High Speed UK

Connecting the Nation, Connecting the Northern Powerhouse, and Connecting Wakefield

Who are we?

- Colin Elliff BSc CEng MICE

  Civil Engineering Principal, HSUK

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- Quentin Macdonald BSc(Eng) CEng MIET FIRSE

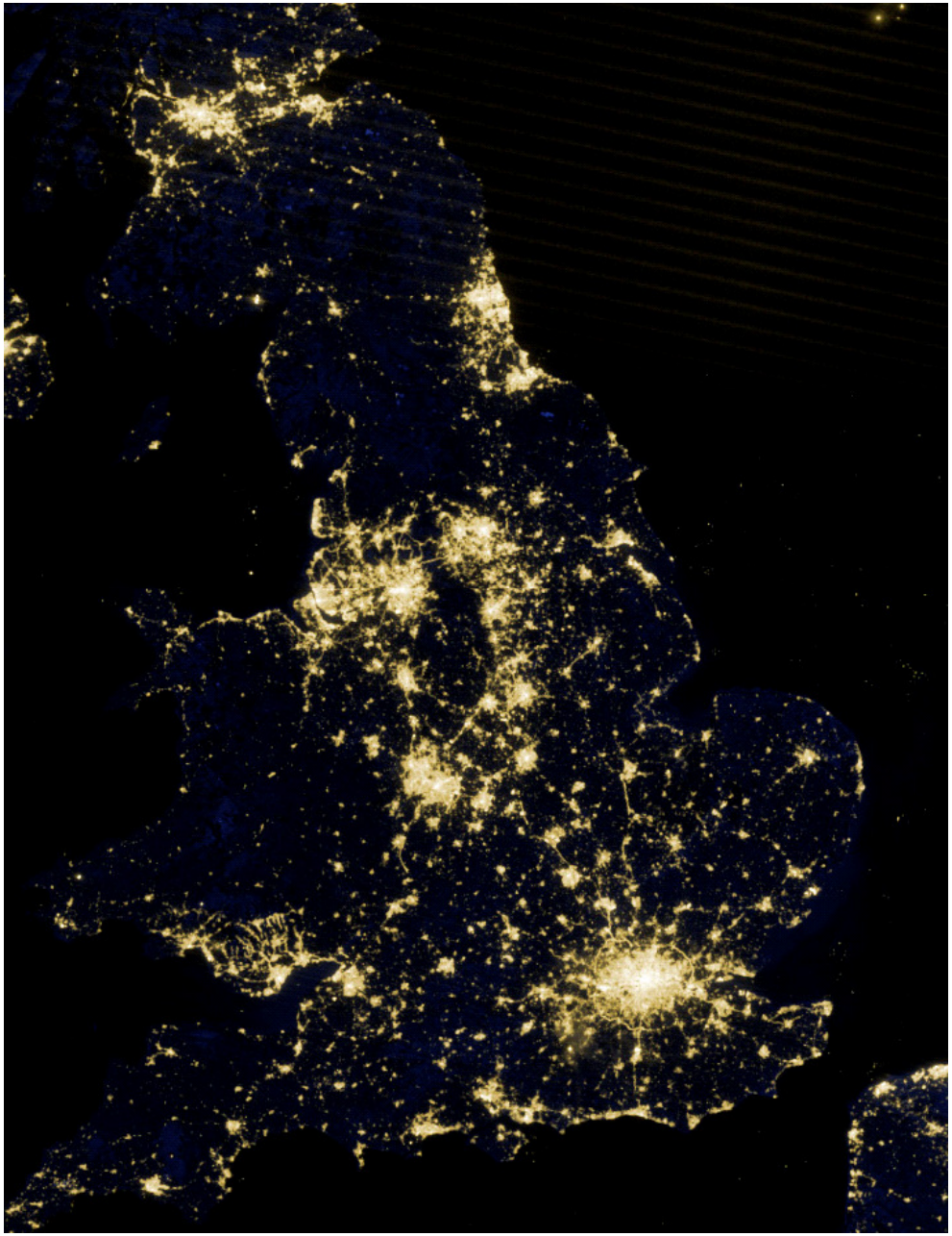
  Systems Engineering Principal, HSUK

Colin Elliff – in one page

- 1958: Born in Darlington
- 1963-1976: Schooling in Hexham & Harrogate
- 1976-1979: BSc in Civil Engineering, Bristol Uni
- 1980: Joined British Rail, started at York
- 1989: Transferred to BR Southern at Croydon
- 1995: TUPE'd to major railway consultant
- 2001: *Rails around London* (ICE paper)
- 2004: Returned to Harrogate, same employer
- 2006: Started developing HSUK concept
- 2010: Gagging order from consultant employer
- 2013: Retired to work full-time on HSUK

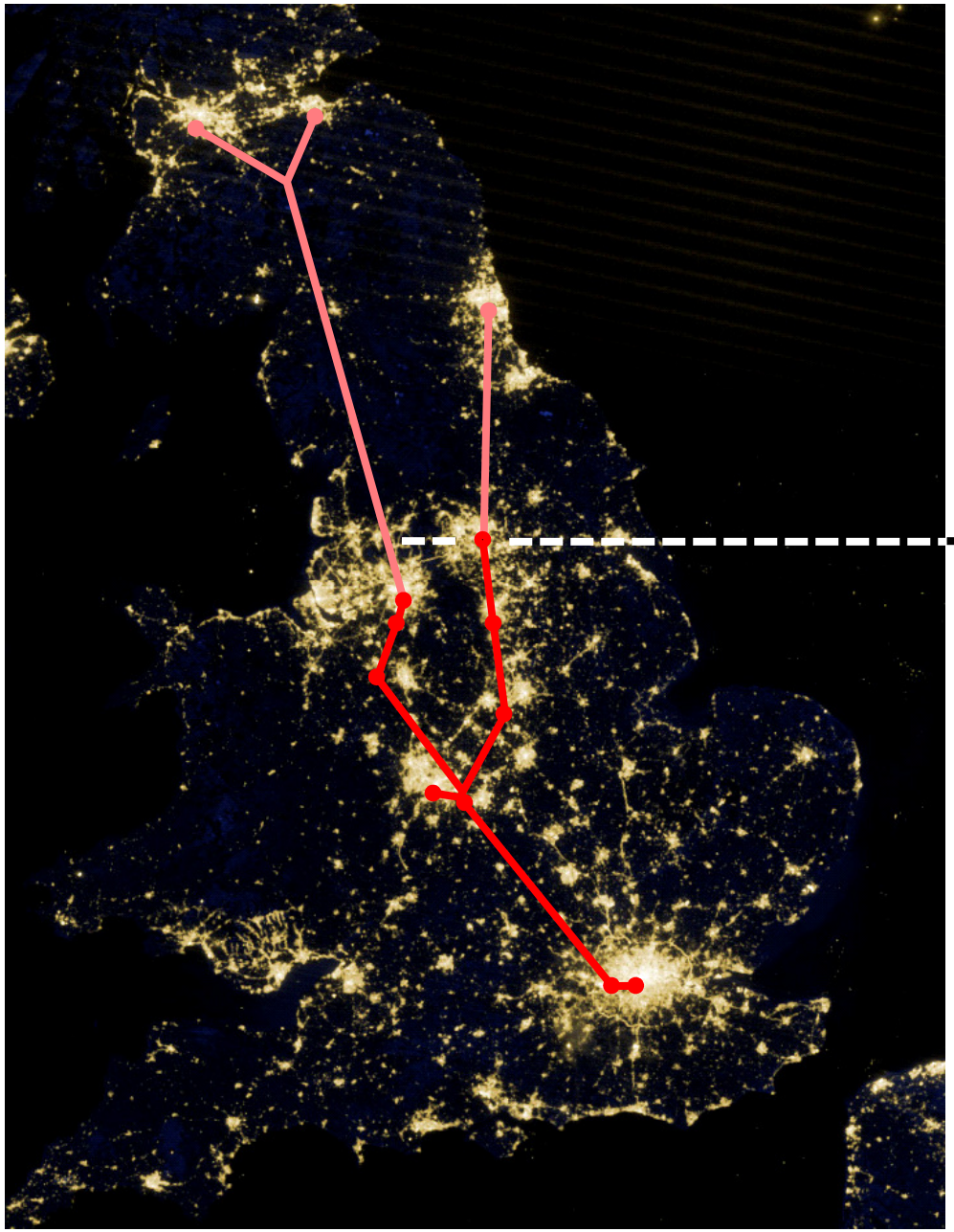
What is HSUK?

- A complete alternative **design** to HS2
- Designed because of the obvious deficiencies of the HS2 design as seen through the eyes of professional railway engineers
- Work began 11 years ago and the essence of the design was complete 4 years ago
- Since then primary focus on analysing the performance of HSUK as a railway system to create a fully integrated UK intercity network



The far from blank canvas of the UK waiting for new railways to traverse it

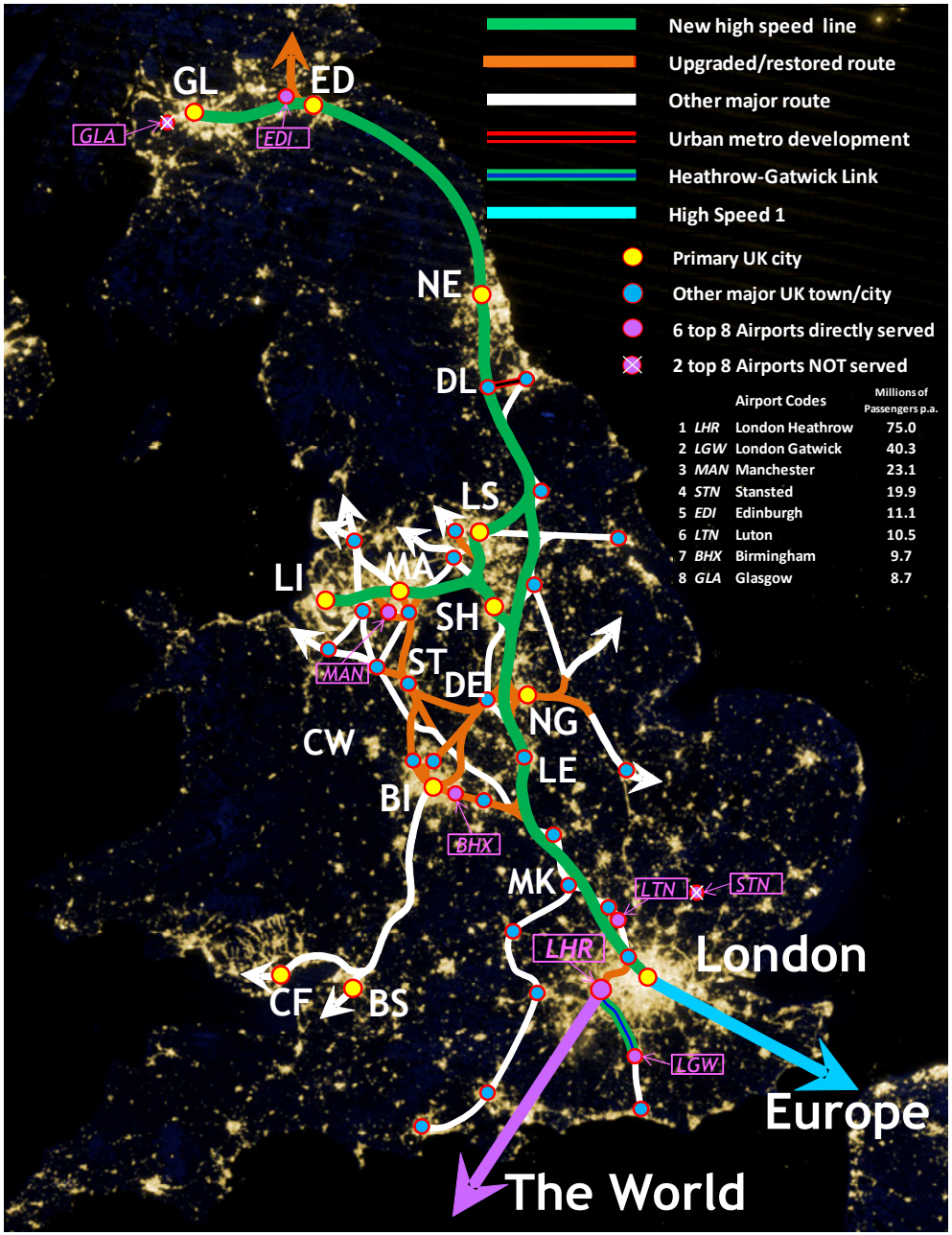
HSUK – High Speed UK – Connecting the Nation



The HS2 proposition

- £55bn for ‘Y’
- No transpennine link, hence HS3
- No integration with existing network

HSUK – High Speed UK – Connecting the Nation

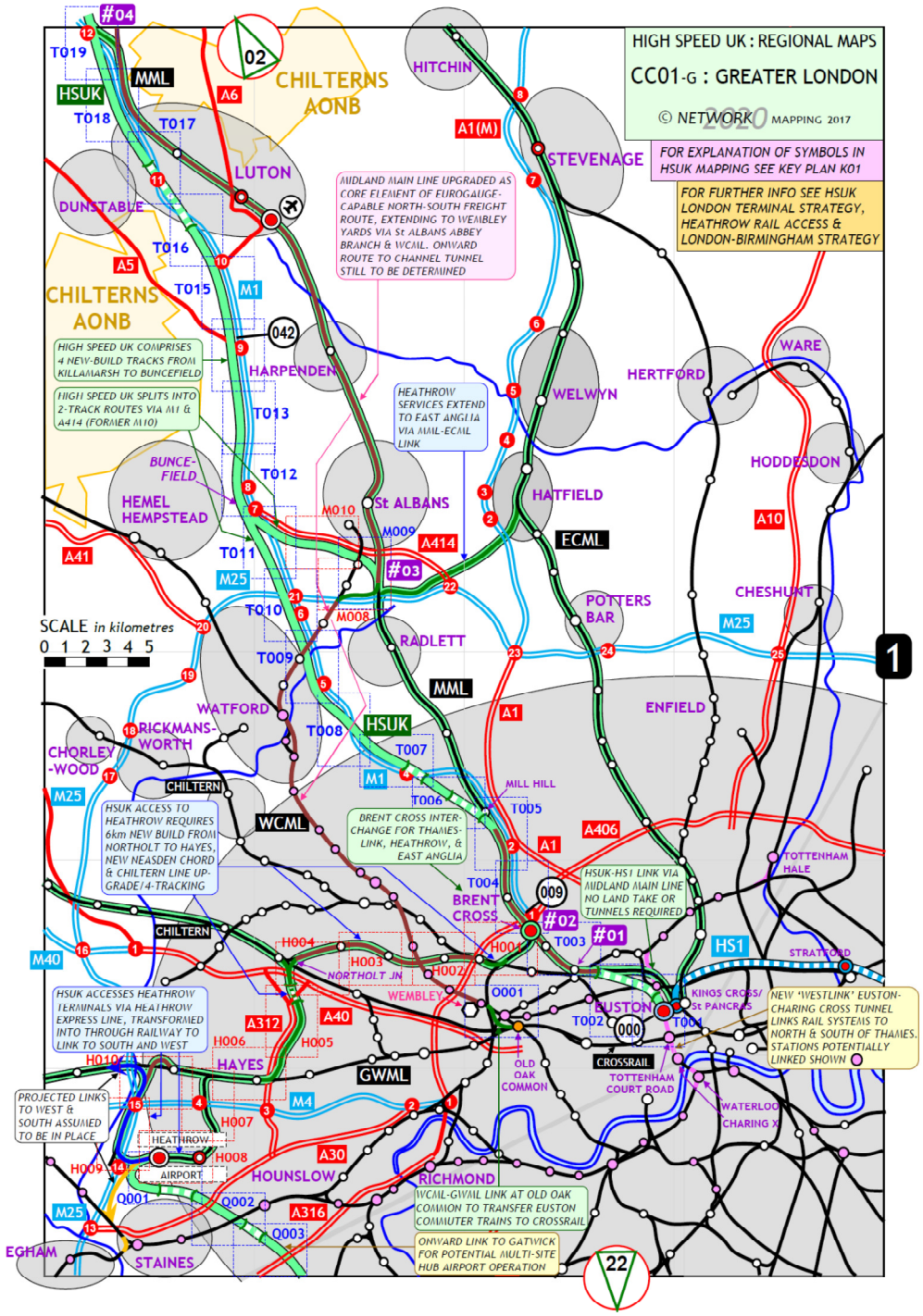


Scope of HSUK

- Full programme of UK intercity rail development
- ~£55bn for equivalent to HS2 ‘Y’
- Integral trans-pennine link
- Full integration with existing network

The HSUK Design

- HSUK is a design which consists of a mixture of new high speed line, upgraded existing lines and reopened lines.
- Fully mapped at a scale of 1:200,000 displaying scope of design. 21 sheets cover from London to Glasgow.
- Fully designed at 1:25,000, ready to be taken to the next stage of detailed development.
- On 400+ alignment drawings every straight, every transition and every circular curve has been designed – with supporting vertical alignments.
- 'Demonstrator Timetable' based on HSUK route designs shows HSUK services & journey times.

