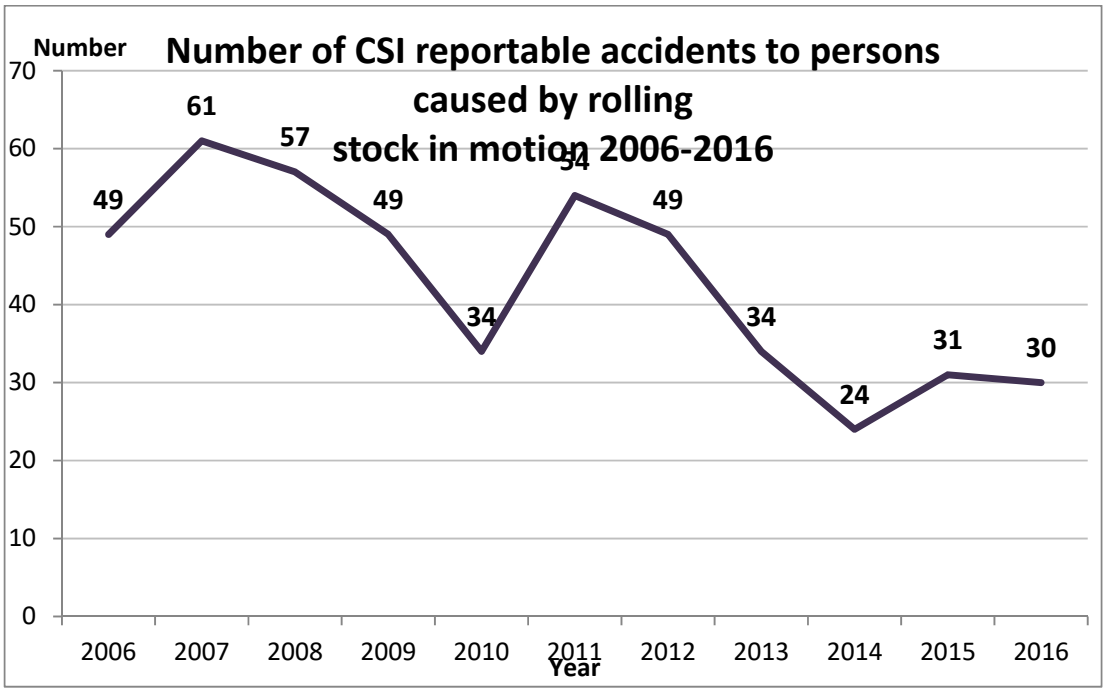


91. The number of reportable level crossing accidents increased significantly, from 3 in 2015 to 10 in 2016. Of the 10 accidents, five resulted in pedestrian fatalities and three were collisions with a vehicle.

92. Given the risks level crossings pose to members of the public, this is a concerning development and ORR remains focused on the continued risk posed by level crossings on the railway. We are conscious that much of the risk is based around user behaviour.

93. See the 'level crossings' section of chapter B3 for more information about ORR and industry strategy to reduce level crossing risk.

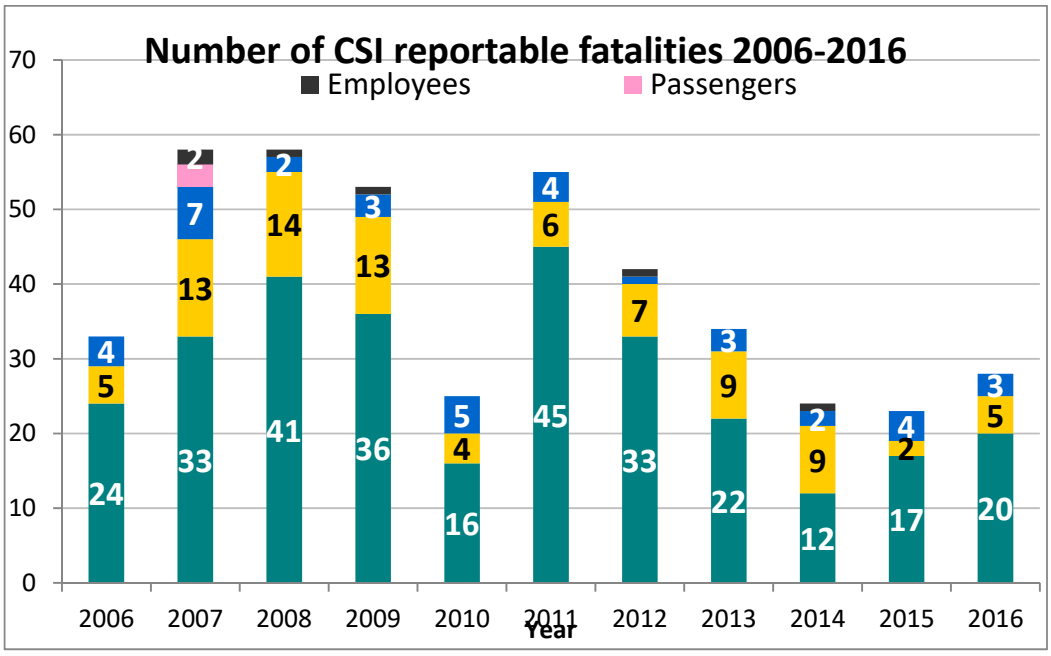
CSI reportable rolling stock in motion accidents



94. The number of rolling stock in motion accidents decreased from 31 in 2015 to 30 in 2016, making it the second lowest figure since CSI data has been collected.

95. Of the number of accidents, 23 led to fatalities, 20 of which were unauthorised persons. The remaining fatalities took place at platforms.

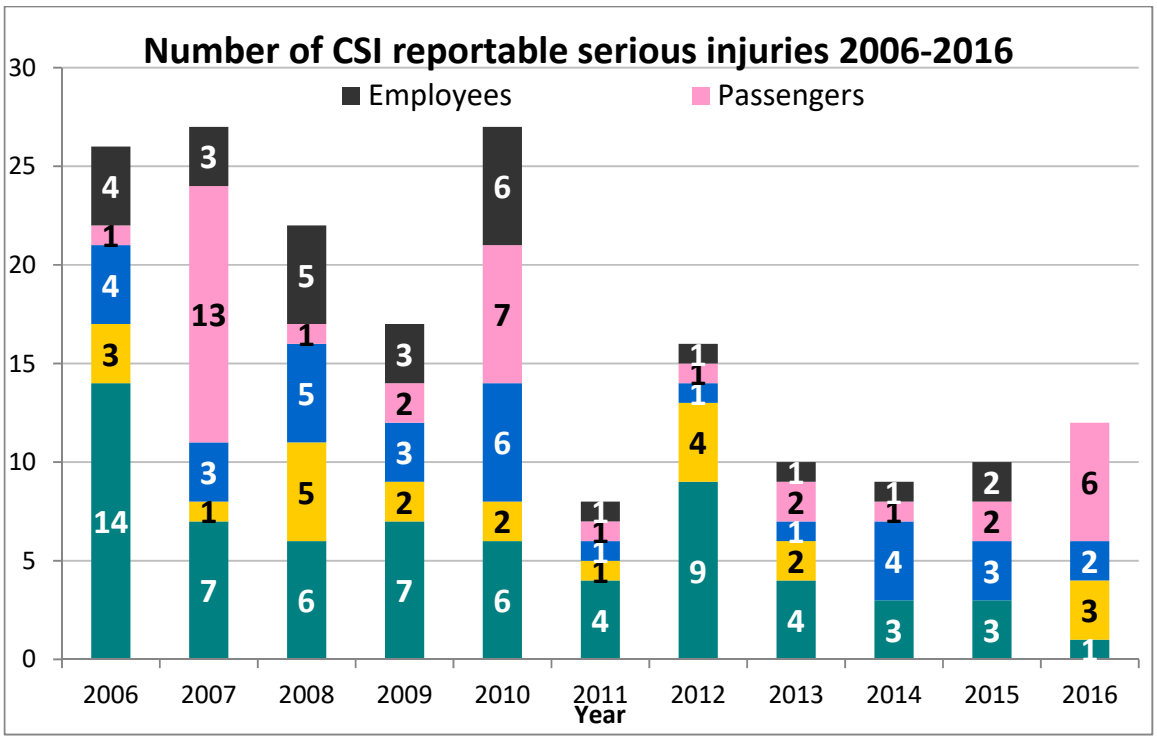
CSI reportable fatalities



96. In 2016, the number of fatalities increased by 5 to 28, the highest since 2013. The vast majority of CSI reportable fatalities continue to be unauthorised users. For the ninth consecutive year, there were no CSI reportable passenger fatalities. For a second year in succession, there were no worker fatalities.

97. The three 'other' incidents all involved trains striking persons at stations or on the track.

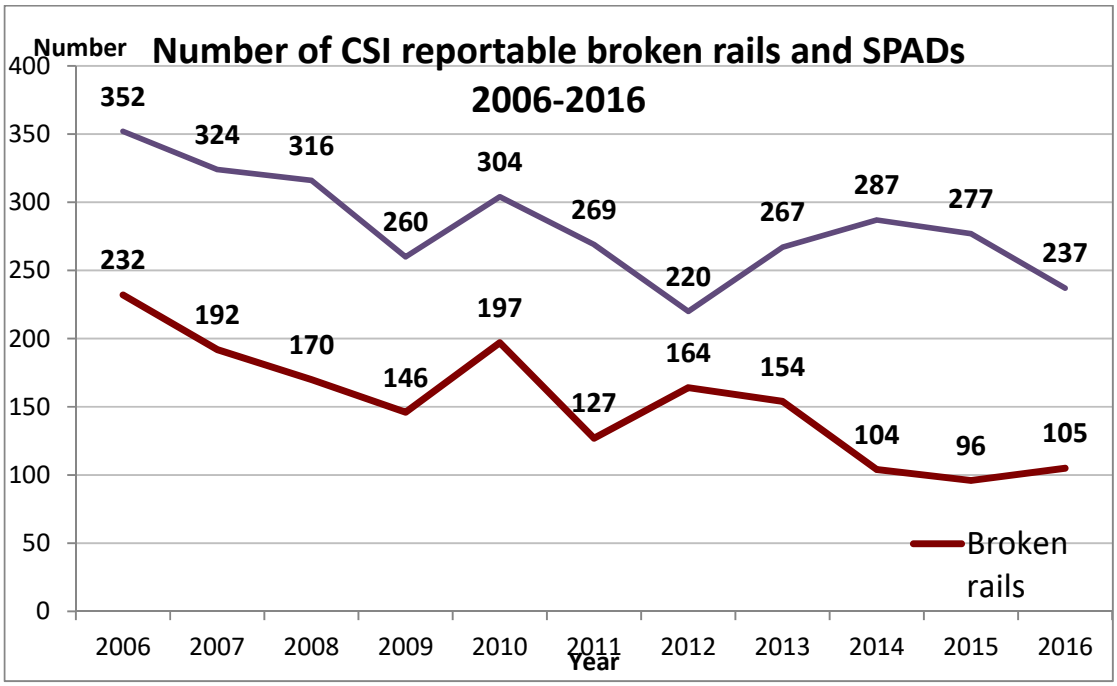
CSI reportable serious injuries



98. There were 11 CSI reportable serious injuries in 2016, one more than in 2015. Key facts were:

- Of the 6 serious injuries to passengers, four involved persons being stuck by a train and one each due to a vehicle collision and a train fire;
- There were no serious injuries to workers;
- One unauthorised person suffered serious injuries after being struck by a train.

