Meeting Rail Needs in High Speed North Submission to the National Infrastructure Commission



May 2020



Overview

On 11 February 2020, the government published the independent Oakervee review of the High Speed 2 rail project and announced plans to proceed with High Speed 2. Phase 1 is now under construction, and Royal Assent for the Phase 2a Parliamentary powers Bill is expected shortly.

At the same time, the government announced its intention to draw up an *integrated rail plan* for the North and Midlands, to identify the most effective sequencing of relevant investments and how to integrate HS2, Northern Powerhouse Rail and other rail investments.

On 21 February 2020, government published the terms of reference for this integrated rail plan.¹

Extract: Terms of reference for the Integrated Rail Plan

The government agrees that, on current plans, Phase 2b of HS2 will deliver connectivity for the East Midlands and the North of England considerably later than the rest of HS2, and that there are questions about whether its design maximises the benefits from connectivity. The government wants to ensure that Phase 2b of HS2 and other planned rail investments in the Midlands and the north are scoped and delivered in an integrated way, including with the wider rail network, whilst driving down unnecessary costs and over-specification.

The plan will be informed by an assessment of the *rail needs* of the Midlands and the North to be undertaken by the National Infrastructure Commission (NIC).

The terms of reference state that the plan will consider the following four areas, based on the NIC's assessment and taking into account value for money, levelling up, affordability and deliverability considerations (emphasis added):

- How best to integrate HS2 Phase 2b and wider transport plans in the north and Midlands, delivering benefits from investments more quickly. This should include a recommended way forward on *scoping, phasing and sequencing delivery* of HS2 Phase 2b, Northern Powerhouse Rail (NPR), Midlands Rail Engine (MRE) and other proposed rail investments. This should take into account.....the appropriate mix of high speed line and upgrades of conventional network, and the sequencing of these, on any elements of the investments under consideration.
- 2. How best *to reduce cost*, including opportunities to reconsider HS2 Phase 2b scope and design standards to prevent over-specification, improve efficiency and reduce costs....
- 3. The recommended *approach to sponsorship and delivery*, including governance and delivery models, and how to take account of the views of local leaders, consistent with delivering on the objectives of the scheme and value for money....

¹ <u>https://www.gov.uk/government/publications/high-speed-north-an-integrated-rail-plan-for-the-north-and-midlands-terms-of-reference/terms-of-reference-for-an-integrated-rail-plan-for-the-north-and-midlands#an-integrated-rail-plan-for-the-midlands-and-the-north-high-speed-north</u>

4. How best to deliver *rail connectivity with Scotland*, in conjunction with the Scottish Government.

Greengauge 21 fully supports the aims of the integrated rail plan including cost reduction. There has in the past been an undue focus on individual projects rather than integrating the various parts of the transport 'jigsaw' into a coherent plan for a passenger (and freight) friendly network. This has to date been the case for HS2 and High Speed North as well as for much smaller projects. The integrated rail plan is a great opportunity to ensure significantly better value for money from the public purse and to ensure that *a programme* of investment emerges that really does focus on the various policy challenges facing the Government. The programme should also be drawn up to mitigate the emerging risk of a hiatus between HS2 Phase 1/2a and 2b/NPR, damaging the supply chain and ambitions such as the development of low-carbon construction techniques.

It is essential, we suggest, that the plan that emerges *tackles key problems apparent today* on the North/Midlands rail networks. Issues such as the overload and unreliability on the Castlefield Corridor in Manchester may be solved in the short term – say the next two years – simply by leaving out some pre-Covid timetabled services. But neither HS2 Phase 2b nor Northern Powerhouse Rail as currently envisaged offer solutions to this core problem on the North of England rail network – and if they did, they wouldn't materialise until c2040 on current timescale estimates. It should not be forgotten that the Castlefield corridor was recognised as the central problem for the North as long ago as 2007.²

So, there is a gap – a huge gap: investments that need to be *completed* in the 2020s and in some cases into the early 2030s if the railway is to operate properly – that is, reliably, less crowded, and without a wasteful under-utilisation of key sections of the network.

We draw attention in this response to the solutions available for this crucial interim period – all the more crucial now given the need for long term economic recovery in the post-Covid world. There are measures that will resolve the Castlefield Corridor and other problems (and opportunities) apparent today across the Midlands and the North. Knowing the direction of the longer term investment plans (HS2 and NPR) provides a helpful framework for this assessment, and points towards a phased programme approach.

A recent report commissioned by Greengauge 21 revisited an earlier piece of work by the late Professor Sir Peter Hall dating from 2014.³ The update argued that although major rail schemes, including the second phase of HS2 and Northern Powerhouse Rail (NPR), are important and welcomed as a long-term means of levelling up the northern economy and driving change, there are serious problems to be addressed in the North's rail network in the next 5-10 years that simply cannot wait for these flagship schemes. An incremental approach of upgrading the existing network needs to start straight away, designed to link up with these major projects to create High Speed North.

While the geography to be covered by the HSN integrated plan represents a very large part of England (covering five of its eight regions), the scope of questions that the National Infrastructure Commission is posing is even broader. It includes questions on connectivity with Scotland and internationally (rail links to ports and airports). So, while the focus may be on the North and Midlands, questions of capacity and connectivity with London, with its major airports, with the ports

² See: Short, Medium and Long Term Priorities Report, *Northern Way*, 2007 and subsequent announcement in October 2007 of the Manchester Hub Study by the Transport Minister

³ See <u>http://www.greengauge21.net/wp-content/uploads/REVISITING-HIGH-SPEED-NORTH-.pdf</u> May 2020

and the channel tunnel in South East England and the East of England also arise. With an ambition to level up the economy, an integrated rail plan might as well be comprehensive. This means adding in important connectivity corridors for the North and Midlands to Wales and South West England too. Frankly it would be inexcusable if it doesn't.

Available Evidence

Greengauge 21 is in a unique position in responding to the NIC consultation, having examined over the last few years the issues surrounding the development of Britain's major rail projects. In May 2018, we published *Beyond* $HS2^4$ – a comprehensive report on the subject. In our response to the consultation, we distil evidence from this and other recent reports and investigations, providing references to limit word length here, while seeking to ensure that the full detail is available and properly taken into account by the NIC.

We acknowledge that the economic circumstances facing decision-makers in 2020/1 are very different from those that pertained just two years ago when *Beyond HS2* was published. Some of what we saw as being long term in 2018 may have to become very long term in practice.

Beyond HS2 provides a comprehensive view of what Britain's railway should look like in 25 years' time. In it, we suggested that Britain's rail strategy has a specific objective: to transform national productivity – as well as supporting greater regional and social equity and tackling climate change. The report sets out measures needed to make this happen.

We show in *Beyond HS2* how to bring together the best of high-speed rail with the existing network suitably enhanced. Our thinking leads to a re-orientation for Britain's railway – from a single hub and spoke model based around London to a national railway network that better serves the needs of the North and the Midlands and Britain as a whole, with HS2 developed from a "Y" to an "X" shaped network, and an extensive programme of major route and more localised improvements to achieve the transformation required.

High-speed plays a part in this national rail strategy, but only a part. We also looked much more widely and examined what is needed for those places that today lack rail services of any description – places often described as *left behind*; at what is needed *within city regions* as well as between them; and how *other transport modes* can be brought into the picture. We believe that the potential role of express interurban bus has been neglected and should be regarded as part of any programme for developing the national rail network.⁵ We include a summary of the *Beyond HS2* report conclusions at Annex A.

Rail passengers rely on joined up networks and systems. These work best with common fares systems, better still with connecting timetables. A piecemeal project-by-project approach carries the risk of wasteful expenditure. City centre stations often act as key nodes in the rail network, facilitating passenger transfer between lines and services as well as offering access to city centre attractions. Their development is crucial but at risk of being overlooked.⁶

⁴ See <u>http://www.greengauge21.net/wp-content/uploads/Beyond_HS2WEB.pdf</u> May 2018

⁵ See <u>http://www.greengauge21.net/the-interurban-bus-network/</u> March 2018

⁶ See Greengauge 21 *Revisiting High Speed North (op cit)* for proposed prioritisation of Manchester Piccadilly as a super hub. Such projects that carry the strong support pf the local authorities concerned, need not be progressed through Parliamentary Bills, and can be implement faster.

Greengauge 21's work has included surveys of local authority views; critiques of the plans for HS2 Phase 2b; and studies that have focused on the Midlands and the North. We have tried to reference all of the relevant work and highlight the evidence it provides in this response.

Coronavirus impacts

Clearly it will take time to re-establish public confidence in travelling by rail after the Covid-19 lock down period. There will be volumetric restrictions imposed so that all trains and stations allow people to keep safely apart from one another for an as yet uncertain period of time. But at some stage the inevitable period of restricted travel on public transport will end and significant rail investment remains critical to the nation's economic future

Longer term consequences of Covid-19 on travel demand

On the question of the *longer term* impact of the changes in travel behaviour wrought by Covid-19. as of May 2020, there is inevitable uncertainty. We make the following observations based on the limited evidence available and an assessment of the likely consequential effects of already discernible trends:

- 1. As the economy recovers, so too will any short-term loss of freight demand.
- 2. A step down in commuting demand, including into city centres is likely, perhaps of the order of 25%, as those businesses and employees that are able to, elect to continue with Virus-period home-working arrangements, rather than returning to a regular full-time commuting pattern, and others (probably particularly in the retail sector) cease high-street operations. These trends will be off-set by a pattern of re-purposing city centre buildings with a greater emphasis on the provision of cultural and service sector activities alongside traditional functions and importantly for rail by an increase in trends towards residential relocation out of larger cities, combined with less than daily visits to respecified offices
- 3. Travel for shopping may well not recover to previously seen levels as home-delivery and internet shopping arrangements are adopted, but day-out travel to cities with multiple attractions will most likely recover
- 4. Travel for employer's business reasons will recover, probably to at least previously seen levels, although behaviour patterns may shift
- 5. Travel for personal business, visiting friends and relatives, to attend sporting and cultural events and domestic and foreign tourism will also recover to equivalent levels subject to the rate of economic recovery, and to employment and personal disposable income levels.

