

What improvements can be made to the local transport in the West Midlands to maximise benefits from HS2 throughout the region?

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Abstract: *Significant investment will be needed in urban transport within the West Midlands conurbation in order to spread investment and wealth brought by the new London to Birmingham, Manchester and Leeds rail line, HS2. This paper will assess proposals in place and suggests alternatives to ensure successful, sustainable development.*

Keywords: HS2, Urban transportation, infrastructure

High Speed 2 (HS2) is the proposed high speed rail link between London and Birmingham, then on to Manchester, Leeds and the North of England, and seeks to improve journey times, capacity and connectivity nationwide (HS2, 2013). It is hoped that it will close the gap between the North and South, in economic terms, with the Department for Transport describing it as an “engine for economic growth” (Department for Transport, 2013a; p.1), allowing the wealth and prosperity of London to be shared on a national scale (Department for Transport, 2010). Phase 1 will see the terminus come to a brownfield site in the Eastside area of Birmingham City Centre, and is expected to be a catalyst for Eastside’s regeneration (Birmingham City Council, 2014), as well as the region’s fairly stagnant economy (Davis, 2014b).

Peter Hall (2013b) reported that it is vital that the wealth and prosperity from the scheme is spread, to serve the deprived areas of the region, developing the

peripheral towns, such as West Bromwich and Walsall, into thriving hubs for the larger city (Davis, 2014b). As a result, HS2 should act as a catalyst for improvement to regional transport in the West Midlands, by connecting all towns and cities in the conurbation to the new terminal in central Birmingham thus extending the wealth brought to Birmingham by HS2 to the supporting, neighbouring boroughs. Birmingham City Council reports the anticipated creation of 14,000 jobs as well as a £1.3bn uplift in the economy and is using the tagline ‘unlocking the potential’ in HS2 publications (Birmingham City Council, 2014).

The urban rail network in the West Midlands, in effect, acts as a rapid transit system and, combined with the single-line Midland Metro, forms a complex transit system serving all seven West Midland authorities. However, the network leaves many locales isolated and without a fast way of getting into Birmingham’s central

business district, and connectivity between peripheral suburbs is poor (Figure 1). For example, if travelling between Hall Green and Selly Oak by train, 3 miles as the crow flies, requires a 50 minute journey time and a walk between Moor Street and New Street stations in central Birmingham (National Rail Enquiries, 2014).

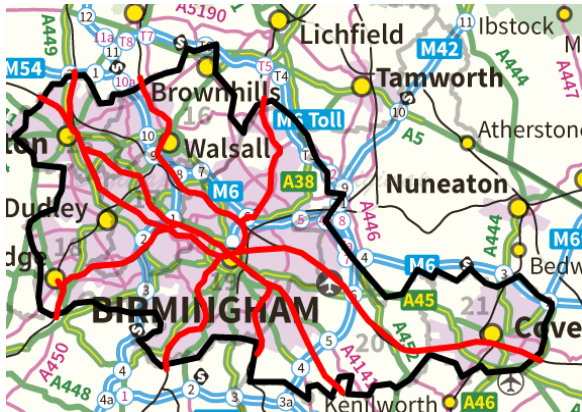


Figure 1: Map showing commuter rail lines with stations within the West Midlands, highlighting urban areas without rail connections on the urban edge.

Birmingham New Street lies at the heart of the national rail network and acts as a hub for commuter rail travel within the West Midlands and beyond, but is running above capacity, creating a major bottleneck in the rail system (Network Rail, 2011a). Users of commuter and longer-distance services through New Street experience unreliability and overcrowded trains, especially at peak times. HS2 should be used to encourage improvements to capacity and frequency across the network – up to 18 trains per hour between Birmingham and London on HS2 alone (Department for Transport, 2013b) which, it is argued, means less crowded trains, and the potential diversion of rail traffic from New Street, thus allowing a more frequent and more reliable

commuter and regional rail network services.

Initial suggestions indicate that there should be investment in cross-conurbation transport, a world-class transit system of which the region can be proud, meeting the aims of Birmingham City Council's plans of creating a 'connected city' (Birmingham City Council, 2010). This is highlighted as one of the benefits of HS2, the development company stating that it will provide "more comfortable, reliable local rail services". (HS2, 2013a, p2). It is predicted that 66,000 daily visits to the HS2 station daily in 2041 when Phase 2 of the scheme is fully operational. Better communication between local authorities in relation to planning should also occur to ensure suitable trans-authority routes are in place and the vast quantity of passengers is catered for.

