

New Station Opportunities for **Hemsworth**

A Review of the Potential for
Improved Local Connectivity
offered by

HS2 and **High Speed UK**

A study by:

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New Station Opportunities for Hemsworth

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| Issue | Date | Purpose |
|-------|------------|-------------------|
| 1 | 06/12/2017 | Draft for comment |
| 2 | 09/04/2018 | Published version |

1. Introduction/Executive Summary

As part of the Government's proposed development of HS2 high speed rail routes in the Yorkshire region, options are being investigated for a parkway station either in West or South Yorkshire. The purpose of this parkway station would be to serve the major communities of South Yorkshire (i.e. Barnsley, Doncaster and Rotherham) which will be bypassed by the current proposals for the 'M18/Eastern' route. One possible location for this parkway would be at Hemsworth in West Yorkshire.

Given that Hemsworth presently has no rail service, it might be argued that the town could derive significant connectivity benefits from a parkway station on a new high speed railway. However, with only long distance destinations and infrequent services on offer, it is likely that the benefits for Hemsworth residents will be extremely limited.

No attention has so far been given to the alternate proposition, that greater community benefit might derive from a new station located on the existing Leeds-Doncaster main line. This would provide Hemsworth residents with improved links to employment opportunities and leisure activities in all the principal regional centres i.e. Leeds, Wakefield, Doncaster and Sheffield. Additionally, with all these centres being key hubs of the national rail network, a new station at Hemsworth also has the potential to transform the town's connectivity on a national basis.

These local and national benefits will be greatly enhanced through the development of High Speed UK (HSUK). HSUK will offer transformed intercity links from all the neighbouring intercity hubs (i.e. Leeds, Wakefield, Doncaster and Sheffield), and through its proposed reconfiguration of the local network around Leeds City station, it will also deliver a huge increase in capacity for local services on all lines including the Leeds-Wakefield-Doncaster/Sheffield routes.

This study investigates 3 alternate scenarios:

- Case 1 : Improvements to Hemsworth's national connectivity, assuming no local improvements and links to high speed rail services at Doncaster, Leeds and Sheffield.
- Case 2 : Improvements to Hemsworth's local and national connectivity, assuming that the projected HS2 parkway station is to be located at Hemsworth.
- Case 3 : Improvements to Hemsworth's local and national connectivity, assuming that the HSUK scheme is fully implemented.

This study also undertakes a wider investigation of the benefits that the adjoining major communities of Barnsley, Doncaster and Rotherham might derive, from either:

- an HS2 parkway station located at Hemsworth, or:
- local rail links from Barnsley and Rotherham to HSUK's network hubs at Doncaster, Leeds and Sheffield.

The study draws the following major conclusions:

- The connectivity benefits of an HS2 parkway station located at Hemsworth are limited both by the limited range of destinations that HS2 can offer, and by the poor service frequencies that it can support.
- This not only limits connectivity benefits for Hemsworth; more importantly an HS2 parkway station will fail in its basic purpose of improving the connectivity of bypassed South Yorkshire communities, in particular Barnsley, Doncaster and Rotherham.
- HS2 does not create significantly greater connectivity benefits for Sheffield, the one community supposedly advantaged by current HS2 proposals in South Yorkshire.
- Much greater benefits for all South Yorkshire communities can be generated through ensuring that high speed rail routes are aligned with the present hubs of the South Yorkshire rail network, in central Sheffield and Doncaster. This maximises benefits both for Sheffield and Doncaster, and also for all the smaller communities (including Barnsley and Rotherham) that are located on radial local rail routes which are focussed on Sheffield and Doncaster.
- This is proved by High Speed UK's vastly superior performance as a fully integrated network. This offers far greater benefits for all communities, large and small.
- The proposed development of a new main line station at Hemsworth and higher-frequency local services – all possible under HSUK proposals – offers much greater benefits for Hemsworth's connectivity, both locally and nationally.
- There is no reason to suppose that significantly greater connectivity benefits might be derived at any of the other sites (at Mexborough and Bramley) reportedly being investigated as locations for HS2 parkway stations. Studies will shortly be published to demonstrate the comprehensive failure of any possible parkway station to improve connectivity for South Yorkshire communities.

1.1. About HS2

HS2 is the Government's scheme for a system of new high speed lines extending northwards from:

- London to the West Midlands (Phase 1);
- The West Midlands to Manchester and the North-West (Phases 2a and 2b);
- The West Midlands to the East Midlands and Yorkshire (Phase 2b).

Together these new lines comprise the HS2 'Y-network'. Within South and West Yorkshire, it is proposed that HS2 will serve:

- central Sheffield at the existing 'Sheffield Midland' station.
- central Leeds at the existing 'Leeds City' station.
- a possible parkway station located on the current M18/Eastern route.

The 'M18/Eastern' route was adopted in 2017, when earlier proposals for HS2 to serve a station at Meadowhall near Sheffield were abandoned and Sheffield Midland was instead adopted as the sole HS2 station in South Yorkshire. See Figure 1.

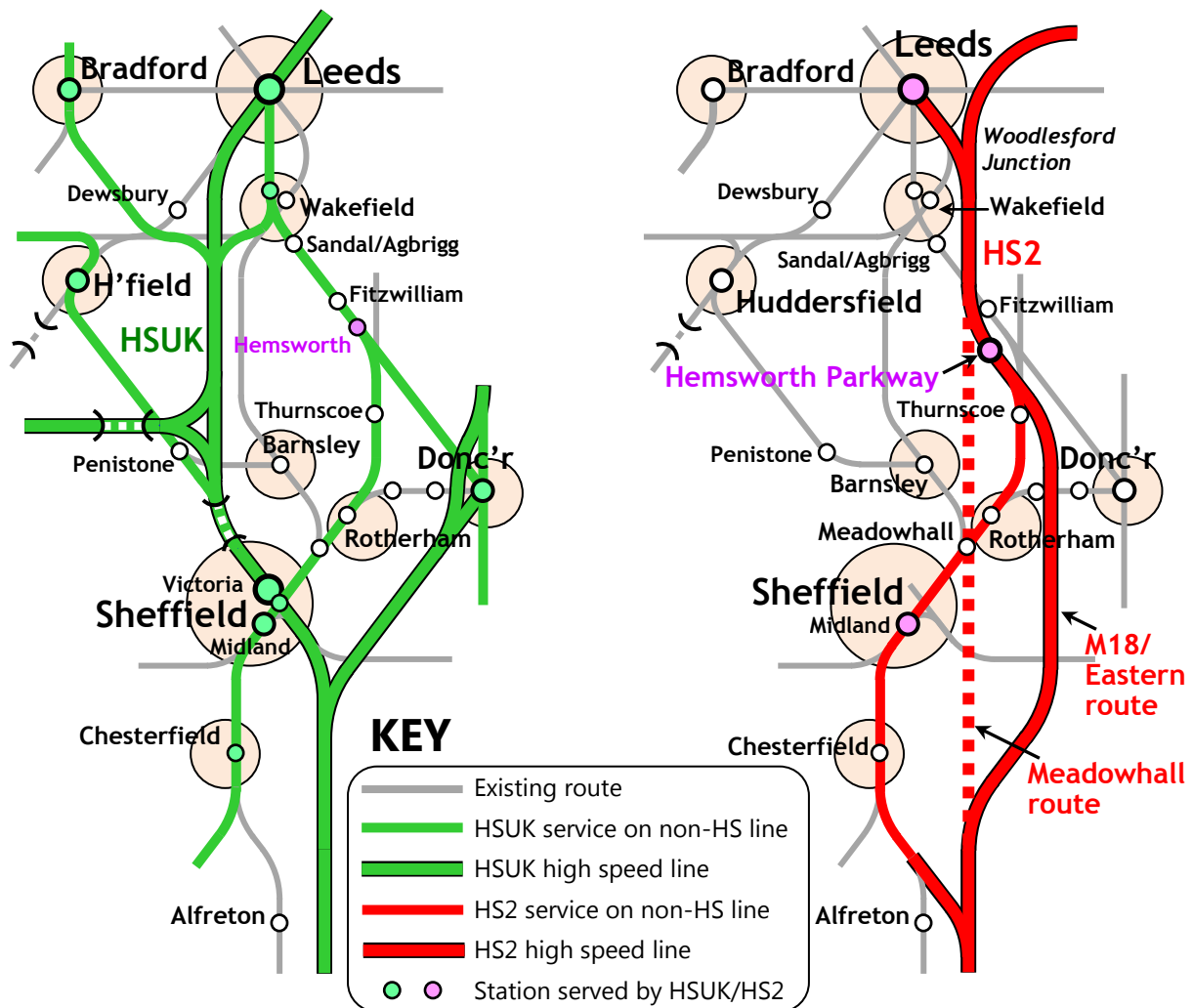


Figure 1 : HS2 and HSUK Networks in Yorkshire, including new Hemsworth Stations

The current investigations into a site for a possible parkway station can be attributed to political pressure from South Yorkshire communities, in particular Barnsley, Doncaster and Rotherham. These communities have been considerably disadvantaged by the adoption of Sheffield Midland, for the following primary reasons:

- Compared with Meadowhall, Sheffield Midland is less accessible and less convenient.
- Due to its location on a 66km long loop off the HS2 trunk route to Leeds and the North-East (i.e. the M18/Eastern route) Sheffield Midland will enjoy fewer HS2 services than were proposed for Meadowhall (which was located on the trunk HS2 route).

With the M18/Eastern route passing close to Barnsley, Doncaster and Rotherham, a parkway station would appear to offer the opportunity to provide high speed rail connectivity to these communities, which would otherwise be left bypassed by HS2, and unable to derive significant benefit.

Currently there is no definitive information as to the location of the proposed parkway station. It is believed that in addition to Hemsworth, sites at Mexborough and Bramley are also under consideration. These sites are briefly considered in Appendix D, and separate studies will be compiled to cover all 3 sites being considered by HS2 Ltd.

1.2. About High Speed UK

High Speed UK has been designed as an alternative to HS2, owing to concerns that HS2 is being developed to misplaced priorities of excessive speed and exclusivity. These misconceptions will prevent HS2 from achieving its fundamental aim of delivering “hugely enhanced capacity and connectivity”¹ between the UK’s major conurbations.

HSUK has been developed to diametrically opposite principles of a lower design speed consistent with following existing transport corridors (in particular the M1) and of full integration with the existing network. HSUK has been designed from the outset to complement and enhance the existing national intercity network, with a blend of:

- new-build high speed lines, including a north-south spine extending from London to Glasgow and a new transpennine route following the abandoned Woodhead corridor to Manchester and Liverpool;
- upgraded existing routes, with close-spaced connections to the new high speed lines.

HSUK will serve all principal cities at their existing city centre stations, with the single exception of Sheffield where the former Sheffield Victoria station will be redeveloped as the city’s primary intercity hub. In accordance with HSUK’s philosophy of full integration, interchange platforms will be provided on the approaches to the existing Sheffield Midland. HSUK’s achievement of comprehensive city centre access for high speed services is only possible with radical bespoke interventions in all principal cities.

HSUK’s network in the Yorkshire region is shown in Figure 1.

HSUK’s development is underpinned by comprehensive route design of over 1,000km of new railway. This has enabled development of both rigorous comparative cost estimates between HSUK and HS2, and also a ‘demonstrator timetable’ to show how HSUK will perform as an optimised national network.

The comparative cost estimates show HS2 to cost around £21 billion more to build than equivalent sections of HSUK.

On all comparisons of improved connectivity and reduced journey time, HSUK vastly outperforms both HS2 and any transpennine HS3/Northern Powerhouse Rail proposals that might develop. It should particularly be noted that despite its design for a lower maximum speed (of 360km/h, as opposed to the 400km/h maximum adopted in the design of HS2’s routes) HSUK can offer far greater network-wide journey time reductions.

¹ On 30th November 2015, HS2 Ltd’s Technical Director Andrew McNaughton stated in evidence to the HS2 Select Committee: “The aim of the HS2 project is to deliver hugely enhanced capacity and connectivity between our major conurbations.”

HSUK's design is documented on www.highspeeduk.co.uk and in the following principal reports which are also referenced in this study:

- HSUK report *HS2 – High Speed to Failure* (2017).
- HSUK report *HS2 – High Speed to Nowhere* (2017).
- HSUK report *The Northern Poorhouse – How the Transport Establishment failed the People of the North* (2018).

1.3. About Hemsworth

Hemsworth is a community located in the Wakefield District of West Yorkshire, close to the border with South Yorkshire. Its population is just over 13,000². Until the 1980s, Hemsworth's economy was heavily dependent upon the coal mining industry; but with the subsequent progressive closure of all mines in the Yorkshire coalfield, it has been necessary for the town's economy to diversify.

Good transport connectivity is now seen as vital, both to support local industry and to allow residents to access employment opportunities elsewhere. In recent years, the area has seen significant improvements in road connectivity, with the building of a bypass around Hemsworth, and the development of new road links to the A1 at Barnsdale Bar and to Barnsley and the Dearne Valley.

By contrast, there have been no parallel improvements to the local rail network, and Hemsworth lacks its own railway station³. This is despite the fact that the Leeds-Doncaster main line passes along the north-eastern edge of Hemsworth's built-up area, less than 1km from the town centre. This leaves Hemsworth as one of the largest Yorkshire communities to be located adjacent to a main line railway, yet not enjoy any rail services.

Given that stations have been opened or reopened in many smaller neighbouring communities, including Fitzwilliam, Thurnscoe and Goldthorpe⁴, it is a mystery why no similar reopening scheme has ever emerged for Hemsworth.

² Hemsworth's population is given as 13,311 on <https://en.wikipedia.org/wiki/Hemsworth>, sampled on 25/11/17.

³ Hemsworth station, located to the north of the town on Station Road, closed in 1967.

⁴ Fitzwilliam station was opened in 1982, and Thurnscoe and Goldthorpe stations were opened in 1988.

2. Methodology

2.1. Assessment of HS2 and HSUK Intercity Journey Times

Sufficient information on both the HS2 and HSUK proposals (i.e. detailed route alignment, station location, connections to the existing network and projected high speed services) now exists to allow detailed calculation of the journey times that both proposals will offer between the principal centres of the UK rail network.

This has allowed the development of a 'demonstrator timetable' covering a prototype national network comprising 496 journeys between 32 key centres⁵. Bespoke software has been developed to enable timings to be calculated for each journey for both HSUK and HS2, and this forms the basis for all the comparisons drawn in *HS2 – High Speed to Nowhere*. The methodology by which these calculations and comparisons have been undertaken, and verified against published HS2 journey times, is described in Section 3 of *HS2 – High Speed to Nowhere*.

4 criteria are considered in the assessment of the performance of both the HSUK and the HS2 interventions in improving connectivity across the 32-centre network:

- Average journey time reduction, considering all journeys to other cities/airports.
- Number of direct (i.e. no change of trains) journeys to other cities/airports.
- Number of journeys made faster.
- Number of journeys on existing intercity network made worse, through reduction of frequency, increase in journey time or introduction of extra changes.

2.2. Allowance for Changes of Train

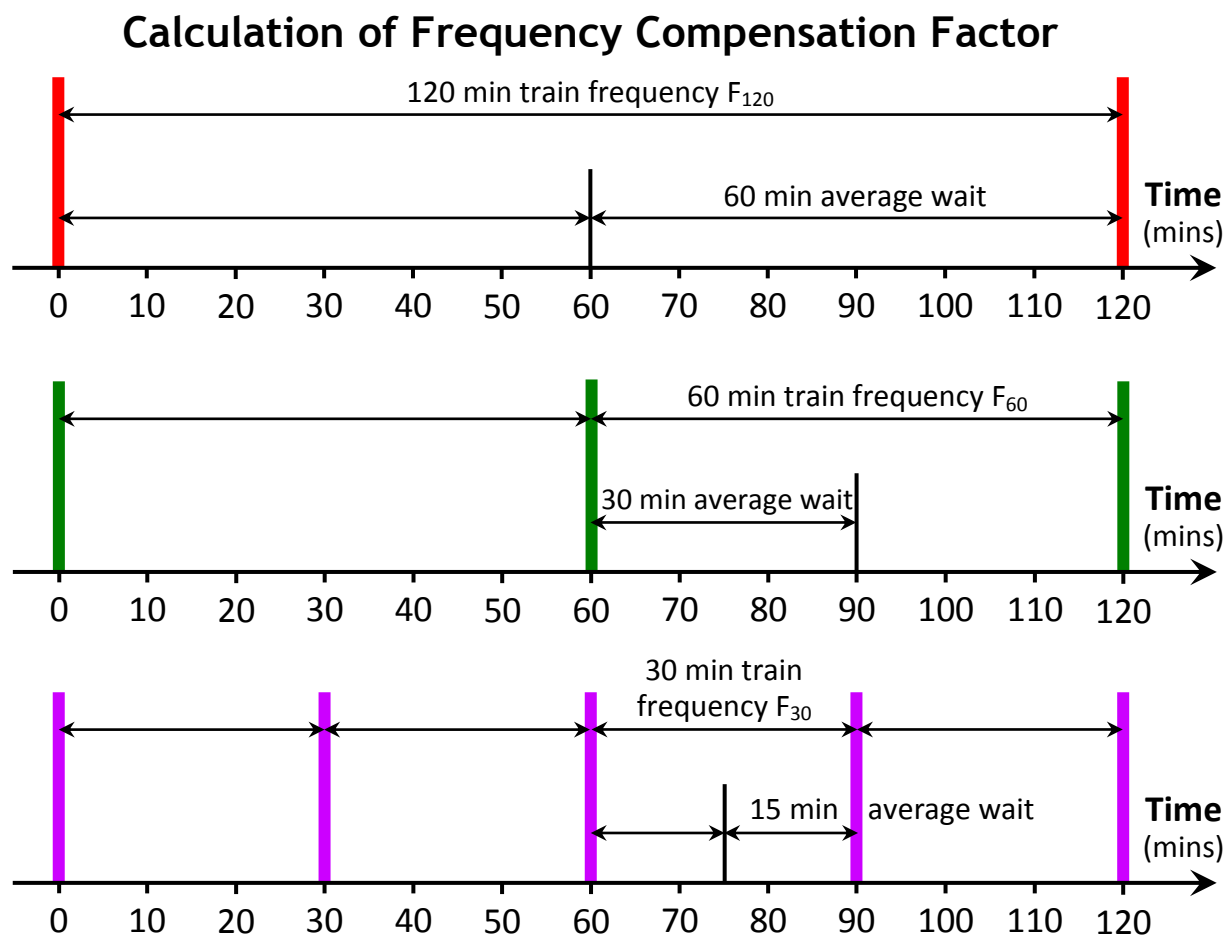
The connectivity and journey time comparisons in *HS2 – High Speed to Nowhere* are based upon the precept that journeys between cities should be direct, with changes of trains avoided wherever possible. With no changes of train journey times are shorter and more attractive to passengers, and the inconvenience and uncertainty of changing at intermediate stations is eliminated.

Accordingly a 20 minute penalty is generally applied for every change of trains that is required in each of the 496 journeys considered in *HS2 – High Speed to Nowhere*. This will apply to every journey from Hemsworth which requires a change of trains at Doncaster, Sheffield and other nearby hubs; whereas a parkway station at Hemsworth will enable some direct journeys to be made e.g. to London, the 20 minute penalty would not apply.

⁵ The 32 centres considered in HSUK's network analysis are as follows: Birmingham, Birmingham Airport, Bradford, Cheltenham, Chester, Coventry, Crewe, Derby, Doncaster, Heathrow Airport, Huddersfield, Hull, Leeds, Leicester, Liverpool, London, Luton, Manchester, Manchester Airport, Milton Keynes, Northampton, Nottingham, Oxford, Peterborough, Preston, Sheffield, Stockport, Stoke, Walsall, Warrington, Wolverhampton and York. This network analysis is fully documented in *HS2 – High Speed to Nowhere*.

2.3. Allowance for Differences in Train Frequency

In any connectivity and journey time comparison, allowance must also be made for train service frequency. The comparisons made in *HS2 – High Speed to Nowhere* are generally based upon trains operating at hourly or better frequency. However, with any HS2 parkway station at Hemsworth likely only to support services operating at 2-hourly frequency (see Item 5.3), appropriate adjustments must be applied to journey times to enable balanced comparisons to be made.



For the comparison of journey times between services operating at 2-hourly and half hourly frequencies.....

$$\text{Frequency Compensation Factor } FCF_{120/30} = \frac{F_{120} - F_{30}}{2} = \frac{120 - 30}{2} = 45 \text{ mins}$$

$$\text{Compensated Journey Time} = JT_{120} + FCF_{120/30} = JT_{120} + 45$$

Figure 2 : Calculation of Frequency Compensation Factor

Figure 2 demonstrates how a 'Frequency Compensation Factor' (FCF) can be calculated to adjust journey times to allow for different service frequencies. This FCF is based upon the greater average waiting times that arise from longer intervals between services. In the example shown, of a comparison between 120 minute (2-hourly) and 30 minute (half-hourly) service frequencies, a 45 minute FCF would be applied as an increment to the 2-hourly journey time offered to enable a fair comparison to be made.

2.4. Assessment of Existing Journey Times to Hemsworth

In the absence of any main line station at Hemsworth, the existing station in the neighbouring village of Fitzwilliam has been taken to be Hemsworth's local station. To allow for the transfer from Fitzwilliam to Hemsworth, an extra 10 minutes has been added to journey times.

2.5. Assessment of Local Journey Times to Hemsworth

The software used to calculate high speed intercity journey times reported in *HS2 – High Speed to Nowhere* has also been used in the calculation of local journey times to a new Hemsworth station. These calculations have been validated by correlating against existing journey times on the electrified Leeds-Wakefield-Doncaster route. It has been assumed that the route from Hemsworth to Sheffield will also be electrified.

2.6. Use of Hemsworth Parkway by Neighbouring South Yorkshire Communities

The primary purposes of any parkway station that might be built on HS2's M18/Eastern route are:

- to enable the principal communities of Barnsley, Doncaster and Rotherham to access HS2 services, and
- to compensate for any connectivity that might have been lost in the proposed relocation of HS2's Sheffield station from Meadowhall to Sheffield Midland.

Accordingly, the feasibility and attractiveness of road access from Barnsley, Doncaster and Rotherham to Hemsworth Parkway has been assessed, with road journey times from each town centre to Hemsworth Parkway taken from the Google distance calculator⁶.

These timings have then been added, with no extra 'change of trains' allowance to the HS2 journey time calculated from Hemsworth Parkway.

It should be noted that no quantitative assessment has been made of HS2 journeys originating in Sheffield but routed via Hemsworth Parkway. All such HS2 journeys are assumed to be routed via Sheffield Midland.

⁶ www.google.co.uk

3. Case 1 : Connections to High Speed Rail Services via Local Links from Fitzwilliam and (potentially) Hemsworth

3.1. Existing Rail Network Connections from Fitzwilliam

With Hemsworth having no station, Fitzwilliam station represents the town's closest connection to national rail services and future high speed rail services. Two local 'stopping' services, both operated by Northern Rail, are routed via Fitzwilliam:

- Leeds via Wakefield Westgate to Doncaster;
- Leeds via Wakefield Westgate to Sheffield.

Both services operate at a frequency of a single train per hour (tph), and stop at all stations along each route. These services are illustrated in Figure 3 below.

