

Revisiting High Speed North



A report commissioned by Greengauge 21
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April 2020

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All opinions in this paper are expressed by the authors solely in a personal capacity

Foreword

The commissioning of this report arose from a chance meeting between Ian Wray and Jim Steer. Back in 2014 Sir David Higgins, then Chair at HS2 Ltd, and somebody who has always had an interest in strategic spatial planning, had suggested that while HS2 dealt with north-south connectivity, it needed to be complemented by better east-west links, especially in northern England.

Greengauge 21's own work in 2009, when developing a high-speed rail plan for the country (*Fast Forward*) had come to a similar conclusion. Ian Wray had co-authored a report (*High-Speed North - Building a Trans-Pennine Mega-City*) in response, teaming up with Professor Sir Peter Hall and David Thrower. Those of us who knew Peter sorely miss his enthusiasm and prompting (sadly, he died soon after the report was written). So, one of the last of his many publications sheds light on how – from an urban planner's perspective built from researching 'world cities' (a term he coined) and successful models of development across Europe – to successfully implement what was to become known as the 'Northern Powerhouse'.

With Government looking to 'level up' the imbalances in the national economy, Ian and David agreed it would be a good idea to re-visit the 2014 report, and here it is: 'Revisiting High Speed North'.

Summary

The Oakervee Report suggested that Phase 2b of HS2 (north of Crewe) should be reviewed in conjunction with Northern Powerhouse Rail (NPR), which will connect places on a 'west-east' axis in the North of England, as well as with measures proposed in the Midlands.

Our paper is a contribution to this debate. As they stand, plans for NPR have become intertwined with HS2, utilising significant parts of currently proposed HS2 investment north of Crewe. In consequence the timescales, uncertainties and risks associated with delivering NPR are now joined by the timescales, uncertainties and risks connected with HS2 Phase 2b. Taken together, these projects now have a current price tag of circa £80 billion and completion cannot be expected before the 2040s. This is just too late. We need to strengthen regional productivity and the economies of the North, meet political deadlines for 're-levelling', and respond to the real risks of an economic depression with early public works. If we do so we now the private sector will invest as much as seven years ahead of high speed service introduction (as demonstrated in France in particular).

We argue that the current collapse of demand for public transport is a short term phenomenon. Post Covid, we contend that demand will return to previous levels and continue to grow, responding to structural change in the economy and a new 'centripetal' urban dynamics. The existing network does not work, crucially through Manchester, but also in Liverpool, Leeds and Sheffield, where city centre stations and lines are at capacity, or in Manchester's case over capacity. Average journey times for Trans Pennine freight are as low as 16mph and 17mph. These are 'super critical' issues which cannot wait for solution until the 2040s.

To develop our thoughts we have looked at the lessons to be learned from the North's successful 1960s and 1970s motorway building programme and returned to a paper published by the late Professor Sir Peter Hall and colleagues in April 2014 (some weeks before George Osborne's Northern Powerhouse speech). Presciently titled 'High Speed North', it set out a plan for a modular solution to the problems we identify. Hall's vision was that: 'By the end of the century the great cities of the north, plus many of its major towns, would at last be linked by a truly 21st. century railway system, bringing them dramatically closer in terms of journey times. As a new northern mega city is born, the benefits to their economies would be incalculable'. It remains valid.

We have revisited the Hall plan, forensically identifying its strengths, and, with the benefit of hindsight, its shortcomings. Our conclusions are that we must have a coherent overall plan that makes sense, but one that can be constructed incrementally and in financially digestible chunks. The great strength of the Hall plan was that it was modular, with significant improvements achieved ahead of turning to mega projects like a Trans Pennine Tunnel. We must make early progress in tying together labour markets across the north, bringing fast growing places like Warrington, Leeds and Manchester together with more challenging labour markets like St. Helens, Wigan, Huddersfield, and Sunderland. The problems are the overloaded Manchester rail network, the need for city terminal capacity expansion across the North, and dealing with the future demand for rail freight (which is forecast to grow by more than 50% by 2050).

One element of the Hall plan now needs to be updated. Hall envisaged upgrading the existing Eccles-Victoria-Stalybridge rail corridor. But the strong desire of Manchester authorities for a 'west-east'

through HS2 station at Piccadilly offers the opportunity of expanding the Piccadilly hub further. A new tunnel under central Manchester, running west-east from Salford to Piccadilly (parallel to the troubled Castlefield corridor) could solve the capacity problem. It would serve fast trains from Chester and North Wales, Liverpool, Blackpool, Barrow and Glasgow, with services emerging eastwards and across the Pennines to Leeds, Bradford, Sheffield, Hull, York and Newcastle.

Our revisions to the Hall plan retain its strategic thrust. It is not enough simply to connect big city centres with ultra-fast, non-stop, services. We must connect the North's towns into the rail network, bringing together all its labour markets, and ensuring that stations act as 'mobility hubs' including connecting buses, bike hire, walkways, cycle ways, and provision for electric car charging.

1 A Shifting Context

Has the Virus Changed Everything?

The corona virus epidemic seems to have turned the world upside down. There are few planes in the sky. The demand for public transport has collapsed. Businesses which seemed like anchors of the emerging economy like tourism, hotels, restaurants and shops have been closed down and in the longer term have big question marks against their revival. Will the revival of city centre living and switch away from suburban lifestyles continue, or will a scared population take refuge in the suburbs, the private garden, the internet, home delivery and an essentially private future?

We doubt whether a sea change in long term trends is likely. It is true that we have never before seen a corona virus shut down, but we have had major economic recessions as well as serious terrorist campaigns, centred on major cities. The physical structure of our cities evolves and changes slowly. To take one dramatic example: Liverpool's economy seemed to fall off a cliff in the 1970s, when 32% of its jobs were lost (79,300)¹. Liverpool's population fell from 750,000 in 1961 to 490,000 at the end of the 1980s. But 50% of those who left the city only moved to other parts of Merseyside² and the city region population has been increasing since 2001³. Liverpool's economy had not fallen off a cliff, it had merely shifted ground.

Rail passenger use – which is strongly aligned to travel into, within and between cities - has been rising steadily since the late 1990s, from a nadir reached in the 1980s. Similarly total road vehicle mileage appears to have reached saturation levels with a turning point in the trend in the late 1980s, after which major new road construction came to an end. City centre and urban living went through a similar change of trend in the mid-1980s. And all of this occurred against the backcloth of a rising trend in internet use. JANET (Joint Academic Network) was launched in 1983, connecting UK universities over a high-speed network, and forming the British part of the global internet for most of the next decade. 1983 roughly marks the point at which different national networks across the world became the modern interconnected internet. The World Wide Web was introduced at CERN by Sir Tim Berners-Lee in 1991, making it easy to view and navigate between websites hosted using hyperlinks.

Centrifugal and Centripetal Urban Dynamics

What was happening? In effect a new set of urban dynamics was replacing the old. After 1958, when the first motorway was opened, the dynamics were *centrifugal*. We built motorways, used relatively uncongested new roads, saw manufacturing job dispersal and inner city collapse, built new towns and low density suburbs, and used growing (mostly road served) airports. Post 1977, the year of the Inner Cities White Paper, a new *centripetal* policy and urban dynamic began to take effect: roads became increasingly congested; there was a modest rail revival, including the faster Inter City 125 services; this rail revival sharply accelerated from the mid-1990s; manufacturing jobs were lost rather than dispersed; city centre jobs and city centre living grew; urban regeneration replaced new towns as the focus for policy; there was something of a city centre cultural renaissance; accompanied by a change in values and behaviour, as laptops and smartphones arrived.

These changes are deep seated and not simply a British phenomenon. In the USA, the 73 million millennials were actually driving less. By the end of the 2000s they drove 20 percent fewer miles than at the outset. They have embraced city centre living, cycling, walkable suburbs, and homes close to railway stations. Since the mid-1990s median home values per square foot have risen by 325% near railroad stations, but only 122% for home values as a whole⁴.

It would take a lot to change, rather than readjust, the new and still emerging *centripetal* dynamic. A central reason for this is the rising importance of agglomeration economies in the new knowledge and information economy (as opposed to mass production). As economist Edward Glaeser points out, cities are all about proximity, density and closeness. They have grown and prospered world-wide even as the wonders of the World Wide Web have unfolded. Transformational IT has not overcome the tyranny of distance. In America, workers in metropolitan areas with big cities earn 30% more than workers outside metropolitan areas. The physicist Geoffrey West has shown that every doubling in city size brings 15-20% increase in wages, patent output and the employment of super productive people⁵. London reflects this urban mathematics. Chape and Wray proposed an explicit policy to create and sustain two super cities in the UK, one north, one south, bringing together the big cities of Liverpool, Leeds and Manchester, which are only some 65 miles apart, and tying their labour markets more closely to the old industrial towns which are between them (like Wigan and St Helens) or nearby (like Blackburn, Rochdale, Bradford and Burnley)⁶.