Aims of Research

The following aims were established for this research:

1. To investigate whether a new railway line between London and Birmingham can improve issues such as capacity, reliability and interconnectivity with urban transport within the West Midlands conurbation.
2. To investigate what benefits an improved urban transport network could bring the wider West Midlands conurbation – and can economic benefits be spread to wider WM Metropolitan Borough.

Literature Review

Over the next 20 years Britain requires major rail capacity improvements between

its provincial cities and within their intraregional networks (Department for Transport, 2010). Although, initially, speed was the driving factor of HS2 (Greengauge 21, 2010), the main benefits of the scheme are now primarily seen in terms of capacity. It is predicted that the rail network will grow by almost 100% by 2030 causing major problems on both commuter and long distance transport corridors (Eddington, 2006). HS2 will act as a relief line to the busy East Coast Mainline (ECML) and West Coast Mainline (WCML) (Hall, 2013a; 2013b) and, to a lesser extent, the at-capacity Midland Mainline (MML), providing the same capacity as a 20 lane motorway (Davis, 2014a). Significant improvements are predicted elsewhere on the rail network as a result of released capacity (Faith, 2014; Greengauge 21, 2014), allowing improved journey times to be treated as a by-product of an increased capacity scheme.

More frequent and faster trains will also have a positive effect on economic growth in the area. The construction of HS2 will result in Birmingham being as close to London as is Cambridge, in terms of travel time (Davis, 2014a). The Birmingham to London section has a benefit to cost ratio of 1.6 (Hall, 2013a) providing wider benefits to the city and region's economy, sharing London's prosperity with the declining, post-industrial, northern regions and their sub-regions (Chen & Hall, 2012). This model is built on Continental experience. The arrival of the French high speed network (TGV) to Lille has resulted in many businesses choosing Lille over Paris, with evident relocation of businesses to the city from the capital (Greengauge

21, 2006). 'Euralille' is now a major business hub, in proximity to the TGV station which now acts as a hub of the European rail network – located on a junction between routes to London, Paris, Amsterdam and north Germany (Bertolini & Spit, 1998), indicating the economic benefits that high speed rail (HSR) can bring to a provincial city.

As a result of increased investment in new buildings and services, HS2 can also be regarded as a catalyst for regeneration, especially in the post-industrial cities of the Midlands and North (Chen and Hall, 2013a). In 2006, Greengauge 21, an independent body which 'drives the debate for HSR', published a report commenting on regeneration opportunities anticipated from HS2 (Greengauge 21, 2006). Several examples were given where HSR has positively impacted upon an area. For example, in Lille where the station was developed on brownfield land in the city centre – similar to that suggested in Birmingham – the city has seen large-scale urban renewal, including the expansion of the central commercial area. This was influenced by authorities which lobbied for regeneration to happen as a result of TGV (Bertolini & Spit, 1998).

So far it has been determined that HSR can bring benefits to the city it serves. However it has been proven that major infrastructure projects benefit the city itself (Bonnafaous, 1987), but have little, and even a negative, impact on the surrounding region (Puga, 2008). It requires solid connectivity from satellite towns to the urban centre to ensure that economic prosperity can be transferred. It is recognised that urban centres will become

the major beneficiary of such projects, but inter-authority communication is encouraged when discussing transport, allowing benefits to be transferred to the entire region (Lucci & Hindreth, 2008).

Bertolini and Spit (1998) coined the term 'transport nodes', which are created as a result of HSR terminals coming to a city. Again, using Lille as an example, significant investment occurred in the city and regional transport infrastructure following the arrival of the TGV, connecting Lille Flandres, the original station for regional connections, Lille Europe (TGV) and further afield (Bertolini & Spit, 1998). This has included the creation of new, underground, metro lines, and improvements to the city's tram network, turning the station complexes into 'transport nodes' – key junctions for the transit network ensuring the whole region is connected to TGV and benefits can be spread (Bertolini & Spit, 1998).

Chen and Hall (2013) support this viewpoint, claiming that improvements to railways in Britain and France post 1970 have benefitted the core cities disproportionately, leaving surrounding satellite towns behind. Britain upgraded current mainlines to be capable of 200 km/h, while France constructed new TGV lines capable of 250km/h+. Both are considered 'High Speed' (Chen and Hall, 2012). A comparison is made between Warrington and Burnley, lying similar distances from Manchester, and Liverpool and Leeds respectively (Hall, 2013a). Warrington, having good connections to Manchester and Liverpool, has a stronger economy than Burnley which has no rail links to Manchester, and long journey

times to Leeds (Chen & Hall, 2012; Hall, 2013a; Northern Rail, 2013) (Figure 2). The deprivation of Eastern Lancashire towns is caused by the poor connections with the two cities (Lucci & Hindreth, 2008). Hall also claims that it is up to the local areas to sufficiently work together, stating that it is the responsibility of the Passenger Transport Executives (PTE) - which are in charge of planning, providing and operating public transport within an urban area (Birmingham City Council, 2013) – to create plans to ensure that the entire area will benefit (Hall, 2013a). However, Warrington or Burnley do not lie within PTE areas, so communication with these peripheral boroughs should be encouraged to ensure that these do not fall behind.