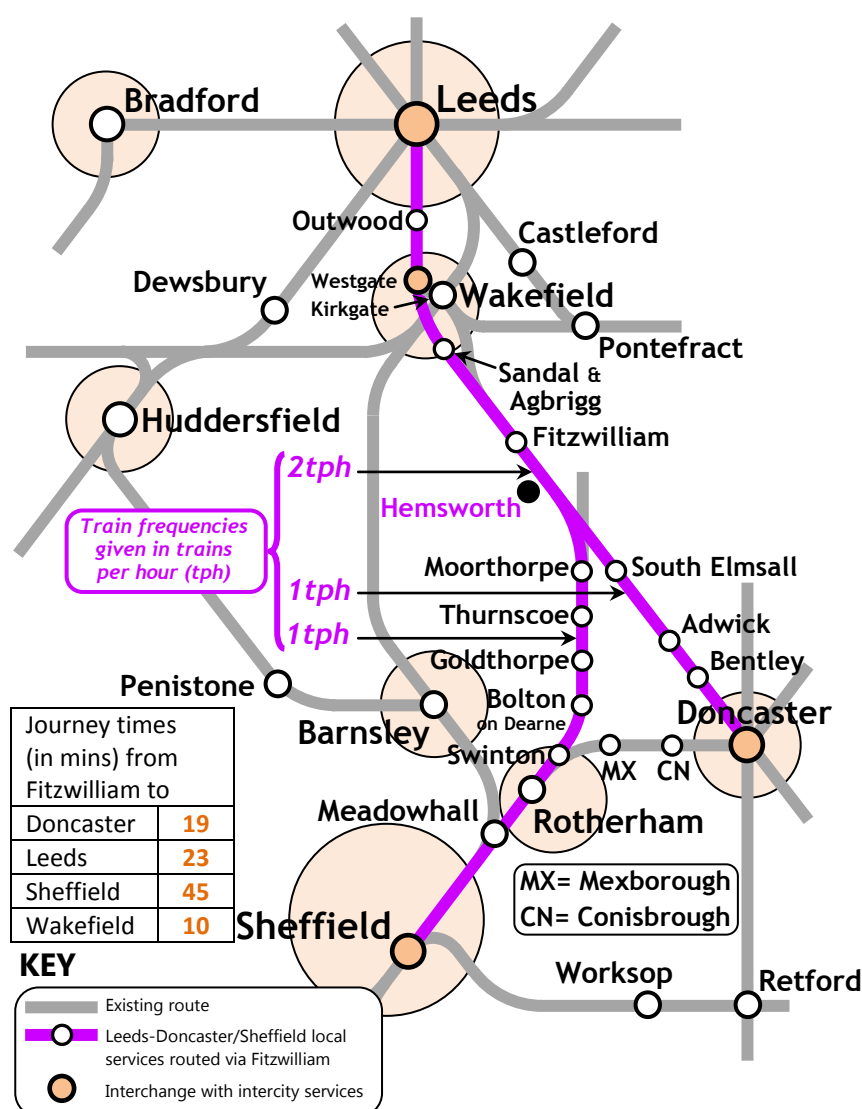


Figure 3 : Existing Leeds-Sheffield and Leeds-Doncaster local routes via Fitzwilliam

Assuming no HS2 parkway station at Hemsworth, and assuming also no enhancement of local services (either through new station at Hemsworth or increased frequency of service), the town's only connection to high speed rail services will be via its existing rail connection at Fitzwilliam to any of the 4 principal network hubs at Doncaster, Leeds, Sheffield and Wakefield, as shown in Table 4.

| Rail Journey | Trains per hour | Journey Time to Fitzwilliam | Hemsworth-Fitzwilliam transfer | Journey Time to Hemsworth |
|-------------------------|-----------------|-----------------------------|--------------------------------|---------------------------|
| Fitzwilliam - Doncaster | 1 | 19 | 10 | 29 mins |
| Fitzwilliam - Leeds | 2 | 23 | 10 | 33 mins |
| Fitzwilliam - Sheffield | 1 | 45 | 10 | 55 mins |
| Fitzwilliam - Wakefield | 2 | 10 | 10 | 20 mins |

Table 4 : Journey Times from Fitzwilliam/Hemsworth to neighbouring network hubs

3.2. Connections to HSUK and HS2 at Neighbouring Network Hubs

The High Speed UK and HS2 service offers for all major cities in the Yorkshire region are defined in *HS2 – High Speed to Nowhere*⁷. Connectivity data relating to onward high speed links from Doncaster, Leeds, Sheffield and Wakefield is given in Table 5.

| HSUK and HS2 network connections from | Connecting service from Fitzwilliam (trains per hour) | Effect of HSUK/HS2 intervention | | | |
|--|---|--|------------------------------------|----------------------------------|--|
| | | Average Journey Time Reduction | Cities Directly linked (out of 31) | Journeys made faster (out of 31) | Journeys made worse ⁸ (out of 31) |
| Doncaster | 1 | 37% | 16 | 25 | 0 |
| | | No HS2 services to Doncaster | | | 16 |
| Leeds | 2 | 50% | 30 | 26 | 0 |
| | | 20% | 4 | 12 | 5 |
| Sheffield | 1 | 53% | 31 | 30 | 0 |
| | | 8% | 3 | 5 | 11 |
| Wakefield | 2 | 40% | 17 | 28 | 0 |
| | | No HS2 services to Wakefield | | | 10 |

Table 5: National Intercity Connectivity offered by existing local services from Fitzwilliam to neighbouring network hubs

It is immediately apparent, from review of Table 5, that Fitzwilliam and Hemsworth (and indeed all West and South Yorkshire communities) will derive vastly superior national connectivity from the high speed connections offered by HSUK at all neighbouring network hubs.

⁷ *HS2 – High Speed to Nowhere* defines Bradford, Doncaster, Huddersfield, Hull, Leeds, Sheffield and York as nodes in its 32-centre network, and connectivity data has been calculated for intercity connectivity from all of these centres. Supplementary calculations have been undertaken for Wakefield.

⁸ A journey 'made worse' is defined in *HS2 – High Speed to Nowhere* as an existing intercity connection that is made less frequent, slower (by the addition of 2 or more extra stops) or requiring extra changes of train through the intervention of HS2. Data on predicted intercity service reductions is given in Table 23, pp91-92, *HS2 Regional Economic Impacts*, HS2 Ltd, September 2013.

The average journey time reductions set out in Table 5 above relate to journeys from Doncaster, Leeds, Sheffield and Doncaster i.e. the principal rail network hubs of South and West Yorkshire, to other hubs of the UK national network (i.e. the 32-centre network described in Item 2.1). Similar calculations have been undertaken to determine the average journey times reductions that HSUK and HS2 will achieve for journeys from Fitzwilliam/Hemsworth across the same 32-centre network.

| Average journey time reduction across 32-centre network | Average JTR – HSR intervention only | |
|---|-------------------------------------|------------|
| | HSUK | HS2 |
| Doncaster | 37% | 1% |
| Leeds | 50% | 20% |
| Sheffield | 53% | 8% |
| Wakefield | 40% | 3% |
| Hemsworth | 25% | 7% |

Table 6 : Average Journey Time Reductions from Hemsworth achieved by high speed rail intervention alone (i.e. no improvements to local rail network)

3.3. Contrast between Journey Time Reductions for Cities and Smaller Towns

Table 6 contrasts the performance of HSUK and HS2 in reducing journey times for Hemsworth and for the other principal network hubs of South and West Yorkshire. Whilst similar differentials exist in the relative performances of HSUK and HS2, in absolute terms the journey time reductions achieved for Hemsworth are significantly smaller. HSUK's 25% figure for Hemsworth compares with an average of 45% for the other 4 centres, and HS2's 7% figure compares with the 20% figure for Leeds (which is the primary connection point to HS2 services).

The calculations undertaken for this study show that the optimum connection point for passengers from Fitzwilliam and Hemsworth to access HS2's high speed services will be at Leeds. The apparent illogicality, of having to travel 30km northwards to join HS2 services running southwards past Hemsworth almost 1 hour later, can be explained by:

- a) the lower frequency of local services to Sheffield;
- b) the decision of HS2 Ltd to serve Sheffield at the existing Midland station, with longer journey times from London to Sheffield than from London to Leeds, and
- c) the greater (although still extremely limited) high speed rail connectivity offered by HS2 at Leeds.

The smaller journey time reductions achieved for Hemsworth can be accounted for very simply by the fact that high speed rail is an intervention that directly benefits only intercity journeys. For a community such as Fitzwilliam or Hemsworth, a major component of the total journey time in a longer-distance journey, for instance to London, is the local journey to Doncaster, and the time spent waiting there for an intercity service to Kings Cross. If the intervention of high speed rail cannot bring benefits to the 'local' component of the journey, and only the 'intercity' component is improved, then the overall percentage journey time reduction that will be achieved is inevitably lower.

Whilst the journey time reductions of 25%/7% achieved by HSUK/HS2 effectively represent the 'base case', it is clear that much greater gains could be achieved through parallel improvements of local connectivity to Hemsworth. The purpose of this study is to test whether HSUK's enabling of improved local services along the Leeds-Wakefield-Doncaster/Sheffield routes together with its more national benefits will deliver greater benefit than any parkway station provided along HS2's line of route.

4. Likely Locations of New Stations in Hemsworth

4.1. New HS2 Parkway at Hemsworth

For an HS2 parkway station located at Hemsworth, a site has been assumed close to where the new high speed line would cross the bypass on the south side of the town, as indicated in Figure 7. This station would comprise 2 platforms on 'loop' lines, with 2 'through' tracks running down the centre of the track layout, as illustrated in Figure 8.

Given the greater length of platform (400m) and the much larger car park required for its greater catchment area, the land take required for an HS2 parkway station would be considerably greater than for a more conventional station on the main line.

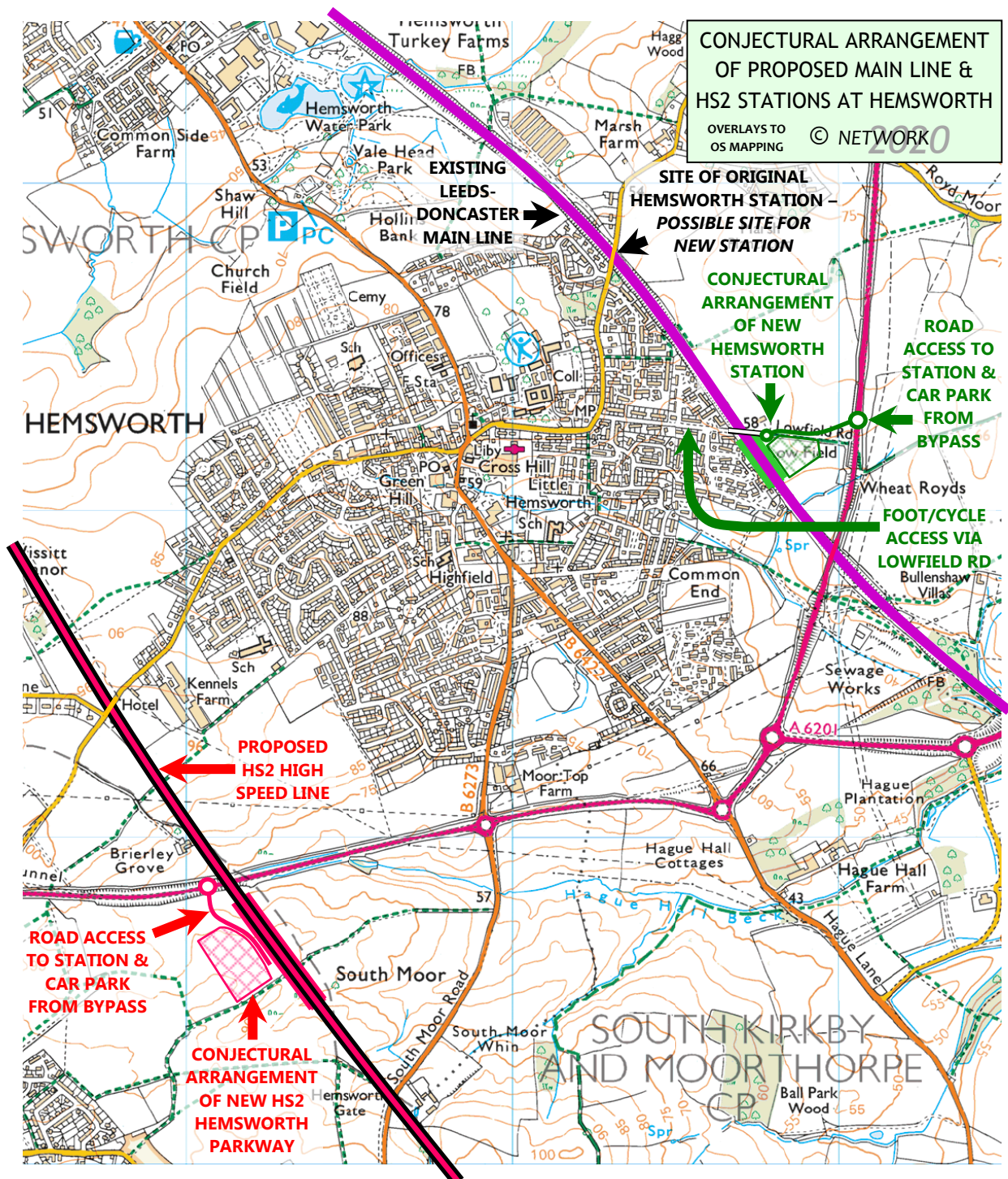


Figure 7 : Possible Locations of new HS2 Parkway and main line stations at Hemsworth

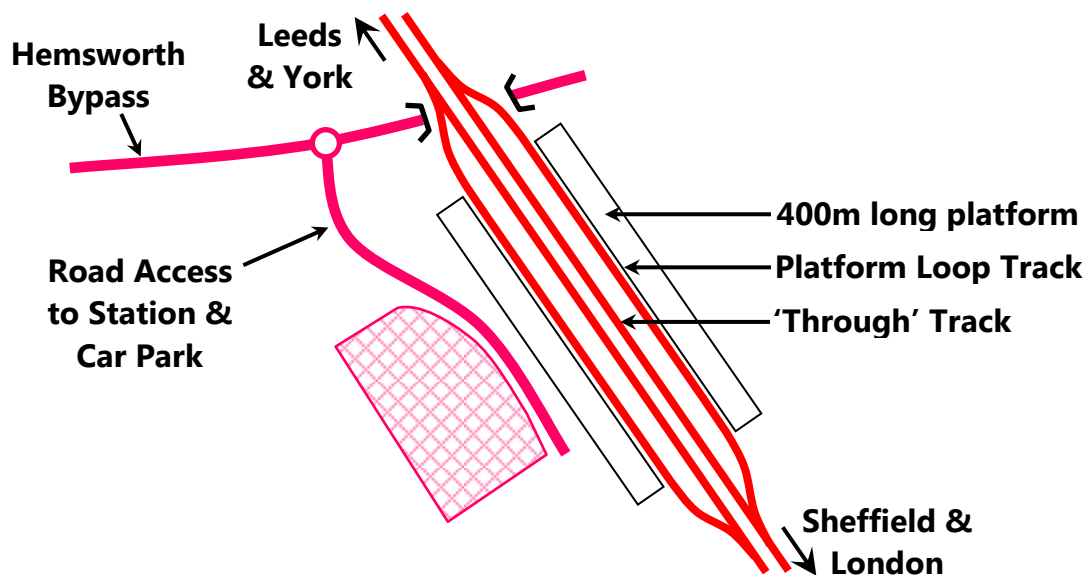


Figure 8 : Indicative Track Arrangement at new HS2 Hemsworth Parkway

4.2. New Main Line Station at Hemsworth

For the purposes of this study, it has been assumed that a new Hemsworth main line station would be located at the existing Lowfield Road bridge, immediately to the north-east of the Hemsworth urban area, as indicated in Figure 4. It is envisaged that Lowfield Road would become the primary route for foot and cycle access from the south-west, while road access would be gained from the bypass, with new roundabout, spur road and car park constructed. The station would likely comprise 2 platforms, each around 80-90m in length, and ideally the platforms would be located on loop lines clear of the main line tracks.

From the perspective of the Hemsworth community, a station on Lowfield Road appears to be a preferable arrangement to the original Station Road site. Walking routes from other areas of the town will generally be shorter, and road access will be easier, requiring only a short spur road from a new roundabout on the bypass.

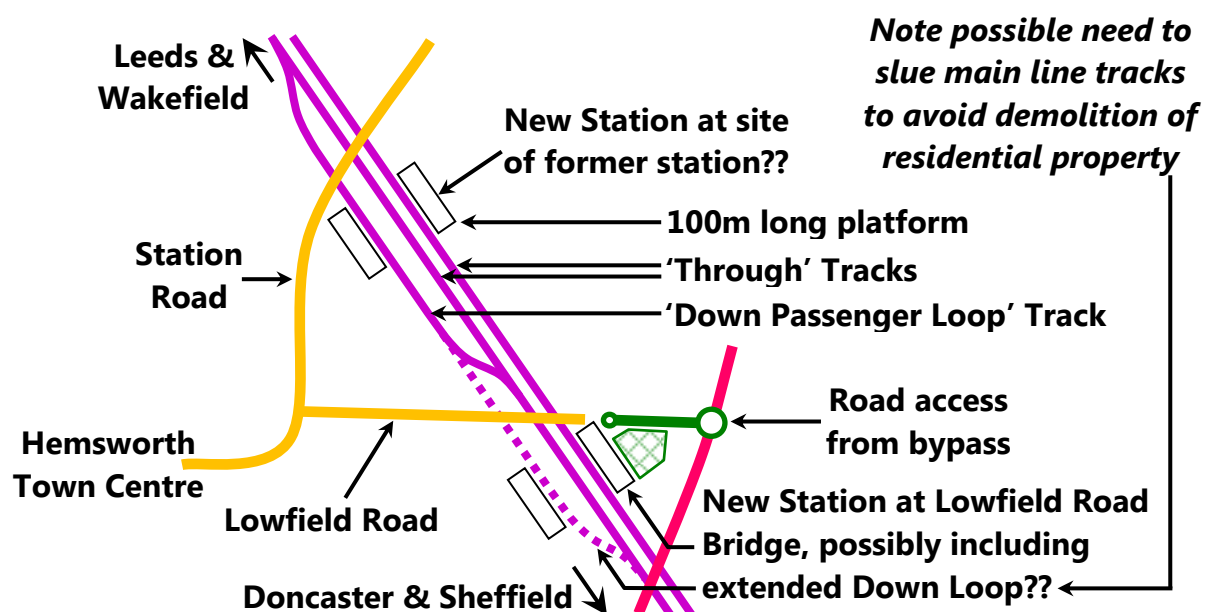


Figure 9 : Possible Sites for new Hemsworth Main Line Station

However, from a railway perspective the original station site may prove superior, more capable of accommodating an ideal track layout with platforms facing onto loop tracks rather than through tracks. At the original station site there appears to be greater available width in which to construct platforms, and a loop line (the 'Down Passenger Loop') is already in existence. If operational studies (see Item 6.1) indicate that this loop needs to be extended or altered for the Lowfield Road site, with the existing main line tracks slued northwards to avoid the need to demolish residential property, this may tip the balance in favour of the original station site.

These issues can only be fully resolved with more detailed study, which must address issues of railway operations, cost and environmental impact. However, there is little doubt that a feasible station site can be found at Hemsworth, and that its total cost will represent an almost infinitesimal fraction of the total expenditure that has been budgeted for the HS2 project.

5. Case 2 : New HS2 Parkway at Hemsworth

5.1. High Speed Services passing through a new HS2 Hemsworth Parkway

Every hour 9 HS2 services and up to 6 Northern Powerhouse Rail (NPR) services in each direction are projected to pass through any new parkway station at Hemsworth. These services are listed in Table 10.

| | Service | Via | Locations Connected |
|--|---------|----------|---|
| 1 | HS2-15 | S | Leeds-Sheffield-Toton-Birmingham Curzon St |
| 2 | HS2-16 | S | Leeds-Sheffield-Toton-Birmingham Curzon St |
| 3 | HS2-17 | M | Newcastle-Durham-Darlington-York-Toton-Birmingham Curzon St |
| 4 | HS2-18 | M | Leeds/Sheffield-Toton-Old Oak Common-London |
| 5 | HS2-19 | M | Leeds-Toton-Old Oak Common-London |
| 6 | HS2-20 | M | Leeds-Toton-Birmingham Interchange-Old Oak Common-London |
| 7 | HS2-21 | M | Sheffield/York-Toton-Old Oak Common-London |
| 8 | HS2-22 | M | Newcastle-Darlington-York-Old Oak Common-London |
| 9 | HS2-23 | M | Newcastle-Darlington-York-Old Oak Common-London |
| 10-15 | NPR | S | Leeds-Sheffield |
| S = Train running through Hemsworth Parkway, routed via existing main line to Sheffield Midland | | | |
| M = Train running through Hemsworth Parkway, routed via M18/Eastern route, bypassing Sheffield | | | |

Table 10 : HS2 Services passing through new HS2 Hemsworth Parkway

(HS2 service numbering applied by HSUK, refer to Appendix E)

It is likely that very few of the services listed above would actually stop at Hemsworth. This can be attributed to several factors:

- HS2 services are extremely time-sensitive. The business case for HS2 is founded upon a very high value placed upon every minute shaved off an existing journey time, and a stop at Hemsworth will increase journey times from London and Birmingham to Leeds, York and Newcastle by over 5 minutes.
- Given the high frequency (possibly 15 trains per hour) and the speed (340km/h or 210MPH) at which high speed trains are projected to pass through Hemsworth, it will be difficult to find 'paths' for both stopping and 'through' services. Once a train has stopped at Hemsworth, it may be necessary to stop for a substantial period (i.e. longer than the standard 2-minute 'dwell' time) to wait for another 'path' to become available.
- The immediate hinterland of Hemsworth Parkway is not densely populated, and it seems unlikely to attract sufficient passengers to support a frequent level of service.
- HS2's service offer for Hemsworth Parkway is fundamentally unattractive. The services running from Leeds and York, that might stop there, only run to a total of 3 different city destinations (Sheffield, Birmingham and London) and 3 different 'parkway' locations (Toton/East Midlands Interchange, Birmingham Interchange and Old Oak Common) at which some level of interchange may be possible.

5.2. Concerns regarding Viability of Parkway Stations

These operational issues are typical for most parkway stations, and they are especially applicable to parkway stations located on new high speed lines, where the uniaxial nature of

the route (north-south, in the case of HS2) and the general lack of connections to the existing network preclude the development of more balanced links in other directions. In the case of any Yorkshire parkway station there would appear to be no possibility of such a station offering transpennine high speed links to meet the requirements of the Northern Powerhouse.

Even on the north-south routes that would be possible from any Yorkshire parkway station, the combination of a) increased journey times to primary cities further north, b) 'pathing' problems with stopping high speed services at the parkway station and c) low population density in the parkway station's immediate hinterland will prevent HS2 from offering the frequent hourly or even half-hourly service offered by most UK intercity railways.

Stations such as TGV Haute Picardie (on TGV Nord between Paris and Lille), or Meuse TGV and Lorraine TGV (on TGV Est between Paris and Strasbourg) provide excellent examples of the parkway station's inability to support viable and attract service levels. Review of the services on offer shows large gaps, often of more than 2 hours, between trains in a given direction; to certain destinations, there can sometimes be only a single train per day. A summary of services from French TGV parkway stations is provided in Appendix F.

These parkway stations have been built for largely political reasons, to assuage the concerns of local communities at being bypassed by the new TGV lines. The poor frequencies on offer indicate clearly that parkway stations have failed in their aim of mitigating the adverse effects upon bypassed communities, and there is little reason to suppose that similar issues would not apply to any HS2 parkway station located in West or South Yorkshire.

5.3. Likely Service Frequencies from new HS2 Hemsworth Parkway

This underlines the basic fact that there is no intrinsic merit in the proposal for a parkway station, either at Hemsworth or at any West or South Yorkshire location. The proposal only exists because HS2 Ltd has failed to develop a viable and acceptable station proposal for Sheffield, located on a fast route and running through (or very close to) the centre of the city.

For the purposes of this study, it has been assumed that sufficient services will stop at Hemsworth Parkway to offer a 2-hourly service to all destination served by HS2 trains originating in either Leeds or York. In the comparison with High Speed UK's service offer, appropriate adjustments have been made to the calculated journey times to allow for:

- the poor service frequencies that will be offered at Hemsworth Parkway.
- the number of changes of train that will be required.

The methodologies employed in making these adjustments are described in Section 2.

