All-Party Parliamentary Group for High Speed Rail

Rail Capacity Inquiry

Response

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EXECUTIVE SUMMARY

This inquiry by the APPG for HSR is to be welcomed in view of Britain's ambivalence to its railways and inability to decide how best the rail network should be developed, or the role it should play in the country's economic and social development.

But it is also necessary to ask: *what exactly is the definition of 'capacity' ?*

The effect on capacity of different performance characteristics, train types and station limitations (e.g., platform lengths) is amply demonstrated by comparing the WCML from Euston with the potential service capability of Crossrail, now being built across London.

The WCML Fast Line may handle *[from December 2012]* 10 X 11-car inter-city Pendolino trains per hour, one 2 x 5-car Voyager trains and two 12-car Desiro commuter trains — giving an overall total seating capacity of just 8,150, or only 34% of that of Crossrail (24 trains per hour, carrying 24,000 passengers) at opening. The number of passengers that could be carried would be significantly greater if duplex trains could be operated — but this is not possible due to the restrictive nature of the British structure (or loading) gauge.

Although this subject tends to feature little in discussions about capacity, I believe the structure gauge issue is one of the more serious factors affecting future railway capacity in Britain.

It is unlikely that 'classic compatible' trains operating beyond the HS2 'Y' network will be able to offer many more than approximately 600 seats each — HS2 Ltd reckons the longest could be 260 metres, seating 650 passengers — whereas two 10-car trains, taking full advantage of the standard European structure gauge and 400 metre platform lengths, would offer 1,100 seats — and if they were of duplex design might offer, say, 1,500 seats.

High Speed Rail is therefore not only significant in attracting passengers due to much-reduced city centre-to-centre journey times, but also because it will be constructed to a structure gauge which could permit much larger numbers of passengers to be carried by each train service. And because operating costs **per seat** are then likely to be much less, the opportunity arises for a range of lower-priced fares to be offered — another factor ignored by critics who choose to claim that HSR will be a "rich man's railway."

However, in terms of future High Speed operations, the structure gauge issue may also have a major impact on investment and running costs. HS2 Ltd has estimated that building VHSTs small enough to operate on the 'classic' network (i.e., similar to today's Eurostars) will cost around 70% more than buying trains 'off the shelf' built to the European GC gauge. Moreover, for the whole life of 'classic compatible' trains, HS2 Ltd has estimated operating and maintenance costs will be 25% above 'off the shelf' trains. And these smaller train services will only carry 60% of the seats of those built to GC gauge.

The difficulties inflicted on operational capacity by the structure gauge also have an impact on potential freight train capacity. Network Rail's investment in improving multi-modal capacity is being achieved by raising structures, such as tunnels and bridges, but cannot address the much more intractable problem — that Britain's structure gauge is also *narrower* than the rest of Europe's (by almost half a metre).

If Britain is to achieve a significant modal shift from road (and domestic air, where relevant) to rail, and also achieve its long term targets for significant reductions in carbon emissions, it will require a railway network than can cope with high demand and offer competitive prices and as well as journey times.

With fuel prices never likely to return to levels experienced in the 20th Century and with other costs likely to become an increasing deterrent to road journeys — together with the need to reduce carbon emissions significantly and the consequences of the increasing travel demand arising from a growing population — the rail network must become, once again, a key element of the national transport infrastructure, much as motorways have been over the past half century.

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A. Introduction

A1. The problems with British attitudes towards transport policy and planning can be evidenced only a short walk from my home in Kenilworth in Warwickshire. There is the site of the former Kenilworth Junction where a line once diverged from the Leamington Spa-Coventry route towards Burton Green and Berkswell to join what is known today as the 'Coventry Corridor' of the West Coast Main Line. It meant trains could travel directly between Kenilworth and Birmingham, avoiding Coventry. Kenilworth became a popular dormitory town for Birmingham commuters and many fine houses were built in proximity of the rebuilt station that had been completed, together with the new line, in 1883/4.