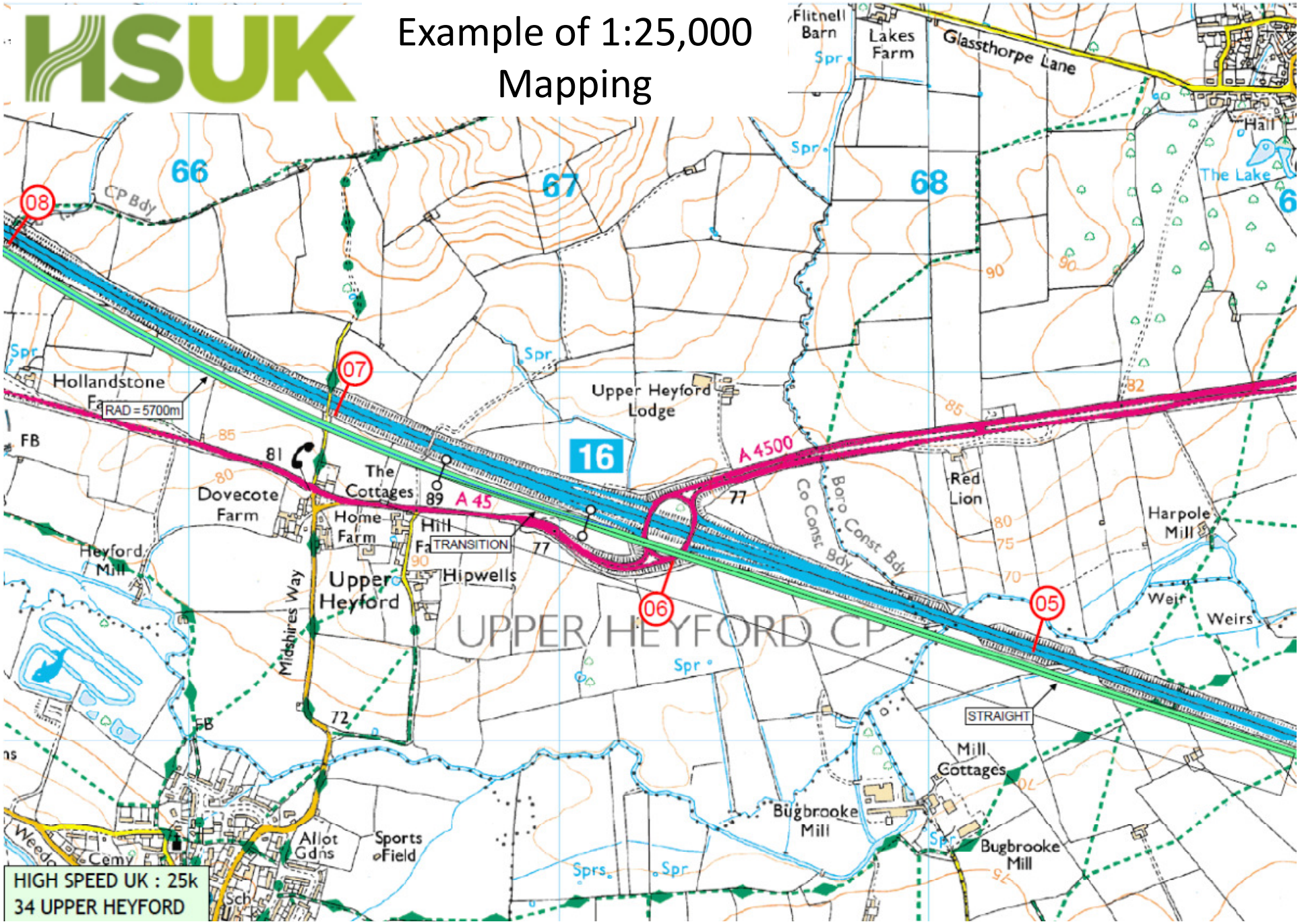


HSUK – High Speed UK –
Connecting the Nation

Example of 1:200,000 scale mapping

HSUK

Example of 1:25,000 Mapping



HS2's Mission Statement

- In evidence to the House of Commons HS2 Select Committee on 30th November 2015, Prof. Andrew McNaughton (then Technical Director of HS2 Ltd.) uttered the following 'Hostage to Fortune':
- **"The aim of the HS2 project is to deliver hugely enhanced capacity and connectivity between our major conurbations."**
- Good stuff - could anyone disagree with that?
- The question is ***does HS2 deliver it?***
- **Answering that question is one theme today.**
- **Introducing *HS2 – High Speed to Failure*:**

Connectivity – *What does it mean?*

- Connectivity – the state of being connected – availability & ease of undertaking a journey
- 4 key measures employed by HSUK:
  1. Journey time reduction
  2. Number of direct journeys possible
  3. Number of journeys made faster
  4. Number of journeys 'made worse'
- 'Made worse' =
  1. Frequency reduced
  2. Journey made slower
  3. Change introduced or new walking transfer

Capacity – *What does it mean?*

- Capacity – how many trains per hour??
- The real Capacity issue – the provision of sufficient 'space' in a railway system to run the trains necessary to achieve the required connectivity.
- Capacity influenced by:
  1. Number of available routes
  2. Number of available tracks
  3. Different types of rail traffic ie speed & stopping pattern
  4. Number of available platforms at stations
  5. Signalling system

What should HS2 achieve (1)?

- **NB only applies within the HS2 Zone of Influence**
  London, W. Midlands, E. Midlands, Merseyside, G. Manchester, S. Yorkshire, W. Yorkshire, Humberside, Teesside, Tyneside, Central Belt of Scotland
- Be accessible to the greatest possible proportion of the UK population X
- Deliver hugely enhanced connectivity and capacity between our major conurbations X
- Give the greatest reductions in journey time for the least cost and environmental damage X
- Improve links to UK's principal airports not just LHR (75.0) but also LGW (40.3), MAN (23.1), EDI (11.1), LTN (10.5), BHX (9.7 Millions of Passengers p.a.) X

What should HS2 achieve (2)?

- Enable the development of 'Powerhouse Economies' in all UK regions X
- Through good network design, maximise the opportunity for more freight to be transported on the existing network thereby reducing road congestion and pollution X
- Offer a scheme with a Benefit to Cost ratio of at least 4.0 as in the Treasury Green Book X
- Conform with all aspects of public policy e.g. the 80% target for reduction of CO_2 required by the 2008 Climate Change Act X

Does HS2 Pass the Tests?

We set 22 tests and judged HS2 against each one.

- HS2 fails every single one of the 22 tests.
- It is clear from the tests that HS2 is a very poor scheme which is not value for money.
- HSUK on the other hand passes all the tests.
- Key difference – HSUK designed as network, offering far greater capacity & connectivity.
- Copies of our report *HS2 – High Speed to Failure* available online www.highspeeduk.co.uk

HSUK – High Speed UK – Connecting the Nation

22 Tests of *HS2 - High Speed to Failure*

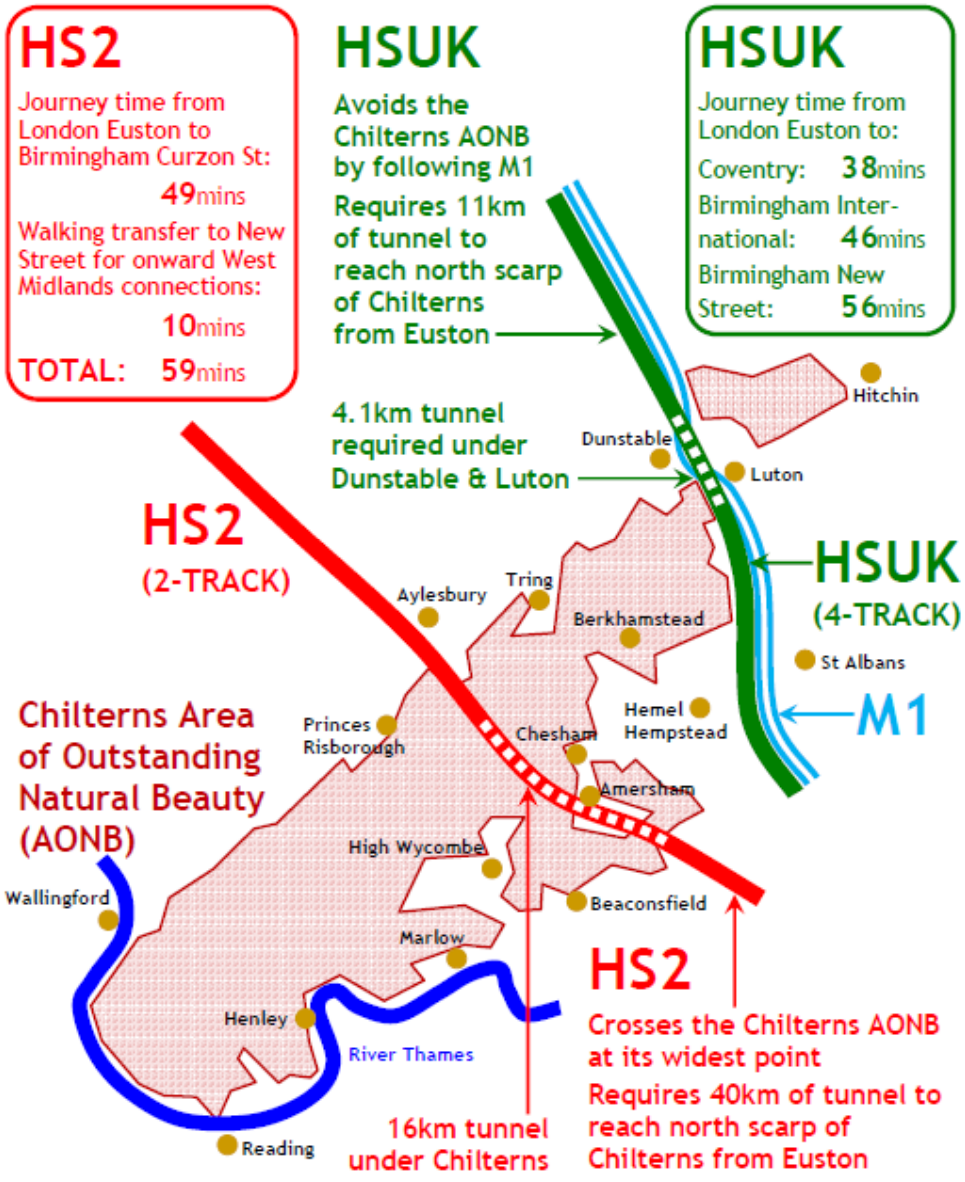
1	Connectivity	12	Midlands Engine
2	Capacity	13	Northern Powerhouse
3	City Centre Station	14	Route to Scotland
4	6 Principles of Network Design	15	Cost & BCR
5	Timetable	16	CO_2 Emission Reductions
6	London Hub Airport	17	Remit vs Objective
7	Heathrow access	18	Speed
8	European access / link to HS1	19	Option Selection
9	Freight strategy	20	Impartial Assessment
10	Chilterns or M1 routeing	21	Network Design
11	Euston access	22	Democracy/Consultation

HS2 fails all 22 Tests

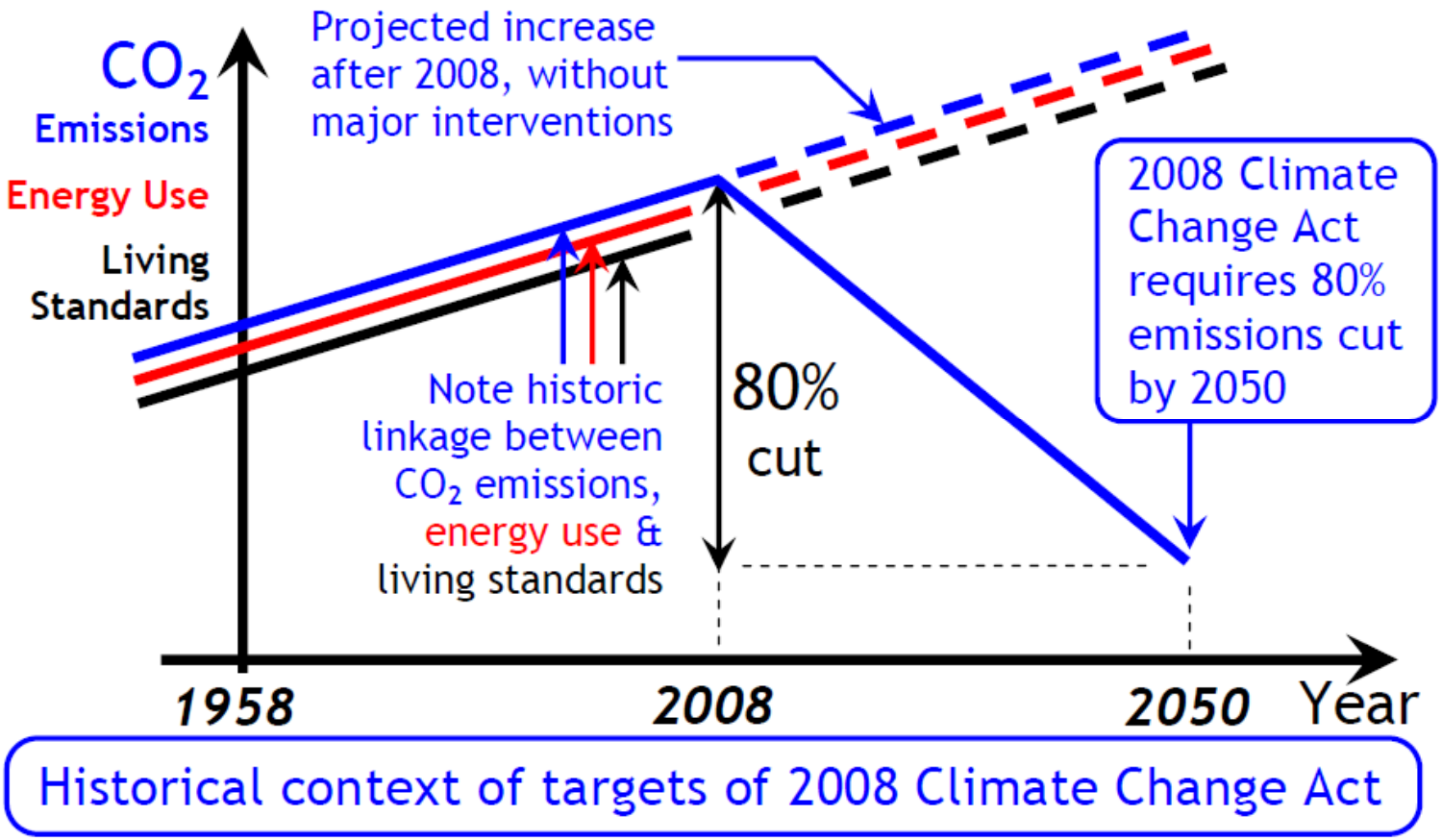
Chilterns or M1 route??

