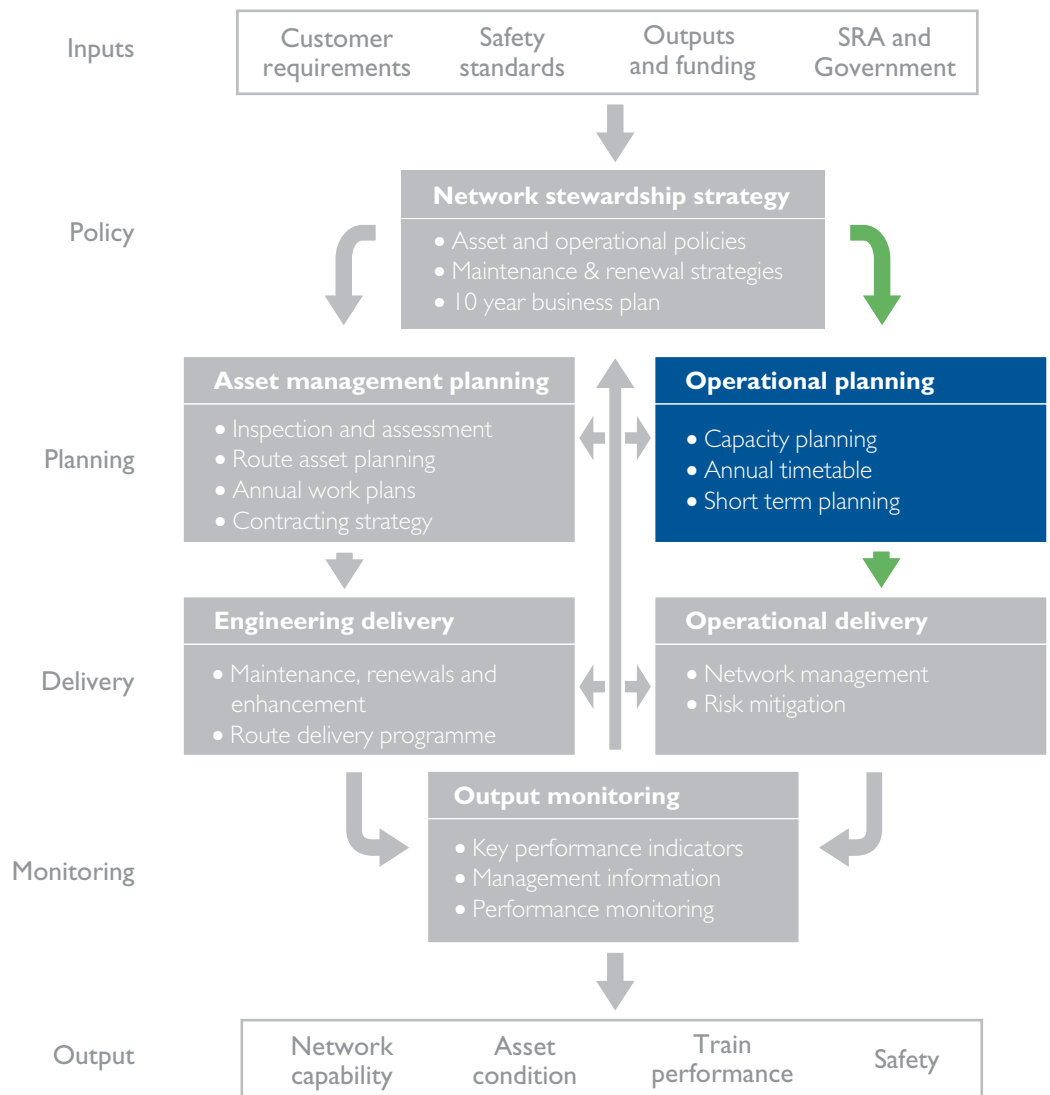


# Section 6

## Operational planning



## Objectives

Operational planning is the process that translates customer requirements for access to the network into detailed plans for the provision of safe and reliable train paths. The effective operation of this process, and hence the production of a robust timetable, is critical to the achievement of our train performance plans, both in terms of the total delay minutes and the number of incidents causing a delay.

