



Europe Economics

Availability Output Measure Review

Final report

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Europe Economics
Chancery House
53-64 Chancery Lane
London WC2A 1QU

Tel: (+44) (0) 20 7831 4717
Fax: (+44) (0) 20 7831 4515

www.europe-economics.com



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1 Introduction

This is Europe Economics' report to ORR for the availability output workstream. The aim of this work is to investigate the present situation with regard to network availability (i.e. in relation to the disruptive impact of engineering possessions) and assess the strengths and weaknesses of the current availability output measures and potential alternatives.

Network availability output is currently measured by the Possession Disruption Indices for passenger and freight (PDI-P and PDI-F respectively), which have been in place since CP4. There are a number of issues with these indices, in particular their inability to meaningfully reflect the disruption caused by possessions, their failure to influence Network Rail's behaviour, and IT problems with their calculation which would be costly to address. This suggests that the current availability output measure may not be fit for purpose.

However, it remains important for Network Rail (and the industry) to understand and consider the impact of engineering works on passengers and freight end users. In particular, as set out in the Scoping Document for this work, in this area more broadly ORR wants Network Rail to:

- Find a balance between the time that the network is available for customers (passenger and freight) while delivering the required maintenance, renewals and enhancements e.g. by finding the most efficient way of taking possessions, and the most effective timing for those possessions.
- Consider its role as system operator and understand and manage the impact of possessions on key passenger and freight flows (e.g. not shutting both East and West Coast mainlines simultaneously).
- Plan as far ahead as possible to enable customers (TOCs and FOCs) and end users (passenger and freight) to also plan ahead and mitigate the impact of the possessions.

To this end, ORR is investigating (within the wider context of PR18) whether an effective and consistent availability measure can be set for CP6 and, if so, what form this should take; and if not, what other safeguards should be in place to protect network availability. Reflecting the focus of PR18, it is recognised that decisions affecting availability of the network are taken at both route and system operator level. The research questions for this work are:

- Can an effective and consistent availability measure be set for CP6 which can achieve the above objectives?
- What are the main issues with PDI-P and PDI-F, and do the concerns with the measures suggest that they are not fit for purpose?
- If the measures are not fit for purpose:
 - Are there sufficient safeguards under current processes (such as Network Rail's Access Framework Principles) for operators and passengers/end users regarding network availability such that ORR can reduce its focus by not having a regulated output measure?
 - Are there suitable alternative options for measures (including those proposed by Network Rail)?

Based on ORR's objectives, we have developed the following criteria for evaluating availability options (including the current situation). This should:

- Incentivise Network Rail to find the most efficient way of taking possessions that minimises the impact on customers i.e. balancing customer need for network availability with the need to maintain, renew and enhance the network. In doing so, this should:
 - have a clear link to network availability;
 - take account of the impact of possessions on customers (e.g. some indication of the value of possession disruption, rather than just how many take place);
 - be passenger / end user focused – take account of wider network impacts (e.g. not closing substitute lines at once);
 - reflect the impact on both passenger and freight flows.
- Have a tangible operational impact – drive behaviour and have clear implications for what management actions are needed to maintain focus on availability.
- Avoid perverse incentives from Network Rail and operators.
- Incentivise Network Rail to carry out its system operator role effectively and plan as far ahead as possible.
- Encourage Network Rail to maintain a focus on availability.
- Result in implementation (including setting of baseline) which is not overly complex or costly.
- Align with / not distort, obstruct or duplicate existing incentives.

Our report addresses the research questions over the following sections:

- Section 2 analyses the current situation regarding the PDI-P and PDI-F measures, Network Rail's possession planning processes, and other checks and balances relating to network availability and the extent to which these have changed since PR13, to address the questions of whether a regulated availability output measure continues to be required. It also discusses the strengths and weaknesses of the current PDI measures.
- Based on the preceding analysis, Section 3 discusses options for regulating or monitoring network availability. For completeness, Section 3 also assesses the alternative measures proposed by Network Rail against the evaluation criteria reflecting the ORR's main objectives in this area.
- The Appendix sets out further details for topics discussed in the main report.

In conducting this work we have spoken with central Network Rail teams for access planning, possession indicator reporting and Schedule 4 management, as well as a Route access planning manager, and we have discussed the issues with the Industry Planning and Schedule 4 teams at ORR. We also draw on a small number of industry discussions with a commuter TOC, a long-distance TOC and a freight operator, and passenger input from London Travel Watch. The scale of this engagement (driven by the timescales for this work) precludes it being representative, but nevertheless provides valuable insights into the issues.

2 Assessment of Current Situation

2.1 Network Rail's possession planning processes

The PDI availability output measures were introduced for CP4 in the context of concern about the amount of possessions that were being undertaken in CP3 and the resultant increasing disruption to the passenger and freight end users. In its consultation on network availability and the seven day railway for PR08, ORR stated that *"it is widely recognised that too much of the railway is unavailable for traffic for too long as a result of engineering work. In recent years there has been a trend for the length of individual possessions to increase."*¹

Industry perceptions, to a large extent, (based on our discussions with customers and responses to ORR's consultations) are that Network Rail's current engineering and possession planning processes reflect a greater emphasis on ensuring that possessions are taken in an efficient way that minimises disruption to services. This is based on timely engagement with passenger and freight train operators, who have the necessary information about passenger flows and are well placed to identify the least disruptive possession plans and to challenge plans that have adverse impacts on network availability. Our conversations with Network Rail have identified the following relevant processes and principles surrounding what possessions it takes on the network and how:

- The general possession planning process and industry engagement.
- Access disputes.
- The Access Framework Principles.
- The Schedule 4 incentive regime.
- The volume incentive.
- Network Rail's Licence requirements to secure the operation, maintenance, renewal and enhancement of the network.

Network Rail considers that possession planning engagement with operators and Schedule 4 in particular provide protection to the end user that PDI was intended to address.

It is not clear at this stage if/how Network Rail's approach to possessions will change for CP6.

2.1.1 General possession planning process

Network Rail's possession planning forms part of the timetable development process set out in Part D of the Network Code.² Part D stipulates the processes and timeframes that Network Rail and other 'timetable participants' (e.g. train operators) must adhere to in consulting on and finalising decisions about track access and the associated train timetables. Network Rail develops its engineering plans

¹ ORR 2008 "PR08: Consultation on network availability and the seven day railway".

² Network Code:
<http://archive.nr.co.uk/browseDirectory.aspx?root=&dir=%5cnetwork%20code%5cNetwork%20Code%20and%20incorporated%20documents>

accordingly (principally through the Engineering Access Statement), and undertakes further industry consultation outside of its contractual obligations at various points in the planning process.

The various elements of the possession planning process, at a high level, are as follows:

- **Engineering Access Statement (EAS).** The EAS³ is developed by Network Rail and describes the rules regulating the arrangements for engineering access to the rail network. It sets out the location, number, date and duration of possession access required by Network Rail. The EAS is published annually and the process begins almost two years before the timetable comes into effect with informal interaction with train operators. The EAS consists of four versions, with v.1 formally published around 13 months before the relevant timetable begins. The final version (v.4) following all industry consultation and amendments is published around 5 months before the relevant timetable begins. During this period, operators can challenge, comment on or object to the plans, and raise formal Access Disputes at versions 2 and 4.
- **Key Network Code timetable deadlines.** The processes set out in Part D of the Network Code are very detailed and relate to all aspects of timetable planning, not just those related to engineering access. We highlight only the most relevant deadlines to illustrate the time-span of the possession planning process.⁴ The deadlines are represented as the number of weeks before the timetable change “D” (i.e. D-59 represents 59 weeks before the commencement of the timetable).⁵
 - D-64 to D-60 — Network Rail consults operators on its proposed changes to its Engineering Access Statement and the Timetable Planning Rules (collectively known as “the Rules”).⁶
 - D-59 — Network Rail publishes the draft Rules for consultation (corresponding to EAS v.1). Operators have one month to comment on or challenge the draft Rules.
 - D-44 — Network Rail publishes the final Rules (corresponding to EAS v.2). Operators can appeal within 15 days.
 - D-26 — Network Rail publishes the New Working Timetable (corresponding to EAS v.4). This takes into account all the engineering planning and industry consultation. Operators can appeal within 20 days.
 - Network Rail can make changes to engineering access plans after D-26, but these must be fully consulted on and must be finalised by D-12. Any changes after D-12 are subject to late notice possession conditions and compensation.

³ Formally known as the Rules of the Route (ROTR).

⁴ A more detailed timeline from Network Code Part D is included in the Appendix.

⁵ There are two timetable change dates per year, one in December (the Principal Change date) and one in May (the Subsidiary Change date). Each timetable period is discrete i.e. the process for the May change is happening alongside the process for the December change. However, the planning for the Principal change date (i.e. at D-59 for the December change date) must include engineering access plans for the whole year. Where D is the Subsidiary Change date the plans only pertain to the timetable period May-Dec and only include revisions that are not material or which were not reasonably foreseen when planning the December draft rules. Operators therefore have a chance to comment, at EAS v.1, on the proposed possessions for the whole year (Dec – May and May- Dec timetable periods).

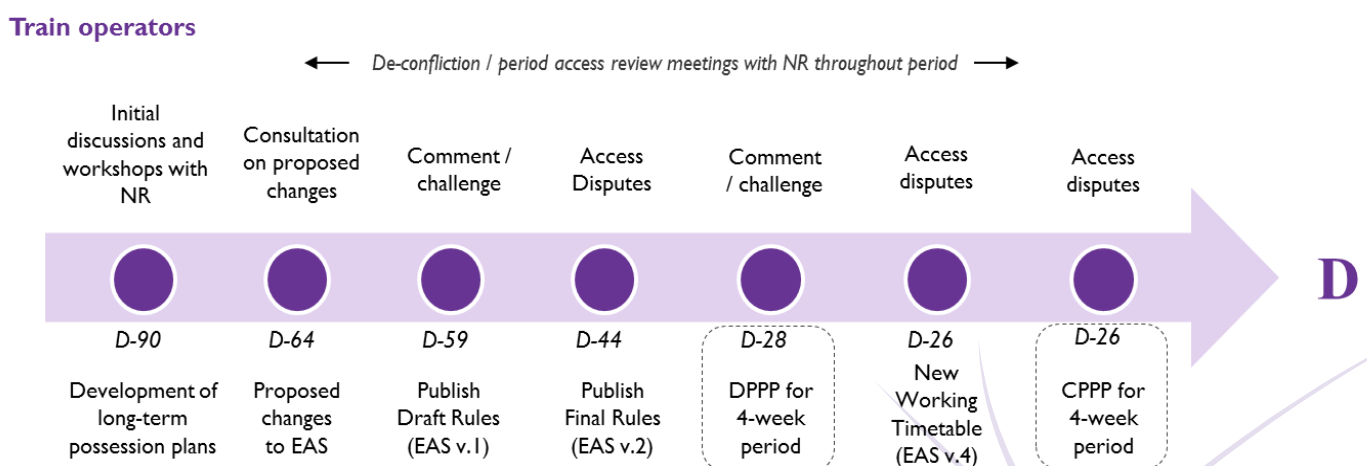
⁶ For substantial engineering access that will last for more than a year, Network Rail must consult on a Possession Strategy Proposal as early as D-90.