This was part of the logic which underlaid George Osborne's Northern Powerhouse speech in June 2014⁷. It also underlaid the plan for High Speed North devised by the late Professor Sir Peter Hall with Ian Wray and David Thrower - and published in April 2014, some weeks before Osborne's speech. Hall's plan was modest, realistic, modular and deliverable, and considered the needs of the places close to and between their cities as well as the cities themselves. We spell out the wisdom of the Hall plan below and consider whether it might be time to return to some of its basic principles.

Looking Ahead

We cannot be certain of the long term outcome and we might be wrong. These are unprecedented circumstances and we are looking through a glass darkly: 'the virus is really disruptive' argument would be that people will get used to working from home and will stick to it. This would affect city centres in particular and mean that past worries about transport capacity pressures are genuinely eased. But there is a counter argument. We may discover that many jobs cannot be carried out effectively from home and that these will turn out to be more important than once thought, and will continue and re-appear, perhaps with an elevated status and maybe higher pay levels, once the virus is defeated. Many jobs – especially high level and creative jobs – need face to face interaction, and in America trends show that high skilled jobs are growing fast⁸. A study of working relationships in London's creative media industry, centred in Soho, found that interpersonal relationships and face to face contact were of absolutely central importance: 'Peer regard, partly based on industry gossip is a lynchpin of smooth labour market functioning in a fuzzy, fast moving, environment'⁹. The same undoubtedly applies to finance and the City of London. And just as bankers and media people need to gossip, musicians have discovered that they cannot rehearse together on line, because of time

delays. Still other jobs involve working with physical artefacts, not computer screens, whether these are works of art, manufactured products, or simply caring for other people. Still other jobs, further down the food chain, involve regular supervision of workers who may not be as self-motivated as others.

One central problem is unlikely to go away, even if the virus is conquered either by natural progression, or vaccine, or strict public health measures. That is the unfortunate jolt it has given a world economy already overburdened with high levels of private debt and overvalued stock markets, risking an economic crash followed by long term economic depression associated with a widespread collapse of demand¹⁰. With interest rates already at historically low levels there is no scope for effective stimulus from that source.

This suggests that governments will fall back on the traditional remedy – public works – and potentially on a very large scale. Governments will want to get the public works programme moving within one or two years, to stimulate the economy and make an impression on the problems before the next general election. This can either be financed by borrowing or by higher rates of taxation. Contrary to popular belief, UK government borrowing as a percentage of GDP is low¹¹ and taxation as a percentage of GDP is also low¹². We know that the needs for public investment are considerable if the UK is to meet a number of wider challenges and enduring problems, including the need to:

- Develop and strengthen the NHS, its personnel, resources and assets, increasing our national resilience to future pandemics
- Decarbonise the economy, to adapt to and mitigate the impacts of climate change
- Secure a much better spatial balance of economy activity
- Rescue the future for many of the old industrial towns left behind by the last few decades of rising wealth and inequality
- Secure much higher levels of national productivity, especially by investing in scientific and medical research and other forms of R&D

This paper is written against this troubling and uncertain backcloth. Within it we want to develop proposals for transport investment in the North of England's rail system designed to meet these shifting and enduring strategic challenges with a realistic programme of investment. Before we move to the imperatives for future investment, we briefly review the strengths and opportunities of the North's economy, drawing on research in the Northern Powerhouse Independent Economic Review¹³.

Lessons from the Northern Powerhouse Independent Economic Review (NPIER)

The NPIER was prepared by SQW consultants in 2016. It is an in-depth study of the north's economy, its strengths, assets and problems. The Review draws attention to the long standing performance gap between the north's economy and the rest of England, as well as London. Over the last thirty years the North's GVA per capita has been 25% below that of the rest of England, including London. As well as having fewer people in work, a prime cause of the North's weakness has been poor levels of productivity, which result in differences in earnings. SQW identify several explanations for the productivity disparity: low enterprise levels; a lack of skills; a technology gap; lower investment in science and technology; and the lack of agglomeration, with northern cities which were too small to

take advantage of economies of scale, a problem exacerbated by poor transport links between key settlements.

The Review looked at the North's sectoral specialisms and the specialisms of particular places, identifying four prime capabilities: advanced manufacturing, energy, health innovation, and the digital sectors including media. In addition it saw three enabling capabilities: financial and professional services; logistics, including ports and airports; and education, especially higher education. The Review mapped the distribution of these various activities across the region.

These maps are instructive for they show very clearly that the strengths are not solely located in the big city centres. Advanced manufacturing capabilities are spread across the north with heavy concentrations in Cheshire, Teesside, East Lancashire, Humberside and York, as well as others near the biggest cities. A similar picture emerges for energy, with big concentrations on the Cumbrian coast, between Liverpool and Manchester, on Humberside and in Teesside. Health innovation capacity has a closer fit with big cities, but there are also strong concentrations in south Cheshire, on Humberside and north of Newcastle. Digital capability shows a stronger relationship with the big cities, as might be expected.

The enabling capabilities, which essentially provide support for the leading sectors (many of which will be exporting sectors) have a much closer relationship with the big cities, especially in their centres and also at their ports and airports.

All this has important consequences for transport investment in general and rail in particular. To develop agglomeration economies we need to link the employing sites and of course the big city centres to their potential labour pool, and to each other. It is not enough simply to link together the big city centres. We also need to link them to current and potential commuting locations - and to places close to and between the big cities. A network approach is needed.

Six Imperatives for Rail Investment

Distilling the discussion above, we can identify six imperatives for rail investment in the north:

- Speed of delivery, if not in shovel ready projects, then at least in projects which can be specified and constructed within five or at most ten rather than twenty or more years
- Value for Money, tackling immediate problems and demonstrating results
- Building agglomeration economies not just within the city centres but across the north as a whole
- Using transport investment to overcome the weaknesses of smaller industrial towns and cities, not least as they often accommodate some of the most important prime capabilities in the region's economy
- Tackling real problems rather than merely addressing long term aspirations
- Promoting a sustainable transport system which supports urban regeneration, rather than urban sprawl, and reduces carbon emissions, not least through a switch to electricity (from sustainable sources) for power supply

The rest of this report is developed with these imperatives in mind. But first we turn to the construction history of the UK's motorway system in the 1960s and 1970s, in terms of politics,

realism and delivery. It turns out that this earlier national infrastructure achievement, with its long incubation period before and after World War Two, has some valuable lessons for the present day.

2 Lessons from the Motorway Builders ¹⁴

Government Inaction

Britain's first motorway was built in the North of England. But, perhaps surprisingly, the first Parliamentary Bill for motorway-style road construction was a private members bill for a new road between London and Brighton, dating back to 1906. Restricted to mechanically propelled vehicles the proposal would have been a dual carriageway with slip road access. Another private members bill introduced in 1923 sought powers to construct a 226 mile northern and western motorway from London to Liverpool. Though revived in 1929, this Bill foundered for lack of government support.

Throughout the 1920s and 1930s the Ministry of Transport held to the view that piecemeal improvements to existing routes rather than big freestanding projects should have priority. In 1931 a Royal Commission on Transport reached dismissive conclusions on motorways: 'We feel that new roads of this nature are not required'¹⁵. In words which might easily have been heard more recently, expressing scepticism about high speed railways, the Department's chief engineer said; 'In a densely roaded (*sic*) country such as ours, conditions would not permit the construction of motorways'¹⁶. His Minister readily agreed: 'I think our task is to improve the system we now have'¹⁷.

Whilst officialdom opposed motorway style roads, local authorities embraced them. The 28 mile long Liverpool –East Lancashire road was built close to motorway standards, on a new alignment. Liverpool's city engineer, John Brodie built the UK's first ring road in the 1920s and was largely responsible for the two mile long Mersey Tunnel, one of the greatest engineering feats of the 1930s. As with the East Lancs Road, the initiative came from local government, not the Ministry.

In pre-war Germany it was a different story. Like Mussolini, Hitler saw new roads as a vivid example of the unity of the Reich, a public works programme which would reduce unemployment and provide essential infrastructure. By 1939 over 2,300 miles of autobahn had been completed. The new roads caught the imagination of British local authority engineers who returned from a study visit to Germany convinced that motorway style roads were the future. The County Surveyors Society established a subcommittee and produced a pre-war plan for a 1,000 mile national motorway network.

Post war, attitudes to state investment and construction began to change – but only slowly. As with the reconstruction of blitzed cities, the airfield construction programme led to new skills in massive civil engineering projects. In 1939 RAF Bomber Command had 27 grass covered airfields; by 1945 it had 126 concrete runway airfields, and government had seen at first hand the quality of the *autobahnen*.

Even so, government support for new roads was not forthcoming. Ministers saw a widespread system of motorways as lacking justification. Although the post war Labour government announced a Ten Year Trunk Road Plan, including 800 miles of motorways, initiative was left entirely with the local authorities. There was no new money and the Treasury pursued its traditional role of squeezing investment to save what little money there was.