HS2
London-B'ham Phase1 cost **£22bn**
Route length **175km**
Tunnel length **50km**

HSUK
London-B'ham Phase1 cost **£14bn**
Route length **180km**
Tunnel length **12km**

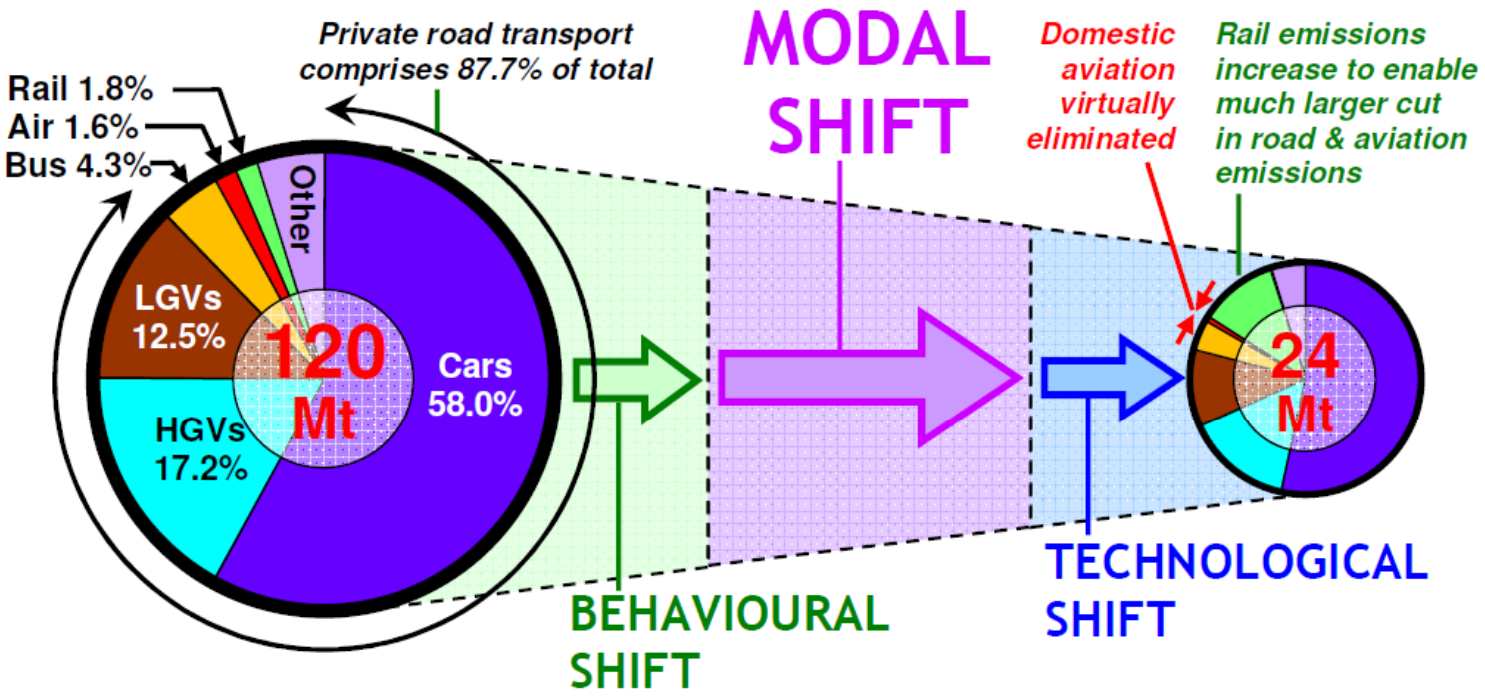


Environmental Implications (1)



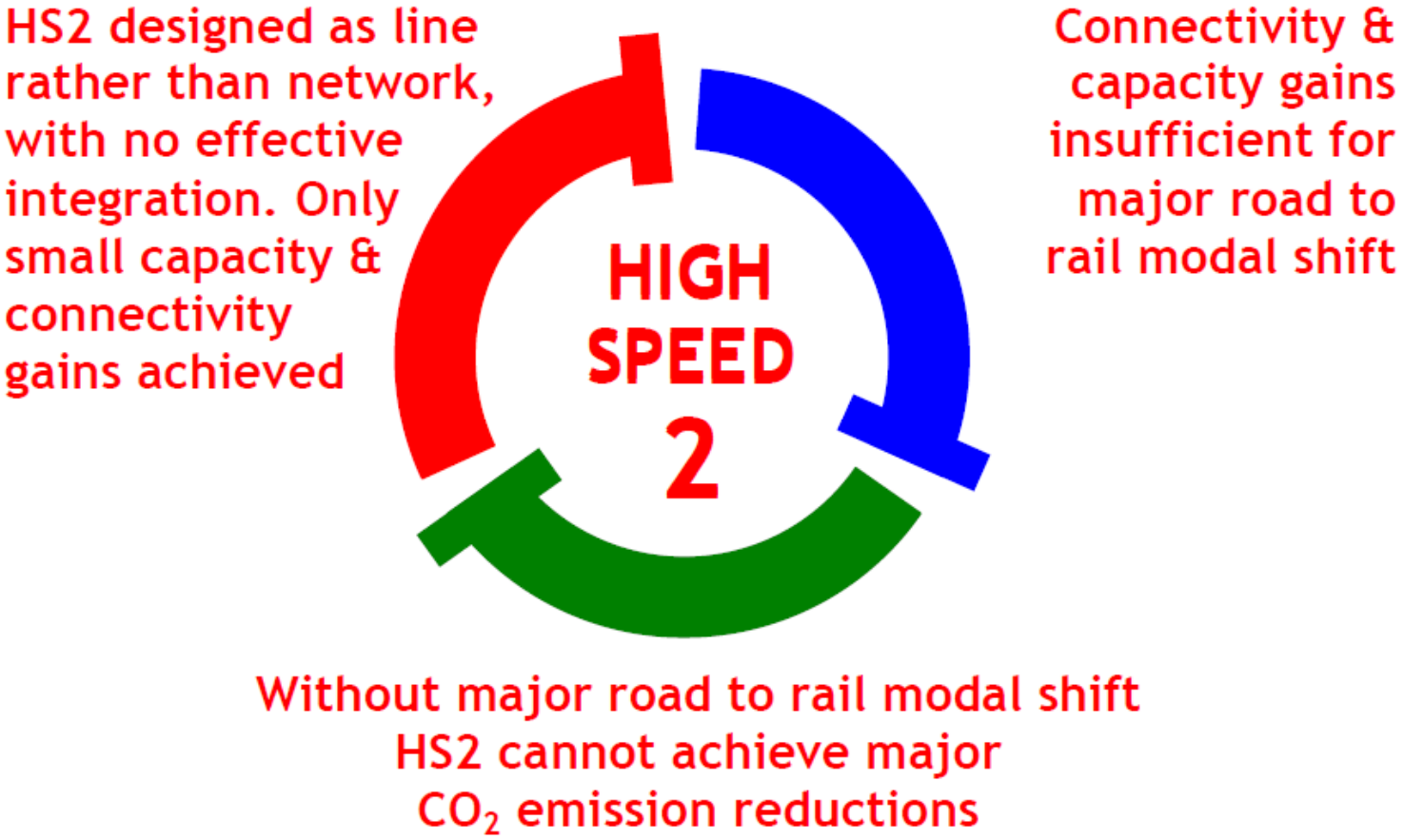
- 80% target not achievable through 'business as usual'

Environmental Implications (2)



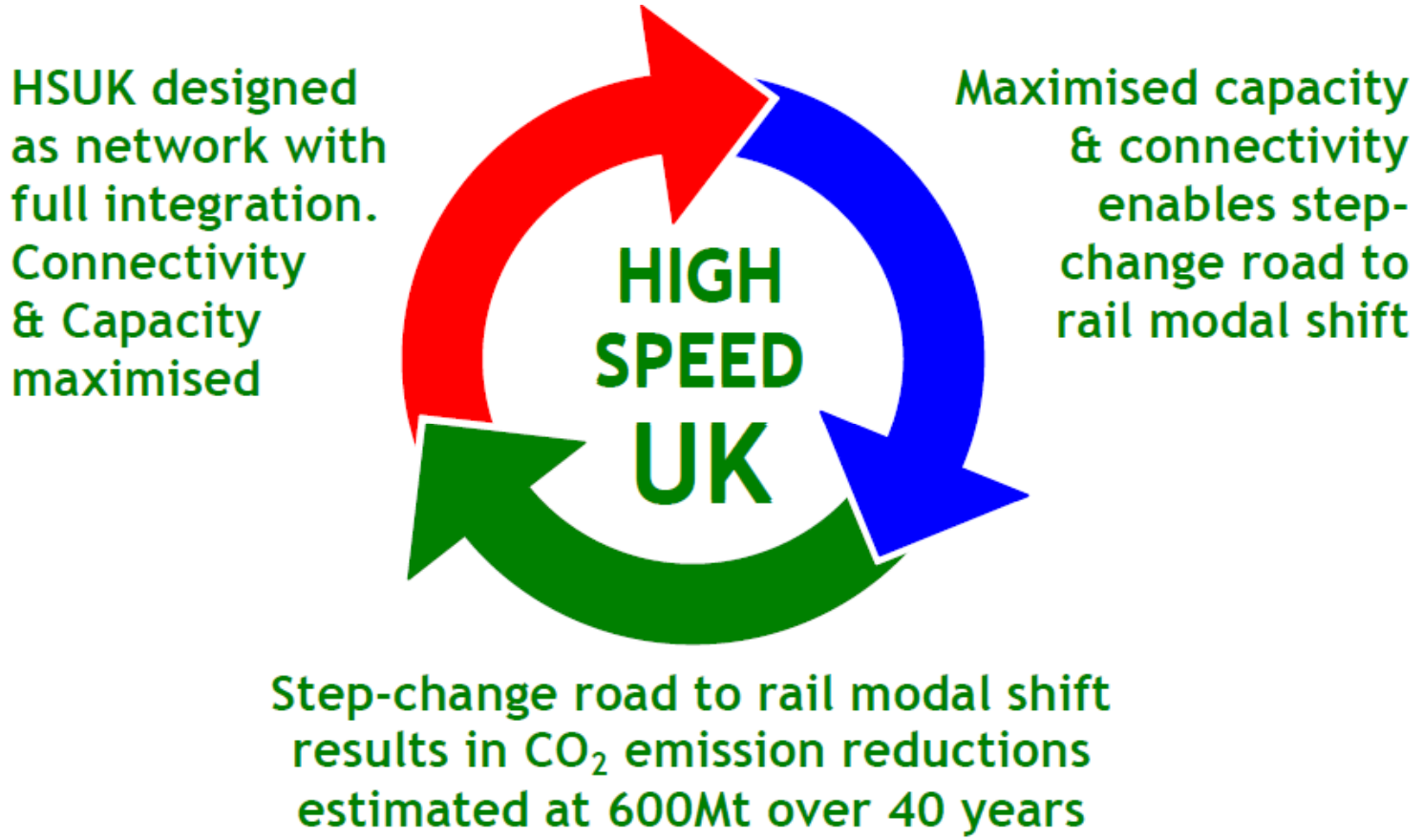
- 25% of CO_2 emissions from the transport system
- Step-change modal shift offers greatest opportunity

Environmental Implications (3)



- Connectivity & capacity failures prevent HS2 from delivering modal shift & consequent CO_2 reductions

Environmental Implications (4)



- HSUK's connectivity & capacity enhancements achieve step-change modal shift & consequent CO_2 reductions

HSUK – High Speed UK – Connecting the Nation

HS2 - High Speed to Failure - Cost

HS2 and HS3

Infrastructure required to interlink London & 6 primary cities of the Midlands and the North:

699km new railway - *mostly clear of existing transport corridors*

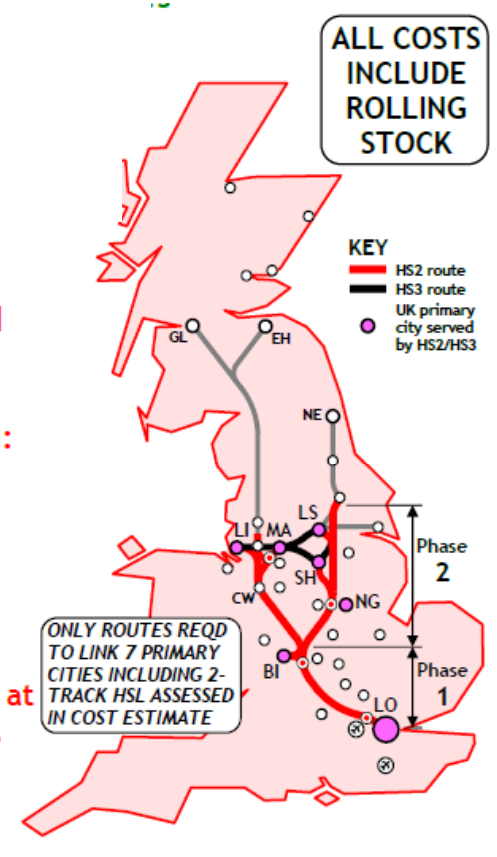
54km upgraded/restored

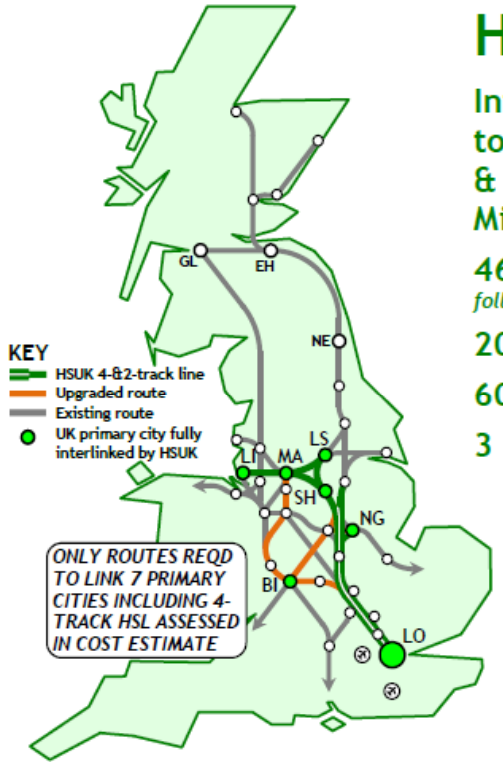
134km tunnel

8 new HS2 stations

Local integration projects at disconnected HS2 stations

Cost estimate £73bn





High Speed UK

Infrastructure required to fully interlink London & 6 primary cities of the Midlands and the North:

462km new railway - *mostly following existing transport corridors*

202km upgraded/restored

60km tunnel

3 new stations

Cost estimate £52bn

ALL COSTS INCLUDE ROLLING STOCK

In other words, HS2 is a complete waste of £21 Billion**
for the simple reason that it is not an efficient design

** *based on elements necessary to interlink 7 primary cities*

HS2 - High Speed to Almost Nowhere

- We decided that *High Speed to Failure* was not enough to convince people how bad HS2 is.
- A quantitative study was needed which would enable HS2's failure to be measured.
- 32 centres were chosen. 32 places to start your journey and, for each starting point, 31 places to finish it.
- That is a total of 496 journeys.
- The journey time for every one of the 496 has been calculated with HS2 and with HSUK and compared with today.
- The results are, we believe, alarming.

