



GREENGAUGE21
Shaping tomorrow's railway

East Coast High Speed

The aim of the ‘Y’ shape for HS2 was to ensure that both sides of the Pennines in northern England would benefit from the project. But planning HS2’s Eastern Arm forced the project’s planners into some awkward choices and compromises (see Philip Haigh, *RAIL* 959). The original scheme has unravelled as a consequence. Eleven years on, the £96bn Integrated Rail Plan (IRP) abandoned commitment to the full Eastern Arm scheme on affordability and value for money grounds (but also didn’t rule it out for ever). The wrong route alignment choices had been taken in earlier years, or so it was implied.

The 2010 Outline Y shaped HS2 Network



This has not gone down well with those responsible for building the regional economic prosperity of the eastern side Britain, for whom a long-term commitment to high speed rail is a building block. The West Midlands and the North West benefits from HS2 as soon as Phase 1/2a opens, with further journey time gains when the Manchester is reached in Phase 2b. The East Midlands, Yorkshire/Humber and the North East must wait until after Phase 2b and part of Northern Powerhouse Rail is completed before knowing their fate.

The 2010 plan for HS2 shown above has been ruled out as costing too much. Instead of delivering east-west economic balance, HS2 is now going to favour the already better performing west side of England for perhaps another thirty years.

Reason enough to ensure the review of the five options identified for HS2 within the eastern geography are examined thoroughly and rapidly. While there will be alignment design and local impacts to consider of course, we believe the strategic level choices are already apparent and can be determined soon enough.

Eastern Arm: current status

First, let’s be clear, the IRP **does commit** to the part of the Eastern Arm which links the East and West Midlands. The issue then becomes which onward connections to provide between the East Midlands and Yorkshire. Greengauge 21 believes there is a better option than the original scheme which failed to serve any city between the West Midlands and Leeds (and which required a separate Leeds ‘bypass’ for onward connection to York and Newcastle).

The original Eastern arm scheme—‘quickest route to Leeds/forget everywhere else’—approach created three problems:

- » It left key intermediate cities—Derby and Nottingham—unserved, and Sheffield ultimately reached only by a lengthy loop using existing lines
- » Neither the lengthy Sheffield loop nor another necessary element, a high speed Leeds bypass, would be well used— making investment hard to justify
- » The overall effect was a failure to create usable released capacity—a large part of the rationale for high speed rail. In this case, there would be no relief for the busy Midland Main Line.

The unserved East Midland cities were to be served by connections from a single intermediate HS2 station, to be built at Toton. Nottingham’s LRT system could be extended to an interchange here, but the onward journey time to Nottingham city centre would be well over 30 minutes. For Derby, it would most likely be a 10-mile bus connection along a busy A52. You can almost sense potential HS2 travellers doing the sums and deciding to forget HS2 and stick to the Midland Main line or the M1/M6.

The current Midland Main Line (MML) service from St Pancras to destinations north of Leicester provides, over each of its limbs onwards to Nottingham and Derby-Sheffield respectively, an hourly fast St Pancras service and an hourly semi-fast service: all useful connectivity for the three largest East Midland cities. If HS2 served the East Midlands solely via a station at Toton, withdrawal of any one of these current MML services means traveller ‘disbenefits’, including to those who want to travel to/from Leicester, Derby, Nottingham and Sheffield city centres. These adverse impacts would have to be scored alongside the undoubted gains from HS2 services to/from Leeds. So, to avoid damaging the project’s business case, none of the current MML services are assumed to be withdrawn. This is very different from the relief impact of HS2 on the West Coast Main Line.

With no capacity release, good ideas like a new through MML service from Mansfield southwards via Toton onto the Midland Main Line are not possible. A solution that serves Derby and Nottingham directly with HS2 services is what is needed to overcome this short-coming. This would provide connectivity gains to these city centres, where economic performance and opportunity is at its highest. There is then no need to retain separate fast services to St Pancras from Nottingham/Derby/Sheffield and the MML timetable can be recast beneficially for Leicester and the other places it serves.