Local Government Initiative

As in the interwar years, initiative lay with local government and specifically with local government in Lancashire where the county council's young and dynamic engineer, James Drake, prepared an ambitious 'Roads Plan for Lancashire' in 1947¹⁸. Over the next 50 years a substantial part of Drake's plan was implemented. Shrewdly anticipating the shortage of public funds and anaemic government support, Drake realised that the best chance of success was in breaking the big project up into a number of smaller free standing schemes which could subsequently be knitted together to form a network. The first two schemes built by Drake were deliberately badged as 'by passes' rather than motorways – the Preston By Pass approved in 1956, and the Stretford By Pass, started in 1957. Both were elements in Drake's big county-wide plan of course. As historic photographs show, the Preston by pass was designed to modest and minimum standards. There was no road lighting, the hard shoulder was a grass verge and the outside lanes were both finished as grass reservations. Yet the bridges were built to sufficient width for eight lanes, including the hard shoulders. Drake kept his staff busy designing schemes for the shelf, so that as soon as government support was forthcoming he would be able to move.

Sir Peter Baldwin, Permanent Secretary at the Department for Transport (and a key ally in the later stages of the motorway programme) knew exactly what the game was:

'Who built the motorways? What I observe first is the complexity of the task when seen as a whole and the uncertainties within it...What was ordered was a system. But it was not ordered as a whole. Successive parts of it were ordered with degrees of uncertainty... about what would be ordered next and when, if at all'¹⁹.

The political and departmental game playing worked; by 1972 a 1,000 mile national network had been built, bearing a remarkable resemblance to the 1938 County Surveyors' plan.

The lessons are straightforward. Clear long term aspirational objectives and a visionary 'badging' concept will ultimately attract popular and political support, especially from voters and local government politicians. But start modestly, without needlessly frightening the Treasury, and bag some early wins. Develop a flexible and modular approach to implementation, both in terms of scale (start with four lanes instead of eight) and in terms of location (build first where it is politically and practically possible to do so) and in terms of need (tackle the obvious problems first), so that these build steadily towards realising your long term aspirations and long term plan. We suggest that these principles might be applied as much to northern rail investment in the 21st century as to northern road investment in the 20th century.

3 Northern Freight Under Stress

The National Picture

According to Office for National Statistics data published in September 2019²⁰, greenhouse gas emissions from all road transport make up 21% of UK greenhouse gas emissions. The Department for Transport's Freight Carbon Review 2017²¹ states that, although they make up only 5% of vehicle miles, heavy goods vehicles account for as much as 17% of total road transport greenhouse gas emissions. A decarbonisation strategy for these vehicles is challenging for two reasons. First, technological solutions for electric propulsion for larger HGVs are at an early stage of development. Second, the diverse mixture of vehicle configurations, weights and fleets make a single industry-wide solution difficult.

The UK is committed through the 2008 Climate Change Act to a long term and legally-binding target of reducing UK emissions by at least 80% on 1990 levels by 2050. In addition, the 2008 Ambient Air Quality Directive sets legally-binding limits for concentrations of major pollutants that impact public health, including particulate matter (PM10s and PM2.5s) and nitrogen dioxide (NO₂).

Moving freight is vital for the economy and, for environmental reasons, there must be a growing emphasis on expanding the role of rail freight, powered by electric traction.

The latest data²² show that total rail freight moved in Q3 was 3.99bn net tonne km; total freight lifted was 15.3m tonnes, a 20% decrease over the previous year, reflecting the final run-down of coal traffic to power stations. But the last 5 years have seen rail increase its share of domestic intermodal (i.e. container) traffic by 13%. The main commodities carried are (in net tonne kms.): intermodal 1.67bn; construction materials 1.07bn; other commodities, 0.49bn; metals 0.30bn; and oil and petroleum 0.25bn. Some flows are reasonably stable, such as containers from South-East ports to Doncaster or Trafford Park. Other flows (such as construction materials) may develop and then cease when a contract is fulfilled. So the system needs enough spare capacity to accommodate short-term flows.

Over the past two decades, the North's rail network has accommodated additional passenger services, absorbing much of the remaining network capacity. Speeds of some passenger services have increased, making it more difficult to share tracks with freight services. Passenger train lengths have also grown, so they are taking longer to clear key junctions, alongside a major increase in passengers, resulting in some station dwell times being extended.

Rail haulage of intermodal traffic and construction materials has grown, as coal haulage has fallen, so that the geography of demand has shifted. Some routes have been adapted to accommodate bigger containers, to W12 or W10 loading gauge (mostly in the Midlands/South) and this includes the East Coast Main Line.

There has been continued reliance for traction on diesels (with the notable exception of the flows of container trains to and from Trafford Park, Manchester). Diesels give operational flexibility, but with reduced power and acceleration and increased pollution. If rail is to provide an environmentally better alternative to lorry haulage, it will need to use electric traction for diverted freight flows.

Growth Forecasts and Slow Speeds

Freight trains cannot be easily fitted into intensive passenger services and so they are often held in passing loops to allow passenger trains to pass. When in loops, or stuck at signals, freight trains lose money and thus competitiveness. Many freight services are painfully slow: Liverpool to Drax power station has an average speed of only 16mph; Immingham to Eggborough power station, 17mph; Immingham to Drax power station, 19mph²³

Transport for the North used the Great Britain Freight Model to forecast future transport flows. A 2050 forecast for the North of England, applying NPIER growth projections, indicated that, in tonne-km, road freight would grow by + 61.8% and rail by + 52.9%. Specific rail freight routes may come under pressure driven by increased intermodal traffic²⁴: strong growth is expected on the West Coast Main Line, particularly south of Warrington and the route to Garston and Widnes; on the East Coast Main Line south of Doncaster, and on sections of line northwards to Leeds, and between Liverpool, Manchester and Leeds.

The extension of HS2 northwards will set fresh challenges for freight in the North. The extra capacity created on the network south of Crewe by HS2 Phase 1/2a is not matched by spare capacity available north of Crewe. The gains of HS2, in terms of released capacity for rail freight, risk being wasted unless some measures to increase track capacity north of Crewe are made in the period to 2030. This is likely to involve some four-tracking of the Crewe-Weaver Junction section of the West Coast Main Line. It might be associated with the use of digital train control systems, which are likely to be needed in any event as a suitable interface with the HS2 systems from Crewe southwards from circa 2030 onwards.

Access to freight terminals is a critical issue. Trafford Park terminal is at present only accessible by rail from the east (i.e. by traversing Manchester city centre). Although this is unhelpful for passenger services, enforced closure of the depot would be undesirable. Its location, according to Rail Freight Group, is considered ideal for its customers.

The alternatives are either:

- A suitable new freight interchange more readily served off the West Coast Main Line (Parkside has been a candidate for some years) *or*
- An access route from the West Coast Main Line to the Liverpool-Warrington-Manchester line, so that the Trafford Park terminal can be accessed from the west. Since these trains are electrically-hauled, this would also require electrification of this second line between the two major cities *via* Warrington, which is desirable in any event.

Growth on the East Coast Main Line may be manageable with minor additions to committed developments. South of Doncaster, the creation of a parallel freight route via Lincoln is proceeding at pace. North of Doncaster, various fixes are available, especially since there has been such a decline in coal traffic on this part of the national network. As for trans-Pennine freight, it must be anticipated that the Trans Pennine Route upgrade will indicate a suitable solution. But nowhere in sight is a coherent rail freight strategy for the North, combining these measures and driving the North's economy forward with a more sustainable freight and logistics system.

The messages for the North of England's economy are clear. If Northern Powerhouse growth forecasts for 2050 are reasonable, there will continue to be massive growth both in road freight traffic and rail freight in the North of England. The projected growth in road freight will outstrip rail, with all the adverse environmental consequences for emissions, noise, accidents and congestion that would bring. Significantly increased rail network capacity would be required to accommodate projected growth. And, if economic growth is accompanied by environmentally-driven policies to further-switch freight from road to rail, even greater rail network freight capacity will be needed. Freight by rail is expected to grow strongly in the North – by more than 50% in the next 30 years. If freight is successfully decarbonised, a much higher level of growth can be expected as electrified rail provides a viable alternative to road haulage across key corridors.

The likely short, medium and long term investments needed to accommodate desirable rail freight growth are set out in the table below.

Rail Network Investment Priorities for Freight Across the North

Short term (2020-2025) rail network investment measures are likely to include:

- overdue investment to deal with crucial rail-traffic bottlenecks such as Manchester Piccadilly
- implementation of modest capacity improvement schemes such as Dore (south of Sheffield)
- minor local electrification extensions such as Manchester-Stalybridge (to help decongest Victoria)
- further selective main line electrification where this enables further elimination of diesel traction and incentivises a move away from diesel only traction
- extensions of existing passing-loops to accommodate longer (750m) freight trains
- creation of additional rail freight terminals, with regard to available capacity on access routes, including potential network enhancement to support new terminals

Medium term (2025-2035) improvements (for which planning should commence at once:

- adapting the North's rail network to accommodate the complex impact of the opening of HS2's initial phase, including implementation of High Speed North initial phases
- additional electrification to permit further elimination of diesel traction and greater operational flexibility/resilience during disruption
- selective quadruple-tracking to enable intercity passenger services to overtake freight (and stopping passenger) trains
- re-opening of disused routes such as Leamside (Durham) to create more capacity for passenger/freight train mix
- grade separation at key junctions, such as Euxton (merge of WCML and Manchester – Preston routes) and Newark (flat crossing of ECML)

Long-term (2035 onwards):

- completion of HSN
- further quadrupling of tracks on existing routes
- further infill electrification
- comprehensive provision of new rail connected distribution depots
- securing electrified intermodal freight and electrified 'last five miles' road distribution

4 The Current Plan for High Speed North

In the Department for Transport's terminology¹, High Speed North is – or rather will be – ‘an integrated rail plan for the Midlands and the North’. When Professor Sir Peter Hall and two of this report's authors (Ian Wray and David Thrower) set out a plan called ‘High Speed North’ in June 2014, they were focussed on what would now be thought of as part of this integrated rail plan – the east-west connections between the North's major cities. This has been variously referred to in the past as Crossrail for the North, HS3, and, now, Northern Powerhouse Rail.