Although there is no reason to suppose that HS2's Hemsworth Parkway (or any other parkway station in South and West Yorkshire) could support frequent HS2 services, journey times have also been calculated assuming hourly services to all destinations.

| From Hemsworth by HS2 to... | | Number of changes | Change at | Raw Journey Time* | Adjusted Journey Time# | Type of Journey |
|------------------------------------|----------------|-------------------------|-----------|-------------------------|------------------------------|--|
| Northern Powerhouse Cities | Bradford | 1 | Leeds | 75 | 95 | Existing Network Journeys |
| | Chester | 2 | Leeds | 194 | 234 | |
| | Crewe | 2 | Leeds | 156 | 196 | |
| | Doncaster | 0 | Direct | 29 | 29 | |
| | Huddersfield | 1 | Leeds | 75 | 95 | |
| | Hull | 1 | Leeds | 111 | 131 | |
| | Leeds | 0 | Direct | 11 | 56 | Direct HS2 Journey |
| | Liverpool | 1 | Leeds | 142 | 162 | Existing Network Journeys |
| | Manchester | 1 | Leeds | 107 | 127 | |
| | Manchester Apt | 1 | Leeds | 125 | 145 | |
| | Preston | 1 | Leeds | 160 | 180 | |
| | Sheffield | 0 | Direct | 17 | 62 | Direct HS2 Journey |
| | Stockport | 1 | Sheffield | 122 | 142 | Existing Network Journeys |
| | Warrington | 1 | Leeds | 138 | 158 | |
| | York | 0 | Direct | 19 | 64 | Direct HS2 Journeys from Hemsworth |
| Midlands Engine Cities | Birmingham | 0 | Direct | 43 | 88 | Parkway (HWP) |
| | Birmingham Apt | 0 | Direct | 56 | 101 | |
| | Coventry | 1 | Birm Int | 64 | 139 | HS2 Journey from Hemsworth Parkway (HWP) with Change |
| | Derby | 1 | Toton | 57 | 122 | |
| | Leicester | 1 | Toton | 60 | 125 | |
| | Northampton | 1 | Birm Int | 110 | 185 | |
| | Nottingham | 1 | Toton | 44 | 109 | |
| | Stoke | 2 | LS & MA | 160 | 200 | Existing Network Journeys |
| | Walsall | 2 | SH & BI | 191 | 231 | |
| | Wolverhampton | 1 | Birm Int | 101 | 176 | HS2 Journey with Change |
| Southern Cities | Cheltenham | 1 | Sheffield | 205 | 225 | Existing Network Journey |
| | Heathrow Apt | 1 | Old Oak C | 96 | 161 | HS2 Journey with Change |
| | London | 0 | Direct | 73 | 118 | Direct HS2 Journey |
| | Luton | 2 | SH & NG | 211 | 251 | Existing Network Journey |
| | Milton Keynes | 1 | Birm Int | 118 | 193 | HS2 Journey with Change |
| | Oxford | 1 | Birm Int | 138 | 213 | |
| | Peterborough | 1 | Doncaster | 141 | 161 | Existing Network Journey |
| Average HS2 Journey Time Reduction | | | | | | 18% |

Table 11 : HS2 Journey Times from Hemsworth

(‘Direct HS2 Journey’ and ‘HS2 Journey with Change’ from new HS2 Hemsworth Parkway.

‘Existing Network Journey’ from existing Fitzwilliam station)

* Raw Journey Time = Actual start to stop journey time, with no allowance for changes or service frequency

Adjust Journey Time = Raw Journey Time plus no allowance for changes or service frequency

5.4. Journey Times from new HS2 Hemsworth Parkway

As noted in Table 6, with local services from Fitzwilliam connecting to HS2 at Leeds and Sheffield, 7% average journey time savings would be achieved for Hemsworth. Any such savings must of course be balanced against the intercity service reductions⁹ on East Coast routes to Doncaster and Wakefield, that have been predicted to accompany the introduction of HS2 high speed services from London to Leeds.

With HS2's Hemsworth Parkway in place, and served by trains generally operating at 2-hourly frequency, the average journey time reduction offered by HS2 would rise to 17%.

If service frequencies from HS2's Hemsworth Parkway were to be increased to hourly, the average journey time reduction offered by HS2 would rise to 30%.

The journey times that HS2 will offer, with a new Hemsworth Parkway station in place, are listed in Table 11. The services noted 'Direct HS2 Journey' and 'HS2 Journey with Change' would operate from the new Hemsworth Parkway, while the services noted 'Existing Network Journey' would start from Fitzwilliam station.

Table 11 lists both 'raw' and 'adjusted' journey times. The 'raw' journey time is the total 'start to stop' timing, including the time taken for intermediate changes. The 'adjusted' journey time includes a 20 minute allowance for every change of trains, and a 45 minute 'frequency compensation factor' applied to account for HS2's anticipated 2-hour service frequency from Hemsworth Parkway (with a generic 30 minute frequency offered by HSUK on comparable routes).

Comparisons with the HSUK service offer for Hemsworth are shown in Tables 22 and 23 in Section 7.

5.5. HS2 Benefits for Barnsley??

Barnsley is located 14km from Hemsworth, with relatively easy road access via the A628. The Google distance calculator indicates a driving time of 24 minutes from the centre of Barnsley to Hemsworth, and this is taken as a journey time component additional to that required to access rail services from Barnsley's main line station (located adjacent to the bus station).

Barnsley currently lacks any regular-interval intercity services, and its local services, extending no further than Leeds, Huddersfield, Sheffield and Nottingham, provide the only opportunity to access the existing intercity rail network. Hence the prospect of access to HS2's longer-distance routes at Hemsworth Parkway will seem attractive.

⁹ Data on predicted intercity service reductions is given in Table 23, pp91-92, *HS2 Regional Economic Impacts*, HS2 Ltd, September 2013. This indicates that East Coast intercity services from London via Doncaster to Wakefield will be reduced from 2 trains per hour to a single train per hour. This reduction has been confirmed in the recent letter from HS2 Minister Paul Maynard to the Crofton community dated 17th October 2017

However, analysis shows the benefits to Barnsley to be relatively limited. With no Hemsworth Parkway, HS2 will offer average journey time reductions of 5% for Barnsley. With Hemsworth Parkway in place, average journey time reductions will rise to 6%.

Comparisons with HSUK's service offer for Barnsley are shown in Tables 24 and 25 in Section 7.

5.6. HS2 Benefits for Doncaster??

Doncaster is located 21km from Hemsworth, with relatively easy road access via the A638. The Google distance calculator indicates a driving time of 29 minutes from the centre of Barnsley to Hemsworth, and this is taken as a journey time component additional to that required to access rail services from Doncaster's main line station (located adjacent to the bus station).

Doncaster is a primary hub of the national rail network, with intercity services extending as far as London, Reading, Birmingham, Manchester, Leeds, Newcastle and Edinburgh. Given the high quality of Doncaster's existing intercity rail links, it is reasonable to question what further benefits might accrue from a road connection to a remote HS2 parkway station.

Analysis shows the benefits that an HS2 Hemsworth Parkway will bring to Doncaster to be almost negligible. With no Hemsworth Parkway, HS2 will offer average journey time reductions of 0.5% for Doncaster. With Hemsworth Parkway in place, average journey time reductions will rise to 1%. It should be noted that Hemsworth Parkway offers no benefits for intercity journeys from Doncaster; the only journey showing any benefit would be to Birmingham Airport and Heathrow Airport.

Of much greater concern is the damage that HS2 will do to Doncaster's intercity connectivity. HSUK's detailed analysis¹⁰ of HS2's performance as a national network, informed by HS2 Ltd's own predictions¹¹ of future intercity services on the existing rail network, demonstrates the full extent to which the bypassed Doncaster will suffer reduced intercity connectivity, with HS2 in place.

Of all the 32 cities and airports considered in HSUK's network analysis, Doncaster will experience the greatest number of journeys made worse, through either reduced frequency, increased journey times or introduction of extra changes of train. Of the 31 journeys to the other centres, 16 journeys will be made worse through the intervention of HS2.

Given Doncaster's extraordinarily poor access to HS2, it is particularly ironic that HS2 Ltd has chosen to locate its High Speed Rail college there.

Comparisons with HSUK's service offer for Doncaster are shown in Tables 26 and 27 in Section 7.

¹⁰ HSUK's analysis of HS2's adverse impacts on Doncaster's intercity connectivity is set out in Appendix D2 of *HS2 – High Speed to Nowhere*.

¹¹ A journey made worse is defined as an existing intercity connection that is made less frequent, slower (by the addition of 2 or more extra stops) or requiring extra changes of train through the intervention of HS2. Data on predicted service reductions is given in Table 23, pp91-92, *HS2 Regional Economic Impacts*, HS2 Ltd, Sept 2013.

5.7. HS2 Benefits for Rotherham??

Rotherham has no direct, high quality road links to any HS2 parkway station located at Hemsworth, and its only viable link to HS2 would be via existing local rail links to Sheffield Midland. These local services, operating at a frequency of 3 trains per hour, would enable passengers from Rotherham to access HS2's services to Birmingham, London and Leeds (the latter route also served by Northern Powerhouse Rail link). HS2 will offer direct high speed links to no other UK city.

Comparisons with HSUK's service offer for Rotherham are shown in Table 28 in Section 7.

5.8. HS2 Benefits for Sheffield??

It should not be forgotten that the logic for an HS2 parkway station on the M18/Eastern route has been principally driven by HS2 Ltd's proposed relocation of Sheffield's HS2 station from Meadowhall to Sheffield Midland. The location of Meadowhall, around 6km from the city centre, was rightly considered unacceptable by the Sheffield business and political community, and intense political pressure was exerted upon HS2 Ltd, to develop proposals for a more acceptable central location.

The hilly topography in Sheffield makes a truly central station (as exists with Leeds City station) impossible to achieve, and of all possible locations, the existing Sheffield Midland station adopted by HS2 is certainly the most central and best connected to the existing local network. However, it has little room for its own expansion and offers few opportunities for commercial property development.

The greatest drawback of HS2 Ltd's Sheffield Midland initiative is that it places the city on a long loop, remote from the trunk route of HS2 (i.e. the M18/Eastern route). This greatly lengthens journey times and discourages the operation of through services. As a result, Sheffield Midland will have fewer HS2 services and fewer HS2 destinations (see Table 12 below) than were previously proposed for Meadowhall.

| Meadowhall HS2 (2012-2016) | Sheffield Midland HS2 (2016-??) |
|---|--|
| Birmingham, Birmingham Airport, Leeds, York, Darlington, Newcastle, London | Birmingham, Leeds, London |

Table 12 : Intercity Destinations offered by direct HS2 services from Sheffield

Comparisons with HSUK's service offer for Sheffield are shown in Table 29 in Section 7. The comparative merits of HS2's and HSUK's proposed Sheffield stations (respectively at Midland and Victoria) are discussed in greater detail in Appendix B.

6. Case 3 : New Main Line Station at Hemsworth connecting to HSUK services from Nearby Intercity Hubs

6.1. Enhanced Local Rail Services from a new main line station at Hemsworth

High Speed UK's alternative proposition for the Leeds-Wakefield-Doncaster/Sheffield corridor entails the following:

- A new station at Hemsworth (and possibly also at other locations).
- Route to Sheffield electrified to match existing route to Doncaster.
- Service frequencies increased from 1 to 2 trains per hour on both Leeds-Wakefield-Doncaster and Leeds-Wakefield-Sheffield routes. These two services would give a frequency of 4 trains per hour from Hemsworth to Wakefield and Leeds.

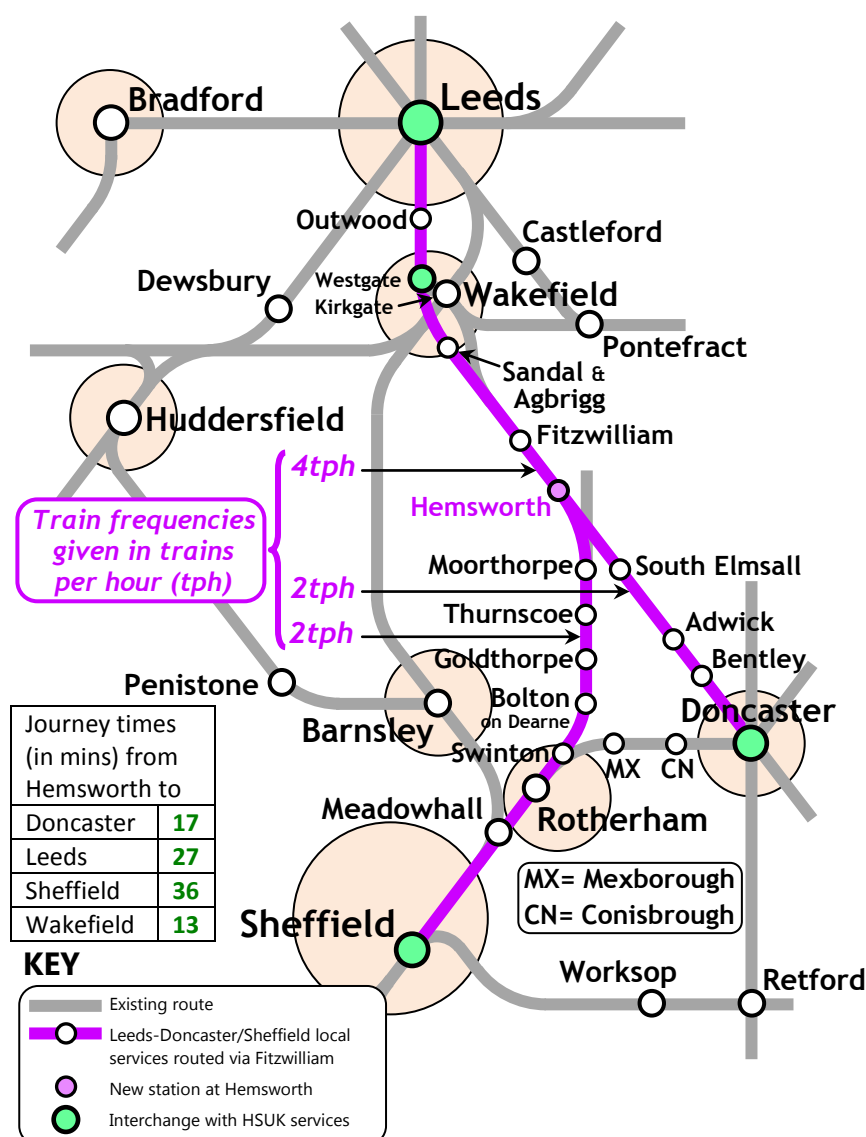


Figure 13 : Existing Leeds-Sheffield and Leeds-Doncaster local routes, including prospective new station at Hemsworth

Any such proposal for new stations and enhanced service frequencies (see Figure 13) is only possible if the line has sufficient capacity, and detailed studies will be required to determine what works (for instance improved signalling or new 'recessing' loops) might be necessary to deliver increased capacity. However, it is legitimate to make the following observations:

- The present hourly train operating pattern, of 3 intercity services, 2 local services and a possible additional freight service (see Table 14) puts no real pressure on the route. The distance-time chart depicted in Figure 15 shows no conflict and good separation between all services currently operating.

| | Operator | Stop/ Non-Stop? | Locations Connected |
|---|--------------------|--------------------|--|
| 1 | East Coast | Non-Stop | Leeds-Wakefield-Doncaster-Grantham-Stevenage-London KX |
| 2 | East Coast | | Leeds-Wakefield-Doncaster-Peterborough-London KX |
| 3 | Arriva XCountry | | Edinburgh-(other stations)-Leeds-Wakefield-Sheffield-(other stations)-Plymouth |
| 4 | Northern | Stopping | Leeds-Wakefield-Doncaster local service, stopping all stations |
| 5 | Northern | | Leeds-Wakefield-Sheffield local service, stopping all stations |
| 6 | Freight | Non-Stop | Hourly freight service (assumed) Hare Park J ⁿ -Doncaster |

Table 14 : Existing Services on Leeds-Doncaster main line station at Hemsworth

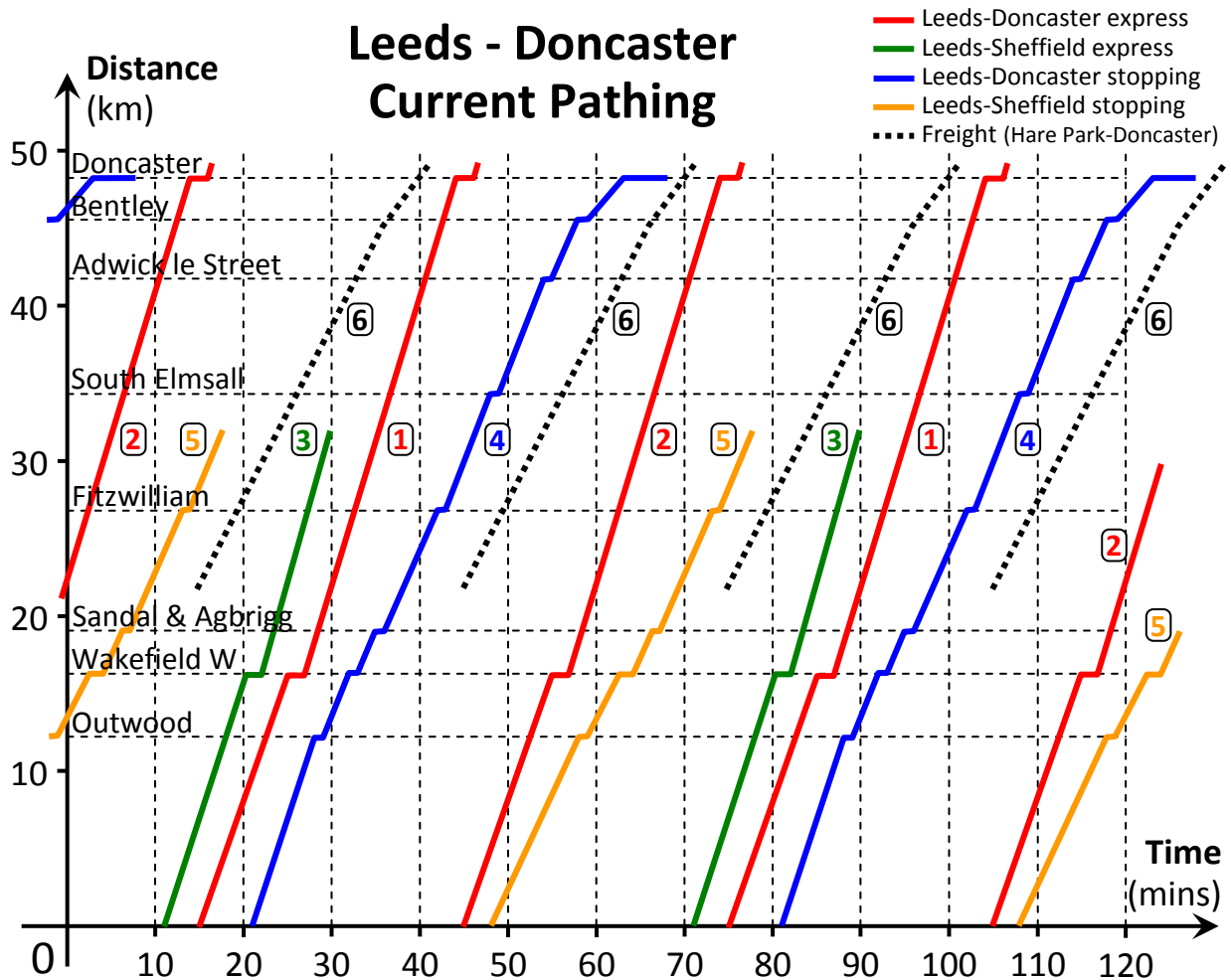


Figure 15 : Pathing Diagram for Existing Services on Leeds-Doncaster main line

- With some rearrangement of services (see Figure 17, necessary in any case with the advent of HSUK as the primary UK intercity network) it appears to be possible to accommodate the increased local service offer set out in Table 16.
- Any conflicts or service resilience issues that might arise with more intensive operation of the Leeds-Wakefield-Doncaster/Sheffield route appear to be resolvable through the introduction (or reinstatement) of passing loops.

| | Operator | Stop/ Non-Stop? | Locations Connected |
|---|----------|--------------------|--|
| 1 | HSUK37 | Non-Stop | Leeds-Wakefield-Doncaster-Grantham-Peterborough-Stevenage-London Kings Cross |
| 2 | HSUK74 | | Leeds-Wakefield-Doncaster-Retford-Newark-Nottingham-Loughborough-Leicester-Luton Apt-Brent Cross-London Euston |
| 3 | HSUK09 | | York-Leeds-Wakefield-Sheffield-Chesterfield-Derby-Walsall-Birmingham New St-Leamington-Banbury-Oxford-Reading |
| 4 | Northern | Stopping | Leeds-Wakefield-Doncaster local service, stopping all stations |
| 5 | Northern | | Leeds-Wakefield-Doncaster local service, stopping all stations |
| 6 | Northern | | Leeds-Wakefield-Sheffield local service, stopping all stations |
| 7 | Northern | | Leeds-Wakefield-Sheffield local service, stopping all stations |
| 8 | Freight | Non-Stop | Hourly freight service (assumed) Hare Park J ⁿ -Doncaster |

Table 16 : Proposed Services passing through new main line station at Hemsworth

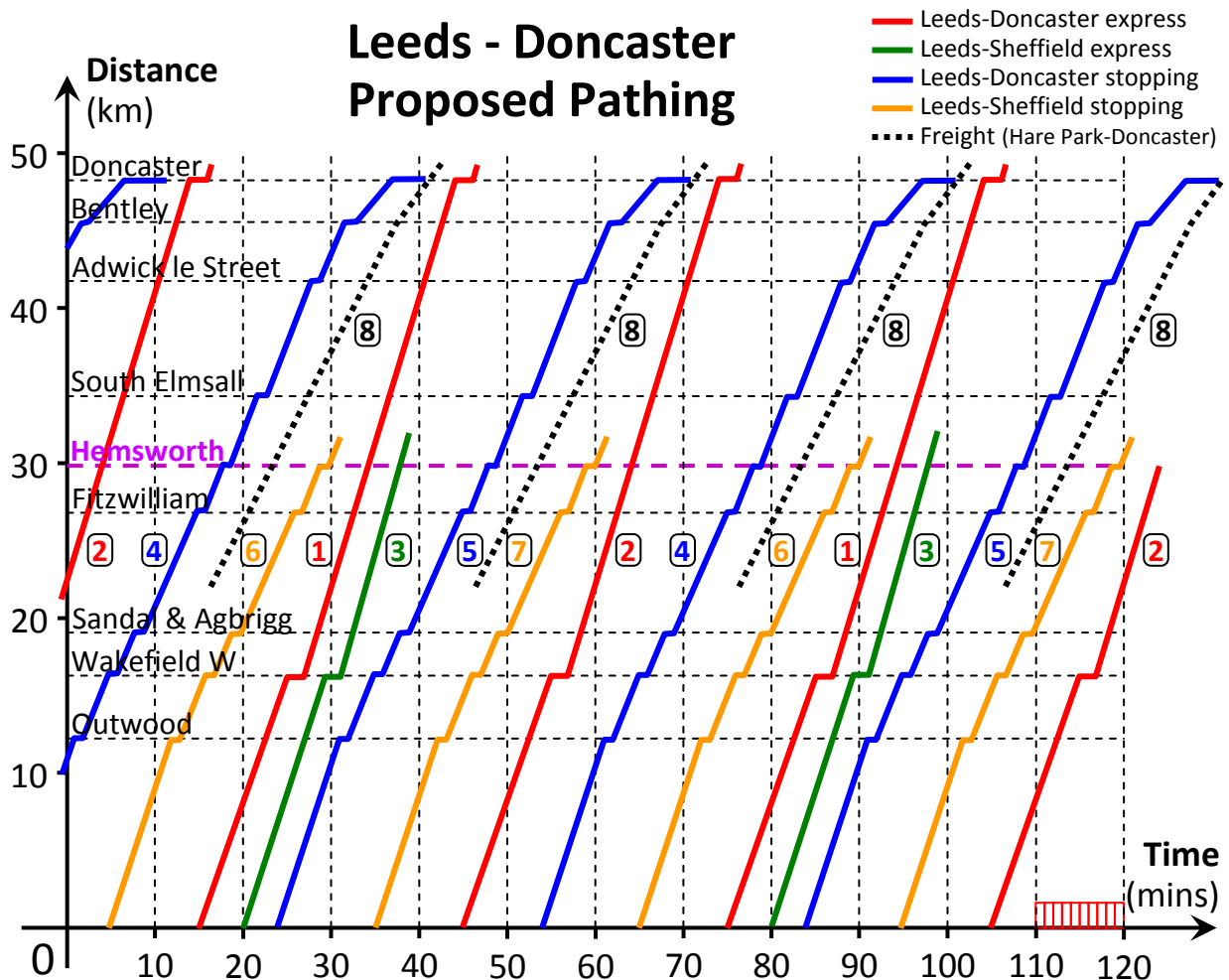


Figure 17 : Pathing Diagram for Proposed Services on Leeds-Doncaster main line

Whilst Figure 17 demonstrates the apparent feasibility of running increased local services on both Leeds-Wakefield-Doncaster and Leeds-Wakefield-Sheffield routes, it is clear that this increase in services will bring the routes much closer to their capacity. It would certainly be prudent to make allowance for passing loops in any scheme for a new station at Hemsworth.