The original scheme in Leeds was also far from ideal. Incorporation of HS2 platforms within an expanded Leeds City station had been ruled out, and so the answer was to be a set of terminal platforms built at 90° to the existing station. So no chance of extending HS2 Leeds trains to, say, Bradford—or indeed anywhere else. Onward HS2 services to York and North East England required their own high speed Leeds bypass.

Nonetheless, one of the options set to be examined again is the original scheme, with the one intermediate station at Toton. It forms a lowly benchmark. The objective of getting to Leeds as fast as possible in practice meant bypassing everywhere en route, so poor outcomes for almost everywhere else.

HS2's Conceptual Design

The HS2 network design has always included onward connections over existing lines. London–Glasgow HS2 services will, for example, travel a greater distance over Network Rail lines (243 miles) than over HS2.

Network Rail and HS2 Ltd have quite different remits and objectives. If running HS2 services over Network Rail lines was viewed from the start as a problem rather than an opportunity, then it should come as no surprise that HS2 was conceived largely as a Japanese-style self-contained system. Its core concept is a set of point to point flows between dead-end termini in London, Birmingham, Manchester and Leeds: Euston, Curzon Street, Piccadilly and New Lane. For the Eastern arm, we believe this philosophy should change. The benefits of integration with the existing network should be recognised and prioritised. The pause triggered by the Integrated Rail Plan should be used to bring this about.

In Japan there are precedents for building Shinkansen stations in non-urban locations and waiting for the surrounding development to follow. Across the nations of Europe, on the other hand, the high speed rail approach is to access city centres using existing railways, with enhancements to city centre stations as needed. This fits better with the British pattern of supporting city growth as the driver of economic growth in a service sector-led economy, while trying to resist urban sprawl and protect the countryside. And it supports the creation of a linked set of national rail hubs.

It is also surely time to drop some EU standards that have been used by HS2 Ltd to date. Without a through-running connection to HS1, there is no sensible case for retaining design standards that allow for future use of European Gauge bi-level high speed trainsets, in the style of the Duplex TGVs used on high speed rail lines in France. This facility can be dropped on HS2's Eastern arm where, in each option available except the original via-Toton plan, all services will continue onwards onto Network Rail tracks where, of course, duplex trains won't fit. This will save multiple ££ capital outlay per-km.

The HS2 rolling stock order for Phases 1+2a, which will see HS2 services operate into Manchester, Liverpool and Glasgow over existing ('classic') lines, has now been placed with Hitachi-Alstom. The specification is for a single 'classic compatible' train design. (It's surely time to drop this mouthful, and come up with something more appropriate.)¹ The possibility of an EU gauge bi-level 'captive' train design in later years will remain available for (say) a London–Birmingham service, if desired.

Another European standard that should be dropped is the rigid 200m/400m train length format. When it comes to looking at the Eastern arm, there are options that make use of upgrades to reach places such as Derby, Sheffield, York and Newcastle. In these cities, HS2 services will use existing city centre stations that cannot accommodate c300m train lengths, but not 400m trains. It is a myth that there is a Technical Standard of Interoperability (TSI) that requires the adoption of 400m long high speed trains: very few trains anywhere in Europe are 200/400m, other than the TGV sets.

1. Maybe *fasto*, old Saxon for speedily?

A related problem can also be overcome. Current thinking on HS2 services is infected with the idea that operating trains as 200m paired sets, dividing and joining them en route is a good idea. Well, it probably isn't—for reasons that train operators know only too well. Dividing and joining trains means adding chunks of longer station dwell time and damages service punctuality (for which further 'allowances' will no doubt need to be added in due course). Today's demand models will not reflect these operational realities and give a false impression and unrealistically high customer benefit estimates. This is not an occasion to be guided by simplistic demand modelling results.

And while we are on this subject, there is no good reason to create an HS2 station in the middle of nowhere. The possible insertion of a high speed station on the Eastern arm near to the existing East Midlands Parkway station can be dropped too. It will be expensive and its key virtue would seem to be to allow dividing and joining 200m train sets: costly to build—and costly to operate. The nearby parkway station on the Midland Main Line, after all, has never generated its forecast level of demand.