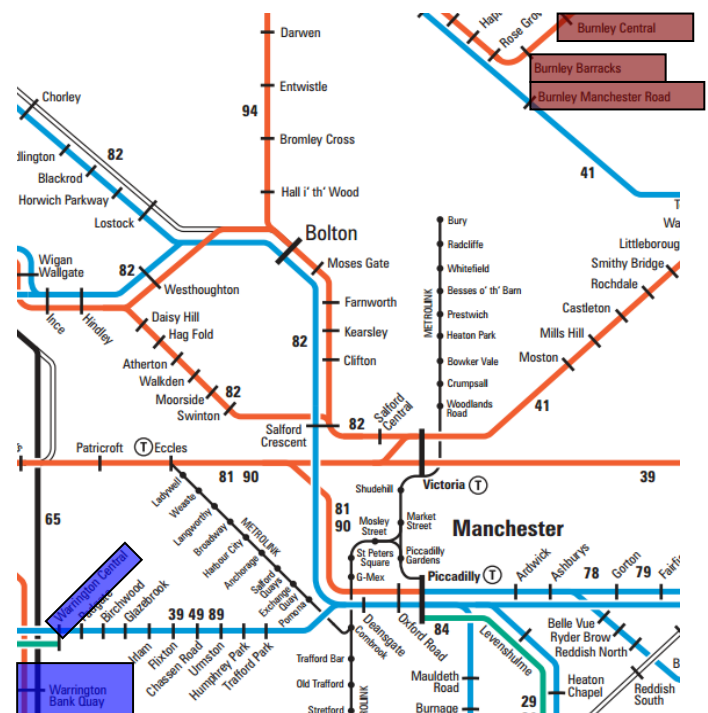


Figure 2: Map showing Burnley and Warrington's rail connections (Network Rail, 2013).

Tours, in France, is an example of a city failing to gain an advantage of HSR as a result of inefficient investment in its transit network. St Perre des Corps, located on the urban edge, acts as a junction station and

allows access to Paris in under an hour, via the TGV. The original central station is on the regional network, but there was no initial connection between the two, resulting in little benefit in central Tours and around the TGV station (Greengauge 21, 2006). Using previous examples, Central Tours should have had appropriate connections in place with the St Perre, avoiding the city being bypassed. It should be noted that Tours now has a TGV link to Paris.

Naturally, HS2 is a controversial project; it has its opponents, particularly in largely middle-class areas such as the Home Counties, which the proposed route will not serve directly (Hall, 2013b). Anti-HS2 campaigners argue that the same benefits can be brought by investing in the WCML, for example lengthening Pendolino trains, converting one first-class carriage per unit to standard class and diverting commuter trains via the new line from Berkshire to Essex via Central London to allow more long-distance services to serve Euston, the WCML's terminus, permitting space for extra long-distance trains (Hall, 2013b; Stokes, 2012). However, this will only solve the problem at Euston; other bottlenecks, such as at Birmingham and Stafford, will remain, or become even worse. Network Rail officially states that it will not be possible to solve capacity problems on the southern section of the WCML unless a new line is built (Network Rail, 2011a), and further upgrades will cost £20bn more than HS2, providing only two-thirds extra capacity (Department for Transport, 2010). In addition, these will cause major disruption to both passengers and business in the Northern cities, similar

to the previous upgrade in the last decade (Hall, 2013).

This section has highlighted the need for a sound transport system to complement the arrival of HS2 in our major cities. An interview in *The Telegraph*, with Louise Elman (2013) of the Transport Select Committee claimed that official reports have not considered the wider benefits. This includes new lines bringing prosperity to other places, spreading the wealth of the core city. Neighbourhoods and employment centres can be self sufficient, but are more likely to succeed if connected by effective and efficient transit networks (Dittmar & Poticha, 2004). Examples such as Tours have proved that failure to sufficiently provide an efficient transport system will result in few, wider benefits of HSR to an area. Other transport networks from cities elsewhere in the world should be studied, to guide future West Midlands development decisions. This will be discussed in the following sections.

