

Planning and Timing of Engineering Works on the GB Rail Network

An independent report for the Rail Delivery Group

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All opinions and writing are by the authors only.

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1. Overview

The industry in general and Network Rail in particular is facing unprecedented opportunities and challenges in the current Control Period. Passenger demand continues to rise with trains getting ever busier. Freight demand is also increasing. Network Rail has committed to spend £38bn in this control period adding capacity whilst maintaining and renewing the railway and reducing its costs by 20%.

It is against this background, and the Christmas 2014 overruns, that this review was set up to make recommendations on the best time of year to undertake major engineering work. It should be pointed out that, after Christmas 2014, Network Rail achieved a 98% success rate of completing their projects on time. While there will always be some risk of project overruns, it is reasonable to explore what more can be done to minimise and manage this risk, given the growing demand for rail services. This report suggests a way forward that will improve the operation and engineering of the railway for everyone's benefit.

There are primarily two periods in the year when most long possessions or blockages of the rail network are taken to undertake major engineering works, Christmas and Easter. Christmas is the only time when the railway is virtually closed whilst at Easter it is often possible to obtain a four day possession.

From about 50 miles out it would be difficult, although not impossible, to close routes into London during the week because of the level of commuter traffic, which drives London's economic powerhouse. A decision to close a route into London would require a very wide consultation and the support of the entire industry and its stakeholders.

Christmas will remain a key period for possessions especially around London. Outside London there have been examples of successful major works being undertaken during the week at times other than Christmas or Easter. The common feature, however, of all successful engineering work has been excellent and early passenger communication, provision of good alternative means of travel and good customer service.

The review studied whether it would be possible to add closures to any extra days either side of a bank holiday. Passenger and freight volumes are still high on these days although there is a marked reduction in London commuter traffic in the days before Christmas. Even in summer the reduction in passenger numbers is much less marked than we had expected.

On Sunday 27th December 2014, many of those travelling by rail would have been doing so for non-commuting trips. This type of traffic will tend to include a higher proportion of infrequent passengers than on a normal working day, although research done for this review suggests that rail use at Christmas does not see a significant increase in elderly passengers. In our view, infrequent travellers are less

experienced travellers in dealing with unplanned disruption than frequent commuters. This should be taken into account by the industry in the quality and depth of contingency planning and communication. However this was not an aspect which came forward in our interviews as an argument to move major works to other times of the year.

Given these factors we concluded that there was an argument for undertaking major works at times other than Christmas and Easter but that around London opportunities would be extremely limited.

There is, though, a case for reviewing the type and volume of work done at Christmas. It appears that work is added to Christmas possessions because the route is already closed for a major possession. Some of this work should be moved to other times to concentrate on those possessions that must be done at Christmas and to reduce unnecessary pressure on resources. This may also allow the development of services on Boxing Day, which all parties recognised is something for which demand is increasing.

An increased focus on extending possessions on midweek nights will allow a cascade of work from weekends, which can, in turn, take work that is currently undertaken at Christmas, Easter and on Bank Holidays (though this needs to be balanced with the growing demand for weekend passenger services). Train Operating Companies (TOCs) and Freight Operating Companies (FOCs) will need to provide more regular midweek night access whilst recognising that 30% of all freight moves at night. We would expect the Department for Transport (DfT) to adopt a flexible approach to first and last trains to enable this change.

Network Rail, supported by the wider industry, needs to earn the right to additional access. It must improve its engineering planning and possession efficiency to support its CP5 obligations to deliver defined outputs, improve efficiency and reduce possession disruption. Avoiding the risk of overruns altogether is not possible without creating substantial additional costs or delaying the programme. The industry cannot afford to do this. It is also essential to improve contingency planning which is subject of a separate study that has been published.

There is a pressing need to drive through a number of the initiatives that have been started by the Rail Delivery Group (RDG) and which are being progressed by the RDG's Asset Programme and Supply Chain Management (APSCM) working group. These include the Industry Access Programme (IAP), improving the efficiency of possessions and reducing the cost of contingency. These initiatives will all contribute to creating improved network access but are not widely used across the industry. This will require involvement of Network Rail at director level and the attention of each TOC and FOC. A lack of involvement will only hinder the process. RDG must drive these initiatives and ensure they are properly resourced with the correct senior representation involved.

Improved planning and minimising last minute changes will mean that engineering work, at any time of the year, is done more effectively and will use resources more efficiently. The early involvement of operators and contractors in planning is essential. Whether major closures are during the week or at the weekend they must be properly planned and publicised at least a year in advance. The involvement and support of both the Department for Transport (DfT) and the Office of Rail Regulation (ORR) will be critical to success. The industry should be taking an all network and strategic approach to the capacity and capability of diversionary routes.

Increasing the efficiency of possessions and enabling more productive time on site is essential if customers are to be convinced of the need for additional access. Increasing the speed of taking and giving-up possessions, the adoption of modern technology to maintain workforce safety, speedy isolation of electric power, a sensible approach to allowing trains to operate alongside engineering sites and installing and exploiting Bi-Directional signalling are all opportunities for the industry to demonstrate improved possession efficiency.

Although engineering work at Christmas is more expensive than other times of the year, the position is reversed when account is taken of the industry compensation regime (designed by Government to protect the interests of taxpayers). The compensation regime does not appear to encourage operators to grant access to the network and the case for change should be considered.

The implementation of this report will be a challenge for the whole industry but it can be done, and in some parts of the country there has been good progress. Network Rail and the operators need to rise to this challenge. The lead for this must come from all Members of the RDG.

2. Executive Summary

2.1. Introduction

The overruns of major engineering works on the East Coast Mainline (ECML) and Great Western Mainline (GWML) during Christmas 2014 affected more than 100,000 passengers. Reviews have been undertaken by Network Rail, the ORR and Passenger Focus to find root causes and to propose improvements. A general thread in the reviews is that the overruns could have been prevented and that the contingency planning had significant shortcomings. However, Network Rail did undertake extensive engineering work during the Christmas period of which 98% was completed on time. This review has taken a long-term and holistic approach in looking at the best time to undertake major engineering works. These works will enable the industry to deliver significant volumes of enhancements and renewals to relieve the increasingly busy railway that is operating in a 24/7 economy. Given the wide range of competing demands in the industry we have recommended concrete steps for the industry to take which should lead to short and long term improvements.

The review team has interviewed key management and staff from Passenger Owing Groups / Train Operating Companies, Freight Operating Companies, Network Rail, ORR, engineering suppliers, passenger organisations, Transport for London and international infrastructure managers. We have reached our conclusions based on these interviews, our railway experience, desk research of major documents and analysis of key issues. In the time available the team have not been able to undertake detailed analysis of the costs and benefits of these recommendations, or of the relative priorities. The industry will need to evaluate these in taking the work forward.

2.2. Findings

2.2.1. Timing of engineering work (Recommendations 1 – 8)

At Christmas the railway is currently closed completely for one day and, in the main, for two. This allows intrusive access to the network for major engineering work, such as signalling commissioning, which requires rolling stock to be absent from parts of the network. Other types of work that require long blockades are major switch and crossing schemes, station rebuilding and major stage works on big projects.

Whilst rail travel is popular around Christmas passenger volumes are lower than the rest of the year. We looked at passenger numbers and type of passenger (leisure or commuter) during the year, which were difficult to obtain in any detail. Although we expected the passenger mix to vary with the time of year we did not find significantly lower passenger flows during the summer holiday periods or around the bank

holidays on the major London routes. Obtaining more detailed insights into passenger flows during the year as a base for planning is essential and is one of our recommendations (recommendation 7).

Freight volumes over the Christmas period are lower than the rest of the year. In addition recovery day / days are available after Christmas, which may not be available if the day following engineering work is a normal working day.

Customer expectations may be changing with additional leisure travel and Boxing Day shopping creating a demand for Christmas train services. The day after Boxing Day was recognised as one of the busiest in the Christmas period for rail travel. The passenger mix at Christmas is different than at other times of the year with a higher proportion of leisure passengers who are unfamiliar with the railway and less capable at coping with modal transfer during disruption. However our high-level research suggests that this difference may not be as marked as expected – there are more elderly passengers in late August than after Christmas. In addition, major changes to the railway timetable may take place in mid-December and are still bedding down at Christmas.

There are a number of issues with undertaking major engineering work at Christmas including the sub-optimal effect of working in poor weather and limited daylight hours. Peak demand at Christmas places extra pressure on key physical resources within Network Rail's and contractors' supply chains, causing labour costs to be approximately double the normal rate plus a bonus and time off in lieu. In addition some specialist plant hire may also attract a premium at Christmas. Christmas working puts strain on key human resources such as signal testers and overhead electrification staff. It is also difficult to implement contingency plans during holidays when the majority of the nation is away from work. The high demand for resources during the Christmas peak means that in some cases they have to be rationed and allocated to work that is part of a larger programme and where failure to do the work would put the whole project at risk.

Spreading major works across the year has a number of benefits such as reducing the load on the supply chain and the planning and logistics teams within Network Rail. An even workload should be delivered less expensively than one that fluctuates. It allows the supply chain and Network Rail to ensure that there is adequate management attention to work. An even workload would enable the supply chain to utilise own equipment rather than hiring from agencies. Therefore with the right people and the right kit on site the level of contingency required could be reduced. There would be a reduced requirement to take key locations out of service at the same time giving greater comfort that contingency arrangements would be effective.

Although the recent focus has been on Christmas we found that Easter provides greater opportunities to undertake major works than Christmas given that it always

offers a four day low traffic period whereas Christmas may only provide two days if it falls midweek. However, there are also a number of issues to take into account with Easter such as passenger and freight traffic returning to normal levels immediately after the Easter break. In addition to the volume of passenger and freight traffic we also found that other times of the year have disadvantages for major works. Besides the different seasons of the year we also collected views on the best time to do engineering work including options such as blockades of seven days or longer, three / four day blocks, 54 hour possessions at a weekend, 29 hour possessions primarily on Sunday, extended midweek nights, ordinary midweek nights and day time.

At present the major blocks at Christmas and Easter contain a range of work. Some of this can be done only at these times: other work can be undertaken at weekends but often is not done because the amount of weekend access is limited and there is pressure to add work to major possessions to improve the overall productivity of work. If the industry were able to make greater use of extended midweek night access (having full due regard for revenues generated by traffic that operates at night, especially freight) it would be possible to move some work undertaken at weekends into midweek nights. This would, in turn, free up weekends to do work that is currently being squeezed into the margins of long blockades. However, this will need to be balanced with the potential revenue benefit from reducing weekend access, which has been a focus of APSCM work.

Away from London, and where fit-for-purpose diversionary routes are available, disruptive work can more easily be done at other times of the year than Christmas. Notice of the block must be communicated to passenger and freight customers significantly in advance of the date of the work. In major cities, other than London, major work can be done at times other than Christmas because of the availability of alternative transport modes. The review team saw the recent Nottingham blockade as a successful example of non-Christmas major engineering work and is aware of lengthy periods of disruption on the Western Route this year.

Work within 50 miles of London will still have to be focused on Christmas because of the levels of passenger and freight traffic, a lack of alternative routes with the capacity for diversions and the lack of capacity on alternative transport modes. In exceptional cases it may be possible to close major routes into London providing notice is provided at least a year in advance. Transport agencies should co-ordinate alternative transport options and stakeholders need to recognise and accept the disruptive effect of exceptional closures. The review team believes that this would require an Olympics style approach to travel management.

To understand the cost difference of spreading the work we have modelled the indicative cost of a hypothetical two day track renewal job on a main line close to a London terminal. Purely from a cost point of view (excluding compensation) our analysis points to the benefit of work being done at times of the year other than at

Christmas. However, our high-level modelling found that this work would cost 31% more than the same work at Christmas because of the compensation to be paid.

Making decisions on the time of year for engineering work is not something to be done lightly and the industry should undertake significantly more analysis to inform itself, customers and stakeholders of the operational and efficiency trade-offs from doing work at different times of the year (recommendation 7). The industry has the tools to do this work although at the current level of sophistication they are labour intensive. For the outputs to be useful all parts of the industry - Network Rail, operators and suppliers - will need to provide detailed information on costs and revenue. We believe that the outputs of this work should be transparent whilst recognising that a number of the inputs will be commercially confidential.

We also recommend that the industry builds up a database with accurate and detailed passenger numbers to make selection of the best options possible and to refine the capacity for diversionary routes

The principal compensation mechanism relating to disruptive possessions is in Schedule 4 of Operators' track access agreements. This mechanism is designed to benefit taxpayers by de-risking assumptions made by franchise bidders about the impact of network availability on revenue and thus on the level of premium to be paid (or subsidy to be received) for the franchise. Our discussions with the industry led us to conclude that the schemes can discourage rather than encourage the optimisation of the level of engineering access necessary to renew and enhance the railway.

We recommend that the compensation regime is reviewed and better structured to encourage the granting of access to the network at times that both minimise disruption to passenger and freight customers and also maximise the efficiency of engineering work (recommendation 8). Such a review will need to include stakeholders with financial, regulatory and other interests in the outcome.

2.2.2. Planning of engineering work (Recommendations 9 – 12)

Successful engineering projects rely on the industry's access planning process to be effective. Good and consistent planning has to be an objective for the industry - churn and late changes that are currently observed in engineering planning should be eliminated. The risk of overruns is assessed by Network Rail. This should be an integral part of the early planning process. In our discussions with Network Rail we were informed about ongoing improvements both in processes and within the Network Rail organisation with an increasing focus on operations and the routes. We believe these developments will eventually bear fruit. We also observed that TOCs and FOCs are not always involved in these change processes. Insights, experience and knowledge vary within Network Rail and the operator community. This leads to

insufficient commitment and mutual understanding and ultimately to a breakdown of communication.

The risk of overruns is a major factor which contributes to late cancellations and the de-scoping of projects. In the current framework, overruns will occasionally take place. To avoid overruns altogether will drive up the costs of the industry as well as delaying the programme of works. The industry cannot afford to become more risk averse as a reaction to the Christmas 2014 overruns. We heard however many concerns across the industry that engineering projects have been de-scoped or cancelled since December. Such an approach would not be sustainable and will have implications for achieving the CP5 programme within time and budget.

A way to reduce the risk of overruns is by planning for fewer projects at Christmas and Easter because during those peak times the quality and the availability of additional staff is less, logistics for the current number of projects is stretched as is the attention of management. Contingency planning is an essential element in the planning and execution of major works which is subject to a separate study.

We recommend that Network Rail obtains further insight from other European operators who face similar problems on the timing of major works. During our discussions with Network Rail and operators there was a constant theme of the need for a stronger focus on avoiding overruns on all work, not just the high profile extended blockades. That said, there was an acknowledgement that in exceptional circumstances brief overruns may be preferable to work being curtailed and a further disruptive possession having to be arranged. If access is not available, then the condition that required the possession in the first place will remain.

Faced with a situation of constant change and churn in the planning of engineering work we were impressed by the IAP initiative, which looks to optimise engineering access taking into account varying types of work to be undertaken on the network. Phase 1 of the programme works within the existing timetabling and engineering planning rules to identify the best whole industry solution on the timing of engineering work. Phase 2 is looking at radical options around the timetabling of railway services. It seeks to avoid the chopping and changing caused by engineering work planning by creating a fixed timetable that incorporates both timetabled train services and predefined blocks of engineering work. Initial studies and pilots under the IAP programme have demonstrated that co-operative working between train and freight operators and Network Rail enhances access opportunities.

The IAP is only one of many industry initiatives claiming the time of senior management in Network Rail and has received too limited engagement from Train Operating Companies, with some notable exceptions. As a result the IAP has yet to be widely adopted by the industry. Focus and active involvement and leadership from Network Rail's senior management (Managing Director, Network Operations

and Managing Director, Infrastructure Projects) and the close involvement of train and freight operators are prerequisites for this key industry programme to succeed.