Ditching these standards and assumptions gives rise to three important opportunities to improve value for money from the Eastern arm:

- » Reducing the capital costs by designing the infrastructure for UK-gauge high speed trains, without the extra heights and clearances needed for EU-gauge
- » With many existing stations capable of handling train lengths in the 250–300m range, there is a risk of, on the one hand, unnecessarily high station rebuild costs for 400m trains, and on the other, inadequate capacity if services are constrained to a 200m train length. So why not a 300m HSR set (with a 100m available as an add-on, if really needed)?

- » Removing the capital costs of an unnecessary high speed station.

It is important to ensure the Eastern arm options don't lock in design assumptions that unnecessarily inflate construction costs and waste capital funding that will undoubtedly be tight.

Leeds via Manchester

We should note that one alternative to be considered in the planned '£100m feasibility study' does not provide a link between the East Midlands and Leeds at all, but instead provides a route from Birmingham and London to Leeds via Manchester (with a reversal at Piccadilly). This would require part of the Northern Powerhouse Rail line to be built², extending as far east as Marsden. This approach with London or Birmingham to Leeds trains reversing at Piccadilly, depends on:

- » Implementing Phase 2b Crewe–Manchester Piccadilly (say 2040, earliest)
- » A subsequent NPR 'high speed' line from Piccadilly to Marsden (say 2050)
- » Operation over an improved railway from Marsden to Leeds (part of this improvement is in hand through the Trans Pennine Route Upgrade—but not the bottleneck through Dewsbury)
- » Some means of accommodating 400m trains at Leeds station (and possibly Huddersfield too)—or plan on running only half-length (200m sets onwards to Leeds).

2. There being no other exit available from the planned HS2 Piccadilly station.

It might still meet the Ministerial commitment that Leeds will (one day) ‘get HS2’. But not before 2050, realistically, and probably even later than the original (if unsatisfactory) HS2 scheme via Toton. Relying on all the dominoes to fall into place to make a Leeds via Manchester approach work looks like three decades of development.

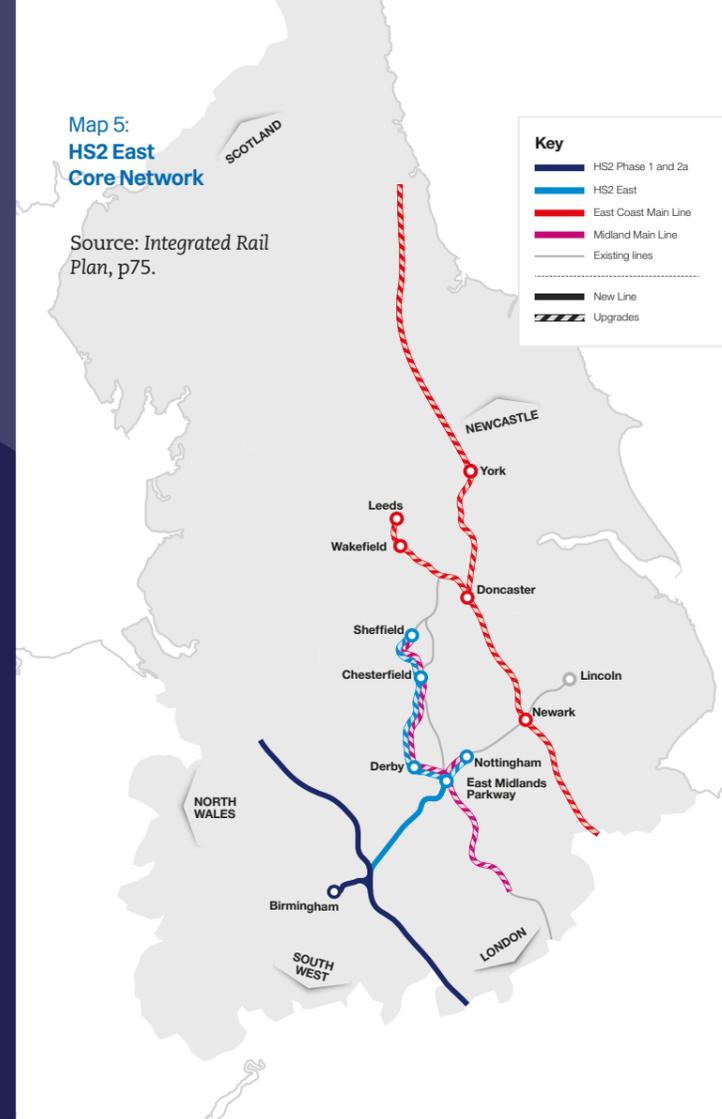
Eastern arm options and the cross-Midland route they share