A2. However, with the growth in car usage, the Leamington-Coventry route was one of the early victims of Dr Beeching's 'Reshaping' plans and in 1965 Kenilworth station was closed, and subsequently so was the line to Berkswell (which had been used for diversionary purposes during electrification between Coventry and Rugby, completed in 1967), and the line between Kenilworth and Leamington was reduced to a single track, with only a passing loop remaining just south of Kenilworth Junction. Tracks along the Berkswell line were dismantled together with the bridge, which hindered high vehicles using the A429 Coventry Road. The section between the junction and the A429 returned to the wilds, while beyond the Coventry Road the alignment to Burton Green and towards Berkswell was taken over by Warwickshire County Council and turned into a bridle way for walkers and horse riders (so a degree of 'transportation use' continued).

A3. Apart from several fruitless attempts by Warwickshire County Council to make plans for a replacement railway station in Kenilworth, the situation remained largely unchanged until the last two years, during which: -

> A3.1 Network Rail published its Route Utilisation Strategy for the West Midlands and Chiltern Line, proposing the route section between Leamington and Kenilworth should be returned to double track to provide extra capacity to meet growing demand for rail freight services (principally to/from Southampton), and to allow the Reading-Newcastle Intercity CrossCountry passenger service to be diverted via Coventry and Birmingham International Airport; double tracking would also be necessary if Warks CC was ever successful with plans for a new Kenilworth station.
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> A3.2 The section of the former Berkswell line between what had been Kenilworth Junction and the A429 was cleared and a new bridge constructed over the Coventry Road in 2011 so that it could form part of the emerging Sustrans national walking and cycle network, carrying on to the Warwick University campus. [This was one of 79 projects across the UK that won a national vote in 2007 of £50 million Big Lottery Funding for Sustrans.]
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> A3.3 The Sustrans network was also intended to embrace the former railway route, now bridle way, to Berkswell — but in March 2010 HS2 Ltd announced that the proposed new High Speed route from London to the West Midlands should incorporate the section of the former line between Burton Green and Berkswell.

A4. So a stretch of railway dating from the 19th Century heyday of railway developments (Leamington-Coventry) might now finally be returned to its original twin track status between Kenilworth and Leamington, after almost 50 years, while a section of closed line between Kenilworth and Berkswell has become part of a walking and cycle route thanks to Lottery funding — and the remainder of the same line is now proposed to become part of a 250mph-capable 21st Century High Speed Railway!

A5. This example — of what might be summarised as combining 'the sublime to the ridiculous' — amply illustrates Britain's ambivalence to its railway and inability to decide how best the rail network should be developed, or the role it should play in the country's economic and social development.

A6. Hence this inquiry by the APPG for High Speed Rail is to be welcomed.

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1) How do you view the current capacity situation on Britain's railways?

1.1 My first comment, in response to your request to make a submission to you, is to ask: *what exactly is the definition of 'capacity' in the sense of this inquiry?*

1.2 Are we talking about the number of passengers that can be accommodated on a particular route or network, or tonne/miles of freight, or a combination of both? Are we talking about the number of trains that might be operated over a specific section of track or tracks? Are we talking about the type of signalling and train control systems and how they may add to or lessen capacity? Are we talking about constraints on capacity generally caused by Britain's adoption in the 19th Century of a more-restrictive structure gauge than much of Europe and the rest of the world?

1.3 And then there are questions as to the adequacy of supporting infrastructure, such as passenger and freight terminals, car and cycle parking facilities and other associated linking/connecting services, such as buses and trams. For example, limited car parking capacity at some stations is often reckoned to suppress train travel.