- Network Rail also publishes **Period Possession Plans** on a rolling 4-weekly basis, which contain a detailed programme of proposed engineering works covering a 4-weekly period, giving sufficient details of planned disruptive possessions to enable an assessment of train alterations to be made. This enables operators to assess how to deal with the disruption (or challenge the plans). The Draft plan (DPPP) is issued 28 weeks before the start of the 4 week period concerned. The Confirmed plan (CPPP) is issued 26 weeks before the start of the 4 week period. Operators can comment on and challenge the DPPP, and raise an Access Dispute if they still disagree with the CPPP.
- Throughout this time, and particularly in relation to the DPPP and CPPP, Network Rail will arrange “**de-confliction meetings**” for all affected operators at the route level.
- In addition to the industry engagement on the EAS and DPPP/CPPP at the route level, **additional consultation** with operators is held through the regular ‘period access review’ meetings and the national planning process.

The timing of the possession planning process

The timeline below is a high-level presentation of the engineering access planning process for a timetable change in December (D). It shows Network Rail’s planning and publication points at the bottom, and train operators’ engagement on the top, against the timeline.⁷ The purpose of this is to illustrate the length of time in advance of a timetable commencement that engineering planning takes place and when operator engagement begins.

Figure 2.1: Summary of Network Rail planning process for timetable start date “D”



Network Rail

Source: Europe Economics assessment of Network Code and Network Rail processes

⁷ Note that the DPPP and CPPP refer to the 4-week period beginning at “D”. Other DPPPs and CPPPs for previous 4-week periods would also be occurring during this timeline but we have excluded them for simplicity.

The Network Code also sets out the processes for timetable variations after 26 weeks before timetable commencement. The timing is now expressed in terms of Timetable Weeks (TW) rather than Date Change (D) as these processes refer to weekly timetables rather than the two main changes per year. Network Rail must consult with all affected parties on the details of the proposed possessions, and operators can dispute the final plans. Final details are published at TW-12, in line with the 'Informed Traveller' deadlines set out in the Code. Network Rail may only make variations to the timetable *after* TW-12 in situations where it is not reasonably practicable to do so earlier. The consultation and notification steps must take place as soon as reasonably practicable.

As shown in Figure 2.1, Network Rail is required to engage with train operators well in advance of the timetable in line with the Network Code. Operators have a number of opportunities to challenge the possession plans. In particular, the de-confliction meetings (which are held at the route level) involve the relevant passenger and freight operators for the route, and ensure that operators can flag any conflicts or unworkable possessions. This would include issues such as possessions at particularly busy times or dates (e.g. if coinciding with a particular event); the impact of the schedule of possessions, such as fewer, longer possessions versus a greater number of shorter possessions; and whether the possession plans would close a main route and a diversionary route at the same time. Operators also contribute by identifying alternative possession schedules or timings, where less disruptive alternatives are available.

As an example, a commuter TOC noted that it had successfully negotiated less disruptive possessions relating to large-scale work around a major London station by offering to end its services earlier in the evening to give Network Rail longer overnight access to the track.

This process appears to be fit for purpose and ensures that possessions take account of their impact on passenger and freight flows (for example not shutting main and diversionary routes simultaneously). It ensures that any planned possessions that are unnecessarily disruptive are identified and improved before the issuing of timetables. As discussed in Section 2.3, train operators can generally be considered a reasonable representative of end user demand (passengers and freight). They maintain pressure on Network Rail to consider network availability when planning the details of possessions, and to revise such details in the case of excessive disruption. Based on our discussions with industry and the responses to ORR consultations, operators appear generally happy with the process. (There are of course instances where operators do not agree with possession plans or feel that changes occur too close to the timetable date, but these must be balanced against the complex optimisation that needs to occur between the need for work to take place, compensation payments, engineering cost etc).

Local variations

Further meetings are held by many routes on a more regular basis (e.g. four-weekly 'period access reviews') to discuss various timescales — the agenda is usually driven by the stage in the planning cycle and the relevant upcoming publication. At the beginning stages of the planning process (e.g. between around TT-80 and TT-64) there is a very iterative process of discussing possessions with train operators.

Central guidance/control

Although access planning is devolved to routes, Network Rail retains some oversight at the system operator level through its '*national access maps*', regular internal route planning manager meetings, and external de-confliction meetings with operators as follows:

- National maps are created by the Central Access Team based on information from Route access managers to provide a national overview of all possessions for each week of the year, and are updated week by week.
- Regular internal national de-confliction meetings are held centrally involving all the Route planners to identify any conflicts and overlaps (including of diversionary routes), which are then resolved.
- National Operator Access Overview and De-confliction Workshops are then held with operators to further identify any national conflicts.
- Further coordination and central oversight is driven by the Access Framework Principles, which we consider later.

Possession planning in practice

Route-level example of the possession planning process

Our discussion with a Route Access Planning manager provides insight into the practical development of the annual possession plans (EAS). At a high level, this process consists of:

- Identifying the large maintenance weekend possessions that need to take place (this work being set out in advance) and plotting these on a timeline.
- Then identifying the large Bank Holiday work (requiring more than 2 days) and plotting these on the timeline, taking into account Bank Holiday events etc.
- Then fitting in the other, smaller possessions around these large ones.

The dates and timings of the possessions would be discussed and finalised with train operators through the DPPP and associated de-confliction meetings. These meetings focus on the combination of possessions that would work for all the operators. The operators do not have much input into the actual *volume* of possessions for the year, or what sort of work takes place within each possession.

According to the Route Planning Manager, planning around the efficiency of the possessions – i.e. how many to take over a period and how best to deliver these – largely involves experience, rather than specific planning tools. A particular challenge is to coordinate one set of possessions with other work that is happening in surrounding areas, or work that is planned for subsequent years, which is not directly under the control of that Route manager. This means that the best ways of delivering possessions (including combining them with others) is not always achieved. With the current process being done on an annual basis, there's a risk that work could be planned in one year that could have waited for the next year and fitted in with another possession planned for the same area. Improvements are being made, however, such as a recent tool from the (central) Infrastructure Planning office showing major possessions planned for the whole control period for each route and surrounding area. This should make it much easier for planners to align / merge possessions over a number of years, thus making more efficient use of them. This planning tool has been promised for the whole of CP6.

Although anecdotal, the above example suggests that currently the planning process may not be focused on making the most efficient use of possessions, and may lead to the overall volume of possessions being higher than it needs to be. A report for the Rail Delivery Group on the planning and timing of engineering works also identified a number of improvements that could be made to the efficiency and utilisation of possessions.⁸ However, reducing the number of possessions should be driven by the Schedule 4 incentive, whereby planners are incentivised to optimise the use of possessions (e.g. by using them for more than one type of work where this is efficient) in order to reduce the number of possessions and resulting S4 payments. We discuss Schedule 4 in the next section.

⁸ "Planning and Timing of Engineering Works on the GB Rail Network" An independent report for the Rail Delivery Group, May 2015.

Role of PDI

Our discussions with Network Rail confirmed that it does not take into account the PDI or the range of other possession indicators⁹ in its decision-making, and there is little understanding of how changes to the number / timing of possessions taken would impact on the PDI metric calculated. Network Rail considers that possession planning engagement with operators and Schedule 4 provide protection to the end user that PDI was intended to provide.

Some possession-related statistics are gathered at the route level, but this is not managed or monitored centrally. For example, the Route Planning Manager we spoke with said his route does collect statistics on the number of possessions taken within a year, how many were late-notice possessions, how many overran, and how many were cancelled (using a bespoke "Planning Portal"). The route reports these figures, but they do not feature systematically in the overall possession planning process (i.e. there is no focus on improving on the statistics year on year). Other routes are likely to gather similar information but this is not systematic across all routes.

This all indicates that Network Rail does not monitor possession disruption and its impact on end users in any formal or centralised way. It does not make use of the PDI or other reported possession indicators, and any route-level monitoring of possession use is localised. Network Rail is of the view that its current processes and other checks and balances (which we describe in this section 2) ensure that end-user impacts of its possession plans are taken into account.

Assessment of PDI

Network Rail has indicated that it does not take into account the PDI-P or PDI-F measures in its possession planning process. In the figure below we explore the strengths and weaknesses of the PDI measures, and assess whether these apply to both PDI-P and PDI-F.¹⁰ A description of the PDI calculations and input variables is included in the Appendix.

Figure 2.2: Strengths and weaknesses of the PDI measures

Strengths

PDI-P a conceptually broad measure of passenger disruption

PDI-P is a broad ranging metric that takes into account the key factors of passenger disruption, such as:

- the location and duration of possessions
- extended journey times and cancellation minutes (measured from a timetable containing no possessions)
- the average number of passengers affected by a possession disruption
- the economic value of time of different groups of passengers

⁹ I.e. as published in its Possession Indicator Report.

¹⁰ Our assessment is informed by our discussions with operators, Network Rail, the ORR and reference to documents on the issue.

Single output target comparable over time

The PDI-P and PDI-F are respectively single figures for Network Rail to deliver to and focus on. A single figure can also be easily compared over time and trends identified.

Data availability

The current PDI-P and PDI-F are calculated using data already collected for other parts of the business (e.g. for Schedule 4) and do not require ongoing bespoke data collection.

Regulatory focus

As a regulated output metric, the PDIs signal the importance of managing availability and the disruption to passengers and freight end users of engineering works.

Weaknesses

Complexity and opaqueness of the metric

Despite the fact that the PDI-P captures passenger disruption well at a conceptual level, a key problem for both Network Rail and industry is that it provides no practical information about which variables are driving its changes over time (e.g. extended journey times, number of passengers, time of day etc.), or at what rate. This means that simply looking at the index gives no information about where any problems are coming from and what management action Network Rail could take to address this. It does not provide information useful to possession planning (e.g. whether it is less disruptive to use fewer longer possessions or more shorter possessions, or the impact of a proposed possession strategy on the PDI to allow Network Rail to trade-off between network availability and engineering efficiency). It also means that adverse movements in the PDI can be due to exogenous factors (e.g. increased numbers of passengers) that are not related to the quality or efficiency of Network Rail's possessions planning processes.