The Eastern arm is planned to leave the HS2 ‘main line’ just north of the delta junction that feeds into Birmingham Curzon Street. This allows both Birmingham and Euston services to reach the eastern side of the country. Originally, this line, ran north-eastwards and joined the Midland Main Line corridor near the Trent river crossing, where it turned north and followed the M1 and Erewash Valley line, a secondary route through Long Eaton to Toton. No other connections were envisaged, although the idea of a trailing connection from Leicester onto the HS2 line to allow a fast Leicester–Leeds connection was mooted.

To serve the eastern side of the country, the Integrated Rail Plan of November 2021³ left open a wide range of possible approaches, while concluding that the original Toton-Leeds scheme was unaffordable. The simplest option combined a cross-Midland section of the original HS2 Eastern arm with upgrades and electrification of the Midland Main Line. It could form a suitable first stage development (see diagram above).⁴

3. <https://www.gov.uk/government/publications/integrated-rail-plan-for-the-north-and-the-midlands>.

4. This was associated with some unspecified improvements to the East Coast Main Line which with minimal expenditure was said to deliver some faintly implausible accelerations to ECML destinations.



This scaled-back option has benefits to Sheffield and Chesterfield as good as in the original full HS2 scheme and it sees Derby and Nottingham join the set of HS2-served cities. Some of the London–Sheffield HS2 services might usefully be extended to Barnsley and Wakefield.

As identified by the National Infrastructure Commission and Midlands Connect before them, east-west rail connections across the Midlands are particularly poor. If this first section of HS2’s Eastern Arm is built and connected to the Midland Main Line (MML) at Trent, then Birmingham–Nottingham journey times could be reduced from today’s 72 minutes to (it is claimed) 26 minutes. Nottingham would also join the set of directly served HS2 cities. HS2 services could include London–Nottingham–Lincoln and London–Derby–Sheffield.

The Technical Report on Strategic Alternatives to HS2’s Eastern arm, written by Mott MacDonald, released in January 2022⁵, sets out a range of further options, including using an upgrade of the Erewash Valley and ‘Old Road’ lines to try to get a fast connection to Leeds at lower cost. All such schemes will no doubt be examined in the upcoming £100m feasibility study, and we do not attempt to pre-judge this comparative work here. But we do wish to make sure that a full (and better) version of the possible application of high speed rail to the East Coast Main Line corridor is examined. It brings a much wider set of benefits to the table and looks to be the right way forward.

5. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033903/strategic-alternatives-to-high-speed-2-phase-2b.pdf

National policy objectives and strategic choices

Rail sector objectives are usually set in terms of a whole array of desirable outcomes and the GBR transition team has work on this in hand. But for UK Governments, over the medium and longer term, only three things really matter:

- » What can the railway do (if anything) to help the economy?
- » What can the railway contribute to the Government commitment to achieve net zero carbon by 2050, given that transport is the highest source of our greenhouse gas emissions?
- » How can it deliver on these two prime objectives while reducing the level of funding support needed from tax-payers/HM Treasury?

Note that these questions are set in terms of what the **railway** can offer, not high speed rail. Government in future will support high speed rail expansion if it is seen to deliver against these three straight-forward criteria. It follows that high speed rail (HSR) options need to be considered in the context of the wider rail network and the service development opportunities that HSR enables or inhibits, freight as well as passenger, at local, regional and inter-regional levels.