Research Method

The research will therefore use case studies – allowing a comparison between the West Midlands and relevant examples from elsewhere.

Semi structured interviews have also been identified as an appropriate research method for this case, as an informal communication will be required to gain the best benefits. Professionals working in the field have been identified and contacted and the aim is to gain knowledge based on their expert opinion (Wragg, 1978).

The anonymised participants were chosen to allow a range of viewpoints and represent opinions from potentially conflicting organisations. Participant 1 is a representative from Centro, based in Birmingham, potentially providing a possible bias and focus on the city as opposed to the region, whose views are likely to be pro-HS2. This may, possibly, fulfil two viewpoints – those of the City of Birmingham and the wider region. Participant 2 represents Walsall Council, an outer West Midlands borough – that is, a distinct town in its own right, outside the limits of the City of Birmingham. The viewpoint of an authority which will not be directly served by HS2 could provide a contrasting view to that of Birmingham and Centro. Participant 3 works for a private transport planning consultancy to give a holistic assessment of the potential benefits and disbenefits of HS2.

Published plans by authorities such as Centro and other West Midland authorities are also studied to assess what is currently proposed as a reaction to HS2. This can then be cross-referenced between each plan to discover what region-wide proposals are in place, and determine if any conflicts arise.

Data Presentation

This section will focus on research findings, considering how each applies to the research aims.

Published Proposals and Plans

In response to the HS2 proposal, Centro published a series of documents, in order to highlight HS2's key strong-points persuading readers to back the

development. Four publications were studied which are:

- *'How the HS2 Y Network will transform the West Midlands'* – region wide (Centro, 2013a),
- *'How HS2 will transform the West Midlands – Birmingham and Solihull'* – similar to above but concentrates on the Birmingham and Solihull LEP (Centro, 2013b),
- *'How HS2 will transform the West Midlands – The Black Country'* – similarly, applies to the Black Country LEP (Centro, 2013c),
- *'HS2 Unlocking the benefits - West Midlands Connectivity Package'* – how HS2 can improve connections in the region (Centro, 2013d).

Supplementary to this is the *connectivity* sections of the *Big City Plan* and *Birmingham Development Plan*, as well as specific transport related plans by way of the *Birmingham Mobility Action Plan* (BMAP) and the *Vision for Movement* produced by Birmingham City Council (2010a, 2010b, 2012, 2013). Perhaps most importantly, the connectivity section of the Curzon HS2 Masterplan was written explicitly for connecting the West Midlands to the HS2 terminal.

Better connections in the city centre are needed to link the four rail stations and the isolated areas of the central area. A common station concourse is proposed in the form of 'Station Square', allowing easy transition between Curzon, New Street and Moor Street stations, serving all lines into Birmingham (Centro, 2013d). A Metro extension is underway linking Snow Hill with New Street, and proposals are in place to connect Curzon station to the

network (Birmingham City Council, 2014).



Figure 3: How the Metro will be incorporated into Curzon's complex creating a transport node (Birmingham City Council, 2014; p.33)

Each document suggests that HS2 will massively improve capacity and be a catalyst for connectivity (Centro, 2013d), therefore proposes methods to allow benefits can be maximized allowing commuter services to be improved (Birmingham City Council, 2013; Centro, 2013b).