CSI reportable broken rails and SPADS

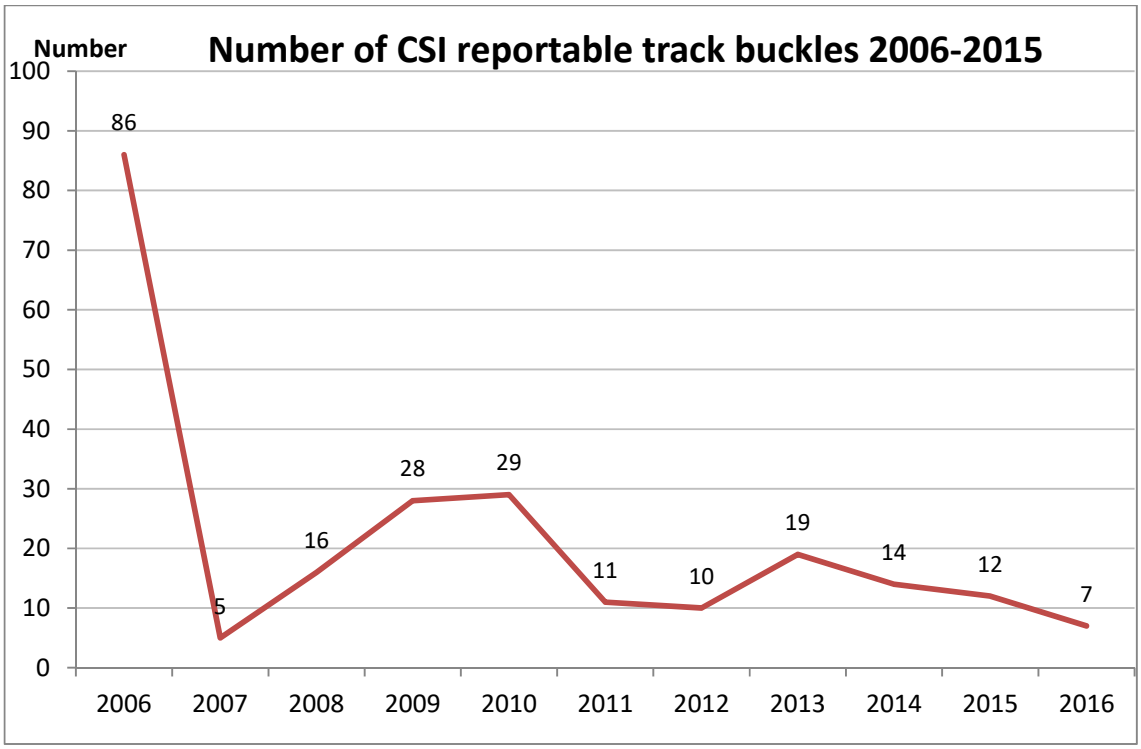


99. There were 105 broken rails in 2016, an increase of 9 over 2015. However, this is still the second lowest figure on record and very low by historical standards. As with 2014 and 2015, this is partly a reflection of the relatively mild temperatures, which compares to a prolonged period of cold temperatures experienced during some previous years, especially in 2010.

100. The continued roll out of automatic ultrasonic inspection by Network Rail has been a key driver in identifying damaged rails before they break.

101. The number of SPADs decreased for second consecutive year in 2016. At 237 incidents, this is the second lowest figure on record and a significant decrease from the previous year. This comes despite growing congestion on the UK network as a result of record passenger numbers. The rail sector is producing a strategy for reducing SPAD risks as the UK's mainline network moves towards automatic train control (ATC) through the implementation of the European Train Control System (ETCS).

CSI reportable track buckles



102. The number of track buckles decreased from 12 in 2015 to 7 in 2016. This is the second lowest figure on record and continues a steady declining trend since 2013.

Automatic train protection

103. There are 15,498 route Km of track in the UK.

Table 2

	Not equipped	Warning+ stop	Discrete	Continuous	Total
Conventional mainline (route length)	1236km	13880km	0km	382km	15498km
High Speed 1				108km	108km

104. 244 km of railway is fitted with ERTMS.

Level crossings

105. There are approximately 5948[3] level crossings on the GB mainline:

Table 3

Level crossing type	Number
Active with automatic user-side warning	252
Active with automatic user-side protection	0
Active with automatic user-side protection and warning	560
Active with manual user-side warning	0
Active with manual user-side protection	322
Active with manual user-side protection and warning	503
Passive	4311
Total	*5948*

[3] RSSB Annual Safety Performance Report: http://www.rssb.co.uk/Library/risk-analysis-and-safety-reporting/2016-07-annual-safety-performance-report-2015-2016.pdf

C.2. Results of safety recommendations

106. The Rail Accident Investigation Branch (RAIB) is the UK's National Investigation Body (NIB) for railway incidents, as defined in article 21 of the Railway Safety Directive.

107. RAIB are able to make recommendations to any organisation (whether part of the railway industry or not) that it regards as best placed to implement changes required to address the risks it identifies through its investigations. As NSA, ORR is responsible for ensuring that recommendations are properly considered by nominated end implementers and where appropriate acted upon.

108. In 2016 RAIB published 23 investigation reports containing 71 recommendations. The scope of this report only covers mainline railways, which accounted for 19 investigations containing 63 recommendations.

109. A list of the investigation reports, recommendations and their implementation status is in **Annex C**.

110. RAIB are also able to make recommendations on ORR, although they did not do so in 2016. Two existing recommendations are currently being implemented by ORR, both related to level crossing guidance.

111. A report published on 28 May 2015 into a fatality at Frampton Mansell level crossing included a recommendation for ORR to update the level crossing guidance for the public to take account of the findings in the report, the latest research by RSSB and any changes to signage made by Network Rail as a result of another recommendation in the report. ORR's guidance will be updated once the RSSB research has been completed and any changes to signage agreed with Network Rail. The guidance will also be subject to any legislative changes made by DfT in relation to level crossings.

112. The other outstanding recommendation against ORR followed an incident on 14 July 2013 where a train struck a car at a user worked crossing. Similarly to the Frampton Mansell recommendation, the report calls for ORR to update level crossing guidance for industry to take account of Network Rail research into crossing times at level crossings users and safe use of User-Worked Crossings (UWCs).

113. The outcomes will be reflected in the revised version of ORR Railway Safety Publication 7 'Level Crossings: A guide for managers, designers and operators'.

C.3. Measures implemented not in relation to safety

114. There were no measures undertaken by ORR beyond those laid down as safety recommendations by the National Investigation Body, RAIB, during 2016. Any safety changes implemented by RUs and IMs in the UK are not recorded or listed by ORR or relevant safety authorities.

D. Supervision

D.1. Strategy and plan(s)

115. ORR publishes a strategy for regulation of health and safety risks[4]. This sets out how ORR set its priorities and targets its activities. ORR has a vision of zero workforce and industry-caused passenger fatalities, with an ever decreasing overall safety risk.

116. A number of sources of information inform the strategies and plans:

- Mainline accident and incident data collected in the Rail Safety and Standards Board's (RSSB) Safety Management Information System (SMIS) and analysed using the Safety Risk Model (SRM);
- Accident and incident data reported to us under the Reporting of Injuries Diseases and Dangerous Occurrences Regulations (RIDDOR);
- NIB investigation findings;
- Intelligence from our audit, inspection, investigation and enforcement activities;
- Informed peer-reviewed opinion from specialist experts; and
- Intelligence from EU and other international developments.

117. Having identified the main risk areas, ORR considers which should be its priorities i.e. those on which ORR should focus its attention as an NSA. This does not mean that ORR does nothing with the other risks; we will still carry out work on other risks by conducting investigations of incident and complaints, monitoring the risk profile of each sector and will add other areas of risk to our collective inspection programmes if we feel it is warranted.

118. It is important to recognise that the risks are prioritised from our perspective as NSA. All risks, irrespective of their priority to us as NSA, must be controlled by the companies (whether RU, IM, ECM, suppliers, entities in charge of maintenance etc.) that create them.

119. An important part of our prioritisation process is to "horizon-scan" and anticipate new and emerging risks, or existing risks where we can foresee that they may change in their importance.

120. Underpinning ORR's prioritisation is a scorecard that is used to analyse the risks and give some ranking. This approach takes account of a range of issues, such as:

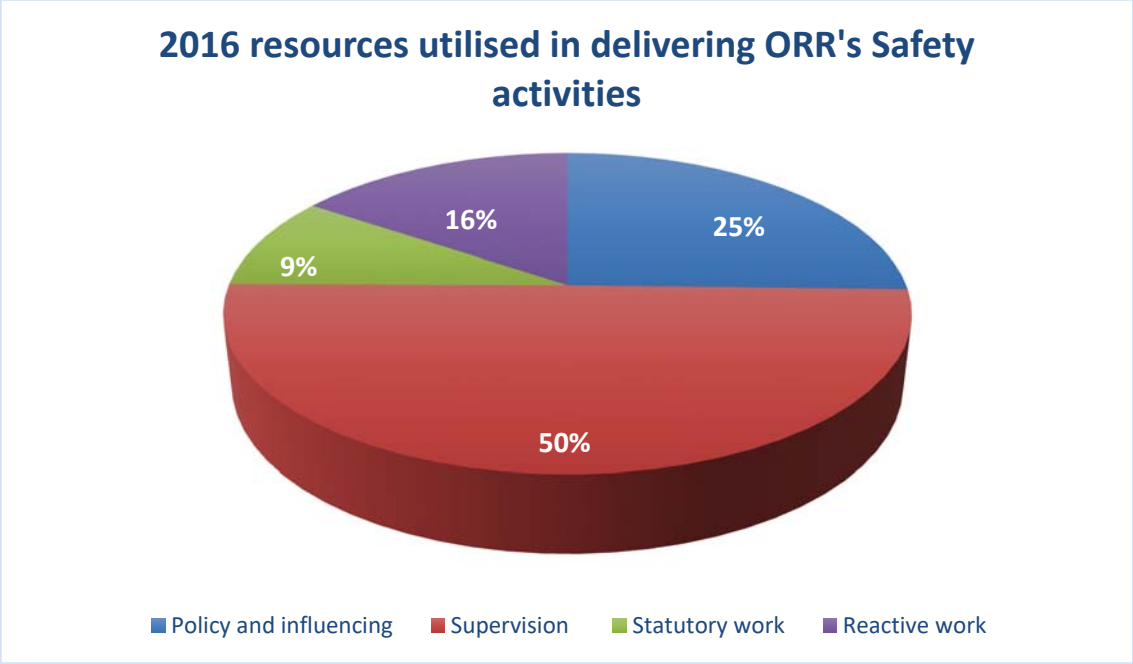
- How well the industry is managing the risk and whether we have confidence that performance will be sustained;
- The enforcement history - i.e. are we intervening more or less over time;

[4] The latest version is available via ORR's website: http://orr.gov.uk/__data/assets/pdf_file/0018/17019/health-and-safety-regulatory-strategy.pdf

- How well the industry is managing the risk and whether we have confidence that performance will be sustained;
- Likely public, political and media concern; and
- Whether we are best placed to make a difference.

D.2. Human Resources

121. ORR measures human resources for safety activities as equivalent to the number of full time employees (FTE) delivering those activities from data collected. The chart below indicates how this time is used:



122. ORR utilised resources amounting to 88.4 FTE working under safety areas. Of this resource, approximately half was devoted to 'supervision' activities. The total number of hours counted as 'supervision' in 2016 was 81,086.

123. Statutory work includes handling NIB recommendations and issuing safety certificates, safety authorisations, level crossing orders and train driver licences. Reactive work includes enforcement.

D.3. Competence

124. In line with the CSM supervision, ORR has an auditable competence management system.

125. The Inspector Competence Management System (CMS) is comprised of the following elements:

- recruit staff with existing skills or potential to develop them;
- assess training needs of new starters;
- deliver training;
- assess competence;
- set annual performance and development objectives;
- monitor performance;
- continual professional development/refresher training; and
- audit and review the CMS.

Recruitment

126. ORR recruits trainee inspectors from a number of backgrounds: external recruitment from the railways industry, external recruitment as health and safety professionals or internal recruitment from within ORR. Prospective candidates must show they have the capabilities to achieve the skills and qualities necessary to become an effective inspector.

127. On appointment, the line manager and the technical training manager undertake a learning needs analysis and set a training plan with regular reviews.

128. For basic health and safety regulatory training, ORR collaborates with HSE (the Health and Safety Executive, which is the main regulator in Great Britain for health and safety in the workplace) and sends staff on a bespoke regulators' course leading to a diploma. For railways specific training, ORR uses a modular course delivered by Birmingham University coupled with in-house training delivered by specialist colleagues.

129. When candidates are deemed to be ready, normally about 2 years after appointment, we hold an interview panel to assess the trainee inspector's ability to meet the competence framework for promotion to become a full inspector.

Annual performance agreements and development plans

130. The line manager and inspector agree a performance agreement each year that will include objectives to develop expertise. The developmental objectives are underpinned by an online competence assessment tool (ORRdat) which is also used by other domestic regulators. The outputs of the ORRdat self-assessment is discussed with the line manager and fed into the performance agreement and the business' annual training plan where appropriate.

