Establishing formal permission to operate

To run freight trains on our track Train and Freight Operating Companies (TOC and FOCs) must negotiate a track access contract with Network Rail, the infrastructure manager.

Operators must have acquired a safety certificate from the ORR in order to obtain a track access contract.

By agreeing to a track access contract all TOCs and FOCs subscribe to the Network Code. The Network Code is a set of industry guidelines and procedures, the purpose of which is:

- to regulate change, including change to the working timetable, change to railway vehicles specified in an access contract, change to the network, change to computer systems and change to the Network Code itself
- to establish procedures relating to environmental damage
- to establish a performance monitoring system; and
- to establish procedures in the event of operational disruption

Planned use of the network by operators

It is the responsibility of Network Rail to establish a timetable for the network, referred to as the 'Working Timetable'. This timetable is re-issued in a revised form twice a year (December and May).

Operators are 'Timetable Participants' in the process of establishing a timetable and submit 'Access Proposals' to inform Network Rail of how they wish to use the network.

In the period between bi-annual revisions of the Working Timetable, either Network Rail or Timetable Participants may wish to vary the Working Timetable, whether by altering or removing a scheduled Train Slot or by inserting a new Train Slot. Network Rail operates processes to facilitate such variations.

An operator's Access Proposal shall include as a minimum in respect of each Train Slot:

- the dates on which Train Slots are intended to be used
- the start and end points of the train movement
- the intermediate calling points
- the times of arrival and departure from any point
- the railway vehicles or Timing Load to be used
- any required train connections with other railway passenger services
- the proposed route
- any proposed Ancillary Movements
- any required platform arrangements at the start, end and all calling points
- any relevant commercial and service codes
- the proposed maximum train speed and length and, in relation to a freight train, the proposed maximum train weight

In response to an operator's Access Proposal, Network Rail either accepts or rejects the proposed use of the railway, having considered a number of factors (**in blue**) including:

Permissable linespeeds

Permissible line speed is the maximum speed at which trains may operate on a track. The maximum permissible speed of a particular train may be limited by other factors which are detailed in the various technical instructions which govern the safe operation of trains.

Each route section has a published speed limit which will vary locally according to track and route features such as junctions where trains pass between different routes.

Detailed information about these speeds is published in the National Electronic Sectional Appendix (NESA).

Gauging capability

This is the science of ensuring that trains do not come into contact with either the infrastructure or with other trains. The principles behind gauging are contained in GE/RT8270 Assessment of compatibility of rolling stock and infrastructure.

Other gauging group standards that underpin the process are:

- GC/RT5212 Requirements for defining and maintaining clearances
- GM/RT2149 Requirements for defining and maintaining the size of railway vehicles
- GE/RT8073 Requirements for the application of standard vehicle gauges
- GE/GN8573 Guidance on gauging

The ability to move a railway vehicle and its load on a particular part of the network depends on the height and width profile, known as loading gauge, of the route concerned.

A railway vehicle must comply with the route loading gauge to ensure that it passes clear of all structures, principally over-bridges and tunnels but also features such as station platforms, canopies and overhead or lineside equipment.

The loading gauge of routes vary, reflecting historical demand for different types of trains and the construction policy of the original railway companies.

We have codified a set of loading gauge profiles for freight vehicles which are identified by a 'W' prefix and a number. As the route number rises so, broadly speaking, does the size of vehicle which can pass. Hence a freight wagon built to comply with a smaller loading gauge (typically W6) is capable of operating over most on the national network. The higher loading gauges (such as W8, W10 etc) enable bigger trains – such as those conveying tall containers – to operate on certain routes.

In special cases, we may permit larger, 'exceptional loads' to be moved by rail. This may require special arrangements eg surveys of the route, speed restrictions or restrictions on trains using adjacent lines while the exceptional load is moving.

Route availability

Route availability (RA) defines the axle weight which can be conveyed over any given route. It is mainly determined by the strength of underline bridges.

The route availability number for a vehicle is principally determined from its gross weight divided by the number of axles, however axle spacing may also be a factor.