PDI-F does not accurately measure disruption

Changes in the PDI-F also do little to inform possession planning. The PDI-F measures the impact of possessions on track availability, rather than service availability. It looks at the proportion of track unavailable, and then adds a freight traffic weight to estimate how much freight has been affected. This weighting takes an average volume across the day for a particular freight group to estimate the amount disrupted. This would not therefore capture the actual disruption, for example if a possession happened at the time when 80 per cent of the freight ran. The weightings are also out of date (baselined to 2007) and would need to be updated. The nature of freight traffic has changed significantly since then in terms of the timings and nature of services (e.g. coal transport has declined considerably, longer distance inter-modal flows are much more important etc.) and the weights do not reflect the freight that is actually running.

According to the freight operator to whom we spoke, operators are also far more concerned about service cancellations than disruption. Diversions and amendments can largely be handled with little adverse impact (although do have impacts on costs e.g. fuel, volume of freight etc.); cancellations affect the reliability and reputation of freight and have a large negative impact on competitiveness with road. As such, the PDI-F's reflection of disruption is further weakened: a long-term possession

could significantly drive up the metric but freight operators may have worked around this quite well, whereas a number for short-lived cancellations could do far more damage.

PDI-P does not fully capture passenger preferences

PDI-P is in general a better reflection of the impact of disruption than PDI-F, and incorporates a range of important elements of disruption. However, not all passenger preferences are captured by the metric. Notably, passengers' preference for remaining on trains (rather than going by replacement bus) is not accounted for by the metric. Longer travel times would negatively impact the measure, whereas in reality passengers may well prefer a longer journey whilst remaining on a train rather than a quicker replacement bus service. Similarly, the amount of disruption is considerably lessened with advance warning and communication, which is also not taken into account by the PDI measure.

Lag nature of the metric

PDI is a lag variable, with PDI-P being published one period in arrears after the possession disruption has taken place. Given the nature of the possession planning process, the most recently reported PDI reflects planning and decisions that occurred over a year previously (potentially up to 80 weeks). As shown in Figure 2.1 above, a PDI number driven by disruption after "D" would reflect planning that began at least at D-64. Similarly, any changes that could be made to the planning process as a result of PDI performance would only come into effect in the next planning phase, again potentially months in the future. Again in Figure 2.1, the Final Rules (EAS v.2) are published in D-44 and represent Network Rail's strategic planning process. Whilst subsequent changes can be made ahead of the timetable change, these are on the basis of iterative industry negotiations and reflect minor revisions rather than any strategic changes e.g. in response to a deteriorating PDI number. The same would be true for any metric capturing on-the-day disruption. (For this reason Network Rail maintains that its proactive approach to consulting on possessions is preferable, to identify significant disruptions well before the trains are due to run.)

A lag metric is less of an issue if the measure is simply to monitor performance over time, although even here the size of the lag means that it is less effective at influencing behaviour. It may be useful to identify long-term trends in disruption and use as a case for discussion with Network Rail about its overall planning strategy. However, for this purpose it may be less costly and as effective to monitor a simpler metric that is already collected and/or reported.

Lack of profile

While the PDI has been reported by Network Rail to ORR on a 4-weekly basis, alongside other measures of network availability (except when the measure was unavailable in 2015), it does not appear to have been regularly used by ORR (or other stakeholders) to challenge Network Rail over their possessions strategy or the availability of the network for users (possibly due to the complexities and difficulties with the measure noted in this section). This may have contributed to the measure having a low profile and prominence both at Network Rail and across the industry.

Lack of route focus

The NARS system was not designed to capture information for PDI at the route level, which further undermines its influence on possession planning as this is largely done at route level. Route-level

information for PDI-F was published, but this was only due to a model (with assumptions) of how freight is distributed across the routes and is not based on any route-level data on disruptions. To amend NARS to collect route-level data for both PDI-P and PDI-F would involve extensive system development, particularly for freight, as NARS was not designed to reflect geographic route boundaries but rather operational freight lines. Therefore PDI is not in line with the approach to route-based regulation proposed by ORR for CP6.

Other required changes to NARS

In addition to reconstructing NARS to reflect route-level disruption, there are a number of other amendments that would be needed to make any further PDI reports meaningful.

- Network Rail recognises the issue of outdated freight weightings in PDI-F and would seek to update these. Passenger flow and timing weightings would also need to be updated for PDI-P. These would all incur modelling and data costs as well as IT costs to amend NARS accordingly.
- There is an error in the calculation of the PDI-P (which has existed since it was created in 2009) relating to the periods covered by the calculation. It is not considered material as it affects both the target and the number, but Network Rail would seek to correct it if the measure was to be continued in CP6.¹¹
- The most significant amendment that is needed is to correct the PDI-P for changes in service groups following franchising re-mapping. Franchises have their own segments of track which are allocated separate weightings, and with the change in groups and names these weightings now misrepresent passenger flows.

Network Rail has provided a high level initial cost estimate to re-build the system of around £600,000 plus business change costs. No detailed cost estimates have been constructed at this stage, for example to reflect other desirable changes if this work were to enable a route level PDI.

The issues described explain why the PDI measures do not influence Network Rail management behaviour, namely that they do not accurately reflect disruption, are subject to measurement/calculation error, are not regularly challenged by ORR and are too opaque to identify what changes to possession planning are needed to influence them. This is further demonstrated by the fact that Network Rail's scorecards do not reflect PDI. The measure was unavailable for a period in 2015, and while Network Rail proactively identified this to ORR and operators, this did not appear to have a negative operational impact for any party.

2.1.2 Access disputes

In addition to the de-confliction meetings and challenges of access plans, train operators can also raise more formal access disputes at EAS v.2 and EAS v.4 (final / decision documents) and CPPP. Disputes are therefore raised well in advance of the timetable, as per the Network Code.

Access disputes are tabled by the operators with the Access Dispute Committee, and the routes concerned seek resolution with the operators. Often the disputes are tabled by operators as a holding objection pending more information from Network Rail (e.g. a capacity study to understand available

¹¹ See <https://www.networkrail.co.uk/wp-content/uploads/2017/02/Possession-Indicator-Report.pdf>, page 37

diversionary capacity or a full de-confliction of parallel routes), in order to meet the timescales in the Code, rather than because they feel they cannot resolve a matter. Only those disputes unable to be resolved become a formal dispute which is adjudicated by the Access Disputes Committee (either by an Access Dispute Adjudication or a Timetable panel, depending on the nature of the dispute). Network Rail centrally monitors all the tabled disputes on a monthly basis and tracks the resolution process with the routes. "Lessons learned" from disputes (in particular those that progress to a formal dispute) are fed back to route planners, but not on a systematic basis. Network Rail states that it tracks disputes over time and that there are planned corrective actions to address underlying trends. Network Rail is developing a Code of Practice to improve the process of dealing with Access Disputes (for example, systematically asking operators to close disputes when dealt with so that they do not remain open).

According to the freight operator to whom we spoke, the possession planning process works well, and it seldom needs to table an access dispute (around two a year). When such a dispute is raised, the operator is of the view that Network Rail is willing to resolve the problem and will find a solution, e.g. offer a diversionary route or alter the possession to enable the services to run. Alternatively, if no practical solution exists, resolution may be achieved through financial compensation. The long-distance operator noted that the timescales for access disputes can be a problem for them because if a dispute proceeds to a formal adjudication, the verdict (regardless of if they win or lose) can be given too close to the timetable commencement date to allow them to reasonably change their train schedules accordingly (i.e. if they had already booked a diversionary route in preparation, or if customers had not been able to buy advance tickets).

According to the Route Manager we spoke with, the number of access disputes has fallen significantly over the past 10 years, evidence in his view that Network Rail's access planning strategy has improved. The central team at Network Rail also suggested that it is now rare for a tabled dispute to escalate to a formal dispute.

2.1.3 Views on an availability output measure

Industry views

Through discussions with operators and a review of relevant consultation responses, we have obtained a small number of views regarding the regulated availability output measure for Network Rail. These views suggest that industry in general does not have significant concerns with the current situation regarding possession planning and availability. As set out in Section 2.3, we consider train operators to be a reasonable proxy in this area for passenger and freight end user demand.

The freight operator and commuter TOC to whom we spoke both suggested that the process for planning access, with industry engagement, was working well and that they had sufficient opportunity to input into the process and act as a safeguard against unreasonably disruptive possessions. The freight operator noted that Network Rail is always very willing to resolve access disputes and find less disruptive alternatives if possible. The TOC mentioned its frequent input on the possessions process (e.g. offering to end night services earlier to grant Network Rail access to the line in favour of taking access at other times). This is notwithstanding perceived areas for

improvement arising from our discussions, such as a more efficient and less disjointed use of possessions across the different Network Rail teams.

This point was picked up in our discussion with a long distance operator, which suggested that 'silos' within Network Rail (either between routes, or between different teams involved in overall possession planning) meant that efficient decisions were not always made: for example engineering planners not understanding the impact of their plans on Schedule 4 payments, and not communicating this with the Schedule 4 team. The long-distance operator also noted that it was not always satisfied with the outcome of challenges regarding disruptive possessions, and that the timescales surrounding access disputes (mentioned above) did not always provide the best outcome. This TOC did support the concept of an availability metric against which Network Rail could be held to account, but recognised that any metric could quickly become too complex the more detailed (and arguably, accurate) it became. It also considered that having a financial incentive attached to a metric would be needed for it to have any impact. In addition to any metric, the TOC strongly emphasised the need for coordinated processes in relation to possession planning to ensure that all involved parts of Network Rail understand the interdependencies and make the most of the information held by different parts.

The freight operator is of the view that although the current PDI measures do not have a practical role, the existence of a regulated availability output is likely to encourage Network Rail to facilitate the extensive industry engagement and its willingness to resolve disputes and planning challenges.

Responses to various consultations on availability outputs do not reflect notable concern. For example, for ORR's Working paper 4: Outputs Framework, out of 10 respondents 5 mentioned availability, but largely in a generic way ("availability continues to be important etc".) and none highlighted any specific issues with possessions or disruptions, whilst one (Freightliner) mentioned its largely positive experience with the availability planning process. Only three (Network Rail, the Rail Delivery Group (RDG) and Freightliner) specifically discussed the PDI measure itself and these comments were not supportive of continuation of the measure.

ORR's initial consultation for PR18 (May 2016) received 59 public responses, of which 9 mentioned disruption and availability relating to possessions. These again included general comments about the importance of network availability and minimising disruptions from engineering work. Two freight operators raised the concern about possessions mainly taking place at night, which is the most efficient time for freight services to run, and suggested the need for better monitoring of possessions to ensure that they are used efficiently. One freight operator thought that Network Rail could approach operators to discuss possessions further in advance; whilst another indicated that the possession planning process is fit for purpose. There were some comments in relation to Schedule 4 and how this could be improved to better reflect disruption e.g. in terms of costs to operators and having additional penalties for cancelling possessions at a late notice.