Other key issues related to planning are the need to simplify decision support tools and to solve the inability to timetable engineering trains to and from sites of work leaving their operation to best endeavours on the day (recommendations 10 and 11)

2.2.3. Possession utilisation and efficiency (Recommendations 13 – 18)

Expansion, renewal and maintenance are interrelated and large engineering projects cannot be regarded in isolation. French and Dutch railways' maintenance is scheduled and planned efficiently in recurring timeslots during week nights or even during the day (inspections). With the efficient planning of maintenance and renewals during the week, time is freed up during weekends and there are only a finite number of large projects to schedule or cluster individually spread over the year.

Whilst our principal remit has been to look at the timing of major engineering works it has become clear that one of the major reasons for the need for the number of possessions, whether at Christmas, Easter or any other time of the year, is that the time spent on productive work in a possession is far less than the time allowed.

The RDG's Asset, Programme and Supply Chain Management (APSCM) working group has put in place a work stream on possession utilisation with the objective of identifying ways in which the industry could work together to make possessions more efficient. The work stream has found that the time spent on productive working is between 30 and 40% in some possessions and occasionally even less. During our interviews we were advised of a number of reasons for low productivity, which bear out the findings of the APSCM work stream. Possession efficiency constraints include:

- The ways in which possessions are taken and given up;
- The procedures for turning off electricity in overhead lines or the 3rd rail;
- Significant restrictions on the operation of the railway alongside possessions;
- Limited fitment of technology such as Bi-Directional signalling that would allow possessions and the operating railway to co-exist;
- Limited deployment of technology such as Bi-Directional signalling even when it is fitted;
- Contractual and management arrangements that drive the industry to inject surplus contingency into possessions in areas such as time, money, labour and plant;

- Multiple contractual interfaces in possessions;
- Short notice changes to the provision of materials and machinery with low-profile work such as track renewals losing out to high-profile enhancement projects;
- Widespread changes and churn during the planning of engineering work; and
- Late notice de-scoping and cancellation of engineering work.

In the light of these findings our conclusion is that the industry should place a much greater focus on improving possession utilisation and efficiency (recommendations 13 – 18). The RDG found that numerous initiatives were being pursued by Network Rail but that implementation and adoption was very slow. Areas of possible improvement, which could be achieved on a relatively short term, are:

- (a) Protection of possessions. The use of flags and detonators to protect possession sites is a time consuming historic practice that relies on staff to walk a mile or more from the site of the possession to place very simplistic protection devices. The application of modern communications technology to protecting work sites will be safer and allow work to start more quickly;
- (b) Adjacent Line Working (ALW). There are many examples in other countries of possessions being undertaken whilst trains continue to operate on adjacent lines. This was also a common method of working in the UK until recently. The safety issues with ALW are as much about engineering machinery fouling the open line as it is about the risk to engineering staff from passing trains. We concluded that Network Rail, contractors, operators and the ORR should look closely at the rules, practices and issues regarding Adjacent Line Working and agree how it can be restored in a safe and effective manner;
- (c) Bi-Directional signalling. The British rail network is primarily signalled for trains to operate in a single direction on a specific track. In contrast mainland European networks are signalled so that trains can operate in either direction. This facility can be used when one line is blocked for planned or unplanned reasons and trains are able to pass the blockage in either direction without the need for special arrangements to be put in place. Bi-Directional signalling is also being used in Europe in normal operation to maintain traffic movements. This would be in a situation when there is more traffic to move in one direction than the other. Bi-Directional signalling allows trains travelling in the same direction to move in parallel at the full speed permitted on the route. Bi-Directional signalling, or

versions of it, are fitted on a number of routes such as the East Coast, Great Eastern and Midland Main Line. We found, however, that this capability was rarely exploited at times of disruption and hardly ever in times of normal operation. We concluded that the industry should undertake a comprehensive review of how it uses the Bi-Directional signalling capability installed on the British network and examine how it could be utilised to enable engineering work and train operations to co-exist. We further concluded that the industry should consider the options for extending a Bi-Directional signalling capability taking into account how it is used on overseas railways;

- (d) Isolation of electric power. We were briefed on issues that influence the time taken to isolate the electrified overhead lines and 3rd rail. We understand that work is now underway to introduce a system of faster 3rd rail isolation but that there are issues with compliance with electricity at work regulations. Both London Underground and MTR are able to take isolations more effectively. In our discussions with the ORR we were advised that funding is available for Network Rail to implement speedier methods of isolating both overhead and 3rd rail electrification. We concluded that the industry should devote resources to resolving compliance issues with 3rd rail isolations and implement rapidly its plans for quicker isolations of the overhead line and the 3rd rail.

2.2.4. Minimising the effects of disruption (Recommendations 19 – 23)

With the increasing dependence of passengers and freight customers on the railways, greater attention should be given to the capacity and capability of diversionary routes, which may be a deciding factor in creating network access. The industry should be planning to increase the capacity and capability of the diversionary or alternative routes to the principal arterial routes on the network. At present the assessment of diversionary options appears to be a bespoke exercise for each significant blockade which creates a risk of late or inadequate consultation. The purpose of a national approach to diversionary routes is to allow the industry to identify where there are significant shortcomings in diversionary capability and therefore to begin the debate about investment in diversionary capability, ideally before the principal route is subject to blockades.

Whilst the principal issues with diversionary routes are capacity and capability we also note that rolling stock limitations reduce the ability to divert – whether it is the availability of carriages given the extended journey times or the lack of diesel powered services for operating on non-electrified diversionary routes. We note that current rolling stock investment is likely to produce surplus diesel powered

resources, which may be used on diverted services even if there is sufficient capacity and rolling stock. The adequacy of a diversionary route may be determined by the capacity of the terminal station, especially in major cities. We are aware that the industry has provided temporary stations in emergency situations in the past and we are also aware of the host of building and safety regulations applying to such construction but we believe that this approach could provide the flexibility currently absent from the network.

2.2.5. Organising for success (Recommendations 24 – 31)

It will require industry wide focus and determination for Network Rail to deliver its commitments for CP5 and further. Many initiatives and work streams have been started within Network Rail and also industry wide by the RDG Asset, Programme and Supply Chain Management (APSCM) working group such as the Industry Access Programme, possession optimisation and reducing the cost of contingency. These initiatives should be promoted without delay. There is always a risk of initiative overload and this should be considered by NR in setting priorities. Improved planning and possession efficiency needs resources to drive change in the industry and it needs funding to implement technological improvements. It needs skills and knowledge to exploit the industry's current functionality and not to default to the lowest common denominator. For example, it is important that the RDG's possession utilisation work stream secures senior level sponsorship from Network Rail and resources to undertake work. But more than anything, if the industry is to agree to additional possessions to ensure the CP5 outputs, it needs the confidence to say what it is going to do, why it is going to do it and the benefits that will result for the passenger, freight customer and taxpayer.

There needs to be greater involvement at the highest level, which means engagement, support and funding from Network Rail's Executive Management Team and Route Managing Directors. It means involvement, support and funding from the Chief Executives of the passenger and freight owning groups and their operating company Managing Directors. It means the early involvement of senior managers from the supply industry. Whilst the work is primarily for Network Rail, its suppliers and its customers to undertake there is a role for funders, stakeholders, DfT and regulators to ensure that the barriers to possession efficiency are the minimum necessary.

Our conclusion is that to achieve this, it is essential that the industry works together at the highest level to improve the ways it plans engineering access and secures possession efficiency. In several discussions the issue came up of an Olympic Style Control Centre to oversee the London possessions and engineering work. Our conclusion is that it is worth for the industry to consider this.

The issue of the competence of the staff involved in engineering work was raised by many interviewees. Concerns about the understanding of different parts of the industry or other's duties and responsibilities has been flagged a number of times, especially the lack of understanding of operating practices and procedures and how services may operate in degraded conditions. Our conclusion is that best practice exchange within the industry has to be set up to create a shared level of knowledge and understanding.

Irrespective of the time of year at which major engineering work is undertaken the need for early and effective communication between Network Rail, its contractors, passenger and freight operators is critical for ensuring the effective and efficient delivery of infrastructure improvements. The same can be said for the different functions within Network Rail where good communication and full co-operation between Infrastructure Projects and the Routes is essential if Network Rail's CP5 investment programme is to be delivered on time and on budget. In parallel the financial incentives and accountabilities within the overall industry and also within the different parts of Network Rail need to be aligned with the financial consequences of decisions taken about the delivery of engineering work. We heard evidence that this was not always the case in practice.

We reiterate that delivery of the CP5 outputs requires leadership, communication and cooperation at every level. Whilst it may be self-evident inside the industry, there should be a clear division of tasks and assignment of accountabilities between the different parties involved in engineering work. RDG should clarify the lines of accountability between the various players in the Industry, including the boundary between TOCs and NR in responsibility for passengers, that FOCs are responsible for freight customers, that Network Rail's IP is an internal supplier for the delivery of most major projects, whilst the Routes are the clients for all projects and responsible for the delivery of some projects.

3. Recommendations for Action

In summary our principal recommendations on the timing of engineering work are:

There is merit in reducing the amount of major engineering work at Christmas and Easter but it cannot be eliminated completely. This can be achieved by cascading work to those days with the lowest possible commuter footfall and freight demand such as extended bank holidays and the summer holidays. This only can be done after extensive passenger research. Such an approach will cause significant passenger disruption, particularly on the routes into London and should be the option of last resort.

Whilst a number of our recommendations will take some time to implement we recommend that in the current year the industry, in close cooperation with the DfT, could agree to extend week night possessions and allow 54 hour blockades on more weekends. The needs of the rail freight industry, which operates many services at night, must be taken into account. In return, Network Rail must significantly improve productivity with 'time on tools' during possessions, which with fewer projects, we expect will reduce the pressure on Christmas 2015 and Easter 2016.

In parallel, with 2016/2017 on the horizon, the industry needs to improve the planning of its major works and be able to deal with planned passenger disruption. In particular, a date must be set in the process for which changes are only allowed in exceptional circumstances with a rigorous change control process. Currently there are too many last moment changes, cancellations or de-scoped projects, although it has been difficult to quantify the number of changes. Passenger Focus, London Travel Watch, operators, passengers and freight customers accept that the railways may have to be shut for enhancements and renewals but they have to be informed in a proper and timely manner with credible transport alternatives. The industry should also develop in this time a coordinated strategy for diversionary routes in particular around London and restore adjacent line working to allow core services to run while engineering works are ongoing.

Our detailed recommendations are listed below. Some additional recommendations and more detailed thinking behind the recommendations are contained in the main report.

Timing of engineering work

1. There is merit in reducing the amount of major engineering work at Christmas and Easter. Logical alternatives to spread the work are those days with the lowest possible commuter footfall and freight demand. Days, other than Christmas and Easter, when major works could be done are extended Bank Holidays and the summer holidays. This only can be done after extensive

passenger research. There will always be significant passenger disruption, mainly on the routes into London. Christmas, Easter and Bank Holiday weekends should only be used for work that requires the additional time available;

2. The industry should make greater use of extended midweek nights allowing work to be moved from weekends into midweek nights although the need of the rail freight industry must be taken into account. Recognising the impact on first and last trains, the DfT must be involved in this process;
3. To be able to deal with planned passenger disruption (and to start creating higher efficiency) the industry needs to improve the planning of its major works in particular to set a date in the process after which changes are only allowed in exceptional circumstances;
4. In managing the risk of possession overruns, need to plan for less work at Christmas and Easter as during these peak times the quality and availability of additional staff is less, logistics for the current number of projects is stretched as is management attention. Contingency planning is an essential element in the planning and execution of major works. Improving contingency planning has been subject of a separate study.
5. Before committing to undertake major works during other times of the year the industry should consider the feasibility of reallocating such works to weekday and weekend closures, and ensure that any such disruptive closures are optimised in terms of possession utilisation and better planning;
6. Whilst work close to major cities may technically be possible at other times of the year the levels of passenger and freight traffic and a lack of availability of alternative transport modes means that work within 50 miles of London will remain dependent on Christmas unless otherwise is agreed by DfT, stakeholders and the TOCs/FOCs. Away from London and where fit-for-purpose diversionary routes are available disruptive work can be done at other times of the year providing notice of the work is communicated to passenger and freight customers significantly in advance of the work being done;
7. Decisions on the best time of year to do particular work should be informed by passenger data as well as comparative costs and efficiencies of possessions. We recommend the industry builds up a database with accurate and detailed passenger numbers to make selection of the best options possible and to refine the capacity for diversionary routes. Obtaining a detailed insight in volume and composition (commuter-leisure) passenger flows during the year as a base for planning is essential to be able to plan possessions. The same holds true of the costs of a possession at Christmas in comparison with the summer. The industry should undertake significantly more analysis to inform itself, customers and stakeholders of the operational and efficiency trade-offs from doing work at different times of the year;

8. While the Schedule 4 mechanism was designed to protect the interests of taxpayers (see page 11), it should be reviewed by the RDG to see whether it can be better structured to encourage the granting of access to the network at times which both minimise disruption to passenger and freight customers and also maximise the efficiency of engineering work. This review will need to include stakeholders with financial, regulatory and other interests in the outcome.

Planning engineering work

9. To focus on improving long term planning the Industry needs a co-operative, creative and disciplined approach to cluster projects together, to establish possessions early and keep to the plan while overrun Risk Assessment must be an early element of the planning and involve all parties;
10. The importance of the activities of the RDG's APSCM working group should be recognised by enhancing the representation from Network Rail and the operating companies. The Network Rail Managing Director of Network Operations and Director of Infrastructure should attend;
11. The industry must improve its engagement on the Industry Access Programme (IAP). This engagement should be realised by RDG Members requiring Route Managing Directors, the Infrastructure Projects organisation and passenger and freight Managing Directors to take an active involvement in the programme and agree a rolling programme of analysis for every route under their control;
12. The industry should give greater attention to the logistics of major works including the supply of key materials, equipment and staff.

Possession utilisation and efficiency

13. Network Rail should place a much greater focus on improving possession utilisation and efficiency than is currently the case and produce a possession productivity measure;
14. Network Rail should actively pursue working with staff representatives to identify options for accelerating the use of technology in protecting possessions;
15. Network Rail, contractors, operators and the ORR should look closely at the rules, practices and issues regarding Adjacent Line Working and agree how it can be restored in a safe and effective manner;
16. The industry should undertake a comprehensive review of how it uses the Bi-Directional signalling capability installed on the network and examine how it could be further utilised to enable engineering work and train operations to co-exist;

17. The industry should devote resources to resolving compliance issues with 3rd rail and Overhead Line Equipment isolations and introduce investment to speed up the isolation process;
18. Network Rail should consider extending best practice from overseas and TfL in isolations, taking possessions of engineering sites and installing and using Bi-Directional signalling capability.