These comments are of course subject to high levels of uncertainty. They also presume there is no overall shift (for instance through fares policy or tax changes) to the cost of travel. Separate consideration needs to be given to the likelihood of 'modal shifts' in travel, and part of this will likely arise from Government policy and the transport sector response to the carbon imperative.

Source: Connecting with Scotland, Greengauge 21, May 2020, for HSR Group

Government policy drivers

The policy drivers behind the case for HS2 were set out succinctly in the recent Ministerial Foreword to the HS2 Phase 1 Full Business Case:

"...its potential to redistribute opportunity and prosperity across the country, provide much needed future rail capacity, and support the 2050 net zero carbon objective..."⁷.

We recognise and endorse these aims. They reflect well what high-speed rail and wider rail improvements can provide.

We also presume that similar goals are in Ministers' minds for the remainder of HS2, and NPR and MRE. These ambitions are reflected in the questions posed in the NIC consultation, except that questions of how best to improve connectivity are extracted as one of the component parts of the ambition to 'level up' the economy.

The carbon reduction imperative is set to be the most dominant driver of transport sector policy through the 2020s and beyond. It is clear that short-haul aviation is a poor alternative to high quality electrified rail alternatives. Of course, speed of rail is a factor in this equation. But all the evidence points towards rail being able to achieve market dominance with journey timings of around 3 hours. So high-speed rail investment must be seen now in the context of this particular opportunity, as well as the economic benefits from higher productivity that flow from the greater connectivity that high-speed rail brings.

Summary of key points

- The integrated rail plan for the North and Midlands is a most welcome initiative. A coherent investment programme is needed, not just a prioritised listing of projects.
- The integrated plan's terms of reference ask for ways to deliver benefits from investments more quickly and to reduce costs. In our responses to the consultation questions below, we set out how these twin aims can be met, drawing on Greengauge 21 work completed two years ago and published as *Beyond HS2*
- We are very clear that the North and Midlands cannot wait until the 2040s to see results from the integrated plan. This puts HS2 Phase 2b and Northern Powerhouse Rail into context, because realistically, they will not be delivered for at least 20 years – too late for the Government's levelling up agenda⁸
- Since these projects were formulated, the problems (and opportunities) in the rail network serving the North and the Midlands have emerged in stark terms. With some adaptations to the longer term high-speed rail plans, and with some fresh thinking, these problems and opportunities can be addressed much earlier and help pave the way for a full realisation of the additional benefits of HS2 Phase 2b and NPR in due course. The challenge is also to do so at reasonable levels of capital cost given the pressures on public finances
- Covid-19 will affect travel demand levels for an as yet unknowable period. Ahead, the reduction of carbon on a trajectory to the Government's committed date of 2050 for net zero will necessarily dominate the way transport investment is shaped. An expansion of the capability of the electrified national rail network has a crucial role to play.

⁷ HS2 Phase 1 Full Business Case April 2020

⁸ Midlands Rail Engine, however, should be deliverable by 2030

• Attention must be switched away from the (already very largely electrified) rail network of the South East and its two new inter-connecting cross-London rail projects (Thameslink and Crossrail). Much greater value in carbon reduction terms will come from addressing rail network short-comings in the Midlands and North (and across the border to Scotland) where rail market shares are low, but the potential is high.

Responses to specific questions

Q1. What potential investments should be **in scope** of the Commission's assessment of the rail needs of the Midlands and the north?

- In answering this question, please consider the terms of reference for the Integrated Rail Plan, particularly that HS2 Phases 1 and 2a are out of scope.

A1. All possible rail developments in the North and Midlands, including, and with an emphasis on, those that are deliverable within the next ten years or so (as well as those that will require Parliamentary Bills and will take longer); and those investments that are designed to improve rail connectivity, capacity and carbon credentials that extend (or the benefits of which extend) into adjoining regions/nations. An Integrated Rail Plan should be comprehensive so while the focus may be on the North and Midlands as well as their links with immediately adjoining regions and nations, questions of capacity and connectivity with London, with its major airports, with the ports and the channel tunnel in South East England and the East of England also arise.

City region rail networks need to be included, as do what might be considered to be peripheral schemes. And integration should be taken as including measures that would improve customer access and/or facilitate seamless travel between modes.

Q2. Which set of rail investments do you believe would, together:

a. best unlock capacity within the Midlands and the north?

A2a. **Investment in upgrading city centre stations and the immediate access lines into them**. This is crucial to the success of NPR/HS2 Phase 2b and has not had the exposure (or the right approach) to date, even though it is exceedingly obvious that these are the locations where capacity constraints bite hardest. If we want a reliable rail network, this is where effort should be concentrated in the North and Midlands (and nationally).

The right approach is to take into account city-region rail network growth aspirations, including the scope for using off-national rail systems (in particular LRT). The needs of rail-freight as well as intercity travel are also part of the mix. Clearly the perspectives taken by planners of individual projects (HS2, NPR being stand out cases) are unlikely to have chanced upon the best and most efficient solutions for city centres since they have a partial perspective. Attempts to address the challenge that cities pose for new high/higher-speed intercity lines by attempting to create new off-centre, inaccessible, hub stations should in general be resisted. They will serve long term to undermine the economic status of the cities they purport to serve and weaken rather than complement existing public transport networks which, for good reason, are city centre focussed.

It should be recognised that the UK is not alone in needing to adapt city centre terminus stations into much more efficient through stations. This has been achieved in London at St Pancras and London Bridge (and in Europe notable examples are at Antwerp, Stuttgart and Zurich). Such

adaptations at city centre stations are often the best way to achieve a major transformation in rail capacity and connectivity and they are needed in the North and Midlands.

In practice, HS2 Phase 2b could add substantial capacity in its own right, but as configured currently, HS2 Phase 2b is poor at unlocking/releasing capacity on existing lines. Any re-consideration of this phase of the project needs to improve its performance in this area by considering rail needs in the way just described.

With Northern Powerhouse Rail, the problem is lack of attention to the need to expand capacity efficiently in city centres. The advantages of through station operation for city-region as well as long distance services (fewer platforms are needed) is being overlooked. A related issue is a weakness in addressing the need to create freight routes that minimise interaction with busy passenger routes. Indirect and circuitous routing of railfreight is a problem that plagues the North of England and the West Midlands and hampers the important role that the logistics industry plays.

Midlands Rail Engine does little to add capacity, except helpfully at Moor Street station. There is a major unexploited opportunity to lift rail capacity across Birmingham. This would be achieved from better utilisation of the Moor Street-Snow Hill cross-city tunnel. This currently accommodates around 9 trains/hour. But it should be possible to upgrade this level to say 22-24tph. It would require a new short connection to be created on the western approaches to the city so that Birmingham's new HS2 station could be accessed speedily and directly from the Black Country, Walsall and Wolverhampton. Planned line re-openings southwards from Stratford-upon-Avon would extend the line's catchment south and east of Birmingham. These lines should of course be electrified.

b. best improve connectivity within the Midlands and the north?

A2b. HS2 Phase 2b and NPR score well on improving connectivity, as does the Trans-Pennine Route Upgrade (TRU) project and Midlands Rail Engine. But all of these projects focus on city-city connectivity which is only part of the challenge.

But even then, the primary city-city connectivity need from rail within the Midlands, which is a better Nottingham-Birmingham connection is *not* actually provided by HS2 – although it *could* be. This can be fashioned from localised changes to the HS2 Phase 2b alignment. The currently planned HS2 alignment veers northwards towards Toton at the critical point as it approaches Nottingham. One of DfT's Strategic Alternatives to Phase 2b envisaged creating a Birmingham-Nottingham-ECML route that would in effect create a faster NE/SW axis and put Nottingham onto it – a complement to the route *via* Derby and Sheffield. This would be achieved by upgrading the Nottingham-Newark line and creating a SW-N connection with the ECML just north of Newark. A combination of Phase 2b between Birmingham and Nottingham (with a conventional speed link to Toton to serve Mansfield) should be examined as a first stage in conjunction with electrification of the Midland Main Line and the completion of a rail freight route (fully segregated from the ECML) between Peterborough and Newcastle.

Towns and former industrial areas also need better connectivity – some desperately. – This can be provided, as recommended in *Beyond HS2* (see Annex A) by:

• a set of metropolitan regional rail plans to link surrounding towns and ex-industrial areas with growing commercial centres (an example here would be the Snow Hill-Moor Street upgrade as noted in answer to Q2 above, since it would transform access from areas such as the Black Country to the HS2 network of services from Curzon Street)

- attention to the coasts where rail connectivity is still limited by a reluctance to provide estuarial crossings that have been provided for the highway network many years ago. New rail estuarial crossings could in the long term be highly beneficial for locations such as Grimsby, Hull and Middlesbrough selected rail line re-openings to connect places such as Mansfield and Ashington with the national rail network
- integration into the national 'rail' offer of a set of connecting high quality interurban bus services.