Passenger representatives

In our discussion with them, London Travel Watch suggested there could be greater passenger engagement at the early planning stages in relation to the structure and nature of disruptive possessions —engagement does occur at present with London Travel Watch, but on a more ad hoc basis — and that London Travel Watch in particular could be more usefully involved in the

diversionary route planning given its insights into how passengers move around London. London Travel Watch did recognise that Network Rail’s communication about engineering work has improved significantly over the years and that this is a key element in minimising the disruption experienced by passengers.

Transport Focus’ response to ORR’s initial consultation also emphasised that greater passenger engagement should be included in the possession planning processes which, in their opinion, do not adequately consider passenger impacts. They show that the way in which disruptions are handled (e.g. communicated well in advance) has a significant effect on passenger impacts, and therefore that incentivising more communication and engagement around engineering work will potentially improve passenger outcomes (although that passenger communication is typically the responsibility of the TOCs rather than Network Rail, as long as Network Rail provides the appropriate information to allow it to happen). Transport Focus did not discuss an *ex post* disruption measure like the PDI-P, but supported an output related to the planning process, such as the passenger engagement described.

2.1.4 Access Framework Principles and the Industry Access Programme

The Industry Access Programme (IAP) is a Network Rail funded and resourced initiative, which was supported by RDG and reported through the Asset, Programme and Supply Chain Management (APSCM) workstream. The programme aims to increase value for money and improve services for passengers by enabling Network Rail, operators and contractors to adopt a more collaborative approach when planning access for maintenance, renewals and enhancement work.¹² There are two phases to the IAP.

Industry Access Programme

“The **first phase** of IAP enhances the existing planning process through decision support tools and a new planning methodology for the industry: the IAP Nine Step Approach. The approach enables operators, contractors and Network Rail to make more informed decisions as part of the access planning process. It sees the industry working together to agree the best access option which balances the costs for maintenance, renewals and enhancement work with revenue and customer impact. For example, would longer midweek possessions cost less overall because fewer possessions are needed? Or would a summertime blockade cause less overall disruption?”

“The **second phase** of IAP is focusing more specifically on designing a new cross industry access and timetable planning process. This aims to reduce the risk of late changes to access and work not being completed in an allotted possession, meaning more access is needed to finish the work.”

Rail Delivery Group (2014) “Running a better railway”

¹² The RGD’s Asset, Programme and Supply Chain Management working group has developed a number of initiatives, including the IAP, focusing on how the industry’s asset management and planning of improvement work could be reformed to drive up efficiency and reduce costs.

The **first phase** was piloted in the South East route in 2013 and a number of tools were developed to cost possession disruptions and improve possession planning. These tools aim to enable better decisions based on understanding the impact (value) of different access options, and including these in a modelling process.

Under Phase 1 an approach was developed to measure the impact of access options on freight operators. Revenue proxies were developed for cancelled and amended freight services (for two kinds of freight, bulk and multi-customer (intermodal)). These were based on lost revenues and costs associated with cancellations and disruptions (on a liquidated damages basis) which the industry felt are more representative than the Schedule 4 compensation payments. The current figures are £13,500 and £6,000 for "multi-customer" (intermodal) and "bulk" services cancellations respectively, and approximately half that for amendments. These figures are for modelling purpose only and do not represent any compensation payments or actual charges.

The aim is to use these values, along with various access options (or 'windows'), to model the least costly possessions based on the freight flows. Freight operators would be sent various access options (start and end day and time) from the Network Rail route access planning team. The operator would then complete the impact data based on the number of services that would be disrupted in each window, and the agreed revenue proxies. This would then identify to Network Rail the least costly window for possessions, which would be incorporated into the wider industry planning strategy.

Phase 1 of the IAP was limited to the South East, and from our discussions with Network Rail there are no immediate plans to roll it out across other routes. Similarly, the planning tools have been left with the South East route and have not been made mandatory for other routes (a report for the RDG suggests a lack of resources and industry engagement as contributing factors to the limited roll-out.¹³). While self-regulation has developed an approach that appears to be working well in the South East, the lack of take-up across the different routes suggests that formalising the approach possibly as a regulatory requirement would be needed to ensure that it is disseminated to other routes. The revenue proxy developed as part of this process, however, may be an option for an alternative disruption measure, which we discussed in Section 3.

The **Access Framework Principles (AFP)** form part of Phase 2 of the IAP. The aim of the AFP is to facilitate better long-term planning of access through a set of pre-consulted access patterns and guidelines, with associated governance (i.e. the roles and responsibilities of access planners, works teams etc. required to deliver on the AFP). The access patterns and guidelines include input from operators, for example:

- Operator-specified access limitations.
- Preferred time and hours.
- Times of year to be avoided.
- Diversionary route information.
- Other key possessions (on other routes) that must be taken into account.

¹³ "Planning and Timing of Engineering Works on the GB Rail Network" An independent report for the Rail Delivery Group, May 2015.

The AFP guidelines specify the points during the planning process at which the planner must engage with the Principles, the processes for when planning is unlikely to be able to fit within the Principles, and terms of reference for the mandatory Periodic Access Planning Reviews with industry. The AFP are established independently of the engineering work plan and instead provide the starting point for access negotiations. The AFP aim to ensure proactive planning to minimise disruption ahead of industry engagement (i.e. rely less on the de-confliction meetings and challenges to highlight problems). A particular element of the AFP is to maintain passenger flows as much as possible by being aware of, and maintaining, diversionary routes when planning possessions.

The Access Frameworks Principles are intended to:

- Establish access principles which Network Rail and operators can plan work within before access has been requested and finalised.
- Incentivise advance planning within operators' preferred access options, minimising disruption and reducing the need to approach operators.
- Reduce assumptions around acceptable access, thereby reducing the potential of operators disputing the access.
- Increase the certainty of delivering the intended work by understanding the access constraints.

Route access managers will be required to take the AFP into account when planning possessions (although this is not mandatory across the routes). All AFP are to be crossed-checked at the SO level in Network Rail.

AFP have been developed and piloted for Wales, and are being used in the engineering access planning process. "Access Framework Principles Wales" sets out the diversionary routes and input from train operators. Other documents on how to use the AFP and how these should fit into the long-term planning process are also provided to the routes. AFPs have been developed for all routes but are not mandatory. In some cases where there is less close interaction between the Route and operators, the information about operators' most acceptable times and dates for access is at a higher level (e.g. based on past trends) and not as detailed as that set out in the Wales example. One long-distance operator commented to us that the access principles must be developed at a national level as well as a route level in order to take into account diversionary routes that cross borders. It also mentioned examples of blockades which did not appear to take into account sensible diversionary routes.

2.2 Other checks and balances

In addition to the access planning processes, there are existing incentives on Network Rail which play a role in ensuring possessions are undertaken in an efficient way, given required maintenance, renewal and enhancement work.

2.2.1 Schedule 4

Schedule 4 of the track access contracts between Network Rail and train operators sets out the arrangements for compensation paid to passenger and freight operators when Network Rail takes possession of the network. Payments cover possessions for maintenance, renewals and

enhancements (although the Access Charge Supplement is only based on maintenance and renewals estimates). For passenger operators, a baseline level of Schedule 4 compensation costs is forecast using assumptions of maintenance and renewals (M&R) volumes and costs, based on previous years' costs. Network Rail is then incentivised to efficiently outperform this value. We note that this baseline forecast considers the *volume* of work needed (i.e. the number of various M&R activities e.g. km of track to be replaced, tonnes of ballast to be renewed) and not the *number* or *length* of possessions required — this is decided later during the possession planning process.¹⁴ Passenger operators then pay the 'Access Charge Supplement' (ACS) which enables Network Rail to recover the baseline Schedule 4 compensation costs. Network Rail is entitled to a reduction in the amount of compensation it pays depending on how early it notifies passenger operators about possessions. Freight operators opt not to pay an ACS and instead freight compensation payments are covered by a funding grant.¹⁵

Currently only franchised passenger operators pay the ACS. Open-access operators choose not to pay the ACS and do not receive standard compensation payments; they can however claim compensation for severe disruptions.

There is therefore an incentive on Network Rail to minimise its Schedule 4 payments. This can be done in a number of ways, in particular:

- Using possessions as efficiently as possible to minimise the impact (e.g. undertaking more than one workstream on a single possession where possible, or combining possessions so as to reduce set-up / take-down time, or taking one longer possession instead two shorter ones, or vice versa) through appropriate coordination and planning.
- Planning the possessions to have the minimum impact on passenger and freight services (e.g. typically overnight and at week-ends and public holidays)
- Planning and notifying possessions as far as possible in advance to benefit from notification discounts.

The first element in particular speaks to a key element of possession disruption. If the Schedule 4 incentive is working properly, then Network Rail would be incentivised to optimise the impact of possessions, and thus minimise the disruption on passengers. Route access planners should, for example, weigh up the costs of using a possession for more than one activity (which can be more costly if teams need to work around each other, equipment must remain onsite for longer etc., but could provide other efficiencies) against the costs of additional Schedule 4 payments for more possessions or having longer possessions (which might impact on first/last trains) as opposed to multiple possessions.

Schedule 4 compensation payment estimates for enhancement work are not included in the ACS as these are recovered through the enhancement project costs. However, the incentive still remains on

¹⁴ The forecast methodology is based on the concept of a 'Schedule 4 unit cost'. This is the average Schedule 4 cost per unit of M&R activity – for example, the Schedule 4 cost per km of track renewed, or per signalling equivalent unit (SEU) of signalling renewed. These Schedule 4 unit costs, combined with the projected volumes of activity in CP5, form the basis of the Schedule 4 forecasts.

¹⁵ Details of the compensation payments are included in the Appendix.

Network Rail to use enhancement possessions efficiently so as to protect their individual budgets and make as few compensation payments as possible.

Risks

Whilst train operators can be considered a reasonable representative of passenger demand (see Section 2.3) and therefore should oppose additional / extended possessions where they can, such incentives for an operator at the end of its franchise may be much weaker. However, this may be mitigated if they are hoping to be re-awarded their franchise and the franchising authority (DfT or Transport Scotland) takes account of past performance in assessing new franchise bids.

It is also possible for the franchising authority to recognise the potential perverse incentives that arise at the end of a franchise for many of the TOC activities (not just possessions planning) and to adjust the incentives and requirements in the franchise agreement to address this. Further, regardless of the operators' strategy, the incentive to minimise payments is still relevant for Network Rail.