Minimising the effects of disruption

19. RDG as part of its strategic planning process, should undertake an exercise to determine, review and enhance diversionary routes for each major route on the network, recognising that some diversionary routes may be under the control of a different Route Managing Director or where the principal passenger operator may be different from the original route;
20. Given that Route upgrades (even for diversionary routes) may be a long-term solution we recommend that the approach to the capacity on alternative routes should be undertaken on a whole industry basis with the pain being shared rather than isolated;
21. To mitigate the effect of disruption we recommend that diverted trains should call at principal stations on the diverted route to mitigate the thinning out of the indigenous service that would be necessary to create capacity for the diverted services. Compensation would be payable to both operators and revenue allocation rules would have to be reviewed but we see this as an option where all alternatives have been exhausted;
22. Some redundant rolling stock should be retained in warm store and made available for diversionary operations. Further consideration would be needed as to whether this stock was held by operators, Network Rail or funders. Whilst surplus stock may be at or beyond its expired life we believe that passengers would prefer to be conveyed on such stock rather than having to use road or to not travel at all;
23. The industry should consider the feasibility of creating temporary stations to accommodate diverted services around major blockades

Organising for success

24. RDG and industry partners must prioritise the key initiatives which will improve the efficiency of engineering projects to resolve the current overload of initiatives and projects;

25. Operating owning groups should build up expertise in the area of access and possession planning to be an equal and knowledgeable partner in each phase of the planning and execution for Network Rail;
26. Early and effective communication regarding major engineering work and a clear understanding of the financial accountabilities and incentives relating to that work needs to be improved by the industry in general and Network Rail in particular.
27. The lessons, advice and recommendations from past studies into effective engineering work should be kept under constant scrutiny and progress towards achieving best practice should be measured and reviewed by the industry.
28. Network Rail should review the operating knowledge of key individuals involved in project management and control positions;
29. The industry cannot afford to become more risk averse in seeking to eliminate any risk of over-runs. Network Rail should make a clear statement as to the action it is taking to reduce or avoid the risk of overruns and ensure that local staff are not taking a more conservative view.
30. RDG should clarify the lines of accountability between the various players in the Industry, including the boundary between TOCs and NR in responsibility for passengers, that FOCs are responsible for freight customers, that Network Rail's IP is an internal supplier for the delivery of most major projects, whilst the Routes are the clients for all projects and responsible for the delivery of some projects.
31. RDG should review whether it would be beneficial for all London passenger operations, including TfL, to be co-ordinated across London with a control centre as was used in the London Olympics.

4. The Views of Railway Users

4.1. Passenger Volumes

A major influence on the timing of major engineering work is the varying number of passengers that use the network during the year. A further influence is the characteristic of those passengers. One of the concerns expressed about undertaking engineering work at Christmas was that a high number of elderly passengers, compared with the rest of the year, would be affected in the event of delays. The review team sought to analyse whether there was a larger number of more elderly rail passengers travelling over the Christmas period.

A detailed study was made of bookings for East Coast, East Midlands Trains, First Great Western and Virgin Trains, which showed that in the period 26/12/14 to 28/12/14 a total of 8,521 Senior Railcards were used in booking travel. This can be compared with, for example, the three days after the last August Bank Holiday when 20,169 Senior Railcard tickets were booked. This is a significant difference. The period after the August Bank Holiday is fairly representative of travel at other times of the year, so it strongly suggests that there are fewer elderly passengers travelling in the Christmas Period.

The review team sought to analyse passenger flows into the London Termini to see if there were any periods other than Christmas and Bank Holidays where it might be possible to give Network Rail more access for major blockades. Although TOCs have access to physical counts of passengers including from Ticket Vending Machines (TVMs), booking office record time of sale, and ticket gates record entry and exit by time, we found it difficult to obtain breakdowns of passenger numbers and types at a level of detail which would help strengthen the analysis by which the best timing for major works can be established. We think the industry needs to improve the collection and availability of such data.

Network Rail has over recent years introduced technology that gives total station footfall on a half hourly basis. However this includes not only passengers but also people visiting a station for other reasons but by comparing these numbers with information that is available through Oyster cards and Lennon, it becomes a good approximation of how passenger volumes vary by different days, but does not give an absolute number of passengers.

The review also looked to see if it would be possible to add extra days for closures on routes into London for the Friday before the August Bank Holiday or the Tuesday after the Easter Bank Holiday.

The analysis of the Network Rail Station counts shows that there is very little reduction in passengers on either of these days and therefore the idea of giving longer closures at this time is not possible without causing major inconvenience for

passengers. The details of the station counts are for the periods around Easter 2014 and August bank holiday 2014. These are shown below in figures 1 and 2.

Figure 1: Weekly Passenger Count Summary – August

Weekly PFM Count Summary - Commencing Sun 17 Aug 2014									Weekly PFM Count Summary - Commencing Sun 24 Aug 2014					
Location	Sun 17-Aug	Mon 18-Aug	Tue 19-Aug	Wed 20-Aug	Thu 21-Aug	Fri 22-Aug	Sat 23-Aug	Sun 24-Aug	Mon 25-Aug	Tue 26-Aug	Wed 27-Aug	Thu 28-Aug	Fri 29-Aug	Sat 30-Aug
Cannon Street Concourse	87	59,576	62,452	59,848	58,944	55,652	8,264	112	119	59,703	60,094	59,513	56,410	7,738
Charing Cross Concourse	60,376	107,985	115,985	119,711	116,566	115,509	79,903	62,276	60,153	107,784	115,261	114,183	112,478	83,459
Euston Concourse	33,420	168,093	189,116	175,667	175,325	197,840	50,126	42,447	28,737	201,149	178,619	175,081	194,886	142,425
Kings Cross Concourse	134,367	160,235	156,747	159,284	167,181	176,246	159,522	96,396	137,567	157,473	149,063	151,703	159,540	135,141
Liverpool Street Concourse	177,966	367,377	382,537	393,300	404,155	404,141	200,446	191,481	148,167	365,931	380,580	396,624	390,581	188,963
London Bridge Concourse	57,558	128,519	136,889	137,635	135,764	131,516	21,019	14,759	14,005	29,572	31,117	32,037	31,031	17,913
Paddington Concourse	125,842	184,785	183,980	189,464	193,558	210,449	120,682	118,174	130,744	180,571	183,900	192,252	189,101	129,771
Victoria Concourse	209,988	329,059	335,080	344,098	344,872	344,590	280,213	242,961	234,132	356,118	366,380	368,755	370,580	269,851
Waterloo Concourse	193,280	328,758	348,493	366,899	364,347	347,551	242,903	192,229	133,908	339,894	352,943	352,077	352,685	258,751

Figure 2: Weekly Passenger Count Summary – Easter

Weekly PFM Count Summary - Commencing Sun 13 Apr 2014								Weekly PFM Count Summary - Commencing Sun 20 Apr 2014						
Location	Sun 13-Apr	Mon 14-Apr	Tue 15-Apr	Wed 16-Apr	Thu 17-Apr	Fri 18-Apr	Sat 19-Apr	Sun 20-Apr	Mon 21-Apr	Tue 22-Apr	Wed 23-Apr	Thu 24-Apr	Fri 25-Apr	Sat 26-Apr
Cannon Street Concourse	204	62,382	62,847	62,213	57,730	37,245	44,976	21,539	291	62,750	64,915	64,133	62,316	8,388
Charing Cross Concourse	93,372	107,258	117,044	118,272	117,493	28,649	26,068	13,953	57,157	102,372	109,945	113,338	112,507	85,035
Euston Concourse	140,583	191,988	195,261	180,969	187,291	169,680	142,752	102,128	172,763	192,595	179,075	184,633	201,101	156,188
Kings Cross Concourse	145,675	167,413	167,693	174,924	199,651	93,446	86,410	94,712	115,464	146,122	152,902	162,150	171,685	139,066
Liverpool Street Concourse	191,214	370,746	393,807	396,262	402,156	190,859	207,890	143,399	146,424	354,397	379,318	394,579	397,937	211,414
London Bridge Concourse	92,378	166,872	178,324	181,448	183,947	66,327	66,113	37,264	37,757	161,799	173,195	181,834	178,294	99,513
Paddington Concourse	123,920	187,369	189,640	195,363	206,821	134,377	123,780	84,625	117,628	180,678	188,057	195,845	194,778	125,008
Victoria Concourse	225,880	340,047	349,454	359,214	367,188	252,420	267,588	188,970	214,117	322,433	331,942	339,017	353,004	243,148
Waterloo Retail	82,006	99,187	110,941	116,589	120,092	78,964	85,676	55,195	58,903	92,220	99,083	113,071	112,540	96,455

Also in reviewing the Network Rail station passenger count figures, the decline in July and August is much less than we expected. For example the weekly August footfall at Waterloo is 2.20m whereas in March it is 2.21m. A similar pattern is observed at Paddington and elsewhere.

These figures have also been checked against Transport for London (TfL)'s Oyster card detail for their underground stations at the London termini. These show that there is a reduction of 6% in August passenger volumes in comparison to a normal week in March. Also the time of the morning and evening peak does not vary by time of year.

4.2. TOC Views

Fourteen TOCs were interviewed and in overall terms their responses were very similar.

In general there seemed to be a lack of understanding by TOCs of the issue facing Network Rail. Equally, it was felt that Network Rail did not have a clear understanding of the challenges facing TOCs. Some TOCs had the view that this problem was caused by the number of management changes especially on big projects and a loss of experience.

TOCs did not have a clear relationship with Network Rail's Infrastructure Projects (IP) organisation and there was little communication between them. The majority of TOCs did not know whether a possession was being taken by the Network Rail Route or IP. The main point of contact was the Route and this relationship seemed to work well. The one TOC that had a good close relationship with IP was FGW because of the work being done on that route. FGW had an impressive contingency plan for all the route closures over the next 3 to 4 years.

TOCs expressed concerns about Network Rail's planning with too many possessions being cancelled or reduced at the last minute. There were examples of where at a GRIP (Network Rail's project development and authorisation process) stage review a project was running late but Network Rail would say it will come right. However often this did not happen and the possession would be cancelled much later in the process, when the decision should have been taken earlier. TOCs thought that for the very major possessions the planning was good and hand back in the main took place on time but the less high profile possessions were not so well run. Again TOCs could not identify if these possessions were route or IP, but the hand backs at London Bridge were praised.

TOCs thought that Network Rail was slow to take possessions and hand them back. There was particular criticism of the time taken when the Overhead Line (OHL) or third rail was involved.

Those TOCs who either through a TfL involvement or shared routes drew favourable comparisons with both London Underground (LUL) and overseas operators such as MTR, where possessions were taken very quickly often using mobile phones to report back to their control.

TOCs reported that some contractors were much quicker at starting work having done things such as the safety briefing before the last train had gone past. Others did nothing in the way of preparation till the last train had passed. The difference in start time could easily be 45 minutes or more.

TOCs were willing to consider major possessions and line closures for Routes that were not within about 50 miles of London at times other than Christmas. A number mentioned with praise the possessions for the Nottingham closure, the Ipswich tunnel, the Southampton tunnels and the Barnstaple line.

The common feature was the availability of diversionary routes both for passenger and freight services, gauge clearance and in the case of Barnstaple such heavily reduced passenger numbers that a coach alternative was possible. The need for these to be publicised a year in advance, provide excellent service during the closure with quality bus/coach services, information and helpful staff. The TOCs made the point that having announced a year in advance that a major closure was going to take place and passengers had planned accordingly it was essential that it took place.

On routes into London the view of the TOCs was that it would be very difficult to take a possession on a weekday given the level of patronage and the lack of spare track capacity to accommodate another operator's trains. The key issue for all TOCs was passenger volumes. There only seems to have been one serious plan to close a route into London during the week recently and this was on the west coast at Watford in summer 2014. Network Rail "pulled" this possession owing, in part, to the schedule 4 costs meaning that it was not cost effective. During the Watford closure London Midland was going to provide coach connections in to the Chiltern and LUL Metropolitan lines. Virgin Trains would have run an hourly service using long Voyager sets from Birmingham via the Chiltern Route and then coming back in to Euston. Other passengers would have been diverted onto East Midlands Trains. Currently on South-eastern there is a debate taking place about the closure of the Sevenoaks tunnel in 2016, but there are some other routes available to reduce the disruption for passengers.

There was a general view that Network Rail should be installing more Bi-Directional signalling and looking at Adjacent Line Working (ALW) again to try to get more capacity for maintenance without taking a major possession. TOCs also raised the issue of whether better use could be made of late evening possessions on four track railways.

The TOCs were of the view that more investment needs to be made in diversionary routes such as the electrification of the line between Peterborough and Ely. FGW was looking forward to the Bicester curve being completed as this would give access back to routes to Bristol and south Wales via Didcot.

TOCs thought it was always necessary to challenge Network Rail on the work plans for possessions and were concerned that since Christmas Network Rail had become too cautious in the amount of work they are targeting.

Those TOCs that had someone with knowledge of engineering had a more constructive debate but a number were not properly engaged in the Network Rail work plan. However not many TOCs raised or seemed aware of any of the initiatives being led through the RDG's APSCM working group.

It was noticeable that SWT with the Alliance had the most integrated approach to possessions and the monitoring of them for instance throughout the weekend, in the same way that LUL does.

4.3. Passenger organisations (Passenger Focus, London Travel Watch) views

Both passenger organisations expressed the view that travel demand management should be the leading driver for access planning. They feel that it is now too much engineering driven. The passenger organisations said passenger's preference is to make the entire journey by train. If this is not possible then the industry should explain the reasons for the disruption as early as possible and explain alternative travel arrangements. Currently advance information is not always to the point and it can be late, ad hoc and unreliable. They feel that passengers are resilient as long as they are informed on time about the alternatives and the benefits of the work being done. Transport for London was felt to demonstrate good practice in providing advice and explanations to passengers.

The passenger representative organisations thought that Christmas is not necessarily the wrong time for major engineering projects despite the 2014 problems. The industry should undertake passenger research about the trade-off before moving from Christmas blockades to other times of the year. Possessions during weekdays and weekday nights were seen as possible depending on the volume of passengers and the alternatives available. However, near London it was thought to be impractical to close the railways on weekdays. Diversionary routes have been improved and the passenger representative organisations believe the industry should continue to develop increased capacity on key diversionary routes.

Both organisations suggested the introduction of an Olympic Games style holistic approach to London transport planning given that 70% of train services are to and

from the capital. They were not enthusiastic about planning on a single route based approach as this is part of the problem they believe, this even holds true for the SWT alliance.

The organisations said that there is some evidence that passengers think that the railways should be open at Christmas but research is required to discover whether this is a theoretical aspiration and if it would convert into usage in the future, Although passenger numbers at Christmas are relatively low compared with the rest of the year, the desire to travel on Boxing Day is increasing.

They said that priority and proper rigour should be applied to contingency planning and lessons learnt should be applied.

They commented that much has been written about communication and information to passengers during disruption. This should be improved. However, they felt that part of the problem is poor communication within the industry between Network Rail's Infrastructure Projects team, Network Rail Routes, passenger and freight operators. One organisation should take the lead with passengers.

Passenger Focus and London Travel Watch are advocates for direct compensation to affected train passengers within the incentive regime instead of only compensating train companies.

4.4. Freight Views

The expansion of rail freight in the last twenty years has contributed to the overall growth of the GB rail industry. Significant investment in locomotives and wagons, combined with a competitive environment and a focus on the customers' needs has seen the development of international traffic through deep sea ports and the Channel Tunnel. Conventional rail freight traffic such as coal, aggregates metals and petroleum still dominate rail freight activity but all freight traffic has one characteristic – the need to be loaded and unloaded where and when the customer wants the goods. This means that freight's requirements for access to the network, which includes minimal disruption from engineering works, is the same as the passenger railway and the needs of freight have to be taken into account when deciding when to undertake major works on the railway.

That said, freight does have some flexibility compared with passenger traffic. Most freight in Britain is diesel hauled and that which is hauled by electric locomotives can use diesel power in the event of the overhead lines being switched off. Providing trains can load and unload where planned freight has more flexibility than passenger as to the route it takes although significantly extended journey times require more resources and some diversionary routes are not capable of taking certain traffic, such as the largest deep sea containers.

A further issue to be considered is that approximately 30% of freight moves at night. We have recommended that greater use should be made of extended midweek nights for engineering work. We recognise, however, that the need to operate an efficient freight railway must be taken into account. In contrast freight activity from Saturday afternoon through to Monday morning is less than at other times of the week. Whilst the rail freight industry aspires to a seven day operation the current position is that it can accommodate the additional weekend possessions that we have recommended.

Rail freight is at its busiest during the autumn. The build up to Christmas increases demand for containerised products whilst the requirement for coal and biomass is higher than the rest of the year as winter stockpiles are built up. Freight locomotives are also utilised to haul the railhead treatment trains which puts further strain on the freight supply chain. Therefore, freight companies would prefer major works to be planned for Christmas, the first half of the year and early summer.