Facing these three real-world policy questions in this wider context, for the eastern side of the country, we suggest there are four strategic choices to make:

1. What can be done to **improve London–Leeds services in the interim**? Whatever emerges as the preferred East Midlands–Leeds long term option, it is unlikely to be deliverable before 2040 earliest

2. Is there a way to specify the eastern side of the country's rail infrastructure (including high speed) so that **longer distance Cross Country**—as well as London—services can use it? In other words, can the value of the Eastern arm be enhanced so that it is not restricted to operating a limited number of shuttles into Curzon Street and Euston? **Can the 'Y'-shaped national HSR network be expanded to be an 'X'?**
3. Should investment in new or enhanced rail infrastructure be located in the **Midland Main Line/M1** corridor or further east in the **East Coast Main Line/A1** corridor? Yes, the M1/MML corridor has cities whereas the A1/ECML corridor has only market towns: it was understandable why HS2 Ltd focused their main alignment search here. But as we have seen, they ended up with an HS2 Eastern arm in the M1 corridor that failed to serve any city besides Leeds.
4. How should the outstanding challenges in the **major city centres—specifically in Leeds and Birmingham** be resolved? Should the HS2 terminus-to-terminus configuration be perpetuated or are there ways to operate through services over a revised HS2 eastern arm, and so spread the benefits of high speed investment more widely?

It may be noted that these questions extend well beyond a search for efficient high speed rail alignments. The £100m for the study of options cannot ignore these crucial wider planning and strategy questions. The right alignment choices can't be made without thinking about services and how they benefit passengers.

Moreover, with such lengthy implementation timescales ahead, the east-side economy needs to see a time-line of measures, not just a line drawn on a map. Ideally there will be an 'adaptive' programme with early benefits, implementable in steps.

Let's look at these four strategic choices in turn.

(i) Accelerating London–Leeds services in the interim

It would be great to be able to have an improvement for the eastern side of the country deliverable by (say) 2030, a little ahead of HS2 starting services in the west.

One of the periodic GNER re-bids for Intercity East Coast in the franchise era contained the idea of using a new route for Kings Cross trains to approach Leeds station from the east, staying on the East Coast Main Line before leaving it at Hambleton Junction. In this conception, London Kings Cross trains would have used the through platforms at Leeds station, with a loop operation (returning via Wakefield).

The wisdom of a loop arrangement may be operationally questionable, but it could have reduced platform occupation levels at the over-subscribed Leeds station, and it would also have shortened Kings Cross–Leeds journey times (for the 50% of trains travelling via Hambleton Junction). It would require the addition of a modest 7½ miles of electrification (Hambleton–Micklefield) to the Trans Pennine Route Upgrade currently in hand.

Today, all Leeds–Kings Cross trains make 3–4 intermediate stops and have journey times of around 2h13 (except one daily non-stop service). Removing these stops and switching to a Hambleton route would allow journey times to be reduced to around 1h55. With no intermediate station demand, despite the attraction of a faster journey, revenues might fall, however. But with trains approaching Leeds from the east, it is an easy matter to extend them onwards, and the obvious primary destination is Bradford, 9 miles to the west. No time-consuming reversals needed, just a facility provided at Bradford Interchange for train layover and probably some reconstruction of Leeds eastern station throat. Bradford's connectivity with London would be transformed with faster London journeys available through the day (probably hourly). Other non-stop Kings Cross–Leeds trains could be extended to Harrogate or Skipton as appropriate. The missing revenue from intermediate stops would in effect be made up from extra passengers (and so revenue) from places to the west and north of Leeds.

Accelerated London–Leeds–Bradford services would be provided without expensive additional platform capacity at Leeds (turnround capacity would be needed at Bradford instead which is not a problem to provide) and much sooner. So platform space at Leeds would be freed up, helping Northern Powerhouse Rail aspirations for frequency increases.

Early acceleration of Leeds to sub 2-hour London journey times would make an interesting contrast with current Avanti West Coast timetable plans ahead of HS2 where Pendolino services will soon be getting additional intermediate stops with slower headline journey times as a result.

(ii) Broadening the function of the Eastern arm: Cross Country

With current plans for the 'western arm' of HS2 and one fewer platform in London Euston it is possible that only 4 trains hour could operate over the Eastern arm to Euston. These are low frequencies to justify high speed line construction. True, being able to operate high speed trains from the north into Birmingham Curzon Street terminus is also an option. But on the original Eastern arm scheme, service 'reach' and appeal would be limited to just Leeds/Toton–Birmingham, a market demand unlikely to support even 2 trains/hour. The loss of multiple pairs of stations in the current Cross Country offering diminishes its value dramatically.