Monitor and assure performance

131. Progress with the objectives in the performance agreement is discussed between the inspector and line manager quarterly. Formal review of the development plan takes place at the half year point.

132. ORR's processes require line managers to monitor and countersign inspectors work in a number of specified situations, for example, an investigation report or enforcement decisions.

133. ORR conducts some sample checks of enforcement notices and also runs peer review sessions on enforcement notices and investigation reports.

Continuing professional development

134. ORR runs a programme of technical training and legal updates based on the outcomes of discussions between inspectors and line managers.

135. To aid their development, we rotate inspectors about teams and encourage short term secondments (internally and with industry) as well as project working with other parts of ORR.

136. All inspectors are eligible for chartered membership status of the Institute of Occupational Safety and Health (IOSH). This brings with it, access to health and safety information and updates, and there is a requirement to carry out and record professional development activity.

D.4. Decision-making

137. ORR sets out the decision-making criteria used to monitor, promote and enforce compliance with the regulatory framework and the procedure for establishing those criteria in the Enforcement Policy Statement[5] and associated enforcement management model[6]. ORR inspectors will use these policies and apply their discretion and judgment in deciding what enforcement action may be appropriate.

138. This statement sets out how ORR will use its powers under the Health and Safety at Work etc. Act 1974 (HSWA), to enforce compliance with both health and safety law and other relevant non-H&S legislation for which ORR is the enforcing authority, such as the law on interoperability and accessibility for people of reduced mobility. The enforcement of licence obligations is dealt with separately under ORR's economic enforcement policy and penalties statement[7].

139. When carrying out an investigation into a possible breach of health and safety law, ORR will seek to determine:

- causes;
- whether there has been a breach of legislation;

[5] http://orr.gov.uk/__data/assets/pdf_file/0016/5650/hswa-enforcement-policy-statement.pdf

[6] http://orr.gov.uk/what-and-how-we-regulate/health-and-safety/health-and-safety-enforcement

[7] http://orr.gov.uk/__data/assets/pdf_file/0018/4716/economic-enforcement-statement.pdf

- whether action has been taken or needs to be taken to prevent a recurrence of an incident and / or to secure compliance with the law;
- lessons to be learnt and whether there is a need to review the law and industry guidance; and
- what response is appropriate in respect of any breach of the law.

140. ORR inspectors have a range of tools at their disposal to secure compliance with the law and to ensure a proportionate response when carrying out inspections and investigations. Inspectors may offer duty holders information and advice, both face to face and in writing. This may include warning a duty holder that in the opinion of the inspector, they are failing to comply with the law.

141. Where there is a choice of remedy or enforcement mechanism available ORR is likely to consider:

- the remedies at its disposal;
- the likely effectiveness of each remedy;
- the speed of resolution;
- cost; and
- any other factors relevant to the specific case.

142. ORR uses the HSE Enforcement Management Model when deciding what enforcement action may be appropriate for breaches of health and safety law, and a separate, supplementary process for other non-risk areas such as interoperability and accessibility.

143. ORR has a number of powers available under which it can take enforcement action (including HSWA, Network Rail's network licence, operator licences and specific powers within the relevant non-Health and Safety legislation) and will consider, using the principles of regulatory enforcement set out in the enforcement policy statement, the most effective, efficient and expeditious solution in the light of its legal obligations.

144. The ultimate purpose of our enforcement policy is to ensure that duty holders manage and control risks effectively, thus preventing harm.

D.5. Coordination and cooperation

145. ORR has in place an agreement with the Channel Tunnel Safety Authority (CTSA, the NSA for the Channel Tunnel) for coordinated activities for inspection and auditing of railway undertakings that operate on both the UK mainline and the Channel Tunnel. The CTSA advises the Intergovernmental Commission (IGC) on safety matters.

146. Joint inspections are carried out by inspectors from ORR and the French NSA (EPSF). A contract for reimbursement exists for ORR to charge relevant costs for work done for the CTSA back to Eurotunnel.

147. If an ORR inspector is working for the CTSA, he or she will make informal contact with the relevant ORR account holder for the railway undertaking operating on the UK mainline.

148. ORR chaired the subgroup on Cooperation Agreements until June 2016. This has achieved significant progress on developing legal texts between NSAs and the Agency as required under the 4th Railway Package.

149. ORR is an active participant in the International Liaison Group of Government Railway Inspectorates (ILGGRI). In 2016, ORR organised and attended a number of supervision workshops for NSAs to discuss legislation, share best practice and discuss cooperation arrangements between NSAs.

150. ORR is also looking to develop its staff and share best practice in supervision through staff exchanges with other NSAs. We have worked with colleagues from the Greek, Finnish and Irish NSAs in recent years and have participated in the Agency's cross-audit programme.

151. ORR has also some cooperation arrangements with Northern Ireland as described in section I.

D.6. Findings and measures taken in 2016

152. In section B of this report we describe the outcomes of our supervision activities targeted at Network Rail and other Railway Undertakings.

E. Certification and Authorisation

E.1. Guidance

153. ORR has produced guidance for the railway industry on the Railway and Other Guided transport Systems (ROGS) regulations that covers the key aspects of the legislation and includes a specific chapter on safety certification and authorisation[8].

154. ORR publishes on its website the assessment criteria for which safety certificates and authorisations (mainline and non-mainline) are assessed against and provides details of evidence expected from an applicant that will demonstrate compliance with the criteria. The opening chapters of the assessment criteria publication also explain the permissioning process and timescales for assessment of applications[9].

155. Applicants are encouraged to set out their application in the order of the criteria wherever possible to make it easier to assess of the application. In addition, ORR publishes its assessment manual of how safety certificates and authorisations are assessed; this provides transparency of ORR's process.

156. ORR welcomes discussions with applicants for safety certificate and authorisation from an early stage (up to 9-12 months before submitting). This enables any concerns or queries to be addressed at the outset and provides additional guidance to an applicant. Generally, these meetings are preferred and strongly recommended by both parties to avoid any confusion and potential rejection of an application upon submission.

157. Applicants for mainline safety certificates are required to complete the Agency application form that is on the ORR website along with ORR guidance. Applicants may also seek advice from their ORR contact should they encounter any difficulty in completing the form.

E.2 Contacts with other NSAs

158. In 2016 ORR was not asked about the details of a Part A safety certificate by an NSA in another Member State and did not contact any other Member State to obtain information on Part A safety certificate of a railway undertakings applying for Part B certificate.

E.3. Procedural issues

159. The average issuing time for Part A Safety Certificates is within the four month timescale laid down in article 12(1) of the Railway Safety Directive. To facilitate the certificate and authorisation application process ORR provides guidance documents and

[8] http://orr.gov.uk/__data/assets/pdf_file/0020/2567/rogs-guidance.pdf

[9] http://orr.gov.uk/__data/assets/pdf_file/0020/3593/cert_auth_criteria_mainline.pdf

informal advice to railway undertakings. This helps the applicant submit the correct documentation in the required format, reducing the administrative burdens for both the applicant and ORR.

E.4. Feedback

160. ORR has an appeal process should applicants be unhappy with ORR's final decision. Details can be found in ORR's assessment manual and the ROGS guidance on the ORR website[10]. It should be noted that applicants are strongly encouraged to raise any concerns initially through their lead assessor. Depending upon the nature of the applicant's concern, it may be prudent to involve the assessment manager and head of inspection.

161. ORR has changed its processes for issuing safety certificates and authorisations over time to take account of feedback from industry.

[10] http://orr.gov.uk/__data/assets/pdf_file/0020/2567/rogs-guidance.pdf

F. Legislation

F.1. Railway Safety Directive

162. Table 4 below illustrates details of legislation transposing the Railway Safety Directive into UK law.

Table 4

Amendments to the Railway Safety Directive	Transposed (Y/N)	Legal Reference	Date of entry into force
Directive 2008/57/EC	Yes	The Railways (Interoperability) Regulations 2011 [S.I. 2011/3066]	6 January 2012
Directive 2008/110/EC	Yes	The Railways and Other Guided Transport Systems (Safety) (Amendment) Regulations 2011 [S.I. 2011/1860]	26 August 2011
Directive 2009/149/EC	Yes	The Railways and Other Guided Transport Systems (Safety) (Amendment) Regulations 2011 [S.I. 2011/1860]	26 August 2011
Directive 2014/88/EU	Yes	The Railways and Other Guided Transport Systems (Safety) (Amendment) Regulations 2015 [S.I. 2015/1917]	11 December 2015

F.2. Changes in legislation and regulation

163. Table 5 below shows the relevant changes in legislation and regulation concerning railway safety in 2016.

Table 5

Legislation and regulation	Legal reference	Date of entry into force	Description of change	Reason for Change
Implementation of Commission Directive 2013/35/EU on minimum safety and health requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields).	The Control of Electromagnetic Fields at Work Regulations 2016 (S.I. 2016/588) http://www.legislation.gov.uk/uksi/2016/588/contents/made	1 July 2016	The Directive lays down minimum requirements for the protection of workers from risk to their health and safety arising, or likely to arise, from exposure to electromagnetic fields (EMF). It covers EMFs with frequencies up to 300 gigahertz and requires that duty holders assess the levels of exposure to EMFs their workers may encounter against a set of specific thresholds. In brief, the Directive aims to ensure that:	These Regulations are not specific to railways and cover only those elements of the Directive that go beyond or are more specific than the requirements already covered in UK legislation through the Health and Safety at Work etc. Act 1974 and the Management of Health and Safety at Work Regulations 1999.

			• the exposure of employees to EMFs is below specified limits, unless a relevant exception applies; • duty holders minimise the risks to workers arising from their exposure to EMFs; and • where exposure is allowed to exceed the exposure limits, the risks posed by that exposure are adequately controlled.	
Implementation of Commission Directive 2014/28/EU on the harmonisation of the laws of the Member States relating to the making available on the market and supervision of transfers of explosives for civil uses	The Explosives Regulations 2014 (Amendment) Regulations 2016 http://www.legislation.gov.uk/uksi/2016/315/contents/made	20 April 2016	These Regulations amend the Explosives Regulations 2014. They improve the safety of civil explosives made available on the market by (i) ensuring that the obligations of all the economic operators in the supply chain are clearer (and in particular, those of importers and distributors); (ii)	The Directive applies the EU's New Legislative Framework approach to the civil use explosives sector. The Framework is a set of general principles and rules, which aims to make legislation on the single market for goods clearer, more consistent and more effective.

			adding to provisions on the traceability of civil explosives; and (iii) providing a more structured market surveillance regime.	

G. Application of the CSM on Risk Evaluation and Assessment

G.1. NSA experience

1. Decisions taken by the proposer on the level of significance of a change

164. The GB mainline Infrastructure Manager, Network Rail, makes widespread use of the CSM for risk evaluation and assessment (the CSM), making the question of significance somewhat irrelevant. ORR supports this use of the CSM, even for changes that are not considered to be significant, as it is a legally valid risk assessment process that is acceptable throughout the EU. It is being used for example, in relation to some nationally significant projects, such as the Great Western Route Modernisation Project that includes electrification, re-signalling, and associated track work.

165. There continues to be increased use of the CSM amongst RUs for managing the risk where the change has been assessed as significant. RUs have used the risk management process for managing change, for example in introducing new rolling stock or processes.

166. A large number of proposers find ORR's Guidance on the application of the CSM for Risk Evaluation and Assessment[11] useful for determining the level of significance of a change.

2. Application of the risk management process by the proposers

167. Risk assessment has long been utilised in GB railways, so the introduction of the CSM did not require substantial change to existing processes. The requirements of the risk management process are broadly in line with existing risk assessment processes in use across the GB railway industry. Inspection of RU/ IM risk assessment processes is a prioritised area for ORR inspection using our Railway Management Maturity Model (RM3).

168. Network Rail makes an assessment of whether to use the risk management process for all new projects and implements it selectively for existing projects. Using the Network Rail project governance process (GRIP), the risk management process is initiated at the start of the project, and formally the 'significance test' at stage 2 (feasibility stage). Whilst more challenging, on-going projects beyond option selection are also applying the process where necessary. The process has been successfully used, for example, for the re-introduction of rail services to the Scottish Borders.

169. ORR is receiving the CSM safety assessment reports as part of the Interoperability authorisation application process.