The rail freight companies provide most drivers, locomotives and wagons that are used on engineering work. Their resources, however, are not infinite. At a time of planned disruption a freight train driver may be required for engineering trains, ordinary freight trains, diverted freight trains and sometimes conducting passenger train drivers when passenger trains are diverted over unfamiliar routes.

In common with other suppliers to Network Rail the freight companies are keen that workload is spread throughout the year and that the workload from one year to the next avoids high peaks and low troughs. The freight operators believe there are considerable benefits from plans being finalised and confirmed in good time before work is undertaken. This allows the freight companies to provide the requisite number of drivers with the requisite knowledge together with other resources such as freight locomotives and wagons. A further element of good planning is the provision of timetabled paths for engineering trains. This ensures that engineering trains arrive at, and depart from, work sites in accordance with the overall work plan. At present timetabled paths are not always provided and the logistics to service engineering work are sometimes underestimated.

We recommend that the requirements of freight operators, both as users of the network and as suppliers to Network Rail, should receive a higher profile during the planning and execution of engineering work. Whilst freight operators are willing to accommodate freight train diversions their needs must not be overlooked in the planning of additional engineering access on the network. In their role as suppliers, the freight operators will be more effective with settled plans, an even workload and detailed attention to the logistics plan.

5. International comparisons

5.1. Summary

As part of this review working visits have been made to Pro-Rail of the Netherlands and SNCF in Paris. Visits to Deutsche Bahn and Banverket (Sweden) could only be arranged for after the conclusion of the review but could be fulfilled if that was thought to be helpful.

The challenge for continental European rail infrastructure managers and operators is to balance access to the rail network with the least disruption for passengers and freight while executing a huge programme of enhancements, renewals and maintenance on an increasingly congested rail network. This challenge is very similar to that facing Network Rail. However, in different contexts and industry structures other solutions are being pursued, which could give new insights for the UK Rail industry. We recommend that Network Rail expands on the contacts which have been made for this review.

Pro-Rail comparison

- The structure and the processes in the Netherlands seem to be simpler and more streamlined than those of Network Rail. It was noteworthy that one person in the organisation at access planning did oversee it all and could easily explain it;
- Planning of engineering works is taking place in a more structured and disciplined manner. After T -8 the planning is fixed;
- Although Pro-Rail is leading and deciding the outcome of the planning process the engagement of the operators in the process is better structured and more comprehensive in the Netherlands than in the UK;
- There is no project work undertaken during the Christmas holidays and the burden of engineering projects is better divided over the year including long blockades during summer holidays;
- Pro-Rail outsources maintenance and engineering to third party engineering companies; Increasing 'Time on tools' by the introduction of new technology and procedures is a focus project to give control to these third parties;
- Although the passenger flow during the peak at Utrecht Central Station is comparable or even higher than at the North London terminal stations, there are weekdays block possessions for which buses and diversionary routes are used as a possible transport alternative; and
- Due to the national smartcard passenger volumes are well known in detail

France comparison

- The challenges for SNCF are similar as for the GB rail Industry i.e. a huge programme of enhancements and renewals in an increasingly congested network in particular around Paris;
- To address these challenges the government has decided to integrate the former RFF into SNCF as a separate business unit/entity called SNCF Infra. This is comparable to DB Netz in Germany. SNCF-Infra is organized in regions, mainly to be able to focus on the railways into Paris in an integral way, and there are integrated control centres. Compared to the London situation there seems to be less fragmentation.
- While passenger flows into Paris are similar or higher than these into London, enhancements and renewals are being done throughout the year, but not at Christmas. Long possessions are taken during the August summer holiday period, even at the RER for which busses and alternative routes are being offered as alternative; It should be noted however that there is hardly commuter traffic during that month.
- SNCF operates on the basis of annual budgets which is regarded as a big disadvantage compared to the UK.

5.2. Netherlands

5.2.1. The Dutch railway network and organisation

The Dutch core rail network is the critical connection between the major Dutch cities. The catchment area is nearly 18 million people and the major operator, NS, serves 1.2 million rail passengers each weekday in a mixture of commuter, leisure and international services. During the morning peak around 400,000 passengers are carried between major stations. The biggest station is Utrecht with 250,000 passengers each weekday. The rail network is also used for freight, serving Rotterdam, the largest port in Europe. The Dutch rail network is one of the most densely used networks in Europe with a very complex timetable. NS offers 5,200 services a day on the core network. On regional, less dense networks, other operators are active. The core services are delivered by double deck trains with a maximum speed of 160 kmh. These have configurations of 1300 seats or even 1900 seats per train.

Pro-Rail is the Dutch infrastructure operator, comparable to Network Rail. Pro-Rail is, as Network Rail a government owned company receiving funds from the government. There are three major line departments within Pro-Rail including Projects with 1000 staff and Operations (Traffic Control, ICT and Asset Management

with 2000 staff and Account and Capacity management, planning and timetabling (250 staff). Project is responsible for the timely and within budget delivery of enhancements and renewals. They interface with engineering firms. Within Operations 'Asset Management' is responsible for the strategic planning of projects. Account and Capacity Management has a department responsible for all access to the network and is the interface to the operators. It is the spider in the web for planning interfacing with projects, operators, timetabling and asset management. Operators are involved in all decisions, if they do not agree with the outcome they can complain with the regulator. Pro-Rail outsources both maintenance and renewals. There are six passenger operators in the Netherlands of which NS is by far the largest. Rail companies operate within in a national concession or franchise (NS has its franchise for the core network until 2025) or in regional franchises. Operators pay track access charges to Pro-Rail based on use. There are no penalty schemes or schedules in contrast to the UK. Three central departments are involved in planning new projects, renewals and maintenance.

5.2.2. Engineering planning and timetabling

Engineering projects take place during extended weeknights (1800 projects less than nine hours), weekends (700 projects between nine and 52 hours) and extended weekends (50 projects more than 52 hours). There is little overlap between them. Extended weekends are available at Easter (3 days), Pentecost (3 days), and Ascension (4 days). In addition the May holidays, February Carnival holidays and summer holidays are available for large engineering projects. On Christmas holidays no projects are planned due to the unfavourable weather conditions. Both at Christmas and Boxing Day normal weekend services are delivered. Passenger numbers and disruption are important parameters in planning major works.

The Netherlands has no concept of a five-year Control Period or a cycle of HLOS/SOFA, strategic business plan and final determination. There is, however, a yearly network statement. Pro-Rail would favour a fixed multi-year funded plan, but the government does not want to commit to that at present.

For the planning of enhancements, renewals and maintenance the annual timetable is the basis. Maintenance is in standard cycles included in the base timetable. Possessions for engineering projects are regarded as incidental and interfere with the standard timetable.

The timetabling process follows European rules:

- 2nd Monday April. All capacity requests received;
- 14 weeks later in July. Concept timetable;
- 3rd Monday August = final timetable;

- October: Final timetable programmed in Donna/VPT; and
- 2nd week of December. Introduction of the timetable

This timetable contains both the schedule of train traffic and possessions. Planning is done in close cooperation with the involvement of all parties (in a concept called “tables”).

5.2.3. Regular Maintenance (cyclical process)

Contrary to the UK, regular maintenance is outsourced to a limited number of privately owned engineering firms of which Strukton Rail has the largest share. After a major maintenance staff fatality the focus has been on safe working. Single line working is not deployed. There is an agreed maintenance schedule which, is built up following a standard process from specific (small) maintenance zones (of which there are around 3000) on week nights every week. Maintenance can only be done when the zone is out of service. Because of the zone structure partial blockades are much easier to realise when trains are operating especially in yards and at complex points and switches. Trains run in the Netherlands in the standard timetable often until midnight and there are some night services. There is little difference between weekend and week day services. Recently it has become possible for the engineering firms to create line blockages directly within the agreed schedules and without the interference of traffic control through direct communication with signal boxes. This has increased productive possession time. There is a constant drive to do maintenance within the normal services pattern.

5.2.4. Enhancements and renewals

Projects are divided into small scale, large scale and new build. Asset management uses the tool of production planning for projects. All projects are incidental i.e. outside the normal timetable. Pro-Rail optimizes the project portfolio on two criteria: hindrance and costs. There are specific criteria in creating line blockades. The chance to influence hindrance is 5 to 10 years before realisation. The production plan has a horizon of 7 years. The reason for this long horizon is the opportunity to cluster projects into a smaller number of logically coherent possessions.

There are three phases following LEAN principles: from T -6 years until T -2 years scoping and planning; from T -1.5 year to T -28 weeks capacity allocation takes place from T -28 weeks until T -16 weeks preparation and freezing of projects; and T -16 weeks until T preparation. A risk analysis is included in the process. A 10% redundancy is included in each project. 2 to 3% of the projects run late. That risk is taken by the industry. The production plan proposals are discussed with the

department of account and capacity management who agrees access with the operators. There is a preference for long possessions for major works. Passengers and NS are happy with that as long as it is well planned and announced a long time ahead. Road coaches provide alternative transport with a minimal effect on passenger numbers. Examples are Den Bosch Station -10 days, Delft -1 week, Gouda- Den Haag. Investment in expansion is €1bn.

Annual volume is €300 million renewals and €150 million on large maintenance projects. Big engineering projects take place during the whole year but longer possessions take often place during the summer holidays. Criteria are:

- Spreading the pain over the year;
- Projects should not influence each other; and
- Preferably there is only one large project at a time, no others.

Renewals in long possessions are 30-40% cheaper to execute than when they are split up in parts.

5.3. France

5.3.1. SNCF Introduction

The challenge for SNCF-Infra and the processes that it follows to create access for enhancements, renewals and maintenance are similar to those of Network Rail.

Currently the former RFF is being integrated into a new division of SNCF called SNCF-infra, comparable to DB Netz. SNCF-Infra is, responsible for railway network management, operation maintenance and engineering. SNCF Infra has 52000 staff, revenues of €7.3bn and oversees a network of 30,000 km with 15,000 train services per day. SNCF infra has three branches and five activities. Branches are: system engineering (Systra), maintenance & works and traffic control. The latter includes timetabling, traffic management and network safety and availability. Activities are: maintenance engineering and asset management, system engineering, maintenance production and planning, specific studies and expertise and data capture and analysis.

SNCF Infra is divided in regions of which Ile de France is the most important. Other regions are North, South East and South West. As with London, the region around the capital is the core of the French Network. RATP is responsible for public transport in Paris (as is TfL in London). SNCF is responsible for the 5 RER lines and the regional trains out of Paris (Transilien), other regional trains (TER) and the high speed InterCitys (Voyages). Gare du Nord, with 200 million passengers a year is regarded as the busiest railway station in Europe – many other major stations are

also extremely busy. As in London the network out of Paris is a radial high density network with limited opportunities of diversionary routes, once outside the RATP network. SNCF carries 4 million passengers each day of which a large part from and to Paris.

5.3.2. Engineering planning

A major challenge for SNCF is a backlog of investment in the rail system during the last part of the 20th century, which has led to speed restrictions. The focus is therefore on a major programme of renewals alongside an extensive enhancement programme. This is a government and political priority, which makes it easier to implement major blockades.

As in the UK, timing of engineering works at SNCF is seen as ‘horses for courses’. The major challenge to finding access, while minimising passenger disruption, is in the Ile de France, which has the highest density of train services and the largest volumes of passengers. The difference with the UK is that August is a major time for (long) possessions. There is much less commuter traffic from and to Paris during that time as the majority of people working in Paris are on annual leave. The outer parts of RER lines, as an example, can then be closed for weeks although the hot weather in August can present engineering challenges. At Christmas time the French Railways offers normal weekend services and this time is regarded as unfavourable for maintenance.

France has a 24/7 economy and therefore SNCF has the same challenges of having less opportunity for long engineering slots during weekends. Fifty weekends of the year are used for engineering possessions. There is an increasing emphasis on longer week nights allowing engineering work during the night by skipping last night services. SNCF Infra say they are moving from condition based maintenance to predictive maintenance following a model of lowest lifecycle costs. Increasingly maintenance and engineering staff are in one pool.

The French Railway industry does not employ the concept of a Control Period and operates within an annual budget allocation. This complicates long term planning. Renewals and enhancements will be dealt with on a route by route basis. Initial planning takes place more than five years in advance; detailed planning is done between five and two years before T. All departments and business units are involved in planning. Capacity is reserved two years before. They state that a large percentage of the planned renewal works is being executed at the time for which it was planned and at T -8 the plan is frozen. The major reason for changes in the plans is non-availability of plant and people. As in the UK, maintenance is included in the normal timetable cycle. Risks of overruns are being mitigated by a modular approach to the network as in the Netherlands.

There is a similar awareness that minimising the effects of disruption for passengers and freight are a key element in access-planning. Diversionary routes or alternative travel (buses) will be offered, which in summer in the Ile de France is easier than for London. SNCF has a large central asset management organisation, which is responsible for the planning of renewals, enhancements and maintenance in cooperation with the operating business units. The organisation has a number of central functions as well as delegated responsibilities in the regions. Ultimately asset management decides on projects in close consultation with the operators. Due to the huge pressure on projects people and equipment are the major complicating factors. Operational planning and execution of engineering and maintenance is overseen from integrated control centres with one single controlling mind. These control centres are SNCF dominated.

6. The timing of engineering access – options and opportunities

6.1. Introduction

The earlier chapters of this report reflect the views of a range of users and stakeholders regarding the best times of year to undertake major works on the rail network. To understand the issues and concerns from an infrastructure management perspective the review team met key Network Rail personnel including members of its Executive Committee, Route Managing Directors, Infrastructure Projects Directors, senior managers responsible for engineering access planning and programme leaders for a range of initiatives to improve the implementation of major works. The review team interviewed a range of representatives from the contracting sector including the National Rail Contractors Group.

During these interviews a number of common themes emerged which primarily identified concerns about an over reliance on working at Christmas, support for work at other times of the year, the need for effective planning of engineering work and the elimination of last minute changes. We also listened to comments about the relationship between the various parts of Network Rail's organisation, the relationship with suppliers and the relationship with operating companies.

6.2. Network Rail's obligations

To understand Network Rail's perspective on the review we revisited the purpose of our review, which is:

'To make recommendations on the best times of year to undertake major works on the rail network having regard to the trade-offs between reliable and predictable operation of train services and **efficient execution of necessary engineering work** (Emphasis added).

It is important to have regard to the final few words in this remit 'efficient execution of necessary engineering work'. Network Rail has an obligation to produce outputs in an efficient manner as determined by the ORR for Control Period 5. If Network Rail fails to produce the outputs or does so in an inefficient way it will have breached its obligations to the industry regulator.

It is, therefore, not in Network Rail's power to either arbitrarily reduce the amount of work it is going to do or to spend more money to achieve those outputs. Therefore, whilst the company is under an expectation to ensure reliable and predictable operation of train services it may not ignore its other obligations in order to do so. Amongst these other obligations is to reduce the amount of disruption that is caused to passenger and freight operators by the engineering work that it undertakes. Therefore, if Network Rail seeks to achieve its objectives by creating more disruption

it will fail regulatory targets. Conversely, it may be that the best overall delivery option for the industry results in relatively expensive delivery methods that result in higher unit construction costs. It is important that ORR recognises this in evaluating the efficiency of Network Rail's unit rates. Balancing these sometimes conflicting targets is a challenge for the company.

6.3. The Contractors' View

The engineering contractors have a general concern about the profile of work on the GB rail network. The back-end loading of work during the current Control Period has been exacerbated by a slower than expected start in CP5. As a consequence the number of contracting staff has been reduced, which in turn reduces the industry's ability to cope with the seasonal peak load driven by the current pattern of major works. They noted a recent trend for more contingency to be injected into work such as a demand that contractors provide additional equipment and staff on site. They also reported instances of planned work being cut short with the consequential elongation of overall programmes.