The Integrated Rail Plan

Here, we examine the DfT integrated plan for High Speed North²⁵, insofar as it can be assessed. Terms of reference for a revised plan were published on 21st February 2020 following a recommendation in the HS2 Oakervee review,²⁶. This suggested that HS2 Phase 2b should be reviewed in conjunction with plans for Northern Powerhouse Rail, as well as the set of measures envisaged in the Midlands.

The new Integrated Rail Plan is set to draw on advice from the Infrastructure and Projects Authority (IPA) on lessons that can be learned from HS2 in terms of cost overruns. Parts of HS2 (London – Birmingham – Crewe) are going to be taken as a given. There is also to be an input from the National Infrastructure Commission (NIC) which is to advise on the ‘rail needs of the Midlands and the North’. The integrated plan will be published by the end of the year.

The scope of the integrated plan is identified as HS2 Phase 2b, Northern Powerhouse Rail (NPR), Midlands Rail Hub and ‘other proposed Network Rail projects’. The scope is set wide in relation to delivery issues, consenting routes (legislation), governance, project phasing, and ways to reduce cost and speed up delivery. It will also cover the question of how best to ‘deliver rail connectivity with Scotland’. The Integrated Rail Plan needs to be in line with the Oakervee Review conclusion (which includes support for the whole of HS2, in all its phases) and cognisant of fiscal and supply chain constraints.

There is no mention of freight (or indeed passengers) in the terms of reference, which focus on infrastructure projects and their efficient delivery, rather than wider objectives, and investment appraisal. This could reflect frustration with the pace of delivery, and a belief that accommodating demand does not at this stage require an overall service plan for the new and by passed rail infrastructure. Parliamentary Powers have been granted for HS2 Phase 1 and they could be forthcoming for Phase 2a by summer 2020. But Phase 2b and NPR are nowhere near ready to build.

The terms of reference state that: “as well as committing to deliver HS2, the government remains strongly committed to Northern Powerhouse Rail.” The test of these slightly differently worded commitments is likely to be revealed in conclusions reached on sequencing and delivery timescales of project elements. The further into the future, the greater the scope for changes ahead, including retraction of earlier commitments. The HS2 Phase 1/2a delivery timescale has slipped to a completion date around 2031. Allowing for the current year to develop the Integrated Rail Plan (High

¹ The Northern Powerhouse Partnership had used the same term, to a different end, recommending “the establishment of HS2 North – a special purpose vehicle working with the private sector to integrate HS2 and Northern Powerhouse Rail (NPR)”

Speed North), the likely duration of the consenting process, and based on experience to date, Phase 2b and NPR might be expected to be delivered in the period 2040-45.

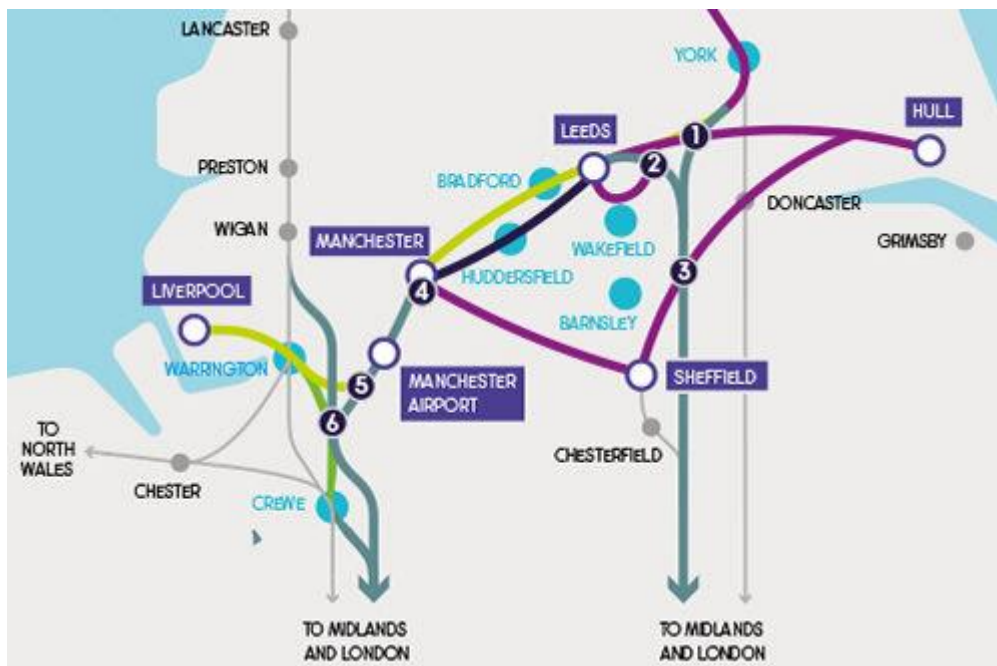
Some parts of the Integrated Plan, especially elements based on upgrading railways, could be delivered much sooner than that. Plans for the Trans-Pennine Route Upgrade (TRU) are understood to be due for announcement in the near future. And the terms of reference suggest that, in respect of one part of the mega-project list, Government wants to proceed quickly: “...will also proceed with the legislation to allow for the development of the Western Leg [of HS2] provided it doesn't prejudice any recommendations or decisions that will be taken in this plan”. So a start on legislation might be expected as soon as January 2021, but it is unclear whether the 'Western Leg' is the Crewe-Manchester section of HS2 or whether the route northwards to Golborne Junction (near Wigan) is also included.

A Plan Prepared Earlier?

Over the last few years, DfT, working with Transport for the North (TfN), has looked at ways to mesh together the largely east-west trajectory of NPR with the two north-south limbs of the HS2 plan²⁷. The attraction was that parts of HS2 Phase 2b would be operating with spare capacity. So, a new fast connection between Sheffield and Leeds, for instance, provided as part of Phase 2b, could also serve to meet part of the Northern Powerhouse ambition of faster connections between the major northern cities. A series of 'touch-points' – connections and junctions between the two projects, and with the existing rail network, were examined during 2018-19 to establish if this could be achieved.

The broad shape of an integrated HS2 and NPR network is therefore known – and is shown below. Here, the HS2/NPR 'touch-points' are numbered 1-6, HS2 phase 2b is shown in blue/grey, new lines built as part of NPR are in yellow, and upgrades to existing lines are shown in purple (TRU) and between Leeds and Manchester in black.

Current Plans to Interlink HS2 and NPR



Key integration features between HS2 and NPR arise at:

- Major stations such as Manchester Piccadilly and Leeds
- Between Liverpool and Manchester where an NPR connection westwards *via* Warrington is added onto the Manchester-Crewe HS2 link (at touchpoints 5/6)
- Between Sheffield and Leeds, where connections to/from the existing network (touchpoints 2 and 3) would allow a new fast connection between the two cities.

The map above does not show North East England, which would be served by NPR largely over upgraded existing lines; nor does it show the Midlands, which is also to be covered in the High Speed North integrated plan. But the map shows the central east-west corridor in the North, and it is on this geography, and especially the western end of the Liverpool-Manchester-Leeds link that we focus.

Candidate variations that have become apparent since the TfN/DfT touch-point plan was published include:

- The possible replacement of the connection at Touchpoint 2 with an extended version of Touchpoint 3 to provide a running connection northwards from HS2 to Wakefield and Bradford
- The possible removal of the Golborne spur of HS2 northwards from touchpoint 6

There are also some issues outstanding, including:

- The design at Manchester Piccadilly station
- The route between Warrington and Liverpool and whether this should be a completely new (high-speed) alignment or an upgrade of an existing rail corridor

- Whether the NPR route should be routed *via* Bradford, with an underground through high-speed station in the city centre.

In each of these three cases, the scope and capital cost differentials are likely to be very substantial.

But this is a serious attempt to ensure that the best overall value for money is obtained by ‘piggy-backing’ fast new train services between the North’s large cities on HS2 infrastructure that would not otherwise be fully used. Exactly how this will be achieved, and its likely cost, remains unclear. What is clear is that consideration of NPR, as now envisaged, has become inextricably linked with HS2 Phase 2b.

In terms of capital outlay, HS2 Phase 2b (eastern and western limbs) is estimated to cost in total between £36.3bn and £40.3bn, in 2019 prices, and NPR has been estimated to cost £39bn. Together these components currently have a price tag of circa £80bn, which may not be acceptable post Covid. Moreover cost estimates for HS2 Phase 1, made at the stage of development now reached by Phase 2b and NPR, increased substantially later.

