

## Route & technical specification

The route connects four key motorway terminals in the UK with a terminal in Northern France for the transport of unaccompanied trailers to and from mainland Europe. It will utilise the Channel Tunnel and will extend for approximately 530km (330 miles) in the UK. A facility at Liverpool Docks will be provided for Irish lorry traffic, maritime containers and related business.

### The route in the UK

In the UK Central Railway intends to construct a 530 kilometre long largely independent railway, avoiding interface conflicts with existing passenger services. This involves upgrading existing railway corridors by, in most instances, constructing two additional tracks parallel with existing lines. By and large, south of Leicester, Central Railway will be fully segregated from existing and planned rail passenger obligations. In the Midlands and Northwest, the frequency of existing passenger service is too low to restrict capacity. It also involves restoring tracks along disused and/or dismantled railway lines such as the Great Central routes in the Midlands and across the Pennines to Manchester. Several studies were undertaken to determine the best way to circuit London, the route around the inside of the M25 between Bletchingley and Gerrards Cross being chosen as the preferred alternative. As required by planning processes, the company will investigate a range of optional route phasing and terminal arrangements as a routine part of verification of its plans by the relevant bodies.

Terminal	Primary Motorway Access
Liverpool	None (Seaforth Port only)
Manchester West	M6/M62
Sheffield	M1/M18
Rugby	M1/M6
West London	M25/M40
France	A1/A26

Redundant and under-utilised railway rights of way will be adopted where this is cost-effective. The route will provide for operation of 1,500m

long freight shuttles leaving UK terminals at approximately hourly intervals during the day. From Leicester to Liverpool, route capacity will be tailored to traffic demand on each section. Timings will be adjusted as required to optimise the use of available paths through the Channel Tunnel and to accommodate UK franchise service undertakings.

### The route in France

In Northern France, the route proceeds from the Channel tunnel to a terminal to the southeast of Arras. With the exception of a short piece of new track, it uses upgraded existing railway lines. The route is 166 km in length in France. Central Railway's terminus in France will be at a road / rail junction, most likely close to the A1/A26 motorways to the southeast of Arras, which is approximately 170km north of Paris. Alternative options, which could save costs and add revenue to the project, are being assessed.

### Route description

The split between new rail corridor, upgrading existing tracks, new parallel tracks and the use of disused lines is shown below. This information sets the track plans within the context of relevant national rail infrastructure and indicates the relationship to motorway corridors. Access interfaces shown are generally to facilitate the use of Central Railway's infrastructure by other operators and to provide for access for construction and maintenance vehicles.

Construction Method	UK	France	Total
Upgrade existing line	162*	58	220
Add tracks	179	102	281
New route	92	6	98
Use dismantled route	99	0	99
Total	532	166	698

\* includes restoration of original four track formations

#### Liverpool to Earlestone

The route from Seaforth to Mount Olive Cord handles Port freight traffic only. The route further east is not heavily used at present but may be subject to issues of service development for NTPE to Earlestone.

#### Earlestone to Eccles

Access to the northwest terminal is provided for by using existing tracks to Parkside near Lowton Junction.

Operation of local services on a 20 minute interval would be sought to provide best fit with Central Railway service frequency of three trains per hour from the terminal.

#### Eccles to Miles Platting

A flyover at Ordsall provides two segregated tracks to approach as closely as possible to Victoria from the west. The route through Victoria is currently based upon one bidirectional track dedicated to freight services. Although preferred by the local authority, this is not optimal (further study prior to parliamentary submission would evaluate alternate routes).

#### Miles Platting to Guidebridge

This route has limited capacity. It is assumed that NTPE services will not be diverted to use this capacity.

#### Guidebridge to Penistone

The route from Guidebridge to Hadfield is shared with a PTE-sponsored 20 minute interval service. The freight shuttles will be scheduled through this section in a way that minimises timetable interaction. Provision of a freight loop at either end of the single track Woodhead Tunnel is included in the cost estimate and will be subject to timetable analysis. Consideration

will also be given to expanding the Woodhead Tunnel to accommodate two tracks, if single track results in schedule constraints.

#### Penistone to Sheffield

This section is dedicated to Central Railway.