6.2. Capacity Issues at Leeds City Station

The true constraint upon the West Yorkshire rail network is not the capacity of its lines but instead, the capacity of Leeds City station on which most of its lines are focussed. Although Leeds station has 17 platforms – more than any other provincial English station – the peculiar arrangement of its incoming routes – 6 routes from the west and one route from the east – means that it functions largely as a terminus station. With trains requiring typically to stand in a platform for around 20 minutes to turn around, rather than 3 minutes to pass through, Leeds station is generally considered to have little or no capacity to accommodate increased services.

These issues are set out in detail in Appendix A.

HSUK has developed detailed proposals (also set out in Appendix A) to resolve the congestion issues afflicting Leeds stations, and with these measures implemented, it appears to be feasible to double service frequencies on all radial routes around Leeds. These routes would of course include the Leeds-Wakefield Westgate-Doncaster and Leeds-Wakefield Westgate-Sheffield routes, both serving a reopened Hemsworth station.

6.3. Journey Times from Hemsworth

Journey times from Hemsworth have been calculated on these local routes to the 4 principal network hubs at Doncaster, Leeds, Sheffield and Wakefield, as follows:

| Journey | Journey Time |
|------------------------------|----------------|
| Hemsworth - Doncaster | 17 mins |
| Hemsworth - Leeds | 27 mins |
| Hemsworth - Sheffield | 36 mins |
| Hemsworth - Wakefield | 13 mins |

Table 18 : Journey Times from Hemsworth to Neighbouring Network Hubs

In these calculations, it has been assumed that the route to Sheffield would be electrified to match the existing electrification on the route to Doncaster.

6.4. Connection to HSUK national high speed network at Doncaster, Leeds, Sheffield and Wakefield

The improved local services along the Leeds-Wakefield-Doncaster/Sheffield routes would form Hemsworth's links to HSUK's national high speed network. Leeds, Doncaster and Sheffield Victoria¹² would be primary hubs of the network, all enjoying greatly improved long distance services and step-change journey time reductions. Wakefield Westgate would also be served by HSUK, and would also constitute a valuable interchange point.

The essential rationale of this study is that frequent local services from a new Hemsworth station to the primary rail hubs of West and South Yorkshire would offer far greater improvements in both local and national connectivity than an HS2 parkway station located at Hemsworth possibly could. This is demonstrated conclusively in the following sections.

6.5. Journey Times via HSUK from new main line station at Hemsworth

As noted in Table 6, with local services from Fitzwilliam connecting to HSUK at Doncaster, Leeds, Sheffield and Wakefield, 25% average journey time savings would be achieved for Hemsworth.

With a new Hemsworth main line station, served by trains running at improved frequency and connected to the HSUK national high speed network at Doncaster, Leeds, Sheffield and Wakefield, the average journey time reduction offered by HSUK would rise to 36%.

The journey times that HSUK will offer, with a new Hemsworth main line station in place and served by frequent local services, are listed in Table 19. Comparisons with the HS2 service offer for Hemsworth are shown in Tables 22 and 23 in Section 7.

Table 19 lists both 'raw' and 'adjusted' journey times. The 'raw' journey time is the total 'start to stop' timing, including the time taken for intermediate changes. The 'adjusted' journey time includes a 20 minute allowance for every change of trains, which must take place at the nearby hubs (Doncaster, Leeds, Sheffield and Wakefield). However, for all journeys to the other 29 centres included in HSUK's 32-centre network, no further changes of trains will be required.

This is a testament to the comprehensive coverage of HSUK's transformed national network, in which over 70% of the possible 496 connections between 32 key centres are served by direct trains (as opposed to around 35% at present). Principal network hubs such as Leeds and Sheffield will enjoy direct services to every other city and airport included in HSUK's 32-centre network. Such an enhanced network will offer dramatic journey time improvements¹³ (vastly reduced, by an average of 46% across the 32-centre network) and will also support frequent services operating at hourly or better.

¹² Access to Sheffield Victoria will be achieved by new interchange platforms located on the existing route from Fitzwilliam/Hemsworth to Sheffield Midland. See Figure B1 in Appendix B.

¹³ HSUK's performance in reducing intercity journey times across the national network is described in *HS2 – High Speed to Nowhere*.

| From Hemsworth by HSUK to... | | Number of changes | Change at | Raw Journey Time* | Adjusted Journey Time# | Type of Journey |
|-------------------------------------|----------------|-------------------------|-----------|-------------------------|------------------------------|--|
| Northern Powerhouse Cities | Bradford | 1 | Leeds | 59 | 79 | Existing Network Journey |
| | Chester | 1 | Leeds | 94 | 114 | Change from local service to HSUK Journey |
| | Crewe | 1 | Leeds | 113 | 133 | |
| | Doncaster | 0 | Direct | 17 | 17 | Improved Local Journey |
| | Huddersfield | 1 | Leeds | 39 | 59 | Existing Network Journey |
| | Hull | 1 | Leeds | 88 | 108 | Change to HSUK Journey |
| | Leeds | 0 | Direct | 27 | 27 | Improved Local Journey |
| | Liverpool | 1 | Leeds | 86 | 106 | Change from local service to HSUK Journey |
| | Manchester | 1 | Leeds | 65 | 85 | |
| | Manchester Apt | 1 | Leeds | 77 | 97 | |
| | Preston | 1 | Leeds | 110 | 130 | Change from local service to HSUK Journey |
| | Sheffield | 0 | Direct | 36 | 36 | |
| | Stockport | 1 | Leeds | 68 | 88 | |
| | Warrington | 1 | Leeds | 78 | 98 | Change from local service to HSUK Journey |
| | York | 1 | Leeds | 53 | 73 | |
| Midlands Engine Cities | Birmingham | 1 | Sheffield | 103 | 123 | Change from local service to HSUK Journey |
| | Birmingham Apt | 1 | Sheffield | 111 | 131 | |
| | Coventry | 1 | Sheffield | 102 | 122 | |
| | Derby | 1 | Sheffield | 79 | 99 | |
| | Leicester | 1 | Sheffield | 63 | 83 | |
| | Northampton | 1 | Sheffield | 102 | 122 | |
| | Nottingham | 1 | Sheffield | 77 | 97 | |
| | Stoke | 1 | Leeds | 103 | 123 | |
| | Walsall | 1 | Sheffield | 102 | 122 | |
| | Wolverhampton | 1 | Sheffield | 122 | 142 | |
| Southern Cities | Cheltenham | 1 | Sheffield | 143 | 163 | Change from local service to HSUK Journey |
| | Heathrow Apt | 1 | Sheffield | 135 | 155 | |
| | London | 1 | Sheffield | 102 | 122 | |
| | Luton | 1 | Sheffield | 112 | 132 | |
| | Milton Keynes | 1 | Sheffield | 115 | 135 | |
| | Oxford | 1 | Sheffield | 144 | 164 | |
| | Peterborough | 1 | Doncaster | 85 | 105 | |
| Average HSUK Journey Time Reduction | | | | | | 36% |

Table 19 : HSUK Journey Times from Hemsworth

(All journeys from new Hemsworth Main Line Station)

* Raw Journey Time = Actual start to stop journey time, with no allowance for changes or service frequency

Adjust Journey Time = Raw Journey Time plus no allowance for changes or service frequency

6.6. Effective Half-Hourly Service Frequency offered on Key HSUK Routes

On all the routes offered by HS2 from Hemsworth Parkway (i.e. to Leeds, Sheffield, York, Birmingham, Birmingham Airport, Coventry, Derby, Leicester, Northampton, Nottingham, Wolverhampton, Heathrow, London, Milton Keynes and Oxford), HSUK offers much superior frequency.

| | Train service frequency (trains per hour) | |
|--------------------|---|---|
| | HS2 from Hemsworth Parkway (assumed 2-hourly frequency) | HSUK from Doncaster (DN), Leeds (LS) & Sheffield (SH) |
| Leeds | 0.5 | 4 (Hemsworth – LS) |
| Sheffield | 0.5 | 2 (Hemsworth – SH) |
| York | 0.5 | 6 (LS) |
| Birmingham | 0.5 | 3 (SH) |
| Birmingham Airport | 0.5 | 1 (SH) |
| Coventry | 0.5 | 1 (SH) |
| Derby | 0.5 | 5 (SH) |
| Leicester | 0.5 | 7 (SH), 2 (DN) |
| Northampton | 0.5 | 2 (SH), 2 (DN) |
| Nottingham | 0.5 | 3 (SH) |
| Wolverhampton | 0.5 | 1 (SH) |
| Heathrow Airport | 0.5 | 1 (SH) |
| London | 0.5 | 6 (SH), 4 (DN) |
| Milton Keynes | 0.5 | 2 (SH) |
| Oxford | 0.5 | 2 (SH) |
| Average | 0.5 | 3.6 |

Table 20 : Service Frequencies offered by HS2 and HSUK

On the basis of the information set out in Table 20, it seems fair to characterise the HSUK service offer (for the centres potentially served by HS2 from Hemsworth Parkway) as an average of at least 2 trains per hour. This supports the imposition of a 45 minute ‘frequency compensation factor’ (see Item 2.3) to HS2’s anticipated journey times from Hemsworth Parkway.

6.7. HSUK Benefits for Barnsley??

Barnsley is located clear of the UK’s primary intercity routes, and this would remain the case even with HSUK’s proposed transformation of the UK rail network. Barnsley’s primary connection to HSUK high speed intercity services will be at Sheffield Victoria, via new interchange platforms constructed on the approaches to Sheffield Midland (see Figure B1, Appendix B). However, the restoration of certain abandoned routes necessary to establish HSUK’s enhanced network will enable substantial improvement of Barnsley’s local links to key centres of the Northern Powerhouse:

- Restoration of the Spen Valley route through Cleckheaton – essential to allow direct HSUK services from London and Birmingham via Sheffield to Bradford – also enables a new local service linking Barnsley to Bradford.

- Restoration of the transpennine Woodhead route – essential to create a new railfreight route linking the major cities of the Northern Powerhouse – also enables a new local service linking Barnsley via Penistone to Manchester.

Together, enhanced local services and improved HSUK intercity links from Sheffield will deliver average journey time reductions of 33% for Barnsley.

Comparisons with HS2's service offer for Barnsley are shown in Tables 25 and 26 in Section 7.

6.8. HSUK Benefits for Doncaster??

Doncaster is currently a primary hub of the UK intercity rail network. It is at the hub of a local rail network extending to Sheffield, Leeds, York, Hull, Cleethorpes and Lincoln, and it enjoys direct links to 6 UK primary cities i.e. Birmingham, Edinburgh, Leeds, Manchester, Newcastle and Sheffield, and many other major UK cities.

With full implementation of the HSUK proposals, Doncaster's connectivity will be greatly enhanced. Direct high speed services will link Doncaster to all 12 primary UK cities i.e. Birmingham, Bristol, Cardiff, Edinburgh, Glasgow, Leeds, Liverpool, Manchester, Newcastle, Nottingham and Sheffield.

Overall, HSUK will offer average journey time reductions of 37% for Doncaster. This contrasts starkly with HS2's pitiful offering of 1% average journey time reductions, and provides the clearest possible indication of the imperative need for major rail hubs such as Doncaster to be directly served by HS2.

Comparisons with HSUK's service offer for Doncaster are shown in Tables 27 and 28 in Section 7.

6.9. HSUK Benefits for Rotherham??

Rotherham's primary connection to HSUK high speed intercity services will be at Sheffield Victoria, via new interchange platforms constructed on the approaches to Sheffield Midland (see Figure B1, Appendix B). Local services, operating at a frequency of 3 trains per hour, would enable passengers from Rotherham to access HSUK's high speed services which will run from Sheffield Victoria to all principal UK cities, including all the other 31 cities and airports considered in HSUK's 32-centre network. Overall, Rotherham will enjoy 33% average journey time reductions.

Comparisons with HS2's service offer for Rotherham are shown in Table 29 in Section 7.

6.10. HSUK Benefits for Sheffield??

HSUK's proposals for Sheffield are unambiguously aimed at providing South Yorkshire's principal city with the comprehensive intercity links and the hugely enhanced capacity and connectivity befitting its status as one of the UK's 12 primary cities. This is achieved with a new station on the site of the abandoned Sheffield Victoria station, and with interchange platforms on the approaches to the existing Sheffield Midland station.

HSUK will offer direct high speed links to all the other cities and airports considered in the 32-centre network described in Item 2.1. Overall, Sheffield will enjoy an average journey time reduction of 53% (i.e. journey times more than halved).

Comparisons with HS2's service offer for Sheffield are shown in Tables 30 and 31 in Section 7.

7. Tabulation of Results

7.1. Comparison of Local Links to Hemsworth with HSUK and HS2 in place

Table 20 below sets out High Speed UK's vastly improved local service offer for Hemsworth's links to neighbouring rail network hubs at Doncaster, Leeds, Sheffield and Wakefield. This would involve a new station at Hemsworth, and existing service frequencies doubled on both Leeds-Wakefield Westgate-Doncaster and Leeds-Wakefield Westgate-Sheffield routes.

In the absence of any definitive proposals, the HS2 service offer is taken to be as existing, with no improvement in service frequencies, no new main line station at Hemsworth and rail network access instead at Fitzwilliam station. Although the Government has held out some hope¹⁴ of increased service frequencies on the Leeds-Wakefield-Doncaster/Sheffield corridor, the best possibility would be an extra train per hour between Leeds and Doncaster; the intention to run Northern Powerhouse Rail services along the existing route to Sheffield via Thurnscoe precludes any possibility of extra services on this route.

No account has so far been taken of the possibility of Northern Powerhouse Rail services between Leeds and Sheffield calling at Hemsworth Parkway. Whilst these would offer faster journeys to Leeds and Sheffield, they would fail to serve Doncaster, Wakefield or any other intermediate destination along the Leeds-Wakefield-Doncaster/Sheffield corridor.

| Rail Journeys to Hemsworth from | | Trains per hour | Journey Time to Fitzwilliam | Hemsworth-Fitzwilliam transfer | Journey Time to Hemsworth |
|---|----|-----------------|-----------------------------|--------------------------------|---------------------------|
| Doncaster | £ | 2 | n/a | n/a | 17 mins |
| | \$ | 1 | 19 | 10 | 29 mins |
| Leeds | £ | 4 | n/a | n/a | 27 mins |
| | \$ | 2 | 23 | 10 | 33 mins |
| Sheffield | £ | 2 | n/a | n/a | 36 mins |
| | \$ | 1 | 45 | 10 | 55 mins |
| Wakefield | £ | 4 | n/a | n/a | 13 mins |
| | \$ | 2 | 10 | 10 | 20 mins |
| £ = Local enhancements made possible by HSUK intervention | | | | | |
| \$ = Unchanged local service with HS2 in place | | | | | |

Table 21 : Comparison of Journeys to Hemsworth with HSUK and HS2 in place

¹⁴ Letter from HS2 Minister Paul Maynard MP to the Crofton community dated 17th October 2017

7.2. Comparison of National Links from Doncaster, Leeds, Sheffield and Wakefield with HSUK and HS2 in place

Table 21 sets out the step-change differences in the connectivity offered by HSUK and HS2 from Hemsworth's neighbouring rail network hubs at Doncaster, Leeds, Sheffield and Wakefield. It is clear that whilst small improvements might be achieved by Northern Powerhouse Rail in improved journey times from Hemsworth to Sheffield or Leeds, these can do little to mitigate the dire onward intercity connectivity offered by HS2 for any of the principal rail hubs along the Leeds-Wakefield-Doncaster/Sheffield corridor.

In all cases of journeys from Hemsworth routed via its neighbouring rail network hubs, HSUK offers vastly superior connectivity and journey time reduction.

| HSUK and HS2 network connections from | | Connecting service from Hemsworth / Fitzwilliam (trains per hour) | Effect of HSUK/HS2 intervention | | | |
|--|----|--|---|---|--|--|
| | | | Average Journey Time Reduction | Cities Directly linked (out of 31) | Journeys made faster (out of 31) | Journeys made worse ¹⁵ (out of 31) |
| Doncaster | £ | 2 | 37% | 16 | 25 | 0 |
| | \$ | 1 | No HS2 services to Doncaster | | | 16 |
| Leeds | £ | 4 | 50% | 30 | 26 | 0 |
| | \$ | 2 | 20% | 4 | 12 | 5 |
| Sheffield | £ | 2 | 53% | 31 | 30 | 0 |
| | \$ | 1 | 8% | 3 | 5 | 11 |
| Wakefield | £ | 4 | 40% | 17 | 28 | 0 |
| | \$ | 2 | No HS2 services to Wakefield | | | 10 |
| £ = Local and national enhancements made possible by HSUK intervention | | | | | | |
| \$ = Unchanged local service with HS2 in place, plus gains and losses in national connectivity resulting from HS2 intervention | | | | | | |

Table 22: National Intercity Connectivity available at Neighbouring Network Hubs

¹⁵ A journey made worse is defined in *HS2 – High Speed to Nowhere* as an existing intercity connection that is made less frequent, slower (by the addition of 2 or more extra stops) or requiring extra changes of train through the intervention of HS2. Data on predicted intercity service reductions is given in Table 23, pp91-92, *HS2 Regional Economic Impacts*, HS2 Ltd, September 2013.

7.3. Comparison of HSUK and HS2 high speed links to Hemsworth

Table 23 compares the journey times that HSUK and HS2 can offer for Hemsworth.

The HSUK journey times are measured from a new main line station at Hemsworth, and all journeys require just a single change of trains to HSUK's national intercity services at either Doncaster, Leeds or Sheffield, to reach any other principal UK city. The necessary addition of 20 minutes (resulting in an 'adjusted' journey time) has been made in respect of this single change of trains.

Where an HS2 service might exist, journey times are measured from a new Hemsworth Parkway station; in the absence of such a service, journey times are measured from the existing Fitzwilliam station, with due allowance for the necessary transfer to Hemsworth. In all cases, the necessary allowance is made, both for any other changes required and also for HS2 services operating from Hemsworth Parkway at the assumed 2-hourly frequency.

The comparisons between the 'adjusted' journey times offered by HSUK and HS2 show HSUK significantly outperforming HS2 on all but some of HS2's direct journeys from Hemsworth Parkway. This superiority is demonstrated not only in HSUK offering 36% average journey time savings across the network, while HS2 offers 18%, but also in HSUK's much wider range of improved journeys. This accords far better with national priorities for a balanced transport system in which all journeys see similar improvements. It is this balanced interregional connectivity that will bring about the necessary improvement in the economies of the UK regions – not superfast journeys just focussed on London, Birmingham and Heathrow.

Table 24 compares the journey times that HSUK and HS2 can offer for Hemsworth, with hourly service frequencies assumed on all HS2 routes from Hemsworth Parkway. This presumes that the political requirement for provision of tenuous and probably uneconomic HS2 connections to South Yorkshire communities will have triumphed over common railway operating logic and the deterrent of 5 minutes added to all HS2 journeys to Leeds and the North-East.

Although the assumption of hourly HS2 services to Hemsworth Parkway shows a significant improvement in achieved journey time reductions (31%), this is still less than the 36% figure offered by HSUK, and it is only achieved along HS2's highly selective routes. This can only reinforce the divisions between those cities favoured by HS2, and those left bypassed.

| | From Hemsworth by HSUK to... | | Raw Journey Time* | Adjust Journey Time# | HSUK winner HS2 winner | Adjust Journey Time# | Raw Journey Time* | From Hemsworth by HS2 to... | |
|----------------------------|---------------------------------|--------------------------------|-------------------------|----------------------------|---------------------------------|----------------------------|-------------------------|--------------------------------|----------------|
| Northern Powerhouse Cities | Bradford | 1 | 59 | 79 | | 95 | 75 | 1 | Bradford |
| | Chester | 1 | 94 | 114 | | 234 | 214 | 1 | Chester |
| | Crewe | 1 | 113 | 133 | | 196 | 176 | 1 | Crewe |
| | Doncaster | 0 | 17 | 17 | | 29 | 29 | 0 | Doncaster |
| | Huddersfield | 1 | 39 | 59 | | 95 | 75 | 1 | Huddersfield |
| | Hull | 1 | 88 | 108 | | 131 | 111 | 1 | Hull |
| | Leeds | 0 | 27 | 27 | | 56 | 11 | 0 | Leeds |
| | Liverpool | 1 | 86 | 106 | | 162 | 142 | 1 | Liverpool |
| | Manchester | 1 | 65 | 85 | | 127 | 107 | 1 | Manchester |
| | Manchester Apt | 1 | 77 | 97 | | 145 | 125 | 1 | Manchester Apt |
| | Preston | 1 | 110 | 130 | | 180 | 160 | 1 | Preston |
| | Sheffield | 0 | 36 | 36 | | 62 | 17 | 0 | Sheffield |
| | Stockport | 1 | 68 | 88 | | 142 | 122 | 1 | Stockport |
| | Warrington | 1 | 78 | 98 | | 158 | 138 | 1 | Warrington |
| | York | 1 | 53 | 73 | | 64 | 19 | 0 | York |
| Midlands Engine Cities | Birmingham | 1 | 103 | 123 | | 88 | 43 | 0 | Birmingham |
| | Birmingham Apt | 1 | 111 | 131 | | 101 | 56 | 0 | Birmingham Apt |
| | Coventry | 1 | 102 | 122 | | 139 | 64 | 1 | Coventry |
| | Derby | 1 | 79 | 99 | | 122 | 57 | 1 | Derby |
| | Leicester | 1 | 63 | 83 | | 125 | 60 | 1 | Leicester |
| | Northampton | 1 | 102 | 122 | | 185 | 110 | 1 | Northampton |
| | Nottingham | 1 | 77 | 97 | | 109 | 44 | 1 | Nottingham |
| | Stoke | 1 | 103 | 123 | | 200 | 160 | 2 | Stoke |
| | Walsall | 1 | 102 | 122 | | 231 | 191 | 2 | Walsall |
| | Wolverhampton | 1 | 122 | 142 | | 176 | 101 | 1 | Wolverhampton |
| Southern Cities | Cheltenham | 1 | 143 | 163 | | 225 | 205 | 1 | Cheltenham |
| | Heathrow Apt | 1 | 135 | 155 | | 161 | 96 | 1 | Heathrow Apt |
| | London | 1 | 102 | 122 | | 118 | 73 | 0 | London |
| | Luton | 1 | 112 | 132 | | 251 | 211 | 2 | Luton |
| | Milton Keynes | 1 | 115 | 135 | | 193 | 118 | 1 | Milton Keynes |
| | Oxford | 1 | 144 | 164 | | 213 | 138 | 1 | Oxford |
| | Peterborough | 1 | 85 | 105 | | 161 | 141 | 1 | Peterborough |
| | 36% | Average Journey Time Reduction | | | | | | 18% | |

Table 23 : Summary of HSUK and HS2 Services and Journey Times from Hemsworth
(2-hourly HS2 services from Hemsworth Parkway assumed)

Explanation of symbols:

- London** Direct HS2 services from Hemsworth Parkway
- Leeds** Direct local service from new Hemsworth main line station
- Oxford** Local journey from Hemsworth (main line) connecting to HSUK
- Oxford** HS2 journey from Hemsworth Parkway with onward connection
- Bradford** Journey via existing network

| | From Hemsworth by HSUK to... | | Raw Journey Time* | Adjust Journey Time# | HSUK winner HS2 winner | Adjust Journey Time# | Raw Journey Time* | From Hemsworth by HS2 to... | |
|----------------------------|---------------------------------|--------------------------------|-------------------------|----------------------------|---------------------------------|----------------------------|-------------------------|--------------------------------|----------------|
| Northern Powerhouse Cities | Bradford | 1 | 59 | 79 | | 95 | 75 | 1 | Bradford |
| | Chester | 1 | 94 | 114 | | 234 | 214 | 1 | Chester |
| | Crewe | 1 | 113 | 133 | | 196 | 176 | 1 | Crewe |
| | Doncaster | 0 | 17 | 17 | | 29 | 29 | 0 | Doncaster |
| | Huddersfield | 1 | 39 | 59 | | 95 | 75 | 1 | Huddersfield |
| | Hull | 1 | 88 | 108 | | 131 | 111 | 1 | Hull |
| | Leeds | 0 | 27 | 27 | | 26 | 11 | 0 | Leeds |
| | Liverpool | 1 | 86 | 106 | | 162 | 142 | 1 | Liverpool |
| | Manchester | 1 | 65 | 85 | | 127 | 107 | 1 | Manchester |
| | Manchester Apt | 1 | 77 | 97 | | 145 | 125 | 1 | Manchester Apt |
| | Preston | 1 | 110 | 130 | | 180 | 160 | 1 | Preston |
| | Sheffield | 0 | 36 | 36 | | 32 | 17 | 0 | Sheffield |
| | Stockport | 1 | 68 | 88 | | 142 | 122 | 1 | Stockport |
| | Warrington | 1 | 78 | 98 | | 158 | 138 | 1 | Warrington |
| | York | 1 | 53 | 73 | | 34 | 19 | 0 | York |
| Midlands Engine Cities | Birmingham | 1 | 103 | 123 | | 58 | 43 | 0 | Birmingham |
| | Birmingham Apt | 1 | 111 | 131 | | 71 | 56 | 0 | Birmingham Apt |
| | Coventry | 1 | 102 | 122 | | 109 | 64 | 1 | Coventry |
| | Derby | 1 | 79 | 99 | | 92 | 57 | 1 | Derby |
| | Leicester | 1 | 63 | 83 | | 95 | 60 | 1 | Leicester |
| | Northampton | 1 | 102 | 122 | | 155 | 110 | 1 | Northampton |
| | Nottingham | 1 | 77 | 97 | | 79 | 44 | 1 | Nottingham |
| | Stoke | 1 | 103 | 123 | | 200 | 160 | 2 | Stoke |
| | Walsall | 1 | 102 | 122 | | 231 | 191 | 2 | Walsall |
| | Wolverhampton | 1 | 122 | 142 | | 146 | 101 | 1 | Wolverhampton |
| Southern Cities | Cheltenham | 1 | 143 | 163 | | 225 | 205 | 1 | Cheltenham |
| | Heathrow Apt | 1 | 135 | 155 | | 131 | 96 | 1 | Heathrow Apt |
| | London | 1 | 102 | 122 | | 88 | 73 | 0 | London |
| | Luton | 1 | 112 | 132 | | 251 | 211 | 2 | Luton |
| | Milton Keynes | 1 | 115 | 135 | | 163 | 118 | 1 | Milton Keynes |
| | Oxford | 1 | 144 | 164 | | 183 | 138 | 1 | Oxford |
| | Peterborough | 1 | 85 | 105 | | 161 | 141 | 1 | Peterborough |
| | 36% | Average Journey Time Reduction | | | | | | 31% | |

Table 24 : Summary of HSUK and HS2 Services and Journey Times from Hemsworth
(hourly HS2 services from Hemsworth Parkway assumed)

Explanation of symbols:

- London** Direct HS2 services from Hemsworth Parkway
- Leeds** Direct local service from new Hemsworth main line station
- Oxford** Local journey from Hemsworth (main line) connecting to HSUK
- Oxford** HS2 journey from Hemsworth Parkway with onward connection
- Bradford** Journey via existing network

7.4. Comparison of HSUK and HS2 high speed links to Barnsley

Table 25 compares the journey times that HSUK and HS2 can offer for Barnsley.