Effectiveness of Schedule 4

ORR's recent consultation on charges and incentives notes that its November 2015 letter revealed "a strong industry consensus that Schedule 4 is broadly effective at driving the right incentives and behaviours, but highlighted certain areas where improvements could be made."¹⁶ Following Network Rail's reclassification as a public sector body (in September 2014) and the restrictions on its ability to borrow from the government, there may be an increasing corporate focus on cash incentives as a driver of its business decisions, and thus on the role of Schedule 4 in possession planning.

2.2.2 Other incentives

The **volume incentive** also incentivises Network Rail to maximise passenger and freight volumes and thus minimise service cancellations through disruptive possessions. Similarly, the **performance regime and output benchmarks** would deter possible perverse incentives to maximise Schedule 4 profits through not undertaking all the forecast M&R work underpinning the ACS.

Finally, as discussed above, **train operators** are able to exert pressure on Network Rail to minimise disruption present in the detailed possession plans through the planning engagement process, the de-confliction meetings and the access disputes.

2.3 Passengers and freight end users

The sections above set out how the possession planning process and other checks and balances contribute to managing the disruption caused by possessions. In this section we draw out specifically how passengers and freight end users are represented.

¹⁶ <http://orr.gov.uk/rail/consultations/pr18-consultations/consultation-on-changes-to-charges-and-contractual-incentives>

2.3.1 Train operator influence

The possession planning process described above allows passenger and freight train operators significant input into the timing and nature of possessions, enabling them to identify and challenge particularly disruptive or conflicting plans. Passenger train operators can be considered a reasonable proxy for passenger interests such that the resulting plans largely reflect end-user preferences. Train operators have a strong incentive to maximise passenger revenues; they do this by providing a high quality service, of which minimising disruption and ensuring availability are key elements (if trains are cancelled or delayed due to possessions or passengers are forced to use bus replacement services there is a direct farebox impact).

Franchise agreements also include specific requirements for operators to minimise disruption to passengers wherever relevant, in response to both planned and unplanned disruption, through engagement with other operators and infrastructure managers.¹⁷ Franchise agreements also take into account performance against benchmarks for the National Rail Passenger Survey which includes indicators about train delays. As discussed in Section 2.2.1 above, there may be perverse incentives for train operators to pay less heed to passenger demand towards the end of their franchise agreements. This could be addressed by specific conditions of the franchise agreement on behaviour towards the end of the franchise; and past performance would still be relevant if the operator wished to renew its franchise.

In its response to ORR's initial PR18 consultation, Transport Focus put forward the view that there are indeed synergies between train operators and passengers in respect of engineering disruption, but that there is a risk that operators may be influenced by short-term commercial interests at the expense of passengers. Transport Focus cites the example that it may be easier / less costly for an operator to provide a rail replacement bus during engineering work, when passengers have a preference for the more complicated, and possibly more expensive, use of a diversionary rail route. Similarly, London Travel Watch indicated in its discussion with us that train operators are largely a good proxy for passenger demand, but that at the margin there could be decisions that suit the operators better than the passengers (for example agreeing to the early closure of a night service to facilitate engineering works being finished more quickly — the cost savings to the operator of not running trains plus the Schedule 4 compensation could outweigh the foregone revenue from passenger disruption, particularly on routes with season-ticket holders).

These are risks, but should be weighed against longer-term profit incentives and wider franchise agreements, as well as the overall complexity of planning possessions (such that it may not always be possible to meet passenger preferences).

Freight operators perhaps have clearer incentives to represent freight end-user needs when negotiating possessions, given the more direct relationship between revenues and the running of services. Our discussion with the freight operator also revealed the importance of effective competition with road, which is significantly undermined by service cancellations in particular.

¹⁷ See for example the franchise agreement for London and South Eastern:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/558065/red-lser-rail-franchise-agreement.pdf

2.3.2 Schedule 4 incentive

Network Rail has an incentive to plan possessions such that Schedule 4 compensation payments are minimised.¹⁸ These payments take account of passenger impacts in a number of ways:

- Through the foregone revenue element, which accounts for passengers being deterred from travelling as a result of disruptive possessions.
- The compensation also includes costs for rail replacement buses which represents impacts on passengers unable to continue their journeys via rail.
- The notification discounts which reduce compensation payments for possessions notified in advance take into account how delays impact on passenger behaviour (using the Passenger Demand Forecasting Handbook). ORR has a workstream to refine and update the notification discount factors based on more recent passenger demand forecasts.

The freight compensation payment is arguably less reflective of end-user impacts as the regime provides only cost compensation, and is based on set amounts depending on the notification period. However there is the possibility of compensation for actual losses for severe disruption.

2.4 Conclusions on the current situation

The possession disruption indices were introduced at a time when disruption from possessions was particularly high, stemming from Network Rail's overall engineering planning strategy. Perceptions of network availability have improved since then, reflected by the reduction in access disputes, the generally passive attitude of operators to ORR's recent consultations on the topic, and the absence of any availability target in the industry-led scorecards. It is our view that network availability is driven by the overall engineering planning strategy and as such any deficiencies that would result in significant availability problems would be apparent well in advance (although the final impact on passengers and freight end-users would further depend on the timing of the possessions and passenger/freight flows on the day). This is reinforced by the fact the industry does not monitor or respond to the current availability output measures, and they do not drive Network Rail's planning strategy.

There are two main elements to the disruptive impact of possessions, namely:

- The overall volume/number of possessions and the associated number of weeks of disruption.
- The time and date at which each possession is taken and the specific lines that are closed, which affects the number and types of passengers or freight services.

Ensuring that possessions are managed in the most efficient way possible, for example combining work where possible, planning well in advance so as to coordinate with subsequent years' work, and taking the optimal length of possession (i.e. fewer longer possessions or more, shorter ones), addresses the first element of disruption. These decisions are targeted by the [Schedule 4 incentive](#). Operators can also challenge the length and frequency of possessions through the industry engagement element of the possession planning process.

¹⁸ See the Appendix for the breakdown of the elements of the compensation payments.

Ensuring that the planned possessions are taken at a time and date that cause the least disruption to operators and obstruct the flow of passengers as little as possible (e.g. by not closing a main and diversionary route at the same time) is addressed through [extensive industry engagement](#) on the EAS and DPPP (through challenges, de-confliction meetings and access disputes), as well as the central national mapping team's internal and external de-confliction process. Further, the aim of the [Access Framework Principles](#) is to provide planners with this industry-led information at an earlier stage so as to embed it in the initial planning process. Whilst there are improvements that could be made at the margin to these processes, and examples of where operator input is not incorporated into final plans, the system as a whole appears to be fit for purpose.

Network Rail's planning process allows for unreasonably disruptive or conflicting possessions to be identified by operators (arguably well placed to understand passenger and freight flows and represent the interests of end-users) and rectified well in advance of trains running. Network Rail's long-term planning strategy has the benefit over any lag disruption metric in that it identifies a potential problem before it disrupts passenger access to the network; whereas any one-off large disruption would 'hit the news' long before it would be picked up by the metric. The cumulative effect of possessions, for example deterioration in availability, should be picked up through industry engagement (e.g. access disputes and complaints), although arguably not in the same consolidated way as an effective availability metric.

Schedule 4, in theory, places an incentive on Network Rail to not only plan for possessions well in advance and not change them, but also to minimise the impact of possessions (and thus disruption to services), for example by coordinating and consolidating different works within the same possession. If, until recently, the incentives from Schedule 4 have not deeply influenced the access planning process, this is a reflection on the structure and size of this incentive. It is unlikely that any availability output measure would achieve what a financial incentive has failed to.

Among the numerous shortcomings of the PDI-P is its inability to identify which variables are driving passenger disruption and what planning decisions need to be taken to alter this. Such decisions should be made at a higher strategic level in terms of how to manage possession planning, which already happens in Network Rail's processes (and indeed if there were any deficiencies these could be identified more readily through examining the processes rather than relying on a disruption measure). Similarly, PDI-F communicates little information about the actual disruption experienced by freight operators. A further issue is one of timing — draft engineering access plans reflecting prior consultation and planning are published around 13 months before the commencement of a timetable. Any problems identified through the PDI would refer to decisions taken up to a year previously, and it would be another year before anything could be done about this in the next planning cycle. The same could be said of any availability output metric measured *ex post*.

In our view an availability measure as an output may not be the most useful way to meet ORR's objectives for Network Rail's possession planning. Many of these objectives are already addressed by Network Rail processes and existing incentives, notably Schedule 4. Further, the largely effective network availability processes have continued in the face of claims from industry and Network Rail that the PDI measures are not taken into account and with the *de facto* absence of the measure when it was not calculated during 2015, which implies that it is not the output measure that has been driving Network Rail's performance in this area. We also do not think that any one metric would

adequately capture disruption in such a way as to be accurate, but at the same time simple and clear enough to understand the drivers of disruption and to inform planning decisions. In addition, given the highly complex optimisation problem involved in planning possessions, even if an effective availability output metric could be created there is a risk of unforeseen consequences, for example increasing costs of engineering work, or deterioration of network performance.

However, there are a number of reasons why a continued regulatory focus on availability as an issue would be appropriate. There appears to be little systematic monitoring/governance by Network Rail at a central level to ensure that the engineering access planning strategies are being complied with at the route level, or that there is a formal strategy to plan possessions as efficiently as possible (even given the Schedule 4 incentive) – although the introduction of a separately regulated National System Operator may provide more central focus in CP6. In addition, the Access Framework Principles, although very encouraging, are not mandatory across routes. Whilst passenger and freight end-users can be considered reasonably well accounted for in the current situation, this appears to occur organically through train operator engagement and the nature of other incentives, rather than being a conscious focus of Network Rail. Further, having a regulated availability output may signal to Network Rail the importance of availability and encourage it to continue in its positive approach with industry engagement and forward planning. The absence of regulatory focus may erode this good practice over time.

2.4.1 Assessment of the current situation against evaluation criteria

We have developed a set of evaluation criteria based on ORR's objectives for an availability option, as described in the Introduction to this report. By way of summary, we assess the extent to which the current situation (excluding PDI) meets these objectives.¹⁹

Incentivise Network Rail to find the most efficient way of taking possessions that minimises the impact on customers and end users i.e. balancing customer need for network availability and the need to maintain, renew and enhance the network. This includes having a clear link with network availability, taking account of both passenger and freight end-user impacts, and reflecting wider network flows (e.g. in relation to diversionary routes).

Through the Schedule 4 payment scheme Network Rail should be incentivised to make the most efficient use of possessions in carrying out engineering work. Minimising Schedule 4 payments would be done by optimising the possessions taken, for example through coordinating different types of work to make use of the same possession, closely matching work required to possessions booked etc. The strength of the Schedule 4 incentive appears to have been less significant in the past in driving efficiency in possession planning, although this appears to be improving since reclassification. However, if acting properly this incentive should achieve such efficiency.