HS2 - High Speed to Almost Nowhere

32 Centres Considered in Journey Time Assessment:

- 7 Primary Cities – Birmingham, Leeds, Liverpool, London, Manchester, Nottingham, Sheffield
- 16 Second-tier Cities – Bradford, Coventry, Crewe, Derby, Doncaster, Huddersfield, Hull, Leicester, Luton, Milton Keynes, Northampton, Stockport, Stoke, Walsall, Warrington, Wolverhampton
- 3 Airports – Heathrow, Birmingham & Manchester
- 6 Gateway Cities – Cheltenham, Chester, Oxford, Peterborough, Preston & York
- 32 Centres, 496 possible journeys

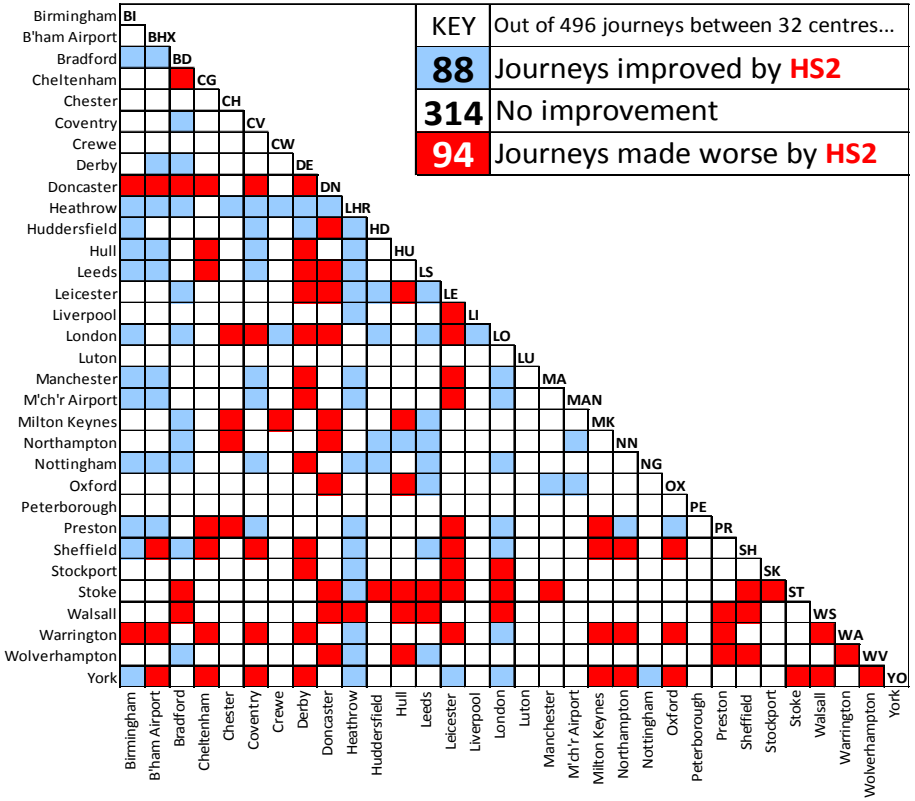
HSUK – High Speed UK – Connecting the Nation

“HS2 & HSUK Journeys Compared”

HIGH SPEED 2

NETWORK PERFORMANCE :

JOURNEYS IMPROVED/MADE WORSE



HIGH SPEED UK

NETWORK PERFORMANCE :

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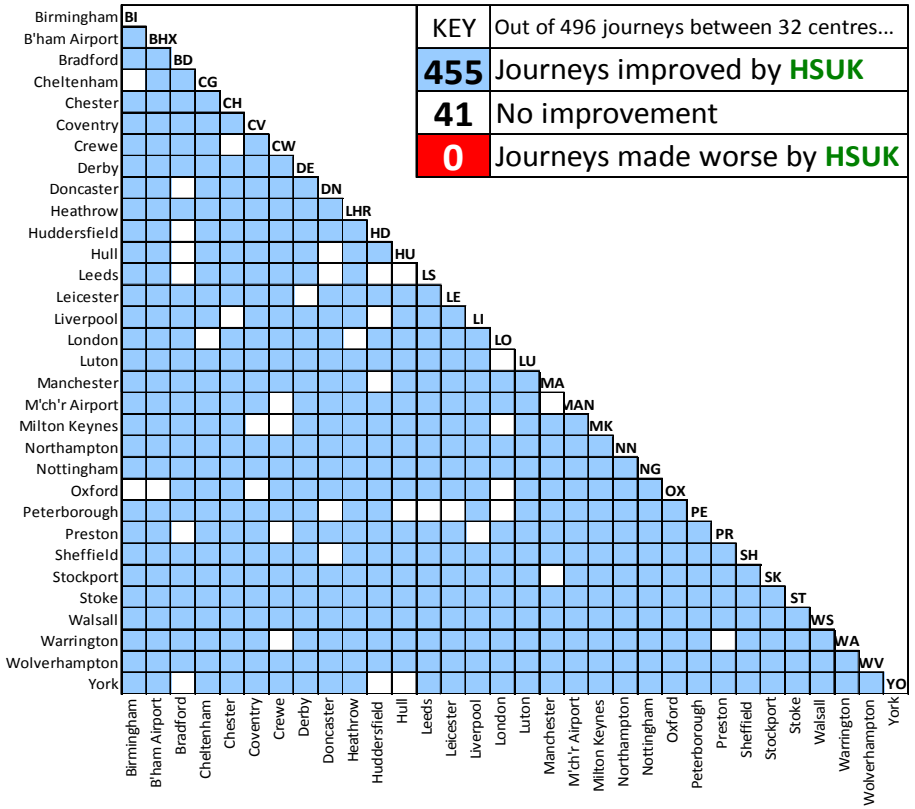

HSUK – High Speed UK – Connecting the Nation

“HS2 & HSUK Journeys Compared”

HIGH SPEED 2

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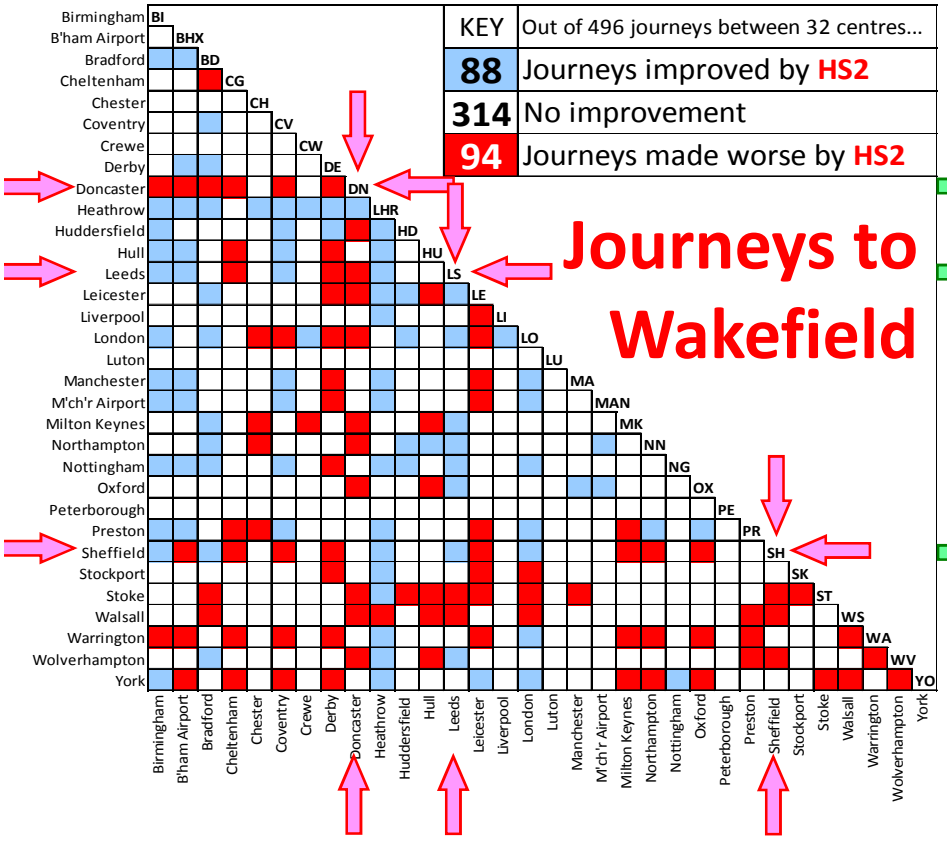
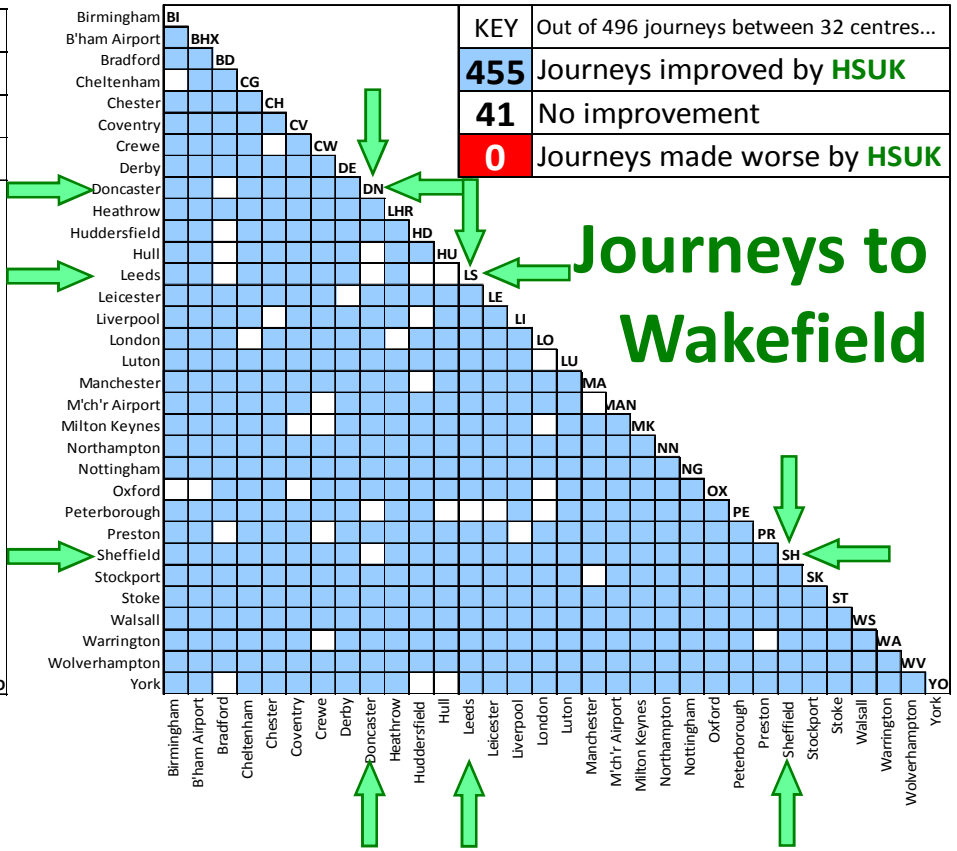


HIGH SPEED UK

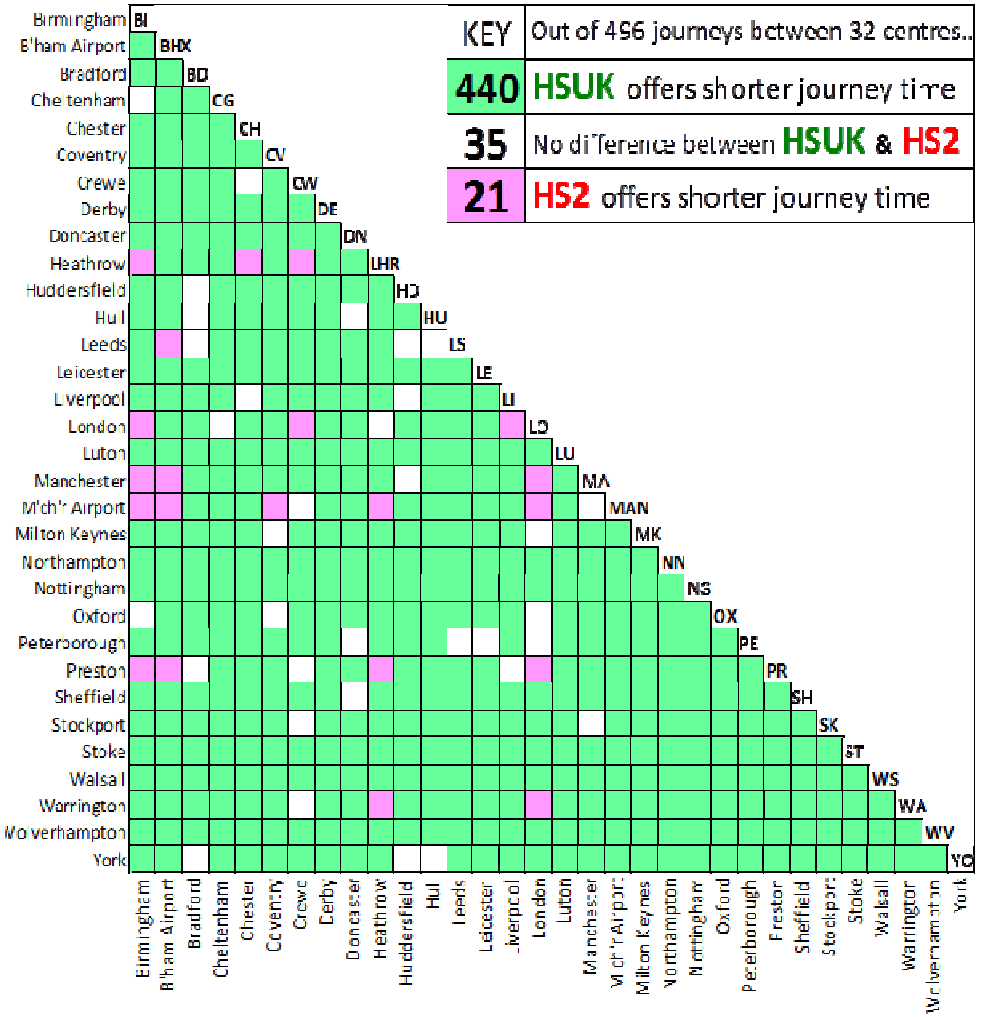
NETWORK PERFORMANCE :

JOURNEYS IMPROVED/MADE WORSE



HIGH SPEED UK & HS2

COMPARATIVE PERFORMANCE IN ACHIEVING JOURNEY TIME REDUCTIONS ACROSS NATIONAL NETWORK

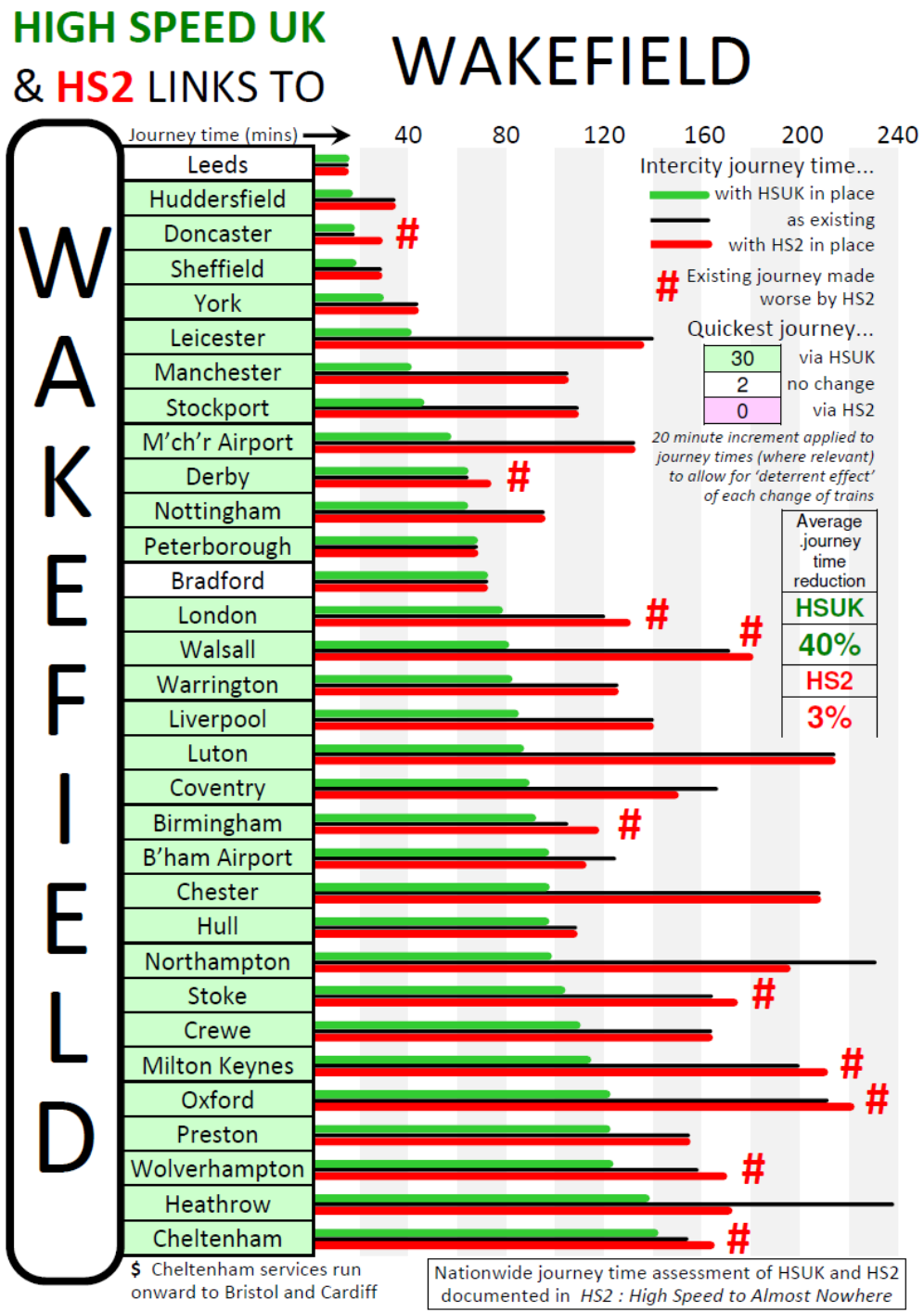


HSUK – High Speed UK
Connecting the Nation

HS2 vs HSUK Fastest Journey Times

Note: Journey Time of 2-leg journey A to C, with change at B, calculated:

- Travel time A to B, *plus*
- Change time at B, *plus*
- Travel time B to C, *plus*
- 20min 'change penalty'



HSUK – High Speed UK
Connecting the Nation

HS2 vs HSUK Journey Times to Wakefield Compared

Principal Findings of the Study (1)

1. HS2 will only benefit a select group of primary cities.
2. HS2 has insufficient capacity to serve other major cities (only 2 tracks in London - West Midlands spine).
3. HS2 fails as high speed railway – only 9% average journey time reduction.
4. HS2 provides no extra capacity for local services in regional cities.
5. HS2 is not future proofed.