1.4 The basic concept of a high-capacity railway is one that utilises trains of common performance characteristics to maximise the number of trains that can be operated per hour — typically up to 24, or one every 2.1/2 minutes. However, as trains of differing performance characteristics are operated, capacity is reduced. For example on the WCML out of Euston, given a mix of 125mph and 100mph trains, restrictive junction speeds and train stopping patterns, the Fast Line accommodates 13 trains per hour (tph). If 'performance allowance' (to compensate for minor disruptions) is omitted, it is possible that the WCML Fast Line out of Euston could accommodate 16 tph with a similar stopping pattern as now if trains had near-identical performance — but the slightest disturbance/delay from the precise plan would play havoc with reliability and punctuality along the whole route.

1.5 The effect on capacity of different performance characteristics, train types and station limitations (e.g., platform lengths) is amply demonstrated by comparing the WCML from Euston with the potential service capability of Crossrail, now being built across London. The latter will be able to handle 24 tph, each train comprising 10 cars initially (but with scope to increase to 12 cars). If we assume a capacity of 1,000 passengers per 10-car train, the theoretical capacity (one way) will be 24,000 pax/hour.

1.6 By comparison, the WCML Fast Line out of Euston may handle *[from December 2012]* 10 X 11-car inter-city Pendolino trains per hour (each of, say, 600 seats), one 2 x 5-car Voyager trains (say, 550 seats) and two 12-car Desiro commuter trains (say, 900 seats) — giving an overall total capacity of just 8,250, or only 34% of that of Crossrail at opening. [When additional trains, just announced, capable of 110mph are available to London Midland, an additional fast line train per hour should be possible, raising the pax/hour to, say, 9,150, or 38% of Crossrail at opening.]

1.7 The number of passengers that could be carried on either route would be significantly greater if duplex trains could be operated — but this simply is not possible due to the restrictive nature of the British structure (or loading) gauge. Although this subject tends to feature little in discussions about capacity, I believe the structure gauge issue is one of the more serious factors affecting future railway capacity in Britain.

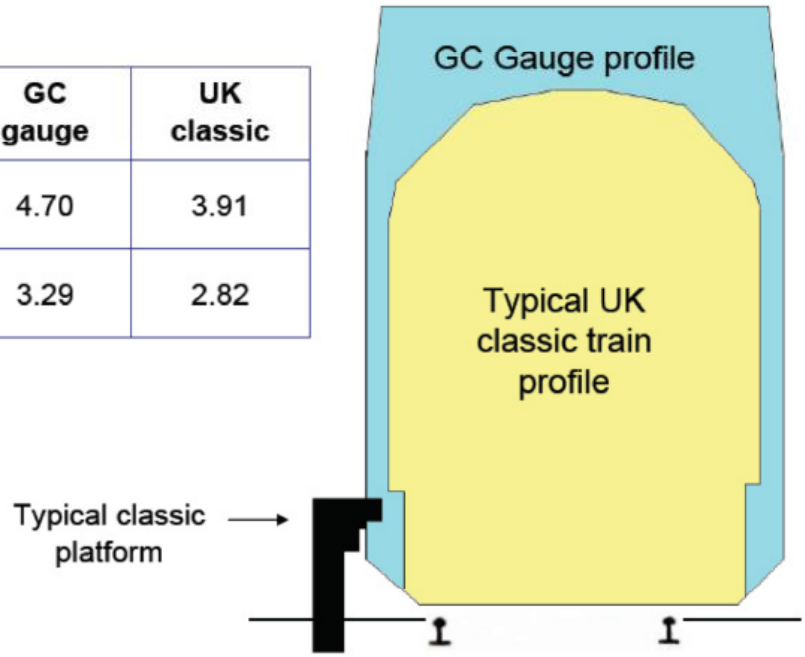
1.8 For example, while the use of 'classic compatible' trains will mean that locations beyond the first phase of the HS2 route — or, later, beyond the Y network — can be served by trains also able to exploit the speed advantage of sections of HS2, these trains will be restricted off the High Speed network by the current structure gauge limitations, including platform lengths (typically 250 metres or less, compared with new HSR platforms of 400 metres) as well as width and height.