[11] http://orr.gov.uk/__data/assets/pdf_file/0006/3867/common_safety_method_guidance.pdf

170. RUs are applying the CSM process principally in relation to the introduction of new or altered rolling stock. Organisational changes are generally reported as falling below the significance threshold and change is managed by internal company process.

3. Involvement of assessment bodies

171. ORR recommends that an assessment body (AB) is involved from the beginning of the project so that it can monitor the development of the hazard record, consider other relevant material (such as a safety plan) and possibly be asked by the applicant to observe tests. The AB must ensure that its involvement in these activities does not jeopardise its independence. The AB's role in oversight does not remove the responsibility of the proposer for overall safety. As part of its supervision activities, ORR has engaged with assessment bodies.

4. Interface management

172. If the proposer disagrees with the decision of an assessment body it must record this in writing. They are not obliged to share this with ORR, but it may make sense for them to do so.

173. ORR expects that the interface issues in any significant change are adequately dealt with. ORR has made this point to Network Rail in respect of projects such as electrification which are currently being planned and it is reiterated in the Guidance ORR has issued in the UK on the CSM. ORR does not have any evidence at this stage that areas of risk are being missed as a consequence of poor interface management.

G.2. Feedback from stakeholders

174. Stakeholders express their experience of the CSM risk assessment in the annual health and safety report they are required to submit to ORR.

175. Network Rail has widely adopted the risk assessment process of the CSM, also using it for processes not considered to be significant. Network Rail noted the following 'lessons learned' from the use of safety verification:

- Engage with the process early
- Produce good quality scope definitions and verification plans
- Engage in and open and honest dialogue with assessors to allow issues to be quickly identified and addressed
- Manage effective closeout of all issues at each verification stage
- Document assumptions, discussions and agreements
- Engage with all affected project stakeholders at an early stage ('duty of co-operation')
- Advise changes to scope and time-scale to assessor ASAP

176. RUs and ECMs are fully aware and supportive; and several have reported that the process is proving beneficial.

G.3. Revision of NSRs to take into account the EC regulation on CSM on risk evaluations and assessment (RA)

177. National Safety Rules require a risk assessment to be done, therefore there is no need to take account of the CSM. ORR's regulatory approach is already aligned with the CSM risk assessment.

178. RSSB has produced guidance on the management of change in the context of CSM RA[12] , aimed at those required to apply the CSM process in their work. RSSB has also produced guidance on design targets[13] for the CSM.

[12] http://www.rssb.co.uk/Library/improving-industry-performance/2012-guide-principles-safe-management-engineering-change.pdf

[13] http://www.rssb.co.uk/Library/improving-industry-performance/2016-01-new-design-targets-for-the-common-safety-method-for-risk-evaluation-and-assessment.pdf

H. Derogations regarding ECM certification scheme

179. In the UK, no alternative measures through derogations to the ECM certification scheme were needed. In 2016, ORR had certified a total of 10 ECMs. No certificates were issued during the reporting year.

180. In 2016, ORR reviewed its position as the certifying body for ECMs and in the anticipation this responsibility will be handed to third parties. UKAS has set up an accreditation scheme for the UK so other certifying bodies can be accredited.

I. Northern Ireland

181. This section of the report covers the railway system in Northern Ireland for the period 1 January 2016 to 31 December 2016. The Department for Infrastructure (DfI) (previously the Department for Regional Development) acts as the NSA in Northern Ireland, although ORR represents DfI in relations with the Agency.

182. The Department for Regional Development was established by article 3(1) of the Departments (Northern Ireland) Order 1999. From 9 May 2016 the functions of the Department for Regional Development transferred to the Department for Infrastructure. The Department for Infrastructure was established by virtue of section 1(6) of of the Departments Act (Northern Ireland) 2016.

183. Translink is the brand name of the integrated public transport operation of Northern Ireland Railways (NIR) as well as Citybus, and Ulsterbus.

184. NIR operates a fully integrated system, acting as both Infrastructure Manager and Railway Undertaking. DfI assist NIR in operating rail services and provides funding to maintain and develop the rail infrastructure and rolling stock.

185. There are no metro, tram or other light rail systems in Northern Ireland, nor is there any privately owned railway infrastructure on which NIR services run.

186. There are a number of Heritage and tourist railways in Northern Ireland which are privately owned and run, mainly using dedicated track. They do not provide passenger services for the travelling public and do not receive funding from the Department.

187. All railway undertakings in Northern Ireland, including heritage railways, are required to comply with safety regulations. In some circumstances heritage railways operating on their own tracks and at a line speed that does not exceed 25mph/40km may be exempted from some regulations where the Department is satisfied that the safety of passengers and the general public is not compromised.

The Safety Authority for Northern Ireland

188. In Northern Ireland the Safety Authority for the purpose of implementing the Railway Safety Management Regulations (Northern Ireland) 2006, (hereafter known as the “Safety Management Regulations”) is DfI. The DfI’s key responsibilities as Safety Authority are:

- To ensure that NIR manages the network efficiently and in a way that meets the needs of its users;
- To encourage continuous improvement in health and safety performance;
- To secure compliance with relevant health and safety law, including taking enforcement action as necessary;
- To develop policy and enhance relevant railway health and safety legislation; and

- To issue or refuse safety certificates to railway operators in accordance with the “Safety Management Regulations”.

189. The Safety Authority duties are managed by DfI’s Transport Strategy Division. DfI’s role as NSA for Northern Ireland is to:

- Provide the appropriate regulatory framework so that railway safety is generally maintained and, where reasonably practicable, continuously improved;
- Assess each duty holder’s application for safety certificates and authorisations, including their co-operation arrangements;
- Assess whether safety is being achieved by inspecting duty holders’ SMS and assessing available safety information and data;
- Authorise the placing into service of structural subsystems in Northern Ireland on the UK trans-European network; and check that they are operated and maintained in accordance with the essential requirements.
- Authorise the placing into service of structural subsystems in Northern Ireland on the UK trans-European network; and check that they are operated and maintained in accordance with the essential requirements.

Development of railway safety in Northern Ireland

190. The purpose of the Railway Safety Management Regulations (Northern Ireland) 2006 was to harmonise safety standards on the NI Railway Network.

191. Part 2 and regulation 18 of the Regulations implement Directive 2004/49/EC on safety on the Community's railways and amending Council Directive 95/18/EC on the licensing of transport undertakings and Directive 2001/14/EC on the allocation of infrastructure capacity and the levying of charges for use of infrastructure and safety certification ("the Railway Safety Directive"), except in relation to access to training facilities, placing in service of in–use rolling stock and accident and incident investigation.

192. Part 2 of the Regulations contains prohibitions in relation to the operation of trains or vehicles on any railways in Northern Ireland and the management and use of infrastructure unless a person has established and is maintaining a safety management system and in specified cases has a safety certificate in relation to the operation of vehicles or a safety authorisation in relation to the management and use of infrastructure. Part 2 also makes provision in relation to the requirements for a safety management system and the issuing, amendment and revocation of safety certificates and authorisations and for the giving of notices to the DfI.

193. Part 3 provides for general duties on any railway operators subject to the duties in Part 2 to carry out risk assessment, co–operate with each other and certain other persons and to prepare an annual safety report to DfI. It makes provision in relation to annual reports to the Agency and for the issuing, keeping and public inspection of documents.

194. Part 4 makes provision in relation to the carrying out of safety critical work on any railways. It imposes obligations on those controlling the carrying out of such work to ensure that it is only carried out by fit and competent persons, and that safety-critical work is not carried out by workers at risk of being fatigued.

195. Part 5 makes provision for appeals in relation to decisions relating to safety certificates and authorisations, for transitional provisions in relation to compliance with the provisions of regulations (3)(1) and (2), for the granting of exemptions and for a defence in relation to the safety verification requirements in regulation 4.

196. The Railways (Safety Management) Regulations (Northern Ireland) 2006 were amended from 30 June 2016 in order to implement European Commission Directive 2014/88/EU. This Directive made minor and technical amendments to the definition of some of the common safety indicators and to the related methodology to calculate the economic costs of accidents.

Common Safety Indicators

197. NIR have provided the required CSI data for 2016 as transport operator in NI. The CSI data has been aggregated at a UK level and includes data for both Great Britain and Northern Ireland (see section C and annex A).

Rail Accident Investigation Branch

198. The Rail Accident Investigation Branch (RAIB) established by the Railways and Transport Safety Act 2003 is established on a UK-wide basis.

199. In 2016 there was one reportable incident on Northern Ireland Railways. The incident occurred on 4 February 2016 when a collision occurred between a passenger train and an excavator bucket near Knockmore Junction. While the lead vehicle was badly damaged, there were no significant injuries to anyone on board the train. RAIB decided to formally investigate and have reported. The resulting RAIB recommendations have been implemented and learning points are being considered.

Safety authorisations

200. No updated, amended or part authorisations were issued in 2016. The DfI continues to work closely with NIR on the development of their application for authorisation.

Supervision of railway undertakings and infrastructure managers

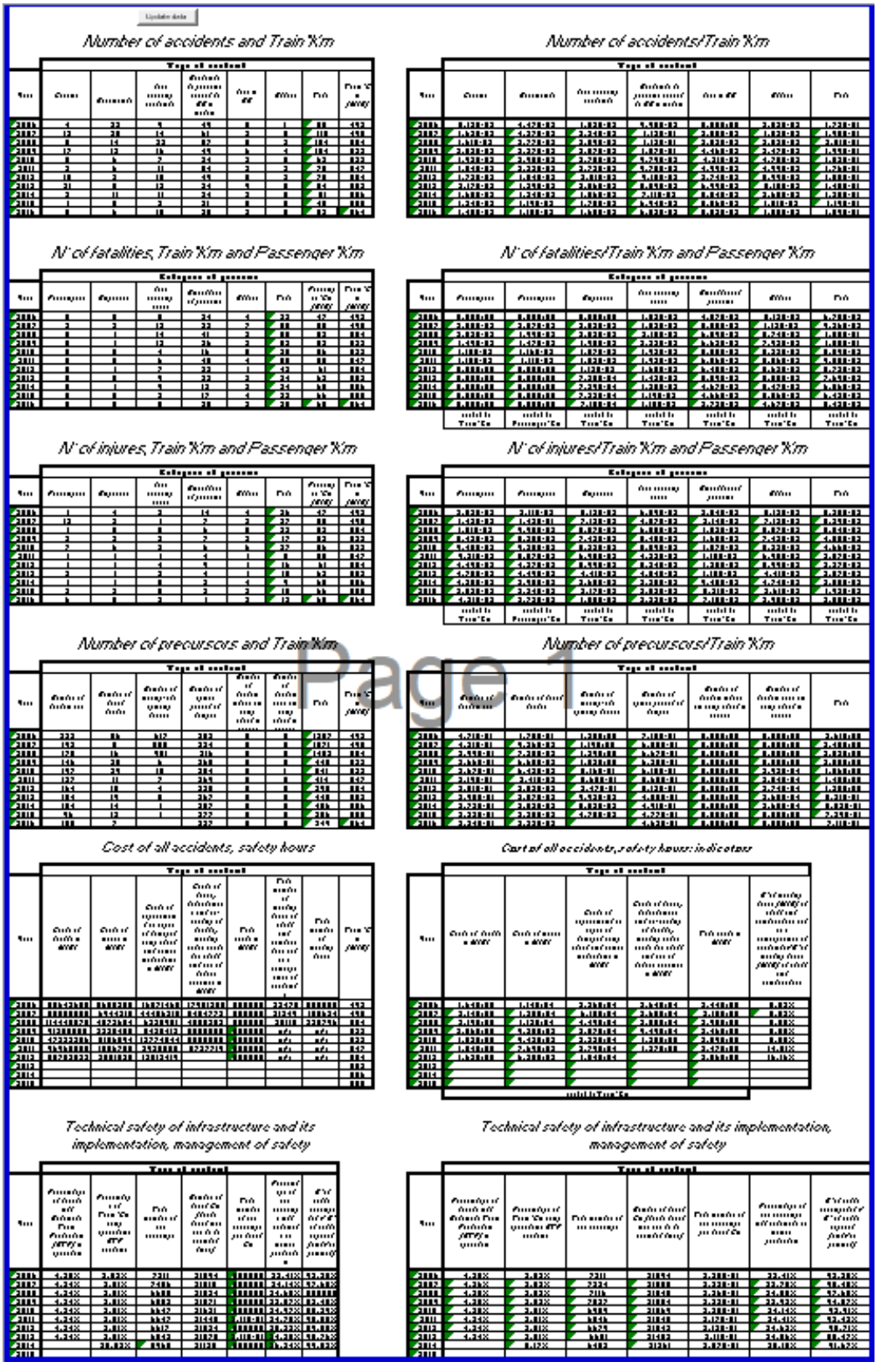
201. The day-to-day supervision of the health and safety performance of the railway industry is undertaken through the Railway Safety Management Regulations (Northern Ireland) 2006

202. The DfI also continues to work closely with its counterpart in the Irish Republic, the Department of Transport and the Railway Safety Commission as well as the two railway operators on the island, NIR and Irish Rail, on all EU issues and mutual railway safety matters as they impact on the shared service between Belfast and Dublin. DfI also works closely with the DfT in Great Britain and ORR on European issues.