It is also important to test whether the TRU *or* the NPR project (or some combination of the two schemes) could better meet the connectivity needs of those places that are struggling in relative terms economically. A way to develop an approach in this territory incrementally and which prioritises addressing city centre challenges was recently published as *High Speed North Revisited*.⁹ This report envisaged a solution to the Castlefield Corridor problem that would allow a set of Manchester city-region local services to be focused on the linked sequence of central area stations (Victoria-Salford-Deansgate-Oxford Road-Piccadilly) while all longer-distance services were switched to a new east-west tunnel under the city centre and a new *super hub* with underground platforms created at Piccadilly.¹⁰

This proposal is illustrated below. It is an approach that **saves cost** outlay and **enhances connectivity** benefits. It is designed to separate out longer distance non-stopping services from shorter-distance city region services. Specifically, it:

- maximises connectivity benefits with shorter Manchester-Liverpool journey times over a more direct (upgraded existing) route than is achieved with the current hybrid HS2 Phase2b/NPR plan
- (ii) reduces the costs of achieving this part of the integrated plan. The new high-speed NPR connection from the HS2 Manchester Airport station west via Warrington and onwards to Liverpool would be scrapped
- (iii) accelerates delivery of private sector regeneration investment around Manchester
 Piccadilly station which would be pre-prepared for new high-speed lines arriving later
 (Phase 2b and trans-Pennine NPR)
- (iv) provides Manchester with a through high-speed station so that high-speed services such as Birmingham-Manchester-Scotland can be operated
- (v) creates the scope for an expanded Manchester city-region rail network, with at its core an established 'Picc-Vic' link freed of conflicting services offering Thameslink style highfrequency capabilities
- (vi) adds capacity at Manchester Piccadilly to accommodate HS2 Phase1/2a services in new low-level platforms capable of taking 400m trains (without which HS2 trains would be constrained to short formation 200m train lengths until Phase 2b is built a most unsatisfactory reduction in seating capacity compared with the existing Pendolino service)
- (vii) Leaves free the disused east-west rail alignment through Warrington Bank Quay (low level) for a lower-cost line re-instatement in this corridor that could serve a useful

⁹ See <u>http://www.greengauge21.net/revisiting-high-speed-north/</u> May 2020

¹⁰ See also Beyond HS2 *op cit* p103

purpose of re-establishing local rail services for Warrington and help open up housing development at Fiddlers Ferry and other locations.



De-conflicting long distance and local rail services through Manchester Piccadilly Superhub.

Q3. Within the set of investments you identified, which individual investment(s) should be the **highest priority**?

- Please explain your rationale for this and how this would affect the phasing and sequencing of the full set of investments you identified.

A3. The main policy imperatives do not all point to the same prioritisation. Carbon reduction as a priority would lead to concentrating on an electrification programme (leaving local branches to be operated by hydrogen or battery units) and adding capacity and improving services so that additional demand could be accommodated on rail from the worst performing alternatives (e.g. HGVs and short-haul air travel). Improving connectivity with an aim to level up the economy as a priority would lead to a combination of HS2 Phase 2b together with the list of measures identified above to help address connectivity deficiencies in so-called 'left-behind' places (see answer to Q2 (b) above).

In practice a balance has to be struck and we think that there are seven key factors to consider:

- speed of progressing through planning and consent processes
- supply chain not just ensuring it has the required capacity to deliver the programme, but that workloads in key areas (such as re-signalling schemes) are kept at a reasonably steady rate and that there is a sufficiency of workload in the forward work programme to support productivity-driven investment from suppliers
- best value for money judged in terms of progress towards objectives per £ capital spend

- distribution of projects so that creating further 'left behind' areas or regions doesn't happen
- distribution of expenditure year-on-year to spread the burden on the Exchequer
- simple logic sequencing, which, with rail, means addressing a number of factors, including rolling stock strategy, ensuring that at each stage sufficient new network capacity is available to accommodate improved services and that simultaneous works are avoided on parallel routes that can offer a diversionary capability
- the need for measures to tackle major network operating constraints that are visible today.

Translating these into a prioritised programme, we identify the following:

- A national electrification programme for England & Wales¹¹ applied to all main lines, strategic freight routes and the busiest commuter rail routes. In England, the obvious starting points would be completion of a 100% electrified trans-Pennine route (via Huddersfield – the TRU scheme); and the completion of Midland Main Line electrification Market Harborough to Nottingham, Sheffield and Leeds (noting that there is a probable need to expand platform capacity in each of these stations, so there is a key interdependency with priority #3 below to resolve)
- 2. 'Burning platform' investments to redress operating constraints. We give two key examples. The first, which brings benefits at a city and regional scale, is the plan to get ahead with creating a 'superhub' at Manchester Piccadilly with through underground platforms connected with the existing railway (and in the long term with a re-specified NPR and HS2Phase 2b). This frees up the newly-created surface connection between Piccadilly and Victoria stations for the expansion of a Manchester city-region network (in the style of Merseyrail Electrics). The second falls into this category not because of current operational short-comings but because of a potential missed opportunity when HS2 Phase1/2a opens. This is the upgrade, electrification and extension of the cross-city route in Birmingham (Snow Hill-Moor Street) needed to connect places with weaker economies in the Black Country and surrounding towns with the HS2 station at Curzon Street (which adjoins Moor Street).
- 3. **Major hub station upgrades.**¹² Given other priority investments, the most pressing would be:
 - a. those for Preston, Carlisle and Glasgow Central on the Anglo-Scottish section of the WCML
 - b. for Birmingham Moor Street (Midlands Rail Hub) to support the creation of HS2 into an X-shaped network¹³

¹¹ Scotland already has a plan to electrify all of its railways in the longer term. For Wales, electrification should be carried out on a reverse 'E' plan, complementing measures already in hand for the Valley Lines. The routes to be covered are (i) South Wales main line (initially to Swansea, later to Carmarthen, Haverfordwest and Milford Haven (a route too long for other zero-carbon traction solutions) (ii) the Newport-Crewe Welsh Borders line, which should be upgraded for higher speeds and long distance service expansion (iii) Shrewsbury-Aberystwyth (after Wolverhampton – Shrewsbury electrification) and (iv) the North Wales Coast line, Crewe-Chester-Llandudno/Holyhead.

¹² A full list is given at Table B5 in *Beyond HS2,* Greengauge 21, May 2018

¹³ See *Beyond HS2 op cit,* p126

- c. at Leeds, where incremental development is reaching its limit, and ahead of TRU, NPR and HS2 Phase 2b implementation, a rebuild with a reduction in terminating trains/increase in cross-city operation and creation of a Leeds city region metropolitan rail network is required (with electrification of the York/Selby-Leeds-Bradford Interchange lines). This may well also require the creation of a third running line into Leeds from the east.
- 4. First stages of the eastern leg of HS2. This is a lengthy route, and its function and value as currently envisaged is going to be determined by the successful operation of a very intense high-speed service over the Birmingham-Euston Phase 1 section of HS2 which remains to be proven. However this issue is resolved, significant value can be derived from progressing two parts of the project between Sheffield and Leeds (which requires a combination of new build and upgrade of existing lines) and between Birmingham and Nottingham (with an interim non-high-speed connection to Toton and Mansfield). The reasoning for this prioritisation is that this addresses the two main city-city connectivity challenges: the busiest city commuter connection in the North and the core east-west connection in the Midlands
- 5. Getting to 3h10 for London-Glasgow/Edinburgh. This requires a line-of-route coordinated programme north and south of the Scottish border, and is of great value to Lancashire, Cumbria, south west Scotland and potentially the Scottish Borders too. But its main aim is to allow the nation to connect English and Scottish cities better and allow air services to be concentrated on those connections for which a fast and reliable surface transport option is unavailable, making a dramatic impact on carbon reduction.
- 6. Three international connectivity schemes. These are:

(i) The western connection into Heathrow airport. This should be used for an expanded set of rail connections direct to the airport from the Midlands (as well as the South West and South Wales) so that its status as a national rail-connected hub (and not just London) can be established.

(ii) This can be considered alongside an equivalent arrangement for Manchester where (as it happens) there is also a western airport access scheme¹⁴ that is a necessary concomitant of the first 'burning platform' scheme for Manchester city centre noted above – and a means of significantly improving rail access to the airport from Chester/North Wales and Sheffield/North & North East Lincolnshire (Scunthorpe, Grimsby, Cleethorpes) to complement existing direct airport connections from across the North (and Scotland) (iii) With expected pressures on continued longer distance HGV use because of driver shortages, excessive carbon emissions and post-Brexit border controls, it is time to ensure that there is a strategic freight route for a much-expanded railfreight operation through the channel tunnel. This requires a new lower Thames rail tunnel (which can also be used for Essex-Kent passenger rail services) so that railfreight using the channel tunnel can operate directly to distribution centres in the Midlands and North avoiding London.¹⁵

7. Modal Integration. This is especially important for 'left behind' places, has low capital cost implications and can be implemented speedily. It entails creating rail <-> express interurban bus hubs and needs a simple policy shift to permit single fares systems to operate across a

¹⁴ See *Beyond HS2 op cit* p110

¹⁵ See *Beyond HS2 op cit* p161

regional and urban-rural geography in the way it does today across London¹⁶. A programme for Lincolnshire would be a good place to start given its sparse rail coverage and low social inclusion and GDP scores.¹⁷

Of course, these are priorities themselves with differing delivery timescales. They do not preclude a bigger and continuing programme in the longer term: i.e. the investment programme described in *Beyond HS2* including HS2 Phase 2b, NPR and MRE.

Q4. What **supporting policies** need to be in place to deliver the benefits of the investments you identified? If there are any dependencies with other investments/policies, how confident are you that these supporting policies will be put in place?