The contractors said that well-planned work is delivered on time and on budget. In contrast work that is subject to constant churn and last minute changes is at increased risk of overrun and overspend. Poor planning may be evidenced by late notice changes to the scope of work or the provision of incorrect equipment or materials.

In relation to the specific issue of the timing of major works the contractors' view is that if the rail industry were able to spread the opportunities for carrying out major works throughout the year rather than primarily at Christmas/New Year and Easter then the following benefits would be obtained:

- The load on the supply chain and the planning and logistics teams within Network Rail would be spread out, producing a more even workload and thus reducing the risk of errors caused by focusing on a single delivery date for the whole industry;
- A level workload throughout the year can be delivered less expensively than one that fluctuates. This would provide an opportunity for Network Rail to produce major enhancements and other work more efficiently;
- An even spread of work would create the incentive for the supply chain to employ people directly rather than through agencies. At present the peaks of activity mean that some labour has to be sourced externally as it would be uneconomic for contractors to retain staff when work is unavailable. It was noted, however, that construction work, whether on building sites or on other transport modes, ceases at Christmas and thus releases temporary labour for

use on the railways' Christmas programme. This labour would not be available at other times of the year;

- Creating high peak demand for staff leads to the payment of premium rates, bonuses and compensatory time off. Whilst there was no suggestion that Christmas working should not attract such premiums it was noted that spreading workload would reduce the number of incidents of such payments; and
- The contractors are conscious of human factor issues and believe that carrying out work at various points throughout the year would allow a better focus on adequate breaks and time away from work. The likelihood of staff being at home with the family at Christmas and not available to attend site would be reduced markedly.

The use and availability of equipment such as cranes, Road-Rail vehicles and tampers is also impacted by the seasonal nature of engineering work. The review team was advised that the existence of high peak demands for equipment led to a combination of premium hire rates, the loss of equipment to high profile jobs or the use of sub-optimal machinery.

Major (and other) works on the railway all contain a level of contingency. This may be an equipment contingency where additional resources are provided in case of a breakdown or a labour contingency in case staff are not available for work or the need for additional work is identified during the possession. There may be a financial contingency in either the cost of the overall project or in the suppliers' rates to cover for unexpected costs and there may be a time contingency to allow for unforeseen events. The contractors felt that the greater certainty of employing the right staff and the right equipment being guaranteed for work would reduce the level of contingency thereby providing more efficient and reliable delivery. Reducing the cost of contingency is a work stream within the RDG's Asset, Programme and Supply Chain Management working group, which is focusing on improving the contractual relationships between Network Rail and its suppliers.

The contractors recognise that external events may sometimes cause priorities to change and even in the best planned environment there may be a need to cancel or cut short work at short notice. However, the contractors feel that there would be significant improvement in an environment of effective planning and workload decision making, especially with regard to the pre-work Go/No go meetings. People would feel under less pressure to push a job to Go status when they have doubts because they would know that in a better planned environment they would not have to wait a year (or longer) until the next opportunity to deliver it.

The contractors also flagged a number of other issues:

- They felt that if major works were undertaken throughout the year it would be less likely that the jobs would require the taking out of service of a number of key locations at the same time;
- Effective possessions require disciplined operation from the entire railway community. Late running last trains can make significant inroads into possession time; and
- Working is more productive in natural light.

In summary the contractors see a number of advantages from spreading the workload (including major works) throughout the year. Whilst they believe that there will always be a need for work at Christmas they felt that undertaking more work at other times would be more productive and more efficient than the current arrangements. They identified good planning as critical to delivery and expressed the view that this was not always apparent.

6.4. The timing of Engineering Work

6.4.1. The seasonality of engineering work

Our discussions with Network Rail and other industry parties focused on the best time of year to undertake major works – as required by our remit. We heard views for and against Christmas as well as the advantages and disadvantages of other times of the year.

Our interviews also covered other options around the best time to do engineering work from major blockades through weekends to extended midweek nights.

6.4.2. Disadvantages of Christmas work

Commenting on the disadvantages of undertaking major works at Christmas interviewees from Network Rail and the supply industry highlighted the sub-optimal effect of working in poorer weather and reduced daylight hours. We were advised that the peak demand at Christmas placed extra pressure on key physical resources within Network Rail's and contractors' supply chains, causing labour costs to be approximately double the normal rate plus a bonus and time off in lieu. In addition some specialist plant hire may also attract a premium at Christmas. Concern was expressed about the continuing long term strain that Christmas working puts on some key human resources within the industry such as signal testers and Overhead Electrification staff. Comments were also made about the difficulties in implementing contingency plans during holidays when the majority of the nation is away from work.

The high demand for resources during the Christmas peak means that in some cases they have to be rationed and allocated to work that was part of a larger programme and where failure to do the work would put the whole timetable at risk. As a result projects such as Western route enhancement, Crossrail and Thameslink would receive resources whilst standalone smaller jobs such as track renewals would have to utilise fewer or sub-optimal resources. In some cases long-planned jobs would have to be cancelled.

There was a recognition that customer expectations may be changing with additional leisure travel and Boxing Day shopping creating a demand for Christmas train services. The day after Boxing Day was acknowledged as one of the busiest in the Christmas period for rail travel (although still less busy than an equivalent day at other times of the year). There was also a perception that the passenger mix at Christmas was different at other times of the year with a higher proportion of old and young passengers who are unfamiliar with the railway and less capable at coping with modal transfer during disruption. That said, our high-level research suggests that the number of elderly passengers is about half of those travelling after the August bank Holiday.

Other issues mentioned by Network Rail interviewees were the pressure from other modes, such as London Underground and airports, to provide a multi modal service and the impact of comparisons with the Highways Agency, which reduces road works at Christmas. It was also noted that major changes to the railway timetable take place in mid-December and are still bedding down at Christmas.

6.4.3. Advantages of spreading the workload

Network Rail and supply industry interviewees expressed support for spreading major works across the year. The load on the supply chain and the planning and logistics teams within Network Rail would be spread out and it was felt that a level workload throughout the year would be delivered less expensively than one that fluctuates to extremes. In part this would be because the supply chain would be more able to utilise direct employees rather than using agency staff with a consequential benefit to both the quality of work delivered and the safety of the operation. Carrying out work at various points throughout the year allows the supply chain and Network Rail to ensure that there is adequate management attention to work.

An even workload would enable the supply chain to utilise their own equipment rather than hiring from agencies and with the right people and the right kit on site the level of contingency required could be reduced. If the work was spread out and planned properly then it would be less likely that the jobs would involve taking out of service a number of key locations at the same time. Strategic locations could be

blocked at separate times meaning that the opportunity to plan for contingency arrangements that would work would be much easier.

Despite these detailed concerns about Christmas operation, which were identified by Network Rail and other parts of the industry, we also heard alternative points of view expressed by Network Rail and others in the industry. These acknowledged that there were some issues that played out in favour of Christmas and against other times of the year.

6.4.4. The need for some work at Christmas

At Christmas the railway is closed completely for one day and, in the main, for two. This allows intrusive access to the network for major engineering work, such as signalling commissioning, which requires rolling stock to be absent from parts of the network. Other types of work that require long blockades are major switch and crossing schemes, station rebuilding and major stage works on big projects.

Whilst rail travel is popular at Christmas passenger volumes are lower than the rest of the year. Freight volumes over the Christmas period are also lower than the rest of the year. In addition recovery day / days are available after Christmas, which may not be available if the day following engineering work is a normal working day.

6.4.5. Issues with undertaking work at other times of the year Easter

Easter provides greater opportunities to undertake major works than Christmas given that it always offers a four day low traffic period whereas Christmas may only provide two days if it falls midweek. However there are a number of issues to take into account with Easter:

- The railway is never closed completely at Easter so any major engineering work will disrupt travellers;
- The timing of Easter is not fixed – it occurs within a five week window and travel patterns will vary depending on whether it is an early or late holiday and how school holidays are timed as a result. People are less likely to take holidays when Easter is early but a very late Easter will see school holidays taken before Easter to preserve even term length;
- Maundy Thursday is one of the busiest days for rail travel in the year and therefore major works cannot start early. This contrast with Christmas where there is a perceptible drop off in commuter traffic in the two or three days before Christmas day;

- Good Friday is increasingly a normal working day in the retail sector with travel patterns and train services at Saturday levels;
- Major retail stores are obliged to be closed on Easter Sunday, which means that travel is lighter than normal Sundays; and
- Unlike Christmas the day following the bank holiday (Easter Tuesday) is a normal working day whereas the day following Boxing Day is still primarily for leisure travel.

Other times of the year have disadvantages for major works besides the high level of passenger and freight traffic.

Summer

Although traffic levels in late July and August are lower than other times of the year (other than Christmas) there is no reduction in service levels and holiday destinations may see additional services. School holidays still last for six weeks so there is no single week in July / August when traffic volumes drop to the levels seen at Christmas. In addition, there are human factor issues in scheduling engineering work at the other major time in the year besides Christmas when workers' families are at home. The difficulties in implementing contingency plans during holidays still apply and whilst easier than Christmas there are still resource constraints. The concerns about inexperienced travellers who do not cope well with disruption are also relevant at this time.

In addition, hot weather brings its own issues with certain types of engineering such as the need to de-stress rails.

Autumn

Freight traffic is at its peak from September to December and passenger volumes build up rapidly after the summer break. At times other than school holidays road transport is committed for timetabled services and school services reducing its availability for planned and unplanned disruption.

The high winds that can be experienced in the autumn make engineering work involving cranes a challenge whilst the leaf fall season diverts freight locomotives and drivers onto railhead treatment trains.

Winter

The issues relating to working in poor weather with limited daylight hours apply to the rest of winter as much as they do to Christmas. When temperatures fall below freezing some materials such as ballast may become frozen in wagons and difficult, if not impossible, to tip. If the ground is frozen it becomes difficult to excavate whilst very cold rails will need to be heated before installation to avoid subsequent expansion and distortion.

Spring

It might be thought that spring would be the best time to undertake major works given its comparatively benign weather and scattering of public holidays. We heard, however, that the strong focus on doing work in the first quarter of the calendar year, which is the last quarter of the railway financial year, sometimes left the work bank a little light in the spring. When combined with contractual changes taking place at the beginning of the financial year the result is that an otherwise suitable time for engineering work is underutilised.

6.5. Options for the timing of engineering work

Besides the different seasons of the year we also collected views on the best time to do engineering work including options such as blockades of seven days or longer, three / four day blocks, 54 hour possessions at a weekend, 29 hour possessions primarily on Sunday, extended midweek nights, ordinary midweek nights and day time.

At present the major blocks at Christmas and Easter contain a range of work. Some of this can be done only at these times whilst other work could be undertaken at weekends but is not done so because the amount of weekend access is limited or the need to add work to major possessions to improve the productivity of work.

At the other end of the spectrum we heard that daytime access to the railway is extremely limited because of the volume of traffic. Conventional methods of inspection mean that this work has to be done at other times.

If the industry were able to make greater use of extended midweek night access (having due regard for revenues generated by traffic that operates at night, especially freight) it would be possible to move some work undertaken at weekends into midweek nights. This would, in turn, free up weekends to do work that is currently being squeezed into the margins of long blockades. However, this will need to be balanced with the potential revenue gain from reducing weekend access, which has been a focus of APSCM work, particularly where it enables operators to run a credible Sunday service.

6.6. Recommendations for the timing of engineering work

We recommend that:

- The industry makes greater use of extended midweek nights allowing work to be moved from weekends into midweek nights;
- Work that is currently undertaken at Christmas, Easter and Bank Holidays because there is insufficient time at weekends can be moved to weekends

(subject to considering the impact on serving demand for passenger services at weekends);

- Christmas, Easter and Bank Holiday weekends should be used for work that requires the additional time available;
- Engineering work should be better planned and undertaken more efficiently. These issues are covered in subsequent chapters;
- Only when work has been reallocated, better planned and made more efficient should consideration be given to undertaking major works at other times of the year;
- Whilst work close to major cities may be possible at other times of the year, because of the availability of alternative transport modes, work within 50 miles of London will still need to be focused on Christmas because of the levels of passenger and freight traffic at other times of the year;
- Away from London and where fit-for-purpose diversionary routes are available disruptive work can be done at other times of the year providing notice of the work is communicated to passenger and freight customers significantly in advance of the work being done.

7. Compensation and incentives

7.1. Introduction

Engineering works on the railway, especially major works, can be extremely disruptive and may result in train services, passenger and freight, being delayed, diverted or cancelled. For the passenger alternative road transport may have to be provided whilst the freight customer may have to reduce the volume of goods transported because of restrictions on alternative routes.

In recognition of the impact that this disruption has on costs, short and long-term revenue, Network Rail pays compensation to passenger and freight operating companies. Given that the nature and level of compensation may affect operators' views on the best time to undertake major works the review team was asked:

'To consider incentives provided by the existing compensation schemes in relation to access and efficient engineering work'

7.2. Schedule 4 compensation

The contractual obligations relating to the payment of compensation are contained in confidential track access agreements between Network Rail and each operator. The principal compensation mechanism relating to disruptive possessions is in Schedule 4 of the track access agreement, which is known as Schedule 4 for short. This mechanism is designed to benefit taxpayers by de-risking assumptions made by franchise bidders about the impact of network availability on revenue and thus on the level of premium to be paid (or subsidy to be received) for the franchise.

Each franchised train operator has different payment rates which are calculated according to the potential revenue loss and value of travel time to an operator's customers. Franchised train operators pay a premium to Network Rail to entitle them to compensation – similar to an insurance premium. Different arrangements apply to freight and open access passenger operators. Compensation is set at a much lower level than for franchised passenger operators.

Compensation rates are approved by the ORR.

7.3. Key points on compensation

In considering the impact of compensation on access for engineering work a number of key points emerged:

- Schedule 4 compensation is not payable on Christmas Day or Boxing Day where there are no timetabled services;

- Possessions are divided into three categories (determined by length of time of the possession) with compensation levels being determined by the type of possession;
- The longer the possession the higher the level of compensation with very long possessions generating compensation for actual loss of revenue rather than on a predetermined formulaic basis;
- Compensation is reduced when early advice is provided to operators. If a possession is required at short notice or the characteristics of a possession that has already been advised are changed the level of compensation is increased;
- Compensation paid to a franchised passenger train operator that is in revenue support is passed through to the DfT; and
- Within Network Rail the cost of Schedule 4 payments lies with Infrastructure Projects.

Our discussions with passenger and freight train operators, Network Rail and other industry stakeholders combined with our own assessment brought a number of issues about the incentive regime to light.

Decisions by operators on whether or not to agree to engineering access are more influenced by the effect on their customers than the amount of compensation to be received. Where early advice is given of possessions the amount of compensation payable is reduced by 50%, which may not reflect the perceived loss of revenue or additional costs.

Passenger operators may be more willing to accept possessions where they receive compensation for actual revenue lost rather than a predetermined assessment of revenue impact. We found evidence of two operators that were willing to accept a week long possession in the summer. But in one case we reviewed Network Rail chose not to proceed with the long blockade in the summer in part because the level of compensation payments made alternative access options more cost effective. This suggests that any decisions on the 'best' time of year to do major works are influenced by the compensation payments to be paid.

Operators who choose not to pay access premiums and as a consequence receive little or no compensation have little motivation to agree to possessions. This may also be the case for those operators whose compensation is passed through to the DfT although the current round of franchising should eliminate operators in this position.

The significant reduction in compensation rates for early advice of possessions motivates Network Rail to request possessions early, sometimes before the work content is known. That said, the level of change and churn we have noted elsewhere

leads Network Rail to pay levels of compensation higher than would be the case if possessions were well-planned and fixed in advance of work.

The absence of services on Christmas and Boxing Day influences thinking about the timing of possessions and the trade-off between not causing any revenue loss (and hence having to make Schedule 4 payments) but incurring increased costs for Christmas working.