Examples of route availability capabilities are:

- RA 3 = up to 16.5 tonnes per axle
- RA 5 = up to 19.0 tonnes per axle
- RA 8 = up to 22.8 tonnes per axle
- RA 10 = up to 25.4 tonnes per axle (the current maximum for freight on the network)

More technical details on how to determine the route availability number for a vehicle are given in the industry standard GE/RT8006 Interface between Rail Vehicle Weights and Underline Bridges, which is available from the Rail Safety and Standards Board website.

A train is automatically permitted to travel over a route if the highest vehicle route availability number is equal to or less than the route route availability number.

Trains exceeding a route's route availability are often permitted to operate with a higher route availability than that published for the route subject to certain conditions being met, such as special speed restrictions. This is to allow train operators to carry more commercially advantageous payloads. We document each instance with a special authority form.

Details of route availability across the network are published in Table D of the Sectional Appendix, except in Scotland where they are contained in a separate publication called Route Availability Table – Scotland.

Length capability

The maximum length of trains that can operate on the network is determined by physical limits such as the length of chord lines, platform lines, loops and terminals.

The limits are set to ensure that trains do not impact on other train movements or the performance of the network.

We work with operators to enable them to transport longer trains, allowing them to provide services that allow them to transport more commercially advantageous payloads. This may be possible through implementing enhanced train plans which provide journeys that avoid stops en route.

Length limits are provided for train operators in the Freight Train Loads Books.

Gradients

The gradient on a route affects the power to weight ratio necessary to operate a train effectively and efficiently. Additional locomotives may be required on occasions to assist heavy freight trains over routes with steep gradients.

Details of loads which can be conveyed and any requirement for an assisting locomotive is provided for train operators in the Freight Train Loads books.

Gradients on the main line network may reach as steep as 1 in 37. Gradient information is published in the form of a map which is available to operators as supplementary information within the National Electronic Sectional Appendix (NESA).

The effect of gradients and the power of the locomotive(s) is factored into the train planning process.

Special freight loads – the RT3973 system principles

The rail freight business in Britain has developed to provide more modern and efficient services for its customers. This has led to bigger, heavier wagon loads travelling today than ever before.

In order to accommodate these more productive loads the rail infrastructure has been enhanced, for example to enable heavy axle weight vehicles or container boxes to be conveyed.

The range of these enhanced services is mapped out across the network through what is known within the industry as the RT3973 procedures. In essence, these document each flow of enhanced freight traffic and provide data (usually operating restrictions) essential for each train's operation.

Governance of operations and possessions on the network

The Engineering Access Statement and the Timetable Planning Rules are collectively referred to as the 'Operational Rules'. In addition, there are rules and procedures for how people and services need to operate.

Engineering Access Statement
The Engineering Access Statement (EAS) describes the rules regulating the arrangements for engineering access to the rail network. It sets out the location, number, dating and duration of possession access (restrictions of use) which we require to deliver inspection, maintenance, renewal and enhance work activities to the infrastructure.

Along with Timetable Planning Rules (more below), when consulted by Network Rail with the relevant users of the railway, the EAS provides rights of access that, with track access agreements of train operators, are described as 'firm rights' and enjoy priority in the timetabling process.

Sections 1 to 3 of the EAS set out the national process for the negotiating and securing engineering access to the rail network.

Sections 4 to 7, the bulk of the EAS document, contain route-specific details of our engineering access opportunities and requirements.

Timetable Planning Rules
The Timetable Planning Rules (TPR) are rules regulating the standard timings between stations and junctions together with other matters enabling trains to be scheduled into the Working Timetable for the various parts of the main rail network.

They are one of a pair of documents along with Engineering Access Statement (above), when consulted by Network Rail with the relevant users of the railway, provide rights of access that, with track access agreements of train operators, are described as 'firm rights' and enjoy priority in the timetabling process.

TPR contains two parts: a National Overview and route-specific sections, containing wide-ranging information required to undertake the compilation of the timetable.

The National TPR contains a plain English description of the timetable planning process together with details of the planning schedule and requirements to be met in train operators' bids for train paths. It also contains a procedure for the agreement of short term changes to EAS and TPR.

The route-specific sections contain such data as standard timing points, sectional running times for specific train types, headway and margin limits to be maintained between trains, station working rules and route capability data.