In our review of the HS2 Eastern arm two years ago⁶, we called for clarity on the role and function of HS2's planned Eastern arm. This, we suggested would benefit from a shift in thinking to recognise that the Eastern arm, as well as providing fast links to London, could also be used to create a much enhanced north-east/south-west Cross Country corridor. It would accelerate cross-country trains across the Midlands. This could transform regional city inter-connectivity, crucial to levelling up and to achieving national economic growth.⁷

6. <http://www.greengauge21.net/what-is-the-purpose-of-hs2s-eastern-arm/>

7. See **RAIL 9XX**.

Accelerated long distance Cross Country services would strengthen both the business case for Eastern arm investment and the economics of the Cross Country business. It requires:

- » A connection to be made to the East Coast Main Line from the Nottingham/Newark line, so that a 125–200 mile/h route is created for long distance NE-SW services with a new route created between Doncaster and Birmingham serving Nottingham (rather than Sheffield) en route
- » Provision of separate semi-fast services along the Leeds-Sheffield-Birmingham axis to serve intermediate centres such as Barnsley, Chesterfield, Burton-on-Trent and Tamworth.

York–Birmingham would take around 1h35 minutes calling at Nottingham instead of the existing Cross Country timing of 2h27 minutes via Leeds and Sheffield. Further time savings could come from using any future high speed line investment in the East Coast corridor (see below). The existing Leeds Cross Country service would be retained because of the extensive inter-regional connectivity it provides.

South of Birmingham to the South West and South Wales, the existing line through Cheltenham needs to be electrified to allow through running of HS2-compatible trains from north of Birmingham (Scotland/Yorkshire/the North East and Nottingham). This also requires using the planned Midland Rail Hub so that accelerated long distance NE–SW services can continue to operate across and serve Birmingham, with a reversal in an expanded Moor Street station (adjoining HS2’s Curzon Street). This in turn requires a new connection from the HS2 Eastern arm to the existing network to the northeast of Birmingham, and

the full set of connections into Moor Street to allow Cross Country trains to call there, an outcome not yet committed but which Midlands Connect continues to press for.

It means that Cross Country NE-SW services would need to be provided by high speed trainsets. In effect the HS2 ‘Y’ shaped network would become an ‘X’ which as noted in **RAIL 9ZZ** is so crucial to economic ‘levelling up’ across the nation. It could also play a key role in decarbonisation.

The top three non-London domestic airline services, pre-Covid were (in descending order):⁸

- » Bristol–Edinburgh
- » Bristol–Glasgow
- » Birmingham–Edinburgh.

These are airline routes that each carried around 400 passengers/day each way and which could be addressed by Cross Country when it is speeded up—and especially if it is able to offer ‘**Lumo-style**’ fares. A limited frequency/limited stop Bristol–Birmingham–Nottingham–Newcastle–Edinburgh service, for example, could attract air travellers and deliver a substantial reduction in carbon emissions. And for every 500 air passengers attracted, there are probably at least 1000 long distance trips by car to be attracted too. It’s these long distance journeys by car which are least amenable to a switch to EVs.

8. <http://www.greengauge21.net/how-to-win-air-travellers-to-rail/>

(iii) High speed rail in the East Coast corridor

There are three good reasons to suppose that the East Coast corridor is a better place for new high speed rail construction than the busy M1 corridor followed by the original HS2 Eastern arm scheme:

1. In following the M1 motorway, HS2 would have created the need for major works on the M1 motorway itself, including its relocation. This is a huge cost and disruption best avoided
2. The M1 corridor used by the original HS2 plan is dotted with towns, (former mining) villages and a lot of newer development (industrial and residential) following the demise of the coal industry. Crossing this complex settlement and land use pattern together with the need to negotiate land remediated from colliery workings is challenging and expensive, yet there is nowhere substantial enough to merit a dedicated HS2 station. On the other hand, the other side of Sherwood Forest, and to the east of the East Coast Main Line, development is much less intense, and the topography is gentler. Earlier examination of routes ‘from the Nottingham area... towards the York area’ were considered by HS2 Ltd but ruled out because they missed South Yorkshire. As we now know, the adopted HS2 plan didn’t serve South Yorkshire either, passing straight through. Now we know the South Yorkshire question can be resolved with both Sheffield/Barnsley and Doncaster being served by HS2 and a revised Eastern arm (via service extensions over the MML and ECML respectively).