7.4. Incentives

The effectiveness of the compensation schemes in the industry has been reviewed a number of times since privatisation but our discussions with the industry leads us to conclude that the schemes discourage rather than encourage the level of engineering access necessary to renew and enhance the railway. The regimes also appear to contain some misaligned incentives:

- The absence of services, and therefore of Schedule 4 payments, on Christmas and Boxing Days incentivises Network Rail to maximise the amount of engineering work on those days, whether or not they are the most suitable for the work;
- The early advice discount factors encourage Network Rail to plan early but reduces the level of compensation to a level that discourages operators from agreeing to possessions;
- The requirement to provide an access premium in order to obtain Schedule 4 payments is an insurance premium that some operators choose not to have. This leaves them disincentivised to agree to engineering access irrespective of the time of year;
- The high compensation cost of late-notice changes should incentivise Network Rail to fix its work plans and possessions early and keep them fixed but this does not appear to be the case; and
- Long and disruptive possessions at times of the year other than Christmas are compensated at a level that is intended to reflect assumptions made about network availability and revenue generated from providing services but are not necessarily the optimal solution for the industry from an engineering efficiency point of view

We recommend that the Schedule 4 element of the industry's compensation mechanism should be reviewed by the RDG to see whether it can be better structured to encourage the granting of access to the network at times which both minimise disruption to passenger and freight customers and also maximise the

efficiency of engineering work. This review will need to include stakeholders with financial, regulatory and other interests in the outcome.

7.5. Schedule 8 compensation

In addition to the compensation provided under Schedule 4 there is also compensation payable when services are affected by unplanned disruption. This might arise from equipment failure, weather related problems or possessions that overrun and delay passenger and freight services. This type of compensation is governed by Schedule 8 of the track access agreements between Network Rail and operators and is known as Schedule 8 for short. As with Schedule 4, this mechanism is designed to benefit taxpayers, in this case by de-risking assumptions made by franchise bidders about the impact of possible unplanned disruption on revenue and thus on the level of premium to be paid (or subsidy to be received) for the franchise.

As we are focusing on the planning of engineering rather than the consequences of overruns, which have been reviewed by other studies and organisations, we have not considered Schedule 8 in depth. However, we have noted the following points.

- If a possession overruns, causes disruption and triggers Schedule 8 compensation then this is likely to be less after Christmas when fewer train services are planned to operate than other times of the year. An overrun on the day after Boxing Day, unacceptable though it may be as was seen at Christmas 2014, will not involve as much disruption to services and hence compensation as an overrun on the day after Easter Monday when a full service is operating for a normal level of commuter traffic; and
- The financial responsibility for Schedule 8 compensation within Network Rail rests with the Routes. Therefore the cost of possession overruns is in a different place to the organisation responsible for commissioning the work. Whilst this issue does not affect the timing of engineering work we believe this separation of cause and effect is worth reviewing.

8. Comparative cost of possessions

8.1. Introduction

The remit of the review team includes the requirement to look at the trade-offs between reliable and predictable operation of train services and the efficient execution of necessary engineering work. Given the emphasis on efficiency we considered whether the cost of engineering work at different times of the year would influence Network Rail, its suppliers and operators in the timing of work.

The cost of a piece of engineering work has many elements including:

- Planning;
- Design;
- Labour;
- Materials;
- Plant and machinery;
- Logistics (locomotives, drivers and wagons);
- Compensation for lost revenue;
- Compensation for additional costs; and
- Project management.

Numerous parties are involved and their contributions all have to be co-ordinated:

- Stakeholders that specify work;
- Network Rail;
- Design companies;
- Civil and Signal engineering companies;
- Providers of plant and machinery;
- Materials suppliers;
- Providers of labour; and
- Providers of logistics services.

Elsewhere in the report we have highlighted the views of the supply community that an even workload throughout the year and over the five years of the Control Period would enable them to reduce costs – a view echoed by Network Rail. Establishing the quantum of such a cost reduction is a complex exercise with a number of commercial and confidentiality issues but we understand that RDG’s APSCM working group is tackling this issue.

8.2. Modelling comparative possession costs

To gain an appreciation of the scale of difference in costs of undertaking engineering work at different times of the year we asked Cogitare to model the costs of undertaking the same type of engineering work at Christmas and in August, using the tool developed for the RDG’s APSCM working group and Network Rail to support the industry in deciding the best time to do engineering work. This tool, the Restrictions of Use Decision Support Tool, has been used to look at engineering work in Kent, between Newport and Shrewsbury, on the Chiltern route and electrification work between Patchway and Swansea. Cogitare has also developed a Track Renewal Optimisation Tool, which is used by a number of contractors.

We asked Cogitare to model the cost of a two day track renewal job on a main line close to a London terminal, which involved the replacement of four point ends in a crossover. The route chosen had a mix of long-distance and commuter services. It was neither the busiest route into London nor the quietest. The work would involve closing the route and passenger trains would not be able to operate. The modelling assumed that the maximum notice of the possession was provided to operators thus maximising the discount rate applicable to the payments to operators.

8.3. Comparing Christmas and other times of the year

Increased labour costs of the hypothetical possession meant that the cost of the engineering work was 47% higher at Christmas than in August. Whilst plant and material costs were similar (although we have heard that plant hire may attract a Christmas premium) labour costs incurred on Christmas and Boxing Day are three times the level of other times of the year. This means that whilst the labour costs of the hypothetical possession are 34% of the total cost in August (excluding compensation) they are 54% of the total cost at Christmas.

However, this apparent higher cost of engineering work at Christmas is completely reversed when compensation costs are taken into account. When compensation payments to the long-distance and commuter operator are included (which are payable in August but not at Christmas) the engineering work in August was found to cost 31% more than the engineering work at Christmas. Nearly half the cost of the August possession was caused by compensation payments.

Proportion of costs for a hypothetical possession at Christmas and August			
	Labour	Other construction costs	Compensation
August	17%	35%	48%
Christmas	54%	46%	0%

We should emphasise that this is a hypothetical example albeit using labour and construction costs that have been verified by engineering professionals as likely to be incurred on this type of possession. The Schedule 4 compensation payments have been calculated by looking at the individual trains and services that would have been affected by the possession.

We should also make the point that all the compensation costs have been loaded on to a single piece of engineering work. If other work sites were in place as part of the same blockade the compensation payments would be spread across the work sites reducing the differential between Christmas and August. That said, we have noted elsewhere that the proliferation of multiple worksites within a blockade, whilst possibly more efficient, increases delivery risk.

A further point is that if the engineering work had been on a route with lower traffic levels or away from the approaches to a major city terminal, the level of compensation would have been lower and the balance between Christmas and August would have been closer.

On the other hand the model assumed that the maximum discount was applicable to compensation payments because sufficient early advice of the possession had been given and no subsequent changes had been made. If the advice of the possession had been provided nearer to the work date or the nature of the original possession had changed since first advised the level of compensation would have increased and the differential between August and Christmas would have been greater. The differential would have further increased if a long blockade had been planned, which would have incurred payments for actual costs and revenue loss. It might be expected that this would be significantly higher in August (or any other time of the year) than Christmas.

We should also register that if scheduled services were to be introduced on Christmas Day and/or Boxing Day, such that compensation for access became payable, the differential between Christmas and the rest of the year might change significantly.

8.4. Blockades v weekends

We also sought views on the cost differences of doing work over longer weekends rather than a single blockade. Using data that had been assessed by the Industry

Access Programme we were advised that a long blockade offered the opportunity for up to 9% cost savings compared to weekends, whereas shorter (e.g. 'Sunday only') weekends were found to have the potential to increase costs by approximately 15%. Whilst this information is useful the effect of compensation payments could significantly affect the outcome depending on where the work was done and the effect on train services.

8.5. Comparative costs - Findings and recommendations

We must emphasise that this high-level exercise can only provide an indicative view of the comparative efficiency of doing work at Christmas and at other times of the year and a similarly high-level view of the efficiency of blockades against weekends and single days.

Given the importance of the need to understand the comparative costs and efficiencies of doing major works at different times of the year we recommend that the whole industry should do more detailed analysis on this issue.

Purely from an efficiency point of view our analysis points to the benefit of work being done at times of the year other than at Christmas. A hypothetical Christmas possession costs 47% more than an equivalent possession undertaken during the rest of the year. This view also holds good where traffic levels are low and compensation payments are only a small proportion of the overall cost of engineering work.

However, where traffic levels are high or work is close to a major city and therefore compensation is a high proportion of the cost of engineering work then there will be advantages from doing the work at Christmas.

We recommend that the industry should undertake significantly more analysis to inform itself, customers and stakeholders of the operational and efficiency trade-offs from doing work at different times of the year. The industry has the tools to do this work although at the current level of sophistication they are labour intensive. For the outputs to be useful all parts of the industry - Network Rail, operators and suppliers - will need to provide detailed information on costs and revenue. We believe that the outputs of this work should be transparent whilst recognising that a number of the inputs will be commercially confidential.

9. Earning the right to more access

9.1. Introduction

A constant theme in our discussions with Network Rail, suppliers, operators and stakeholders was the recognition that if more access is to be granted to undertake engineering work and that if that access is potentially disruptive then the industry must be able to demonstrate that the access is well planned and is being used efficiently. Irrespective of the time of year that major works are undertaken the industry must earn the right to disrupt the railway.

9.2. Planning engineering work

Paramount in the need to earn the right to disrupt the railway is the expectation that engineering work will be planned well and the churn and late changes that are currently observed in engineering planning are eliminated. Good planning has to be an objective for the industry irrespective of the time of year the work is done.

Engineering planning involves a range of industry players and historically there have been issues about engagement, late changes and poor communication that have adversely affected the planning and delivery of efficient engineering work.

The effect of late changes manifest themselves in many ways:

- Inadequate plant and machinery is available to do the work;
- Employed labour has to be supplemented by casual labour;
- Train services are disrupted;
- Possessions are completed far earlier than expected but train services are not planned to operate;
- The volume of planned work is not achieved requiring a further possession to complete the work; and
- Logistics services are unplanned or incorrectly timed.

Establishing an engineering planning system in which the industry has confidence is a precursor to any changes in the timing of major engineering works.

Before any engineering work happens on the railway an extensive planning programme is undertaken. In summary the elements of this programme are:

- Deciding the work that has to be undertaken. This may range from the replacement of rails, through renewal of points and crossings to major signalling replacement. Other work that has to be planned is civil engineering

work of various kinds including work on structures, cuttings and embankments;

- Identifying the machinery, materials and labour to undertake the work and how these will be conveyed to and from the engineering site;
- Agreeing with train operators when the work can be done especially when the volume, complexity and content of the work impinges on the advertised passenger and freight timetables; and
- Putting in place the arrangements for conveying passengers around the engineering work and / or diverting freight and passenger trains around the work.

9.3. The risk of overruns

The rail industry is fully aware that major overruns, which cause unplanned passenger disruption, should be avoided. The risk of overruns is expressed in the Delivering Work Within Possessions (DWWP) and is based on a number of parameters. The scheme includes the establishment of projects which receive significant attention. The Quantitative Scheduled Risk Assessment (QRSA) is a parameter within the DWWP that if the threshold is above 90% projects are normally executed.

Changed risk assessment during planning is a major factor which contributes to late cancellations and the de-scoping of projects. To avoid overruns altogether will drive up the costs of the industry as well as delaying the programme of works. The industry cannot afford to become more risk averse as a reaction to the Christmas 2014 overruns. We heard however many concerns across the industry that engineering projects have been de-scoped or cancelled since December. Such an approach would not be sustainable and will have implications for achieving the CP5 programme within time and budget

A way to reduce the risks of overruns is by planning for fewer projects at Christmas and Easter, as during these peak times the quality and availability of additionally needed staff is lower, and logistics are stretched as is management attention.

Establishing contingencies in case of major overruns is another essential element in the planning and execution of major works. To improve contingency planning, recommendations are offered as part of a separate study.

9.4. Rail Delivery Group initiatives

The RDG has commissioned a range of work to identify where the industry can work better together in a number of areas and disciplines. The Asset, Programme and

Supply Chain Management (APSCM) working group of RDG involves Network Rail, operators and the supply industry in looking at initiatives that will help the industry in being both more efficient and more customer-focused in areas such as engineering work. In particular it has looked at opportunities to reduce disruption whilst also improving the quality of access to undertake this work. We took a close interest in the work of the APSCM working group as we felt that it offered a number of ideas to make the planning and execution of engineering work more effective and thereby provide Network Rail with increased opportunities to work on the railway whilst reducing customer disruption.

To reflect the importance of the activities of the APSCM working group we recommend that the representation from Network Rail and the operating companies should be at the most senior level to ensure that the working group's recommendations are accepted and implemented by all industry players.

9.5. Industry Access Programme

The APSCM working group supports fully the Industry Access Programme (IAP) initiative, which looks to optimise engineering access taking into account varying types of work to be undertaken on the network. The IAP programme is in two phases. Phase 1 works within the existing timetabling and engineering planning rules to identify the best whole industry solution on the timing of engineering work. It takes into account the disruption to passengers and freight users, the resulting revenue effect, the cost of the engineering work and the compensation payments made to operators.

The IAP is seeking to introduce a standardised approach to engineering access planning:

The nine stages of the IAP process are:

- Review access requirements to deliver the engineering work bank;
- Collect data from Network Rail and operators, which will inform discussions about optimum access;
- Populate the decision support tools, which will provide information on the optimum whole industry basis work bank and access plan;
- Undertake a collaborative review of the results to agree the optimum access plan (this stage has been marked by challenges to the data and the outputs);
- Produce the preferred access option;
- Publish the Engineering Access Statement;

- Manage subsequent changes to the plan;
- Deliver the access and the associated engineering work; and
- Review whether the anticipated benefits have been achieved.

Phase 2 is looking at more radical options around the timetabling of railway services and seeks to avoid the chopping and changing caused by engineering work by creating a fixed timetable that incorporates both timetabled train services and predefined blocks of engineering work.

Initial studies and pilots under the IAP programme have demonstrated that co-operative working between train and freight operators and Network Rail, whether under the IAP programme or similar initiatives enhances access opportunities. We have noted with interest the greater use of extended weekday nights to undertake work on the track. By changing the timing of first and last trains on days of the week when they are less busy Network Rail and its contractors have been able to undertake more engineering work. In the case of Tonbridge to Hastings this approach enabled a significant backlog of maintenance to be cleared whilst on the Great Eastern Main Line it has allowed productive operation of the High Output Ballast Cleaner. We have noted, though, that the resourcing of engineering trains for extended week night work will need to take into account the overall workload of the freight operating companies.

The IAP is only one of many initiatives claiming the time of senior management in Network Rail and has received limited engagement from Train Operating Companies, with some notable exceptions. As a result the IAP has yet to be widely adopted by the industry. Without more active involvement and support from Network Rail's Routes, its Infrastructure Projects organisation, train and freight operators it is likely that the initiative will fail and that the historic silo approach to planning work will continue.

9.6. Engineering planning - recommendations

We recommend that the industry improves its engagement on IAP. We recommend that RDG Members should require Route Managing Directors, the Infrastructure Projects organisation and passenger and freight Managing Directors to take an active interest in the programme and agree a rolling programme of analysis for every route under their control.

We recognise that considerable analysis is required to establish the optimal possessions for a work bank and that the existing decision-support tools require considerable manual entry and manipulation. We have also heard concerns about the sensitivity and confidentiality of the revenue data required to support the model

but we believe that there is considerable merit from ensuring that the right work is done in the right possessions at the right time.

We recommend that the Decision Support Tools for the Industry Access Programme are reviewed and, if possible, simplified to make data entry and analysis easier.