#### Sheffield to Chesterfield

This route section is already a partly dedicated freight railway. Planning applications relating to Tinsley yard may force use of one of several alternate sites for the Sheffield terminal. This report therefore assumes that through trains to Manchester operate via Woodhouse/Darnall to access the Stockbridge line. As the segment of line to Beighton Junction carries passenger traffic, interlaced tracks or other means will be used at the two stations to minimize land take while maintaining platforms to appropriate standards. This route section would provide a single access track as at present to the North end of Tinsley yard. This is to avoid single ended terminal arrangements. Traffic levels will be such that sharing is unlikely to be an issue.

#### Chesterfield to Long Eaton

Because of the low frequency of services this route section presumes shared operation of a two track railway, with passing loops provided for Alfretton & Mansfield Parkway. From Tapton Junction to Clay Cross the route supports (or has supported) a four track formation throughout - full segregation of two tracks as dedicated freight capacity is proposed. (Present slow lines are to the east side of the route). Here interworking with EWS will be accommodated and does not justify provision of separation.

#### Long Eaton to Syston Junction

The full four track configuration of the Midlands Mainline route will be restored; this involves re-building the fourth track with Central Railway using the east side tracks exclusively for its freight service.

#### Syston Junction to Rugby

An SRA decision to develop the Nuneaton to Felixstowe route for freight services (as an alternative to routings through London) provides an opportunity for a combined

solution. A dedicated two track freight route from Syston Junction through to South Wigston is proposed. This will be shared with the SRA sponsored Nuneaton to Felixstowe route. The large-gauge Central Railway route will provide an alternative route for trains from further north linking to Felixstowe and thus may enhance Transpennine capacity. The two tracks bypass Leicester station using the freight yards to the east. This route section is already congested as passenger services, particularly those provided by MML, have grown in frequency. The new two track railway runs on the east side of the M1 from Wigston junction just south of Leicester to the M1/M6 junction.

#### **Rugby (M1/M6 Junction) to Ashendon**

The Midlands terminal is in the vicinity of the M1/M6 junction to maximise access to the West Midlands. The new route follows the east side of the M1 crossing over the WCML, where a cord would be constructed, and then continues to the south to re-enter the Great Central corridor near Willoughby. The two track route follows the alignment of the dismantled Great Central Railway through Daventry and Brackley to Ashendon. Interaction with Calvert freight traffic will be minimised.

#### **Ashendon Junction to Gerrards Cross**

After modest track shifts and station relocations two additional tracks on the south and west sides the railway will be built for Central Railway services along the whole of the corridor. This will include station and track modifications at most stations.

#### **Gerrards Cross to Merstham**

The route joins the Chiltern Line railway corridor just west of Gerrards Cross. The route continues to the proposed West London terminal serving the M3/M4/M40 corridors and west London. The line continues along the inside of the M25 to reach the Heathrow area. The route then continues along the inside of the motorway generally going under existing junctions and over crossing motorways until Junction 9 to the west of Leatherhead, where the route enters a long single bore tunnel under the North Downs re-surfacing to the south of the M25 west of Merstham.

#### **Merstham to Tonbridge**

The route continues around Merstham at the edge of the M25 motorway and crosses from the west to east side of the M23 via a short length of tunnel near the A25. From the Bletchingly tunnels two additional tracks will be built to the south of the existing tracks to Tonbridge.

#### **Tonbridge to Channel Tunnel**

At Tonbridge two additional tracks will be constructed in a depressed section to cross under the Hastings line. Further east the route shifts to the north side of the existing track via a short tunnel and parallel with the existing mid-Kent line to cross again to the south side near the River Beult west of Headcorn. Proceeding east through Ashford, using the Hastings platform (it would be rebuilt to the east) with an additional track along the south side, the route continues to Eurotunnel where it splits to avoid the Dollands Moor terminal before joining the fast lines.

#### **Channel Tunnel to French Terminal**

From the Eurotunnel exit a short length of single track will be built to link with the Boulogne line. The existing electrified line will be re-routed to eliminate the double curve and upgraded to handle Central Railway's structure gauge requirements. From to Boulogne to Etaples the existing two track line, 14 km in length will be electrified and structure clearances increased. From Etaples the existing single track line will be expanded to two tracks, with adequate clearances for Central Railway and electrified for a length of 98 km. The route proceeds to the new terminal and maintenance depot along a new alignment for approximately 3km to the southeast of Arras.