The HSUK journey times are measured from the existing Barnsley station, and all journeys involve a single change of trains to HSUK's national network at either Leeds, Sheffield or Manchester (the latter enabled by a new semi-fast service along the reopened Woodhead route). The necessary addition of 20 minutes (resulting in an 'adjusted' journey time) has been made in respect of this single change of trains.

Where an HS2 service might exist, journey times are measured from the existing Barnsley station, with due allowance for the extra road journey time to reach Hemsworth Parkway. In the absence of such a service, journey times are measured from the existing Barnsley station to either Sheffield or Leeds, where connection would be made to either existing intercity or HS2 services. In all cases, the necessary allowance is made, both for any other changes required and also for HS2 services operating from Hemsworth Parkway at the assumed 2-hourly frequency.

The comparisons between the 'adjusted' journey times offered by HSUK and HS2 show HSUK significantly outperforming HS2 on all journeys from Barnsley via Leeds or Sheffield, and on all but 2 HS2 journeys via Hemsworth Parkway. This superiority is demonstrated not only in HSUK offering 33% average journey time savings across the network, while HS2 offers 6%, but also in HSUK's much wider range of improved journeys, in particular new direct journeys to both Manchester and Bradford.

All this accords far better with national priorities for a balanced transport system in which all journeys see similar improvements. It is this balanced interregional connectivity that will bring about the necessary improvement in the economies of the UK regions – not superfast journeys just focussed on London, Birmingham and Heathrow.

Table 26 compares the journey times that HSUK and HS2 can offer for Barnsley, with hourly service frequencies assumed on all HS2 routes from Hemsworth Parkway. This presumes that the political requirement for provision of tenuous and probably uneconomic HS2 connections to South Yorkshire communities will have triumphed over common railway operating logic and the deterrent of 5 minutes added to all HS2 journeys to Leeds and the North-East.

Although the assumption of hourly HS2 services to Hemsworth Parkway shows a significant improvement in achieved journey time reductions for Barnsley (12%), this is still less than the 33% figure offered by HSUK, and it is only achieved along HS2's highly selective routes. This can only reinforce the divisions between those cities favoured by HS2, and those left bypassed.

| | From Barnsley by HSUK to... | | Raw Journey Time* | Adjust Journey Time# | HSUK winner HS2 winner | Adjust Journey Time# | Raw Journey Time* | From Barnsley by HS2 to... | |
|----------------------------|--------------------------------|--------------------------------|-------------------------|----------------------------|---------------------------------|----------------------------|-------------------------|-------------------------------|----------------|
| | | | | | | | | | |
| Northern Powerhouse Cities | Bradford | 0 | 37 | 37 | | 92 | 72 | 1 | Bradford |
| | Chester | 1 | 105 | 125 | | 215 | 175 | 2 | Chester |
| | Crewe | 1 | 106 | 126 | | 147 | 107 | 2 | Crewe |
| | Doncaster | 1 | 51 | 71 | | 71 | 51 | 1 | Doncaster |
| | Huddersfield | 0 | 53 | 53 | | 53 | 53 | 0 | Huddersfield |
| | Hull | 1 | 113 | 133 | | 133 | 113 | 1 | Hull |
| | Leeds | 0 | 36 | 36 | | 36 | 36 | 0 | Leeds |
| | Liverpool | 1 | 81 | 101 | | 147 | 127 | 1 | Liverpool |
| | Manchester | 0 | 40 | 40 | | 103 | 83 | 1 | Manchester |
| | Manchester Apt | 1 | 72 | 92 | | 127 | 107 | 1 | Manchester Apt |
| | Preston | 1 | 92 | 110 | | 177 | 157 | 1 | Preston |
| | Sheffield | 0 | 22 | 22 | | 22 | 22 | 0 | Sheffield |
| | Stockport | 1 | 63 | 83 | | 92 | 72 | 1 | Stockport |
| | Warrington | 1 | 89 | 109 | | 136 | 116 | 1 | Warrington |
| | York | 1 | 71 | 91 | | 88 | 43 | 0 | York |
| Midlands Engine Cities | Birmingham | 1 | 82 | 102 | | 103 | 83 | 1 | Birmingham |
| | Birmingham Apt | 1 | 90 | 110 | | 125 | 60 | 0 | Birmingham Apt |
| | Coventry | 1 | 81 | 101 | | 163 | 68 | 1 | Coventry |
| | Derby | 1 | 58 | 78 | | 86 | 66 | 1 | Derby |
| | Leicester | 1 | 60 | 80 | | 118 | 98 | 1 | Leicester |
| | Northampton | 1 | 80 | 100 | | 209 | 114 | 1 | Northampton |
| | Nottingham | 1 | 58 | 78 | | 80 | 80 | 0 | Nottingham |
| | Stoke | 1 | 91 | 111 | | 163 | 123 | 2 | Stoke |
| | Walsall | 1 | 80 | 100 | | 185 | 145 | 2 | Walsall |
| | Wolverhampton | 1 | 113 | 133 | | 185 | 145 | 2 | Wolverhampton |
| Southern Cities | Cheltenham | 1 | 122 | 142 | | 184 | 164 | 1 | Cheltenham |
| | Heathrow Apt | 1 | 114 | 134 | | 183 | 143 | 2 | Heathrow Apt |
| | London | 1 | 92 | 113 | | 140 | 120 | 1 | London |
| | Luton | 1 | 117 | 137 | | 251 | 211 | 2 | Luton |
| | Milton Keynes | 1 | 94 | 114 | | 217 | 122 | 1 | Milton Keynes |
| | Oxford | 1 | 123 | 143 | | 200 | 180 | 1 | Oxford |
| | Peterborough | 1 | 98 | 118 | | 164 | 142 | 1 | Peterborough |
| | 33% | Average Journey Time Reduction | | | | | | 6% | |

Table 25 : Summary of HSUK and HS2 Services and Journey Times from Barnsley
(2-hourly HS2 services from Hemsworth Parkway assumed)

Explanation of symbols:

- Leeds** Direct local service from Barnsley
- Oxford** Local journey from Barnsley connecting to HSUK
- Heathrow Apt** HS2 service from Hemsworth Parkway
- Oxford** Local journey from Barnsley connecting to HS2
- Bradford** Journey via existing network

| | From Barnsley by HSUK to... | | Raw Journey Time* | Adjust Journey Time# | HSUK winner HS2 winner | Adjust Journey Time# | Raw Journey Time* | From Barnsley by HS2 to... | |
|----------------------------|--------------------------------|--------------------------------|-------------------------|----------------------------|---------------------------------|----------------------------|-------------------------|-------------------------------|----------------|
| | | | | | | | | | |
| Northern Powerhouse Cities | Bradford | 0 | 37 | 37 | | 92 | 72 | 1 | Bradford |
| | Chester | 1 | 105 | 125 | | 215 | 175 | 2 | Chester |
| | Crewe | 1 | 106 | 126 | | 147 | 107 | 2 | Crewe |
| | Doncaster | 1 | 51 | 71 | | 71 | 51 | 1 | Doncaster |
| | Huddersfield | 0 | 53 | 53 | | 53 | 53 | 0 | Huddersfield |
| | Hull | 1 | 113 | 133 | | 133 | 113 | 1 | Hull |
| | Leeds | 0 | 36 | 36 | | 36 | 36 | 0 | Leeds |
| | Liverpool | 1 | 81 | 101 | | 147 | 127 | 1 | Liverpool |
| | Manchester | 0 | 40 | 40 | | 103 | 83 | 1 | Manchester |
| | Manchester Apt | 1 | 72 | 92 | | 127 | 107 | 1 | Manchester Apt |
| | Preston | 1 | 92 | 110 | | 177 | 157 | 1 | Preston |
| | Sheffield | 0 | 22 | 22 | | 22 | 22 | 0 | Sheffield |
| | Stockport | 1 | 63 | 83 | | 92 | 72 | 1 | Stockport |
| | Warrington | 1 | 89 | 109 | | 136 | 116 | 1 | Warrington |
| | York | 1 | 71 | 91 | | 58 | 43 | 0 | York |
| Midlands Engine Cities | Birmingham | 1 | 82 | 102 | | 82 | 67 | 1 | Birmingham |
| | Birmingham Apt | 1 | 90 | 110 | | 95 | 60 | 0 | Birmingham Apt |
| | Coventry | 1 | 81 | 101 | | 133 | 68 | 1 | Coventry |
| | Derby | 1 | 58 | 78 | | 86 | 66 | 1 | Derby |
| | Leicester | 1 | 60 | 80 | | 118 | 98 | 1 | Leicester |
| | Northampton | 1 | 80 | 100 | | 179 | 114 | 1 | Northampton |
| | Nottingham | 1 | 58 | 78 | | 80 | 80 | 0 | Nottingham |
| | Stoke | 1 | 91 | 111 | | 163 | 123 | 2 | Stoke |
| | Walsall | 1 | 80 | 100 | | 185 | 145 | 2 | Walsall |
| | Wolverhampton | 1 | 113 | 133 | | 170 | 145 | 2 | Wolverhampton |
| Southern Cities | Cheltenham | 1 | 122 | 142 | | 184 | 164 | 1 | Cheltenham |
| | Heathrow Apt | 1 | 114 | 134 | | 155 | 143 | 2 | Heathrow Apt |
| | London | 1 | 92 | 113 | | 112 | 120 | 1 | London |
| | Luton | 1 | 117 | 137 | | 251 | 211 | 2 | Luton |
| | Milton Keynes | 1 | 94 | 114 | | 187 | 122 | 1 | Milton Keynes |
| | Oxford | 1 | 123 | 143 | | 200 | 180 | 1 | Oxford |
| | Peterborough | 1 | 98 | 118 | | 164 | 144 | 1 | Peterborough |
| | 33% | Average Journey Time Reduction | | | | | | 13% | |

Table 26 : Summary of HSUK and HS2 Services and Journey Times from Barnsley
(hourly HS2 services from Hemsworth Parkway assumed)

Explanation of symbols: **Manchester** Direct local service from Barnsley
Oxford Local journey from Barnsley connecting to HSUK
Heathrow Apt HS2 service from Hemsworth Parkway
Oxford Local journey from Barnsley connecting to HS2
Bradford Journey via existing network

7.5. Comparison of HSUK and HS2 high speed links to Doncaster

Table 27 compares the journey times that HSUK and HS2 can offer for Doncaster.

The HSUK journey times are taken direct from HSUK's national timetable in which Doncaster one of the 32 key network nodes. Under this timetable, Doncaster will be directly linked to all 12 UK primary cities (as opposed to only 6 at present). This will maintain and enhance Doncaster's status as a primary hub of the national intercity network, and it represents a significant enhancement of the intercity connectivity both of Doncaster and its large hinterland which extends to the East Coast.

With Doncaster completely bypassed by HS2, the town will remain reliant the existing network for its intercity connectivity. Where an HS2 service from Hemsworth Parkway might offer improved connections, journey times are measured from the existing Doncaster station, with due allowance for the extra road journey time to reach Hemsworth Parkway. In the absence of such a service, journey times are measured from the existing Doncaster station to either Sheffield or Leeds, where connection would be made to either existing intercity or HS2 services. In all cases, the necessary allowance is made, both for any other changes required and also for HS2 services operating from Hemsworth Parkway at the assumed 2-hourly frequency.

No allowance has been made in these comparisons for the huge damage that HS2 will inflict on Doncaster's intercity connectivity through its existing intercity services being a) reduced in frequency, and b) increased in journey time.

The comparisons between the 'adjusted' journey times offered by HSUK and HS2 show HSUK significantly outperforming HS2 on all journeys from Doncaster via Leeds or Sheffield, and on all HS2 journeys via Hemsworth Parkway. This total superiority is demonstrated not only in HSUK offering 37% average journey time savings across the network, while HS2 offers less than 1%. This accords far better with national priorities for a balanced transport system in which all journeys see similar improvements. It is this balanced interregional connectivity that will bring about the necessary improvement in the economies of the UK regions – not superfast journeys just focussed on London, Birmingham and Heathrow.

Table 28 compares the journey times that HSUK and HS2 can offer for Doncaster, with hourly service frequencies assumed on all HS2 routes from Hemsworth Parkway. This presumes that the political requirement for provision of tenuous and probably uneconomic HS2 connections to South Yorkshire communities will have triumphed over common railway operating logic and the deterrent of 5 minutes added to all HS2 journeys to Leeds and the North-East.

The assumption of hourly HS2 services to Hemsworth Parkway shows no major improvement in achieved journey time reductions for Doncaster, which will only rise to 4%, still far less than the 37% figure offered by HSUK.

| | From Doncaster by HSUK to... | | Raw Journey Time* | Adjust Journey Time# | HSUK winner HS2 winner | Adjust Journey Time# | Raw Journey Time* | From Doncaster by HS2 to... | |
|----------------------------|---------------------------------|---|--------------------------------|----------------------------|---------------------------------|----------------------------|-------------------------|--------------------------------|----------------|
| Northern Powerhouse Cities | Bradford | 1 | 71 | 91 | | 91 | 71 | 1 | Bradford |
| | Chester | 1 | 111 | 131 | | 191 | 171 | 1 | Chester |
| | Crewe | 1 | 91 | 111 | | 141 | 121 | 1 | Crewe |
| | Huddersfield | 1 | 55 | 75 | | 87 | 67 | 1 | Huddersfield |
| | Hull | 0 | 51 | 51 | | 51 | 51 | 0 | Hull |
| | Leeds | 0 | 30 | 30 | | 30 | 30 | 0 | Leeds |
| | Liverpool | 1 | 76 | 96 | | 160 | 140 | 1 | Liverpool |
| | Manchester | 1 | 52 | 72 | | 78 | 78 | 0 | Manchester |
| | Manchester Apt | 1 | 69 | 89 | | 100 | 100 | 0 | Manchester Apt |
| | Preston | 1 | 85 | 105 | | 161 | 141 | 1 | Preston |
| | Sheffield | 0 | 23 | 23 | | 23 | 23 | 0 | Sheffield |
| | Stockport | 0 | 63 | 63 | | 69 | 69 | 0 | Stockport |
| | Warrington | 0 | 92 | 92 | | 134 | 114 | 1 | Warrington |
| | York | 0 | 18 | 18 | | 21 | 21 | 0 | York |
| Midlands Engine Cities | Birmingham | 0 | 82 | 82 | | 98 | 98 | 0 | Birmingham |
| | Birmingham Apt | 1 | 64 | 84 | | 138 | 130 | 1 | Birmingham Apt |
| | Coventry | 1 | 55 | 75 | | 160 | 140 | 1 | Coventry |
| | Derby | 0 | 57 | 57 | | 57 | 57 | 0 | Derby |
| | Leicester | 0 | 26 | 26 | | 109 | 89 | 1 | Leicester |
| | Northampton | 1 | 49 | 69 | | 218 | 178 | 2 | Northampton |
| | Nottingham | 0 | 40 | 40 | | 108 | 88 | 1 | Nottingham |
| | Stoke | 1 | 101 | 121 | | 134 | 114 | 1 | Stoke |
| | Walsall | 1 | 73 | 93 | | 160 | 140 | 1 | Walsall |
| | Wolverhampton | 1 | 86 | 106 | | 152 | 132 | 1 | Wolverhampton |
| Southern Cities | Cheltenham | 0 | 122 | 122 | | 165 | 145 | 1 | Cheltenham |
| | Heathrow Apt | 1 | 100 | 120 | | 198 | 173 | 2 | Heathrow Apt |
| | London | 0 | 65 | 65 | | 98 | 98 | 0 | London |
| | Luton | 1 | 66 | 86 | | 197 | 157 | 2 | Luton |
| | Milton Keynes | 1 | 63 | 83 | | 214 | 174 | 2 | Milton Keynes |
| | Oxford | 1 | 92 | 112 | | 174 | 174 | 0 | Oxford |
| | Peterborough | 0 | 49 | 49 | | 49 | 49 | 0 | Peterborough |
| | 37% | | Average Journey Time Reduction | | | | | 1% | |

Table 27 : Summary of HSUK and HS2 Services and Journey Times from Doncaster
(2-hourly HS2 services from Hemsworth Parkway assumed)

Explanation of symbols:

- London** Direct HSUK service from Doncaster
- Oxford** HSUK journey from Doncaster requiring single change of trains
- Heathrow Apt** HS2 service from Hemsworth Parkway
- Oxford** Local journey from Doncaster connecting to HS2
- Bradford** Journey via existing network

| | From Doncaster by HSUK to... | | Raw Journey Time* | Adjust Journey Time# | HSUK winner HS2 winner | Adjust Journey Time# | Raw Journey Time* | From Doncaster by HS2 to... | |
|----------------------------|---------------------------------|---|--------------------------------|----------------------------|---------------------------------|----------------------------|-------------------------|--------------------------------|----------------|
| Northern Powerhouse Cities | Bradford | 1 | 71 | 91 | | 91 | 71 | 1 | Bradford |
| | Chester | 1 | 111 | 131 | | 191 | 171 | 1 | Chester |
| | Crewe | 1 | 91 | 111 | | 141 | 121 | 1 | Crewe |
| | Huddersfield | 1 | 55 | 75 | | 87 | 67 | 1 | Huddersfield |
| | Hull | 0 | 51 | 51 | | 51 | 51 | 0 | Hull |
| | Leeds | 0 | 30 | 30 | | 30 | 30 | 0 | Leeds |
| | Liverpool | 1 | 76 | 96 | | 160 | 140 | 1 | Liverpool |
| | Manchester | 1 | 52 | 72 | | 78 | 78 | 0 | Manchester |
| | Manchester Apt | 1 | 69 | 89 | | 100 | 100 | 0 | Manchester Apt |
| | Preston | 1 | 85 | 105 | | 161 | 141 | 1 | Preston |
| | Sheffield | 0 | 23 | 23 | | 23 | 23 | 0 | Sheffield |
| | Stockport | 0 | 63 | 63 | | 69 | 69 | 0 | Stockport |
| | Warrington | 0 | 92 | 92 | | 134 | 114 | 1 | Warrington |
| | York | 0 | 18 | 18 | | 21 | 21 | 0 | York |
| Midlands Engine Cities | Birmingham | 0 | 82 | 82 | | 87 | 87 | 0 | Birmingham |
| | Birmingham Apt | 1 | 64 | 84 | | 100 | 90 | 1 | Birmingham Apt |
| | Coventry | 1 | 55 | 75 | | 138 | 108 | 1 | Coventry |
| | Derby | 0 | 57 | 57 | | 57 | 57 | 0 | Derby |
| | Leicester | 0 | 26 | 26 | | 109 | 89 | 1 | Leicester |
| | Northampton | 1 | 49 | 69 | | 192 | 162 | 1 | Northampton |
| | Nottingham | 0 | 40 | 40 | | 108 | 88 | 1 | Nottingham |
| | Stoke | 1 | 101 | 121 | | 134 | 114 | 1 | Stoke |
| | Walsall | 1 | 73 | 93 | | 160 | 140 | 1 | Walsall |
| | Wolverhampton | 1 | 86 | 106 | | 152 | 132 | 1 | Wolverhampton |
| Southern Cities | Cheltenham | 0 | 122 | 122 | | 165 | 145 | 1 | Cheltenham |
| | Heathrow Apt | 1 | 100 | 120 | | 168 | 173 | 2 | Heathrow Apt |
| | London | 0 | 65 | 65 | | 98 | 98 | 0 | London |
| | Luton | 1 | 66 | 86 | | 197 | 157 | 2 | Luton |
| | Milton Keynes | 1 | 63 | 83 | | 200 | 174 | 2 | Milton Keynes |
| | Oxford | 1 | 92 | 112 | | 174 | 174 | 0 | Oxford |
| | Peterborough | 0 | 49 | 49 | | 49 | 49 | 0 | Peterborough |
| | 37% | | Average Journey Time Reduction | | | | | 4% | |

Table 28 : Summary of HSUK and HS2 Services and Journey Times from Doncaster
(hourly HS2 services from Hemsworth Parkway assumed)

Explanation of symbols:

- London** Direct HSUK service from Doncaster
- Oxford** HSUK journey from Doncaster requiring single change of trains
- Heathrow Apt** HS2 service from Hemsworth Parkway
- Oxford** Local journey from Doncaster connecting to HS2
- Bradford** Journey via existing network

7.6. Comparison of HSUK and HS2 high speed links to Rotherham

Table 29 compares the journey times that HSUK and HS2 can offer for Rotherham.

The HSUK journey times are measured from the existing Rotherham station, and all journeys involve a single change of trains to HSUK's national network at either Leeds, Sheffield or Doncaster. The necessary addition of 20 minutes (resulting in an 'adjusted' journey time) has been made to allow for this single change of trains.

Rotherham is considered to be too far to the south of Hemsworth, with road links also too poor, to allow any access to HS2 services at a new Hemsworth Parkway. In the absence of such services, journey times are measured from the existing Rotherham station to either Sheffield or Leeds, where connection would be made to either existing intercity or HS2 services (no connection to HS2 is possible at Doncaster). In all cases, the necessary allowance is made for the change at Sheffield and Leeds, and any other changes that might be required.

With no practicable connections to HS2 services from Hemsworth Parkway, no allowance has had to be made for HS2 services operating at greater than hourly frequency.