Delivering these requirements ensures that we are compliant with our network licence and the cross-industry Track Access Conditions in respect of:

- the production of the National Rail Timetable (Licence Condition 3);
- the timetabling process (Access Condition D); and
- the Informed Traveller process (Licence Conditions 3 and 9).

## Approach

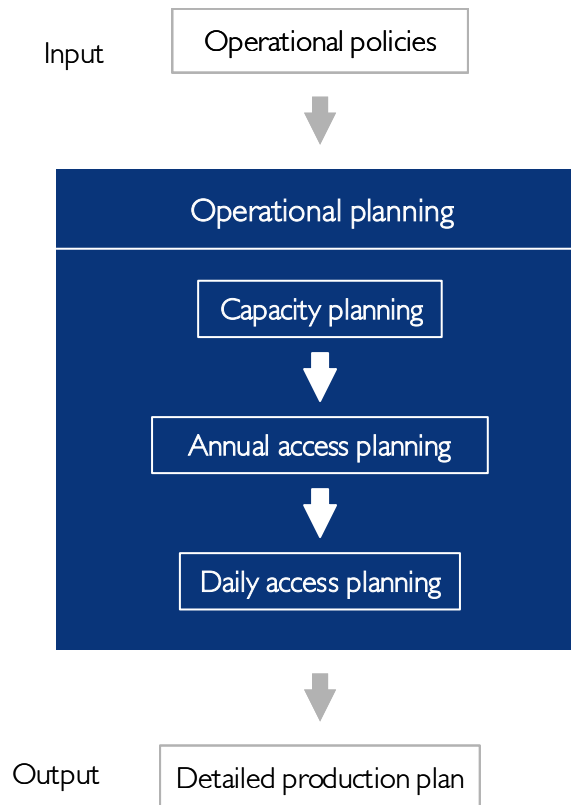
The operational planning process must ensure at every stage that there is an appropriate balance between the requirements of train operators to provide train services and the need to maintain, renew and enhance the network. Also, a proportion of capacity must remain unoccupied to enable recovery from any disruptions to the plan.

Our goal is to implement an efficient and effective operational planning process, with three key components (illustrated in the figure below):

- robust capacity planning over a ten year horizon to ensure that plans for provision of network capacity and plans for train services which will consume that capacity are synchronised and aligned with customer and stakeholder expectations;
- annual access planning which produces the “permanent” timetable, published as the National Rail Timetable (NRT), which provides a sound basis for delivering train paths safely and reliably; and
- efficient daily access planning which incorporates temporary changes into the timetable to meet short-term traffic demands and requirements for engineering works on the network, while ensuring that the timetable remains robust.

The final output of the process is the detailed plan that is used by our front-line production staff and train operators to deliver the real-time operation of the railway.

**Figure 6.1 Operational planning**



In this section we set out our long-term goals and set our priorities for action over the next two years, including:

- working closely with the SRA to support its Capacity Utilisation Policy and to develop route utilisation strategies which optimise capacity usage and clarify future requirements;
- completing development and implementation of a suite of strategic access planning tools and systems to ensure the impact of changing capacity and traffic patterns is understood prior to timetable development;
- leading the refinement of the timetable structure to deliver improvements in reliability of operation;
- continuing to review the rules on which timetables are developed;
- national coordination of possessions planning to ensure that changes in engineering access remain compatible with the timetabling process;
- continuing to overhaul our timetabling systems and tools to increase efficiency and to replace technically obsolete systems; and
- contributing to an industry-wide recovery plan to meet the Informed Traveller timescales, through improved engineering planning and cutting process cycle time.