3. There are no existing rail services in the M1 corridor that could be switched to a new high speed line and there is no usable released capacity either for the Midland Main Line. On the other hand, if the Eastern arm of HS2 is extended along the ECML corridor, all Kings Cross trains could be switched to any new alignment created bar those that call at intermediate stations. Not only could trains to all destinations in Yorkshire/Humber, the North East and Scotland make use of the speed-up in services this would offer (potentially saving around 15 minutes), but the major junctions at Doncaster could be bypassed by non-stopping trains (rather than ploughing through the centre roads), saving the need for a complex set of disruptive junction investments in the years ahead, and allowing Doncaster station to realise its full hub potential. It is a key station, the gateway, for much of South Yorkshire, for North East Lincolnshire and for the Humber.

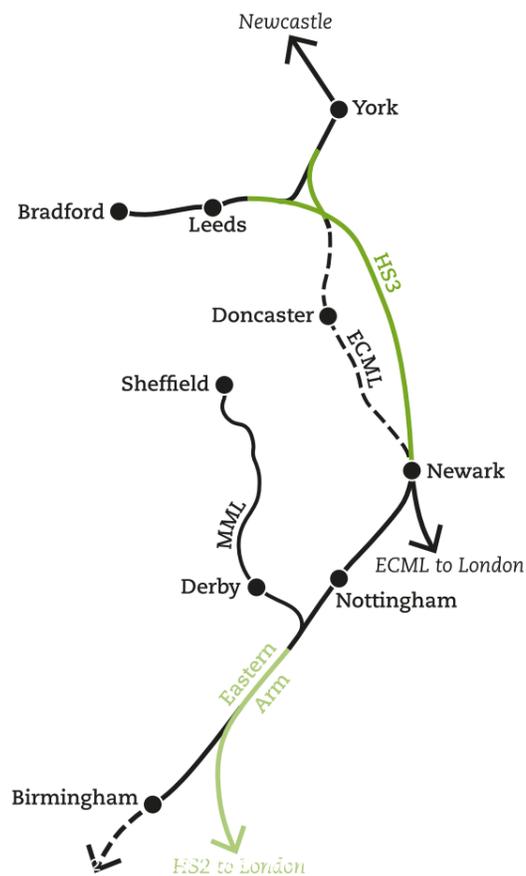
The East Coast Main Line is reached by the so-called ‘Newark’ option, as identified in the Mott MacDonald report on strategic alternatives for the Eastern arm. It is illustrated below, although the version shown here differs from the Mott MacDonald proposal⁹ in two respects:

- » It doesn’t illustrate (for simplicity) the scope to create a high speed line from Lowdham (between Nottingham and Newark)—which may well be desirable in practice, nor

9. This scheme is not an entirely new invention; an upgrade option featured as a strategic alternative in DfT’s business case assessments of HS2 as long ago as 2013.

» does it show the roundabout approach to Leeds that Mott MacDonald envisaged, which we believe is much less desirable. Motts reach Leeds from a new high speed line east of Doncaster over a freight line to Adwick to regain the existing route through Wakefield to reach Leeds. True, it would have fitted with the old plans for new terminating platforms at Leeds (New Lane), and maybe this was a constraint in Mott MacDonald's remit or thinking. But this means that fast Leeds trains can go no further than Leeds when what's needed is extending London-Leeds trains to Bradford and elsewhere. It doesn't fit with the idea of a progressive speed-up of Leeds and Bradford Kings Cross trains from the late 2020s onwards. There is a faster route into Leeds from the east via Hambleton Junction.