The comparisons between the 'adjusted' journey times offered by HSUK and HS2 show HSUK hugely outperforming HS2 on all journeys from Rotherham. This total superiority is demonstrated in HSUK offering 33% average journey time savings across the network, while HS2 offers only 3%.

| | From Rotherham by HSUK to... | | Raw Journey Time* | Adjust Journey Time# | HSUK winner HS2 winner | Adjust Journey Time# | Raw Journey Time* | From Rotherham by HS2 to... | |
|----------------------------|---------------------------------|---|--------------------------------|----------------------------|---------------------------------|----------------------------|-------------------------|--------------------------------|----------------|
| Northern Powerhouse Cities | Bradford | 0 | 54 | 74 | | 116 | 96 | 1 | Bradford |
| | Chester | 1 | 95 | 115 | | 199 | 139 | 3 | Chester |
| | Crewe | 1 | 112 | 132 | | 136 | 96 | 2 | Crewe |
| | Doncaster | 0 | 25 | 25 | | 25 | 25 | 0 | Doncaster |
| | Huddersfield | 1 | 54 | 74 | | 107 | 87 | 1 | Huddersfield |
| | Hull | 1 | 92 | 112 | | 112 | 92 | 1 | Hull |
| | Leeds | 0 | 56 | 56 | | 56 | 56 | 0 | Leeds |
| | Liverpool | 1 | 70 | 90 | | 180 | 160 | 1 | Liverpool |
| | Manchester | 0 | 50 | 70 | | 91 | 71 | 1 | Manchester |
| | Manchester Apt | 1 | 61 | 81 | | 116 | 96 | 1 | Manchester Apt |
| | Preston | 1 | 79 | 99 | | 165 | 125 | 2 | Preston |
| | Sheffield | 0 | 12 | 12 | | 12 | 12 | 0 | Sheffield |
| | Stockport | 1 | 53 | 73 | | 80 | 60 | 1 | Stockport |
| | Warrington | 1 | 79 | 99 | | 145 | 125 | 1 | Warrington |
| | York | 1 | 64 | 84 | | 93 | 73 | 1 | York |
| Midlands Engine Cities | Birmingham | 1 | 71 | 91 | | 95 | 75 | 1 | Birmingham |
| | Birmingham Apt | 1 | 79 | 99 | | 163 | 123 | 2 | Birmingham Apt |
| | Coventry | 1 | 70 | 90 | | 178 | 138 | 2 | Coventry |
| | Derby | 1 | 48 | 68 | | 73 | 53 | 1 | Derby |
| | Leicester | 1 | 50 | 70 | | 103 | 85 | 1 | Leicester |
| | Northampton | 1 | 70 | 90 | | 222 | 182 | 2 | Northampton |
| | Nottingham | 1 | 48 | 68 | | 113 | 93 | 1 | Nottingham |
| | Stoke | 1 | 80 | 100 | | 151 | 111 | 2 | Stoke |
| | Walsall | 1 | 70 | 90 | | 173 | 133 | 2 | Walsall |
| | Wolverhampton | 1 | 103 | 123 | | 173 | 133 | 2 | Wolverhampton |
| Southern Cities | Cheltenham | 1 | 122 | 131 | | 171 | 151 | 1 | Cheltenham |
| | Heathrow Apt | 1 | 114 | 124 | | 175 | 133 | 2 | Heathrow Apt |
| | London | 1 | 92 | 103 | | 132 | 112 | 1 | London |
| | Luton | 1 | 117 | 126 | | 226 | 206 | 2 | Luton |
| | Milton Keynes | 1 | 94 | 103 | | 215 | 122 | 1 | Milton Keynes |
| | Oxford | 1 | 123 | 132 | | 188 | 168 | 1 | Oxford |
| | Peterborough | 1 | 98 | 107 | | 110 | 90 | 1 | Peterborough |
| | 33% | | Average Journey Time Reduction | | | | | 4% | |

Table 29 : Summary of HSUK and HS2 Services and Journey Times from Rotherham
(All links to HS2 at Sheffield)

Explanation of symbols:

- Leeds** Direct local service from Rotherham
- Oxford** Local journey from Rotherham connecting to HSUK
- Oxford** Local journey from Rotherham connecting to HS2
- Bradford** Journey via existing network

7.7. Comparison of HSUK and HS2 high speed links to Sheffield

Table 29 compares the journey times that HSUK and HS2 can offer for Sheffield.

The HSUK journey times are measured from the new Sheffield Victoria station, and all journeys are direct, with the single exception of Crewe which will require involve a change of trains at Manchester. HSUK's achievement of direct connectivity to almost every major UK city will transform Sheffield's intercity connectivity, resulting in average intercity journey time reductions of 53% (i.e. average journey times more than halved).

HSUK can only achieve these step-change journey time reductions by focussing its high speed routes upon Sheffield city centre. HSUK's primary routes from London to Manchester and Leeds will pass through Sheffield Victoria, as will its primary CrossCountry routes from the South-West and the South Coast to Yorkshire, the North-East and Scotland. Together, these two service strands will enable Sheffield to be directly connected to almost every principal UK city.

By contrast, HS2 will only bring high speed services to central Sheffield by means of a remote connection to the Midland Main Line south of Chesterfield. This places Sheffield Midland on a very long (66km) loop, and this both increases journey times and deters through services. Rather than sustain a 25 minute delay in running through central Sheffield, through services will instead bypass Sheffield by taking the faster M18/Eastern route. The delay imposed by HS2's Sheffield loop has the perverse effect of making HS2's London to Sheffield journey times longer than its journey times from London to Leeds, 50km further north.

As a result of these deficiencies, HS2 will offer only 8% average journey times, and a very restricted list of intercity destinations – just London, Birmingham and Leeds. This represents a very small fraction of the number of cities to which Sheffield will be directly connected, with the HSUK scheme in place. The comparisons between the direct connectivity offered to Sheffield by HSUK and HS2 are set out in Table 31.

7.8. Comparison between Road Access to Candidate Parkway Locations

Comparisons between the quality of road access to the various candidate parkway sites at Hemsworth, Mexborough and Bramley are presented in Appendix D.

| | From Sheffield by HSUK to... | | Raw Journey Time* | Adjust Journey Time# | HSUK winner HS2 winner | Adjust Journey Time# | Raw Journey Time* | From Sheffield by HS2 to... | |
|----------------------------|---------------------------------|---|--------------------------------|----------------------------|---------------------------------|----------------------------|-------------------------|--------------------------------|----------------|
| Northern Powerhouse Cities | Bradford | 0 | 27 | 27 | | 80 | 60 | 1 | Bradford |
| | Chester | 0 | 68 | 68 | | 149 | 129 | 1 | Chester |
| | Crewe | 1 | 65 | 85 | | 100 | 80 | 1 | Crewe |
| | Doncaster | 0 | 23 | 23 | | 23 | 23 | 0 | Doncaster |
| | Huddersfield | 0 | 27 | 27 | | 80 | 80 | 0 | Huddersfield |
| | Hull | 0 | 74 | 74 | | 85 | 85 | 0 | Hull |
| | Leeds | 0 | 19 | 19 | | 26 | 26 | 0 | Leeds |
| | Liverpool | 0 | 43 | 43 | | 107 | 107 | 1 | Liverpool |
| | Manchester | 0 | 23 | 23 | | 50 | 50 | 0 | Manchester |
| | Manchester Apt | 0 | 34 | 34 | | 73 | 73 | 0 | Manchester Apt |
| | Preston | 0 | 52 | 52 | | 126 | 106 | 1 | Preston |
| | Stockport | 0 | 26 | 26 | | 41 | 41 | 0 | Stockport |
| | Warrington | 0 | 52 | 52 | | 76 | 76 | 0 | Warrington |
| | York | 0 | 37 | 37 | | 49 | 49 | 0 | York |
| Midlands Engine Cities | Birmingham | 0 | 44 | 44 | | 48 | 48 | 0 | Birmingham |
| | Birmingham Apt | 0 | 52 | 52 | | 118 | 98 | 1 | Birmingham Apt |
| | Coventry | 0 | 43 | 43 | | 128 | 108 | 1 | Coventry |
| | Derby | 0 | 21 | 21 | | 28 | 28 | 0 | Derby |
| | Leicester | 0 | 23 | 23 | | 56 | 56 | 0 | Leicester |
| | Northampton | 0 | 43 | 43 | | 168 | 148 | 1 | Northampton |
| | Nottingham | 0 | 21 | 21 | | 50 | 50 | 0 | Nottingham |
| | Stoke | 0 | 53 | 53 | | 100 | 80 | 1 | Stoke |
| | Walsall | 0 | 43 | 43 | | 130 | 110 | 1 | Walsall |
| | Wolverhampton | 0 | 76 | 76 | | 122 | 102 | 1 | Wolverhampton |
| Southern Cities | Cheltenham | 0 | 84 | 84 | | 124 | 124 | 0 | Cheltenham |
| | Heathrow Apt | 0 | 77 | 77 | | 128 | 108 | 1 | Heathrow Apt |
| | London | 0 | 56 | 56 | | 85 | 85 | 0 | London |
| | Luton | 0 | 79 | 79 | | 150 | 130 | 1 | Luton |
| | Milton Keynes | 0 | 56 | 56 | | 166 | 146 | 1 | Milton Keynes |
| | Oxford | 0 | 85 | 85 | | 144 | 144 | 0 | Oxford |
| | Peterborough | 0 | 60 | 60 | | 93 | 93 | 0 | Peterborough |
| | 53% | | Average Journey Time Reduction | | | | | 8% | |

Table 30 : Summary of HSUK and HS2 Services and Journey Times from Sheffield
(HSUK services from Sheffield Victoria, HS2 services from Sheffield Midland)

Explanation of symbols:

- London Direct HSUK service from Sheffield
- London Direct HS2 services from Sheffield
- Crewe Local journey from Sheffield connecting to HSUK
- Crewe Local journey from Sheffield connecting to HS2
- Bradford Journey via existing network

Principal Intercity Destinations offered from Sheffield by direct high speed services...

| Meadowhall HS2 (2012-2016) | Sheffield Midland HS2 (2016-??) | Sheffield Victoria HSUK |
|---|--|---|
| Birmingham, Birmingham Airport, Leeds, York, Darlington, Newcastle, London | Birmingham, Leeds, London | Birmingham, Birmingham Airport, Bournemouth, Bradford, Brighton, Bristol, Cheltenham, Cardiff, Coventry, Chester, Darlington, Derby, Doncaster, Edinburgh, Glasgow, Gatwick Airport, Heathrow Airport, Huddersfield, Hull, Leicester, Leeds, Liverpool, London, Luton, Manchester, Manchester Airport, Milton Keynes, Newcastle, Norwich, Northampton, Nottingham, Oxford, Peterborough, Plymouth, Preston, Reading, Stockport, Southampton, Stoke, Walsall, Warrington, Wolverhampton, York |

Table 31 : Intercity Destinations offered by direct services by HS2 and HSUK from Sheffield

8. Conclusions

8.1. Enhanced Rail Services from Hemsworth

The primary purpose of this study has been to assess the benefits that a new HS2 parkway station at Hemsworth might offer, and to determine whether greater community benefits might stem from:

- a new Hemsworth station on the Leeds-Wakefield-Doncaster/Sheffield main line, with direct local services to Leeds, Doncaster and Sheffield;
- higher frequency services on this line, made possible by the intervention of the HSUK scheme at Leeds City station;
- enhanced national intercity connectivity offered by HSUK at Leeds, Doncaster and Sheffield.

This study has demonstrated that even with HS2 offering direct long-distance services from a parkway station located at Hemsworth, the limited range of destinations and the poor service frequencies will greatly restrict the connectivity benefits that it can offer. Taking the example of similar parkway stations on the French TGV network, it has so far been assumed that a new Hemsworth Parkway station would enjoy at best services operating at 2-hourly frequency.

Much greater benefits can be gained from HSUK's alternative strategy of focussing its high speed routes on city centre stations, and engineering the extra capacity that will also permit local rail services to be improved, with increased frequencies and additional stations. This strategy will greatly enhance Hemsworth's links to the major neighbouring rail hubs of Doncaster, Leeds and Sheffield, all of which can support high speed services operating at hourly or better frequencies to a comprehensive range of destinations.

The benefits that HS2 might offer for Hemsworth are of course principally dependent upon the HS2 parkway station being located there. If either (or none) of the other sites were to be selected, then Hemsworth would only gain small journey time benefits which would be outweighed by the greater connectivity losses accruing from the proposed withdrawal of East Coast intercity services to Doncaster and Wakefield.

8.2. Enhanced Rail Services from Barnsley, Doncaster and Rotherham

As part of a wider investigation into a possible new HS2 parkway station at Hemsworth, its potential benefits for the major communities of Barnsley, Doncaster and Rotherham have also been investigated. These are the major South Yorkshire towns that have been left disadvantaged by the proposed relocation of Sheffield's HS2 station from Meadowhall to the more central Sheffield Midland station, and any parkway station on the M18/Eastern route is intended primarily to benefit these communities.

This study has demonstrated that a new HS2 parkway station at Hemsworth will only offer small benefits for Barnsley, and almost negligible benefits for Doncaster and Rotherham.

By contrast, HSUK will offer far greater benefits for Barnsley and Rotherham through connection to its high speed intercity services at Leeds and Sheffield. Doncaster is of course

a primary hub of the HSUK network, and that makes possible even greater connectivity benefits for Doncaster.

8.3. Enhanced Rail Services from Sheffield

The fundamental motivation for the relocation of HS2's Sheffield station from Meadowhall to Sheffield Midland (which of course also led to the adoption of the M18/Eastern route) was to achieve improved high speed rail connections to the city centre. However, this has only been achieved by placing Sheffield on a 66km long loop, remote from the trunk M18/Eastern route (which forms the trunk route to Leeds and the North-East). This has the effect both of lengthening journey times to Sheffield and of discouraging the operation of through services.

As a result, HS2 fails to offer Sheffield substantial journey time savings, and it fails to offer high speed services to a widespread range of destinations. The extent of HS2's failure is only revealed by HSUK's vastly superior performance. Whereas HS2 offers Sheffield 8% average journey time reductions and 3 destinations, HSUK offers 53% journey time reductions and direct high speed links to over 40 major destinations. HSUK's superiority can be attributed to its design from the outset as a network, with integration and city centre access prioritised.

8.4. HS2 : Total Failure of Yorkshire Routeing Strategy

Whilst the intervention of new high speed rail lines must accomplish far more than simply deliver the shortest possible journey times, the performance of any scheme in reducing journey times across the network, for a range of communities large and small, still provides the simplest indicator of that scheme's effectiveness.

| | Average Journey Time Reduction achieved by | | | |
|--|--|-------------------------------|---|---|
| | High Speed UK | HS2 with no Hemsworth Parkway | HS2 2-hour frequency to Hemsworth Parkway | HS2 1-hour frequency to Hemsworth Parkway |
| Sheffield | 53% | 8% | 8% | 8% |
| Barnsley | 33% | 5% | 6% | 13% |
| Doncaster | 37% | 0.5% | 1% | 4% |
| Rotherham | 33% | 4% | 4% | 4% |
| Hemsworth | 36%** | 7% ^{##} | 18% | 31% |
| ** = Hemsworth main line station assumed to be in place ## = Journey time reductions assessed via Fitzwilliam | | | | |

Table 32 : Summary of Journey Time Reductions achieved by HSUK and HS2

Table 32 indicates clearly that HS2's routeing strategy in Yorkshire has failed on all levels, either for small, medium or large population centres. This stems from HS2 Ltd's long-standing failure in designing HS2 as a stand-alone intervention, with no attempt to design HS2 with the necessary integration with the existing railway system to perform effectively as a network and thereby serve all communities.

It is plain that there is no coherent masterplan guiding the development of HS2 as an integrated national network to deliver the "hugely enhanced capacity and connectivity"¹⁶ that has been promised for HS2. Instead, there has been a series of sequential ill-considered interventions in which the design of the stand-alone HS2 has lurched from one crisis to another. The current proposals for the M18/Eastern route, which was rejected in an earlier iteration of HS2 Ltd's route selection process, merely provides the latest example of the 'sticking-plaster engineering' by which the HS2 proposals have developed.

This study has also demonstrated unequivocally that there is no intrinsic merit in any proposal for an HS2 parkway station in Yorkshire; it has come about primarily as a consequence of HS2 Ltd's failure to develop acceptable proposals for a well-connected station in central Sheffield. Table 32 shows clearly that parkway stations, whether served at the assumed 2-hourly frequency or the commercially unlikely hourly frequency, cannot mitigate HS2's fundamental design failure.

By contrast, HSUK's design as a national network, fully integrated with the existing railway system, offers far greater journey time savings for all communities, whatever their size. It also provides the extra capacity at critical network bottlenecks (such as Leeds) to permit improved local services and new stations for communities such as Hemsworth.

Although this study has only examined the possibility of a new HS2 parkway station at Hemsworth, it is confidently predicted that similar studies will shortly establish that other candidate sites for HS2 parkway stations in Yorkshire will fail in a very similar manner.

¹⁶ "Hugely enhanced capacity and connectivity" is the expressed aim of the HS2 project, as stated in evidence to the HS2 Select Committee. On 30th November 2015, HS2 Ltd's Technical Director Andrew McNaughton informed the HS2 Select Committee: "The aim of the HS2 project is to deliver hugely enhanced capacity and connectivity between our major conurbations."

Appendix A

Capacity Issues on Leeds-Doncaster line and Solutions for Leeds City Station

HS2 Ltd and the Government have argued¹⁷ that projected withdrawal of one of the two East Coast intercity services from Wakefield to London will create capacity for extra local services. However this argument does not stand up to serious technical examination.

Currently, around 6 trains per hour operate on the Leeds-Wakefield-Doncaster line, along which both Sandal & Agbrigg and Fitzwilliam stations are located. These trains are as follows:

- Leeds-Wakefield-Doncaster-Grantham-Stevenage-London Kings Cross (Virgin East Coast);
- Leeds-Wakefield-Doncaster-Peterborough-London Kings Cross (Virgin East Coast);
- Edinburgh-(other stations)-Leeds-Wakefield-Sheffield-(other stations)-Plymouth (Arriva CrossCountry);
- Leeds-Wakefield-Doncaster local service, stopping at Sandal & Agbrigg and Fitzwilliam, and at other local stations (Northern);
- Leeds-Wakefield-Sheffield local service, stopping at Sandal & Agbrigg and Fitzwilliam, and at other local stations (Northern).

In addition to the trains listed above, infrequent freight services also operate, generally at a maximum frequency of 1 train per hour.

An analysis of the capacity constraints on the Leeds-Wakefield-Doncaster route, and of the potential for increased local services, is presented in Item 6.1 of this study.

Whilst it is true that removal of a Leeds-London intercity service would create more track capacity on which to operate more local services, the more fundamental truth is that with £55 billion or more public money due to be expended on HS2, communities should not be presented with an 'either-or' choice by which local connectivity can only be improved by worsening more long-distance connectivity to the nation's capital city. If HS2 is to prove a worthwhile investment of public money, then it should be capable of generating step-change improvements in both local *and* national connectivity.

The commentary presented in the 17/10/17 Maynard letter fails to acknowledge that:

- A 2-track line operating at 6 trains per hour, even with varying stopping patterns, cannot generally be characterised as a congested route.
- If congestion or conflicts do exist between fast and slow services, and more local services are required, then obvious remedies such as construction of passing loops, especially at station locations, should be considered long before the withdrawal of vital intercity services is contemplated.
- Even if two new local services were to be introduced to compensate for the withdrawal of one intercity service, the difference in length of the respective trains

¹⁷ Letter from HS2 Minister Paul Maynard MP to the Crofton community dated 17th October 2017, hereafter referred to as the '17/10/17 Maynard letter'.

would still imply a net loss of seats on the crucial Wakefield Westgate-Leeds commuter service.

- The true constraint on the West Yorkshire rail network is not restricted capacity on its key routes into Leeds, but the lack of platform capacity at Leeds station.
- It should additionally be noted that Northern Powerhouse Rail services between Leeds and Sheffield will follow the same route currently taken by local services to Sheffield via Thurnscoe (see Figure 3). This leaves no possibility of increasing the frequency of local services from Sandal & Agbrigg and Fitzwilliam to Sheffield, and contradicts a specific claim in the 17/10/17 Maynard letter, that local services to Sheffield might be improved.

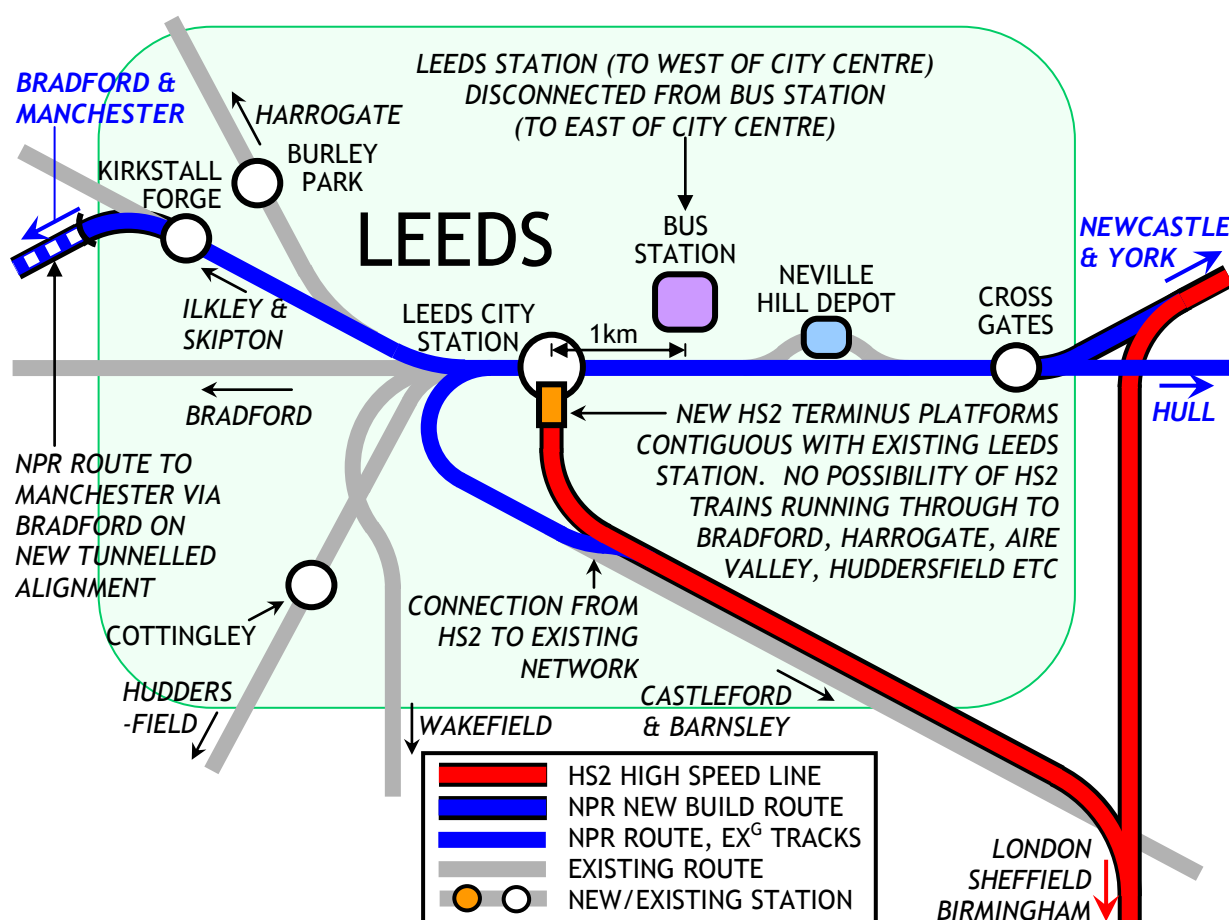


Figure A1 : HS2 & Northern Powerhouse Rail Routes to Leeds

(extract from Appendix E3 (Figure E3.1, p82) of *The Northern Powerhouse* (2018))

The problems at Leeds station are apparent from Figure A1. Whilst 6 routes approach the station from the west, only a single route (via Cross Gates) approaches the station from the east. This imbalance leaves most local services having to terminate at Leeds, and this requires trains to remain standing at a platform for a much longer time (perhaps 20 minutes) than if the train were to simply stop to disembark and embark passengers, and then continue in the same direction (perhaps 3 minutes). This creates a far greater demand for platform space, and as a result, even with 17 platforms (the greatest number for any provincial station in England), Leeds is generally considered to be 'full' with little capacity to accommodate new services.

The 5 new terminus platforms proposed for HS2 services (and Northern Powerhouse Rail services from Sheffield) will do almost nothing to relieve the train congestion problems affecting existing services, or create the capacity for existing routes to operate at higher frequency. This problem will become increasingly severe as new services need to be added to address the requirements of the Northern Powerhouse.

Additionally, further passenger overcrowding will be created from new HS2 passengers arriving at Leeds, and changing to local services to Bradford, Halifax, Harrogate, and towns in Airedale and Wharfedale. It should particularly be noted that the proposed HS2 platforms are terminus platforms, and as such it will not be possible to operate through services; passengers will have no option but to change trains.