Conclusions

203. Although there was one incident on the Northern Ireland rail network, safety performance remains at a high standard. European safety data showing that Northern Ireland still has one of the safest railways in Europe.

Annex A: Common Safety Indicators (CSIs)



Annex B: Potentially High-Risk Train Accidents

The events highlighted red are those RAIB is investigating or for which it has published a report.

Derailments (excluding level crossings) - 4			
Date	**Location**	**Railway Undertaking**	**Description**
08/05	Oxley Chord	Freightliner	Freight train derailed and rerailed. Number of wagons unknown
16/09	Watford Tunnels	London Midland	Passenger train derailed after striking a landslide while exiting tunnel (lead vehicle only)
20/10	Fletton Junction	DB Cargo (UK)	Non-passenger train consisting hauling locomotives derailed (two vehicles) and continued on to block the line
05/11	Southampton Eastern Docks	DB Schenker	Passenger train derailed due to rotten sleepers and track out of gauge
Collisions between trains - 3			
14/02	Mountsorrel Redland	East Midlands Trains	A passenger train collided with a second train's discharge chute, which was foul of the line
03/04	Plymouth	Great Western Railway	Rear-end collision between two passenger trains in station. Train was signalled onto platform without sufficient room to fully fit into the platform
17/08	Aberdeen	Unknown	Collision between locomotive and coaching stock during shunting operation

Buffer stop collisions - 2			
20/06	Nottingham	East Midlands Trains	ECS struck bufferstops in station due to uncoupling error
21/06	Shrewsbury	London Midland	Passenger train struck buffer stops due to driver's loss of concentration
Trains struck by large falling objects - 0			
Collisions with road vehicles on level crossings - 4			
10/14	Norfolk	Unknown	A passenger train struck a tractor at Hockham Road level crossing. 27 injuries were sustained, including a major injury to the tractor driver
27/05	Fishguard Harbour	Unknown	A passenger train struck a lorry at an Automatic Open level crossign
12/08	Waterbeach	Unknown	A passenger train struck a road vehicle at a user worked crossing
07/16	Kingmoor	Unknown	A non-passenger train struck a tipper truck at an Open crossing.
Collisions with road vehicles not at level crossings (excluding derailments) - 3			
15/06	Uphill Junction	Great Western Railway	Passenger train struck a motorcycle which had been intentionally left on the line
25/08	Crescent Road	Merseyrail	Passenger train struck a road vehicle which had been driven onto the railway in error.

03/12	Cleghorn	Virgin West Coast	Passenger train struck a road vehicle which had been driven onto the railway in error.
Total - 16			

Annex C: Safety Recommendations

Incident	Safety Recommendation	State of Implementation
	1 The intent of this recommendation is for Balfour Beatty to better identify and mitigate the hazards associated with the introduction and operation of railborne plant. Balfour Beatty should undertake a review of its processes for risk assessment and implement any measures necessary to ensure the identification of reasonably foreseeable hazards relevant to the design (including modification), operation and maintenance of railborne plant, while always taking into account the consequences of human error. This may include consideration of methods and guidance in technical standards and related documents, relevant accident and near-miss data, information in established safety risk models, and the competence and expertise of those involved.	Progressing
	2 The intent of this recommendation is for Balfour Beatty to properly assess and manage the risk implications of proposed changes to the design and use of products and equipment. Taking into account any changes that it has recently introduced, Balfour Beatty should review its processes for change management and how they are being implemented. It should make any necessary enhancements to align them with a system-based design approach so that when railborne plant is modified, or where changes are made to its operation or maintenance (paragraphs 201b, 201c.i, 201c.ii, 202a and 202b): - all changes to the design, operation and maintenance of the complete plant system are identified, irrespective of whether any vehicle or equipment has been used before in a different application; - the impact and significance of the identified changes are systematically and objectively assessed using suitable expertise and criteria, such as those in the common safety method for risk evaluation and assessment (CSM RA); - all significant risks are robustly assessed, using suitable expertise, in accordance with a structured and systematic process, such as one that follows the risk management process in the CSM RA (or at least its essential elements); - safety requirements that are necessary to mitigate the significant risks to an acceptable level are determined, this may include adopting requirements in relevant technical standards; - the safety measures needed to comply with the safety requirements, such as any design and procedural enhancements, are implemented; and - supporting conclusions, justifications and evidence of compliance with	Progressing

	safety requirements (including those in any adopted technical standards), are suitably recorded and documented.	
	3 The intent of this recommendation is for RSSB to review and clarify the guidance it provides to the rail industry on management of changes relating to operation of vehicles and plant within engineering possessions. RSSB should, in accordance with due industry process, and in consultation with the Plant Standards Committee, review and enhance its guidance relating to the approval and management of change of railborne plant with the objective of emphasising the need to follow a sound and systematic risk management process (such as that in the common safety method for risk evaluation and assessment) when proposing a change to the design, operation or maintenance of vehicles and plant operating in an engineering possession	Progressing
	4 The intent of this recommendation is for the risks associated with new or modified railborne plant to be properly managed before such plant is allowed to operate on the national network. Taking into account any changes that it has recently introduced, Network Rail should review its processes for product acceptance of new and modified plant, and how they are being implemented, and make any necessary enhancements so that they consistently confirm that (paragraphs 201c.iii and 201d.ii): - associated risks have been robustly assessed using a structured and systematic process, such as one that follows the risk management process of the common safety method on risk evaluation and assessment (or at least its essential elements); - the safety requirements necessary to mitigate risks to an acceptable level have been determined, this includes those in adopted technical standards; - there is evidence that all identified safety requirements have been complied with and that safety measures are in place; and - that supporting conclusions and justifications have been suitably recorded.	Implementation on-going
	5 The intent of this recommendation is for Balfour Beatty to improve the quality of alterations made to the electrical systems of its equipment. Balfour Beatty should undertake a review of its procedures for the modification of electrical equipment of railborne plant, and their implementation, and make any changes necessary in order to ensure that work is correctly documented and is carried out in accordance with recognised good practice	Progressing
	1 The intent of this recommendation is that members of the public have immediate access to the contact details for the railway in the event of	Progressing

Froxfield collision	an accident on an overline bridge that endangers the railway. Network Rail should develop and implement a programme for the timely installation of identification plates on all overline bridges with a carriageway for which it is responsible (unless the consequence of a parapet falling onto the tracks or a road vehicle incursion at a particular bridge are assessed as likely to be minor). Installation should be prioritised so that those bridges assessed as being at highest risk are fitted first. Network Rail should also modify its standards relating to the installation of identification plates accordingly (paragraph 103b). This recommendation may also apply to other infrastructure managers.	
	2 The intent of this recommendation is that the RVI assessment process should include specific consideration of the risk of road vehicles on an overline bridge knocking a parapet onto the tracks below. The Department for Transport should include in its guidance for assessing the risk of road vehicle incursion (RVI), a method for specifically assessing the risk of road vehicles damaging a bridge parapet and knocking debris onto the track below, so that proportionate mitigation can be considered by both railway and highway RVI assessors	Other PB or A
	3 The intent of this recommendation is that Network Rail's RVI assessment procedures take into consideration the risk of a large vehicle on an overline bridge knocking over a parapet onto the tracks below. Network Rail should: a) include a requirement (aligned with any revised DfT guidance arising from recommendation 3) in its RVI assessment procedures for overline bridges, to specifically assess the risk of road vehicles damaging a bridge parapet and knocking over debris onto the track below so that proportionate mitigation (eg road signage) can be considered by its RVI assessors; and b) brief its RVI assessors accordingly	Progressing
	4 The intent of this recommendation is that when trains are permitted to run following a collision, there is a mandated requirement to consider the circumstances of the collision carefully, and impose an appropriate speed restriction for the onward movement, especially when there are passengers on board. RSSB, in consultation with industry, should propose, and then promote, the introduction of an additional specific requirement in an appropriate Railway Group Standard, so that in the event a train is damaged in an incident (including striking objects on the track) and is to be moved (with or without fitter attention), the conditions of any such movement, including the maximum permissible speed, are subject to a full consideration of: a) the circumstances of the incident (including the train speed and nature of any obstacle struck);	Progressing

	b) the limitations of any on-site assessment of damage; and c) whether or not there are passengers on board	
	1 The intent of this recommendation is that the risk of overrun by trains operated by steam traction on Network Rail managed infrastructure is reduced as far as is reasonably practicable. RSSB, working in conjunction with operators of steam traction and Network Rail, and in accordance with normal industry processes, should undertake a review of the current standards, policies, procedures and risk assessment tools intended to assess, prevent and mitigate the risk associated with overruns on Network Rail managed infrastructure. This review should consider if these arrangements adequately control the risk of overrun associated with the movement of trains fromed of steam locomotives and/or preserved vehicles. It should specifically consider: - the extent to which existing railway group standards and associated guidance adequately mitigate the risk of operating such trains; - if there are features of steam locomotives and preserved vehicles which may potentially increase the likelihood or magnitude of overruns (such as reduced forward visibility or braking systems not designed to meet modern standards of performance) or which may potentially make the consequences of an overrun worse (such as vehicles not being designed to meet modern standards of crashworthiness); - the compatibilty of braking performance of steam-hauled trains and/or preserved vehicles with signal spacing on lines where signals are more closely spaced (eg lines where different maximum permitted speeds apply to passenger and freight trains); - how the train crew of steam locomotives interact with the controls and visual and audible indications of the Automatic Warning System and the Train Protection and Warning System; - if the minimum crewing level for steam movements specified within GO/RT 3440 Issue 2 remains appropriate; and - if steam movements are adequately accounted for within existing tools intended to assess the risk of overruns (such as SORAT). Companies operating steam locomotives and/or preserved vehicles on Network Rail managed infrastructure and Network Rail should implement any measures identified by this review as being required to adequately control the risk from overrun (paragraphs 256a, 256b, 257a, 257b, 257c, 258 and 280).	Implementation on-going

	2 The intent of this recommendation is that an external party reviews the implementation of changes to West Coast Railways' safety management system following this incident in order to ensure that they have been effective. The review should also consider the company's safety culture. West Coast Railways should make arrangements for a review of its safety management system and safety culture to be undertaken by an external independent party whose suitability has been agreed with the Office of Rail and Road. The review should consider if the changes made following the SPAD of 7 March 2015 have been implemented and if they have improved the capability of West Coast Railways to control risk and the prevailing safety culture within the company. This review should specifically examine; - governance, policy and leadership; - control and communication and how this is organised; - the co-operation and competence of employees; - the planning and implementation of risk controls and how this is managed; and - monitoring, review and auditing of compliance to the safety management system and how this is managed. West Coast Railways should make any changes identified as necessary (paragraphs 257a, 257b, 257c and 260).	Implemented
	3 The intent of this recommendation is that West Coast Railways implements arrangements for the acquisition and retention of route knowledge by drivers which are in line with industry best practice. It is also intended to ensure that West Coast Railways observes the requirements of mandatory standards with respect to identifying signals and signs which may be difficult to see from steam locomotives. West Coast Railways should review the arrangements by which drivers that it employs acquire and retain route knowledge. This review should take into account whether these arrangements meet with the requirements of RIS 3702 Issue 2 'Route Knowledge for Drivers, Train Managers, Guards and Driver Managers'. West Coast Railways should also consider how proposed routes for steam operations are assessed in order to identify signals and lineside signs which may be difficult to see from a steam locomotive cab and how drivers of West Coast Railways operated steam trains are to be provided with additional competent assistance in sighting any signals or lineside signs falling within this category. This should be done with regard to the requirements of GO/RT 3440 Issue 2 'Steam Locomotive Operation'. West Coast Railways should make any changes identified as necessary (paragraph 261).	Implemented