The Rule Book
Operations on the railway follow industry operational rules and procedures. The main rules and procedures which ensure the safe operation of freight trains can be accessed at the Rail Safety and Standards Board website (RSSB).

The industry's Rule Book and the Working Manual for Rail Staff are particularly important in the context of freight operation and up-to-date electronic copies can be accessed at the same site.

The RSSB manages Railway Group Standards on behalf of the industry and builds industry-wide consensus to improve rules and procedures and raise safety standards.

It is a not-for-profit company owned by major industry stakeholders and is independent of any single railway company or their commercial interests.

Railway Operational Code (ROC)
The purpose of the Railway Operational Code (ROC) is to sustain the operation of train services on the network and restore operation of the network following disruption.

Maintenance of the network

Overview
Network Rail aims to maintain the railway infrastructure in a safe and reliable condition, by working to specifications, defined in Network Rail standards, which set out what must be maintained and how it should be maintained.

The list of work identified as being necessary is known as the unconstrained workbank, and comprises both major items of work specified by location and some items of work which are specified only as volumes of activity to be carried out on each route.

Delivery of works requires the mobilisation of the project or maintenance team and the scheduling of resources and booking of possessions. It also includes the provision of tools, facilities and equipment.

Where is work required?
The need to renew the infrastructure derives from inspection, maintenance and the requirements set out in the asset policies and supporting Network Rail standards, and generally documented as workbanks in asset management systems and Route Asset Management Plans (RAMPs).

The need to enhance the railway network derives from agreements made by Network Rail in Control Period settlements, franchise agreements, published in Route Utilisation Strategies (RUSs) and from 'third party' agreements.

How do we inspect the infrastructure?
Network Rail inspects the infrastructure in a number of ways, including patrol by foot and by aerial survey and by local data collection/survey. We also use track recording vehicles (measurement trains) to monitor the quality of the track that the measurement train is travelling on. These specially built trains are used to assess the condition of track so that engineers can later determine where to work.

Our infrastructure monitoring fleet of locomotives, coaching stock and multiple units, totalling 71 vehicles, work to record data in the following areas using the following trains:

- Track Geometry – New Measurement Train (NMT), Track Recording Coach (TRC), Track Inspection Coach (TIC2), Track Recording Unit (TRU) and Plain Line Pattern Recognition trains (PLPR1-4)
- Ultrasonic test trains – UTU1, UTU2, UTU3 and UTU4
- Structure Gauging Trains – SGT and SGT2
- Overhead Monitoring – Mentor (also carried out by NMT)
- Radio Survey Trains – RSC1 and RSC3

Infrastructure monitoring trains are operated and maintained by our National Delivery Service (NDS) for Asset Information, who provide the on train technicians for data collection and processing and manage and maintain the data collection systems fitted to the infrastructure monitoring fleet.

New Measurement Train (NMT)
The NMT is a converted Intercity 125 full of advanced detection and recording equipment, including scanners, lasers and digital video cameras. It can instantaneously measure and report on the condition of the track and other components.

Among other things it counts every single sleeper and even individual rail clips; takes crystal-clear digital images; measures even slight oscillation (bounce) and noise; and checks the 25 kV overhead cabling system that powers electric trains.

The NMT gives extremely accurate reports on the type and exact location of even very small maintenance requirements. This means we can fix potential problems before they affect how trains are running.

Track geometry
Geometry, in general, is concerned with questions of size and position of faults as well as relative positions of the vertical and horizontal rail-head profiles.

Our aforementioned measurement trains take two basic measurements of the rail profile in a sequential fashion whilst its recording instruments are turned on:

- Vertical – i.e. the rail top (of both rails)
- Horizontal – i.e. the centre line between the two rails

Track Quality is calculated from:

- Vertical Alignment (Top) = How much does the track undulate
- Horizontal Alignment (Line) = How straight is the track

The Geometry measurement trains also look for any track irregularities to:

- Rail Gauge = gap between the two rails (standard is 1435mm)
- Cross Level = height difference between the left rail and the right rail

Network Rail reports on exceptions found in the basic geometry measurements using the parameters defined in the Network Rail standards. There are two categories of basic measures relating to track geometry:

- Point Measurements Faults – these apply to a specific location
- Linear Measurements – these apply to a section of track. Network Rail has decided to split the whole network into segments of track that are generally (but not always) an eighth of a mile long (i.e. 220 yards).