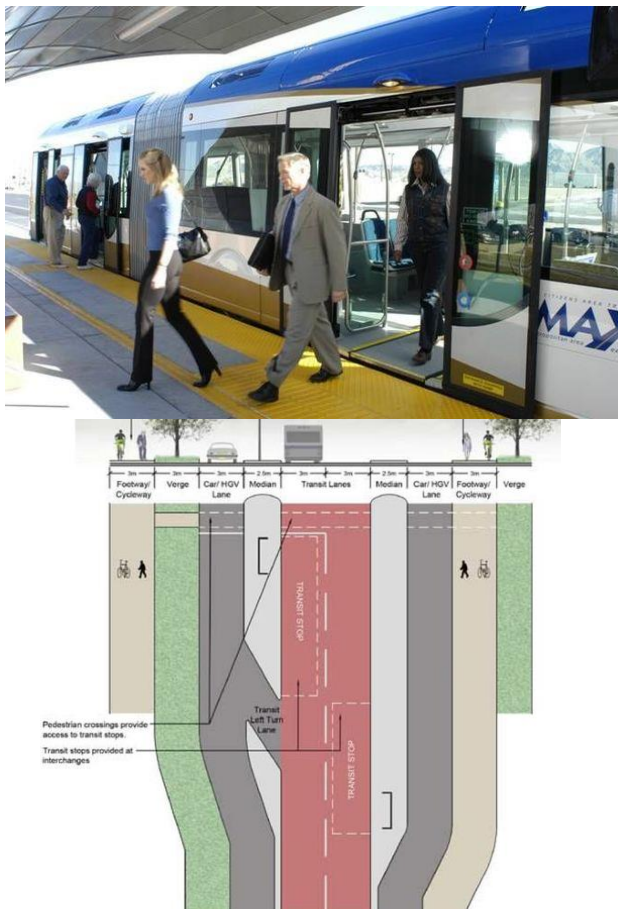
It is imperative for quality connections to central Birmingham or Birmingham Interchange from the outlying towns, suggesting a '6-4-2 model' developing current and creating new job opportunities (Birmingham City Council, 2013). This means that important interchange stations will be served by 6 trains per hour (tph), supported by 4tph serving less important stations and 2tph for rural and suburban stations. This will be achieved by creating new transit lines throughout the region, thus ensuring that towns are 'plugged into HS2' (Centro, 2013a: p1). This will require using the Cross-City line in Birmingham as a model; specifically on the Birmingham to Walsall, Birmingham to Wolverhampton and the Snow Hill routes (Centro, 2013b; 2013c).

Plans to open lines to passengers will offer access to areas poorly served by rapid transit, pumping a new heart into deprived areas (Birmingham City Council, 2013). The lines include the Sutton Park line serving north-eastern suburbs, Kings Heath line serving southern Birmingham and several lines around Walsall (Birmingham City Council, 2010; Centro, 2013b; 2013c). Also included are routes outside the metropolitan area – Tamworth and Nuneaton should have increased stopping services to Birmingham with new local stations (Birmingham City Council, 2010b). The Walsall to Brierley Hill line will be integrated into part of the regions Metro system with connections to Birmingham available at Wednesbury (Centro, 2013c). New Metro routes will also serve southeast Birmingham, connecting the city centre to the airport and Interchange station via south-eastern suburbs (Centro, 2013b).

However, a movement away from rail-orientated transit is investigated (Centro, 2013b). The region has a dense bus network and this will remain the primary transport method for the foreseeable future (Birmingham City Council, 2013), but there is a need to make the system attractive and of a higher quality. A bus rapid transit system known as SPRINT (Figure 4) will act as an alternative to a tramway, but will be given the same priority over standard bus and vehicular traffic (Birmingham City Council, 2013) (Figure 5). The SPRINT will allow longer vehicles than the similar 'guided busway', allowing the same capacity and speed advantages as a tram (Birmingham City Council, 2013; Centro, 2013b), opening up high-quality transport corridors and

improving the attractiveness of the West Midlands' transport network (Birmingham City Council, 2014). It will also allow faster and more reliable connections for onward travel and access to transport hubs from isolated areas (Birmingham City Council, 2013).

Figure 4: An artist's impression of how SPRINT will look showing characteristics of a tram



Interview Findings

Following research by Hall (2013a, 2013b), the interviewees unanimously felt that HS2 must happen to improve transport as a result of released capacity. Although conflicting viewpoints were a possibility, the two authorities support HS2. These views were backed up by the impartial private sector interviewee who argues that the outlying towns will massively benefit for increased rail provision following the

release in capacity. It is claimed that the towns will benefit from becoming commuter settlements for Birmingham, which is recognised by Walsall Council (participant 2), stating that the good rail provision to the regional city should be in place to ensure the borough is an attractive place in which to reside. However, Walsall's view is subject to change should improvements to its local transport network be denied. It is suggested that HS2 will be at the expense of local improvements in terms of funding, potentially leading to further isolation from Birmingham which has been highlighted as an issue for Walsall, with a poor transport system. This includes reopening closed lines in the borough and beyond, meaning better connectivity to other parts of the Black Country, and allowing 6tph to Birmingham which is a priority.

Participant 3 suggests the need to create better commuter connections with the East Midlands. Initial plans by Cento will mean the creation of new commuter routes from Tamworth and Nuneaton to Moor Street which can be extended to Derby, Nottingham, Leicester and beyond. An interesting point made by the participant 2 is the claim that, unlike our continental neighbours, Britain's commuter and mainline that services share the same lines, meaning mainline services are prioritised at the expense of stopping services; resulting in an infrequent service for smaller settlements. Should HS2 be constructed, express services will bypass commuter lines, meaning increased frequency on both mainline and local services between the East and West Midlands.