### **General system specifications**

The railway shall be designed to accommodate the following train types:

- Central Railway's freight shuttles
- Locomotive hauled freight trains comprising one locomotive at each end with a variable number of intermediate freight cars (train length may vary from 1000 to 1500 metres)
- Locomotive characteristics to be backward compatible with present Eurotunnel freight

shuttle locomotives in all respects and sufficient in power to operate within Eurotunnel 'standard path' specifications pulling loaded wagons

- Freight wagons type A, to be open vehicles suited to ramp end-loading of unaccompanied semi-trailers only. Wagons for lorry trailers are expected to be able to accommodate lorry trailers up to 4.2m high, 2.6m wide and 14.04m long
- Freight wagons type B, to be open frame vehicles suited to crane loading of maritime ISO standard freight containers. Containers of up to 40ft length (12.2m); 8ft width and 9ft 6inch height will be accommodated. Stacking of two containers is not provided for at the present time.

Vehicle designs will permit the following:

- Axle load maximum 22.5t to provide for interoperability in Europe (25.0 tonne operations are being investigated and will be considered as the design is developed)
- Gauge and axle load to permit operation through the Channel Tunnel
- Design maximum speed 135-40 kph
- To operate in normal train length of 1000 to 1500m.

### Other services

Although designed primarily as a freight railway, the design and operation will take into account franchise requirements for any passenger trains operating over Central Railway's facilities, subject to capacity and other constraints. The route will be designed to accommodate passenger trains of:

- up to 12 vehicles to C1 gauge with each vehicle of 23m length nominal
- nominal axle load per vehicle per standard passenger train specifications.

The route will also accommodate freight trains compatible with UIC Gauge C from Europe, and UK national traffic to W12 gauge. The latter may have axle loads of up to 25.5t at 120kph, and will generally comply with applicable Technical Specifications for Interoperability (TSI), and with UK Railway Group Standards on those aspects where the TSIs place no

requirement.

### Required route characteristics

The following design criteria will be followed as the route is developed:

- The alignment will provide for a normal gradient of up to 1.0% with a maximum not to exceed 1.5% for short lengths of track
- The alignment shall provide for worst case horizontal curvature of 200m radius
- Main line alignment shall provide for normal curve radius of 1000m minimum
- Vertical radius of curvature shall not exceed 1000m
- Nominal track centreline spacing of 3.74 - 4m
- Vertical clearances to structure to permit trailers on flat bed wagons with regular clearances for overhead catenary
- Rail super-elevation on curves shall not exceed 120mm
- Main line point-work shall support a minimum speed of 40kph on the divergent route, and 70kph on through-running loops.

Central Railway will require sufficient Right of Way ("ROW") for two tracks along independent sections of its route, plus land required for cutting and embankments, Overhead Line Electrification (OLE) structures, road and other crossings and utilities. For dual track sections the average width of ROW required will be approximately [12m] without special allowances for structures and grading. For the purposes of 'Limits of Deviation' a 25m ROW is applied to provide for most structures and earthworks under five metres in height.

### Service provision

All service frequencies indicated are for trains in one direction and assume the operation of the same service in the opposing direction. The system will be designed to sustain a minimum continuous traffic of 6-8 freight shuttle trains per hour (with the possibility of future expansion where feasible) at all locations south of Rugby where new infrastructure is provided principally for the freight service.

Between Rugby and Sheffield the system will be designed to sustain a minimum continuous traffic of four freight shuttle trains per hour at

all locations where new infrastructure is provided principally for the freight service. In the area in Leicester where the route is shared with the Felixstowe Nuneaton services, the capacity will be six freight trains per hour.

Between Sheffield and Newton-le-Willows, the system will be designed to sustain a minimum continuous traffic of three freight shuttle trains per hour at all locations where new infrastructure is provided principally for the freight service. The service to the west of Newton-le-Willows will be designed to support one train per hour.

The service will be sustained on a 20/24 hour basis with the recognition that maintenance possessions of four hours will typically apply at hours which minimize adverse impacts on Central Railway's revenues as well as the operations of any shared facilities. Where the route is shared with 'other services' single track operation may apply during the maintenance period. Terminals will remain operational throughout the daily maintenance period.

### Provision for expansion

Central Railway design specification makes provision for growth in freight shuttle traffic up to a peak capacity of eight trains per hour between 6am and 12pm. Although this will provide ample capacity to meet expected demand until 2016 - 2020, current traffic forecasts indicate that after that date these capacities could be exceeded.