Principal Findings of the Study (1)

1. HSUK will directly benefit all major UK cities.
2. HSUK has sufficient capacity to serve other major cities (4 track London - South Yorks spine).
3. HSUK succeeds as high speed railway – 46% average journey time reduction.
4. HSUK provides step-change capacity increase for local services in all principal regional cities.
5. HSUK is future proofed.

Principal Findings of the Study (2)

6. HS2 has only been designed as a line – not as a national network.
7. HS2 will seriously damage the existing national rail network.
8. HS2 will be the fastest railway in the world and possibly provide the slowest network.
9. HS2 will reinforce the North-South divide.
10. HS2 has never been technically optimised as a railway system.

Principal Findings of the Study (2)

6. HSUK has been designed as a network.
7. HSUK will greatly enhance the existing national rail network.
8. HSUK may not be the fastest railway in the world but should achieve the greatest overall acceleration of an existing network.
9. HSUK should reverse the North-South divide.
10. HSUK's achievement in designing an enhanced national railway system is unparalleled.

HS2 - High Speed to Almost Nowhere

- This document is a report on the findings of the study of 496 journeys.
- Currently on our web site in draft form.
- It will be finalised soon and published.
- HS2 fails abysmally as a national network, offering no worthwhile gains in capacity and connectivity.
- Does it do any better as a local system offering benefits for Wakefield & for the North?

HSUK – High Speed UK – Connecting the Nation

High Speed Rail in Wakefield – 5 Key Requirements

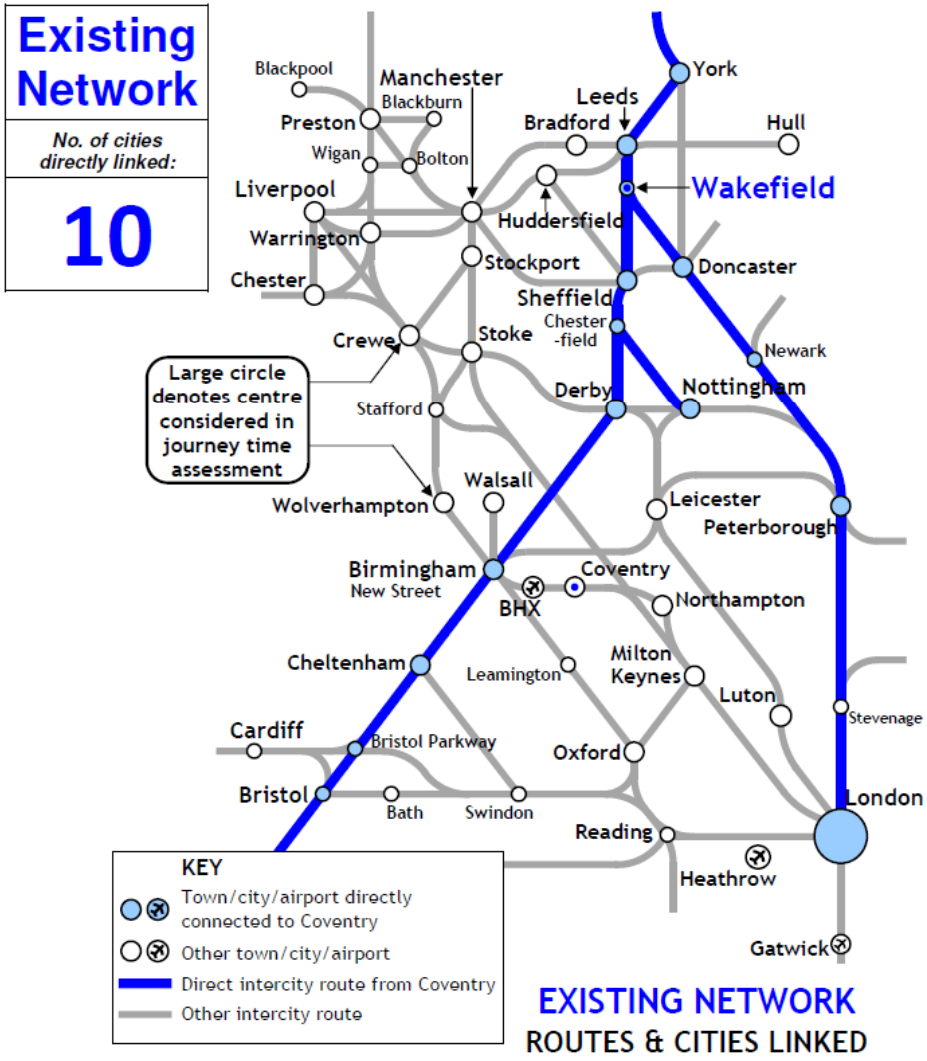
1. Direct links to other major UK cities, or
2. Improved intercity links with change at Leeds, Sheffield or Doncaster
3. Direct links to other cities of the Northern Powerhouse
4. Local capacity/connectivity gains in links to Leeds, Sheffield & Doncaster
5. Full integration between local and national networks

Wakefield – It's a Major Community

- Borough Population 320,000
- Wakefield City Population 78,000
- 'Five Towns' separate area
- Intercity Connectivity of Wakefield must be maintained
- Local Connectivity of Wakefield and 5 Towns must be improved

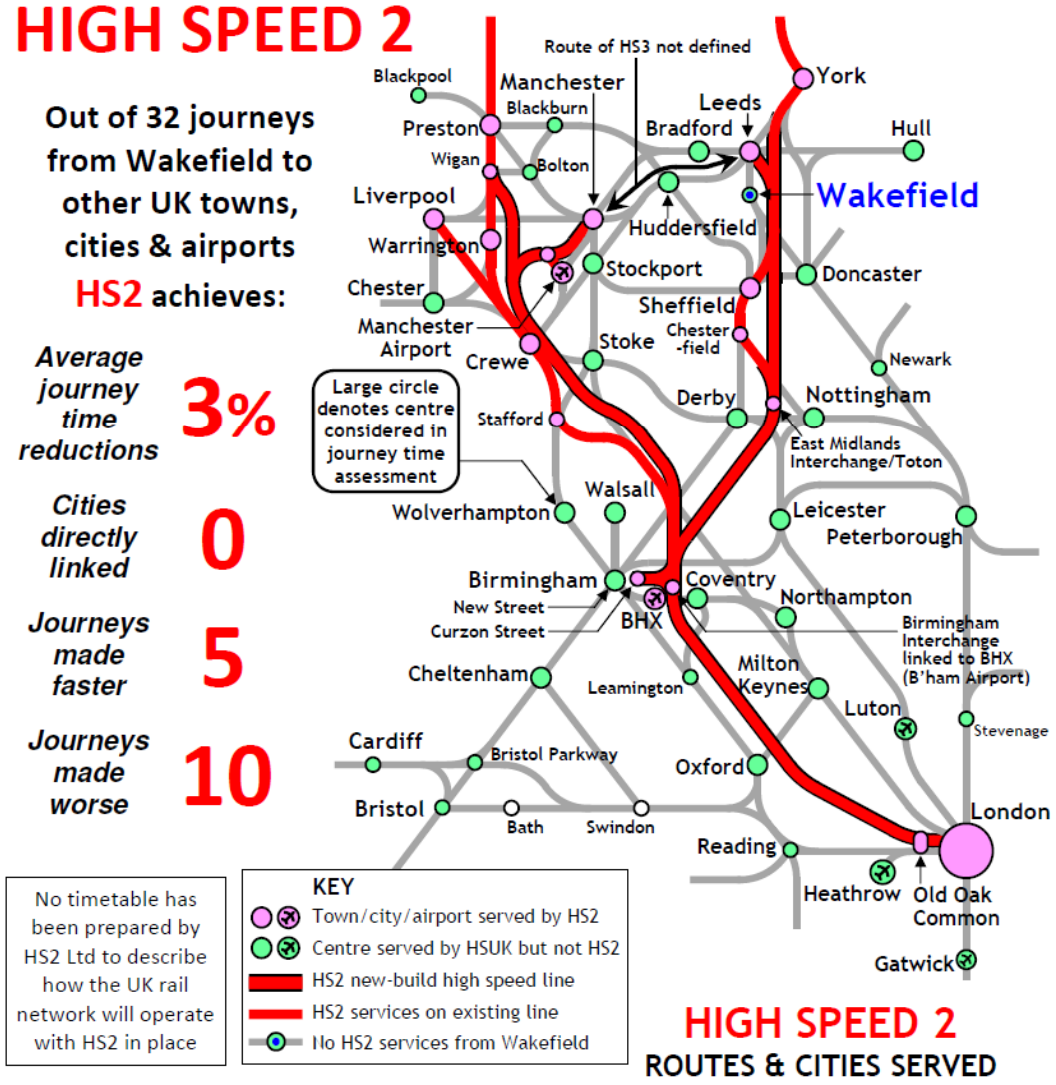
Present Rail Links to Wakefield

Direct links to all major UK cities via intercity network??



No HS2 services to Wakefield

Direct links to all major UK cities via HS2??



Reduced Intercity Services to Wakefield

Intercity services to London reduced from 2tph to 1tph

Xcountry services diverted via Toton

hs2 engine for growth

2tph Birmingham-Manchester.	2tph to/from Newcastle, also calling at Old Oak Common and either York or Darlington.	ICEC, Great Northern and TransPennine - net 11 fewer services per day, new 16-train Peterborough-King's Cross service, from 1 to 16 Lincoln-King's Cross trains, reduction from 45 to 16 ICEC Leeds-London services (NB overall Leeds-Euston frequency increased) and 10 fewer ICEC Edinburgh-London services (note ICWC services via Manchester described above).
2tph Birmingham-Leeds, calling at Toton and Sheffield.	1tph providing a second hourly service to/from York, also calling at Old Oak Common and Toton.	CrossCountry services to North East and North West - no change in frequency, additional stops at Birmingham International, Coventry, Sheffield HS, Toton, Alfreton, Macclesfield and Congleton, and some services shortened from Edinburgh/Newcastle to Newcastle/York.

HIGH SPEED TWO (HS2) LIMITED

HS2 Regional Economic Impacts

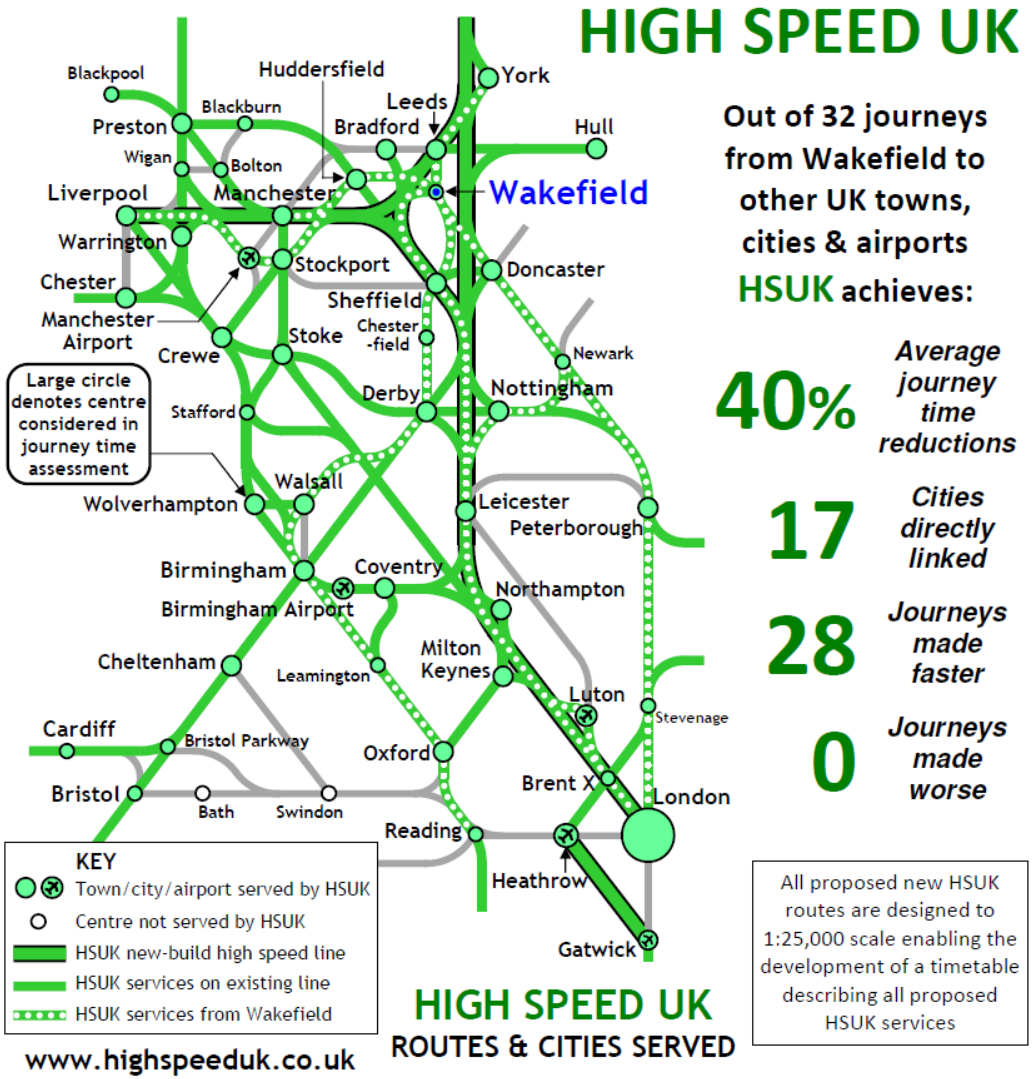
Table 23, pp91-92, HS2 Regional Economic Impacts (2013)

Hemsworth Parkway??

- No substitute for HS2 services to central station in Wakefield
- No local rail links - only served by road
- Unlikely to generate sufficient traffic to justify frequent services
- Poor range of services
- Journey time penalties for Leeds & York
- Parkways rarely a good solution for high speed intercity rail

High Speed Rail in Wakefield

Direct links to all major UK cities via HSUK??