In addition, we will implement EU Directive requirements to move to a single annual timetable change each December with effect from December 2004.

# Capacity planning

The train operators and SRA, together with the Scottish Executive, Welsh Assembly and PTEs, need to be able to plan their long-term businesses with some certainty regarding the availability of future train paths. Consequently, we need to maintain a view of the capacity that will be provided by the network in the future and how that capacity will be allocated. Although it is important to have a plan for the future physical configuration of the network, the available capacity cannot be understood without analysis of the likely pattern of train services. An important element of operational planning is to plan future capacity, in conjunction with customers and stakeholders.

Future capacity planning is also required to meet our licence conditions and to enable us to prepare our business plans.

## Capacity Utilisation Policy

In 2003, the SRA published its Capacity Utilisation Policy (CUP) following consultation with industry parties and funding bodies. The CUP envisages that the SRA will produce a National Network Utilisation Strategy, comprising a Long Distance Statement (LDS) and a series of Route Utilisation Strategies (RUSs). The purpose of the LDS is to define a national framework of long distance passenger and freight services around which future timetabling specifications will be constructed. The RUSs develop in more detail the specification for all services required on particular routes and will cover those parts of the network where there is congestion and significant multi-user operator issues.

We are working closely with the SRA to develop RUSs. The pilot RUS for the Midland Main Line route was published in 2004 and work is in progress on several other RUSs. The SRA is leading the work programme and providing analysis of market demand and customer requirements whilst we are contributing timetabling expertise and detailed knowledge of network capability and performance delivery. In addition, we are ensuring that adequate provision is made for maintenance and renewal work at an early stage in the development of RUSs.

We expect to continue to make a major contribution to the development of the LDS and RUSs. A range of modelling tools supports the timetabling work carried out in collaboration with the SRA and it is intended to develop and improve the suite of tools to enable greater automation and efficiency.

## Improved utilisation and development of the network

Our network licence obligations require us to seek the improvement, enhancement and development of the network in a timely and economical manner. A key element of this is to improve the utilisation and ongoing development of the network. As a consequence, we undertake analytical work on each route to:

- understand options for how the existing rail network can be most effectively used to deliver SRA and other stakeholder objectives;
- understand how performance can be improved, through the trade off between the number of train operated and performance level delivered; and
- ensure appropriate engineering access is available, so that the performance and output level required can be delivered.

## Assessing capacity and utilisation

The assessment of route capacity is essential to our understanding of route utilisation. The overall capacity of a line is determined by the intervals between trains, as permitted by the signalling system. A contingency is built in to allow for perturbation, leading to the practical headway used for timetabling purposes. The capacity used for each train is equal to the planning headway, plus the differential time taken to traverse the section between different trains if they run at different speeds. The capacity used by all the trains is summed, and is expressed as a number of minutes per hour, and this is converted into a percentage of an hour. Actual utilisation depends on the exact ordering of trains and the length of the sections chosen.

## Current and predicted utilisation

A capacity utilisation map is included in Section 11. High levels of utilisation, 90% or more, are shown on the map in red, and fall into three categories:

- lines carrying a mix of passenger and freight traffic, often over long distances, where utilisation of capacity is high over long periods of the day;
- commuter routes, where an intensive service operates for a short period in the peak, but where spare capacity exists outside the peak; and
- low capacity routes, often single track, where the passage of a train occupies all of the available capacity for a significant distance.

It is possible to operate at such a high level of capacity utilisation for limited periods, but service reliability is at risk and delays compound rapidly. We assess possible solutions on those parts of the network where capacity utilisation is at 90% or expected to reach that level, if it is expected that additional services are to be introduced. These capacity bottlenecks are identified in the Route Plans document, together with options to resolve these capacity constraints.

This approach is required to meet EU Directive 2001/14 which relates to identifying where demand for train paths exceeds the capacity available, as well as identifying a range of possible solutions. We will be required to undertake the provisions of the directive once it becomes UK law later in 2004. This will include carrying out capacity analysis and making recommendations on options to the SRA to resolve constraints where capacity constrained infrastructure is identified. The SRA will make decisions based upon the analysis.

