HS2's Eastern Arm Version 3

Ardent students of the shape-shifting and shrinking nature of HS2's wider scope may have noticed, with some surprise from recent Government statements, that the Eastern Arm of HS2 may *not* now be entirely discarded.

Instead it could be set to live on in a much changed form, very largely using existing railways instead of new high-speed lines.

The complete demise of the Eastern Arm was signalled in Prime Minister Sunak's October 2023 major cut-back to the scope of HS2.

But in a newly revised form, HS2 could still bring benefits to the East Midlands and Yorkshire *using existing railways*, instead of new high-speed alignments as this paper explains.

The important shift can be found in the Secretary of State's instruction to HS2 Ltd[1] *to retain the 'spurs' to Phases 2a and 2b*. These spurs relate to the possible (later) addition of:

(i) a connection northwards in some form to Crewe (this is the 'Phase 2a' part of the instruction: we have discussed the important choices on this issue previously – see Filling the gap: West Midlands-North West England – Greengauge 21)

and

(ii) a connection to a revised form of an Eastern Limb (that's the *Phase 2b* part).

Here we explore the implications of this second (Phase 2b) spur, which is clearly intended to provide some form of HS2 service to the eastern side of the country.

What has been abandoned... and what retained

Property acquired by HS2 Ltd for the original eastern limb is still set to be abandoned. And this includes the route between the West and East Midlands *via* Toton (between Derby and Nottingham) which is no longer being pursued.

Flashback to 2021 and the Integrated Rail Plan

The prospects for a new high-speed rail alignment (the 'Eastern Arm' of the HS2 Y-shaped network) were diminished by the previous Government's Integrated Rail Plan (IRP) of November 2021. The IRP set out options for the Eastern Arm, including the possible use of existing railways as an alternative to a new HS2 alignment.

The new-build section of HS2 line, essentially east-west across the Midlands including a new East Midlands Parkway station, would need to have been retained in all cases. In the IRP, it was envisaged that the 'cross-Midlands' high-speed line part of HS2 would either connect into a new high-speed north-south alignment, or into existing north-south railways to reach Yorkshire.

For detail of the Integrated Rail Plan, see:

https://www.gov.uk/government/publications/integrated-rail-plan-for-the-north-and-the-midland

The Secretary of State's new guidance to HS2 Ltd mentions a modest exception to the complete abandonment of the Eastern Arm property protections. We understand that this small exception arises

[1] Initial assessment of HS2's current position on cost and schedule

in Leeds, adjacent to the existing Leeds station. Here property acquisition/protection is to be retained for 'onward station access' arrangements, which we understand is most likely to take the form of a re-sited station car park.

But the more significant part of the instruction to HS2 Ltd is that provision is still to be made for a junction pointing east (the term used is 'spur') on HS2 in the West Midlands, and this is now envisaged to accommodate the connection of a future 'conventional speed' railway to HS2.

The Secretary of State's instruction to HS2 Ltd's CEO is needed because the 'spur' is to be provided on the Phase 1 route, which is now under construction[2]. The location is where connection for the Phase 2b 'Eastern Arm' alignment was to have been located, the point where the two 'arms' of the once-envisaged Y-shaped high-speed network would come together.

Although this instruction passed without stirring wider public interest, we believe this is an important shift, and one which can ensure that cities on the east side of England can in future get a valuable economic boost from HS2, as well as those on the western side.

Implications

To be clear, HS2's Eastern Arm – that is, a new line built to high-speed operating standards – is *not* to going be re-instated. But the ability to provide a connection to a 'conventional speed line' instead signals a further shift away from any notion of HS2 as a free-standing line with operations largely insulated from the vagaries of using the existing rail network.

This was never an absolute position of course, but there was often the feeling that 'onward HS2 connections' – to today's national network – so that HS2 trains could reach Glasgow and Newcastle, for example, were something of a side-show.

Now, with a much reduced footprint of new-build high-speed railway, it is time to shake off any residual notion of HS2 offering a self-contained free-standing railway. As things now stand, only London-Birmingham services will be able to operate throughout on HS2 tracks.