Track Geometry Reporting (TGR)
Among the many Asset Services and Data systems that we operate and manage, our TGR system enables the management of track geometry in accordance with the standards set by Network Rail and assists in targeting the locations for maintenance work on track. It also provides an awareness of the overall state of track geometry.

In broad terms, the system processes track geometry measurement data and matches it to the locations responsible for maintaining that track. It maintains an incremental snapshot of data that is building up over time. This historical data facilitates the analysis of trends over a range of operating periods. The system also enables end users to review point-in-time snapshots of the state of the network.

Track geometry measurement data from a number of sources is fed to the system. For track geometry, the sources of the data are track recording vehicles such as the New Measurement Train (NMT). The data is cleansed (i.e. bad data removed) and then passed to the track geometry data warehouse. Users have two reporting systems pointing at this data warehouse:

- A reporting system known as the Track Geometry Reports (TGR). It is accessed via the corporate portal (Connect) and hosts a variety of standard numeric and graphical reports that go to a more detailed level. The primary audience of the reports are our maintenance organisation
- Track Geometry Business Objects Reports (TGR Business Objects), is an additional reporting system that pulls data from the same warehouse but reports on information at a summary level every period. The primary audience is senior management and the rail regulator

Rail grinders
The Network Rail grinding fleet is managed by NDS and comprises of plain line and switch and crossing machines which can be used to maintain the rail profile and reduce track surface defects throughout the network.

The fleet consists of three in-traffic plainline machines, three in-possession plainline machines and five switch and crossing grinders, which include ground support crews to undertake pre and post inspections of switches.

The machines are planned in a cyclical programme based on the required tonnages outlined in the Network Rail standards and some shifts are planned to address specific site defects on a shift by shift basis.

Stoneblowers and tampers
These machines restore the line and level of the track to ensure a smooth ride for passengers and freight. However, whereas tampers correct the vertical height of the track by inserting tamping tines into the ballast bed in an attempt to move extra ballast under the sleepers, the stoneblower lifts the track and blows a carefully calculated quantity of extra material under the sleepers using compressed air. This method avoids disturbing the ballast bed, and so holds the corrected geometry for longer than a tamper would do.

NDS Fleet currently operates 12 plainline stoneblowers for the maintenance of plainline track. We also operate three of the new multipurpose stoneblowers, which can treat switch and crossing work in addition to plainline.

The stoneblower team has also assumed responsibility for Network Rail's EM-SAT machines. These machines measure the track geometry and its position within an Absolute Track Geometry system (ATG) in preparation for maintenance by tampers and stoneblowers. They are used exclusively on the West Coast routes, as these are the only UK routes currently operating within ATG.

Seasonal and incident fleet
This fleet provides equipment to mitigate seasonal treatment throughout the year including weed spraying, autumn rail head treatment, conductor rail anti-ice treatment and snow clearance.

Track standards
The Network Rail Track Asset Management Policy sets out the approach of the company in delivering track which meets the safety and commercial standards which the company and its customers require. The asset policy is supported by six principal Network Rail standards, covering:

- Track design (NR/L2/TRK/2049 *Track Design Handbook*)
- Construction (NR/L2/TRK/2102 *Design and Construction of Track*)
- Inspection and maintenance (NR/L2/TRK/001 *Inspection and Maintenance of Permanent Way*)
- The control of risks associated with continuous welded rail track (NR/L2/TRK/3011 *Continuous Welded Rail (CWR) Track*)
- The control of risks associated with animal incursion, trespass and vandalism (NR/L2/TRK/5100 *Management of Fencing and other Boundary Measures*)
- The control of risks associated with lineside vegetation (NR/L2/TRK/5201 *Management of lineside vegetation*).

Further aspects of track management arrangements are detailed in other relevant Network Rail standards.

Competence requirements are set out in individual standards such as NR/L2/TRK/001 *Inspection and Maintenance of Permanent Way* and NR/SP/CTM/011 *Competence and Training in Track Engineering*.