The Eastern arm and the ECML Corridor



In this diagram we term the ECML corridor's high speed line HS3. It supports the creation of:

- » A faster London–Leeds–Bradford service (operating via Newark and Hambleton Junction and a new line around Doncaster)
- » Faster journey times between Edinburgh/North East England/ Yorkshire–Humber and London
- » A new and significantly faster NE-SW cross country corridor, improving cross-country connectivity through to Cardiff, Bristol and beyond. It in effect converts the HS2 network from a 'Y' shape to an 'X' shape and provides attractive timings for NE–SW trains through the Midlands
- » Instead of the HS2 Phase 2b plan to operate London–Edinburgh HS2 services via Crewe, London–Edinburgh HS2 trains could operate via Nottingham, York and Newcastle, switching one of the west coast HS2 paths to the east coast: five east side high speed trains/hour to London rather than just four
- » It adds Nottingham and Derby and Doncaster and Bradford to the HS2 service map. Nottingham would be the first city centre with a through station (Midland, upgraded) on HS2
- » Additional capacity to the southern part of the East Coast Main Line. In effect, the high speed line via Nottingham offers a lengthy bypass to the southern bottlenecks on the East Coast Main Line, including Welwyn

- » The opportunity to extend a Midland Main Line St Pancras–Leicester–Nottingham (or Derby/Sheffield) service onwards to Doncaster and beyond, providing valuable service network resilience and well as spreading connectivity benefits across the East Midlands and Yorkshire/North East
- » A phased programme of ECML Corridor improvements.

(iv) A strategic choice: Birmingham and Leeds city centres

A design feature of the original Eastern Arm, with dead-end termini at Leeds and Birmingham and a single intermediate parkway-style station at Toton limits the services that can be operated and is predicated on large volumes of enforced passenger interchanges. We are not alone in questioning this approach. The National Infrastructure Commission when reporting on the 'Rail Needs for the North and Midlands' saw the same limitations: under a design heading, it pointed to the advantages both of through stations rather than termini, and of city centre stations rather than parkways.¹⁰

The challenge in Leeds is to create a suitable operating pattern and to decide what needs to be done on the east side of the station which has only two approach tracks. Crucial parameters need to be set for train lengths, including for Trans Pennine Express trains which continue to have relatively short formations, and as we have seen, for HS2 trains, which currently might be either 200m (too short) or 400m (too long). It may be that some additional terminating capacity from the south is needed—perhaps for local services, in which case there might be a case for a much scaled-

10. http://www.greengauge21.net/wp-content/uploads/GG21_Meeting_Rail_Needs_Of_The_Midlands_And_North_A4P_FINAL.pdf

back (shorter) version of the planned HS2 platforms. Potentially these could be orientated in parallel with the current platforms rather than at 90° to them.

For Birmingham, Midlands Connect has indicated it doesn't mind how northern as well as southern access to an expanded Moor Street (adjoining the HS2 Curzon Street station) is provided, so long as the connections are made. Our perspective is that this facility is vital for inter-regional trains as well as those operating within the Midlands Connect geography. To this plan should be added a connection from the Moor Street-Snow Hill line to Wolverhampton and North-West England if Birmingham is to retain its full service capability with a single-site long distance rail hub. The alternative, for SW–NW connections, is an upgrade of the Marches line via Hereford.

Conclusions

The original HS2 plan for the east side of the country is dead if not buried. Fortunately, there is a much better way forward.

Unlike the old Eastern arm plan which focused solely on getting the fastest journey times to Leeds, it is possible to improve connectivity much more widely and in the process free up some capacity on the Midland Main Line. High-speed rail is, of course, as much about capacity as quicker journeys.

The cross-Midland part of the original Eastern arm looks set to proceed, with a revised set of connections to the routes to Derby-Sheffield and Nottingham rather than the earlier plan (to Toton). Many more services can be speeded up, the spread of high speed rail economic benefits can stretch much wider. Rail sector revenues will be higher; carbon reduction can be accelerated.

Improvements for the ECML can be done in steps as has been done successfully in the past.

We have identified here several ways to take cost out of this next stage of HS2's development.

There is no reason to wait until the Parliamentary procedures for Crewe-Manchester are complete to start seeking the powers for this scheme.

New high speed infrastructure north of the River Trent should follow and would be better value if developed in the East Coast Corridor rather than along an 'M1' corridor.

This leads to a programme of measures that can be adapted to budget availability. The original scheme was undeliverable before the 2050s. Here we show how the speed up of London-Leeds can be started in the next few years.

A £100m feasibility study of options identified in the Integrated Rail Plan has been promised. But before then—and urgently—there are some key strategic choices to be faced. Confronting those choices now will save money and break the pattern of HS2 being planned in isolation from the rest of the rail network.