As well as network/track utilisation, we assess station passenger capacity. At many stations on the network, especially the London termini, the capacity of the station to accommodate passenger throughput may be reached before the network serving the station reaches the limit of its capacity to handle trains. We assess measures to alleviate and control such levels of overcrowding, which could necessitate restricting passenger access to the stations at peak periods. In 2002/03, an initial study was completed on the SRA sponsored station passenger capacity project, which was aimed at gaining an appreciation of passenger congestion/crowding issues at key stations on the national rail network.

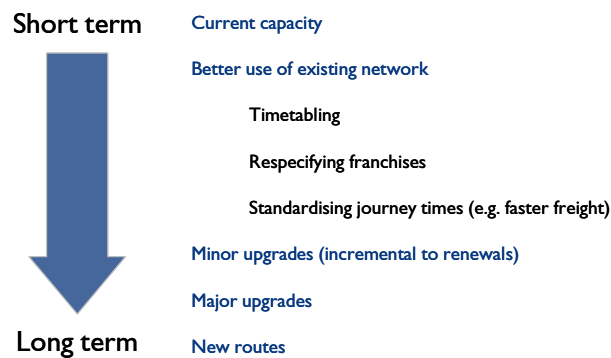
## Accommodating additional demand on the network

In order to understand how the demands of our stakeholders can be addressed we carry out a route strategy process which examines how growth could be accommodated on the network and highlights potential performance issues. We work closely with the SRA to define the most appropriate and optimal approach to improving the utilisation and capacity of the network, within the financial resources available, taking account key issues such as the effects on network performance.

Demand forecasts are the starting points for route strategy analysis. We examine underlying passenger and freight demand growth and estimate how this demand will translate into additional train paths on each route. We also incorporate the aspirations for increased patronage by the SRA, other stakeholders and of passenger and freight operators. We use demand forecasting models for each route to arrive at an overall view on future train-path demand. Changes in linespeed and freight capability are also examined.

The diagram below summarises the range of options available to increase the capacity of the network.

**Figure 6.2 How growth over 10 years might be accommodated**



The approach is hierarchical. We investigate non-infrastructure solutions before considering infrastructure upgrades. Our analysis is used as an input to the SRA's RUSs. Non-infrastructure solutions include:

- retaining existing timetable and infrastructure and running longer trains where necessary;
- using a larger percentage of the theoretical train-path capacity of the route; and
- operating more trains by relaxing timetabling constraints (possibly by reducing conflicting train movements or by amending franchise commitments).

Infrastructure solutions include:

- enhancing infrastructure to allow increased train lengths, usually via lengthening platforms;
- investing in additional capacity to run more trains – this can range from small-scale investment in infrastructure through to major route upgrades; and
- segregating by service type – routes with train services with similar speeds and stopping patterns enable more train paths than routes with a mix of train speeds and stopping patterns.

It is important when considering timetable solutions that the possible performance impact is fully assessed. Similarly, where there are changes to the number of train movements or size of trains that operate on the network, there will be a change of tonnage passing over the relevant part of the network. This must be assessed as the tonnage passing over each section of the network influences the required levels of maintenance and may result in accelerated wear, and hence increased component renewals.

## Strategic access planning

We are developing improved processes for planning access to the network at a strategic level, with a ten-year time horizon. These processes are undertaken by a team created in 2002/03 and staffed by a mix of experienced train planners and new recruits to the industry. The work of this team complements the SRA's work on its CUP for the network and provides an important input to the industry's long-term plans.