	4 The intent of this recommendation is that West Coast Railways implements arrangements for the maintenance of On Train Data Recorders which ensure that this equipment can meet the requirements of the relevant mandatory standards. West Coast Railways should review the arrangements by which On Train Data Recorders fitted to trains that it operates are maintained. This review should specifically ensure that such recorders are maintained in a way which means that they are capable of supporting the key objectives for data recording as laid down in GM/RT 2472 Issue 2 'Requirements for Data Recorders on Trains'. These include: the use of systematic safety monitoring as a means of preventing incidents and accidents; - the identification of driver, train and infrastructure performance in the period leading up to and (if appropriate) immediately after an incident or accident; and - the recording of information relating to the performance of both the locomotive / traction unit and the person driving. West Coast Railways should make any changes identified as necessary (paragraph 263).	Implemented
	5 The intent of this recommendation is to ensure that emergency and temporary speed restrictions are designed and implemented in a way which results in clear and correct information being provided to train drivers. Network Rail, in association with any contractors who carry out such work, should review how the design and implementation of emergency and temporary speed restrictions is managed by the Swindon Maintenance Delivery Unit and how this resulted in the errors identified in this report. This review should consider: - the information, instruction and training given to designers of TSRs; - the procurement process for designs, including the circulation list for information and designs provided to Network Rail; - the process for conversion of ESRs to TSRs, including the criteria for deciding whether an ESR design is modified, or if a new design must be used; and - the process for implementing ESRs and TSRs, including the checking of designs and the action to be taken if conditions on the ground do not match the design. Network Rail should also determine whether any of the issues identified may apply to other maintenance delivery units and take action as necessary to make any changes required (paragraph 256b)	Progressing

Clapham South station	1 The intent of this recommendation is to ensure that London Underground continues to improve management of PTI risks by building on work already started by a group established after the Clapham South accident. The time-bound, funded programme provides a means for London Underground to demonstrate its long-term commitment to reducing these risks where reasonably practical. London Underground should review the feasibility and effectiveness of measures to reduce risks associated with passengers being trapped in train doors and then dragged at the platform-train interface (PTI). The review should include measures already considered for all or part of the London Underground network, techniques already used by other railway operators, measures already considered by RSSB and measures made possible by the latest technology available when the review is undertaken. The review should include, but not be restricted to, consideration of: - improving detection of objects trapped in train doors; - improving the ability of passengers to pull out objects trapped in doors (including by improving door seal arrangements); - improving train operator views of the PTI at despatch (eg increasing the number of CCTV cameras, repositioning cameras and providing larger monitors); - enhancing the methods available to staff performing SATS duties when they need to alert train operators, or stop trains, in an emergency; - using gap fillers or alternative means to reduce the gap between platforms and both moving and stationary trains;l adapting platform markings to reduce passenger crowding close to trains/doors; and - raising passenger awareness of the safety risks associated with objects, fingers and hands becoming trapped in doors. The review should conclude with a time-bound, funded plan for progressing development of potentially viable measures. This should, if appropriate, include solutions which are only applicable to some parts of the London Underground network.	Implemented
	1 The intent of this recommendation is to alter the maintenance instructions for former AAE Megafret wagons running in the UK to clarify when the centre pivot liners should be checked, to reduce the likelihood of these items becoming worn to the extent that the safety of the wagon is compromised. VTG AG should update the maintenance instructions for its Megafret wagons operating in the UK to clarify the method to be used to check for wear of the centre pivot liner, and clearly specify the periodicity for these checks (paragraph 135a). In defining this periodicity VTG AG should take into account the wear characteristics of centre pivot liners that it permits to be installed and the distance travelled by the wagons. This recommendation may also be applicable to VTG AG's Megafret wagons operating in other countries.	Implementation on-going

	2 The intent of this recommendation is to improve the management of risk posed by wagons operating in service after a systemic fault has been identified. VTG AG should review, and update as necessary, the processes that will apply if a systemic defect is identified with a former AAE wagon (paragraph 137). The processes should ensure that the risk of continued fleet operation is understood and any necessary mitigation measures put in place to reduce it to an acceptable level. It should also provide for adequate communication of safety related information to all other owners, operators and maintainers.	Implemented
	3 The intent of this recommendation is to improve the standard of maintenance of two-levelled switches and crossings (S&C) by Network Rail maintenance staff by making them more aware of the presence and significance of two-levelling and by providing them with the drawing(s) showing correct design configurations. Network Rail should review, and update as necessary, its S&C training course(s) to confirm that there is adequate coverage of two-levelling of S&C. It should ensure that S&C maintenance staff who undertake maintenance of two-levelled S&C are competent to identify and maintain two-levelled S&C. In addition, Network Rail should introduce a system to make the necessary information available to enable correct maintenance of two-levelled S&C (paragraph 135b). The knowledge, skills and experience required to ensure that two-levelled S&C can be maintained competently should be made explicit within Network Rail's competency management system. The competency requirements should cover all staff likely to be involved in planning, executing and supervising the maintenance of two-levelled S&C.	Implementation on-going
	1 The intent of this recommendation is to prevent passengers being put at risk of an accident at the platform train interface, in circumstances where they have been able to open passenger trains doors using the door open controls after the door closing cycle has been initiated. The recommendation seeks completion of work already started by some railway organisations. Operators and owners of trains with power operated doors should jointly review passenger door operation, and apply any necessary modifications so that, if doors are opened by passengers using the door open controls during the door closing cycle, the doors will fully open for a period consistent with safe use by a passenger (paragraph 117a).	Progressing
	2 The intent of this recommendation is to increase the opportunity for seeing incidents and accidents at the platform-train interface during the train dispatch process, therefore reducing the risk that a train departs with a passenger in an unsafe position. Although continuous monitoring of all doors is preferable during this period, the recommendation acknowledges that this is sometimes impracticable (eg if staff cannot see all doors at the same time).	Progressing

	The RSSB, in consultation with the railway industry, should include in suitable guidance that train crew undertaking dispatch duties should, where practicable, monitor train doors during the door closing period. This is additional to the existing railway rule book requirement for a train safety check after doors are fully closed (paragraph 117e).	
	1 The intent of this recommendation is to improve MRDL's care of drivers and other staff involved in an accident. Metrolink RATP Dev Ltd should improve its process of providing for the welfare of staff who have been involved in potentially traumatic incidents. This should include immediately releasing them from safety critical activities as well as arranging for them to be accompanied to an appropriate location. It should also contain provisions for support and/or counselling, taking account of the possibility that the individual may need to provide evidence to investigating authorities	Implemented
	2 The intent of this recommendation is to promote a further examination of the need for additional risk control measures in the Piccadilly Gardens area. Metrolink RATP Dev Ltd in conjunction with Transport for Greater Manchester should review the effectiveness of risk mitigation measures associated with tram operations through the pedestrianised area in the vicinity of Piccadilly Gardens. This review should include: - reference to previous risk assessments; - identification of the dominant contributors to the overall level of risk; - historical experience of accidents and near misses in this area (based on collation of existing data); and - the experience and knowledge of tramway staff, including drivers. The findings of this review should be used to identify and evaluate possible additional mitigation measures. Any that are considered to be reasonably practicable should then be programmed for implementation	Progressing
	3 The intent of this recommendation is for guidance on tramways explicitly to promote measures to evaluate and manage the risk to pedestrians arising from the operation of trams through pedestrianised areas such as Piccadilly Gardens. UK Tram should, as part of revising guidance for the design and operation of urban tramways, make explicit provision for the management of risk in areas where trams and pedestrians/cyclists share the same space. This should include: - guidance on the collection and collation of data on accidents and incidents; - the types of hazards to be considered; - methods of risk assessment; and - examples of design and operational measures for mitigating the risk.	Progressing

Oakwood Farm UWC	1 The intent of this recommendation is to reduce the risk to users of Oakwood Farm UWC. Network Rail should: a) undertake a comprehensive review of the safety of the crossing at Oakwood Farm UWC in the light of the findings in this report, its own hazard reviews, human factors advice, and suggestions from the authorised user, in order to minimise the risk to users; and b) implement any improvements identified in part a) above at Oakwood Farm UWC in liaison with the authorised user.	Progressing
	2 The intent of this recommendation is to reduce the risk to users of other POGO equipped crossings. Network Rail should develop and implement a programme for a timely review of the safety of other user worked crossings it has fitted with POGO equipment and those it intends to fit in the future. The review should include particular consideration of the following: a) the design standard for crossings fitted with POGO equipment (paragraph 77); b) the ways in which users in different types of vehicles operate the crossing gates, including the function of the gate operating buttons (paragraph 74); c) the clarity of instructions to enable unfamiliar users to use the crossings safely and to minimise reliance on the briefing of all visitors by authorised users (which is not always practicable) (paragraph 94); d) improving the conspicuity of the MSLs (eg using two MSLs on each side of the crossing, the use of larger 'road traffic light' style red and green lights, flashing red MSLs, or wig wag lights) and the number and clarity of the signs, to minimise confusion and distraction (paragraph 64); and e) whether the opening of the gates should be disabled unless the MSLs are displaying green lights (paragraphs 41 and 61). This review should draw on the findings from recent relevant research (eg RSSB's research into signs at private level crossings (T983) and human factors advice). Any measures for safety improvements at such crossings should then be implemented at higher risk locations and incorporated into the standards for future designs.	Implementation on-going
	3 The intent of this recommendation is to reduce the risk from the introduction of infrastructure equipment onto the railway network. Network Rail should review the robustness of its processes for accepting new equipment and technology onto the railway, including particular consideration of the following: a) definition and adherence to an appropriate level of safety assurance; b) the early involvement of human factors expertise, where appropriate, throughout the product's introduction; c) the risk assessment processes applied to the new equipment itself and the infrastructure into which it is to be integrated; d) definition and monitoring of trials, implementation of any resulting	Insufficient Response

	improvements, and the roll-out of the product to other locations; e) maintenance of a hazard record for the life-cycle of the product; and f) a process for undertaking regular audits to check the implementation of its product introduction processes and correcting any identified shortcomings (paragraph 116b). It should then, where appropriate, produce a time bound plan for the amendment of the standard.	
	1 The intent of this recommendation is to manage the derailment risk arising from locked up wagon suspensions by ensuring that wagon maintenance regimes facilitate the prevention of defects. This recommendation seeks completion of work that VTG has already initiated in response to the derailment. It may also be applicable to other entities in charge of maintenance for freight wagons, as the circumstances leading to suspension lock up of the type identified in this derailment may not be limited to VTG. VTG Rail UK should review and improve the inspection and maintenance regimes for its wagons with Y25 type bogies to ensure that these adequately manage the risk arising from suspension locking up. This review should include, but not be limited to: l understanding which friction surfaces in the suspension systems of its wagons with Y25 type bogies can be subject to excessive or uneven wear that could lead to suspension locking up; - understanding the prevalence of such wear to these friction surfaces; - amending inspection processes to allow identification of uneven wear patterns on friction surfaces; - consideration of methods, such as measurements or physical markers, to allow identification of suspension lock up problems; and - consideration of the use of wheel weight data sources, such as Gotcha, to identify wagon defects that can increase derailment risk (paragraphs 105a and 105b). This recommendation may also be applicable to other entities in charge of maintenance for freight wagons.	Open
	2 The intent of this recommendation is to develop industry understanding of the potential wear mechanisms that can lead to suspension lock up, so that wagon maintenance regimes adequately manage the associated risks. VTG Rail UK should liaise with other entities in charge of maintenance for freight wagons to review and, if appropriate, amend its inspection and maintenance regimes for wagons with Y25 type bogies to ensure that friction surface inspection and/or replacement frequencies are compatible with foreseeable wear rates. This review should include, but not be restricted to: - understanding the mechanisms that lead to friction surface wear in Y25 bogie suspension; - understanding the wear rates that are experienced in service; and - understanding the limits of wear that can lead to suspension locking (paragraph 105b).	Open