Aims, Aspirations, Risks and Shortcomings

Government’s aims for these projects are expressed in terms of meeting a capacity need in a way that enhances connectivity across the nation and addresses the ambition to ‘level up’ the economy.

The commitment to Phase 1 of HS2, which has a price estimate of £40-43bn in 2019 prices, was made before the scale of the Covid 19 and its impact on the national economy became apparent. There will be, as a result of Covid-19, very much greater pressures on public finance in the period 2021-31 when Phase 1 (and potentially Phase 2a) is due to be built - although there may also be pressure for a rapid public works programme to avert economic depression. The connectivity benefits – and very largely, the capacity benefits – of the project are unlikely to be diminished in a post Covid-19 world. Moreover, the merit in expanding high-quality electrified rail network capacity should not be overlooked, at a time when the transport sector is facing a de-carbonisation challenge. So, while fiscal pressures will be complex, there is no reason to turn against this part of the Government’s intended transport sector capital spend.

As we argued earlier, within and across the North, the need to strengthen the existing transport network that links the major cities, both with each other and with the Midlands, Scotland and London, remains very strong. We have no difficulty with the longer term economic aspirations that have prompted Government support for these investments, nor in their search to ensure that they are delivered efficiently. But we see two weaknesses.

The first is this: completion by the 2040s is simply too late, if the aim is to strengthen regional productivity and the economies of the North - and Midlands. It will not meet political deadlines to deliver for the North nor respond to the risks of recession. Nor will it provide the assurance and incentive for the private sector to commit to new investment in the North. Evidence from high-speed rail projects elsewhere (France, in particular) has shown that there is a market stimulus, with the private sector investing in response to the connectivity gains that HSR brings, as much as 7 years ahead of high-speed service introduction. Once there is certainty, businesses are comfortable with investing in anticipation. But on the basis of precedents elsewhere, for the North of England, Phase 2b or NPR-related development might not be visible on the ground until perhaps 2033-5.

The second problem is that the ingredients for the new Integrated Rail Plan may not solve problems already apparent (which we later term 'super-critical issues'). The Plan ingredients are focused on high speed connections between a relatively small number of larger city centres rather than integrating regional labour markets across the Trans Pennine Corridors and beyond, by developing mobility hubs in smaller centres, with connecting buses, bike hire, walk and cycle ways, provision for electric car charging and so on.

The Integrated Plan components have been designed to address, in the case of HS2, a future capacity problem on north-south rail arteries foreseen 20 years ago, and in the case of NPR, an opportunity to create better pan-Northern intercity connectivity identified in 2014. But the problems that became apparent on the North's rail network in 2018-19 need to be addressed urgently. They will not be addressed by the Integrated Rail Plan components, even when they come on stream, probably in more than 20 years' time.

Basically, the North's rail network is over-loaded, right now. Some solutions may be found in the short term, perhaps cutting some services so that those that remain can be operated with acceptable levels of reliability. But what comes next? Where is the medium-term plan to address the problems of rail network congestion, readily apparent at Manchester, but incipient in other major cities where central stations and approaches have inadequate capacity?

While it is true that other more modest schemes exist that could be delivered earlier (the Trans-Pennine Route Upgrade (TRU) being the prime example²⁸), they too do not tackle these network problems. As a result, none of the possible headline projects, whether medium or long term, will solve today's super critical problems, as discussed below.

The Integrated Rail Plan will provide a major boost to the North's economy in due course (the 2040s), and we intend here to take these plans as a given, recognising that in some respects they are still evolving. But this means that there is a real gap to be addressed: how to bring about the pressing improvements needed in the 2025-2035 period. It calls for a modular, incremental approach, not unlike the plans developed by local government which successfully delivered the North's motorways some 60 years ago.

5 High Speed North: The Hall Plan

In their paper published in 2014, the late Professor Sir Peter Hall, with David Thrower and Ian Wray, set out the vision²⁹ of a 20-year staged programme to create high-speed rail links between the major North of England cities. The Hall plan, as we term it, was a response to Sir David Higgins' paper 'HS2 Plus'³⁰. Sir David had summarised the challenge as connectivity between the great Northern cities:

'The key to improving these, particularly east to west, is to integrate HS2 into the existing network to improve connectivity between Liverpool and Manchester, Manchester and Leeds, Leeds and Hull.....HS2 and the future of the existing network need to be considered together.'

In response, the Hall plan first set out the parameters of the investment debate. The UK now has the biggest regional disparities in Europe. Greater London is as big as the next six urban areas put together. If the national economy is to be rebalanced, it argued, we must create an economic counterweight to London, bringing together three great cities only 60 miles apart, Liverpool, Manchester and Leeds, continuing to York to connect the North-East, with a new high speed rail link. This would be backed-up with electrification and other improvements for key links to places currently isolated from the core cities.

Hall *et al* went on to argue how fast rail connections could play a huge role in underpinning regional economic growth, through creating an integrated high-level labour market and building-up urban agglomeration and its consequent economic benefits. The Hall authors saw the ultimate objective of what they termed High Speed North as being to cut Liverpool-Leeds journey times to 55 minutes or less, initially securing improvement in journey times through the use of tilting Pendolino-type trains, and then subsequently through the construction of new lines and the upgrading of existing infrastructure.

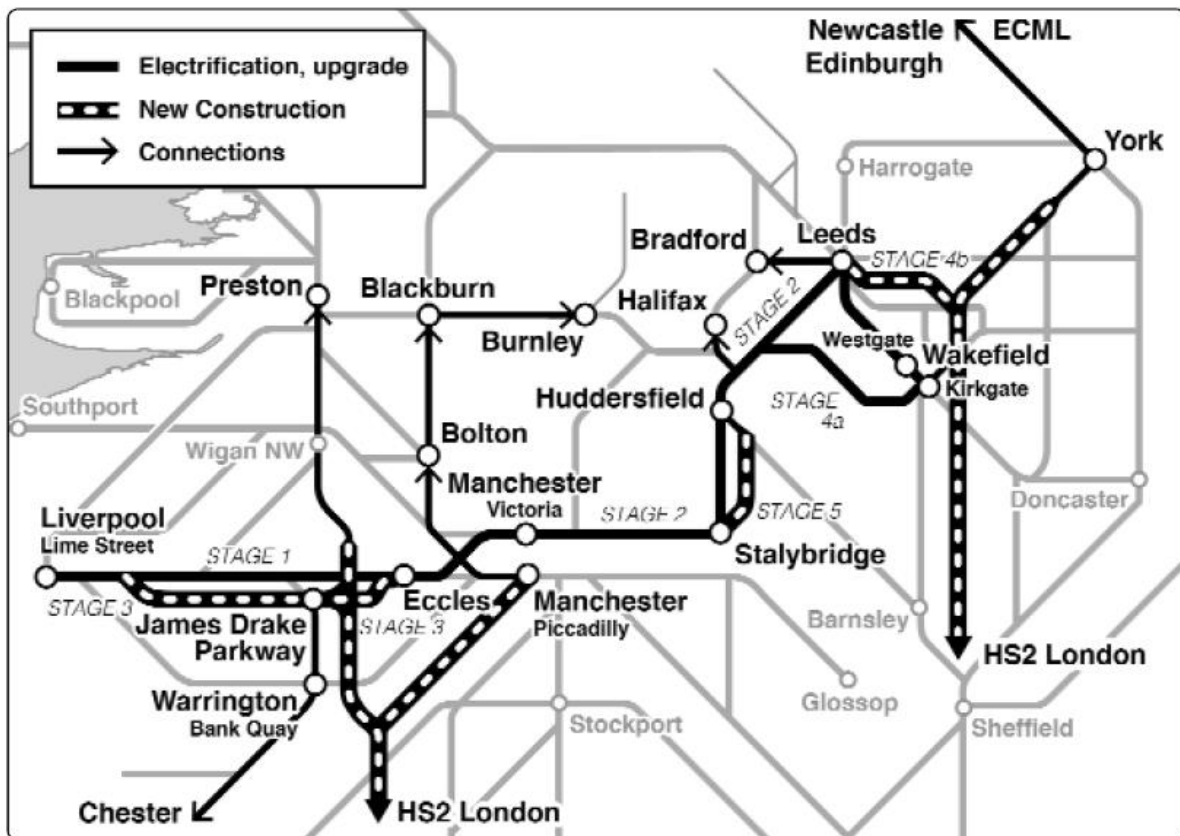
A Modular Approach

In more detail, improvements would be phased as follows:

Stage 1: Electrification of Liverpool-Manchester (this is now implemented)

Stage 2: Implementation of the Northern Hub schemes, and electrification of Manchester-Leeds, plus introduction of Pendolino trains. The Ordsall Chord, between Victoria and Oxford Road (part of the northern Hub plan) has now been implemented, but the re-modelling of Oxford Road and Piccadilly remains unresolved, and other elements in the Hub plan are on hold. Details are still awaited of how much of Manchester-Leeds will be electrified under the approved £2.9bn Trans-Pennine Upgrade. New bi-mode (electric/diesel) trains have been introduced in 2020 but these do not tilt, cause carbon and particulate emissions, and have the weight penalty of carrying full fuel tanks and diesel engines over the Pennines.