A4. We identify three key supporting policy areas:

- (i) The value of the rail network, and investment in it, is currently constrained by its outmoded fares system that presents a near-impenetrable boundary for connected travel. While some add-on fares exist (such as plus-bus) these are one-off and exceptional. So, the first supporting policy is to break this ring fence and make **public transport ticketing multi-modal, nationally**. Where this has been done elsewhere, it has been associated with a zonal fares system, which in London was introduced first. This provides the necessary simplification and also allows much more refined market segmentation of pricing for the elderly, job-seekers, students, family groups etc. Ordinarily, given the British track record to date, we could only place a very low level of confidence on this being achievable. But with nearly all public transport revenue currently lost because of Covid-19, there is a unique once-in-a-lifetime opportunity to make rapid progress with this change and to use the unique financial levers at Government's disposal to ensure that all public transport service providers participate.
- (ii) Similarly, there is a need to use the period where rail demand is diminished post Covid-19 (i.e. perhaps the next 2-5 years) to continue and expand Network Rail's programme of engineering works, making use of extended possessions with service diversions to make optimum use of this period. While many works can be carried out under permitted development rights, others will need to use the Development Consent Order process. Government needs to ensure that it has arrangements in place to progress priority rail engineering works under this regime, and Treasury, DfT and Network Rail need to agree an accelerated approvals process – initially for this post-Covid period.
- (iii) Pricing of competing transport modes needs to be re-visited to support achievement of the committed Government environmental objectives. Comprehensible simple multimodal pricing structures will help long term. But it is important to give the right price signals to road users too. In the short term this can be done – especially at a time of low fuel prices – by restoring some part of the lost income from having had a long period of frozen fuel taxes. This would yield necessary income for the Exchequer, and send an important signal in the wider consumer market-place that the era of fossil fuelled car ownership is coming to an end. That is not to say there aren't challenges in such an

¹⁶ Note that some interurban bus routes can already be accessed and tickets purchased via for instance Train Line, but this a far from universal capability

¹⁷ See <u>http://www.greengauge21.net/the-interurban-bus-network/</u> March 2018

approach given the immediate limitations on public transport and the absence of cycling and walking alternatives for many day to day journeys.

Q5. What impact would the investments you identified have on **greenhouse gas emissions**? In particular, how would they affect the UK's ability to meet its domestic and international targets, including the Paris Agreement and net-zero?

- In answering this question, it would be helpful if you could consider the expected decarbonisation of road transport, as set out in the Commission's National Infrastructure Assessment and Freight Study.

A5. The evidence is that the priority measures we identify above will have a dramatic and beneficial impact on reducing transport sector greenhouse gas emissions. For example, the reduction in carbon dioxide emissions from providing for a doubling of freight paths on the Anglo-Scottish route is estimated at 45,000 tonnes per annum.¹⁸ For London-Edinburgh journeys, travelling by air (excluding emissions from accessing and using airports), a single passenger will be responsible for 144kg greenhouse gas (GHG) emissions. The equivalent for the same journey by car is 115kg GHG (diesel) and 120kg GHG (petrol).¹⁹ For rail travel the current equivalent figure is 16 kg GHG.²⁰ This figure will reduce as electrical power generation is further de-carbonised and as regenerative braking systems come into use with HS2 (and other) trainsets. As the rail share of the air+rail London-Edinburgh/Glasgow market is expected to double with the implementation of Priority 5 (answer to Q3, above – 3hr 10 min London-Edinburgh/Glasgow rail journey times) it is reasonable to anticipate at the very least **a halving of emissions from the combined London-Edinburgh/Glasgow air+rail travel market** – plus further greenhouse gas emission savings from reduced long distance car travel too.

With regard to the Commission's National Infrastructure Assessment and Freight Study, we share the conclusion that it will be possible, as well as important, to switch to low-carbon means for last mile (last 5 mile) freight distribution systems. But we do not share the NIC study's confidence in solutions for carbon reduction of the national HGV fleet. Reliance on this strategy would seem to be a high-risk approach. The NIC's concern that a solution based on greater use of de-carbonised railfreight would be too expensive we don't agree with.

Instead we suggest that an electrified national railfreight network linked to a set of freight interchanges for onward distribution - serving a network of cities with over 250,000 population needs to be created. There are, after all, two north-south electrified railways suitable for railfreight: what's missing is the electrification of these lines where freight takes diversionary routes to allow high-speed passenger operation and to access the key ports at Felixstowe, London Gateway and Southampton, and the creation of suitable strategic freight routes across the North and the West Midlands.

For trans-Pennine freight, a route using the Calder Valley and Copy Pit lines together with a new northern access to Liverpool via Ormskirk should be created – and the route electrified. In all of these cases of strategic freight routes, distances are lengthy, electrification is needed, and this can

¹⁸ Source: Greengauge 21 for HSR Group, *High Speed Rail and Scotland*, May 2020

¹⁹ Decarbonising Transport: Setting the Challenge, Department for Transport, March 2020

²⁰ Update of the assessment carried out by Professor Roger Kemp for the Rail Safety and Standards Board study of Traction Energy Metrics, published in Modern Railways, May 2020

support improved local-regional passenger services too, offering improved connectivity for instance to Blackburn and Blackpool. In the West Midlands, there is a need to identify suitable crossconurbation strategic freight routes that avoid the current practice of lengthy complex routing for freight that entail double-backs and long journey times with diesel traction. Currently such secondary routes are unfortunately more likely to be seen as a low-cost means of expanding local passenger rail coverage.

There is growing interest in the UK and across Europe in using high (and higher) speed rail trainsets for the distribution of logistics and premium parcels – a major growth sector, and one where, with reduced air sector capacity, rail has a major opportunity. On HS2, Old Oak Common station could be re-purposed to accommodate high-speed logistics services operating in evenings and early pre-commuting (am peak) periods. Elsewhere, city stations are generally under-utilised at night times, but operation into/from the network of strategic freight interchanges described above could prove best of all.

Q6. In addition to greenhouse gas emissions, what are the potential **environmental effects** (positive and negative) of the investments you identified?

A6. Expanding the capacity and capability of the electrified rail network, as described, brings further net environmental benefits to the nation. These are air quality gains, the potential avoidance of the damaging effects of parallel highway schemes and of unnecessary airport and short haul flight expansion.

Air quality gains will be experienced by modal switches from more polluting tyre/road based modes of transport and short-haul aviation and from the progressive removal of diesel traction from rail. These gains can be expected in particular:

- (i) around airports which have substantial volumes of domestic flights
- (ii) on and near the nation's strategic highway network where less traffic can be expected given modal diversion to more and better rail services – subject to parallel policies including on fuel prices to ensure no resurgence of highway use arising from the reduction in congestion that will arise
- (iii) in cities where a significant level of modal switch to a combination of metro, city region rail with walk/cycle as access modes in place of car-based travel can be expected
- (iv) in city centre stations as terminating diesel train services are removed and replaced with cross-city electrified train networks
- along the M6 corridor on the eastern flank of the Lake District (and eastern flank of the Yorkshire Dales) and through the Southern Uplands in Scotland where HGV and car traffic will be cut along the M74.

Major new rail line projects will be capable of providing valuable spoil for environmental mitigation projects – as successfully achieved at Wallasea Island, Essex, with new wetlands created from Crossrail tunnel spoil, and at Samphire Hoe Country Park, near Dover created from Channel Tunnel excavations.

At sites where road schemes are abandoned – such as the Lower Thames crossing road scheme which would be replaced by a new Lower Thames rail crossing as described in answer to Q3 – there would be other wider benefits. The highway scheme has a major adverse effect on historic woodland which would be avoided with a rail crossing.

Against these operational gains need to be set localised adverse impacts including from construction traffic while the rail investments are underway. These can be minimised as in previous projects through extensive use of rail and indeed water based transport, for instance to remove spoil, and by other environmental mitigations.

Q7. Aside from those delivered by improved connectivity and greater capacity, what broader impacts on **people's quality of life** could the investments you identified have?

A7. We identify five primary areas of quality of life gains:

- (i) improved air quality leading to better health
- (ii) reduced road traffic volumes leading to a reduction in accidents, less risk for cyclists and pedestrians and less pressure on Hospital A&E departments
- (iii) reduced perceived need for car ownership and use, freeing up disposable income for other expenditure preferences
- (iv) better access for those living in places 'left behind' to health facilities (giving a direct improvement to quality of life), and through access to higher education and employment opportunities, the chance to raise income levels and hence personal health and welfare
- (v) reduced stress, with greater reliance on an improving network of public transport options, making for example journeys to work reliable and less stressful than when undertaken on congested roads.²¹

Q8. How would the **costs and benefits** of the investments you identified **be distributed** economically, socially and geographically?

A8. Our aim in *Beyond HS2* was to address the nation's needs as a whole and not ignore places on the periphery or post-industrial areas where currently demand levels are lower than in more prosperous areas. It is true, there are also better connections between prosperous large cities, but the approach which stresses the importance of feeder modes (city region rail networks; connections with interurban bus lines) should ensure that the benefits from these city-city improvements reach a broad hinterland. So, we are confident that the programme we set out would help redress social inequalities and have a much fairer distribution of beneficiaries geographically (north and south and within the North and Midlands).²²

Q9. Which set of investments would best **improve rail connectivity with Scotland?** – *If these are different to the investments you identified above, please explain why.*

A9. Priority #5 (in answer to Q3 above) is improved connectivity with Scotland. We regard this as hugely important and the investments needed to achieve the new target of 3h10 minute London-Glasgow/Edinburgh journey time, a doubling of cross-border railfreight and better regional rail services. We have placed it ahead of, for example, the HS2 Phase 2b scheme to link Crewe and

²¹ See, for example, <u>Transportation Research Part F: Traffic Psychology and Behaviour</u> <u>Volume 14, Issue 2</u>, March 2011, Pages 111-116 by Richard E. Wener and Gary W. Evans ¹ <u>https://doi.org/10.1016/j.trf.2010.11.008</u>

²² see <u>http://www.greengauge21.net/the-uks-2070-transport-infrastructure-requirement/</u> of November 2019, which sets the transportation component of UK2070s plan to address social inequality, based, as here, on the *Beyond HS2* blueprint.