HS2 Eastern Arm, version as of 2025

The 'spur' from HS2 to a future Eastern Arm was originally planned to be provided on the section of HS2 between the delta junction into Birmingham Curzon Street and Handsacre Junction[3]. Presumably, the scope for the spur will be agreed and set by HS2 Ltd to provide the necessary earthworks, trackwork and signalling to permit the subsequent construction of the link without significant disruption what (by then) should be the established pattern of operation of services between London and North West England and Glasgow. The change is that the spur is now envisaged to connect HS2 to the existing railway from Birmingham to Derby and Sheffield, with a short new line built to conventional design speeds.

It had been noted for a while by some commentators that, at the expected location of this planned junction on HS2, the existing Birmingham-Derby main line is within 5 miles distance. It raises the possibility of a much lower cost means of providing an effective 'Eastern Arm' using the HS2 line to London.

The opportunity created would be for **a Leeds-Sheffield-Derby-London HS2 service** using existing stations in these Yorkshire and East Midlands cities, using existing lines and the new connecting line of some 5 miles length to reach HS2. Trains on this route would operate at 'conventional' line speeds over existing lines (and the connecting line) and at high-speed when using HS2 infrastructure.

A service frequency of 2 trains/hour in each direction is envisaged. Higher service frequencies would likely be constrained by the need to accommodate new HS2 services on existing lines alongside existing train services. However the HS2 Phase 1 core route to London could handle more, once the planned second phase of the HS2 station at Euston is brought into active use.

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[2] Where the spur is to be provided, construction work is currently on hold, but will re-commence in due course

[3]where the HS2 phase1 alignment re-joins the West Coast Main Line

In comparison with the currently presumed HS2 service plans, this development would mean adding to the set of cities with direct HS2 trains:

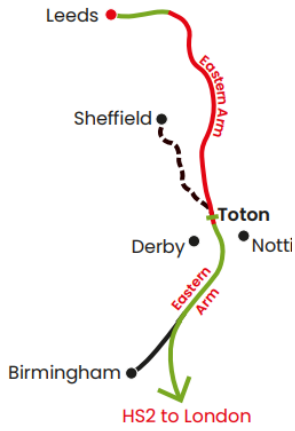
- **Derby** (it had been originally proposed that Derby along with Nottingham would *not* be served directly by the HS2 Eastern Arm, but from an HS2 station at Toton);
- **Sheffield,** which was originally planned to be served by a station at Meadowhall, but latterly over a lengthy traverse of a secondary line branching off from HS2 at Toton;

as well as

- **Leeds,** which would originally have had a faster service over a fully-fledged high-speed route.

Overall, economic gains would not be so great as those from the original HS2 plans, but then the *capital outlay would be very substantially reduced*. In the case of Derby, connectivity gains would be greater and felt more directly. Sheffield was in any event to have had services provided over an existing secondary route from Toton: the new route *via* Derby to Sheffield will miss a section of high-speed line, but is actually shorter than that once intended *via* Toton.

Earlier plans for HS2's Eastern Arm[4]



Source: Greengauge 21

Perhaps most important of all, subject to provision of the planned second stage of incremental capacity at Euston, these 'eastern side of England' HS2 services *could be introduced much sooner* (say, ten years earlier) than would be possible with the original HS2 Eastern Arm plans.

New connection to the Birmingham-Derby line

The new connection would be around 5 miles in length, built from the HS2 'main line' near Kingsbury to join the existing railway from Birmingham to Derby (most likely between Kingsbury junction and Wilncote). This is already a busy, relatively straight, main line railway, with a mix of long distance cross country services and railfreight. To accommodate additional train services on the Birmingham-Derby-Sheffield line will require (at the least) re-consideration of existing signalling systems and electrification, and possibly other forms of incremental improvements to today's railway line.

The new 'short & conventional' connection to join with HS2 would of course also require planning powers. It will *not* be following the originally planned Phase 2b alignment (for which Parliamentary Powers don't exist and which would necessarily have been sought at some stage if the earlier Integrated Rail Plan was to proceed).[5]

As a much more modest infrastructure scheme of some 5 miles route length to be operated at 'conventional' line speeds, with fewer local impacts, it might be appropriate to use a Transport & Works

[4] See: Sheffield-Leeds-Whats-Next-A4-FINAL-1.pdf, December 2022

[5] While a Hybrid Bill Parliamentary process for the Eastern Limb has not been started, this hasn't stopped some land being purchased by HS2 ltd, for instance, controversially at the Shimmer Estate in South Yorkshire. All land acquired apart from a small section in Leeds will now need to be re-sold.

order process (as was successfully used in the 2000s on the Trent Valley 4-tracking and the Norton Junction schemes), rather than a Hybrid Bill approach as used on the main sections of HS2, to obtain the necessary planning powers. This would relieve Parliament of the risk of another resource-hungry, and lengthy, Bill Committee process.