The Hall Plan for High Speed North, April 2014



Stage 3: This first stage of major new investment would create 20 miles of new high-speed route out of Liverpool, following the M62 motorway. It would form the first stage of any high-speed trans-Pennine route but would also link into HS2 to give Liverpool a complete high speed link to London. Just east of where it crossed the WCML, the new line would re-join an upgraded Chat Moss route. There would be a new hub station for the Warrington/St Helens area, “James Drake Parkway”, on the site of the former Parkside colliery, near Newton-le-Willows.

From there on, the eastern half of the present Liverpool-Manchester route is straight and level, much of it across Chat Moss, and could readily be four-tracked to give two new high-speed tracks into Manchester Victoria. There would be a rail/Metrolink interchange at Eccles to give access to the Salford Quays area, requiring a very short extension of Metrolink.

The section eastwards from Manchester Victoria to Stalybridge would become high-speed-only. The local services would be switched to the Guide Bridge and Stalybridge route, and this route and the Hadfield/Glossop and Hyde Loop routes converted to tram-train. A replacement for the present Ashton station would be created at Ashton Park Parade, on the Guide Bridge-Stalybridge line, and the present Metrolink route to Ashton extended to this station, with services continuing to Stalybridge where there would be interchange with High Speed North.

The Metrolink system would thus reach from the interchange at Eccles station to the interchange at Stalybridge station, on the German model.

Stage 4: A parallel investment for the 20 miles to the west of Leeds, from Huddersfield, using the same approach as recommended above for the Chat Moss route. It would involve 14 miles of upgrading and electrification from Huddersfield to Wakefield Kirkgate, plus a short 2.5 miles of new line to a delta junction with HS2.

The work could be done in two sub-stages. First, depending on feasibility, a short new link could be built to connect into the present Doncaster-Wakefield Westgate-Leeds line, south of Wakefield Westgate, giving access to the present Leeds station and with services continuing to York and the North East. A second sub-stage would be to connect into the new HS2 line to give continuous high speed running into the HS2 terminus at Leeds. There could also be onward running via HS2's eastern arm direct to York and Newcastle.

Halifax and Bradford, too, were not be forgotten. High speed services from the Manchester direction could operate via Huddersfield and the admittedly-slow route via Bradley and Greetland junctions to Halifax and Bradford. And from the south, HS2 services on the eastern arm could also operate to Wakefield and either Huddersfield, Halifax and Bradford.

Stage 5: Although there was once a four-track alignment from Marsden eastwards to Huddersfield, which could theoretically start back from Diggle if the disused Pennine tunnels were renovated and re-tracked, restoring the route to pre-late-1970s condition, this route could never remotely constitute a high speed line. The first, low-cost, improvement could thus be some selective four-tracking and the introduction of Pendolino services – which took 20% off West Coast Main Line journey times.

However, the more radical longer-term high speed solution would involve building a new direct base tunnel under the Standedge summit of the Pennines, on the model of the modernisation of the great trans-Alpine routes, and similar in length to London's Crossrail tunnel. This would commence immediately north-east of Stalybridge and emerge in the Holme Valley, south of Lockwood, to run into Huddersfield on the present four-track alignment. This would complete a high speed railway from Liverpool through Manchester to Leeds, dramatically increasing capacity, including capacity on the old classic route for better local services and freight. It would also provide continuity of the workforce post-HS2 tunnelling.

HSN was therefore seen as being achievable in five manageable stages, starting with electrification of Liverpool-Manchester Victoria (now in place) and following that a carefully-phased and funded programme over two decades.

6 Solving the Puzzle

What Professor Sir Peter Hall and his co-authors envisaged was a staged plan to create the high-speed connections that would allow Liverpool, Manchester and Leeds to combine their economic strengths, with an end to end journey time of 55 minutes. Some of the component parts of his plan – the North West electrification scheme, and Ordsall chord – have been delivered in the six years since the Hall plan was published. More may follow when the Trans Pennine Route Upgrade is finalised. And in the longer term, the Northern Powerhouse Rail plans may complete the job.

But in the last six years much else has changed. Rail usage in the North has grown strongly, new services have been introduced, and new train fleets have come into service. But there has been no guiding hand ensuring that each improvement contributes to a wider sequential development. Those bidding for franchises each sought to maximise revenues; the timetabling of critical route sections – and the North has many of these – were made on a bid and offer basis. No wonder service delivery has been woeful.

Lessons from the Hall Plan

We draw four key lessons, set out below, from the Hall paper. The first is that there has to be an **overarching plan**. Overarching in the sense that each part of the rail system must be considered together *because it is a network*; and also in the sense recognised across Europe (from where Sir Peter Hall drew many of his insights) that inter-regional rail services need to be properly integrated with city-region networks. It is this latter realisation that allowed the plan to be brave where the rail sector is currently timid. The challenge of making sure the benefits of investment are not left to a hope that they will ‘trickle down’ to local communities can be addressed by creating new interchanges between the inter-city network and city region networks – for which he saw a key role for an extended Manchester’s light rail Metrolink system. This, along with the creation of a new park and ride facility at Parkside, creates accessibility from towns across the Mersey belt to capitalise on new infrastructure that is primarily designed to speed up city-city links.

This wider approach, thinking about access to, as well as operations along, the main arteries, helps address tough decisions that have to be faced: is this part of the network designed for high-speed connectivity between cities or to meet local travel demand? If the answer is both, then in effect two railways side by side may well be needed – hence an emphasis on (potentially expensive) four tracking in some corridors.

The second is that there must be a set of **phased enhancements** that lead to a coherent end-state (Hall allowed 20 years to get there, which remains an achievable timescale). In fact there is an ‘end-state 20-years hence plan’: its outline is already broadly known as the combination of HS2 Phase 2b and Northern Powerhouse Rail. Unfortunately interim steps are notable by their absence – and so it is these which we concentrate here, looking back at the 2014 plan. We take as a given Government’s resolve to deliver the long term investment.

Yet the long term vision (illustrated complete with its touchpoints between HS2 and NPR in Chapter 4) is *not* the end-state that Peter Hall envisaged, and interim measures identified in 2014 will have to be re-shaped accordingly. These interim steps deserve to be brought to decision-makers attention,

and considered carefully by the National Infrastructure Commission, because they are entirely absent from today's narrative.

The third lesson is that it is sensible to **combine sections of upgraded lines with brand new high-speed alignments**. This means that careful comparisons are needed of whether new build or upgrade is best, and how much of each. This will be fresh territory: it is a subject that has been side-stepped by the division of possible investments in the North into separate studies of upgrade (Trans Pennine Route Upgrade) and new build (Northern Powerhouse Rail).

The fourth is that it may be possible to **adopt successful technology applications from elsewhere**. The shining example of this in the 2014 paper is the idea that journeys can be speeded up before new high-speed lines are built using tilting train technology. This seems to have been given scant attention, despite its huge success with the Pendolino (and Voyager) fleet on the West Coast Main Line. Another example in the paper is the use of tram-train.

These, then, are key lessons to take forward:

- an overarching plan
- with phased enhancements
- combining sections of upgraded lines with new high-speed alignments
- adopting successful technology applications from elsewhere.

Some Limitations

But it is also necessary to recognise some limitations in the 2014 work, and to test whether plans that would have worked in 2014 are still applicable today. Since we are focussing on the interim steps (rather than the end-product fashioned around NPR and HS2 Phase 2b) it is also essential to consider the problems on the North's railways today, which may not have been foreseeable in 2014,) and make sure that there are measures to address them.

The Hall plan implicitly presumed that the major city centre stations across the North would accommodate additional services that would inevitably be operated over the new and upgraded lines. It is not alone in overlooking the serious limitations that these stations impose on accommodating passenger demand growth. So, a new plan must address a reality that became all too apparent in 2018/9.

The Hall plan upgrade Stage 1 (Liverpool-Manchester) has happened in the last few years, with electrification of the route. It has also brought about 4-tracking of part of this line, between Huyton and Roby. Could this be extended and the extent of new build necessary be reduced, while still bypassing the junctions at Earlestown and Newton-le-Willows and creating new connections with the West Coast Main Line and a new station at Parkside? These are key questions to be resolved by a detailed new build *versus* upgrade study. A corridor study is needed.

With Stage 2 (Leeds-Huddersfield), does the expected electrification, with limited four-tracking and junction improvements where the route crosses the Calder Valley line (part of the TRU project and currently subject to a Network Rail consultation) mean that changes should be made to the later stages of the Hall plan in Yorkshire? We must expect that some refinements would be appropriate, consistent with the four key lessons noted above.

Super-Critical Problems Visible Right Now

As well as looking back at the Hall plan, we need to identify the major problems today for which there are as yet neither short term or long term resolutions. These fall beneath the radar of the mega plans (NPR/HS2) and lie beyond the fixes available to timetable planners. We do not include here measures which are merely in the highly desirable category – such as route electrification, arguably essential to lower rail’s carbon foot-print. The ‘super-critical issues’ are those that will hold back rail service development and undermine the wider contribution it should make to the North’s economy.