Another example of inadequate planning is in the provision of engineering trains for engineering work. We understand that resourcing these trains is enabled through a mixture of rostered and voluntary work and requires the freight operating companies to balance competing demands for drivers' time. Engineering sites that are remote from centres of freight activity generate significant and unproductive travelling time and alternative ways of resourcing engineering trains should be considered. A further cause of inefficiency was the inability of the industry to timetable engineering trains to and from sites of work leaving their operation to best endeavours on the day. It is not clear that the importance of punctual operation of engineering trains is understood in all parts of Network Rail or in the wider industry. The resulting uncertainty around the delivery of new materials and the removal of spent material adds uncertainty and risk to engineering activities.

We recommend that the industry should give greater attention to the logistics of major works including the supply of key resources for the movement of materials and equipment.

10. Possession utilisation and efficiency

10.1. Introduction

If the rail industry is to justify the retiming of engineering work and the granting of additional access it will need to demonstrate to passengers, freight customers and the taxpayer that the time is being used effectively. We repeat the point that the industry has to earn the right to greater access to the network if passengers and freight customers are to be asked to accept planned travel disruption throughout the year. Regrettably, our discussions with Network Rail, its contractors and operators revealed wide-ranging concern that the amount of work done in possessions is sub-optimal.

The RDG's APSCM working group has put in place a work stream on possession utilisation with the objective of identifying ways in which the industry could work together to make possessions more efficient. The work stream has found that the time spent on productive working is between 30 and 40% in some possessions and occasionally even less. During our interviews we were advised of a number of reasons for low productivity, which bear out the findings of the APSCM work stream. Possession efficiency constraints include:

- The ways in which possessions were taken and given up;
- The procedures for turning off electricity in overhead lines or the third rail;
- Significant restrictions on the operation of the railway alongside possessions;
- Limited fitment of technology such as Bi-Directional signalling that would allow possessions and the operating railway to co-exist;
- Limited deployment of technology such as Bi-Directional signalling even when it is fitted;
- Contractual and management arrangements that drive the industry to inject surplus contingency into possessions in areas such as time, money, labour and plant;
- Multiple contractual interfaces in possessions;
- Short notice changes to the provision of materials and machinery with low-profile work such as track renewals losing out to high-profile enhancement projects;
- Widespread changes and churn during the planning of engineering work; and
- Late notice de-scoping and cancellation of engineering work.

In the light of these findings we recommend that the industry should place a much greater focus on improving possession utilisation and efficiency.

10.2. Studies of possession utilisation and efficiency

To inform this conclusion we reviewed recent work on possession utilisation and efficiency. There are numerous studies on the subject – perhaps suggesting that this is a difficult problem to solve – and we highlight the findings of some of the studies below.

10.3. Review of possessions by English, Welsh & Scottish Railway

Concerns about possession efficiency are not new. In 2007 UK rail freight operator English, Welsh & Scottish Railway (EWS) (now DB Schenker Rail UK) commissioned work from a Canadian expert who compared UK and North American practice in possession management. Among his conclusions were:

- Organisational structure and heavy reliance on contractors clouds accountability and complicates execution;
- Possession delivery involves nine or more different companies;
- Long time scale for planning possessions forces line managers to take a conservative view of asset life leading to premature renewal; and
- UK possessions are much longer time than North American practice for the same amount of work and use substantially more plant and machinery.

10.4. Rail Value for Money Study

The Rail Value for Money (RVfM) Study¹, chaired by Sir Roy McNulty, was published in May 2011. The Study considered a wide range of subjects in identifying opportunities to improve value for money in the GB rail industry. The management of possessions was included in the Study's work².

Among the comments regarding engineering work and possessions management were:

- '... there exists a great deal of frustration ... with the inefficient and disruptive manner in which railway engineering possessions are planned and managed. ... the current arrangements were seen by stakeholders as:

¹ Rail Value for Money Study, DfT and ORR, May 2011

² Ibid, Section 18.2

- inefficient, costly and risk-averse;
- good business for bus owners, not for rail operators;
- incentivised to shut the railway, rather than keep it open for normal business;
- anachronistic, in that journey patterns/society has changed, but railway engineers' activities and planners' thinking have not – Sundays and weekends are no longer the quiet periods of the week when people stay at home, they are now periods of major recreational activity;
- significantly worse in their execution than past arrangements (even pre-privatisation) when trains ran with less disruption when engineering works did happen; and
- A product of declining operational management skills and competencies that are becoming increasingly engineering led (the phase used by one stakeholder was that “more thinking was going into the pouring of concrete than running trains”).

Looking at best practice in other countries the RVfM Study commented

‘Other European countries have different approaches to the same issue:

‘In many countries infrastructure (particularly signalling) has been designed to facilitate works taking place during times of reduced train operation. This structural design approach at times of asset renewal pays dividends during the whole-life of an asset. However, even in Great Britain, where, for instance, Bi-Directional signalling has been provided to enable blocked lines to be avoided by using parallel tracks, such facilities are rarely used.

‘Risk is managed by proportionate management action rather than by cancelling trains and shutting routes. For instance, work sites close to running lines are protected by speed restrictions, modified hand signalling, single-line working (Bi-Directional management of trains manually over a single parallel line) or, as used to happen in Great Britain, trains are stopped and cautioned to protect the works.

“White Periods” are timetabled into the train plan to enable engineers’ access to the track during the middle of weekdays, for example, in France on the TGV routes out of Paris, where services are timetabled to create track access periods for their engineers as a standard practice. Although this is not an optimal solution, it is often a value for money alternative – particularly where, at present, high frequency services render work impossible on four-track sections of line during the day, despite the services running being largely

empty. A modified timetable during the middle of weekdays could allow White Periods with little negative effect upon passenger amenity on some routes in Great Britain.

'In some countries, system design allows for discrete diversionary routes that allow line closures for engineering works that minimise disruption. Sadly, such design has been either overlooked in Great Britain or removed under short-sighted rationalisation schemes. Freight operators, who would be the most affected by weekday night possessions, have stated their willingness to use alternative routes provided they are fit for purpose.'³

The RDG was created in response to the findings of the RVfM Study and its working groups and work streams reflect a number of the areas identified by the RVfM Study as offering opportunities for improving value for money. It is not clear to the review team whether the high-level engagement between industry parties, envisaged by the RVfM Study, in areas such as possession management has yet achieved its full potential.

10.5. Lloyd's Register review of Possession Management

In 2012 Lloyd's Register (Lloyd's) produced a Possession Management Review report⁴ for the ORR in connection with the 2013 Periodic Review. The report covered areas such as:

- Asset management / workbank planning;
- Timing of engineering work;
- Investment in maintainability;
- Policy;
- Possession booking / timetabling; and
- Possession management processes.

Lloyd's compared Network Rail with overseas comparators from Europe, North America, Australia and the Far East and highlighted a number of issues that have been echoed in the interviews that the review team has held with industry representatives.

³ Ibid

⁴ Possession Management Review for PR13 for Office of Rail Regulation, Final Report, 27 April 2012

On asset management / workbank planning Lloyd's found that there were 'inconsistencies in approach and differing timescales in planning processes'⁵.

On investment in maintainability Lloyd's highlighted the congested nature of the UK network and concluded that to achieve improved maintainability required:

'the creation of a core network capable of signalled Bi-Directional operation with new signalling and facing crossovers required to give this flexibility. Additional diversionary capability, with sufficient clearance for 9'6" containers on intermodal services, and with more capacity for berthing engineering trains near to worksites is required., with more flexible electrification systems, simpler isolation processes and better road access to main routes being an important part of the overall investment package'⁶.

Each of these points has been raised in one or more of the interviews conducted by the review team.

In its conclusions on contracting policy Lloyd's found that the effect of involving contractors at a late stage in the planning process had multiple negative outcomes. Our discussions with the industry, including Network Rail managers and contractors, brought the same issues to the fore. Lloyd's report stated that the negative outcomes included:

- 'Endemic late re-working of plans, with contractors requiring changes as they come on board.
- Multiple interfaces requiring co-ordination and re-planning sometimes until a few hours before work starts.
- Loss of "learning" between jobs, as frequent changes of contract and employment of casual labour to minimise first cost loses continuity over time.
- Lack of quality from a largely casual workforce, often not working full-time on rail work due to current emphasis on weekend working, with low skill levels requiring additional staff and producing low-quality outcomes and more prescriptive safety arrangements'⁷.

Turning to the booking of possessions Lloyd's noted the extremely long lead times (in contrast to comparator railways) for booking possessions driven, in part, by Network Rail's desire to reduce compensation payments. On possession start-up and hand-back Lloyd's concluded that whilst the difference in time was lower than previously thought

⁵ Ibid, Executive Summary

⁶ Ibid, Executive Summary

⁷ Ibid, Executive Summary

- ‘... the variability in times recorded for taking and handing back possessions is much greater in the UK than for Comparators. This has a variety of causes, including relatively low historic investment in creating an easy-to-maintain network, multiple organisations on site and a large, casualised workforce lacking familiarity with the rail environment. This results in an elongated planning timescale and start-up and handback processes which tend to take significantly longer and involve more people at all stages than equivalent processes overseas.’⁸

Finally, on the timing of engineering work, Lloyd’s did not comment on Christmas working but was critical of the focus on weekend possessions and the limited use of midweek nights commenting that:

- ‘This is driven by historical factors, and has become entrenched through the Schedule 5 access rights of TOCs and FOCs, which were set at privatisation in 1994 based on market and operational factors dating back decades in many instances’⁹
- Lloyd’s notes that overseas comparators use midweek timeslots ‘which are often lengthened far beyond those available to Network Rail by the use of worksites alongside running trains to allow core freight, passenger and empty-stock movements to continue during most engineering operations.’¹⁰

The review team found the Lloyd’s report a comprehensive summary of many of the issues relating to possession management and we recommend that the RDG should bring together industry players to consider how the industry could pursue the initiatives identified in the report.

10.6. Findings of the RDG’s possession utilisation work stream

In 2013 the RDG’s possession optimisation work stream commissioned a monitoring exercise of seven possessions on one route:

- Three possessions started late, the causes being signaller workload, late running trains and adjacent line blocks;
- Four of the possessions were given up two hours ahead of schedule; and
- The other three possessions were handed back with minor delays.

Analysis of other possessions, which were not regarded as unusual, identified instances where a possession was found to be light in content and additional work

⁸ Ibid, Executive Summary

⁹ Ibid, Executive Summary

¹⁰ Ibid, Executive Summary

was added at short notice. Whilst the additional work was completed the original purpose of the possession was not achieved as the requisite machinery was not available.

A major possession was found to have a planning error, which required a complete recasting of the work with possession and working limits amended and work cancelled. A further planning error was found on the night of the possession and all work was cancelled.

The RDG analysed the actual working practices in possessions and found that a typical member of staff would undertake the following schedule

22.00 - begin shift;

22.00 to 23.00 – collect equipment for the work and receive an initial briefing;

23.00 to 00.15 – drive to site, receive site briefing and gain familiarity with the working area;

00.15 to 00.50 / 01.30 – await the taking of the possession;

00.50 / 01.30 to 02.20 / 04.30 – work on site (significant variability in working time.

02.20 / 05.00 – return to depot / go straight home;

06.00 – shift ends

The RDG found that there were numerous initiatives being pursued by Network Rail but that implementation and adoption was slow.

10.7. Opportunities to improve possession utilisation and efficiency

Examples of productivity initiatives, some of which are considered elsewhere in this report, include:

- Industry access programme;
- Introduction of a Mobile Maintenance System;
- Introduction of Track Circuit Operating devices;
- Quicker overhead line isolations;
- Quicker third rail isolations;
- Bi-Directional signalling;
- Protection of possessions; and

- Adjacent Line Working.

The review team has asked interviewees about possession productivity and the following suggestions have emerged. We recognise that most of the suggestions have been under review for some time but we were surprised that progress was limited and in some cases, such as the approach to Adjacent Line Working, operations were now more restrictive than before despite the advent of modern communication and workforce protection techniques. It was not clear to us that these initiatives were being championed at the most senior industry levels, nor did we find that industry stakeholders were being educated on the benefits of these changes. One reason could be the absence of a possession productivity measure, which would form the baseline for assessing the impact of implementing each of the initiatives.

10.8. Protection of possessions

The use of flags and detonators to protect possession sites is an historic practice. It is a time consuming practice that relies on staff to walk a mile or more from the site of the possession to place very simplistic protection devices. The application of modern communications technology to protecting work sites will be safer and allow work to start more quickly.

One initiative for taking and giving up possessions is the Track Occupancy Permit (TOP) system that is in use in Canada and provides for possessions to be taken using phone / radio communication with the protection being provided by signals. The system was trialled in the UK but discontinued after the emergence of labour relations issues.

Network Rail is working with staff representatives to identify options for the use of technology in protecting possessions and we recommend that this work is accelerated.

10.9. Adjacent Line Working

The operation of service trains at the same time as engineering work is being undertaken is known as Adjacent Line Working (ALW). Train Operators are more likely to agree to a possession of the track if they can maintain services whereas a complete closure that prevents services running is likely to be resisted. As Lloyd's found, there are numerous examples in other countries of possessions being undertaken whilst trains continue to operate on adjacent lines. This was also a common method of working in the UK until recently. The safety issues with ALW are as much about possession machinery fouling the open line as it is about the risk to engineering staff from passing trains. The increasing use of all-purpose on-track

plant, which is not built specifically for rail use, creates a greater risk of fouling the adjacent line.

We were advised that studies by the ORR of incidents in Europe involving ALW decided that the implications or potential outcome of an incident occurring under ALW conditions should be classified as “catastrophic”. Given this classification, the previous requirement to do all that is “reasonably practicable” to prevent an occurrence or an incident under these circumstances no longer applied and the requirement to eliminate the risk came into play.

In the past contractors would have used speed restrictions, warning systems or fencing to mitigate the risk however, this new classification meant that the risk had to be eliminated completely and various measures such as the fitting of slew restrictors on all machines came into play. These restrictors could not be electronic ones as they might be overridden – so they had to be mechanical restrictors.

In conjunction with this initiative possessions are now being planned without any ALW to further mitigate the risk. The resulting restriction of access has caused operators to reject these access opportunities and the related possessions thus reducing the ability to undertake work on the network.

We heard concerns about lack of compliance, which discourages the industry from pursuing possession efficiency. If High Output equipment is operating on the two centre roads of a four-track railway (one road for operation; one road for clearance purposes) trains are permitted to run at line speed on the outside road adjacent to the one blocked for clearance purposes. On the outside road adjacent to the operating equipment trains are permitted to operate at 25mph. However, there have been numerous incidents of trains passing the site at speeds significantly in excess of 25mph.

Historically, trains would have been stopped at the signal preceding the site of work and instructed to pass the worksite at caution but this is now seen as detrimental to performance and the industry now relies on drivers to follow the speed restrictions published in the Weekly Operating Notice and in Late Notice cases.

Other approaches to controlling speed have yet to be implemented. The use of lineside speed indicators that flash when speeds are being exceeded (similar to the highways) has not received product approval whilst the use of temporary Train Protection and Warning System (TPWS) transponders is regarded as ‘an abuse of signalling technology’. Other issues for staff protection such as magnetic fencing have also been slow to be implemented.

We recommend that Network Rail, contractors, operators and the ORR should look closely at the rules, practices and issues regarding Adjacent Line Working and agree how it can be restored in a safe and effective manner.

10.10. Bi-Directional signalling

Compared to mainland Europe the British rail network is primarily signalled for trains to operate in a single direction on a specific track. In contrast mainland European networks are signalled so that trains can operate in either direction. This facility can be used when one line is blocked for planned or unplanned reasons and trains are able to pass the blockage in either direction without the need for special arrangements to be put in place.

The review team has also witnessed Bi-Directional signalling being used in Europe in normal operation to maintain traffic movements. This would be in a situation when there is more traffic to move in one direction than the other. Bi-Directional signalling allows trains travelling in the same direction to move in parallel at the full speed permitted on the route.