This passenger congestion is not intrinsic to Leeds itself. It occurs as a consequence of the almost exclusive focus of the West Yorkshire rail network upon Leeds station, and it places all 'satellite' communities, including major towns and cities such as Halifax, Huddersfield and Bradford in a subsidiary relationship to Leeds that does not benefit any community:

- Passenger congestion at Leeds, and overcrowding on local services is increased.
- With few if any direct intercity services to satellite communities, journey times are extended by both the time taken in changing trains at Leeds, and by the journey time on the local train.
- With the West Yorkshire network mostly comprising radial routes focussed on Leeds, and few circumferential routes, the system as a whole lacks the alternate routes and the resilience necessary to cope with disruption.

These problems are generally avoided through the more diversified and integrated approach adopted by High Speed UK. As Figures 1 and C2 demonstrate, HSUK has the connections to the existing network that are necessary to enable high speed services to access all of the major communities of West Yorkshire, with no need to change trains at Leeds.

The capacity problems at Leeds station will be resolved through HSUK's much greater integration with the existing network.

HSUK's proposals for Leeds (see Figure A2) will add 2 new tracks across the city from Cottingley in the south-west to Cross Gates in the east to create a dedicated route for high speed intercity services, segregated from local services. This will be achieved through 3 principal interventions:

- Restoration of Farnley Viaduct to the south-west of Leeds station;
- Widening of Leeds East Viaduct to 4 tracks;
- Restoration of 4 tracks along existing trackbeds from Neville Hill to Cross Gates.

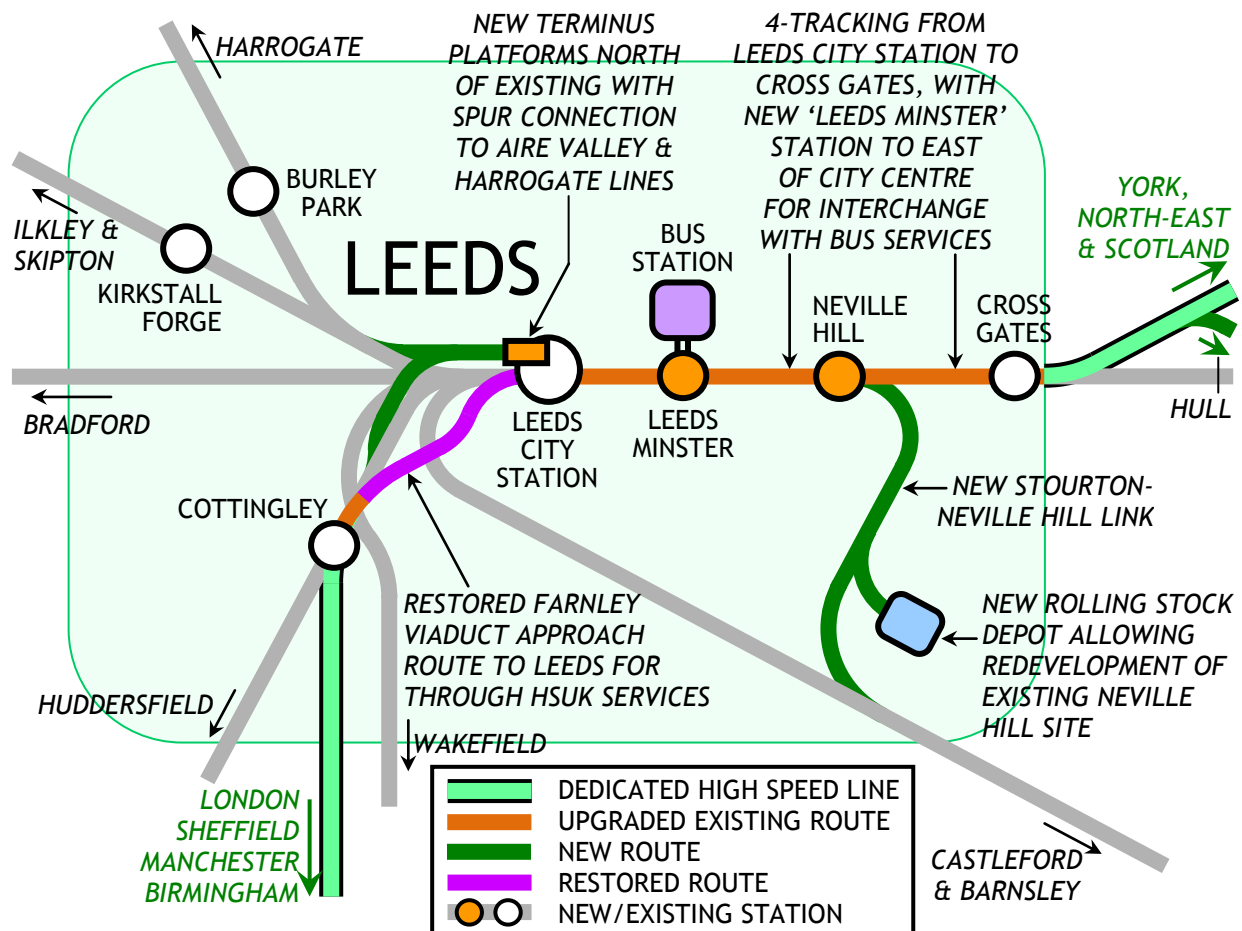


Figure A2 : HSUK Routes to Leeds

(extract from Appendix E3 (Figure E3.2, page 84) of *The Northern Poorhouse* (2018))

With new tracks devoted to high speed intercity services, the existing tracks will have greatly increased capacity for local services. This creates the opportunity for new stations on the route east of Leeds, at Leeds Minster and at Neville Hill. Leeds Minster station will act as a catalyst for redevelopment of the east side of the city centre and provide a much-needed rail interchange to complement the city's bus and coach station.

Additionally, the construction of a new link from Stourton to Neville Hill will allow many of the services which currently approach Leeds station from the west and terminate there to approach instead from the east. Rather than terminate at Leeds and consume valuable platform capacity, these services can then continue to destinations such as Bradford and Huddersfield. With many more through services operating, the capacity of Leeds station will be vastly increased. The proposed integration and through running of local services is shown on Figure A3.

Construction of the Stourton-Neville Hill link will also give access to a large area of industrial land on which a new rolling stock depot can be established, and thereby allow the existing cramped Neville Hill site to be developed for housing, close to the proposed Neville Hill station.

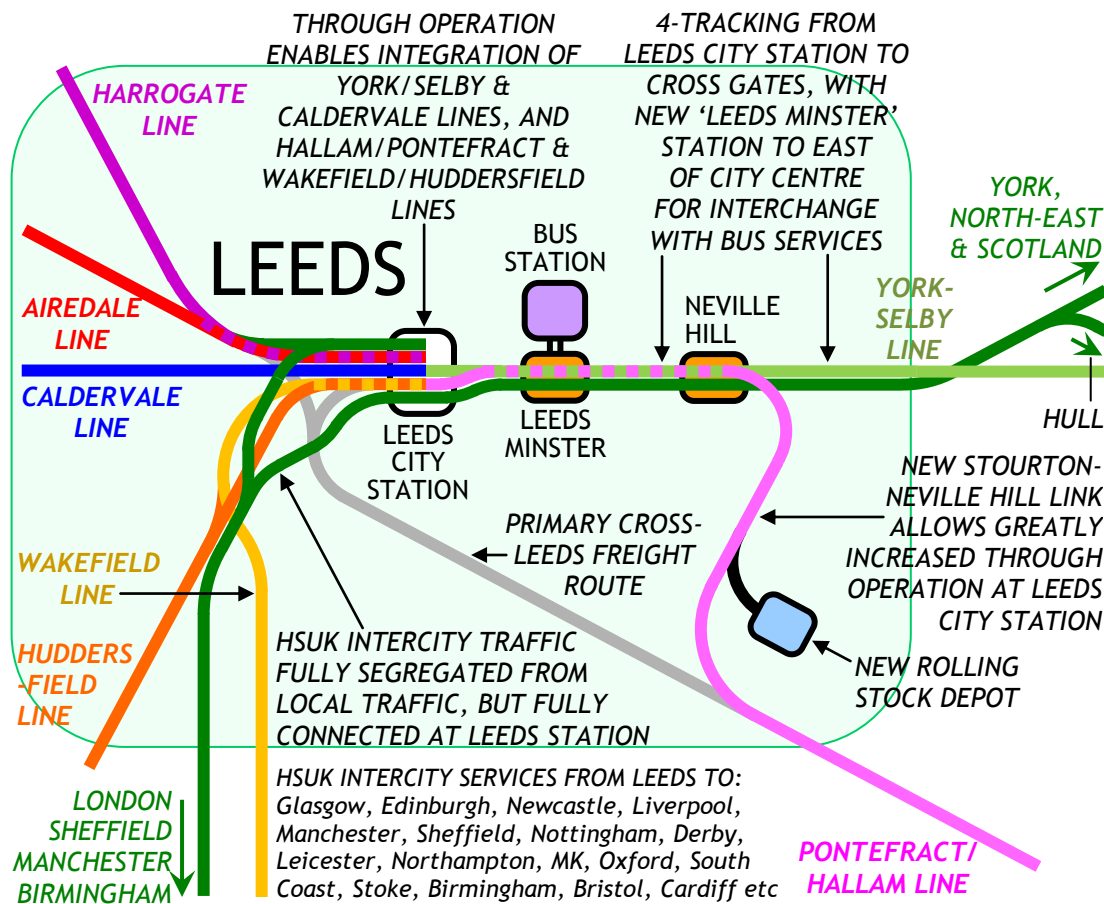
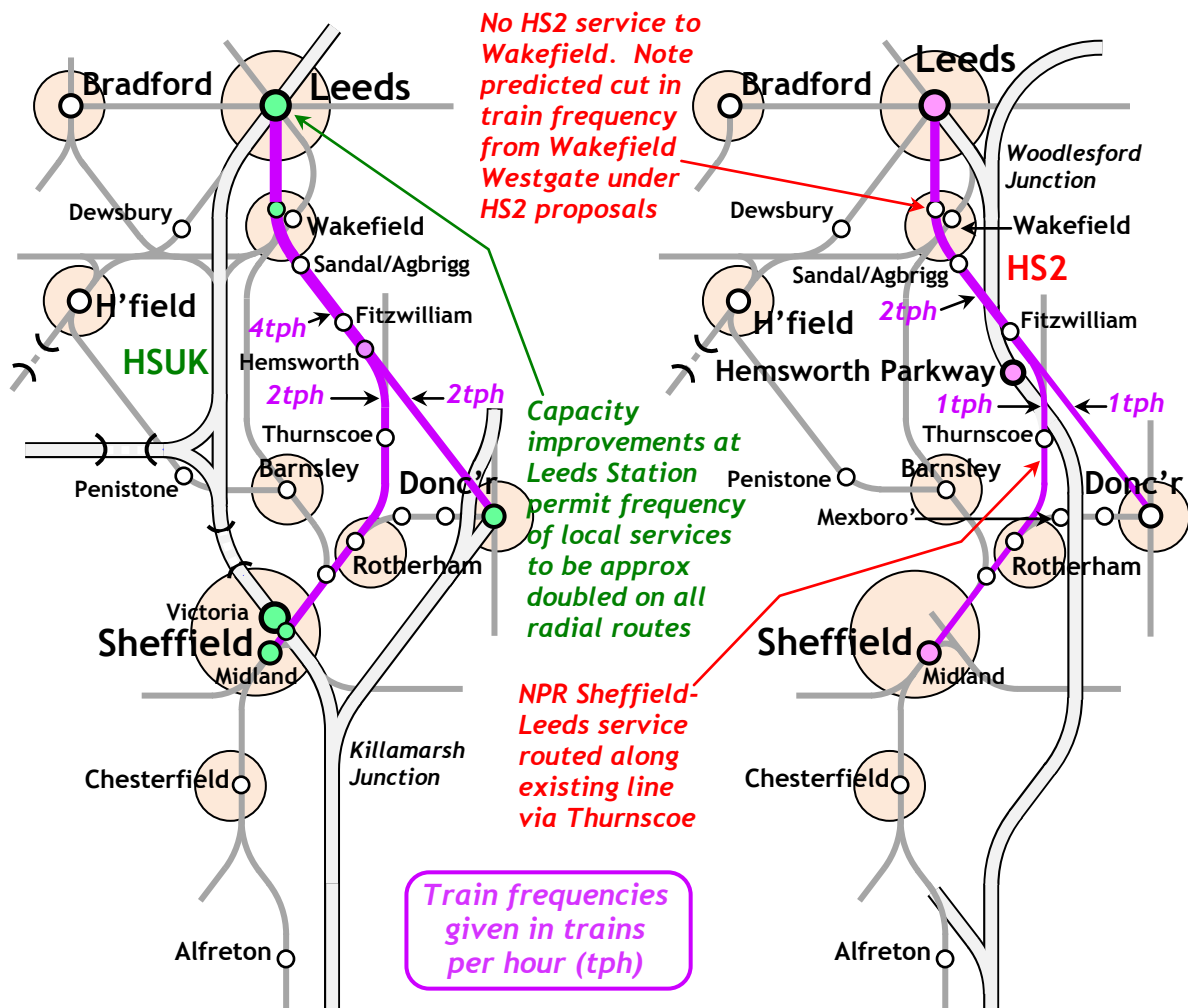


Figure A3 : HSUK & Local Services in Leeds

(extract from Appendix E3 (Figure E3.3, page 85) of *The Northern Poorhouse* (2018))

Overall, with the HSUK improvements in place, it should be possible for local services to Leeds to be approximately doubled in frequency. On this basis, it is reasonable to predict that the intervention of HSUK should enable the frequency of local services from Leeds via Wakefield Westgate to Sandal & Agbrigg and Fitzwilliam to be increased to 4 trains per hour. 2 trains per hour would continue to Sheffield and 2 trains per hour would continue to Doncaster.

These improved services are illustrated in Figure A4.



KEY

| | |
|--|--|
| | Existing route |
| | Local services from Fitzwilliam and/or new Hemsworth station |
| | Interchange with HSUK/HS2 services |
| | New-build high speed line |

| Train frequency to: | HSUK | HS2 |
|---------------------|-------------|-------------|
| Leeds | 4tph | 2tph |
| Doncaster | 2tph | 1tph |
| Sheffield | 2tph | 1tph |

Figure A4 : HS2 and HSUK Improvement of Local Services in Hemsworth area

Figure A5 shows how the Hemsworth community will be connected to HSUK and HS2 services, and the superiority of the HSUK connections is immediately apparent.

- HSUK offers connections to high speed rail services at 3 ‘hub’ locations – Leeds, Doncaster, Sheffield, and also Wakefield – while HS2 offers connections at only 2 locations – Leeds and Sheffield.
- HSUK offers more frequent links from Crofton to these network hubs.
- At all these hub locations, HSUK offers much greater average journey time reductions and far more direct intercity links.

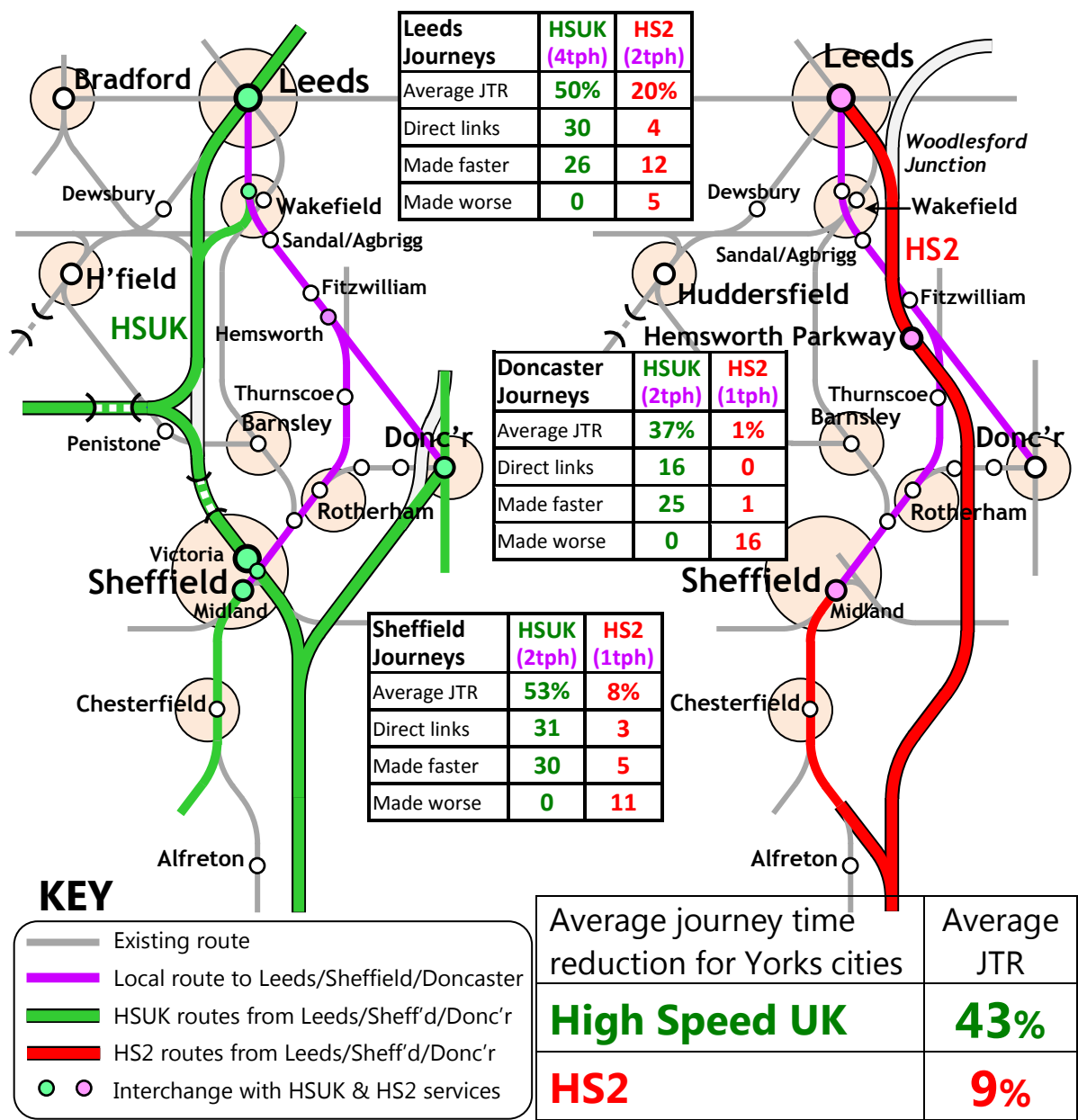


Figure A5 : Connection of Local Services to HS2 and HSUK

Appendix B

HS2 and HSUK Proposals for ‘high speed’ stations in Sheffield

HS2 Ltd and the Government have that projected withdrawal of one of the two East Coast intercity services from Wakefield to London will create capacity for extra local services. However this argument does not stand up to serious technical examination.

The amended proposals for HS2 to serve Sheffield Midland station, released in July 2016, have ostensibly addressed the concerns of the local community at the previous HS2 proposal for a station at Meadowhall, 6km from the city centre. Sheffield Midland will certainly be a superior ‘port of entry’ to the city, but it carries several major drawbacks.

1. The station and its approach routes can only accommodate HS2’s ‘classic compatible’ trains rather than the 400m long double-decker rolling stock proposed for use elsewhere on the HS2 system.
2. More seriously, the location of Sheffield Midland on a 66km long loop off the HS2 trunk route will effectively place Sheffield on a very long siding. This will significantly increase journey times to Sheffield, and it will also discourage the operation of through services, given the time penalty of around 22 minutes that will apply for through services routed via Sheffield Midland compared with services running non-stop via the bypassing route.
3. In terms of Northern Powerhouse links to other Northern cities, Sheffield Midland’s greatest problem is that it lacks the capacity to accommodate all projected services. These comprise existing services, HS2 services and the 12 terminating services per hour (6tph from Leeds and 6tph from Manchester) specified for Northern Powerhouse links. Sheffield Midland is located on a confined site, and it lacks space into which it can feasibly expand.
4. A further problem is that Sheffield Midland feeds naturally into the Hope Valley route to Manchester, for which there is no feasible option – other than the construction of a new tunnel over 30km long – by which the specified 30 minute Sheffield-Manchester journey time can be achieved.
5. HS2’s bypassing route around Sheffield will require major demolitions at Mexborough, where a new housing estate stands in HS2’s path. This is HS2’s greatest single impact upon residential property outside London.

HSUK’s proposed Sheffield station (see Figure B1), to be constructed on the site of the former Sheffield Victoria, avoids most of the problems of Sheffield Midland. Sheffield Victoria’s south-east to north-west orientation is well aligned with HSUK’s onward routes to Manchester and Leeds, and its location on a through trunk route rather than on a loop makes Sheffield Victoria an attractive calling point on long-distance intercity journeys.

To enable full integration between local services and HSUK intercity services, new interchange platforms will be constructed on the existing route into Sheffield Midland, close to the location of the former Attercliffe Road station. This will allow passengers from outlying communities such as Rotherham and Barnsley easy access both to HSUK’s high

speed services and also to new employment opportunities that will arise with the planned redevelopments in the vicinity of Sheffield Victoria.

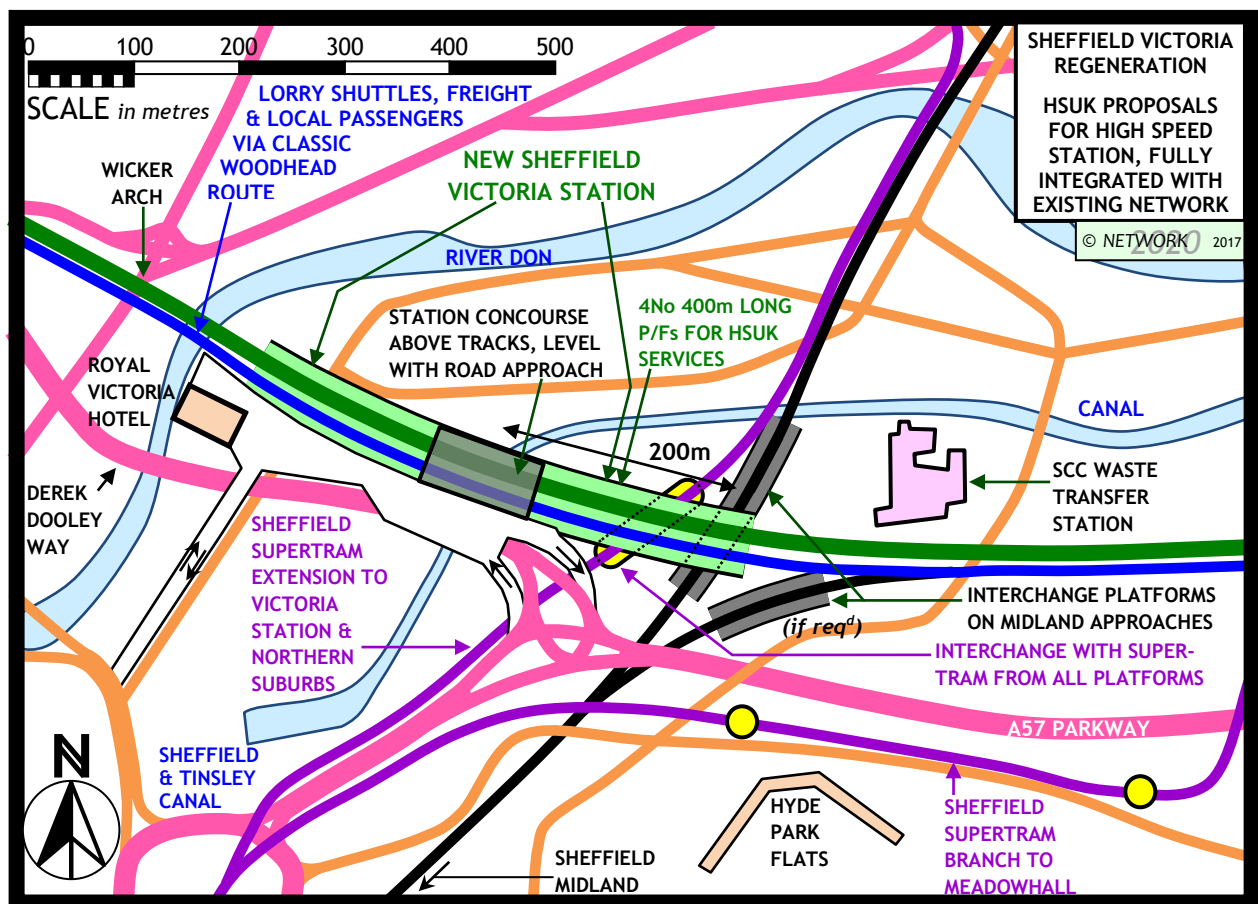


Figure B1 : Proposed HSUK scheme for restored Sheffield Victoria Station

HSUK's proposals align fully with Sheffield City Council's plans to regenerate the former industrial areas in the Don Valley, around Sheffield Victoria. The gains for the local economy arising from this redevelopment far exceed what can possibly be achieved in the vicinity of Sheffield Midland, where HS2 services are proposed to terminate.