A Forward Capacity Plan (FCP) is being created which will contain details of access rights sold (or expected to be sold) to train operators, expected access requirements for maintenance, renewal and enhancement work, details of the available network capacity and constraints on its use. The FCP will be underpinned by a series of future timetable and infrastructure configuration options, which will demonstrate that its content is internally consistent, that the desired level of performance is deliverable and that it incorporates the emerging SRA work on RUSs. The FCP and underpinning timetables will provide a practical view of the means by which the SRA's overall growth forecasts for the industry might be achieved, and will allow necessary infrastructure changes to be identified.

The FCP will be updated at regular intervals and there will be a clearly defined process for evaluation of all proposed changes to ensure that they are operationally viable and that planned use of the network is optimised. This process will follow the established steps for evaluation of investment schemes from pre-feasibility stage through to detailed design and will include identification of the impact of each proposal on safety, performance, earnings, operating costs, and compliance with contractual and Passenger Service Requirement constraints.

A provisional FCP was created during 2002/03 and work on the underpinning timetables to verify its deliverability is expected to continue throughout 2004/5. Our further work on the FCP includes the creation of a capacity register.

## Predictive timetabling exercises

We carry out specific timetabling exercises in which the SRA or others propose significant changes to service levels or infrastructure. This scheme evaluation process exists to ensure that options can be compared and decisions made on a firm basis. A range of techniques are used to provide an appropriate level of evaluation at the key stages in development of a scheme through feasibility study, option comparison and selection, single option development and detailed design. At the early stages, automated construction of outline timetables is carried out using the Capacity Management Suite decision support tools to enable rapid evaluation of a large range of options. In most cases, final confirmation that a particular timetable is actually deliverable requires preparation of a sample timetable by traditional manual means. We intend to carry out advance timetabling for all major service changes to ensure that there is adequate examination of alternative timetabling solutions, and to allow the annual timetabling process to focus on improvements to timetable quality and resilience, rather than basic service design.

For the West Coast route, in addition to infrastructure options to enhance performance (e.g. the removal of level crossings and layout improvements to reduce conflict) a completely new timetable is being developed. This timetable is being constructed to minimise the impact on performance of service disruption, removing the inherent performance problems associated with integrating new services into an existing timetable.

## Structural improvement of the timetable

We are carrying out a thorough review of the basis on which the timetable is constructed with a view to improving its robustness and delivering an improvement in operational performance. This work is being carried out in conjunction with train operators and the SRA. The main elements are:

- updating basic data in the Rules of the Plan, such as point-to-point running times and standard station dwell times, to take account of current operating conditions and passenger loadings. Changes are based on theoretical considerations, analysis of computer records of historical operating performance and direct measurement by stopwatch;
- revision of standards for addition of performance allowances to take account of day-to-day variations in operation and minor incidents;

- route-by-route analysis of the impact of revised base data and allowances on service patterns and performance levels; and
- evaluation of alternative timetable structures on all main routes to identify options for reliability improvement.

The results of this work will enable us to identify options for the production of a more robust timetable, beginning with the December 2004 timetable. The Rules of the Plan review started in 2002 and is complete or in progress for the following routes:

<b>Figure 6.3 Rules of the Plan – progress by route</b>	
<b>Route</b>	<b>Implementation Date</b>
Great Western Main Line (part)	December 2004
West Anglia	Deferred at SRA request
Transpennine	December 2004
Midland Main Line	June 2005
East Coast Main Line	December 2005

A provisional programme of future reviews has been agreed with the SRA to coordinate with production of their Route Utilisation Strategies and steps are being taken to accelerate this initial programme to achieve complete national coverage by the end of 2005. A revised plan will be finalised by 31 March 2004.

There is general support from train operators and the SRA for improvements to the Rules of the Plan so that these reflect more accurately real operational conditions and thus allow a more robust train plan to be developed. There is an expectation that the review will deliver punctuality improvements and will release under-used capacity by implementing a more effective timetable structure. However, in some cases it is likely that published journey times will increase slightly as the effects of professional driving techniques and extended station dwell times due to increased passenger volumes are reflected in the timetable.