The bus network in the West Midlands is very large and complex. However, all interviewees agreed that journey times are long and the attractiveness of the system is poor. All also claimed that, although the connections are in place, the network needs some significant improvements to allow it to be a sustainable transport method and increase patronage. The SPRINT initiative is welcomed by participant 1 to improve the bus network and provide quality rapid transit in the region; however it is clear that it will be a risk due to the untested technology. Participant 2 claimed that National Express (NX), the main bus operator in the region, is reluctant to invest in new technology, claimed by participant 2. The X51 route connecting Birmingham and Walsall is planned to be upgraded to SPRINT, however NX is unenthusiastic for change because the current system works well and is profitable.

Local governance is also highlighted as a problem. Following the abolition of the regional planning tier, Local Enterprise Partnerships (LEPs) were established to perform a similar function. However the boundaries are not appropriate and are subject to negotiation between LPAs resulting in the West Midlands metropolitan area being covered by three LEPs – the Greater Birmingham & Solihull LEP, Coventry and Warwickshire LEP and the Black Country LEP. Each partnership has its own priorities and, although each has a duty to cooperate, conflicting developments are being proposed. Centro is responsible for region-wide transport planning and management, but due to the different system of regional

planning, its representative claims that the body is losing power and is becoming less important, so strategies will need to be put in place to reverse this.

Case Studies

Rapid Transit and High Speed Rail

Similar to the Curzon Masterplan in Birmingham, the Part Dieu TGV station in Lyon was intended to redevelop a neglected area of the city centre along with the regeneration masterplan for the wider area (Thompson, 1995). The area was connected to the wider metropolitan area by a new underground metro system, designed around the historic tramway network which would support shorter connections. It is run by a single operator (as well as buses) providing one integrated system.

TramTrain Technology - Manchester

An aim of Greater Manchester 'Metrolink' was to radicalise urban transport by converting poorly-used suburban railway lines into a high-frequency tramway. Initially, lines from Manchester Piccadilly to Altrincham and Manchester Victoria to Bury were converted, linked with street running in the city centre, resulting in express services to the heart of the city rather than to the rail stations in the city centre fringe, as well as taking away the strain from the station (Knowles, 1996).

Tunnels for Urban Services

Newcastle and Liverpool have rerouted some of their commuter services into tunnels in the centre of the city. Like TramTrain, it connects the suburbs with the central core and allows more frequent services to outer towns. However, it is suggested by participant 3 that it is not

practical to build tunnels though Birmingham due to the location of underground services. This can be backed up by Centro (2005) as well as a feasibility study stating that a street running system would suit the city more.

Karlsruhe Model

The Karlsruhe Model combines rapid transit with normal heavy rail workings. Synonymous with the city in which it was developed in Germany, major stations are served by both tram and longer distance interurban services and, in most cases, do not require a platform change, thus incorporating seamless transition between commuter and long-distance services (Voskuhl, 1995).

Reroute away from main station

The Northern Hub programme focuses on inter and intraregional transport in Manchester. New chords are to be built to allow trains from the north and east to use Victoria instead of Piccadilly, improving capacity and frequency on all lines serving the city (Network Rail, 2011b).

Discussion

For efficient plans to work, the West Midlands Metropolitan Area should be covered by one authority, or at least the regional planning tier should be reinstated. The current system means that the three West Midland LEPs and each local planning authority (LPA) will be competing to get the best benefits from HS2. Birmingham should remain the primary centre with other boroughs planned to support the city. Only when this is completed will the success of the following suggestions be fully realised. A combined housing strategy will be in place

reduce the 'housing crisis' that the area is facing, and new housing can be connected to Birmingham's CBD by an efficient transport system.

The role of Centro should be reemphasised and run by the new 'Greater Birmingham' authority allowing contributions relating to sustainable transport from all boroughs. This will speed up the planning process as only a single LPA will be involved. Fringe districts such as Lichfield, Bromsgrove and possibly as far afield as Hereford should be incorporated as associate members of the authority, allowing full representation of the travel-to-work area.

In the Eastern Black Country there are two railway lines - Birmingham-Walsall and Birmingham-Wolverhampton via Smethwick - and the Metro from Birmingham-Wolverhampton via Wednesbury, providing good transit links to Birmingham. In the west there is little, and places such as Halesowen have no rail provision. The proposal to incorporate Brierley Hill and Walsall into the Metro should go ahead, but should ensure that the provision for future extensions are in place. The route is expected to serve Birmingham but takes a significant diversion via Wednesbury; therefore a more direct route should be investigated.