1.9 Therefore, it is unlikely that Very High Speed trains (VHSTs) operating beyond the Y network will be able to offer much more than approximately 600 seats each — HS2 Ltd reckons the longest could be 260 metres, seating 650 passengers — whereas two 10-car VHSTs, taking full advantage of the standard European structure gauge (GC, to which HS2 is planned to be built, as is HS1 already) and platform lengths, would offer 1,100 seats —

and if they were to be of duplex design, might offer, say, 1,500 seats (depending on the internal configuration).

• Structure gauge comparisons

	GC gauge	UK classic
Maximum height (m)	4.70	3.91
Maximum width (m)	3.29	2.82



(Image: HS2 Ltd)

• Duplex VHSTs, such as this French train, could carry upwards of 1,500 passengers when operating in pairs, 400 metres long — but are too large to operate within Britain's current structure gauge.

1.10 High Speed Rail is therefore not only significant in attracting passengers in future, for example from both road and aviation, due to much-reduced city centre-to-city centre journey times, but because it will be constructed to a wider and higher structure gauge, and have longer platforms, enabling much larger numbers of passengers to be carried by each train service. And because operating costs **per seat** are then likely to be much less than for smaller trains, the opportunity arises for a range of lower-priced fares to be offered (similar to the marketing techniques adopted by the airlines following introduction of wider-bodied and/or larger-capacity aircraft) — another factor ignored by critics, who prefer to claim, wrongly in my view, that HSR will be a "rich man's railway."

1.11 The difficulties inflicted on operational capacity by the structure gauge also have an impact on potential freight train capacity. In multi-modal operations, some of the problems have been or are being overcome by Network Rail's programme of raising structures to enable the standard international container box of 9ft 6in depth to be carried on UK standard-height wagons. This avoids the need for specially built wagons, with low platforms between the bogies, which are both costly and restrict total train capacity. It is notable that since Network Rail has been able to make significant structure gauge enhancements along the routes to/from the Haven Ports and Southampton the number of containers being carried by trains instead of lorries has increased considerably.

• 8ft and 9ft 6in containers heading for Southampton on a standard height wagon

1.12 But progress with improving the structure gauge, and thus capacity, is slow. For example there still remains only one route cleared for 9ft 6in-high containers into Scotland, the West Coast Main Line. At present, diesel locomotives haul most freight trains over the northern section of the WCML (even though the route is electrified) with much-inferior performance to electric ones and their slow speeds over the steep northern gradients further limit route capacity (also the time available for essential track maintenance).

1.13 However, although NR's investment in improving multi-modal capacity has been achieved by raising structures, such as tunnels and bridges, it has not addressed the much more intractable problem — that Britain's structure gauge is also *narrower* than the rest of Europe's (by almost half a metre).

1.14 DB Schenker has recently highlighted this problem with introduction of its freight service from and to Poland, using rail freight wagons built to the full European structure gauge which therefore can only enter Britain from the Channel Tunnel via HS1 and must terminate in East London (Barking) because the structure gauge on the rest of the network is too restrictive. Goods in these wagons can only be taken forward by transhipment to other vehicles (typically lorries) — a 21st Century echo of the 19th Century's chaos at places like Gloucester where trains running on 'standard' gauge tracks met those of the

Great Western Railway operating on 'broad gauge' tracks. After the 'gauge war' Britain adopted the 'standard' gauge of 4ft 8.1/2in (1,435mm), as did most of the rest of Europe — but unfortunately Britain retained its limited structure gauge.

• GC gauge freight wagon at Barking having travelled on HS1

1.15 There have been suggestions that the slow lines of the Midland Main Line could be converted to European width as well as height standards and if this route was linked with re-opening of the former Sheffield-Manchester route via Woodhead it could provide a GC-gauge route at least as far as South Yorkshire and Greater Manchester.