The current process does focus on end-users and takes account of wider network flows. Network Rail's detailed operator engagement process and central mapping meetings would, once the number of possessions is optimised, provide the means by which the impact in terms of time, day and passenger/freight flows is minimised as operators comment on or dispute proposed possession

¹⁹ The PDI measures are assessed discretely in Section 3 along with proposed alternatives.

details. The Schedule 4 incentive also considers passenger impacts through its lost revenue compensation, and notification discounts which are based on passenger demand data. In addition, the Access Framework Principles are based on operators' consideration of passenger and end-users preferences (e.g. with respect to busy times, events, and important routes). Train operators can generally be considered a reasonably proxy for end users in this respect.

However, there appears to be little *formal* consideration within Network Rail of the impact of disruptive possessions on passengers and freight end-users, as this is not monitored and is dealt with organically as part of the operator engagement process and the Schedule 4 incentive.

Finally, Network Rail's Licence requirements as well as the output benchmarks ensure that the required engineering work is indeed carried out and does not suffer in the desire to minimise possessions.

Have a tangible operational impact – drive behaviour and have clear implications for what management actions are needed to maintain focus on availability.

The current possession planning process at the route level appears to be increasingly focused on possession efficiency as attention to Schedule 4 increases (in terms of minimising compensation payments) which is driving decision making. However, there does not appear to be systematic measurement of possession efficiency across Network Rail — further governance around this could help to ensure that the focus on efficiency is equally shared across the routes and continues in the future. That said, this seems to be the remit of the Schedule 4 incentive rather than an availability option.

The Access Framework Principles provide a good basis for more management-focused impact, by setting out planning principles specific to each route to be considered before the possession planning begins. Again, further governance around this could be needed to demonstrate compliance as the AFP are not mandatory across routes, and to ensure that principles are upheld at a national level as well.

The operator engagement does provide a more targeted focus on management activity as it is clear what needs to be done to address particularly disruptive possession plans.

Avoid perverse incentives on Network Rail and operators.

There is a risk that relying on Schedule 4 compensation payments and operator engagement does not completely reflect end-user demands. For example, passenger operators near the end of their franchise may not challenge Network Rail on the details of a disruptive possession that occurs after the end of their franchise. However, other operators on the same routes would minimise this impact, and the operator may wish to show good performance in order to be favourably considered in the refranchising process and, for the rest of the time, financial and management incentives on train operators are likely to ensure appropriate end-user attention.

Incentivise Network Rail to carry out its system operator role effectively and plan as far ahead as possible.

The Schedule 4 incentive should ensure that Network Rail plans its possessions, and any changes, as far in advance as possible. In addition, the AFP principles ensure that possession planning at the route

level takes into account diversionary route details to maintain passenger and freight flows, and Network Rail's current (central) national mapping overview and updates ensure that any related conflicts are identified and rectified well ahead of timetable commencement. The separate regulatory determination for the NSO in CP6 with separately monitored outputs and scorecard also focuses Network Rail on ensuring that its system operator role is carried out effectively.

Encourage Network Rail to maintain a focus on availability.

The current processes, although largely fit for purpose, do not appear to be part of a concerted focus on availability by Network Rail either centrally or at the route level. Certainly it is likely that the overall engineering planning strategy has developed in order to improve availability since CP3, but there is little in terms of monitoring progress and compliance.

Result in implementation (including setting of baseline) which is not overly complex or costly.

Not applicable to current situation.

Align with / not distort, obstruct or duplicate existing incentives.

Not applicable to current situation.

3 Development of Options

In this section we consider possible options for maintaining an appropriate level of focus on availability beyond the existing framework of Schedule 4, the Network Code processes and Network Rail's management initiatives.

We begin by considering options to address the gaps in the current situation where ORR's objectives are not fully met. For completeness, we then assess Network Rail's suggested alternatives against the evaluation criteria. Next steps with development of any options would also need to take account of value for money of each option, setting any development and operational costs against the benefits accrued to passengers and freight end users.

3.1 Suggested options for enhancing the current situation

As set out in Section 2, we are of the view that any measures proposed should complement the current situation and seek to address the gaps or risks that exist, rather than attempting to meet all the ORR's objectives within a single option. Based on the issues we identified above, we consider that an option to enhance the current situation and fulfil the evaluation criteria should:

- Maintain pressure / focus on availability as an important output and encourage Network Rail to continue with its proactive approach to planning and its willingness to work with operators to resolve conflicts. The option would thus rely on the existing processes but strengthen and encourage them to continue, perhaps including formalisation of the processes.
- Provide evidence that existing processes are being monitored in some way for compliance at the route level and that they come under Network Rail governance. This could potentially include analysis of the Schedule 4 incentives on the efficiency of possession planning, and adherence to the Access Framework Principles.
- Provide evidence that the current processes explicitly take into account passenger and end-user impacts.
- Possibly include a monitoring metric which is easily reported, to maintain regulatory pressure. The more timely the metric (e.g. reflecting elements of the planning process rather than *ex post* disruption) the better.
- Be something that ORR can easily monitor and challenge Network Rail on if necessary.

Option 1: Compliance monitoring

This option could entail Network Rail compiling a master document (or other means of achieving a similar effect, such as a decision tree) detailing all the elements of its processes that have an impact on availability (similar to what we have done at a high level in Section 2) and how these take account of passenger and freight end-user impacts. This would demonstrate that availability was a focus, and would make it clear to the routes how their actions contributed to this focus. It would also consolidate disparate areas within Network Rail that have an impact on availability (for example, the Infrastructure Planning team has developed a tool useful for planning possessions which the Access Planning team

do not appear to be aware of). The document would be held and monitored centrally by the NSO, but communicated to routes and other relevant planning teams, with specified review and update points. A condensed version could be reported to ORR along with a checklist or some explanation of how the various process elements are doing. A further step could then entail monitoring points against these elements to ensure that the various processes were being complied with (possible measurement metrics are set out at Option 2 below). For example:

- Ensuring that the AFPs are considered by all routes at the beginning of each planning period, perhaps on a 'comply or explain' basis.
- Demonstrating that routes are planning possessions with efficiency in mind (i.e. as they should be doing under the Schedule 4 incentive) potentially detailing planning tools used and identifying where routes need assistance.
- Demonstrating that operator engagement is happening and that operator input is effectively considered. This may require some external input (such as operator surveys, or an audit of access disputes) to prevent biased reporting by Network Rail or gaming by operators.

Option 2: Process metrics

Network Rail could record and analyse simple high level metrics to support the above compliance monitoring process. For example:

- Collect analysis from routes about the use of possessions, such as: number taken per year (possibly normalised by the value of work); the number of late notice possessions; the proportion cancelled or overrun; proportion of worksite not taken (e.g. incomplete use of a possession), the current working timetable measure (passenger and freight). According to our discussion with the Route Planning Manager, this information is available through its 'Planning Portal' but the extent to which this is done across the board is unknown. Rolling this out across routes may be costly. There may be other ways, e.g. as part of Schedule 4 optimisation, to track the efficiency of possession planning and other routes may collect other useful metrics.
- Further analysis of access dispute statistics. The central Network Rail team already tracks access disputes and follows up with operators about resolution with the routes, and this information could be collected and analysed over time to identify positive or negative trends in the number and nature of disputes. This would contribute to evidence of the functioning of the engagement process and also at a higher level of the overall possession planning strategy. Potential distortions and notable changes could be easily investigated, e.g. to prevent gaming from operators by not closing a dispute once it has been resolved, or to ascertain whether a dispute is the result of a once-off planning shortfall or represents a more systemic issue. The use of 'holding' disputes (which are tabled by operators for timing reasons rather than concerns of unresolvable issues) would also need to be considered such that these do not distort the picture.

Option 3: Disruption monitoring metrics.

Other monitoring metrics could be introduced. However, we emphasise our concerns with any *ex post* measurement of disruption in terms of it accurately capturing passenger and freight end-user disruption whilst being clear enough to inform management decisions; and the effectiveness in identifying and rectifying disruptions before they become an issue. Any disruption metric should at most be used as a high level, long-term proxy for availability, and in conjunction with the other

options, for example as a prompt for requiring more detailed information about Network Rail's current processes. Such a metric may also serve to highlight the focus on availability (if it was felt that the other options would not be as effective in doing so).

If such a metric were to be used, it should be based on data that are already collected so as to minimise additional costs. Options could include:

- For passengers, an unweighted measure of extended journey times or cancellation minutes from possessions, consolidated at the route level and sensibly normalised. This data is already collected for Schedule 4 compensation payments and considers disruption against a 'no restriction' baseline (see the Appendix), although some work may be needed for the route-level consolidation.
- A potential metric suggested by an operator could include a high-level categorisation of the routes using Network Rail's engineering-based categories (e.g. a category "1A" route represents a high-volume route with high-value passengers, a category "5" represents a much more rural route). The disruptive possessions could then be tracked on a category basis and a high-level value attached reflecting the average number of passengers and the economic value of the travel time.
- For freight, the number of cancellations (normalised), as cancellations appear to be the most disruptive to freight operators. This would need to be based against an appropriate timetable and may not consider amendments that have been 'baked in' to the timetable. (Cancellations and disruptions are recorded for the purpose of Schedule 4 payments, although cancellations are only recorded if they happen after the T-12 timetable, which is 12 weeks before the service is due to run.) However, if cancellations are indeed the most disruptive to freight operators this may still be an effective monitoring measure.
- For freight another possible measure could be one based on the revenue proxy developed for the IAP in the South East. This however is not currently collected and would entail recording of every freight service cancelled or disrupted, multiplied by the revenue proxy (which may be different for different freight commodities).

3.2 Assessment of other alternatives

Below is our assessment of the alternative availability metrics suggested by Network Rail. As we do not consider that any *ex post* disruption metric would answer the issued raised, this analysis is at a high level. Additionally, Network Rail has not progressed any of these further, including details of data availability.²⁰ We begin, for completeness, with an assessment of the current PDI measures. We also present a summary table of the alternatives using a high-level scoring mechanism.

²⁰ A more detailed assessment of three proposed alternatives to PDI was undertaken for ORR at PR13 (a comparison of the working timetable run on the day with a 'disruption-free' working timetable; a bus replacement metric; and a freight metric measuring the % of time that a route is open and available for use by freight trains). The report considered, among other things, how accurate the proposed input data are and the likely impacts of poor quality data. The report noted a number of difficulties present in the detail of the options such as how to capture the various inputs, which base timetables to use, and shortcomings in what the available data actually measure. This suggests similar issues would need to be overcome in the detail of these alternative options.