HSUK – High Speed UK – Connecting the Nation

Journey Time Benefits for Wakefield

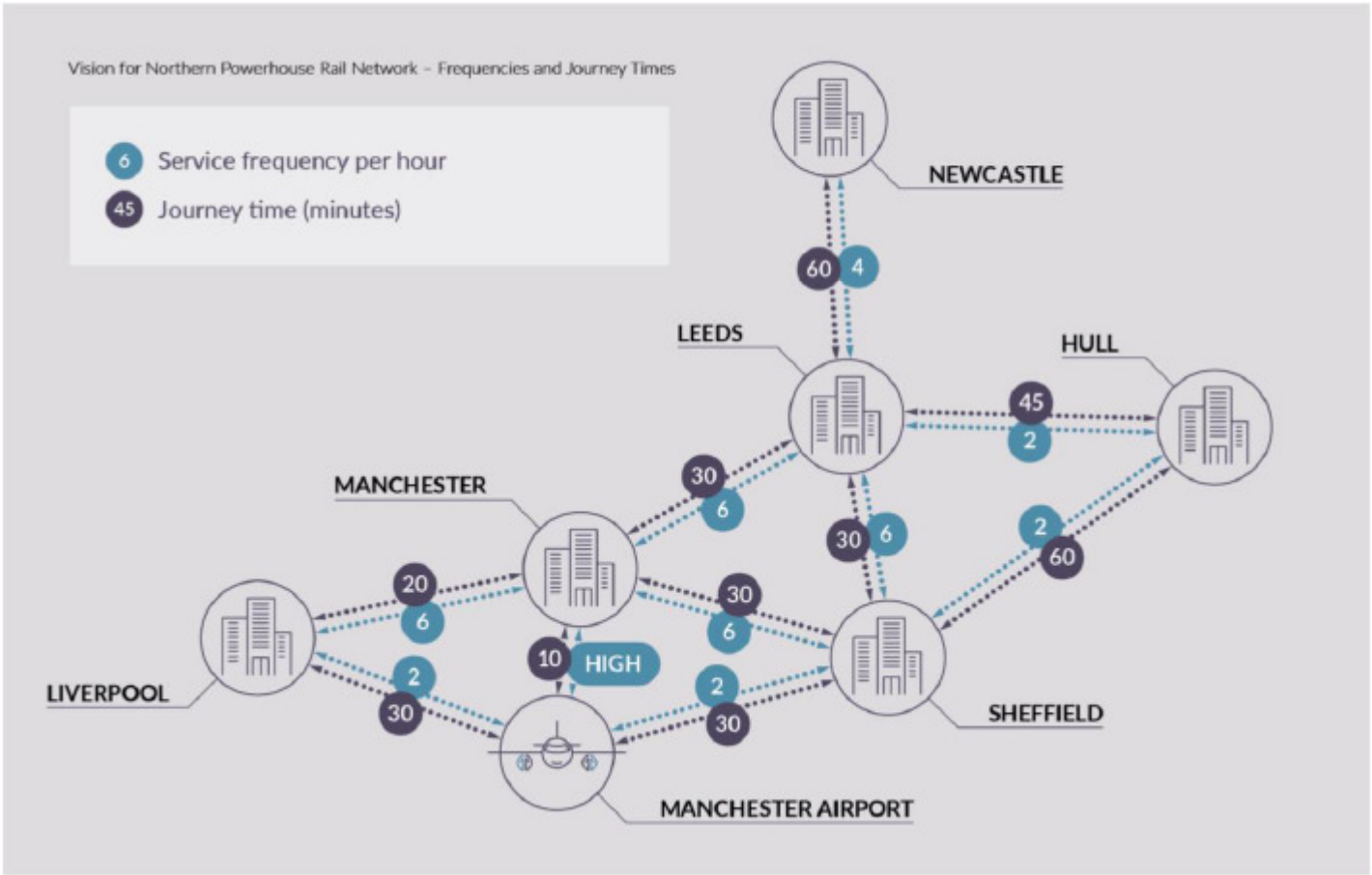
Northern City/ Airport	HIGH SPEED UK				HS2			
	Average journey time reduction	Cities directly linked by HSUK services	Journeys made faster (out of 31)	Journeys made worse (out of 31)	Average journey time reduction	Cities directly linked by HS2 services	Journeys made faster (out of 30)	Journeys made worse (out of 30)
Bradford	50%	12	25	0	13%	0	12	4
Doncaster	37%	16	25	0	1%	0	1	16
Huddersfield	40%	17	26	0	8%	0	8	2
Hull	32%	16	26	0	3%	0	5	8
Leeds	50%	30	26	0	20%	4	12	5
Liverpool	43%	27	28	0	4%	2	2	1
Manchester	42%	29	28	0	13%	4	6	3
M'ch'r Airport	43%	13	29	0	18%	4	7	2
Sheffield	53%	31	30	0	8%	3	5	11
Wakefield	40%	17	28	0	3%	0	5	10
York	42%	24	28	0	9%	2	5	10

Making the Northern Powerhouse Happen – 6 Key Railway Requirements

1. Development of high quality fast & direct links between all key Northern centres.
2. Creation of new transpennine route.
3. Equal priority for Yorkshire & Lancashire.
4. Adherence to Northern Powerhouse targets.
5. Inclusion of smaller communities.
6. Maintenance of high quality links to London.

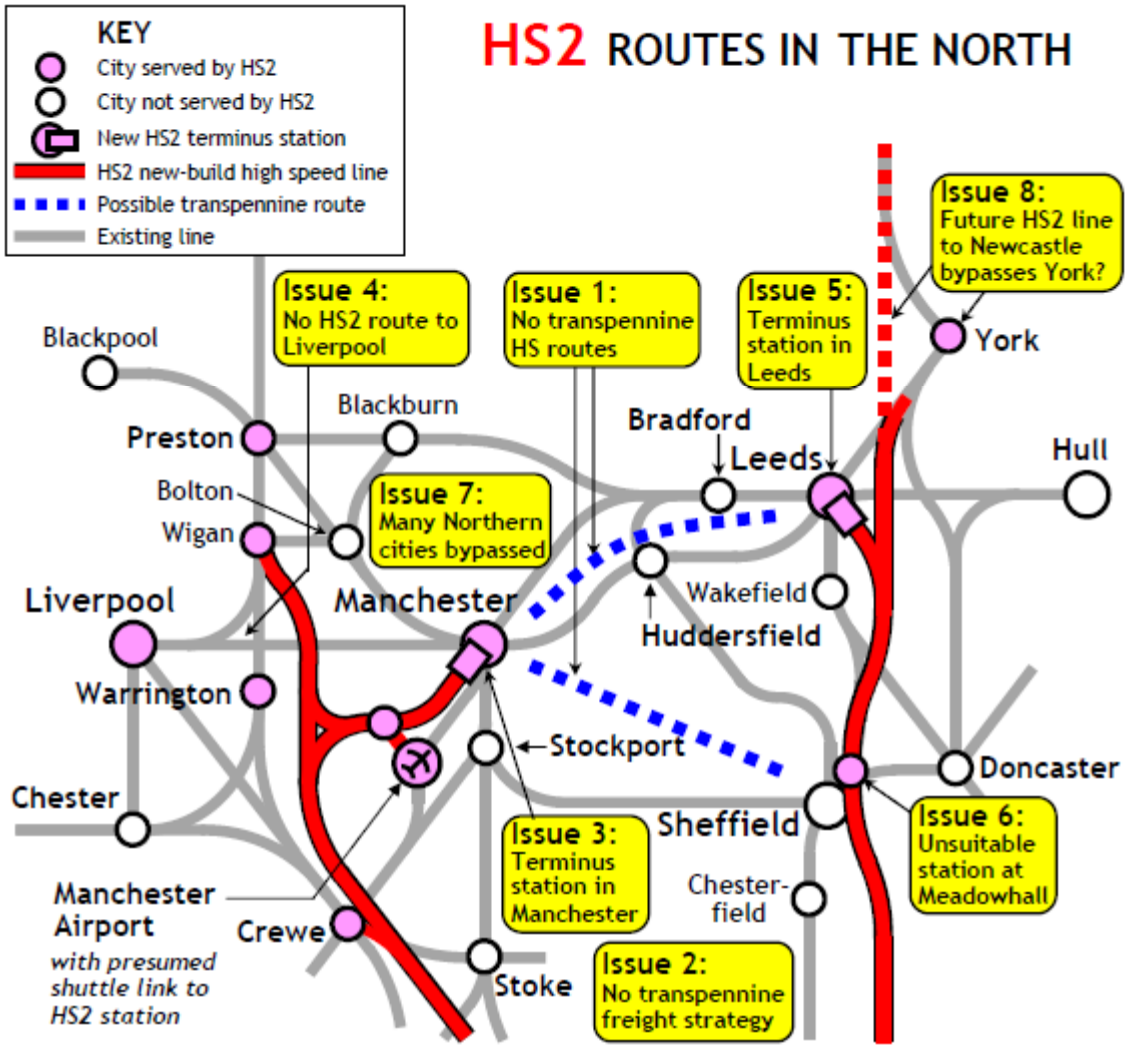
Northern Powerhouse Rail Links

Northern Powerhouse/HS3 Specification



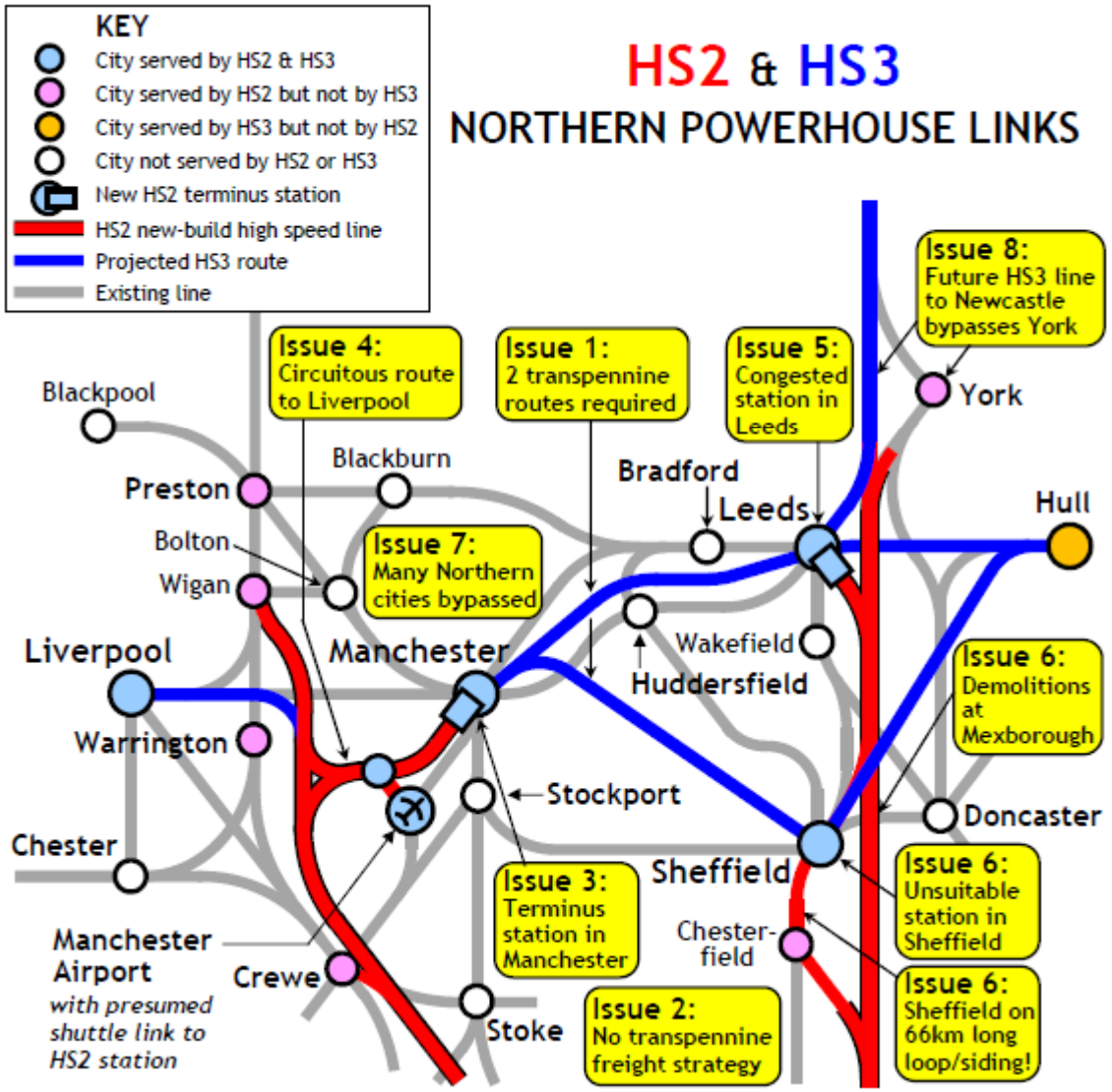
Northern Powerhouse Rail Links

Direct links to all cities of the Northern Powerhouse via HS2??



Northern Powerhouse Rail Links

Direct links to all cities of the Northern Powerhouse via HS3??



Northern Powerhouse Rail Links

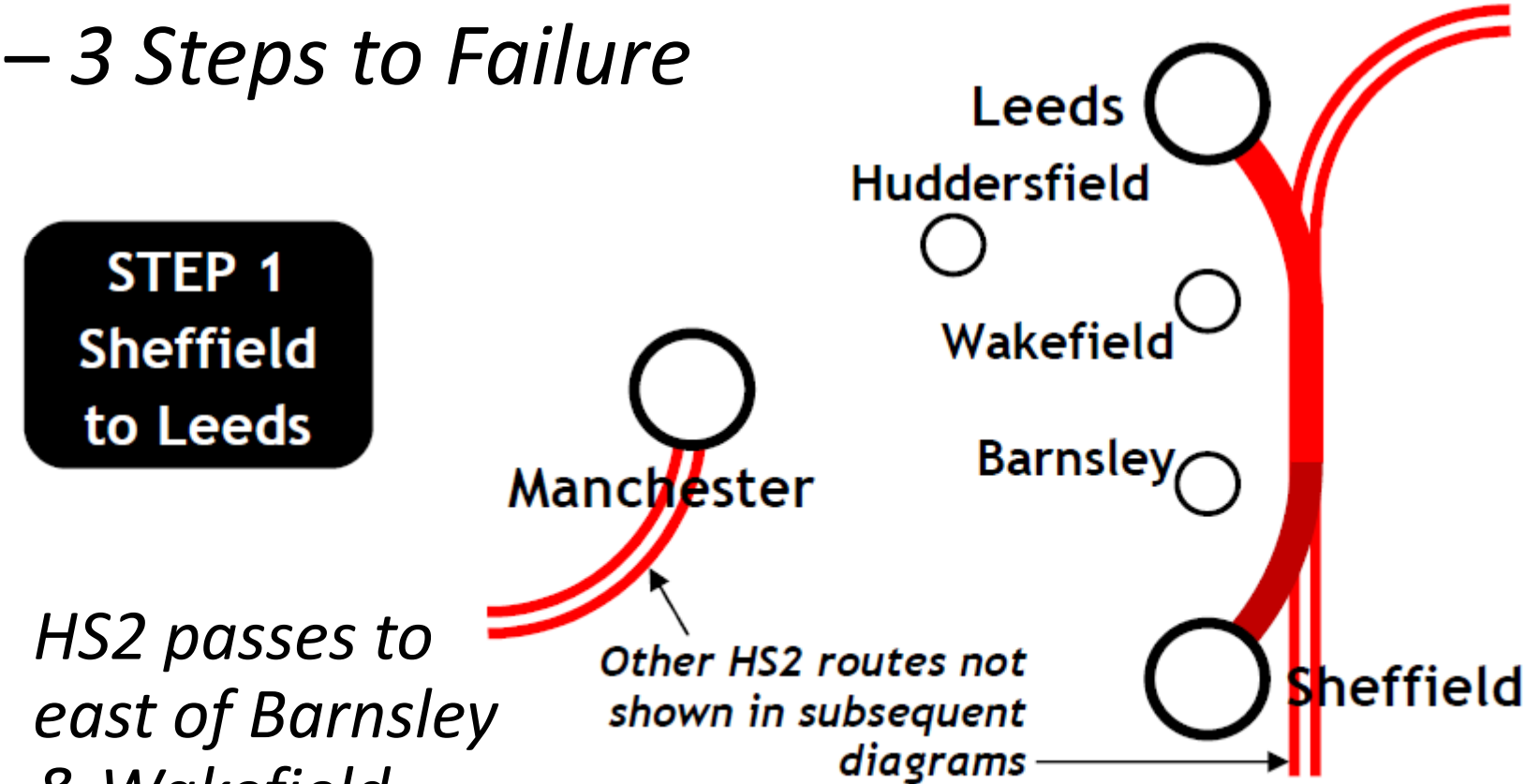
HS2 – 2 direct links out of 28 possible

Hull	HU							HS2 direct link
Leeds	o	LS						No HS2 link
Liverpool	o	o	LI					
Manchester	o	o	o	MA				
M'ch'r Airport	o	o	o		MAN			
Newcastle	o	o	o	o	o	NE		
Sheffield	o		o	o	o	o	SH	
Wakefield	o	o	o	o	o	o	o	WF
	HU	**LS**	**LI**	**MA**	**MAN**	**NE**	**SH**	**WF**
London	o							o