Manchester with a new high speed rail line which probably has a weak business case, especially if compared with a line of route upgrade

The rationale for this prioritisation is set out fully in a separate report.²³ The investments involved are designed to support:

For the West Coast

- 8 long distance daytime passenger paths/hour on Anglo-Scottish routes
- Service levels and connectivity no worse than today's for *all* intermediate stations
- A 3h10 journey time London Glasgow and Edinburgh
- Enhanced connectivity through connectional timetabling with interurban bus and local rail services at key hub stations (Carlisle, Penrith, Oxenholme, Lancaster)
- New long distance through services from off-route locations including Barrow-in-Furness, Windermere, Workington/Whitehaven and Dumfries and Kilmarnock
- An increase in daily freight paths to 40 (each way)
- Punctuality restored to PPM 90 or equivalent
- Resilience to 50-year flood risks
- An ability to accommodate additional services from a Northern Ireland SW Scotland rail connection should the Irish Sea tunnel and new rail connections be provided.

In addition, these plans should also anticipate the completion of the Borders Railway connection to Carlisle and the restoration of medium-speed long distance passenger services over the Settle-Carlisle line.

And for the East Coast:

- A reduction of 15 minutes in Edinburgh-London journey times
- Capacity for 5 cross border long distance passenger trains/hour
- An increase in daily freight paths between Newcastle and Edinburgh to 12 (each way)
- Punctuality restored to PPM 90 or equivalent
- Resilience to 50-year flood risks
- Capacity to accommodate additional services in east Mid Lothian to support housing development plans

To meet connectivity (and capacity and carbon reduction) needs 'to Scotland', the infrastructure programme set out in the table below is needed. The programme entails around 50 miles of new HSR lines in the West Coast corridor and some substantial upgrades. Works at key stations such as Preston, Carlisle, York and Newcastle will inevitably entail some disruption and it will be important that the current practice of planning engineering works so that only one of the cross-border routes is facing major works at the same time is maintained.

²³ Greengauge 21 for HSR Group, High Speed Rail and Scotland, May 2020

Investment Programme to Meet Anglo-Scottish Connectivity, Capacity and Carbon Reduction Needs

Location	Element		
West Coast corridor	Glasgow Central and approaches	400m platforms; segregated fast line approaches	
	HSR Rutherglen-Carstairs	Saves 12 minutes	
	Dynamic freight loops Carstairs-Carlisle-Tebay	Added freight capacity and performance	
	Station modernisation: Carlisle and Preston	Faster station approaches; added capacity	
	Penrith	Possible high-speed cut-off	
	HSR avoiding Oxenholme- Lancaster	Saves c14 minutes	
	Wigan-Crewe <i>either</i> HS2 Phase 2b <i>or</i> Route upgrade	Saves 2-5 minutes	
	ETCS re-signalling Crewe northwards	Added capacity	
East Coast corridor	Edinburgh Waverley and Newcastle Central extra (400m) platforms	400m platforms; fast line approaches	
	HSR Mid-East Lothian	Added capacity	
	Measures to protect the line north of Berwick from coastal erosion	Added resilience to climate change	
	Dynamic freight loops north of Newcastle	Added freight capacity and performance	
	Fully segregated freight lines Peterborough-Newcastle	Can also support new local rail passenger services	
	Improvements at York and Darlington stations and approaches	Added capacity	
Other areas	Electrification of Felixstowe- Nuneaton and Basingstoke- Nuneaton (for Southampton) strategic freight routes	To provide electrified routes from ports to distribution centres	
	In Scotland, electrification of main lines northwards from central belt to	To support cross-border high- speed service extensions	

Stirling/Perth/Inverness and Dundee/Aberdeen	
Borders railway completion	To support new regional services and enhance connectivity
Improvements to Cumbrian Coast line and electrification Barrow-Carnforth and Windermere-Oxenholme	To support new through services
Provision for new 'Port Road'	If SW Scotland- Northern Ireland tunnel proceeds

Q10. What would be the impact of the investments you identified on **connectivity between the Midlands and the North, and other parts of the UK**?

- Please explain where and how impacts would occur.

A10. Alongside the connectivity improvements with Scotland, described in answer to Q9 above, the overall programme we set out in *Beyond HS2* to 2040/50 includes a set of important measures:

- Midland Main Line electrification and new direct services on it from Mansfield as well as established services
- further enhancements to the East Coast Main Line including through provision of a segregated freight route between Peterborough and Newcastle as well as implementation of HS2 (with its orientation changed from a Y-shape to an 'X' providing much better services between Yorkshire and NE England with Bristol/SW England);
- a new connection direct from Manchester Airport to Chester and North Wales that can operate extensions of trans-Pennine services from Yorkshire/the Humber and NE England
- an upgrade of the Newport-Crewe line to create a much faster and more direct route from South Wales (and Bristol/SW England) to the key centres in NW England (and Scotland)
- a presumption of extensive semi-fast services on the West Coast Main Line linking Midland and Northern cities to Milton Keynes and the Oxford-Cambridge arc
- electrification of the Peterborough-Cambridge line to provide the basis for new intercity services between Yorkshire, Cambridge and thence in the very long term via a new high-speed line to Stansted and Stratford/the City (London)
- implementation of the Midlands Rail Hub network of services which in conjunction with the Birmingham-Nottingham section of HS2 will improve connectivity between outlying counties of the Midlands, both with each other and beyond to SE, SW and Eastern England.

Together, these developments offer much better accessibility and connectivity from the major cities and rail network hubs of the Midlands and the North to Scotland; to North/Mid and South Wales; and to Eastern England, SE England and SW England. With the possibility of a Northern Ireland tunnelled connection as an add-on to the Anglo-Scottish investment, there would be enhanced connectivity across the whole of the UK.²⁴ This should be a fundamental objective for the nation, post-Brexit and post-Covid-19.

Q11. What would be the impact of the investments you identified **on international connectivity** across the Midlands and the north?

- Please consider the impact on both ports and airports.

A11.

(i) Airport access

We have shown in the investment programme described in Annex A how:

- direct rail access can be provided to Heathrow Airport from the Midlands (and potentially the North too)
- direct rail access can be provided from Yorkshire to Stansted Airport
- much improved rail access can be provided from across the North (including from Sheffield) and also beyond to Manchester Airport.

HS2 will provide good rail access to Birmingham Airport from across the North (but only if the planned HS2 service pattern includes more services stopping at Birmingham Interchange).

(ii) Port access

The programme provides for:

- Direct railfreight access from Scotland and across the Pennines to Liverpool docks
- Electrified freight routes for freight flows to/from distribution centres in the North and the Midlands to the nation's largest container ports at Felixstowe, Thames Gateway and Southampton;
- A new means of avoiding London for freight flows from the North and the Midlands to the Channel tunnel.

These measures transform the opportunity to use efficient and carbon-friendly means of completing the domestic portions of international freight flows.

They also transform rail access to/from most of the major international airports, providing the capability to support direct services with no requirement to change trains *en route* to the airport (a concept which has underpinned the successful development of the Trans-Pennine Express network). Evidence clearly suggests direct services are essential to attracting travellers away from road-based access modes such as coach, minibus, taxi and private car.

²⁴ See <u>http://www.greengauge21.net/connecting-great-britain-and-northern-ireland/ January 2020</u>

Annex A: Extracts from the conclusions from Greengauge 21 May 2018 report - *Beyond HS2*

(with minor text changes and updates; items irrelevant to the Midlands and North removed. Full report available at <u>http://www.greengauge21.net/wp-content/uploads/Beyond_HS2WEB.pdf</u>)

A1: The Urgent Need for a National Strategy

The report took HS2 infrastructure – to be implemented in Phases 1, 2a and 2b – as a commitment and asked what lay beyond.

In the absence of an industry plan, we set out to develop one. Our planning horizon was 2040, but much of what was considered could be implemented in the 2020s. Others – notably the National Infrastructure Commission – are looking even longer term, to 2050.

Our rail system, we found, is playing a growing and central role in supporting the national economy. Over the last 15-20 years, it has been the fastest growing major rail system in Europe and has become its safest.

The default alternative to rail is a reversion to over-reliance on the road network. But this in practice only holds a prospect of greater congestion – a damaging surcharge on economic activity – and this would be the case even if there was to be a huge new road building programme.

Rail is best attuned to the accommodation of concentrated demand flows. It is the mode of transport that makes cities with thriving centres possible. Cars, on the other hand, are space-inefficient, and growth in their use through the last century has promoted large swathes of urban and suburban sprawl.²⁵ This doesn't change with the prospect of autonomous control systems. The cherished pattern of town and country planning and development is, if anything, put at further risk by this type of technological development.

The environmental and land costs of over-reliance on private cars are already huge. A continuation of low density development reliant on road-based transport, will lead to a much greater loss of countryside than will be affected by a few selected new rail links and with new development focussed around stations.

For England as a whole, there is no spatial plan, and regional spatial plans and targets have been scrapped. Their abolition was driven in part by a desire to 'cut red tape', but their absence (and that of any consistent, alternative, spatial planning at the sub-regional level) is no encouragement to inward investors that seek certainties and an understanding of the prospects for specific locations, when contemplating major development.