The railway lines closed by Beeching in the 1960s, particularly around Walsall, should be reopened to expand the rail network providing isolated settlements with a fast link to Walsall and Birmingham. The Karlsruhe Model could be used to provide local stopping and express services without the need for new infrastructure. There is little space to build

an interchange with Curzon Street on the line into New Street, so TramTrain should be used to permit an interchange with Curzon station, with trams switching to street running in the Neechles area travelling along Curzon Street and into the rest of the city centre.

The reopening of chords around Moor Street will allow capacity enhancements in local and national rail services as well as new services completely. To supplement this, the line between Burton and Lichfield should also be reopened to provide an alternative route for trains connecting the East and West Midlands. It will also allow villages such as Fradley and Alrewas to have a rail connection, thus creating attractive commuter settlements.

Similar to the system on Merseyside, Centro should assign the transport operator within its boundaries to create a local-centric system. All modes of transport should be run by the same operator to create a fully integrated system. This will allow local transport to share a uniform branding providing a visually integrated network, similar to that of Transport for London. Better still, Centro should operate the network itself, running a 'not for profit' model, providing cheap fares for users, but problems may arise when funding for future investment is needed.

The SPRINT initiative is a powerful idea, given the lower cost of construction compared to a tramway and supports Birmingham's historic image as a motor city. However for it to succeed in providing express transit it must have segregated routeways to prevent vehicular congestion causing delays on the network

and allowing higher speed. However the proposed circular route only acts as a Birmingham circle, so to improve region-wide connectivity a metropolitan circular route should be investigated, as well as radial routes into the city centre.

Conclusion

Final thoughts when carrying out the study indicated that the West Midlands is well prepared for HS2, although there is room for improvement, as the previous section discusses; especially regarding the organisational structure to ensure successful implementation. Of all regions to be served by HS2, the East Midlands will face the greatest problems because of the lack of a Passenger Transport Executive and the station is located on the urban edge. Similar research to that carried out in this study should investigate what Nottingham, Derby and Leicester can do to ensure that benefits can be fully felt.

HS2 is very 'London centric': where all lines will serve London. Further studies should assess whether the proposed links between the High Speed and conventional networks are sufficient to provide improvements to speed and capacity to the entire rail network: for example, links to the Cross-Country Mainline (XC) where trains run from Penzance to Aberdeen via Newcastle. This will allow XC services to run on HS2 between Birmingham and Leeds, reducing journey times and releasing capacity for regional commuter lines in the Midlands and Yorkshire.

References

Bertolini, L. & Spit, T. (1998) *Cities on Rails: The redevelopment of railway station areas*. Bath: Bath Press.

- Birmingham City Council (2010a) *Birmingham Big City Plan*. Birmingham: Birmingham City Council.
- Birmingham City Council (2010b) *Vision for Movement*. Birmingham: Birmingham City Council.
- Birmingham City Council (2012) *Birmingham Plan 2031*. Birmingham: Birmingham City Council.
- Birmingham City Council (2013) *Birmingham Mobility Action Plan*. Birmingham: Birmingham City Council.
- Birmingham City Council (2014) *Birmingham Curzon HS2 Masterplan*. Birmingham: Birmingham City Council.
- Bonnafaous, A. (1987) 'The regional impact of the TGV', *Transportation* Vol. 14, pp.127-137.
- Centro (2005) *Birmingham City Centre Underground Study*. Birmingham: Centro.
- Centro (2013a) *How the HS2 Y Network will transform the West Midlands*. Birmingham: Centro.
- Centro (2013b) *How HS2 will transform the West Midlands: Birmingham and Solihull*. Birmingham: Centro.
- Centro (2013c) *How HS2 will transform the West Midlands: the Black Country*. Birmingham: Centro.
- Centro (2013d) *HS2 Unlocking the benefits - West Midlands Connectivity Package*. Birmingham: Centro
- Davis, E. (2014a) *HS2: the Big Debate* [lecture]. Birmingham: Birmingham City University.
- Davis, E. (2014b) *Mind the Gap: London vs. the rest* [Television programme]. BBC, 10 March.
- Department for Transport (2010) *High Speed Rail: Presented to Parliament by Secretary of State for Transport*. London. Retrieved 22nd Feb 2014 from: <http://www.official-documents.gov.uk/document/cm78/7827/7827.pdf>
- Department for Transport (2013a) *HS2: Developing a new High Speed Rail network*. London: The Stationery Office.
- Department for Transport (2013b) *Investing in Britain's future: why we need HS2*. London: The Stationery Office.
- Dittmar, H. & Poticha, S. (2004) *Defining Transit-Oriented Development: The New Regional Building Block*. In Dittmar H. & Ohland, G. (eds.) *The New Transit Town*, Washington, DC: Island Press.
- Chen, C. & Hall, P. (2011) 'The impacts of high-speed trains on British economic geography: a study of the UK's InterCity 125/225 and its effects', *Transport Geography*. Vol. 19, pp. 689-704.
- Chen, C. & Hall, P. (2012) 'The wider spatial-economic impacts of high-speed trains: a comparative case study of Manchester and Lille sub-regions',

Transport Geography. Vol. 24, pp. 89-110.