1.16 In terms of future High Speed Rail operations, the structure gauge issue will also have a major impact on investment and running costs. HS2 Ltd has estimated that the cost of building VHSTs small enough to operate on the 'classic' network (i.e., similar in size to today's Eurostars) will be around 70% higher than buying the rolling stock 'off the shelf' built to the European gauge. Moreover, for the whole life of 'classic compatible' trains, HS2 Ltd has estimated that operating and maintenance costs will be 25% higher than 'off the shelf' trains built to GC gauge.

1.17 In my view, in order to minimise the high costs implicit in 'classic compatible' operations, it would be desirable to construct the full HS2 'Y' network in a single phase if at all possible. I say this not only to achieve the fullest economic and transport benefits at an earlier stage but because of the long-term savings that would accrue to initial investment and subsequent train operating costs, and the greatly increased capacity that it would make possible from the outset.

1.18 Britain's restricted loading gauge also has serious implications for rolling stock manufacturers, who are not really able to compete to produce trains to the European scale. If they were to do so, each vehicle would have to be conveyed by road as a wide load at least as far as HS1 in East London. By comparison, European manufacturers can

build trains down to the British loading gauge, then haul them from their factories across Europe, through the Channel Tunnel and deliver them anywhere on the British network.

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2 - {What capacity do you believe Britain's railways will require in the future?
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{What is the best way of providing capacity and future-proofing Britain's rail network?
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{What will be the effects of providing extra capacity, beyond addressing journey supply? What would be risked by failing to provide that capacity?

2.1 If Britain is to achieve a significant modal shift from road (and domestic air, where relevant) to rail, and achieve its long-term targets for significant reductions in carbon emissions, it will require a railway network that can cope with high demand and offer competitive prices as well as competitive journey times.

2.2 There is little doubt (and plenty of evidence from other countries that already operate HSR services) that in terms of journey time reductions High Speed Rail can become enticingly attractive to many of today's non-rail travellers. But it is questionable whether attractive fares can be offered in Britain unless considerably greater capacity is available (and it should be noted that a principal reason for many of the high-priced peak hour fares today is simply the law of supply and demand — capacity has been depressed by past actions, e.g. Beeching, and by physical limitations, including the size of trains due to the structure gauge and restricted platform lengths, and fares reflect these capacity limitations — while the number of passengers today is at its highest for the past 90 years!).

2.3 As explained above, one of the great advantages of building new lines is that they can be constructed to the full European loading gauge, thus permitting longer, wider and higher trains able to carry many more passengers than 'classic compatible' ones, but with only relatively marginal increases in operating costs **per seat**. The objective for marketers is then to maximise seat occupancy, which will be best done by offering attractive fares in a similar manner to that already proven by many airlines. HS2 cost estimates also clearly demonstrate that building a new line to High Speed standards is only about 10% greater than for a conventional one, but with much faster journey times a HSR line will attract substantially more passengers and produce a greatly superior business case.

2.4 With oil prices never likely to return to levels experienced in the 20th Century and with other costs likely to become an increasing burden and deterrent to road journeys — together with the need to reduce carbon emissions significantly, and the consequences of rising travel demand resulting from a growing population, largely due to longevity — the rail network needs to become, once again, a key element of the national transport infrastructure, as motorways have been over the past half century.

2.5 But in developing additional railway capacity, whether with new infrastructure or more and larger trains, or both, it is also essential that associated systems make access to and egress from the rail network as seamless as possible. Therefore, there will be a continuing need for integrated planning of land use and terminals (either new or expanded), as well as provision of bus, tram and other feeder services, together with walking and cycling routes, and, of course, adequate car parks — which will need in future to be equipped for electric cars so that they may be charged while the occupant(s) undertake their main centre-to-centre journey by train.

2.6 For increasing volumes of rail freight there will also need to be sufficient terminals, strategically located for distribution of goods by deliveries to and collections from all significant population areas — again, ideally, using electrically-powered road vehicles. It will be essential that local planning authorities do not frustrate development of strategic freight terminals by refusing planning permissions or by seeking to make excessive restrictions.