Set-backs caused by a lack of proper planning in rail electrification projects in 2014-16 led to reluctance on the part of Government to continue with a rail enhancement capital programme. Having lifted the rail sector from the hopeless arrangement of annual budget-setting that characterised the British Rail era (1948-1997), and instead put in place five-year programmes with independent regulatory oversight, enhancements are now being considered again by Ministers on a

²⁵ Smart Growth – from Sprawl to Sustainability Jon Reeds, Green Books, 2011

case-by-case basis (while, ironically, the road sector has finally caught up with the rail reforms and enjoys a 5-year strategic plan).²⁶

The need for a 5-year delivery plan set in the context of a longer term strategy for rail has never been more palpable. The absence of both strategy and plan puts at risk local, regional and national ambitions: it carries an economic cost.

We risk becoming over-reliant on the delivery of HS2. The ambition to re-balance the national economy needs much more than HS2; whole regions cannot be left to struggle with second-rate and over-stretched transport infrastructure. And HS2 is best not left treated as a stand-alone project given its wider potential.

What further improvement in connectivity, capacity and capability should be expected from rail transport? And what should be done for those areas and places that too often are ignored in transport and other policies: the economic periphery, the places left behind?

The plan that emerged was the result of a set of strategic choices, informed by the evidence from a rich volume of studies. Unconstrained from a focus on a specific region or corridor, we were able to look in greater depth at the policy drivers; consider customer needs carefully and in relation to train service arrangements before contemplating infrastructure needs; and then look carefully at candidate investment projects and (crucially) the interactions between them.

A2: The Planning Imperatives and Prospects

Logic suggested a starting point of examining customer needs and travel markets leading to the simple point that *service* ambitions need to be formulated before considering *infrastructure* investment.

We considered national and regional policy imperatives, market trends and passenger requirements, as well as those of freight. Concerns over capacity, connectivity, productivity, regional economic disparities, social inclusion and health inequalities, international trade, carbon reduction and air quality, reliability, resilience and reduced safety risks all drove the shape of the suggested long-term rail strategy for Britain.

Measures of productivity across Britain we found to be closely related to measures of peripherality. The country is highly centralised on London (and within London, on its central area). Rail has brought London's success – rather than other transport modes – and it is rail that is also crucial to helping achieve a more balanced spread of economic activity across the nation.

Integral to economic success, as the work of the Government's Social Mobility Commission makes clear, are questions of well-being and health, and access to work opportunities and regionalised health care is crucial. The Commission identified better public transport as one of three policy levers

²⁶ Rail network operation, maintenance and renewal (as opposed to enhancements) remains funded on a 5year basis and with a budget (at £48bn) generally considered to be realistic. But the separation of enhancements from renewals, in a plan where much of the investment inevitably centres on upgrading existing lines, makes costing, at this stage, impractical.

to tackle the problems of communities that have been 'left behind', prompting a question we addressed in *Beyond HS2*: what contribution can the rail sector make to enhance social mobility?

Rail use has been growing at over 4% per annum for around 20 years. Recent levelling off in the pace of growth (pre-Covid-19) has occurred primarily in the congested South East, where service quality levels have suffered in the last 2-3 years. But in the South East major new rail schemes (Crossrail, Thameslink) are coming to fruition over the next two years, providing transformational connectivity gains and service uplifts. And elsewhere growth (pre-Covid) has remained strong.

A young population cohort, over the same 20-year period, has been reducing its use and ownership of cars and turning to rail. The prospects for rail remain strong. Reinventing its appeal for family travel is a challenge ahead in respect of the 'for us, car ownership is unnecessary' cohort.

We looked at meeting individual passenger needs, and how the railway system as a whole has to be responsive to customers in a helpful and coherent way. It also needs to be made fully accessible and readily negotiable for a diverse set of people and travel needs. HS2 can be used as a catalyst for helping the railway system as a whole shift to a new level of passenger-friendly arrangements in fares and ticketing systems, in supporting people negotiate interchanges and in providing the capacity for relaxing and enjoyable journeys.

Freight on rail brings measurably valuable benefits (fewer large trucks on our roads) but is receiving diminishing levels of grant support (down to *c*£10m annually). Railfreight grants, we concluded, should be increased substantially. The strengthened freight grant regime can be used to encourage changes that will ensure better overall use of available network capacity (use of electric traction; longer freight trains; avoiding busy cross-city sections needed to handle growing commuter demand). It can and should also support new and expanded freight services that need to be focused on those corridors where more and longer freight trains can be accommodated, and where new strategic freight interchanges can be provided.

HS2 will relieve the southern parts of the West Coast Main Line in England and create a growth opportunity for railfreight which will be greatly reinforced if, as we recommend, the Felixstowe-Nuneaton cross-country route upgrade and electrification is completed. Elsewhere, some relatively modest new lines are needed to solve problems of rail access to ports.

From these starting points, we set out in successive chapters:

- a national strategy
- an examination of HS2 corridors, the services that would run on HS2 and the opportunities created on parallel lines
- a study of the rail services and developments needed in the regions and devolved nations across Britain *and*
- consideration of what should be done to re-connect places left behind.

We summarise findings on these areas in the following paragraphs.

A3: Connectivity at a national level

HS2 provides extra capacity and improved connectivity between our largest cities. Its network shape – as a 'Y' – means that there is scope to add further services to the two network arms. There is more spare capacity (on current HS2 service plan assumptions) on its eastern limb.

An examination of current rail connectivity between the 37 English Local Enterprise Partnership (LEP) areas - and their equivalents in Scotland and Wales - revealed some surprising gaps. Using some of HS2's spare capacity could help make good these weaknesses, but better connectivity can also come from upgrading existing lines as well as from new high-speed infrastructure – the latter only being justified where capacity constraints cannot be overcome by lower cost measures.

A key area of connectivity weakness is between English provincial cities in the North and the Midlands with South Wales (Cardiff) and with Scotland. Some new services – such as Trans Pennine Express's Liverpool-Scotland service – have since been introduced. Others are needed. This points to a need to relieve critical sections of line that will become bottlenecks and uplift line-speeds where feasible and viable, including beyond the northern limits of the new HS2 infrastructure.

We now identify a target of a 3h10 London-Glasgow/Edinburgh rail journey time (with equivalent speed-ups for links between Scotland and provincial cities in England), and believe this could be achieved by 2033-5, allowing a substantial switch from short-haul air travel to rail.

A4: HS2 Service Parameters and Plans

When fully developed, it is planned that HS2 will carry 18 trains/hour over the 'stem' of the Ynetwork – an intensity of use that has not yet been achieved on existing high-speed networks elsewhere. It is a good ambition, but a degree of prudence prompted us to use a more cautious assumption of a maximum of 16 trains/hour for this report.

There are three key consequences:

- (i) it would not be possible to accommodate the full set of London services on HS2 as set out in HS2 Ltd's plans
- (ii) with a slightly lower throughput, the current plan to insist that every HS2 train stops at Old
 Oak Common can be re-visited. A four train/hour stopping pattern would be a good option, allowing most HS2 trains to save (say) 4 minutes on their journey times to/from London.
- (iii) a reduction in the impact of Phase 2b on the capacity requirements at Euston from 2033 (when other changes at Old Oak proposed in the strategy in Chapter 8 are taken into account).

The consequential need to remove some London trains from the services in the HS2 service plan raises the question of which destinations gain most from HS2 and which least – and if there are any good alternatives available. This led us to the view that *upgrading the East Coast Main Line (ECML)* should become a high priority alongside the implementation of HS2. It is a key strategic choice. It would allow Newcastle-London timings to closely match stated ambitions *via* HS2. The aim would be to match the customer service offer using the ECML as would have been on offer of the journey was made *via* HS2.

Newcastle (and York/Humber and the North East) would benefit directly from HS2 by an increased provision of 'cross country' services to a set of British cities to which journey speeds are currently much slower than they are to the capital.

We therefore propose a key change in planned '2033' service routeing, with Leeds-London trains retained on HS2 and Newcastle-London trains remaining on an upgraded (and more direct) East Coast Main Line. If instead the current service assumption survives, with all the main long-distance London services taken off the ECML and switched to a route *via* HS2, then the case for further investment in the East Coast Main Line – much of which would be made over the period to 2029 – would be jeopardised.²⁷ On the other hand, with long term certainty over its retained intercity role, investment in the ECML is very likely to be justified, north and south. The investment needed requires an expansion of the current plan as provided for in the 'East Coast Connectivity Fund'.

This enables another key conclusion benefitting cross country services: *HS2 should be configured as an 'X' rather than a 'Y' shaped network*. This is illustrated in Figure A.1, below. The new 'limb' of HS2, to the south west from Birmingham, is achieved by means of an additional HS2 junction in the West Midlands, adoption of an expanded Moor Street station in place of New Street and an upgrade of the line from Birmingham – Bristol Parkway (including its electrification and provision for operation at speeds of 125 mile/h) to create a sub 1-hour journey time.

Note that this proposition requires the implementation of the Midlands Rail Hub and the integration of Moor Street and Curzon Street stations which adjoin each other. This enables benefits from HS2 to extend from the North and the Midlands to South West England and South Wales and will improve its business case. It has implications for the development of local rail services in the West Midlands.