28 possible direct links between 8 centres

Northern Powerhouse Rail Links

The Northern Powerhouse
– 3 Steps to Failure

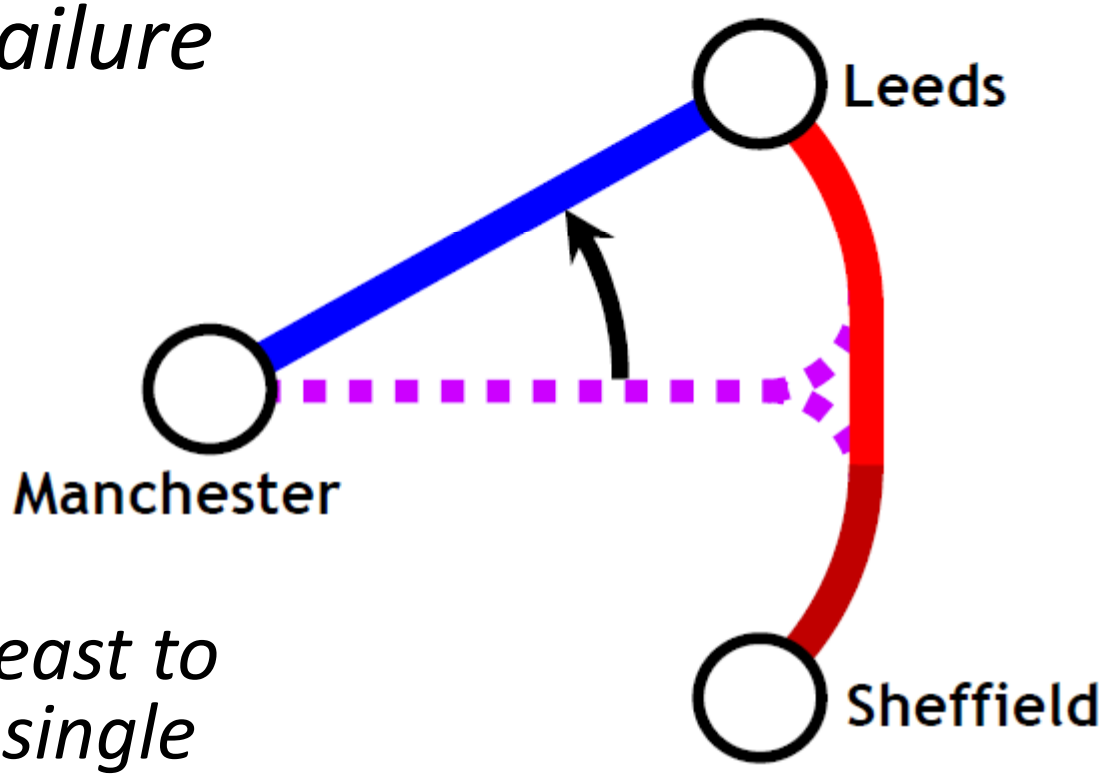


HS2 passes to east of Barnsley & Wakefield

Northern Powerhouse Rail Links

The Northern Powerhouse
– *3 Steps to Failure*

STEP 2
Leeds to Manchester

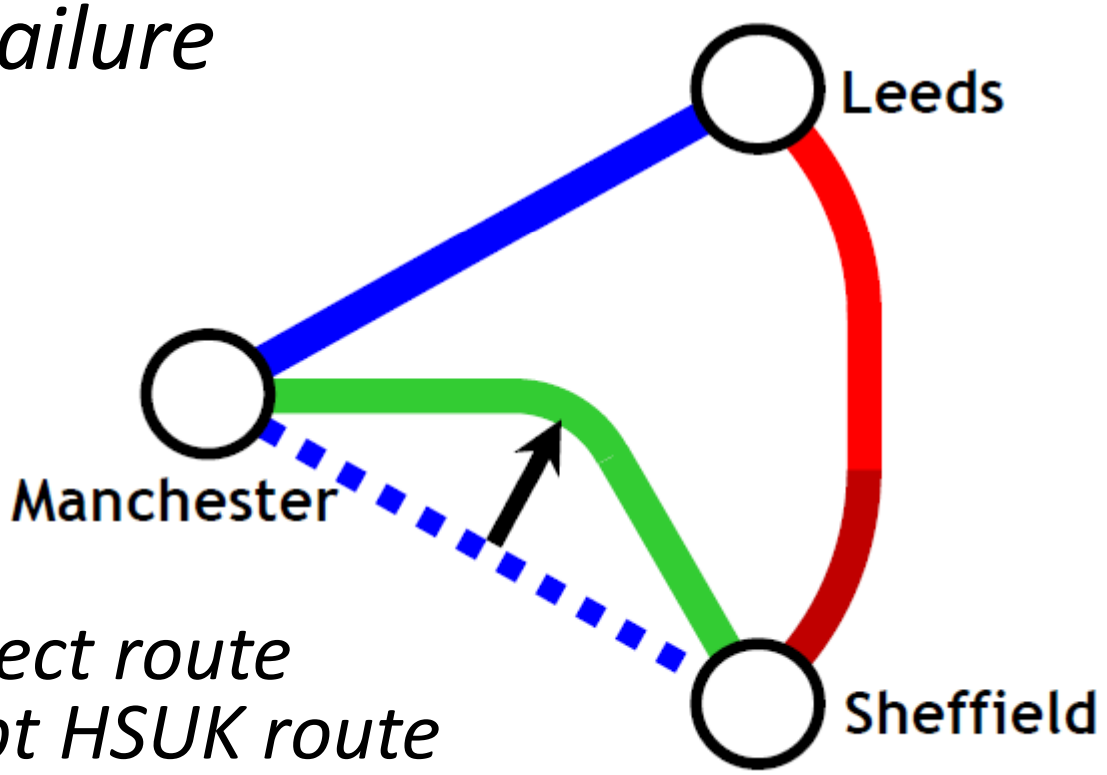


HS2 too far to east to integrate with single transpennine 'HS3' route

Northern Powerhouse Rail Links

The Northern Powerhouse
– *3 Steps to Failure*

STEP 3
Manchester to Sheffield

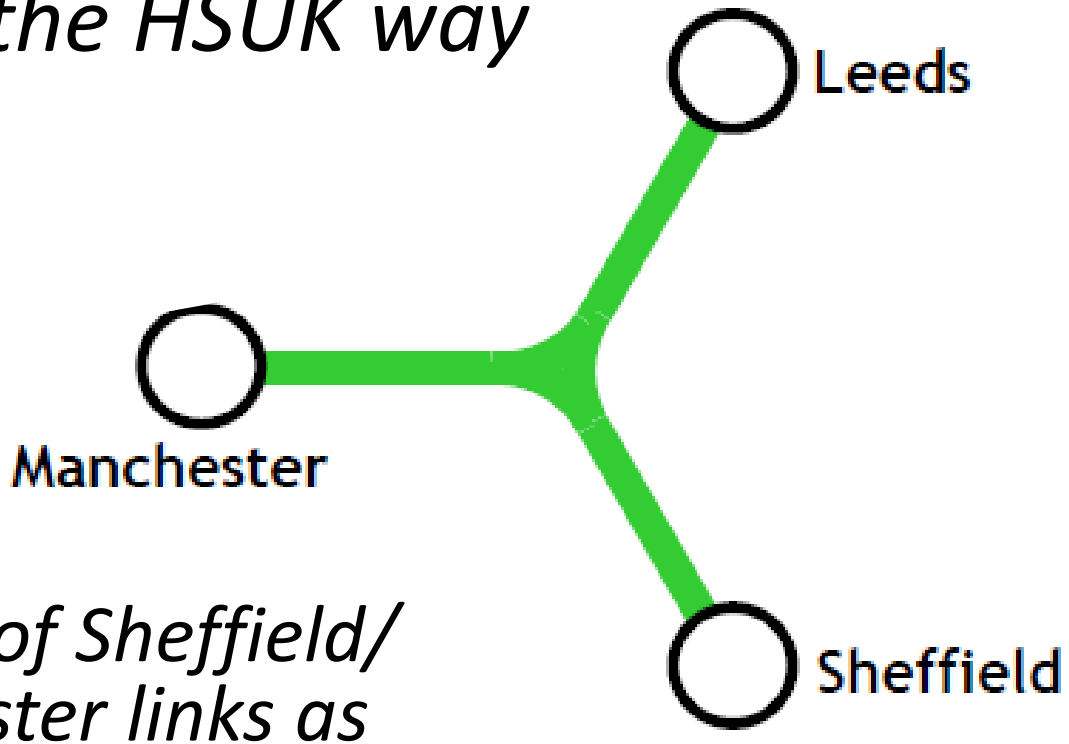


No feasible direct route therefore adopt HSUK route via Woodhead

Northern Powerhouse Rail Links

The Northern Powerhouse
– *Succeeding the HSUK way*

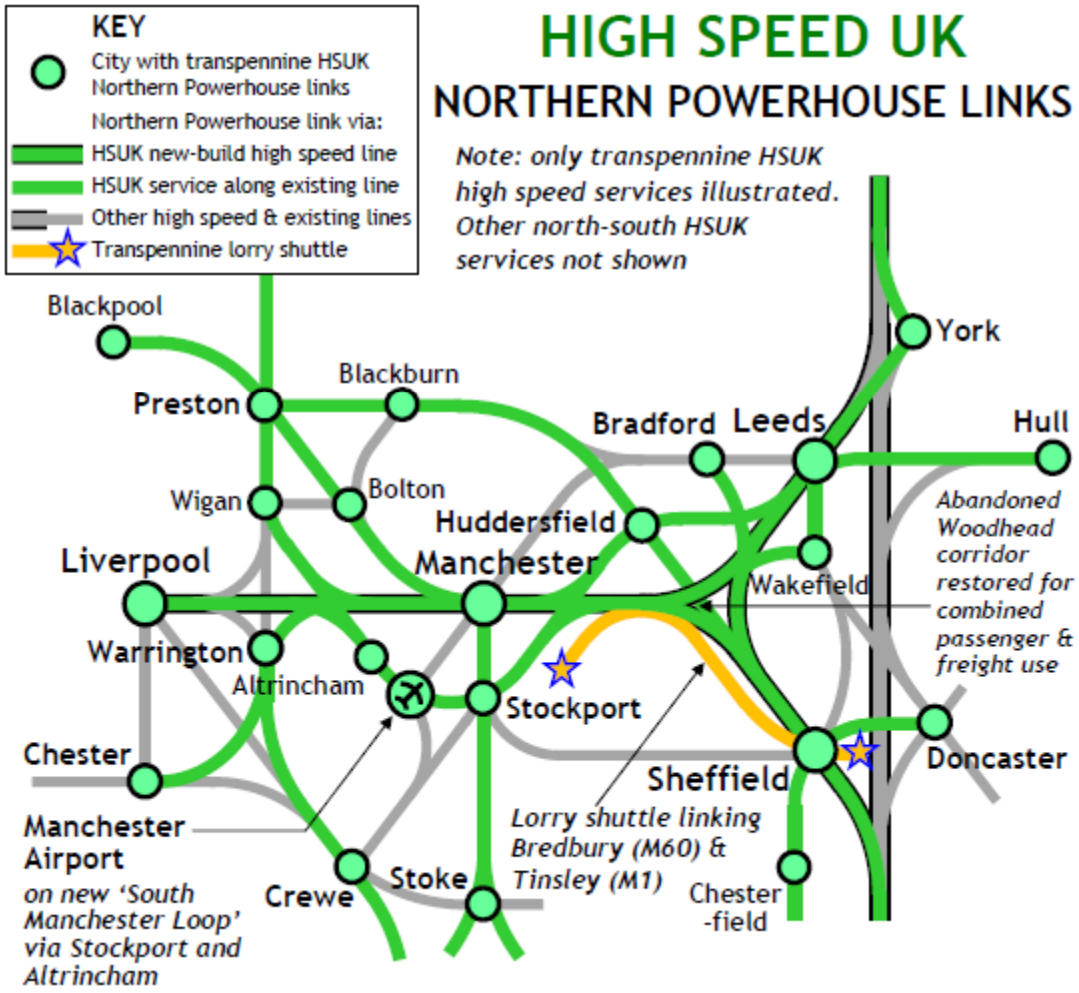
Sheffield Manchester & Leeds



Holistic design of Sheffield/ Leeds/Manchester links as part of national network

Northern Powerhouse Rail Links

Direct links to all cities of the Northern Powerhouse achieved by HSUK



HSUK – High Speed UK – Connecting the Nation

Northern Powerhouse Rail Links

HSUK – 24 direct links out of 28 possible

Hull	HU							HSUK direct link
Leeds		LS						No HSUK link
Liverpool			LI					
Manchester				MA				
M'ch'r Airport				o	MAN			
Newcastle	o					NE		
Sheffield							SH	
Wakefield	o					o		WF
	HU	**LS**	**LI**	**MA**	**MAN**	**NE**	**SH**	**WF**
London					o			

28 possible direct links between 8 centres

HSUK – High Speed UK – Connecting the Nation

Northern Powerhouse Rail Links

The Northern Powerhouse – *Comparing Costs of HS2 and HSUK*

	Total length of route	Total length of tunnel	Transpennine crossings	Major gains in local capacity?	Estimated cost
HSUK	120km	36km	1	Yes	£10.4bn
HS2/HS3	199km	59km	2	No	£15.9bn

Comparisons with HSUK relate only to HSUK routes linking Sheffield, Leeds & Manchester

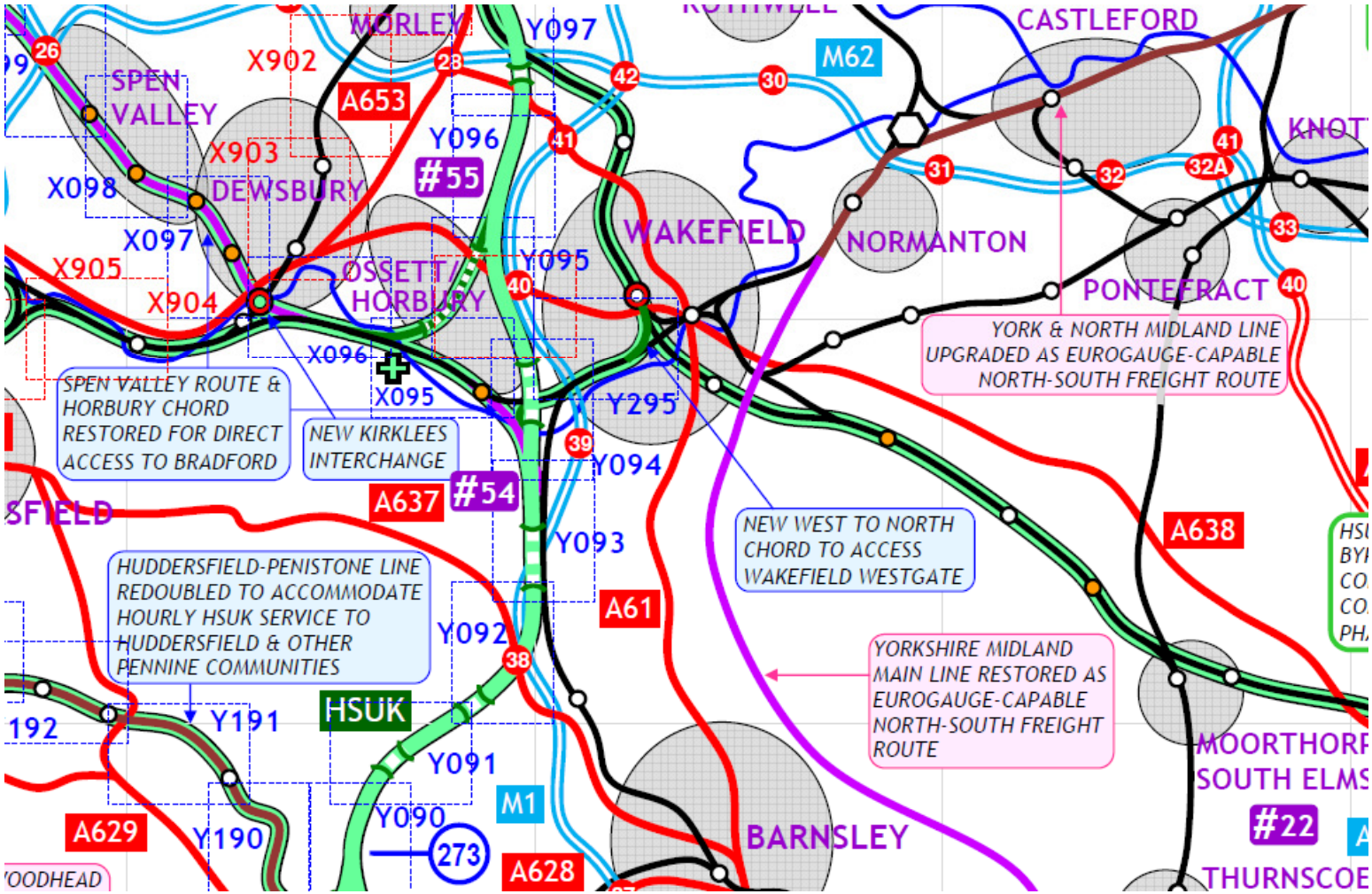
Northern Powerhouse Rail Links

The Northern Powerhouse – *Comparing Performance of HS2/HS3 and HSUK*

Journey between Northern Powerhouse cities	**Existing journey time** (mins)	**Specified journey time** (mins)	**HSUK journey time** (mins)	**HS2/HS3 journey time** (mins)
Sheffield-Leeds	40	30	19	30
Liverpool-Manchester	32	20	19	26
Manchester-Sheffield	48	30	23	??
Manchester-Leeds	49	30	26	30
Leeds-Manchester Airport	62	40	37	??
Sheffield-Manchester Airport	73	30	34	??
Liverpool-Manchester Airport	65	30	26	??
Leeds-Newcastle	87	60	51	??
Leeds-Hull	55	45	35	??
Sheffield-Hull	86	60	56	??