To recap, our evaluation criteria are as follows:

- Incentivise Network Rail to find the most efficient way of taking possessions that minimises the impact on customers i.e. balancing customer need for network availability and the need to maintain, renew and enhance the network.²¹
 - Has a clear link to network availability
 - Takes account of impact of possessions on customers (e.g. some indication of the value of possession disruption, rather than just how many take place)
 - Is customer / end user focused – takes account of wider network flows (e.g. not closing substitute lines at once)
 - Reflects impact on both passenger and freight
- Have a tangible operational impact – drive behaviour and have clear implications for what management actions are needed to maintain focus on availability.
- Avoid perverse incentives from Network Rail and operators.
- Incentivise Network Rail to carry out its system operator role effectively and plan as far ahead as possible.
- Encourage Network Rail to maintain a focus on availability.
- Result in implementation (including setting of baseline) which is not overly complex or costly.
- Align with / not distort, obstruct or duplicate existing incentives.

²¹ We note that our assessment of the alternative measures considers this criterion largely theoretically, based on the design of the measure rather than how Network Rail might implement it. The more practical elements of the measure are captured by the subsequent criteria.

Figure 3.1: Assessment of current PDI and alternative measures

PDI-P in present situation						
Efficient end-user focused possession taking	Drive management actions	Avoid perverse incentives	Support SO role	Encourage focus on availability	Minimise implementation cost	Does not overlap with existing incentives
<p>Has link with network availability in terms of when customers are most impacted by disruption. Accounts for impact of possessions on passengers in terms of the 'value' of disruption not just number of possessions (e.g. number of passengers affected, excess time and the value of that time). Weightings are outdated. Does not account for all passenger preferences (e.g. remaining on trains rather than buses even if extended journey time greater). Does not clearly take into account wider network flows (e.g. keeping main diversionary routes open).</p>	<p>The complexity of the calculation, the lack of information about what is driving the change in the number, and lag-nature vis a vis the planning process means little influence on management decisions. Lack of route-level index in particular prevents management decisions in devolved context.</p>	<p>No perverse incentives identified.</p>	<p>No. No way of flagging closures of main / diversionary routes. Does not take into account planning times.</p>	<p>Yes, by virtue of being reported as regulatory output. In reality very little impact: NR appears to have little <i>formalised</i> focus (e.g. through monitoring) on the impact of its possessions on passenger availability.</p>	<p>In present situation implementation costs are historic; some ongoing data collation/reporting costs.</p>	<p>Some overlap with Schedule 4 in terms of measuring the extent of disruption (some of same inputs are used). S4 should already account for efficient possession planning.</p>

PDI-F in present situation						
Efficient end-user focused possession taking	Drive management actions	Avoid perverse incentives	Support SO role	Encourage focus on availability	Minimise implementation cost	Does not overlap with existing incentives
<p>Has clear link with network availability.</p> <p>Seeks to account for the impact on freight end users, in terms of the volume of freight disrupted. However only aggregate volumes are captured which does not reflect actual disruption (e.g. no account taken of time of day when services run). Weightings are also outdated. Does not clearly take into account wider network flows.</p>	<p>The complexity of the calculation, the lack of information about what is driving the change in the number (in particular no information about the timing of possessions), and lag-nature vis a vis the planning process means little influence on management decisions.</p>	<p>No perverse incentives identified but rather, weak incentives on NR to consider the impact of the timing of possessions.</p>	<p>No. No way of flagging closures of main / diversionary routes. Does not take into account planning times.</p>	<p>Yes, by virtue of being reported as regulatory output. In reality very little impact: NR appears to have little <i>formalised</i> attention (e.g. monitoring) on the impact of its possessions on freight availability.</p>	<p>In present situation, implementation costs are historic; some ongoing data collation/reporting costs.</p>	<p>Some overlap with Schedule 4 which should already account for efficient possession planning.</p>

Continue with PDI-P and PDI-F but at a route level.
 This would entail rebuilding NARS to account for route-level inputs for both passenger and freight, and new data collection. Other NARS issues would also need to be addressed (e.g. the outdated weightings and incorrect period for calculation). Presumably the issue with the franchise re-mapping could be addressed during the route-level rebuild, although would most likely entail some cost over and above this.

Efficient end-user focused possession taking	Drive management actions	Avoid perverse incentives	Support SO role	Encourage focus on availability	Minimise implementation cost	Does not overlap with existing incentives
<p>Similar to current measures, although may reflect disruption more accurately if weightings improved.</p>	<p>Little difference over current PDI-P and PDI-F, although route focus may provide greater accountability. Usefulness of metric still subject to previous shortcomings.</p>	<p>No perverse incentives identified.</p>	<p>No. No way of flagging closures of main / diversionary routes. Does not take into account planning times.</p>	<p>Same as any metric would, by virtue of being reported as regulatory output. In reality very little impact.</p>	<p>High. Costs would include rebuilding system to account for routes and to correct for franchising change, plus data and consultant costs for updating weightings.</p>	<p>Some overlap with Schedule 4 in terms of measuring the extent of disruption (some of same inputs are used). S4 should already account for efficient possession planning.</p>

Possession disruption measure based on Schedule 4 data.						
This would be a simplified version of PDI-P using the schedule 4 data inputs but without adding further weightings. Sample data not provided by Network Rail; however if aligned to our suggested monitoring metric, data for passengers could include the NREJT or the WACM, with some sensible normalisation. Value of this data is that it captures changes from all possessions compared to a 'no restriction' baseline. Data for freight could include the number of services cancelled or amended.						
Efficient end-user focused possession taking	Drive management actions	Avoid perverse incentives	Support SO role	Encourage focus on availability	Minimise implementation cost	Does not overlap with existing incentives
Similar in many respects to current measure. Less reflective of the impact of passenger/freight disruption without weightings.	Simpler message in terms of how the metric reflects passenger /freight disruption, but less detail about the extent of impact without weightings. Behavioural impact similar to any ex post metric - largely useful for identifying long-term disruption trends to prompt further scrutiny of planning process, rather than directly driving management actions. Not related closely enough to the planning process to drive decisions.	No perverse incentives identified.	No. No way of flagging closures of main / diversionary routes. Does not take into account planning times.	Same as any metric would, by virtue of being reported as regulatory output. In reality very little impact.	Likely to be low, as data already collected for S4 on an operator basis, although reconfiguration to route-level needed. Potential difficulties in making measure public without sharing confidential operator data.	Likely overlap - if NR is focused on reducing S4 payments they would be focused on reducing these variables already.

Comparison of the Working Timetable (WTT) against the Actual timetable.

The WTT is that produced after the EAS negotiations and therefore includes many 'baked in' possessions. This would therefore only show short-term disruptions, which may be useful for short-term planning purposes. It is not clear *what* would be compared i.e. cancellations or extended journey time. No obvious benefit over and above the S4 metrics of NREJT and WACM, particularly as NR state they do not currently collect the data for this metric.

Efficient end-user focused possession taking	Drive management actions	Avoid perverse incentives	Support SO role	Encourage focus on availability	Minimise implementation cost	Does not overlap with existing incentives
Less information than current measure about the 'value' of disruption if unweighted. Would only cover possessions scheduled after EAS planning.	Clearer message in terms of how the metric reflects passenger /freight disruption. But would not include full impact of possessions. Not related closely enough to the planning process to drive decisions.	No perverse incentives identified.	The comparison with the WTT would only highlight short-term planning changes, which would not encourage planning further in advance. No other support of SO role (i.e. passenger flows).	Same as any metric would, by virtue of being reported as regulatory output. In reality very little impact.	More costly than the S4-based metrics as data not currently collected. No confirmation from NR what this would entail.	Some overlap with S4 only if same input data used.

Comparison of the timetable at T-12 against the plan of the day.

This identifies the change in availability from the point at which a passenger is able to book tickets – i.e. the deterioration in the offer to the passenger. Data not currently collected by NR.

Efficient end-user focused possession taking	Drive management actions	Avoid perverse incentives	Support SO role	Encourage focus on availability	Minimise implementation cost	Does not overlap with existing incentives
Would not include possessions 'baked in' to the timetable. Possibly more accurate reflection of passenger disruption, but only based on expectations on the day rather than wider passenger demand for availability (i.e. a well publicised disruption is still disruptive). No obvious freight reciprocal.	More isolated driver of disruption (e.g. short-term changes) which could be useful to monitor if this was felt to be a particular failing of NR. More readily incorporated into planning as timeframe is much closer to the next TT publication. But only reflects 'minor' changes to possession plans as majority are embedded by this stage.	May create a narrow focus on short-term availability, especially if resources are diverted from long-term planning processes.	Would not encourage forward planning for NR as measuring such a short time frame. No other support of SO role (i.e. passenger flows).	More transparent measure of availability for passengers/consumer groups, which may put greater pressure on NR behaviour. But lack of long-term focus would not address more disruptive (even if anticipated) possession plans.	More costly than the S4-based metrics as data not currently collected. No insight yet from NR what this would entail.	Some overlap with short-term / unplanned disruption compensation in Schedule 4 and Schedule 8.

The weekend working timetable measure.						
This is a current indicator reported on by NR. It represents the % of train schedules that ran as scheduled or were disrupted (cancelled / replaced by buses vs the permanent timetable) per weekend, per TOC. It would need to be extended out to a weekly measure. No input from NR as to what this would entail.						
Efficient end-user focused possession taking	Drive management actions	Avoid perverse incentives	Support SO role	Encourage focus on availability	Minimise implementation cost	Does not overlap with existing incentives
Would not include possessions 'baked in' to the working timetable. Would not capture impact of disruption (e.g. extended journey time). Should capture passenger preferences i.e. bus replacements.	Seems a clearer, simpler metric to record changes in train schedules, and may serve as a better high-level monitoring metric.	Would not focus on the extent of the disruption e.g. if fewer schedules changed but if the delays were significant. May create narrow focus on only minimising the number of changes.	Would encourage planning from the permanent timetable which is fairly long term. No other support of SO role (i.e. passenger flows).	No more so than other metrics, although its simplicity may be easier to monitor and communicate. However current Weekend measure not used by NR in its planning.	More costly than the S4-based metrics as data not currently collected for week timetable. No insight from NR what this would entail.	No overlaps identified.
Possession efficiency.						
Finding a way to measure the efficiency within a possession to ensure that the use of the possession time that is taken is maximised. No measure suggested by NR. Could use our suggestions of route-level reporting of possession planning.						
Efficient end-user focused possession taking	Drive management actions	Avoid perverse incentives	Support SO role	Encourage focus on availability	Minimise implementation cost	Does not overlap with existing incentives
Indirect link to network availability, but does not directly focus on passenger impact. However, could be valuable as a means of monitoring NR's processes, particularly in terms of the element that is less influenced by operators.	Clearest link to manager actions as this relates to the planning process rather than <i>ex post</i> disruption. Would identify where possessions could be used more efficiently and overall number reduced.	None identified, as long as it forms part of the current planning processes.	Would encourage efficient longer-term possession planning. No other support of SO role (i.e. passenger flows).	No direct focus on availability. This could be created however, by higher level monitoring by NR as suggested in our options.	Unknown and would depend on the extent to which routes currently collect and analyse such data.	Should already be done as part of S4 - would balance increased costs of sharing possessions with savings on S4 payments.