The super-critical issues are, we suggest:

- the overload on central Manchester’s rail network
- the need to expand the main city stations in Liverpool, Sheffield and Leeds to accommodate planned service expansion in the longer term
- the inability to operate east-west freight services between Liverpool and Yorkshire/North East England.

These are issues that are not covered by the Hall plan, although to some extent they may have been anticipated. We will consider how the Hall plan might be adapted to address them below. The problems are as follows.

First, we cannot efficiently operate the mix of trains that are contained in today’s timetables over a single pair of tracks. This is most visibly so on the tracks in Manchester between Deansgate, Oxford Road and Piccadilly Stations, where long distance trains such as those between Nottingham and Liverpool, or Glasgow and Manchester Airport, must find their place in a welter of commuter services from all points of the compass into central Manchester and with the main freight flow for the city to Trafford Park.

Second, the increase in train services to overcome connectivity weaknesses can be expected to grow in the years ahead. Some of these have been already brought forward in the Northern and Trans Pennine Express franchises, where there is evident passenger demand. Early incarnations such as a ‘direct’ Lincoln-Leeds service that runs via Sheffield will surely be replaced in the years ahead by a direct train one hour faster via Doncaster. Strong travel markets such as Harrogate-Leeds currently operate with only 2 trains/hour, but much greater use would be made of a service with doubled frequency that becomes close to a ‘turn-up-and-go’ facility. All of this puts even more pressure on the main city centre stations.

The central stations in the major northern stations are simply running out of platform space and need more capacity and better approaches.

Third, freight trains are seeking to navigate the urban rail networks of major centres and especially Manchester, where passenger service intensity is such that capacity cannot be found. Gauge clearance could be addressed by the TRU project but getting freight capacity across city centres is not in the remit. It remains unclear whether in the longer term Northern Powerhouse Rail would help. That would provide capacity relief to existing trans-Pennine routes, but it does not create cross city routes for freight.

All three problems largely arise in the heart of the North's largest cities. This should not be surprising. Equivalent cities in Europe such as Stuttgart and Zurich have come across similar problems. There are solutions; they usually involve tunnelling and they are expensive. But without them, new intercity links - let alone expanded city region rail networks - will not work. The challenge to be faced in updating the Hall plan, is whether it can be adapted to address these 'super critical problems' ahead of the arrival of NPR and HS2.

Updating the Hall Plan

A question arises as the west-to-east trajectory of the Hall plan approaches Manchester. The 2014 plan claims that: 'the eastern half of the present Liverpool-Manchester route.....could readily be four-tracked to give two new high-speed tracks into Manchester Victoria'. Is this still plausible?

True, it was once was a 4-track railway, but over the Eccles-Ordsall section much of the track-bed was given over to the M602 urban motorway. Either this section must be tunnelled, or one of the two M602 carriageways needs to be given up for rail. Did the national motorway plans (described in Section 2 above) envisage urban motorways such as this? Is one carriageway now dispensable?

As urban motorway plans developed worldwide in the 1970s, protest movements grew. With some minor exceptions in Birmingham and Leeds, the ideas for motorways *within* cities were abandoned: large cities would have a motorway box instead. In Manchester's case, the M60 was completed in 2000, leaving the M602 and the Mancunian Way as the only motorway sections inside Manchester's M60 ring. These two roads are anachronisms. These are essentially left-overs from 1960s plans to create a motorway across urban Manchester: so is it time for a motorway slim down?

Extending the enhanced fast rail line to Victoria rather than Piccadilly as in the Hall plan needs a re-think. It is still relevant, partly because the roundabout route being considered for the Northern Powerhouse Rail link between Manchester and Liverpool will be no faster than today's connection. Manchester's authorities want high-speed connections to be centred on Piccadilly station and this has affected the designs for HS2 and NPR.

We would argue that a tunnelled approach from Ordsall in Salford to the planned new station at Piccadilly station (which would have to be underground) would create a through facility for longer distance trains in the desired location at Piccadilly. This route could be connected to the West Coast Main Line (as is today's route, but through rather sub-standard junctions). It could then take all long distance fast services west out of Manchester, with destinations as diverse as Glasgow, Edinburgh, Barrow, Blackpool, Chester and North Wales – as well as Liverpool. Connected to the existing railway on the south east side of the bigger Piccadilly long-distance station, it would provide enhanced

connections to Sheffield as well as via the future NPR to Leeds, Hull and Newcastle and via HS2 to Manchester Airport, Birmingham and London. The service options and levels of accessibility and flexibility created would be enormous. This need not wait until the full Phase 2b and NPR plan comes along.

The tunnel would remove longer distance services from the Castlefield corridor and allow it to become focussed on city region rail services. With a unified train fleet in the style of Merseyrail Electrics, this corridor could become Manchester's Thameslink, with computer controlled 24 trains per hour through the central section of a wider network. These operations could be transferred to Transport for Greater Manchester in a long-term concession, equivalent to the successful Merseyrail electrics operation. True, it needs the underground version of Piccadilly station to be built. But this would realise pan-Northern benefits, not least in tying together the more distant labour market areas and the centre of Manchester. It would provide a sound resolution of one of our identified super critical problems, which just happens to be the most crucial link on the North's entire rail system. Places like Burnley, Accrington, Blackburn, Wigan and Rochdale could then have regular frequency and direct links to Manchester's city centre stations.

In Yorkshire, the Hall plan cleverly linked to HS2 south of Leeds so that onward routes to Hull/York/North East England as well as into the HS2 platforms at Leeds can be made. And it provided alternative connections for onward services to Hull and the North East, one using a connection that would serve Wakefield Westgate and Leeds *en route*, the other bypassing Leeds.

As the Hall plan makes clear, the critical question is how HS2 is connected to the existing network in the North. And in Yorkshire, there are outstanding questions for HS2/NPR configuration in both South and West Yorkshire. In advance of that, it is difficult to see how to make the Hall plan any better. Above all, it serves to emphasise that the integrated plan for HS North needs to be mindful not just of HS2, NPR and existing rail plans, but also of the absence of intermediate measures that will develop the network ahead of mega-project completion.

Growing Places and Declining Places

Although the North is sometimes caricatured as a region with endemic economic problems, the truth is more complex. The North does contain some of the weakest urban economies in Britain. Research shows that the North has nine of the ten British towns with the highest rate of relative decline – Blackpool, Burnley, Blackburn, Bradford, Wigan, Bolton, Hull, Grimsby and Middlesbrough³¹. At the same time it has some of the country's fastest growing places. In terms of GVA Change between 1997 and 2013, Warrington was ranked as the eighth fastest growing place in the UK with 104.6 per cent growth, just behind Edinburgh with 106.7 per cent. Newcastle, Manchester, Sheffield and Leeds also showed healthy growth rates between 92 and 93 per cent, just below the national average of 94%. Blackburn and Blackpool again featured at the bottom of the GVA growth rankings with 59 per cent and 53 per cent growth rates respectively³².

It is striking that several of the places with the highest rates of decline are within, or quite close to, the metropolitan belt which runs from Liverpool across to Manchester and Leeds, and would be served by the enhanced rail services advocated in this paper. This makes it all the more important to bring weaker and stronger places together, via mobility hubs and connecting rail services, so that the economic benefits of faster growing places can be dispersed across the wider regional economy.

There is more to this than simply laying on extra train services or reopening old branch lines. There must also be adequate capacity to accommodate these services across the rest of the regional rail system and especially in congested locations like city centre stations. And the labour market effects are subtle of course. No one expects unskilled workers in Blackpool to commute to jobs in Manchester. But more skilled workers can make the journey whether they are attracted to places with weaker economies by lower house prices or more likely because they have existing personal or family connections with these places. And once there their wages will inject spending power into the local economy creating jobs for those on lower wages. This is exactly the pattern which has emerged in the more successful US cities, where successful economies create well paid jobs and these in turn help to create a buoyant local service economy³³

7 A Grand Design Which Works

Our paper is not intended to set out a blueprint but to explore issues in a rapidly changing economic and social context. Our starting point in the discussion was Sir Peter Hall's great paper from 2014 which set out visionary, yet entirely realistic, aspirations for using rail investment in order to restructure the relationships between towns and cities in the North. The aim was not simply to improve connectivity, as Sir David Higgins had correctly argued, but to build agglomeration economies, widen labour markets, and to start to bring smaller old industrial towns back into the mainstream. The Hall paper concluded that: 'By the end of the century, the great cities of the north, plus many of its major towns would at last be linked by a truly 21st century railway system, bringing them dramatically closer in terms of journey times. As a new northern mega city is born, the benefits to their economies will be incalculable'³⁴.

The Hall plan was an outstanding example of the sort of integrated planning Britain needs to rediscover if it is to break out of 'siloes' and disconnected thinking. We have set out our conclusions in nine messages, bearing its words in mind.

First, the lessons from the origins of the UK motorway network, and its subsequent successful construction in stages during the 1950s-1980s, are clear. **Have a coherent overall plan that makes sense, but make sure it can be constructed in financially-digestible chunks.** It will take time, but the costs become manageable and the phasing of the work fits in with the capacity of the construction industry to build it, saving costs. Moreover there is progress on the ground, and that sense of visible achievement will help to build momentum.