## Annual timetable planning

The current timetabling process was introduced for the development of the May 2004 timetable and is contained in the current version of Track Access Condition D. It consists of three phases:

- an initial phase during which the Rules of the Route and Rules of the Plan are prepared;
- a drafting phase during which train operators and ourselves collaborate to produce a draft timetable; and
- a finalisation phase when train operators and Network Rail work together to refine the content of the draft timetable and we make final decisions on the timetable content.

### Rules of the Route

Regular opportunities for access to the network for maintenance and renewal work are documented in the Rules of the Route, along with a register of disruptive possessions that are expected to take place during the timetable year. Clearly the Rules of the Route need to be based on a sound understanding of actual possessions requirements. These are collated and an engineering conference is held each November to examine the proposed workload for the following timetable year (e.g. the engineering conference in November 2003 dealt with possessions in the timetable year December 2004 to December 2005). This conference coordinates the various work requests and devises an annual possession plan, which can be reflected in the Rules of the Route.

During 2003 Integrated Planning Units were introduced into the regions and they have the task of producing a consolidated possessions plan for each region. During 2004 they will be replaced by a route-based delivery planning units. National coordination takes place through the National Access Unit, which will ensure that diversionary routes are protected and that the impact of multiple possessions on long distance train services is minimised.

We provide preliminary proposals for the Rules of the Route to train operators approximately 55 weeks before the timetable change date. Train operators are allowed a period of around three weeks to advise us of any concerns and to make counter-proposals. We have a further week to consider their responses and issue a final version of the Rules of the Route, which may be subject to appeal.

## Timetable conference and drafting process

The annual timetable conference is held in February each year and is attended by all train operators, the SRA and ORR. Its primary purpose is to agree in principle the service changes required on each line of route and to ensure national coordination of those changes. The final day of the conference is the Priority Date (as defined in Access Condition D) which is the deadline for each train operator to provide us with a formal statement of the contractual rights under its Track Access Agreement that it wishes to exercise in the coming year, any new rights that it wishes to negotiate, and the timetable specification which it seeks as an expression of those rights. This conference is followed by a drafting period for the summer timetable of around 16 weeks, during which we construct a draft timetable to meet the requirements set out in the train operators' statements. This involves regular consultation with the train operators and the application of Access Condition D prioritisation rules and decision criteria.

## Finalisation and publication of the timetable

Following the issue of the draft timetable (currently 28 weeks before the timetable change date), train operators have an opportunity to work with Network Rail for a further six weeks to refine the draft timetable, following which we prepare and issue our final timetable offer. The timetable offer is transferred into the train service database (TSDB), which feeds data into the editing and printing system for the National Rail Timetable and a large range of other information systems.

We are required to produce a timetable that honours any firm contractual rights that are declared in train operators' bids. Where a train operator seeks paths in the timetable that are not supported by existing firm contractual rights, those requests receive a lower priority in the timetabling process. Currently, we operate two timetable planning cycles per year, leading up to the principal change date in mid-December and the subsidiary change date in mid-June.

## European legislation

EU Directive 2001/14/EC relating to the allocation of railway capacity took effect on 15 March 2003. It is being implemented on a voluntary basis in the UK pending production of the necessary statutory instruments. The directive has a number of important effects on the operational planning process:

- from December 2004 there will be an annual timetable change each December and an intermediate adjustment date each June;
- some changes to the sequence of timetable development and the length of each stage have been necessary;

- the Rules of the Route and Rules of the Plan have been incorporated into a Network Statement, which also includes other information required by train operators such as physical network data and full details of legal and contractual requirements for access to the network; and
- a formal process for identifying congested infrastructure and developing capacity enhancement plans will be introduced, although details are still under discussion with the DfT and SRA.