In Britain Bi-Directional signalling, or versions of it, are fitted on a number of routes such as the East Coast, Great Eastern and Midland Main Line. We found, however, that this capability was rarely exploited at times of disruption and hardly ever in times of normal operation. In part this is because in many areas the use of Bi-Directional signalling has to be pre-advised to staff. We also found that, like adjacent line working more generally, there was a reluctance to plan the use of a route's Bi-Directional capability during engineering work.

We recommend that the industry undertakes a comprehensive review of how it uses the Bi-Directional signalling capability installed on the British network and examines how it could be utilised to enable engineering work and train operations to co-exist.

We recommend that the industry considers the options for extending its Bi-Directional signalling capability taking into account how it is used on overseas railways.

10.11. Isolation of electric power

We were briefed on issues that influence the time taken to isolate the electrified overhead lines. Isolation has three stages:

1. Turning off the power;
2. Protecting (through earthing) against the power being incorrectly restored;
and
3. Protecting Against Induced Current.

The industry had chosen a resource intensive rather than technological solution to compliance and the multiplication of human resources and interfaces may be prone to error. We learned of one example of a recent isolation that required 360 earth wires to be put in position before the isolation was complete.

We were advised of the system of using a three position switch where position one is for electricity switched on, position two is for electricity switched off and position three is for electricity switched off and earthed. This is similar to the approach used on HS1. We understand that this may be an expensive system to retrofit but we would recommend a retrofitting programme to reduce the impact of isolation time on possessions.

In our discussions with the ORR we were advised that funding is available for Network Rail to implement speedier methods of isolating both overhead and 3rd rail electrification.

We understand that work is now underway to introduce a system of 3rd rail isolation but that there are issues with compliance with electricity at work regulations.

We recommend that the industry must devote resources to resolving compliance issues with 3rd rail and overhead isolations and implements rapidly its plans for quicker isolations of the overhead line and the 3rd rail. Lessons can be learnt from MTR, TfL and other electricity powered operators.

11. Minimising the effects of disruption

11.1. Introduction

If the industry does agree that more major works should be undertaken at times other than Christmas it will need to mitigate the potential disruption. A parallel report has been produced that looks at contingency planning in London¹¹.

A further element of planning is the use of diversionary routes to avoid disrupted parts of the network. We have concluded that greater attention should be given to the capacity and capability of diversionary routes, which may be a deciding factor for an operator in agreeing to network access. The industry should be planning to increase the capacity and capability of the diversionary or alternative routes to the principal arterial routes on the network.

11.2. Diversionary routes

The characteristics of a diversionary route include:

- Sufficient capacity to accommodate diverted and indigenous services. There may be circumstances where the best industry solution is to reduce the number of indigenous services to accommodate diverted trains;
- Capability. All routes have different characteristics: loading gauge, permitted axle weight, line speed, platform length and electrification are just some. The acceptability of a diversionary route will be influenced by whether an operator can run trains with the same characteristics as on the original route. One example is the ECML south of Peterborough where the diversionary route via Cambridge is not wired between Peterborough and Ely. Another is where a route cannot accept the same height and width of freight vehicles as the original route;
- The knowledge held by train drivers of the characteristics of the diversionary route. Where this knowledge is absent the route cannot be used or another driver (perhaps from a freight company) needs to be hired. Much of the industry's engineering happens at places remote from the road network resulting in trains being used to transport materials to and from site. We heard that there was a high demand for freight train drivers who will be used to drive:
 - Engineering trains;
 - Freight trains;

¹¹ London Termini Contingency Plans, PIMS Ltd, March 2015

- Freight trains diverted by engineering work, which tend to require additional driving hours as diversionary routes are longer; and
- Conduct passenger trains on diverted routes where the passenger driver is not trained to drive on that route.

At present the assessment of diversionary options appears to be a bespoke exercise for each significant blockade which creates a risk of late or inadequate consultation.

11.3. A strategic approach to diversions

We recommend that the industry, as part of its strategic planning process, should undertake an exercise to determine first and second level diversionary routes for each major route on the network, recognising that some diversionary routes may be under the control of a different Route Managing Director or where the principal passenger operator may be different from the original route.

A first level diversionary route will be one that has the same capability and operating characteristics as the original route. For example both routes are electrified or are cleared to the W10 loading gauge. A second level diversionary route will be one that still allows an operator to get from the origin to the destination point but does not have the same capability or has some other operating disadvantage such as the need for reversal.

The purpose of a national approach to diversionary routes is to allow the industry to identify where there are significant shortcomings in diversionary capability and therefore to begin the debate about investment in diversionary capability, ideally before the principal route is subject to blockades. We recommend that this should be a priority task for the RDG's Planning Oversight Group.

In our recommended categorisation of diversionary routes we do not include the issue of capacity. We recognise that the majority of arterial routes and their primary diversionary routes are already full. Whilst the strategic work described above should look at capacity enhancements as well as capability.

However, given that route upgrades, even for diversionary routes, may be a long-term solution we recommend that the approach to the capacity on alternative routes should be undertaken on a whole industry basis with the pain being shared rather than isolated.

Diversion over an alternative route whilst the principal route is blocked will have a negative impact on the operations of the diverted route.

We recommend that diverted trains should call at principal stations on the diverted route to mitigate the thinning out of the indigenous service that would be necessary to create capacity for the diverted services. Compensation would be payable to both

operators and revenue allocation rules would have to be reviewed but we see this as an option where all alternatives have been exhausted.

We offer two examples:

1. Diesel powered diverted west coast services can be diverted over the Chiltern route but would be required to stop at Princes Risborough and High Wycombe.
2. Diesel powered diverted east coast services can be diverted over the West Anglia route but would be obliged to call at Cambridge and Bishops Stortford to cover for thinned out West Anglia services.

Whilst the principal issues with diversionary routes are capacity and capability we also note that rolling stock limitations reduce the ability to divert – whether it is the availability of carriages given the extended journey times or the lack of diesel powered services for operating on non-electrified diversionary routes. We note that current rolling stock investment is likely to produce surplus diesel powered resources.

We recommend that these resources should be retained in warm store and made available for diversionary operations. Further consideration would be needed as to whether this stock was held by operators, Network Rail or funders. Whilst surplus stock may be at or beyond its expired life we believe that passengers would prefer to be conveyed on such stock rather than having to use road transport or not to travel at all.

Even if there is sufficient capacity and rolling stock the adequacy of a diversionary route may be determined by the capacity of the terminal station, especially in major cities. We are aware that the industry has provided temporary stations in emergency situations in the past and we are also aware of the host of building and safety regulations applying to such construction but we believe that this approach could provide the flexibility currently absent from the network.

We recommend that the industry should consider the creation of temporary stations to accommodate diverted services on major blockades.

12. Organising for success

12.1. Introduction

The cautious and inconsistent approach to possession management is reflective of a lack of shared knowledge in the industry. We were told of instances where the various parties involved in a possession did not have the same views as to what was operationally feasible. We were told that Bi-Directional signalling could have been implemented to allow possessions and operations to co-exist but a lack of planning confidence meant that these opportunities were missed. We were also told of occasions when Adjacent Line Working could have operated, albeit in more restrictive circumstances than in the past, but was not applied leading to access opportunities being missed.

We have also heard of examples of work being de-scoped or cancelled since the beginning of 2015 because of the risk of overruns. It is not yet clear whether these decisions will impact on Network Rail's efficiency and output targets for CP5 but we are concerned that the enhancement and upgrading of the network planned for CP5 could be undermined by emerging views on possession management. This led the review team to consider the issues of skills, competence and management in the industry.

12.2. Skills, competence and management

The issue of the competence of the staff involved in engineering work was raised by many interviewees. Elsewhere we have highlighted the benefits of a directly employed rather than a casual workforce, whilst recognising that the latter enables the industry to meet peak workloads. Concerns about the understanding of different parts of the industry or other's duties and responsibilities has been flagged a number of times, especially the lack of understanding of operating practices and procedures and how services may operate in degraded conditions.

We also heard that major projects provided stability of work and attracted high calibre staff whereas minor projects, such as track renewals, were multi-locational and less attractive to project management staff.

We were told of a number of examples of good and not so good communication between Network Rail, its contractors and train and freight operators. We also heard concerns about communication and co-operation between the various parts of Network Rail's organisation. Whilst Network Rail has devolved extensive responsibility to its Routes there is still a strong central control of Infrastructure Projects. Financial incentives appear to be fragmented with Infrastructure Projects funding possession compensation payments whilst Routes bear the cost of making payments for disruption caused by overruns.

Whilst it is not our role to review Network Rail's organisation structure we do recommend that ways to improve communication and co-operation between Infrastructure Projects and the Network Rail Routes should be treated with some urgency. We understand that Network Rail has been reviewing accountabilities within the devolved structure, in which IP is an internal supplier for the delivery of most major projects, whilst the Routes are the clients for all projects and responsible for the delivery of some projects. We recommend that this is communicated clearly to the rest of the industry. We also recommend that Network Rail reviews the operating knowledge of key individuals involved in project management and control positions.

12.3. The impact of the Christmas overruns on current work

During our discussions with Network Rail and operators there was a constant theme of the need for a stronger focus on avoiding overruns on all work, not just the high profile extended blockades. That said there was an acknowledgement that in exceptional circumstances brief overruns may be preferable to work being curtailed and a further disruptive possession having to be arranged. If a job is stopped to prevent an overrun a further possession will be required. If access is not available then the condition that required the possession in the first place will remain.

The industry cannot afford to become more risk averse. We heard however many concerns across the industry that engineering projects have been de-scoped or cancelled since December, as a reaction to the Christmas 2014 overruns. Such an approach would not be sustainable and will have implications for achieving the CP5 programme within time and budget.

We recommend that Network Rail makes a clear statement as to the action it is taking to reduce or avoid the risk of overruns and ensures that local staff are not taking a more conservative view of risk than that determined by the company's management.

12.4. The way ahead

Whilst our principal remit has to been to look at the timing of major engineering works it has become clear that one of the major reasons for the need for the quantum of possessions, whether at Christmas, Easter or any other time of the year, is that the time spent on productive work in a possession is far less than the time allowed. This inefficiency is now being exacerbated by decisions to de-scope and cancel work before or even during possessions.

Improved possession efficiency will not happen by itself – it needs resources to drive change in the industry and it needs funding to implement technological

improvements. It needs skills and knowledge to exploit the industry's current functionality and not to default to the lowest common denominator. It is important that the RDG's possession utilisation work stream secures senior level sponsorship from Network Rail and resources to undertake work.

But more than anything, if the industry is to agree to additional possessions to ensure the CP5 outputs, it needs the confidence to say what it is going to do, why it is going to do it and the benefits that will result for the passenger, freight customer and taxpayer. It is essential that the industry works together at the highest level to improve the ways it plans engineering access and secures possession efficiency.

Involvement at the highest level means engagement, support and funding from Network Rail's Executive Management Team and Route Managing Directors. It means involvement, support and funding from the Chief Executives of the passenger and freight owning groups and their operating company Managing Directors. It means the early involvement of senior managers from the supply industry.

Whilst this work is primarily for Network Rail, its suppliers and its customers to undertake there is a role for funders, stakeholders and regulators to ensure that the barriers to possession efficiency are the minimum necessary.

Without a focused and determined approach to the subject the industry will not improve its engineering access and possession management and any additional access for major works will fail to deliver the improvements and enhancement that the railway needs.

With a focused and determined approach the industry can have the self-confidence and also provide others with the confidence that the expansion and enhancement of the railway is in capable hands.

13. Appendices

13.1. Appendix A: List of Interviewees

Company	Name
London Travel Watch	Janet Cooke
Office of Rail Regulation	Alan Price (member of APSCM)
Office of Rail Regulation	Ian Prosser
Office of Rail Regulation	Joanne Whittington, Graham Richards
Passenger Focus	Guy Dangerfield
Rail Delivery Group	Members
Rail Delivery Group	Members of the Asset, Programme and Supply Chain Management (APSCM) Working Group

Train Operating Companies

Company	Name
Transport for London	Mike Brown
Abellio	Dominic Booth, Jan Chaudhry
Arriva	Chris Burchell
Chiltern Railways	Rob Brighthouse
East Coast (Directly Operated Railways)	Michael Holden
East Midlands Trains	David Horne
First Great Western	Mark Hopwood
First Great Western	Mike Hogg, Barry Milsom, Joanna Davey
First Transpenine Express	Nick Donovan
GTR	Dyan Crowther, Paul French
London Midlands	Patrick Verwer, Tom Joyner, Ollie Glover
MTR Crossrail	Steve Murphy (member of APSCM)
National Express	Andrew Chivers
Northern	Alex Hynes
Southeastern	David Statham, Richard Dean (member of APSCM)
Southwestern	Tim Shoveller, Samantha McCarthy, Dave Morris
Virgin Trains	Phil Bearpark

Freight Operating Companies

Company	Name
DB Schenker	Nigel Jones (member of APSCM), Nick Gibbons, Nigel Oatway
Freightliner	Lindsey Durham

Trade Unions

Company	Name
ASLEF	Mick Whelan
TSSA	Manuel Cortez

Suppliers

Company	Name
Amey	Simon Bunn (member of APSCM)
Babcock	Ron McAulay (member of APSCM)
Railway Industry Association	Jeremy Candfield (Member of APSCM)
National Rail Contractors Group	Members
Cogitare	Larry Fawkner

Network Rail

Company	Name
Network Rail	Mark Carne
Network Rail	Dominic Baldwin
Network Rail	Robbie Burns
Network Rail	Patrick Butcher
Network Rail	Jo Connaughton
Network Rail	Fiona Dolman (member of APSCM)
Network Rail	Nick Elliott
Network Rail	Andy Facer
Network Rail	Steve Featherstone
Network Rail	Paul Gilbert
Network Rail	Robin Gisby
Network Rail	Patrick Hallgate
Network Rail	Paul Hebditch
Network Rail	Phil Hufton
Network Rail	Neal Lawson (Member of APSCM)
Network Rail	Richard Lewis
Network Rail	Francis Paonessa
Network Rail	Paul Plummer
Network Rail	Richard Schofield
Network Rail	Allan Spence
Network Rail	Phil Verster
Network Rail	Gordon Williams

ProRail and SNCF

Company	Name
Jan Swier	ProRail
Robert Degenhart	ProRail
Jean Yves Fristot	SNCF
Jacques Berling	SNCF
Arnaud Manoury	SNCF
Vincent Maumy	SNCF

13.2. Appendix B - Terms of Reference

Planning and Timing of Engineering Works

Review

Terms of Reference

1. Purpose of Review

To make recommendations on the best times of year to undertake major works on the rail network having regard to the trade-offs between reliable and predictable operation of train services and efficient execution of necessary engineering work.

2. Commissioning and stakeholders

The report has been commissioned by the Secretary of State for Transport. The review will be sponsored by Network Rail but will fall under the responsibility of the RDG for their approval as to the recommendations and for publication.

Key stakeholders to this Review are: the DfT, Transport Scotland, Transport for London, RDG and the ORR.

Key consultees will include Passenger Focus and London Travelwatch.

3. Scope of the Review

(i) to consider the lessons learned from experience of Christmas 2014 and earlier major programmes of engineering work and their possessions, including those outside holiday periods.

(ii) to review experience and best practice in other countries.

(iii) to consider factors affecting the impact of engineering work on train service operations at different times of year.

(iv) to consider how major work can best be managed so as to limit impact on passenger and freight operations, whenever work is carried out, including risk analysis and contingency planning.

(v) to consider incentives provided by the existing compensation schemes in relation to access and efficient engineering work.

(vi) and to make recommendations.

4. Timing.

The review will commence on the 13th January 2015 and be completed by the end of March 2015.

5. Resources

- i. Sufficient expert resources will be made available to the team by Network Rail and the RDG working group on access.
- ii. A resource will be made available to make notes of the interviews and to draft the report.

6. Budget

The budget for the review will be made available by Network Rail