Second, HS2 in the North (Phase 2b) and Northern Powerhouse Rail have become intertwined as High Speed North. **Phase 2b of HS2, and as it stands, Northern Powerhouse Rail cannot expect to be implemented before 2040** - and perhaps later. Yet significant elements of improvement could be delivered well before then. A stage-by-stage approach makes sense in terms of financing, in terms of working towards High Speed North, and, crucially, getting action on the ground which would build confidence and attract much needed private investment.

Third, the **North's rail network is overloaded right now.** The network does not work, crucially through Manchester but also in other cities such as Liverpool, Leeds and Sheffield, where city centre stations and lines are at capacity or in the case of Manchester, over-capacity.

Fourth, because of this overload, rail freight services in the North are underachieving. **Average journey speed for Trans Pennine freight trains are as low as 16 mph and 17 mph**, yet Transport for the North forecasts (drawing on the Northern Powerhouse Economic Review) envisage growth in freight volume exceeding 50% by 2050. Meanwhile passenger rail travel between the major cities of Liverpool, Manchester, Leeds, Bradford, Sheffield, Hull, Newcastle and Sunderland is (apart from York-Newcastle) mostly stuck at 1960s speeds.

Fifth, the Hall plan of 2014 set out a staged modular solution to these problems. Stage 1 was Liverpool-Manchester electrification, now done. Stage 2 was Northern Hub, only part-done, and Manchester-Leeds electrification, still awaiting Trans-Pennine Route Upgrade, plus Pendolino trains, apparently not even considered. Stage 3 was a new high-speed line eastwards from Liverpool,

connecting with HS2, and an upgraded line onwards to Manchester Victoria and the Stalybridge railhead. Stage 4 was a similar mix of new and upgraded line driven westwards from Leeds, bringing Bradford, Leeds and Sheffield into the new network via a link with HS2's line to Leeds. Finally, the expensive stage 5, a new tunnel beneath the Pennines to link stages 3 and 4 together, creating a largely-new link from Liverpool to Leeds and connecting onwards to Newcastle and to Hull, completed the picture. The important point is that **it was a modular plan, with significant improvements achieved ahead of turning to major mega projects** like a new Trans Pennine Tunnel (with all the risks, costs and uncertainties that prevail in mega projects, not least in the current environment).

Sixth, with the fundamental issues that led to the Hall plan still confronting us (and some new ones added since) there is still the need for (a) an overarching plan for the North's rail system, (b) a phased implementation programme, adopting a strategic mix of new and upgraded lines (as in Germany), (c) use of existing proven technology such as Pendolino trains and electrification. Most of all, **we need to make early progress on tying together the North's labour markets**, bringing fast growing places like Leeds, Warrington and Manchester together with more challenging labour markets like Wigan, Stalybridge, Huddersfield, Bradford, Sunderland and St Helens.

Seventh, achievable timescales are crucial. Post-COVID, although finance could be tight, **government will want to champion public works which quickly deliver on the ground to get the economy moving** and to demonstrate results on its decarbonisation and re-levelling agendas. The critical problems remain the overloaded Manchester rail network, the need for city-terminal capacity expansion right across the North, and dealing with the future demand for rail freight. The plan should bring higher speeds, but the central need is for greater network capacity, reliability and resilience.

Eighth, the Hall plan should be updated in relation to the west-east passage through Central Manchester. Hall envisaged using the Eccles-Victoria-Stalybridge corridor, plus some conversion of local services to Metrolink or tram-train. But the strong desire of Manchester authorities for **a west-east 'through' HS2 station underground at Piccadilly would offer the opportunity for expanding the Piccadilly hub even further**. It avoids, too, the turnback problem that would arise in its absence.³⁵ A new west-east tunnel under central Manchester could be used by fast trains from Chester and North Wales, Liverpool, Blackpool, Barrow and Glasgow, with services emerging eastwards and across the Pennines to Leeds/Bradford, Sheffield, Hull, York and Newcastle.

Ninth, we strongly support a system of devolved finances and control to implement rail investment in the north. City regions should obviously assume responsibility for their own city region rail services. But tracks for local/regional and intercity services need to be segregated so that intercity and long distance services (high-speed, conventional and freight facilities) are left to the national system operator to develop and alongside separate regional networks for North West, Yorkshire-Humber and North East. **We must connect all of the North's towns into the network – and ensure that stations can serve as mobility hubs** with connecting buses, bike hire, walk and cycle ways, provision for electric car charging and so on.

After the COVID virus the North will not want to return to normal, because in relation to its rail network at least, normal was not working. To re-start the North's economy and stimulate private sector investment, we have to see visible progress through the next 5-10 years. There is welcome Government commitment to produce an integrated plan for 'High Speed North'. But based on delivery timescales to date for HS2 in the Midlands and South, we are unlikely to see even the first fruits of this endeavour before 2040. So a development of Hall's thinking is even more necessary today. We need a plan which provides modular incremental development, better links between intercity and metropolitan networks, a way to connect the North's cities and towns into the prosperity that High Speed rail can bring, and, most important, an investment path through the next five, ten and fifteen years. We do need a grand design. But we need a realistic delivery programme too.

Notes and References

¹ Source: Peter Hall, London 2001, Table 8 , p. 54

² Against the Trend: Arguments for Revival and Growth in Liverpool, Applied Property Research, August 1989 (unpublished)

³ Source: Michael Parkinson et al (2016) The State of Liverpool City Region Report. Liverpool University/Liverpool John Moores University

⁴ See Ian Wray, No Little Plans: How Government Built America's Wealth and Infrastructure (2019) pp. 130-131

⁵ Geoffrey West, The surprising math of cities and corporations. TED talk, July 2011
https://www.ted.com/talks/geoffrey_west_the_surprising_math_of_cities_and_corporations?language=en

⁶ Alan Chape and Ian Wray (2012) Introducing a Northern Tilt, Town and Country Planning, August 2015. See also Chape and Wray Together: the Way Ahead for Liverpool and Manchester, Town and Country Planning, February 2012

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⁸ Source: US job growth graph in Martin Wolf's FT article <https://www.ft.com/content/b427db58-77e6-11ea-af44-daa3def9ae03>

⁹ Gary Cook, Naresh Pandit and Jonathan Beaverstock, Cultural and economic complementarities of spatial agglomeration in the British television broadcasting industry, 2011, Environment and Planning A, Volume 43, p. 2918

¹⁰ <https://www.ft.com/content/c8999d7d-a6b4-465f-bbe3-bf9df019656a>

¹¹ The British budget in 1814 reached £66 million. The national debt soared to £679 million, more than 200% of GDP. https://en.wikipedia.org/wiki/Economic_history_of_the_United_Kingdom#cite_note-58

Public spending rose to over 56 percent of GDP in World War I, and then settled down to 30 percent of GDP in the 1920s and 1930s. Defence spending in World War II sent overall public spending over 60 percent of GDP, peaking at 70 percent of GDP in 1945, before declining to 36 percent of GDP by 1949.

In the 1980s public spending rose initially to over 45 percent GDP with the recession and the Falklands War, before starting a decline that bottomed out at 35 per cent of GDP in 2000. Public spending rose to 40 percent GDP by 2008 and then rose to 45 percent in the recession after the financial crisis of 2008-09, including the enormous sums required to support the banks.

https://www.ukpublicspending.co.uk/uk_national_spending_analysis

In 2018 -2019 public spending was 39% of GDP

<https://tradingeconomics.com/united-kingdom/government-spending-to-gdp>

¹² Ireland aside, the UK has the lowest state spending as a proportion of GDP amongst other advanced countries, ranging from Finland (57%) to Japan (40%). The UK share (36%) was comparable only with the USA (35%) Source: Danny Dorling (2016), A Better Politics, London Publishing Partnership, using 2010, 2012, 2015 IMF databases

¹³ See SQW consultancy, 2016, Northern Powerhouse Independent Economic Review
<https://www.sqw.co.uk/insights-and-publications/northern-powerhouse-independent-economic-review/>

¹⁴ This section draws on Chapter 7, Driving Ambitions, in Ian Wray, Great British Plans: Who Made Them and How They Worked, 2016

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- ¹⁵ Quoted in G. Charlesworth, *A History of British Motorways*, 1984, London: Telford, p.9
- ¹⁶ *Ibid*, p. 16
- ¹⁷ Quoted in F. Cook, *Post War Planning and Motorways* in P. Baldwin and R. Baldwin (eds.) *The Motorway Achievement*, Vol. 1, 2004, London: Telford, p. 112
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- ¹⁹ Sir Peter Baldwin, quoted in *The Motorway Achievement*, Vol. 1, 2014, P. Baldwin and R. Baldwin (eds.)
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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/590922/freight-carbon-review-2017.pdf
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- ³³ Moretti, E *The New Geography of Jobs*, 2013, Boston MA: Mariner Books
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- ³⁵ See Bechtel, for Manchester City Council, *Development of Piccadilly Station: Technical Report Confidential* December 2019