Choices

There would be an option to make the new connection to HS2 Phase 1 further north (so shifting the location of the spur to be provided as part of HS2 Phase 1) so that services joining HS2 would leave the existing Derby-Birmingham line to the north of Tamworth, and use what might turn out to be a shorter section of new line. This would enable Eastern Arm HS2 trains to travel a slightly greater distance on HS2, and so shorten journey times, and quite possibly shorten the length of the new connecting line needed too.

It would also avoid introducing new trains on the section of line through Tamworth/Wilncote leaving the existing railway there better able to accommodate future Birmingham commuter service provision to/from Tamworth. But there is a trade-off: such a switch would rule out the possibility of selected Tamworth station calls on HS2 services (which could provide access to HS2 services from a catchment that includes Lichfield as well as from other intermediate stations on the Birmingham-Derby and West Coast Main lines).

We understand that a connection to the Birmingham Derby line was examined by HS2 Ltd some years ago, so there may be available off-the-shelf assessments to inform the process.

Urgency

The time available to consider options for the location of this short new link between HS2 and the national rail network is limited. Works on the section of Phase 1 between the HS2 Delta Junction and Handsacre junction is, as it happens, currently on hold as part of the rationalised and re-phased Phase1 delivery plan, but will be re-started in due course. While the need to make provision for a Phase 2b spur may not appear to be an immediate concern, a firm decision on its location is needed. There is a short window of opportunity to ensure the pros and cons and possible local impacts are examined, and an informed decision made.

It would be wise to examine the options and make public the findings of what would be a short, focussed assessment. Such a study would need to take into account environmental and other impacts, but account should also be taken of the wish of the current Government to make sure that critical infrastructure decisions are not unnecessarily held up. This scheme, while modest in scale and adopting conventional (rather than high-speed) design standards, will itself be a project of national significance, and should be afforded priority status.

It would be hard to find elsewhere such a modestly-sized infrastructure project with equivalent economic growth potential – productivity gains from improved connectivity between two of the nation's nine planning regions - *Yorkshire & the Humber* and the *East Midlands* on the one hand, and three others (*West Midlands, South East and London,* on the other).

So, we recommend that a study of the possible alignment choices for short Eastern Arm connection options should be instigated without delay: this is a relatively modest project but certainly one of national significance. The current transition to Great British Railways (GBR) should not be allowed to delay this work.

Service Benefits

(i) Derby and Sheffield

These two cities are served by today's East Midland Railway service over the Midland Main Line (MML). This is (in 'Inter City' terms) a Cinderella route, only capable of supporting a short stretch of 125 mile/h operation, electrified only as far north as Wigston (which is to the south of Leicester) and operating to & from a space-restricted concourse in London's St Pancras station.

Fast or semi-fast services currently link the main East Midlands cities with London, running typically to/from Nottingham or Sheffield, where trains have lengthy turn-rounds occupying scarce platform space in the city's main station.

With a new connection available for faster services from Derby and Sheffield using HS2, the existing MML service plan could be re-configured to improve London connections for Leicester and Nottingham and key intermediate stations[6] between Sheffield and London. Passenger demand pressures at the domestic part of St Pancras station would be relieved by a switch of Sheffield and Derby passengers to HS2 platforms at nearby Euston.

Sheffield, it has been estimated, could gain a full half-hour saving over today's London journey times, helping it shrink the city's connectivity to the capital, gaining the locational advantages currently enjoyed by Leeds and Manchester with their faster services. Derby-London journeys would be accelerated by a near-similar amount.

These gains would help the locational appeal of Sheffield for business investment, building on its pre-eminence in the field of advanced manufacturing.

For Derby, one of the nation's existing productivity hot spots, with major employers in the form of Rolls Royce and Toyota, it would mean joining what can be seen as the British component of Europe's high-speed rail network of train services. Handy enough since it is the designated HQ for Great British Railways: better not to be on a back-water of the national rail system!