	This recommendation may also be applicable to other entities in charge of maintenance for freight wagons.	
	3 The intent of this recommendation is to ensure that the derailment risk at Angerstein Junction is adequately controlled. Network Rail should review and, if appropriate, alter the infrastructure configuration on the line between Angerstein Junction and Angerstein Wharf sidings to reduce its contribution to the derailment risk in the immediate vicinity of the 851A trap points. This review should include, but not be limited to, consideration of: - the wagon types and loads normally using the line; - the layout of the check rail; - the speed and braking profiles of trains using the line; - the locations and operation of signalling equipment; and - the location of the trap points, or the provision of alternative risk mitigation measures (paragraph 105c).	Open
	1 The intent of this recommendation is for Network Rail to improve the reliability and accuracy of the stress free temperatures recorded in its database of rail stresses as a key element of its strategy for the prevention of track buckles. Network Rail should: a. review its guidance to maintainers on the circumstances in which: - a re-measurement of stress free temperature; or - the re-stressing of rails to a stress free temperature of 27oC, is considered appropriate. The review should include an assessment of whether sufficient account is taken of factors not explicitly covered by the standard currently, such as the difficulty of maintaining stress in short sections of plain line between abutting switch toes or the nature of any maintenance work carried out, which can affect the buckling resistance of vulnerable track; and b. develop a programme to deliver any actions arising from the review, including amendments to standards and early rebriefing of track maintenance staff, to meet the intent of the recommendation	Open
	2 The intent of this recommendation is to reduce the risk of track buckles by enabling the consistent application of Network Rail's procedure for the calculation of critical rail temperatures, with sufficient account taken of all relevant factors. Network Rail should: a. assess whether the descriptors of ballast shortage conditions in its current standards and guidance require further clarification to enable consistent calculation of critical rail temperatures. The review should also include an evaluation of whether additional allowances should be made for combinations of conditions, such as localised ballast shortage in switches and crossings (particularly around point motor bearers), sub-intervention level misalignments and any maintenance that could have affected the stress free temperature; and	Open

	b. develop a programme to deliver any actions arising from the review, including amendments to standards and rebriefing of track maintenance staff, to meet the intent of the recommendation	
	3 The intent of this recommendation is to ensure that there are sufficient resources available to Lincoln depot to manage the risks from track buckling. Network Rail should review the Ellipse track maintenance workbank for the area covered by its Lincoln depot to ascertain the adequacy of resources to prepare the track for hot weather, taking account of the overall workload and the level of resources assessed as required in its 'Phase 2BC' reorganisation, and then implement a plan to manage any shortfall	Open
	4 The intent of this recommendation is to ensure that there is a robust process in place at Lincoln depot for reprioritising work orders relating to hot weather preparation so that the mitigation of any associated risks is appropriately managed. Network Rail should examine the process of managerial oversight of the reprioritisation and cancellation of work orders at its Lincoln depot assure itself that these are being undertaken in accordance with company procedures, that the decision-making processes are technically sound and risk based and, where necessary, any interim mitigation measures are put in place (paragraph 101b). This recommendation may have wider application within Network Rail's maintenance functions.	Open
	1 The intent of this recommendation is to improve the fence inspection process such that potentially substandard fences are properly identified for repair or renewal. This might be accomplished as part of the Business Critical Rules review of standards. Network Rail should modify its risk rating methodology for fencing inspections to include guidance on: a) the design of the fence and its appropriateness for the adjacent land use; and b) condition ratings based on objective and relative (benchmarked) criteria. If necessary, Network Rail should commission research to establish the relevant criteria	Implementation on-going
	2 The intent of this recommendation is to improve the railway's response to reports of large animals within the boundary fence in order to reduce the probability, or mitigate the consequences, of any subsequent accident.	Implemented

	Network Rail should provide clarification for signallers in terms of how they may interpret the Rule Book regarding their response to reports of animal incursions, including guidance on how long to continue cautioning trains and what constitutes being 'sure' that the line is again clear, and re-brief as appropriate	
	3 The intent of this recommendation is to reduce the risk of derailment arising from collisions with obstacles for electric multiple units operating exclusively on third rail lines. London & South Eastern Railway Limited, in conjunction with Govia Thameslink Railway, Porterbrook Leasing Company Limited17 and Eversholt Rail Group should develop, and then implement, a programme for retrofitting obstacle deflectors to Electrostar units that are not currently fitted, but are equipped with mountings for such deflectors	Progressing
	4 The intent of this recommendation is to address the residual risk of derailment arising from collisions with obstacles for other units on the national network that are not currently fitted with obstacle deflectors, taking a targeted approach by identifying those fleets that are most likely to offer a positive case for fitting of obstacle deflectors. RSSB, in consultation with the industry, and involving due industry process, should consider the case for retrofitting obstacle deflectors to units that are not currently equipped, other than those referred to in Recommendation 3 (paragraph 91c). The analysis should include re-evaluation of the findings of previous research in the light of this investigation and select for initial analysis the fleets that are most likely to have a positive case for retrofitting obstacle deflectors.	Progressing
	5 The intent of this recommendation is to ensure that drivers have continuous access to a railway emergency call facility in the event of an accident that affects the on-board train radio. London & South Eastern Railway Limited, in conjunction with Siemens Rail Automation Ltd and Network Rail, should complete their work to understand the nature of the problem with the GSM-R train radio system in this accident, and then implement reasonably practicable measures to ensure that its drivers have the facility to make an emergency call in similar situations in future (paragraph 93b). Examples of such measures may include: a) improving the resilience of the GSM-R radio system following an accident such as a derailment; b) providing drivers with GSM-R handheld units; c) ensuring that all relevant signalbox telephone numbers are stored in drivers' company mobile phones; and/or d) providing guidance to drivers on the actions to take if the GSM-R radio becomes inoperative. On completion of its work, LSER should update the National Incident	Progressing

	Report it raised on this matter (paragraph 114). Note: This recommendation may be applicable to other train operators.	
	1 The intent of this recommendation is to improve the rail industry's understanding of passenger behaviour when boarding and alighting from trains and to identify the best methods and technology to promote safe behaviour. RSSB, in consultation with the industry, and involving due industry process, should consider consolidating the findings from existing research and good industry practice, and undertaking new research as necessary to identify the optimum means for promoting safe behaviour by passengers when boarding and alighting from trains	Progressing
	2 The intent of this recommendation is for train owners to continue to review whether sensitive door technology can be applied to all fleets in the Networker family. Angel Trains and Eversholt Rail should extend current research on fitting sensitive edge door technology on class 365 trains to include other units in the Networker family (classes 165, 166, 465 and 466), and develop a plan for the fitting of modified doors to those units if the case can be made to do so	Progressing
	1 The intent of this recommendation is to reduce the risk of trains colliding in possessions or work sites due to excessive speed. By reducing train speed through compliance with the rules, trains will take longer to transit through possessions and work sites, which may in turn promote shortening the length of possessions and work sites. Each freight operating company should have a driver competency management system that includes monitoring of its drivers when driving trains within both possessions and work sites to: - identify and address any non-compliances with the rules for driving in possessions and work sites; and - assess how well its drivers are able to proceed at caution when travelling in a possession or work site and address any observed deficiencies (paragraphs 116a.i and 116a.iii). This recommendation may also apply to other organisations who operate on-track machines in possessions and work sites.	Open
	2 The intent of this recommendation is to take action in the short term to reduce the risk of a misunderstanding (missing or incorrect information) when drivers are given instructions for making a movement from a signal protecting a possession, within a possession or within a work site. The freight operating companies should collaborate to produce a common form which will then be issued to all freight train drivers to record the instructions briefed to them when making:	Open

	- any movement into, within or out of a possession; - movements into, within or out of a work site (other than short distance shunting movements and movements made during the work activity) (paragraph 115b.i and 115b.iii). This recommendation may also apply to other organisations who operate on-track machines in possessions and work sites.	
	3 The intent of this recommendation is to implement longer term measures to reduce the risk of a misunderstanding (missing or incorrect information) when drivers are given instructions for making a movement from a signal protecting a possession, within a possession or within a work site. The freight operating companies, in conjunction with Network Rail, should implement a method of working such that the content of briefings given to freight train drivers for making movements in accordance with Rule Book module GE/RT8000/T3 (Possession of a running line for engineering work) is recorded. The method adopted should include consideration of: - the minimum amount of information within these briefings that must be recorded for the safe movement of the train; - the person who must record this information; - how this information must be recorded; and - where the requirement on relevant staff to record this information should be mandated (paragraph 115b.i and 115b.iii). This recommendation may also apply to other organisations who operate on-track machines in possessions and work sites.	Open
	4 The intent of this recommendation is to reduce the risk of trains colliding in long possessions or long work sites due to the practicalities of drivers complying with the rules for driving in possessions and work sites. The freight operating companies should collaborate to: a) Investigate the practicalities of driving freight trains in possessions and work sites for long distances at a speed of 5 mph (8 km/h) or at other slow speeds when proceeding ‘at caution’ as defined in Rule Book module TW1 section 25. This should include consideration of the human factors issues that may influence the behaviour of drivers and their ability to drive trains at an appropriate speed. b) Assess the skills a driver needs to drive in such circumstances, the effect of freight train braking performance, and the level of geographical knowledge that a driver needs. c) Develop and implement a programme of work, in conjunction with Network Rail, to address any issues identified by parts (a) and (b) (paragraph 116a.ii). This recommendation may also apply to other organisations who operate on-track machines in possessions and work sites.	Open

Fletton Junction	1 The intent of this recommendation is to build on management processes and techniques already available to drivers and their managers, so as to provide the appropriate support when needed to mitigate safety risks caused by adverse influences from a driver's personal circumstances. Virgin Trains East Coast should introduce an enhanced process to encourage increased partnership between its drivers and their managers. This process should include: - encouraging drivers and their managers to have timely, open, and honest discussions about drivers' personal circumstances, and the operational risks arising from personal problems; - recognising that staff suffering from stress may not be the most appropriate people to judge the possible effects of this stress; - providing drivers with access to, and encouraging them to apply, appropriate advice about the management of fatigue, including the importance of appropriate eating as well as sleeping; - evaluating and disseminating the advantages and limitations of non-technical skills training, particularly whether non-technical skills are the appropriate means to address risks due to distraction from personal problems; and - identifying the additional or alternative support which should be provided to drivers if non-technical skills training does not adequately mitigate the risks associated with their personal circumstances.	Progressing
	2 The intent of this recommendation is to identify locations (such as Fletton Junction) where there is a greater than usual risk that a driver may be unaware of a speed restriction. This is one of the circumstances in which the effectiveness of mitigation provided by infrastructure and signalling equipment should be considered (learning point 4). Virgin Trains East Coast, working with Network Rail, should review and implement any necessary improvements to its processes for: - reviewing Virgin Trains East Coast routes to identify locations where a driver may be at greater than usual risk of being unaware of a speed restriction; - identifying appropriate and effective mitigation measures at these locations; - implementing these mitigation measures when they are within Virgin Trains East Coast's control; and - confirming that Network Rail is aware of these mitigation measures when they are within its control.	Implementation on-going
	3 The intent of this recommendation is to capture, and make available at an appropriate time, information about risk mitigation measures which should be considered at line speed restrictions. Network Rail should introduce a process to capture and retain the output from recommendation 2 relating to its infrastructure, so that: -any reasonably practicable short-term risk reduction measures are taken; and	Insufficient Response