## Timetabling process efficiency improvements

We recognise that there are significant inefficiencies in the current timetabling process that make it highly labour intensive for train operators and can lead to a sub-optimal product. A major constraint is the present systems configuration of our main applications. Data transfers between these systems are extremely slow and unreliable and none of the systems provides any decision support capability, so identification and resolution of conflicts between different demands on network capacity remains a manual process.

A series of efficiency improvements are being developed which will enable us to shorten the end-to-end timetabling process, create time to carry out important quality checks and save resources. The provisional plan is:

### 2004 timetable:

- implement agreed changes to Access Condition D to deliver a simplified industry process;

### 2005 timetable:

- introduce automated conflict resolution on a limited basis, using existing CMS tools;
- eliminate the seven regional systems by incorporating the required short-term planning and TSDB upload functionality into Trainplan; and
- introduce systematic measurement of timetable quality to inform timetabling decisions.

### 2006 timetable:

- extend the use of automated conflict resolution and timetable construction (to the extent that this is economically viable); and
- incorporate data transfer functionality into Trainplan to allow abolition of APLAN (our current access planning system).

We have recently transferred managerial responsibility for train planning from the regions to a central role, with this role having the responsibility for implementation of these changes. The main benefits are expected to be:

- a reduction in end-to-end development time of seven weeks (2006 timetable onwards);
- improved timetable quality (measured as performance robustness and commercial attractiveness to TOCs) in the 2005 timetable, with a further improvement in the 2006 timetable; and
- significant staff savings from the 2005 timetable (i.e. in the development process starting in February 2004), with further savings to be delivered for the 2006 timetable.

# Short-term timetable planning

## Rolling spot bids

The annual timetable planning process deals with passenger and freight services. Its structure is suited to the needs of passenger TOCs who require service changes to take place in a coordinated manner at fixed times of the year. It is less suited to the needs of FOCs whose business requirements evolve continuously. The rolling spot bid process meets these business requirements.

Between completion of the main timetable development phase and the timetable start date, and during the currency of the timetable, train operators may submit additional bids and these are incorporated into the permanent timetable so long as they do not result in changes to advertised passenger services. This process is used by passenger TOCs to finalise their empty stock workings, and is used extensively by freight operators to modify their services to meet changing commercial demands. It is usual for the cumulative changes to freight services in a timetable period to be rolled forward as the planning base for the next timetable period.

## Informed traveller

It is a requirement of our licence and each TOCs licence that daily changes to passenger train times are published at least 12 weeks in advance. This is achieved through the informed traveller process. In recent months these timescales have not been achieved due to the high level of changes to the possession plan after T-26 to deal with emerging engineering priorities. The industry is monitoring progress to enable full compliance to be regained at the earliest possible date. There is a particular focus on minimising late changes on key bank holidays.

We believe that improvement of the operational planning element of the informed traveller process is possible, and a proposal is being developed which would reduce the planning lead time so that the possession plan could be finalised later, whilst still allowing train service amendments to be published at T-12.

## Short notice train service amendments

Following completion of the Informed Traveller process, there is a continuing need to make short-term temporary amendments to the timetable to meet particular commercial and operational needs such as charter trains, test trains, sandite and de-icing trains, movement of rolling stock for overhaul and driver training runs. There is also a continuing need to amend freight train services to meet the business requirements of freight operators. We deal with most of these changes as individual items in order of receipt. However, a large part of the freight train plan is finalised through a series of commodity-based weekly plans, e.g. the Anglo-Scottish coal programme, and further amendments to them which are handled until two working days before the day of operation. All the short notice amendments are uploaded into TSDB, and a nightly data transfer takes place to provide the daily train plan into real-time operational systems.

The level of freight planning workload in the last few days before the day of operation is such that full validation of all the proposed train paths is not possible and prioritisation on essential checks is necessary. We have established a central short notice freight team to address this workload and quality issue by pre-planning of a range of standard freight train paths on main routes that can be “called off” on a daily basis as required. It is intended to complete the extension of this approach to all main short-term freight flows over the next few months.