(ii) Leeds and West Yorkshire

As far as Leeds and nearby Wakefield are concerned, each city is served by London trains which operate over the East Coast Main Line (ECML) to London Kings Cross. Here the current ambition is to increase train frequency above its current 2 train/hour pattern: there is plenty of demand, but further capacity on the ECML is at a premium, as is platform capacity at Leeds station.

As with Sheffield, most London trains 'lay over' at their northern terminus – in this case at Leeds station, wasting platform capacity, and causing time-consuming crossing moves in and back out of the station in the process.

Oddly at present, London trains approach Leeds from the west, necessarily so because of the need to serve Wakefield *en route,* a station call for London trains that serves as a useful 'railhead' for wider West Yorkshire.

But today's arrangement precludes serving Bradford (or Harrogate or Skipton) directly with a fast London service, since the service extensions from Leeds onwards to these places creates a need to reverse trains at Leeds station, an inefficient and slow process to the frustration of passengers and rail service providers alike.

An alternative arrangement – once proposed in part by GNER in the days of franchising – would see Kings Cross trains approach Leeds much more directly from the East Coast Main Line at Hambleton, that is, from the east rather than the west. This brings three key benefits:

- A shorter (and higher line-speed) route with an intermediate stop at Wakefield removed – so, an acceleration of Leeds-London train timings
- The opportunity for more and faster direct London services for Bradford (and Harrogate and Skipton)
- Relief to the pressures on platform capacity at Leeds station with most services extended to serve Bradford/West Yorkshire more widely, and so far fewer trains 'laying over' in Leeds station platforms.

But there is a key drawback of course: the re-routing of Leeds-London KX trains to a faster, more direct route would mean Wakefield would lose its direct half-hourly interval London services. This is where the scaled-back short connection as described here, to form an HS2 Eastern Arm, enters the picture. In

[6] These include Bedford where, in future, easy interchange with the new Oxford-Cambridge line will be possible

future, HS2 services operating from Leeds *via* Derby and HS2 to London would inevitably pass Wakefield *en route*, and so could allow Wakefield to retain its fast half hour interval London service, using HS2 instead of the East Coast Main Line. Journey times from Wakefield using HS2 to reach London would match those achievable today, so protecting the wider 'rail-head' role that Wakefield provides to its wide catchment.

Interim measures should be feasible (subject to pathing constraints) with the potential scope to extend existing East Midlands Trains from London to Sheffield onwards to Wakefield to help build market confidence ahead of the speed up that HS2 would offer in due course.

Other service opportunities should also be considered. Would a limited-stop Birmingham (Curzon Street)-Derby-Sheffield-Leeds-York-Newcastle-Edinburgh service be of value, for example, adding to the services that could use the new Phase 2b spur, using the under-utilised west-north component of HS2's Delta junction in the West Midlands, and the spare platforming available at HS2's Curzon Street station?

Conclusion

DfT asking HS2 Ltd, in its infrastructure works on the Phase 1 scheme, to ensure that a short spur is provided to a future eastern 'Phase 2b' re-imagined as a conventional speed railway means that the 'Eastern Arm' of HS2 lives on, but in a hugely scaled-back version in terms of cost to the public account.

We believe it makes good sense at this time.

East Midlands and South, West and North Yorkshire economies can all gain from HS2, and the opportunity it had been assumed was lost in the amputation of HS2 plans in October 2023, can be significantly recovered.

The bigger direct winners would be Derby and Sheffield. The train service and economic connectivity gains for these cities could be substantial.

A coherent plan is possible that can ensure there are wider, all-round, connectivity gains, as described here for Leeds and especially Bradford (and North Yorkshire) too.

Care needs to be taken to ensure that the very much shorter connection, built to 'conventional not high-speed' standards from HS2 to serve the eastern side of the country is provided at the best feasible location, and is specified in a way that maximises value for money in terms of the public account.

We urge DfT to ensure that the work needed to assess the best location for the 'Eastern Arm spur' – and for its alignment onwards to the nearby Birmingham-Derby line – is carried out without delay and its results are widely shared. Action on this issue cannot wait until a fully-fledged GBR is in place.

This is a huge opportunity to show how value for money can still be obtained from the cut-back form of HS2 which is now in the middle of its construction phase, ensuring that cities on the eastern side of the country, as well as on the western side, benefit from the capital outlay on HS2.

Greengauge 21, August 2025