Roads - style availability measure. A measure of the percentage of the rail network available to passenger and freight traffic in any given year. A track is considered unavailable if it is closed to train and freight traffic because of planned engineering work.						
Efficient end-user focused possession taking	Drive management actions	Avoid perverse incentives	Support SO role	Encourage focus on availability	Minimise implementation cost	Does not overlap with existing incentives
Clear link to network availability, but little end-user consideration. The metric is similar to PDI-F - track availability not considered a useful measure of disruption as it does not reflect actual traffic affected or the suitability of diversion routes. Unclear how it would reflect passenger disruption. The metric would not provide much information about planning/notification timeframes and the number of services affected.	Could be a simple metric to capture changes in availability over time, more for monitoring purposes than to drive management action due to the limited information it would convey.	None identified, although no incentives on the timing of possessions.	No other support of SO role (i.e. passenger flows).	Same as any metric would, by virtue of being reported as regulatory output. In reality very little impact.	Uncertain. NR cite challenges extracting track unavailability data from the possession planning data. However, this is already done for the current PDI-F measure.	No overlaps identified.

3.2.1 Summary of alternatives assessment

The figure below presents a high-level scoring of the alternatives. Increasing scores reflect the increasing benefit of the option; for example, against “Minimise implementation cost” a score of 2 represents a less costly option than a score of 1. The scores should be considered as relative, i.e. 3 represents the best performing option against a criterion, rather than the option scores perfectly against that criterion.

We have not included an overall score per option given the simple nature of our assessment and the fact that some criteria would weigh more heavily than others.

Figure 3.2: Summary of alternative measures

	Efficient end-user focused possession taking	Drive management actions	Avoid perverse incentives	Support SO role	Encourage focus on availability	Minimise implementation cost	Does not overlap with existing incentives
PDI-P	●●	●	●●●	●	●	n/a	●
PDI-F	●	●	●●	●	●	n/a	●
PDI at route level	●●●	●	●●●	●	●●	●	●
Possession disruption measure based on Schedule 4 data	●●	●	●●●	●	●	●●	●
Comparison of the Working Timetable (WTT) against the Actual timetable.	●	●	●●	●	●	●	●●
Comparison of the timetable at T-12 against the plan of the day	●	●●	●	●	●●	●	●●
The weekend working timetable measure	●	●●	●●	●	●●	●	●●●
Possession efficiency	●	●●●	●●●	●●	●	●●	●
Roads - style availability measure	●	●	●●	●	●	●●	●●●

4 Appendix

4.1 Description of the PDI Measures

We present here a description of the PDI-P and PDI-F calculations and input variables.

4.1.1 PDI-P

The passenger metric PDI-P is calculated from an equation that combines a range of inputs, as shown below, which are then calculated in the NARS system:

$$EPJwVT = \frac{\sum_{SG} \left[\sum_d \{ (NREJT_{SG,d} + WACM_{SG,d}) \cdot BF_{SG,d} \cdot PASS_{SG,d} \cdot ToDW \} \cdot VoT_{SG} \right]}{\sum_{SG} PT_{SG}}$$

Essentially, the equation reflects the additional journey time for passengers multiplied by the value of time, divided by the train kilometres. There are three sets of inputs:

Manually inserted inputs into NARS that are collected as part of the Schedule 4 database:

- Extended journey time (NREJT) for the service group (SG), by day (D).
- Weighted average of cancellation minutes (WACM) for service group, by day.
- Busyness factor (BF) measuring the frequency of services, for service group, by day.

The NREJT and WACM are calculated by comparing the timetable that ran on the day with three earlier timetables, the Working Timetable (WTT) and the Corresponding Day Timetable (CDTT). The WTT is the bi-annual timetable from May – December and December – May and is published following the negotiations and iterations to the EAS described in Section 2.1.1 above. The CDTT is a reference timetable which is free of any restriction of use and has all the trains that operators would run with no restriction of use. Therefore, the disruptions caused on the day of travel include ‘baked-in’ possessions that would have been in the WTT but not in the CDTT, and any possessions from the short-term planning process that would have been introduced after the WTT.

Automatically fed inputs into NARS from other parts of the business which are updated daily or thereabouts:

- Average passenger train kilometres scheduled by service group (PT).

Constant variables built into NARS, namely weightings:

- PASS is the daily average number of passenger journeys per day for the relevant service group.
- Value of Time (VoT) reflects the ratios of business, commuter and leisure traffic and associated values of time or each passenger group.

- Time of Day Weighting (ToDW) is a pre-determined fraction representing the percentage of passenger journeys for the relevant Service Group during the time of day (average values for each hour of the day) and day of week.

4.1.2 PDI-F

The freight metric PDI-F is calculated using the following equation:

$$TwF = \frac{\sum_{ELR} \left\{ \sum_d (TU_{ELR,d} \cdot FTW_{ELR,d}) \right\}}{\sum_{ELR} \left\{ \sum_d (TT_{ELR,d} \cdot FTW_{ELR,d}) \right\}}$$

The equation reflects the train kms unavailable multiplied by the volume of freight traffic, divided by the total track kms multiplied by the volume of freight traffic.

PDI-F has no manual inputs, and uses only automatically collected inputs updated regularly through Network Rail systems:

- Track unavailable (TU) is the track-km hours unavailable due to possessions.
- Total track available (TT) is the total track km-hours for the relevant service for the relevant day.

As well as weightings:

- Freight traffic weighting (FTW) is the average volumes of freight for the relevant service across the day.

4.2 Network Code Part D Timetable Development Dates

Below is an excerpt from the Network Code Part D (Annex 1) showing the timetable development process. We have highlighted the deadlines corresponding with our summary diagram Figure 2.1.

Figure 4.1: Network Code Part D Annex 1 - Timeline for the timetable development process

Milestone	What happens
D-73	Network Rail issues the timetable process dates for both the Principal Change Date and the Subsidiary Change Date 73 weeks before the Principal Change Date
D-70	Network Rail issues draft International Freight Capacity Notice (in relation to Principal Change Date only)
D-70 to D-65	Network Rail consults Timetable Participants on its proposed International Freight Train Slots
Revision of the Timetable Planning Rules and Engineering Access Statement (collectively known as the Rules)	
D-90	If Network Rail wants to rely on a Possessions Strategy Notice it must issue a Possessions Strategy Proposal to all Possessions Strategy Participants for consultation
D-64	Network Rail issues its decision in a Possessions Strategy Notice which Possessions Strategy Participants may appeal within 20 Working Days of receipt
D-64 to D-60	Network Rail consults Timetable Participants on its proposed changes to the Rules and its anticipated Restrictions of Use
D-60	Network Rail considers representations made by Timetable Participants and provides a final version of the International Freight Capacity Notice. Timetable Participants may appeal the determinations in the final International Freight Capacity Notice within 5 Working Days of receipt
D-59	Network Rail issues the draft Rules for consultation
D-59 to D-54	Timetable Participants may make representations or objections to the draft Rules
D-54 to D-44	Network Rail considers all representations or objections and prepares revised Rules
D-44	Network Rail issues revised Rules which Timetable Participants may appeal within 15 Working Days of receipt
D-44 to D-26	After consultation with any affected Timetable Participants Network Rail may make minor revisions to the Rules in order to optimise the New Working Timetable. Timetable Participants may appeal these revisions within 5 Working Days of receipt
Timetable consultation, preparation and publication	
Up to D-64	Timetable Participants and funders inform Network Rail of any events they think should be included in the Draft Calendar of Events
D-64	Network Rail issues Draft Calendar of Events
D-64-59	Timetable Participants and funders make any representations or objections to the Draft Calendar of Events
D-55	Timetable Participants planning significant new services or significant amendments to their services must notify Network Rail as soon as possible and before D-55 if possible No later than D-55, Network Rail shall publish the Strategic Capacity Statement which is relevant to the preparation of the New Working Timetable.
D-54	Network Rail issues Calendar of Events
D-55 to D-40	Initial Consultation Period. Timetable Participants discuss their proposals with Network Rail which carries out a consultation and facilitation process with other

	Timetable Participants
D-48	Network Rail consults International Operators and includes provisional paths in the New Working Timetable
D-45	Network Rail issues the Prior Working Timetable which will be the starting point for the New Working Timetable
D-40	Priority Date
D-40 to D-26	Timetable Preparation Period Throughout this period a draft of the emerging New Working Timetable is available online. Timetable Participants may submit Access Proposals at any time and Network Rail will, as far as reasonably practical, incorporate these in the New Working Timetable
D-26	New Working Timetable is published (subject to the result of any appeals which must be made with 20 Working Days of its publication)

4.3 Schedule 4 compensation payments

Franchised **passenger** operators schedule 4 payments are to compensate for a combination of the following.

Figure 4.2: Passenger operator compensation payment inputs

Loss of future revenue	Replacement bus cost	Costs or cost savings from a change in train mileage	Costs related to cancelled or late amended possessions
<ul style="list-style-type: none"> For revenue losses as a result of passengers being deterred from travelling due to possessions disruption. Compensation is based on Schedule 8 payment rates and a discount rate determined by notification discount factors 	<ul style="list-style-type: none"> For additional costs incurred when running replacement buses the amount of compensation received is the product of estimated bus miles (EBMs) and the EBM payment rate Different rates for London and South East and the rest of the country 	<ul style="list-style-type: none"> TOCs may make cost savings or incur additional costs as a result of changes in train mileage operated due to possessions. 	<ul style="list-style-type: none"> Cost compensation where actual costs exceed £5,000

Source: ORR

Additional compensation for severe disruption caused by possessions over a sustained period of time or very long-lasting possessions (Type 2 and Type 3 possessions).

The Schedule 4 **freight regime** provides only cost compensation. There are three levels of compensation depending on the notification and degree of disruption (with the possibility of compensation for actual losses for severe disruption) and higher payments made for late notice possessions

CP5 criteria for possession types and compensation rates (2012-13 prices) for each tier before and after T-12 are as follows:

Figure 4.3: Freight compensation levels

Possessions notified before T-12	Possessions notified after T-12
Category 1 compensation -£300 per service	Service variation - £596 per service
Category 2 compensation - £800 per service	Late notice (service is cancelled) - £1,566 per service
Category 3 – possibility of actual costs/losses in addition to liquidated damages	Category 3 – possibility of actual costs/losses in addition to liquidated damages

Source: ORR