²⁷ Noting that the case for investment in the ECML north of York is unaffected by these considerations

Figure A.1 Changing HS2 from a 'Y' to an 'X'



A number of new connections are being considered for HS2 Phase 2, and their consideration has to be driven by thought-through train service plans. We outline how the HS2 connections may be simplified in the Manchester area, while we suggest additional connections for Nottingham. At the London end of the route, we explain how current plans to add platforms at Old Oak Common for services from the Chiltern line could and should be elaborated into a through east-west connection, linked eastwards via the North London Line to HS1, providing wide connectivity gains. This creates the possibility of at least some parts of the country other than London and Kent being able to have direct access to Eurostar services at Ebbsfleet and Ashford, as well as valuable new cross-London connectivity. If, in addition, a second west-side route is added to the Elizabeth line, by means of a connection to the West Coast Main Line at Old Oak as proposed a few years ago by Network Rail and Transport for London: this could further strengthen Old Oak's value as an interchange, *as well as reduce the pressure on Euston and offer savings in HS2 Phase 2b costs.*

The new HS2 stations will act as attractive hubs, and we set out how some of the places that have been ignored to date in connectivity plans – such as Mansfield – can be connected to them.

A5: Overall plan – 2040

Consideration of regional plans, together with our own analysis, allowed us to identify a number of opportunities for new or improved rail services that would significantly enhance connectivity for local and regional trips and permit much better access to the national rail network, including from places 'left behind'.

Our approach was comprehensive. No major cities are excluded, and neither are any regions, however sparsely populated or remote. The plan builds on HS2, adds two more high-speed rail lines, and also outlines a much wider set of changes and developments to create the comprehensive connectivity gains we believe the country needs to prosper. It relies on upgrades as well as new build. These needn't be disruptive to implement – as was found with the four-tracking scheme along the Trent Valley section of the WCML in the 2000s and the Stafford area improvements that followed. It will create a world-leading network, linked through a series of hub stations, either with their Victorian heritage suitably upgraded, as we know can be achieved: see the examples of St Pancras, Edinburgh Waverley and Paddington alongside more radical transformations such as those at London Bridge and Reading. The plan for 2040 is illustrated in Figure A.2.

Figure A.2 Beyond HS2: 2040



Overall, this 'Beyond HS2' plan, to be fully implemented by 2040 provides²⁸:

- 101 miles of new high-speed railways (300km/h+)
- 127 miles of new fast railway lines (200-250km/h)
- 97 miles of other new lines (of which the Okehampton-Tavistock re-opening and Bedford-Cambridge (EWR) comprise 60% of route mileage)
- 838 miles of route upgrades (of which the three main lines (West Coast, East Coast and Great Western) comprise 66% of route mileage)
- *six* enhanced city region rail networks (for Birmingham, Bradford, Leeds, Liverpool, Newcastle and Manchester)
- new rail links at three international airports (Heathrow, Manchester and Edinburgh)
- new services on the West Coast and East Coast Main Lines, using capacity released by HS2
- a programme of investment at 16 stations to create an overall network of 44 national hub stations
- studies for two new estuarial rail crossings and plans for one (Lower Thames)
- two new port access routes (for Tilbury/Gateway and for Liverpool) and completion of the Felixstowe – Nuneaton strategic freight route
- a programme to create a set of nominated national mini-hubs to fill gaps in the rail network with commercially-operated interurban buses, with integrated ticketing.

High-speed rail corridors

Developing additional connections for HS2 and strengthening the pattern of train services that will use it, is one part of the strategy. Working up plans for the use of released capacity is another: at present this core benefit from HS2 is left unrealised. Yet just as development plans around HS2 stations are already being spurred by progress made towards building HS2, so too other places can get equivalent benefits from the released capacity and improved services that HS2 makes possible, once the pattern of use of released capacity is committed. Planning rail services *ahead* reduces uncertainty and has an economic dividend.

We looked across the country as a whole to identify where else large-scale network capacity shortfalls (of the type that triggered HS2) are foreseeable and so where new high-speed lines would be the best approach.

One such corridor is across the Pennines, between Leeds and Manchester, as then being studied by Transport for the North and Department for Transport together. Arrangements for transiting across Leeds and Manchester are likely to be critical – and *we conclude a new east-west tunnel is likely to be needed for Manchester*. The topography of the Pennines may be challenging, but the distances are quite short, so the solution is unlikely to be a new *high-speed* route (over 250 km/h).

The Great Western Main Line, together with the relevant parts of the East and West Coast Main Lines, as shown in Figure A.2, needs to be enhanced to meet growing demand pressures. A common theme is likely to be the deployment of new digital ETCS train control technology to optimise train

²⁸ See Annex B for details

throughput and performance reliability – and potentially to accommodate higher speeds. Where new sections of line are justified to provide sufficient route capacity, the opportunity for operation at speeds in the 125-150 mile/h range will need to be considered.

But in two areas, the limitations of network geography combine with an expected growth of demand and a complex mix of rail services can be identified now as justifying the construction of new highspeed lines. We therefore included two new high-speed lines in our overall 2040 plan:

- a route from London to Stansted (target journey time: 15 minutes), where the line would split, with one route continuing towards Cambridge, the other towards Colchester. This would provide major capacity relief to the Great Eastern Main Line, so allowing much faster Norwich-London journey times, and reduce the cost of accommodating Crossrail 2 along the Lea Valley, and provide a valuable new fast cross-country route, Ipswich-Colchester-Stansted-Cambridge, capable of onward extension from Cambridge (to the Midlands and North)
- (ii) a route from Rutherglen to Carstairs in Scotland, taking high-speed non-stop services off a busy multi-junction commuter rail route.

We also assumed that a new high-speed connection into Liverpool from HS2 would be built. The high-speed rail elements and main line upgrades are shown in Figure A.3.

Figure A.3 projected national high-speed network



Further high-speed lines might be developed for the post-2040 period, for instance northwards from the new high-speed line towards Cambridge if the capacity created in the East Coast Main Line is fully used up, and over some northern parts of the West Coast Main Line, driven by the twin ambitions of fast intercity journeys, competing against short-haul domestic air flights, and the need to accommodate local services and freight.

A6: Developments needed by 2030

Some local capacity pressures and connectivity short-comings that could have a bearing on overall network development are more pressing and arise well before 2040. We would highlight:

- the need to connect the Black Country to the new HS2 station in Birmingham at Curzon Street (new rail connections are needed along with an intensification in the use of the Moor Street-Snow Hill cross city connection)
- the pressures on the Castlefield corridor in Manchester, where a north-south connection has (at last) been provided for an expanding network of city region services, but which also has to accommodate long distance inter-regional trains.
- the role that a western link to Manchester Airport can play in freeing up the key network constraint at the existing terminus station and reducing conflicting train movements at Piccadilly station in the medium term (by 2029). This would be followed by a tunnelled link westwards from the new HS2/Northern Powerhouse Rail platforms at Piccadilly to Ordsall.²⁹

There is a pressing need to enhance several major city-region rail networks. Funding programmes that were available to city authorities in earlier years to support the creation of, for example, the Tyne & Wear Metro and Liverpool's 'loop and link' networks no longer exist. Yet without better city region rail networks, not only will their economic development be held back, but the benefits of investment in HS2 will be constrained. We have identified six city regions where investment to create better cross city rail links would bring huge benefits, and shown the specific measures needed. Together, these amount to projects of national significance. There are equivalent developments needed in London too, but those we have identified do not carry the high price tag associated with Crossrail 2.

²⁹ This scheme would bring multiple benefits: it would allow the 20-minute Liverpool-Manchester (Northern Powerhouse Rail) target journey time to be achieved; it would free up Manchester's Castlefield Corridor to support an expanded city-region rail network; it would allow some HS2 services from the south to be extended beyond Manchester Piccadilly and continue northwards.

Creating six new city region rail services and networks

The cities of *Bradford, Manchester, Leeds and Birmingham* have established, but inefficient city region rail networks. *Newcastle and Liverpool* have established metro-style operations, but there is scope to extend the reach of the local service network and expand labour markets accordingly. In each city, there are plans or prospects for new fast/high-speed rail links for intercity travel. Effective hub stations in each city will need to feed local, city-region rail passengers into the new fast/high-speed stations – in much the way that London Underground does for London's intercity stations.

Except for Leeds and Newcastle, there is the problem legacy (and opportunity) of multiple stations, making some cross-city travel problematic. This is acute in Bradford, and needs to be solved if Northern Powerhouse Rail is to be routed to serve the city. In Manchester, the Northern Hub has overcome the isolation of Victoria and Piccadilly stations but the line between them has to carry a mix of longer distance inter-regional demand as well as city region flows. In Birmingham, there is an under-utilised cross-city route between Snow Hill and Moor Street/Curzon stations.

While Leeds has a well-sited single city centre station – into which HS2 platforms will be combined – it has few local services operating on a cross-city basis. As a result, platforms are occupied by terminating trains, and the scope to expand services is constrained by platform non-availability.

In all six cities there is the need, prompted by HS2 (and in the north, Northern Powerhouse Rail) to create new or improved city region rail networks. These would have shared characteristics: a cross-city electrified route, able to support a number of city region radial lines with high metro-like service frequencies providing access to the new high-speed networks, and reaching places that are in need of a connectivity boost.

The importance of connectivity with international gateways – ports and airports – led to a number of specific proposals (Figure A.2 above again refers):

Ports

- for London Gateway/Tilbury and, potentially, the freight terminals in North Kent, a new freight link between Pitsea and Wickford, together with a new south-east connection to the Great Eastern Main Line to create a freight route around London for freight movements that conflict with expansion of London Overground services; this route would also provide valuable and missing north-south rail connectivity in Essex and could be usefully combined with a new lower Thames rail crossing to connect the towns and cities of Essex and Kent by train without needing to travel *via* central London
- for the new port at Liverpool and across the Pennines, the upgrade of the line through Ormskirk to Preston and a re-instated connection at Lostock Hall to connect eastwards via Blackburn to the Calder Valley line and destinations in Yorkshire, Humber and the North East
- although not shown in Figure A.2 for clarity, the completion of the Felixstowe-Nuneaton strategic freight route.