Unlike HS2, HSUK also aligns with Sheffield's natural ambitions for direct high speed links to all other principal UK cities, and for comprehensive direct connectivity to the other cities of the Northern Powerhouse.

HSUK's performance in these respects, vastly superior to that of HS2, is demonstrated by the timetable developed for its national high speed network. This shows direct services from Sheffield Victoria to all major UK cities, and journey times to other Northern cities which meet the Northern Powerhouse specification (see Table C3). On routes to adjacent cities including Manchester and Leeds there are high service frequencies, sufficient to meet the frequency specification. The need for dedicated HS3/Northern Powerhouse Rail services will either be very small or non-existent.

Appendix C

Implications of HS2 and HSUK for Northern Powerhouse

The 2016 and 2017 changes¹⁸ to HS2 proposals in Yorkshire have resulted in both Leeds and Sheffield gaining the city centre stations required for the Northern Powerhouse. However, there has been no strategic readjustment of HS2's route between the two cities. This leaves the designed HS2 route, passing to the east of Barnsley and Wakefield, too far to the east to be compatible with any future 'HS3' transpennine high speed line.

HS2 Ltd's route selection, both of its original route via Meadowhall and its selection of its present 'M18' route via Mexborough, has been undertaken with thought only for creating a north-south route in Yorkshire as part of the overall strategy for the HS2 'Y'. This leads naturally to an easterly route where the topography is more favourable and construction costs should be lower (notwithstanding concerns about subsidence risks in an abandoned coalfield). There is little doubt that HS2's Sheffield-Leeds route to the east of Barnsley and Wakefield will cost less to build and will require a much shorter overall length of tunnel, than HSUK's route to the west of Barnsley and Wakefield.

However, when the requirements of the Northern Powerhouse are also taken into account, then the situation is transformed. The specified journey time targets will improve transpennine links from Sheffield and Leeds to Manchester and Liverpool to a 'high speed' standard equivalent to that of HS2, and (like HS2) this standard can only practicably be met through the construction of a new east-west transpennine main line, fully integrated with the north-south HS2 in Yorkshire. This is what the original 'One North' proposition¹⁹ called for, and it is a matter of great concern that this fundamental requirement, crucial to the achievement of the transport ambitions of the Northern Powerhouse, appears to have been substantially 'diluted' in subsequent iterations of official policy documents²⁰ from the DfT, Transport for the North and the National Infrastructure Commission.

These documents all point towards a sequential process by which initial determination of HS2's east-sided Sheffield-Leeds route will then require the creation of 2 separate transpennine routes i.e. from Leeds to Manchester and from Manchester to Sheffield, to fulfil the requirements of the Northern Powerhouse. These routes depicted in Figure C1 will cost over £5 billion more to construct than HSUK's routes linking the 3 cities.

¹⁸ 2016 – Original HS2 New Lane terminus at Leeds abandoned in favour of new terminus proposal contiguous with existing Leeds City station.

2017 – Original HS2 route via Meadowhall abandoned in favour of M18/Eastern route entirely bypassing South Yorkshire conurbation, with spur connections to existing routes to Sheffield Midland.

¹⁹ *One North : A Proposition for an Interconnected North* Published by the city regions of Leeds, Liverpool, Manchester, Newcastle and Sheffield in July 2014.

²⁰ Official policy documents as follows:

A - *The Northern Powerhouse: One Agenda, One Economy, One North* HMG/ Transport for the North, March 2015;

B - *The Northern Transport Strategy* HMG/Transport for the North, March 2016;

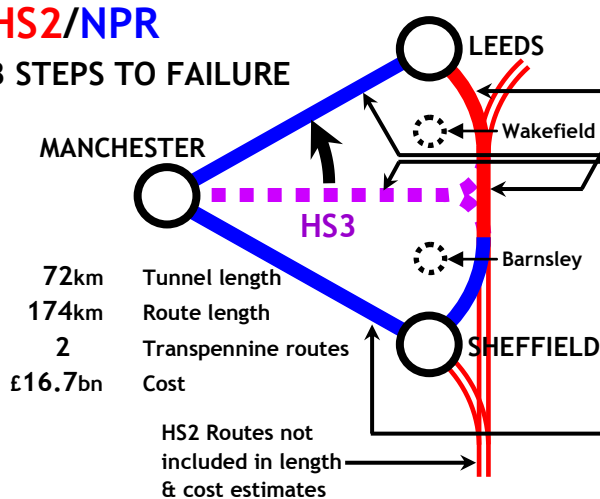
C - *High Speed North* National Infrastructure Commission, 2016 (**not to be confused with High Speed North, predecessor project to High Speed UK**) ;

D - *Transport for the North presentation* to ICE meeting at the Tetley, Leeds, dated 21/2/17.

E - *Strategic Transport Plan*, Transport for the North, January 2018.

HS2/NPR

3 STEPS TO FAILURE



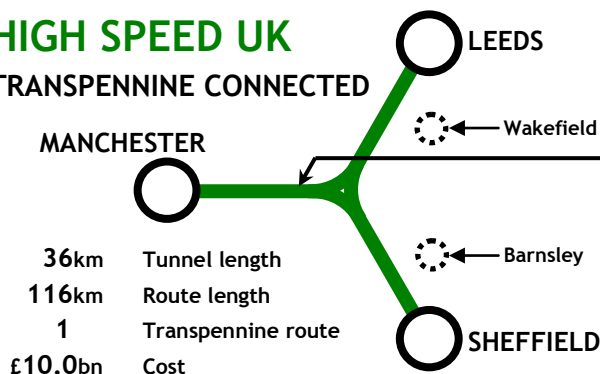
STEP 1 - design HS2 route to east of Barnsley and Wakefield with no thought for transpennine connectivity.

STEP 2 - with HS2 too far to east to integrate with single 'HS3' transpennine route, instead focus creating new Leeds-Manchester route as primary Northern Powerhouse transpennine route, requiring circa 33km of new tunnel.

STEP 3 - finally, examine options for Manchester-Sheffield. With no practicable route through Peak District National Park, another 33km long tunnel will be required.

HIGH SPEED UK

TRANSPENNINE CONNECTED



HSUK's ALTERNATIVE HOLISTIC APPROACH
Integrated development of Sheffield-Leeds route with transpennine route to Manchester via abandoned Woodhead corridor - *all part of integrated development of HSUK national network*

Figure C1 : Alternative HS2 and HSUK approach to linking Sheffield, Leeds and Manchester

The extra costs of official proposals (both HS2 and Northern Powerhouse Rail) to link Sheffield, Leeds and Manchester can very simply be attributed to the sequential and uncoordinated process by which HS2 and Northern Powerhouse Rail have been developed. This process, by which the 'HS3'/Northern Powerhouse Rail is based upon HS2's established routes in both Yorkshire and the North-West, is described in the 17/10/17 Maynard letter (p5 para 5)²¹.

HS2's inefficiencies, which are revealed by comparison with HSUK, should not be entirely surprising; if HS2 has been designed with no thought for transpennine connectivity, it is highly unlikely that an efficient system of transpennine communication will result when 'HS3'/Northern Powerhouse Rail links are retrofitted onto the established HS2 proposals.

By contrast, HSUK – which has been developed from the outset as an integrated network, with the aim of interconnecting all of the UK's major conurbations – achieves the same transpennine links at vastly reduced cost. This shows the immense value of holistic design.

Comparative costs and lengths of tunnel are summarised in Figure C1.

²¹ Further disjointed thinking is revealed in the bullet-pointed list on page 6 of the 17/10/17 Maynard letter. For instance, detailed HSUK analysis reveals that a Liverpool-Manchester Airport-Manchester Piccadilly route cannot possibly meet the Northern Powerhouse specification for a 20-minute Liverpool-Manchester journey, and would fail to integrate with likely development of transpennine routes to Leeds from Manchester Victoria. These issues are discussed in greater detail in Section 5.8 of *HS2 : High Speed to Nowhere* (2017), and in *The Northern Poorhouse – How the Transport Establishment failed the People of the North* (2018).

The commentary also reveals no structured consideration of how such a western route might open up opportunities for a single transpennine link via the abandoned Woodhead corridor (that might connect Sheffield *and* Leeds to Manchester). A Sheffield-Leeds route constructed to the west of Barnsley and Wakefield will certainly cost more than HS2's favoured easterly route; but if that more expensive route enables multi-billion pound savings in the overall cost of connecting Sheffield, Leeds and Manchester in accordance with the targets of the Northern Powerhouse, then it is clearly a price worth paying.

It is also apparent that neither HS2 Ltd nor Transport for the North have made any detailed consideration of the potential of the abandoned Woodhead corridor to transform connectivity across the Northern Powerhouse. The targets set for radically reduced passenger journey times, greatly increased train frequency and decongested arteries for freight transport cannot be met by the present 'upgrading' strategy along the existing Leeds-Huddersfield-Manchester route.

Only the creation of a new transpennine rail route, designed to accommodate the needs of both passengers and freight, can meet the needs of the Northern Powerhouse for step-change increases in capacity and connectivity between the major cities in the North; and only along the abandoned Woodhead corridor does there seem to be the potential to establish these links. It is significant to note that the ambition for a new multi-purpose route was clearly stated in the original 'One North' report²² that formed the basis of the Northern Powerhouse; however, under current Transport for the North strategy this requirement has been substantially 'watered down'.

It would appear that no official body, either HS2 Ltd, Transport for the North or Network Rail, has ever taken the trouble to undertake a detailed engineering assessment of the Woodhead corridor, to determine its true potential as the principal transpennine route of the Northern Powerhouse, capable of meeting all journey time targets.

However, whilst officialdom has failed, the detailed route design undertaken for the alternative High Speed UK scheme demonstrates the full potential of a restored Woodhead corridor:

- New high speed lines routed via Woodhead can meet all the Northern Powerhouse targets for reduced journey times for journeys between Northern cities, and from these Northern cities direct to Manchester Airport.
- The existing Woodhead route is capable of redevelopment for railfreight and lorry shuttle links across the North. No other route has a similar potential to relieve HGV congestion on all transpennine and trans-Peak flows between the M62 and the A50.
- The overall lengths of tunnel for a regenerated Woodhead route are small compared with the much greater lengths required for upgrading either the Manchester-Leeds 'Diggle' route or the Manchester-Sheffield 'Hope Valley' route to achieve the

²² *One North : A Proposition for an Interconnected North* Published by the city regions of Leeds, Liverpool, Manchester, Newcastle and Sheffield in July 2014.

specified 30 minute journey times²³. The comparisons made in the 17/10/17 Maynard letter with the tunnelled length required for a new road, presumably constructed to motorway standard, are not valid.

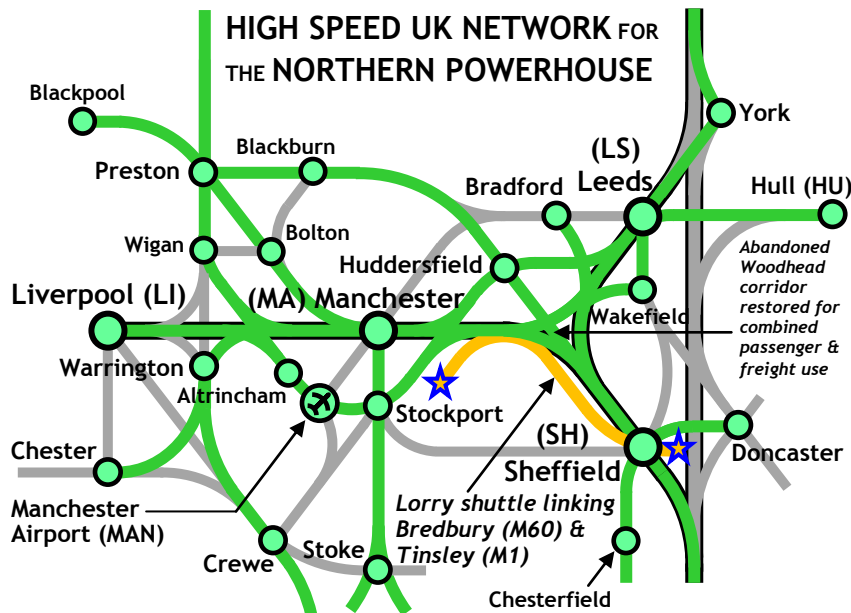
- The environmental benefits of diverting lorry flows on the A628(T) Woodhead Road to the restored railway considerably outweigh the additional environmental impact of constructing new high speed lines in the 'industrial' landscape of Longdendale – in which high voltage power lines, congested trunk road, Victorian reservoirs and abandoned railways are all present.
- There is an eminently feasible strategy, envisaged under HSUK proposals, to redevelop all of the Woodhead tunnels (ie 2No Victorian single track tunnels and the 1953 2-track tunnel) for railway purposes. Although there are certain engineering concerns with the current state of repair of the Victorian tunnels, these concerns appear to be very small compared with the much greater problems and risks involved with building and maintaining HS2's high speed lines in subsidence-prone areas, in the areas of both the Yorkshire coalfield and the Cheshire salt mines on either side of the Pennines.

It is a matter of massive public concern, that none of the official bodies charged with developing transport in the North of England appear to be capable of taking the necessary overview, to co-ordinate all aspects of transport policy to ensure that the Northern Powerhouse will actually come to fruition. The vastly superior performance of HSUK shows what is possible with the holistic vision of a fully integrated railway, delivering the fully connected railway network that the North needs.

The failure of official strategies to develop a coherent transport strategy that will drive economic development of the Northern Powerhouse has been confirmed with the publication in January 2018 of Transport for the North's *Strategic Transport Plan*. The full extent of this failure is set out in the HSUK document *The Northern Poorhouse – How the Transport Establishment failed the People of the North*.

²³ Studies undertaken by HSUK indicate that upgrades of existing transpennine routes to achieve the specified 30 minute journey times would require the following major lengths of tunnel:

- Manchester-Leeds 'Diggle' route – approx 10km to bypass Stalybridge, 15km to bypass Dewsbury.
- Manchester-Sheffield 'Hope Valley route – approx 30km tunnel from New Mills to Dore, to bypass all of Goyt Valley and Peak District National Park.



| Journey times (mins) | Specified journey time | HSUK journey time |
|----------------------|------------------------|-------------------|
| SH-LS | 30 | 19 |
| LI-MA | 20 | 19 |
| MA-SH | 30 | 23 |
| MA-LS | 30 | 26 |
| LS-MAN | 40 | 37 |
| SH-MAN | 30 | 34 |
| LI-MAN | 30 | 26 |
| LS-NE | 60 | 51 |
| LS-HU | 45 | 35 |
| SH-HU | 60 | 56 |

Figure C2 : HSUK Performance in Northern Powerhouse

| Journey between Northern Powerhouse cities | Existing journey time (mins) | Specified journey time (mins) | Specified frequency (trains per hour) |
|--|------------------------------|-------------------------------|---------------------------------------|
| Sheffield-Leeds | 40 | 30 | 6 |
| Liverpool-Manchester | 32 | 20 | 6 |
| Manchester-Sheffield | 48 | 30 | 6 |
| Manchester-Leeds | 49 | 30 | 6 |
| Manchester-Manchester Airport | 13 | 10 | 10 |
| Leeds-Manchester Airport | 62 | 40 | 2 |
| Sheffield-Manchester Airport | 73 | 30 | 2 |
| Liverpool-Manchester Airport | 65 | 30 | 2 |
| Leeds-Newcastle | 87 | 60 | 4 |
| Leeds-Hull | 55 | 45 | 2 |
| Sheffield-Hull | 86 | 60 | 2 |

Table C3 : Northern Powerhouse Journey Time & Train Frequency Specification

‘10 Smart Questions’ regarding Northern Powerhouse Rail (NPR) proposals published by Transport for the North (TfN)

1. NORTHERN POWERHOUSE RAIL JOURNEY TIMES

Can the routes proposed by TfN meet the HS3 journey time specification?

2. NPR TRAIN FREQUENCY

Can TfN’s proposed routes and stations provide the extra capacity both for new NPR services operating at the specified frequency, and also for step-change growth in more local services?

3. NPR STATION LOCATION AND CONFIGURATION

Do the stations proposed by TfN provide the extra capacity necessary to operate both the envisaged increased rail services stipulated by the HS3 Specification and the required step-change increase in local services? This generally requires city centre stations fully integrated with local transport networks and with HS2, and ‘through’ (rather than terminus) configuration.

4. LONGER-DISTANCE NPR JOURNEYS

Do the TfN proposals offer enhanced ‘through’ journeys on longer-distance routes e.g. Liverpool to Hull or Newcastle, that are not covered explicitly in the HS3 Specification?

5. INCLUSION OF SECOND-TIER CENTRES AND OTHER COMMUNITIES

How will the TfN proposals extend the benefits of Northern Powerhouse Rail to second-tier centres e.g. Bradford, York, Warrington, Preston, and also to less populous/ more peripheral communities? If these centres are bypassed or otherwise excluded, how will adverse economic impacts be avoided?

6. INTEGRATION OF NPR WITH HS2

How will Northern Powerhouse Rail be integrated with HS2 to ensure seamless links to neighbouring cities outside the Northern Powerhouse region e.g. Nottingham, Derby, Leicester, Stoke, Edinburgh and Glasgow?

7. TfN VISION FOR RAILFREIGHT

How will the TfN proposals deliver benefits for railfreight, noting in particular the requirement of the proposed Liverpool Superport for improved cross-Manchester and transpennine freight links?

8. MINIMISED DEPENDENCY UPON HS2

Can the TfN proposals be developed to deliver optimum results without dependency upon or predetermination by the pre-existing HS2 proposals?

9. TfN VISION FOR IMPROVED RAIL LINKS BETWEEN PRINCIPAL CENTRES OF THE NORTHERN POWERHOUSE

Do the TfN proposals offer a complete vision for achieving the network of accelerated routes and enhanced railfreight links between the principal centres of the North, as set out in the HS3 Specification? If some routes have been prioritised over others, on what basis was this choice made?

10. TECHNICAL EXCELLENCE FOR THE NORTHERN POWERHOUSE

Do the TfN proposals represent the best technical solution to meet the HS3 journey time specification and fulfil all the other rail transport requirements set out above, that are necessary to ensure sustainable economic growth in the Northern Powerhouse Region?

Appendix D

Comparison between Road Access to Candidate Parkway Locations

Qualitative comparisons between the quality of road access to the various candidate parkway sites at Hemsworth, Mexborough and Bramley are presented in Table D1.

| Parkway Location | Hemsworth | Mexborough | Bramley |
|--|--|---|---|
| Existing Road Access | Via A628 and A6201, on Hemsworth Bypass | Via A6023 local road between Mexborough and Conisbrough | Via M18 Junction 1 |
| Proximity to: | | | |
| Barnsley | Good (via A628) | Fair, subject to road improvements | Fair (via M1 and M18) |
| Doncaster | Good (via A1 & A6201) | Fair, subject to road improvements | Good (via M18) |
| Rotherham | Poor | Fair, subject to road improvements | Good via local urban road network |
| Sheffield | Not practicable | Not practicable | Fair, via A630 Parkway to central Sheffield |
| Requirement for road improvements? | Completion of improvements along A628 to Barnsley would be desirable | Mexborough site is only practicable with major enhancements to local road network | Primary limitations are congestion on M1 and feasibility of modifications to M18 Junction 1 |
| Access to Northern Powerhouse Rail Intercity Services? | Possible | Not possible | Not possible |

Table D1 : Assessment of Road Connectivity to Possible HS2 Parkway Stations

Appendix E

Proposed HS2 Services to Yorkshire Region

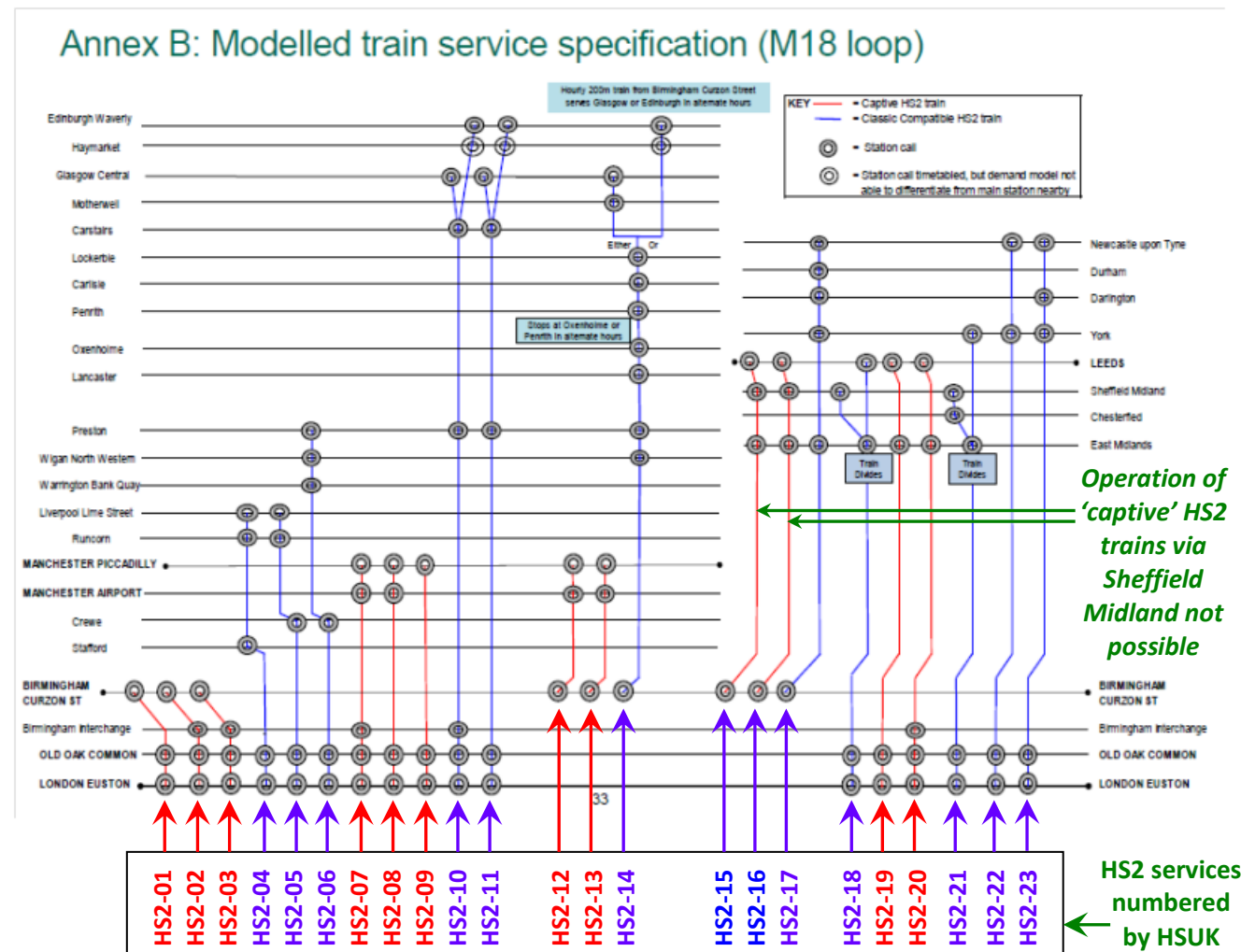


Figure E1 : Predicted HS2 Services (HS2 Ltd, 2016)

Numbering of Proposed HS2 Services for Detailed Journey Time Review by HSUK

| | |
|--------|--|
| HS2-15 | Leeds-Sheffield-Toton-Birmingham Curzon St |
| HS2-16 | Leeds-Sheffield-Toton-Birmingham Curzon St |
| HS2-17 | Newcastle-Durham-Darlington-York- Toton-Birmingham Curzon St |
| HS2-18 | Leeds/Sheffield-Toton-Old Oak Common-London |
| HS2-19 | Leeds-Toton-Old Oak Common-London |
| HS2-20 | Leeds-Toton-Birmingham Interchange-Old Oak Common-London |
| HS2-21 | Sheffield/York-Toton-Old Oak Common-London |
| HS2-22 | Newcastle-York-Old Oak Common-London |
| HS2-23 | Newcastle-Darlington-York-Old Oak Common-London |