Chen, C. & Hall, P. (2013) 'Using HS2 to irrigate the regions', *Town and County Planning Magazine*: London.

Eddington, R. (2006) *The Eddington Transport Study: The case for action. Sir Rod Eddington's advice to Government*. London: Her Majesty's Stationery Office:

Elman, L. (2013) *HS2 'needed' to avert capacity on Britain's railways, say MPs*. Interviewed by Nathalie Thomas. *The Telegraph*, 13th December.

Faith, N. (2014) *Denigrating big projects is our national sport*. [Online]. Retrieved 18th Mar 2014 from: <http://www.independent.co.uk/voices/commentators/nicholas-faith-denigrating-big-projects-is-our-national-sport-6288884.html>

Greengauge 21 (2006) *High Speed Trains and the Development and Regeneration of Cities*. Retrieved 16th Mar 2014 from: <http://www.greengauge21.net/wp-content/uploads/hst-regeneration-of-cities.pdf>

Greengauge 21 (2010) *HS2 – why the critics are wrong*. Retrieved 24th Mar 2014 from: <http://www.greengauge21.net/wp-content/uploads/HS2-why-the-critics-are-wrong.pdf>

Greengauge 21 (2014). *Building a better understanding of HS2*. Retrieved 24th March 2014 from: <http://www.greengauge21.net/blog/buildin>

[g-a-better-understanding-of-the-key-issues/](#)

Hall, P. (2013a) *HS2 or What?*. University of Birmingham: The Lunar Society.

Hall, P. (2013b) 'High Speed Two: The Great Divide', *Built Environment*. Vol. 39, pp. 339-354.

HS2 (2013a). *The HS2 Story*. Retrieved 29th January 2014 from: <http://www.hs2.org.uk/about-hs2/high-speed-rail-hs2/hs2-story>

Knowles, R. (1996) 'Transport impacts of Greater Manchester's Metrolink Light Rail System', *Journal of Transport Geography*, Vol. 4, pp. 1-14.

KPMG (2013) *HS2 Regional Impacts*. London: HS2 ltd.

Lucci, P. & Hindreth P. (2008) *City Links: Integration and Isolation*. London: Centre for Cities.

National Rail Enquires (2014) 'Journey Planner: Hall Green to Selly Oak'. Retrieved 9 April 2014 from: <http://ojp.nationalrail.co.uk/service/timesandfares/SLY/HLG/today/1245/dep>

Network Rail (2011a) *West Coast Mainline Route Utilisation Strategy* [report]. London: Network Rail.

Network Rail (2011b). *Northern Hub: Ordsall Chord*. Retrieved 25th Mar 2014 from: <https://www.networkrail.co.uk/north/Ordsall-Chord.aspx>

Network Rail (2013) 'Regional Connections – Liverpool, Leeds, Manchester, Sheffield', Retrieved 25th Mar 2014 from:

http://www.nationalrail.co.uk/css/NetworkRail_LiverpoolLeedsManchesterSheffieldmap.pdf

Northern Rail (2013) 'Timetable 8', [Online]. Retrieved 16 Mar 2014 from <http://www.northernrail.org/pdfs/timetables/20140309/Timetable8.pdf>.

Puga, D. (2008) *Agglomeration and Crossborder Infrastructure*. European Investment Bank Papers. Vol. 13.

Stokes, C. (2012) 'Optimised Alternative to HS2 - The Scope for Growth on the Existing Network', Retrieved March 3rd, 2014, from 51m: <http://www.51m.co.uk/wp-content/uploads/2013/08/ch1.pdf>

Thompson, I. (1995) 'High-speed transport hubs and Eurocity status: the case of Lyon', *Journal of transport Geography*, Vol. 3 No. 1, pp. 29-37.

Voskuhl, D. (1995) 'Viewpoint: Interlinking the region with its centre - The example of the Karlsruhe region in Germany', *Journal of Transport Geography*, Vol. 3, No. 4, pp. 281-286

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