	- appropriate information about risk reduction measures is available for consideration when future infrastructure changes are being considered and developed.	
	4 The intent of this recommendation is to identify, and ensure replacement of non-compliant operational signage. It may be possible to include this within an existing inspection activity. Network Rail should develop and then implement a process to: - check whether operational signs (eg signs associated with speed restrictions) are provided in accordance with relevant documentation (eg signalling plans); and - record, and then correct, any non-compliances that are identified.	Insufficient Response
	5 The intent of this recommendation is for investigations to gain a deeper understanding of events caused by people who become distracted. Virgin Trains East Coast should review and develop its existing arrangements for incident investigation so that information about possible causes of loss of attention/distraction (eg from personal problems) is properly considered as a possible cause of the incident	Implementation on-going
	1 The intent of this recommendation is to reduce the risk of accidents arising from errors by inexperienced drivers. Govia Thameslink Railway should review its arrangements for managing trainee drivers, to minimise the risks that may arise from errors associated with inexperience. The review should include consideration of: - the stage of training at which new drivers are permitted to drive on higher-risk sections of route, such as the approach to buffer stops; - the amount and type of training, and experience, necessary for trainee drivers to achieve competence in other circumstances in which they may need to respond quickly to events, or otherwise act in a timely manner, such as sounding the warning horn, entering occupied platforms, and drawing up to other vehicles and obstructions; and -additional measures to enhance trainees' familiarity with train controls before first driving trains in passenger service (eg the greater use of simulators and/or practice on trains in sidings). Govia Thameslink Railway should then put in place a programme for the implementation of any reasonably practicable measures for improvement that are identified during the review	Progressing
	2 The intent of this recommendation is to improve the quality of the training given to new drivers by driver instructors on GTR, to reduce the risk of accidents and incidents occurring during training. Govia Thameslink Railway should review the selection, training and management of its driver instructors, to improve the quality of training delivered to drivers. The review should draw on the guidance in RSSB	Progressing

	publication RS/100 'Good practice guide on competence development' and ORR publication RSP1 'Developing and maintaining staff competence', and include: - the criteria for selection of individuals to act as driver instructors; - the training given to driver instructors on methods of teaching, the supervision and mentoring of trainees, and development of non-technical skills; and - how the competence of driver instructors is assessed, with particular reference to the ability to teach, and possible techniques for assessment, including assessment from the driving seat. The management arrangements should be updated with relevant findings from this review	
Shalesmoor tram collision	1 The intent of this recommendation is that operators of light rail systems actively review and recognise any risks on their systems arising from low adhesion conditions, and proactively manage these risks. The RAIB has reviewed procedures for the management of low adhesion from a number of UK light rail systems, and believes that the safety learning from the accident at Shalesmoor could be applied to these other systems. UK tram operators should review their processes for assessing and managing the risk from low adhesion conditions on their networks. This should include consideration of how drivers are trained and briefed for the low adhesion season, and other measures to manage low adhesion conditions. Where this review shows it to be necessary, operators should put in place a timely programme of improvements.	Implemented
	1 The intent of this recommendation is to reduce the risk of fatigue arising from the rosters and diagrams worked at Westbury depot. DB Cargo (UK) Ltd should review the driver diagrams and rosters at Westbury depot to identify those at highest risk of fatigue and amend the timing, duration and/or operation of these trains in order to reduce the fatigue risk. The review should consider the findings from this investigation, industry good practice, staffing levels and feedback from the company's drivers (paragraph 102b).	Open
	2 The intent of this recommendation is to improve the management of fatigue amongst freight operating companies, in accordance with contemporary research and good practice. Freight operating companies should expedite a review of their fatigue risk management systems to ensure that they have sufficient controls (eg policies, company standards) in place which are consistent with published good practice (such as that from ORR and RSSB), including: - rostering rules and associated staffing levels (such as limits on working hours, overtime and consecutive shifts), especially for night shifts; - appropriate use of biomathematical fatigue models (such as the FRI); - training and education on fatigue for safety-critical workers and controllers of safety-critical work;	Open

	- fitness for duty checks when booking-on for duty; - processes for gathering and using feedback, in an open and timely manner, from safety-critical workers on fatigue-inducing shift patterns; - in consultation with their occupational health advisers, screening and treatment for sleep disorders as part of medical assessments, both routinely and particularly where a worker has been involved in a suspected fatigue-related incident, and requirements on individuals to declare any known sleep disorders to their employer. (paragraph 103b)	
	3 The intent of this recommendation is to improve the industry's understanding of fatigue risk through deeper analysis of available data sources, providing more intelligence on fatigue risk precursors which could feed into fatigue risk management systems (although this should not be a reason to delay the implementation of recommendation 3) and be of benefit to the wider industry. DB Cargo (UK) Ltd, in cooperation with other freight operating companies, should submit a research proposal to RSSB with the aim of conducting more detailed analysis on incident patterns using normalised data (eg long shifts, consecutive shifts), revisiting previous research in this area and building on recent advances in SPAD data analysis (paragraph 134).	Open
Knaresborough derailment	1 The intent of this recommendation is that signal boxes should always be operated by members of staff who have the necessary knowledge and familiarity with the signal box and its operation. This recommendation relates to the signaller competence action plan which was initiated by Network Rail in April 2016. When carrying out its review of the effectiveness of the recently revised procedure 4-20 of the Operations Manual NR/L3/OPS/041, Network Rail should review whether the changes to the requirements on non-signallers have resulted in them maintaining the required level of knowledge and experience needed to operate the signalling locations for which they are authorised, including where it has not been practicable for them to operate those locations, and implement any further necessary changes.	Implementation on-going
	1 The intent of this recommendation is to improve the management of scour risk and increase the quality of information available to staff responsible for making decisions about the safety of structures. Network Rail should review and improve the management of scour risk by Scotland Route. The review should encompass formal procedures, the way in which they are implemented and the competencies of staff. Any lessons learnt should be applied to other Routes where appropriate. The improved measures for the management of scour risk should provide for: a. Prompt holistic evaluations of all relevant existing information (including poor structure condition, shallow foundation depth, possible future changes in river bed level and scour assessments) whenever	Open

	new information is received about a structure at risk of scour damage (paragraphs 172b and 173a.i), followed by timely: - implementation of necessary remedial work; or - effective risk assessment (including any necessary investigations) for any decision to defer or omit remedial work recommended by the examination regime or other specialists; and - implementation of any temporary mitigation found necessary by these risk assessments. b. Circumstances where water level monitoring is not a reliable measure of risk from scour or water action (paragraph 173a.ii. c. Circumstances where structure degradation, climate change and other factors mean that historic behaviour of a structure and the surrounding environment is not a good indicator of future behaviour d. Enhanced measures for automatic monitoring of parameters such as water level, flow rate, bed level (ie direct measure of scour) and structure movement.	
	2 The intent of this recommendation is to enhance response arrangements for operations staff dealing with structures over or adjacent to water, which can suffer damage (including scour damage) that is not immediately apparent. Network Rail should review, and if necessary, enhance its processes for operations staff responding to defect reports (eg track faults) where these may relate to structures over, or adjacent to, water. The enhancements should provide responses which take account of the risk that the defect is a consequence of structural damage caused by water action (eg scour, impact from floating debris, debris blockage etc.).	Open
	3 The intent of this recommendation is to ensure that the latest version of all relevant documentation and processes are being used by control room staff. The documentation and other processes should be updated and checked periodically to ensure that they remain fit for purpose. Network Rail should review and improve the management and assurance systems for all control centre processes relating to the safety of railway infrastructure used by Scotland Route. The review should encompass both documented processes and the way they are implemented. It should include: - procedures directly relevant to control room staff; - inputs required from other parts of Network Rail; - inputs required from external organisations; and - arrangements for prompt updating and periodic verification of processes. Any lessons learnt should be applied to other Routes as necessary.	Open

Queen's Park station	1 The intent of this recommendation is to provide an effective competency regime for London Midland managers who drive trains and assess the train driving skills of others. London Midland should review and improve the process for routine competence management and assessment of driver managers and other managers with train driving competencies. The review should include consideration of: - the extent to which people of the same grade and/or from the same location should undertake assessments; - the minimum amount of driving which driver managers should undertake, and the processes required to record and audit this activity; - the content and frequency of the refresher training needed for maintaining the skills needed to assess train driving; - monitoring and, where necessary, improving the conduct of assessments; and - including an explicit statement about how responsibility for safety of the train is allocated to a driver and an assessor during an assessment.	Open
	2 The intent of this recommendation is to ensure that safety critical information is easily and unambiguously seen in late notices and other communications. London Midland should review and improve the communication of safety critical information transmitted to its drivers using traditional methods (eg late notice cases) and any transmitted electronically. The review should include: - ensuring essential safety information is prominently displayed; - ensuring subsidiary information is differentiated from safety critical content; - ensuring non-essential information is omitted; - considering the use of differing fonts, differing font sizes and colours; - considering use of maps or plans; and - considering the introduction of a requirement for staff to acknowledge the receipt and understanding of such communications. This recommendation may also apply to other train operators.	Open
	3 The intent of this recommendation is to assist prompt action in response to safety related issues which require identification of the person driving a train. London Midland should introduce an effective means of ensuring that relevant staff (for example control room operators) can rapidly establish who is driving a train (for example when driver managers replace booked drivers). This recommendation may also apply to other train operators.	Open
	1 The intent of this recommendation is that Tarmac and Wabtec take steps to address the risk that the use and maintenance of rail vehicles poses to passing trains, not just directly to staff. Tarmac and Wabtec should review and improve their processes for	Open

(Barrow-on-Soar)	hazard identification and risk assessment to ensure that they encompass consideration of the risk that their rail operations, including maintenance activities, might pose to other railway operations.	
	2 The intent of this recommendation is to ensure that Wabtec's management of maintenance and inspection is effective. Wabtec should review its management arrangements at Barrow Railhead to ensure that the maintenance and inspection procedures are clearly defined, understood and correctly executed. This should include definition of the areas of the site where the type of work is prohibited or permitted (paragraphs 131b and 132a). This may also apply to other Wabtec maintenance sites.	Open
	3 The intent of this recommendation is for Tarmac to prevent continued operation of rail wagons it owns with known defects, without introducing measures to mitigate the associated risks. Tarmac should review its management processes, and their implementation, to identify why no action was taken to manage the risk from continued operation of the unloading wagons after it had been informed of the unacceptable condition of the electrical system. It should introduce any necessary changes to prevent a similar occurrence.	Open
	4 The intent of this recommendation is to ensure that the electrical system deficiencies are addressed before any of the SDT fleet re-enters service. Before any re-entry to service, the registered keeper of the SDT vehicles should ensure that the condition of the electrical system is restored to be safe to operate in the environment in which it is to be used.	Open
	1 The intent of this recommendation is that the effect of skewed alignment on the safe use of passive crossings is fully understood and managed. Network Rail should (paragraphs 94a.i and 95): i. identify the effects of skewed alignment at passive level crossings on user behaviour, including the sighting of approaching trains; ii. review its processes and guidance for level crossing risk management, including the 'all level crossings risk management' tool (ALCRM), to determine whether the impact of skewed alignment is sufficiently taken into account; and iii. make any necessary changes to its processes.	Open

	2 Recognising Network Rail's commitment in its 'Transforming Level Crossings' document, to equip all existing passive crossings with automatic warnings by 2039, the intent of this recommendation is that the risk to vulnerable users at passive level crossings is reduced in an expedient manner during the interim. Network Rail should (paragraph 96a): i. review its criteria for determining when it is appropriate to include an allowance for vulnerable users when calculating the required warning time at level crossings that are used by pedestrians; this review should take into account forecast demographic changes, in particular the ageing population; ii. review the allowances made for vulnerable users to take into account good practice and research; and iii. use the above to review levels of risk at existing passive level crossings to inform decisions to prioritise the crossings that are to be upgraded with the addition of automatic warning systems, or otherwise improved.	Open
	1 The intent of this recommendation is to improve the presentation of information to service control staff so that they can comply with the LUL rule book requirement to come to a complete agreement on the actions to allow a train past a signal at danger. London Underground Limited should provide signallers and, as appropriate, service control staff with adequate means of determining the position of points and a clear method of identifying the required points and their positions in order to be able to come to a complete understanding and agreement of the actions necessary to set a route in order to pass a signal at danger.	Open
	2 The intent of this recommendation is to ensure that all staff who may be called on to provide information for safety critical decisions are aware of the need, and are able, to pass complete messages. London Underground Limited should review its safety critical communications training and revise it to include the provision of training to staff members who may need to provide information to operational staff, in order to ensure adequate, accurate and complete information is conveyed and full understanding reached.	Open
	3 The intent of this recommendation is to improve the quality of team working to avoid conflict and promote improved decision making during periods of degraded working. To promote and enhance team working, and to facilitate effective decision making in degraded working situations, London Underground should identify barriers to good decision making by service control staff, particularly where there are interfaces between lines and take action to develop the capability of these staff to: i. communicate effectively; ii. challenge decisions where there is doubt or uncertainty;	Open

	iii. be aware of information gaps and the risk that assumptions may fill knowledge gaps; and iv. to be aware of how some behaviours may adversely influence the behaviours of others, and how to deal with this.	

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