Airports

• at Heathrow, the creation of joined-up connections to the west, south and south-east that will support the operation of direct airport services from South West England, South Wales

and the Midlands without compromising the already critically-loaded route between Airport Junction and Paddington

• at Manchester Airport, the implementation of the western rail link, opening the opportunity to operate a rich set of new direct airport services and overcoming the capacity constraints of the current terminus arrangements.

A7: A strong customer focus

The customer imperative is to provide a railway system that works as a coherent whole. New technology will help with ticketing, and in due course, with easier to negotiate ticket and security checks; it will also provide travellers with personalised guidance through complex hub stations. A simplified fares system – we have elsewhere suggested a national zonal design that can be extended to work on feeder transport modes³⁰ – will be needed too. Friendly and helpful expert staff will still be required. It must become easier for those with mobility difficulties to use the rail system, which lags what's on offer from the bus network. A renewed focus on network benefits, with live travel information and support, is long overdue.

These customer needs apply in the heart of a busy network, but also at its – sometimes neglected – periphery, where dependence on connections and low service frequencies can be especially challenging.

In *Beyond HS2* we set out how the set of measures that are needed to address the complex geography of places others refer to as 'left behind'. The overall strategy therefore includes:

- a set of metropolitan regional rail plans to link surrounding towns and ex-industrial areas with growing commercial centres
- attention to the coasts where rail connectivity is still limited by a failure to provide estuarial crossings that have been provided for the highway network many years ago. New rail estuarial crossings could be highly beneficial for locations such as Grimsby, Hull and Middlesbrough
- selected rail line re-openings to connect places such as Mansfield and Ashington with the national rail network
- integration into the national 'rail' offer of a set of connecting high quality interurban bus services.

A8: Next Steps

Beyond HS2 called for an integrated plan and in High Speed North and the Government's remit to the National Infrastructure Commission there is the welcome prospect of a start on one.

It should be pointed out that setting out a 20-25 year vision does *not necessarily* lead to a need to fully fund plans from the outset and its adoption by Government does *not* imply a commitment that will be a source of future regret. But it does create a basis for others to plan their businesses. It is itself a boost to the economy.

³⁰ The case for zonal fares can be seen at <u>http://www.greengauge21.net/general/rail-in-the-north-stepping-</u> stones-to-a-rebalanced-britain/#more-2723

The Department for Transport published its strategy for transport investment in July 2017³¹. But this seeks only to set a short to medium term investment framework, not prepare a plan. And the National Infrastructure Commission is charged to produce a National Infrastructure Assessment³² which is intended to take a view of Britain's long term infrastructure needs and make associated recommendations to Government, but this will be looking broadly across transport as a whole as well as digital requirements, waste and flood and drought risk. The NIC cannot consider proposals that are not deemed to be of national significance.

The Government has established a centralised National Rail Network Enhancement Pipeline, to be entered through approval of business cases, but this offers no guarantee of overall coherence and leaves the risk that the strongest advocates will prevail³³ - those with the greatest capacity and capability to promote business cases – rather than projects that will deliver the best value for money across a wide range of objectives, and that form part of a coherent overall plan.

There is a gap – the rail industry is not charged with producing a long-term plan. The Strategic Rail Authority, with its statutory obligation to prepare strategies, was wound up fourteen years ago.

It is clear that ignoring the value of a coherent plan carries a high price:

- the full benefit of HS2 will not be realised
- places that benefit from released capacity created by HS2 will continue to presume they are at risk of being bypassed, or disadvantaged
- places not served at all by HS2 will not get the improvements needed to provide connectivity gains – and in the case of the South West – even essential day by day network resilience will continue to be illusory
- accessing our ports and airports will remain over-dependent on access by congested road networks
- areas 'left behind' will remain 'left behind'
- the economic boost that a well thought out strategy provides, will be lost
- the rail supply chain a re-born industrial sector in the making will fester, its forward work-load at best uncertain, at worst unknown
- with investments taken on a case-by-case basis, the scope for programme and project cost savings will be lost, and nugatory expenditure will be a very high risk.

Funding of rail enhancement programmes should be returned to a medium-term programme basis and set in the context of a long term plan. Whatever emerges as the long term 'guiding mind' for the rail sector post-Williams – the National Infrastructure Commission or a rail industry body charged with long term planning - needs to assume responsibility for the national rail strategy and for keeping plans coherent and up-to-date. The current exercise overseen by the NIC should not be relegated to a one-off.

³¹ Department for Transport Investment Strategy – Moving Britain Ahead, July 2017

³² The National Infrastructure Commission set out its draft vision and priorities for action in 2017 in Congestion, Capacity and Carbon: Priorities for National Infrastructure. Its National Infrastructure Assessment is due later this year.

³³ Asad Khair, KPMG writing for Transport Times, April 2018

National Plan components (tables A1-A6)

We have annotated these tables to show schemes in the Midlands shaded orange and those in the North blue.

Table A1: New high-speed lines

Route (preliminary assumptions)	Mileage (approx.)
Stratford -Stansted	30
Stansted-Audley End	12
Stansted-Marks Tey	27
Sub total	69
Rutherglen-Carstairs	26
HS2/WCML-St Helens Jnct	6
Total	101

Table A2 New Fast Lines (200 km/h)

Route (preliminary	Mileage (approx.)	
assumptions)		
Newhouse-Shotts	6	
Inverkeithing- Bridge of	30	
Earn & Cross Tay link		
Liverpool – Ulleskelf	91	
(Northern Powerhouse		
Rail)		
Total	127	

Table A3 New Lines

Route (preliminary assumptions)	Mileage (approx.)
Bedford-Cambridge (EWR)	32
Essex-Kent N-S connections	9
Bradford cross city link	1
Manchester Airport western links	3
New chord north of Cowley Bridge and	26
Okehampton-Bere Alston	
Croxley Link	2
Old Oak-Kilburn	2
Heathrow western, south western and south	8
eastern connections	
Durham bypass	8
Berks and Hants cut-off	2
Curriehill-Edinburgh Gateway	2
Elizabeth Line connection to West Coast Main	2
Line	
Total	97

Table A4: Route Upgrades

Route (preliminary assumptions) ³⁴	Mileage (approx.)
ECML King's Cross-Darlington	232
WCML Edinburgh-Carstairs-Wigan	207
Manchester-Huddersfield-Leeds	32
Sheffield-Hazel Grove-Stockport/Altrincham	42
Sheffield-Doncaster (part of)	5
Chester-Altrincham	30
Marks Tey-Colchester	5
GWML Didcot-Cardiff	92
GWML Didcot-Oxford	10
BML Croydon area	2
Bromsgrove-Bristol Parkway	74
Reading-Taunton	107
Total	838

Table A5: Network of National Hub Stations

Existing ³⁵	Upgrade investment 2020-40
Birmingham New Street	Birmingham Moor Street
Brighton	Carlisle
Bristol Parkway	Chester
Bristol Temple Meads	Colchester
Cambridge	Crewe
Cardiff	Darlington
Derby	Doncaster
Edinburgh Waverley	East Croydon
Exeter St David's	Glasgow Central
Hull	Leeds
Leicester	Manchester Airport
Liverpool Lime Street	Oxford
Manchester Piccadilly	Preston
Newcastle	Sheffield
Norwich	Swansea
Nottingham	Warrington
Peterborough	
Reading	
Southampton Central	
York	

³⁴ Note: these are overall route upgrade lengths; in practice, some sections will not need to be upgraded

³⁵ Together with 8 London terminus stations: Paddington, Euston, St Pancras, Kings Cross, Liverpool Street, London Bridge, Waterloo, Victoria

Table A6 Interurban bus lines (providing missing rail links) – *selected sample of high quality fully accessible routes only*

Connecting		Route	Frequency	
Inverness	Fort William	919	8/day	Scottish City Link
St Andrews	Leuchars*	X42	8/hour	Scottish City Link and
				otners
Leven	Kirkcaldy*	X38, X27	I wice hourly	Scottish City Link
Galashiels-Hawick	Carlisle	X95	hourly	Borders Buses
Norwich	Kings Lynn*	X1	half hourly	First
Kings Lynn	Spalding*	505	Every 20 minutes	Stagecoach
Spalding	Boston-Lincoln*	IC5		Brylaine
Boston	Skegness*	IC7	hourly	Stagecoach
Lincoln	Skegness*	IC6	hourly	Stagecoach
Grimsby-Louth	Skegness*	51 and IC9	hourly	Stagecoach
Grimsby	Hull			Various incl. National
				Express
Peterborough	Kings Lynn*	NRT Table 26A	Half hourly	First
Peterborough	Corby	X4, NRT	hourly	Stagecoach
Gloucester	Hereford*	33	Hourly	Stagecoach
Cardiff	Newtown*	Т6	Two-hourly	Traws Cymru
Carmarthen	Abervstwyth*	T1	hourly	Traws Cymru
Abervstwyth	Bangor*	Т2	Two-hourly	Traws Cymru
Exeter	Bude	NRT Table	8/day	Route 6/6A
		135D		Stagecoach
Exeter	Weymouth	X53 and others	Twice hourly +	First
Bristol	Wells, Glastonbury & Street*	376	Twice hourly	First, Mendip Explorer
Lewes	Uckfield*	28/29	Twice hourly	Regency Route,
				Brighton & Hove Bus
				company
Scarborough-Whitby	Middlesbrough*	X93	Two-hourly	Arriva
Harrogate	Ripon*	36	Every 20 minutes	Transdev

Notes

1. NRT – national trail timetable.

2. Services and operators subject to change.

3. Asterisk (*) denotes covered in Interurban Bus: Time to Raise the Profile, Greengauge 21, March 2018