In particular, it is expected that Central Railway will examine the best means for increasing network capacity along line segments where this is required. Various options exist that will need to be analysed. ERTMS level 2/3 will be in hand, this should permit closer headway control under normal operating conditions and could produce a 50% increase in capacity over current constraints, giving a peak period capacity of up to 12 trains per hour (freight shuttles operating at five minute headways). Where Central Railway is expanding or rebuilding bridges and new structures these will be designed to accommodate future expansion as required.

### Design factors

#### • Track and boundary arrangements

The design will presume the provision of UIC 60 or heavier rail with concrete sleepers and ballasted track. In tunnel sections a low profile slab track design will be applied to minimise tunnel section and maximise availability. Noise mitigation will be a principal concern when designing track and boundary arrangements. Central Railway does not support the concept of segregation fencing between its and Network Rail's formations except under exceptional circumstances, as access for maintenance and incident management purposes would be impeded. However, where off-side noise mitigation is required, there is likely to be segregation (see our Property Protection Scheme briefing note for further information).

#### • Stations

Station platforms will not be generally provided along the freight operating tracks. Where platforms are required, they will be located on loop or interlaced tracks that accommodate the longest passenger train expected to serve that station.

#### • Power Supplies

The route will be electrified with a 25kV catenary system compliant to the relevant TSI for operation of Medium Speed Trains on 'Connecting Lines'. Contact wire height will be maintained within 6.0m to 6.2m above rail level. (Note that this wire height will not support standard UK pantograph systems, and that the TSI pantograph head is not compatible with current UK practice). The electrical supply system will sustain a service of eight freight shuttles an hour in each direction in the segment of route between Rugby and Arras with the possibility of future expansion when and if required. A 2x25kV autotransformer supply arrangement is envisaged. Phase separation sections will conform to the TSI. Supply will be expandable to 12 trains per hour in the future. Where there is an interface with existing UK overhead electrification between Guidebridge and Hadfield, the local service trains will be adapted to inter-operate on the Central Railway system. (It is expected that

the existing trains will be replaced prior to this section of the Central Railway route opening. Therefore this requirement can form a part of the relevant procurement specification at minimal incremental cost).

- **Signal & Communication Systems**

The route will be fitted with ERTMS at level 2. Wayside signals will only be supplied where justified by local passenger train services. Train detection will typically employ axle counter systems. Separate detection of broken rails will be provided in both running rails to the maximum degree reasonably feasible. The entire route will be capable of bidirectional signalled operation for freight shuttles and other ERTMS equipped trains. A signalled headway requirement of three minutes will apply throughout the route as a minimum requirement on both tracks and in both directions of travel for all signalled main line movements. The freight shuttle locomotives will also be fully compatible with the Eurotunnel in-cab signalling system, TVM 430, and with the CSR / GSM-R voice radio systems.

### Freight shuttle terminal design

The terminal design provides access to loads via mobile ramps to trains split into sections. The feasibility of an alternative arrangements using side loading will be explored with the operator. The terminals will require significant land take, but are not capital intensive. Since similar terminals exist elsewhere, design detailing is a site specific issue with limited connection to other technical issues. Costs presume an operation based primarily on semi-trailers. Where applicable, land is reserved at terminal sites to permit the addition of container terminals and other freight operations. Containers may be loaded if they are mounted on over-to-road chassis.

Trains are intended to operate on a unit basis, with locomotives presumed to remain with their allocated set of wagons. Some reduction

in total fleet size may be achieved in subsequent design phases to the extent that locomotives can be allocated on a next-train basis.

The key interface characteristic is wagon width, which will determine the accuracy with which drivers are expected to reverse semi-trailers onto the wagon rakes. The greater the skill required, the longer the turn-round time is likely to be. The trade-off between wagon width and turn-round time is subject to further analysis but has little impact on system cost analysis.

Principal train and terminal required minimum operating performance requirement by terminal is shown below.

<b>Terminal</b>	<b>Travel Time</b>
Train terminal unload & loading	2 hours
Liverpool Seaforth - N France	8.2- 9.5 hours
M6/Salford - Northern France	7.7- 9.0 hours
Sheffield Tinsley - Northern France	6.3- 7.5 hours
Rugby M1/M6 - Northern France	4.9- 6.0 hours
West London - Northern France	3.9- 5.0 hours

### Vehicle & system maintenance facilities

The location of these facilities will be substantially determined by land availability and considerations of non-revenue mileage. With phased operation, temporary provisions will be provided in northern France and a site to be selected in the UK.

While every effort has been made to ensure the accuracy of the information contained in this document, no responsibility can be taken for errors or omissions made.