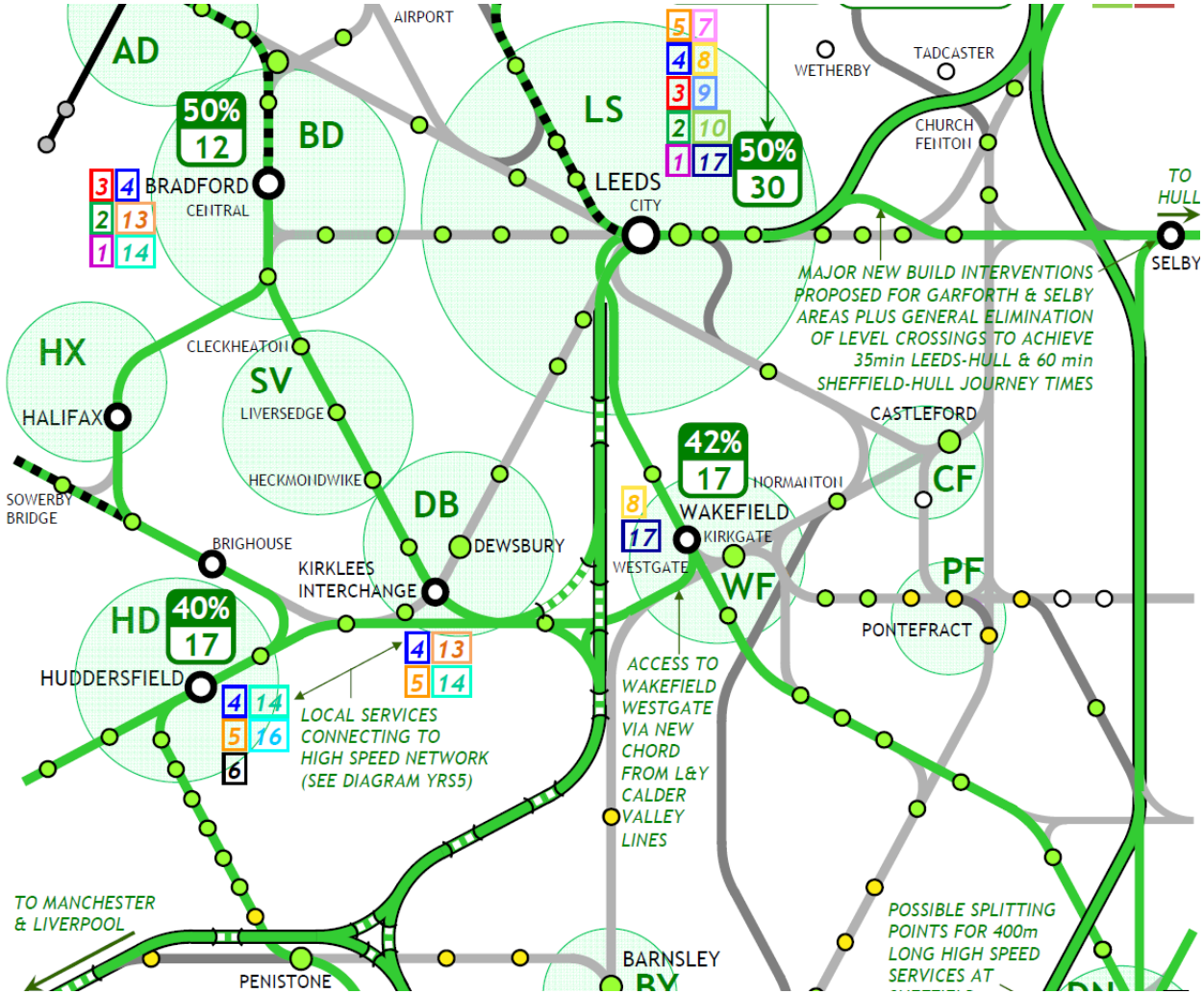
HSUK – High Speed UK – Connecting the Nation

High Speed Rail in Wakefield



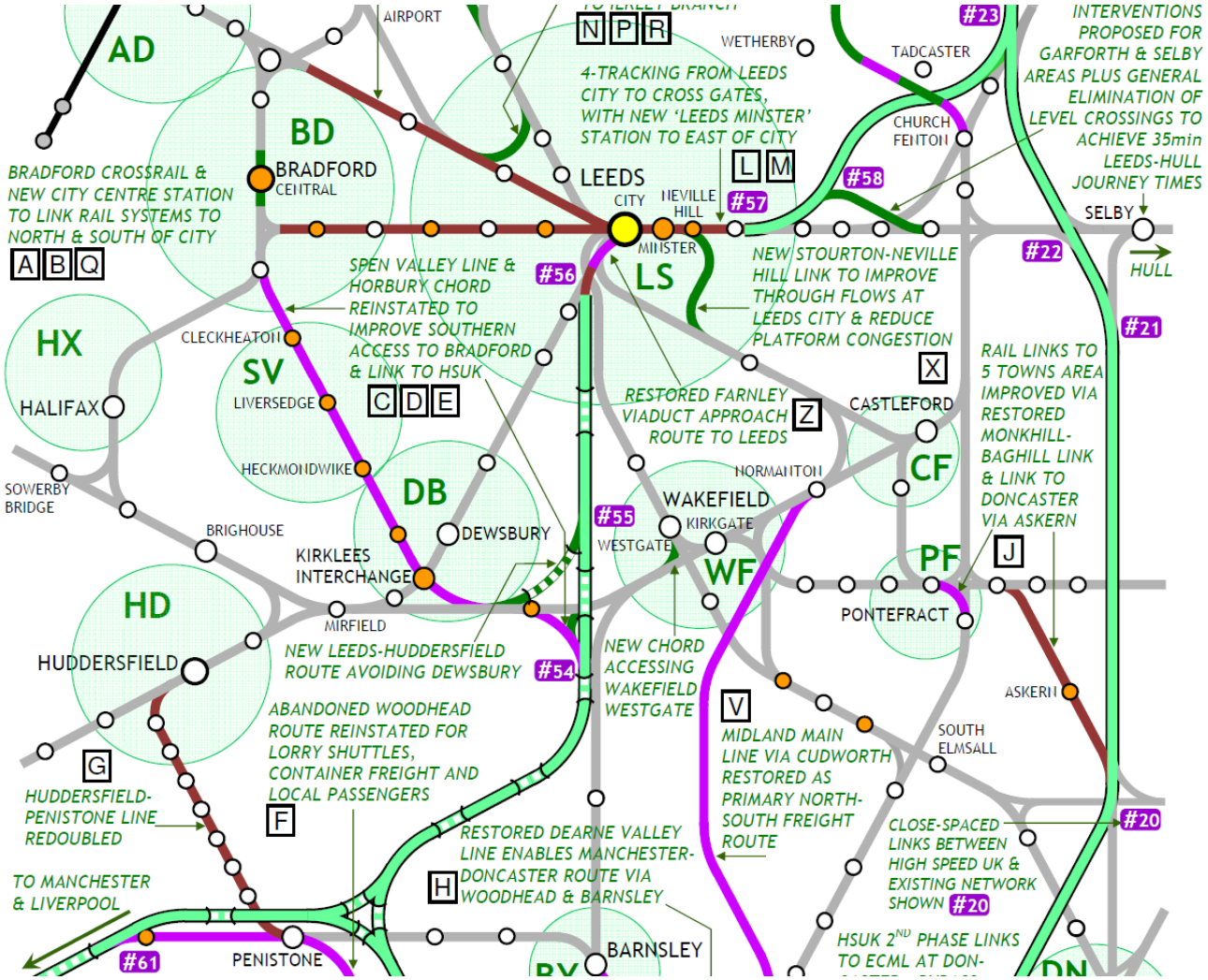
High Speed Rail in Wakefield

HSUK serves Wakefield Westgate



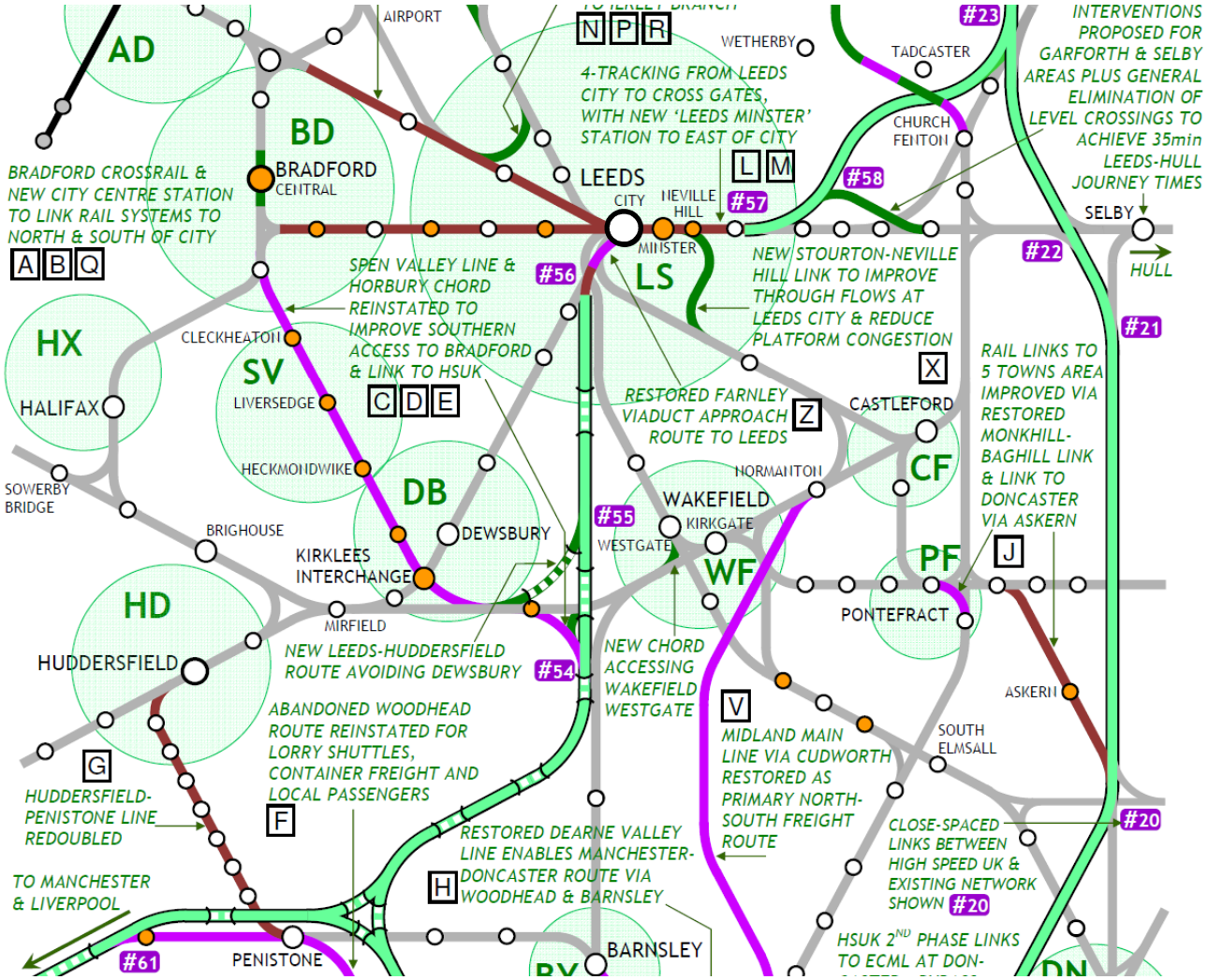
High Speed Rail in Wakefield

Integrated program of HSUK upgrades



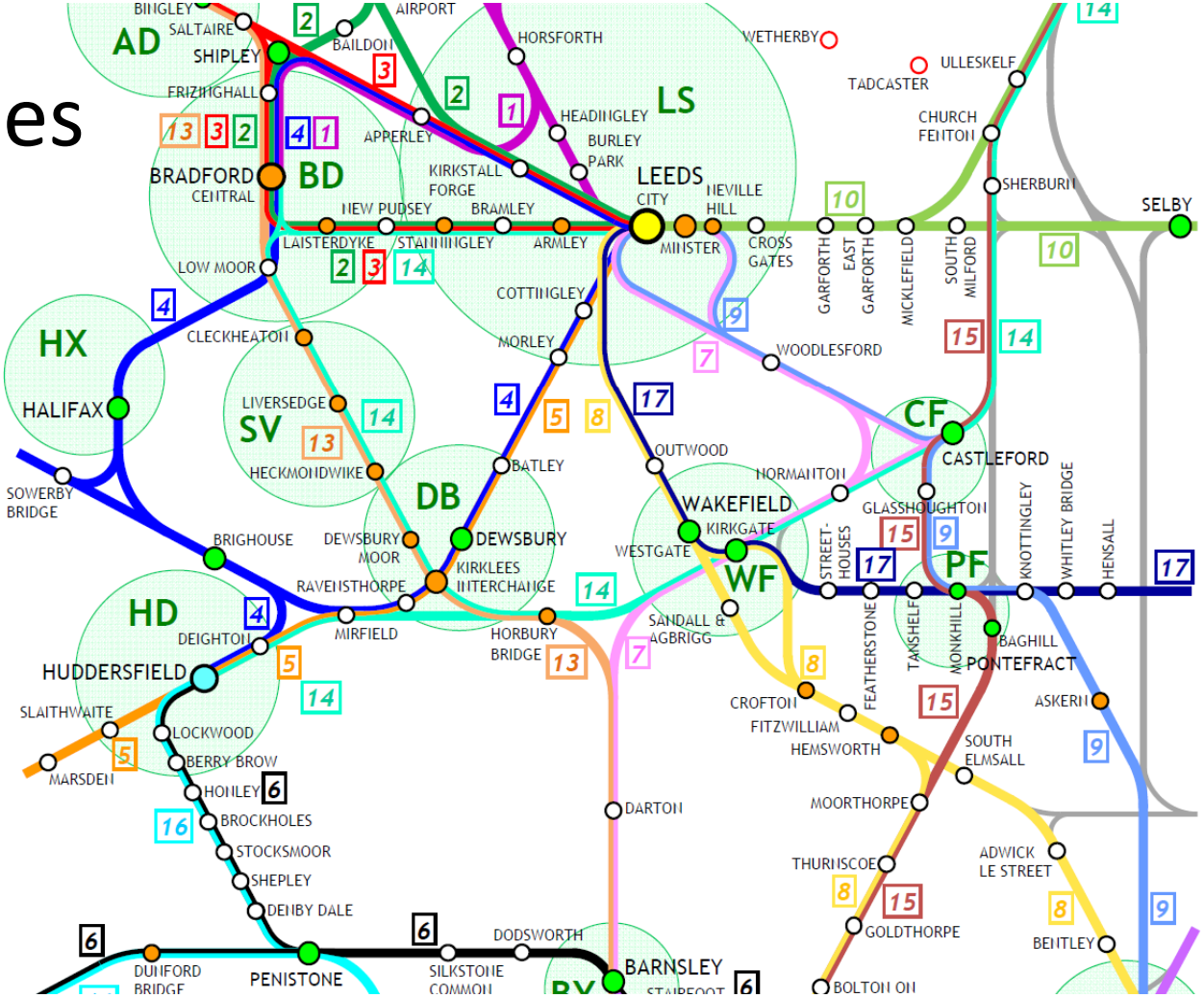
High Speed Rail in Wakefield

Integrated program of HSUK upgrades. *Note new stations* •



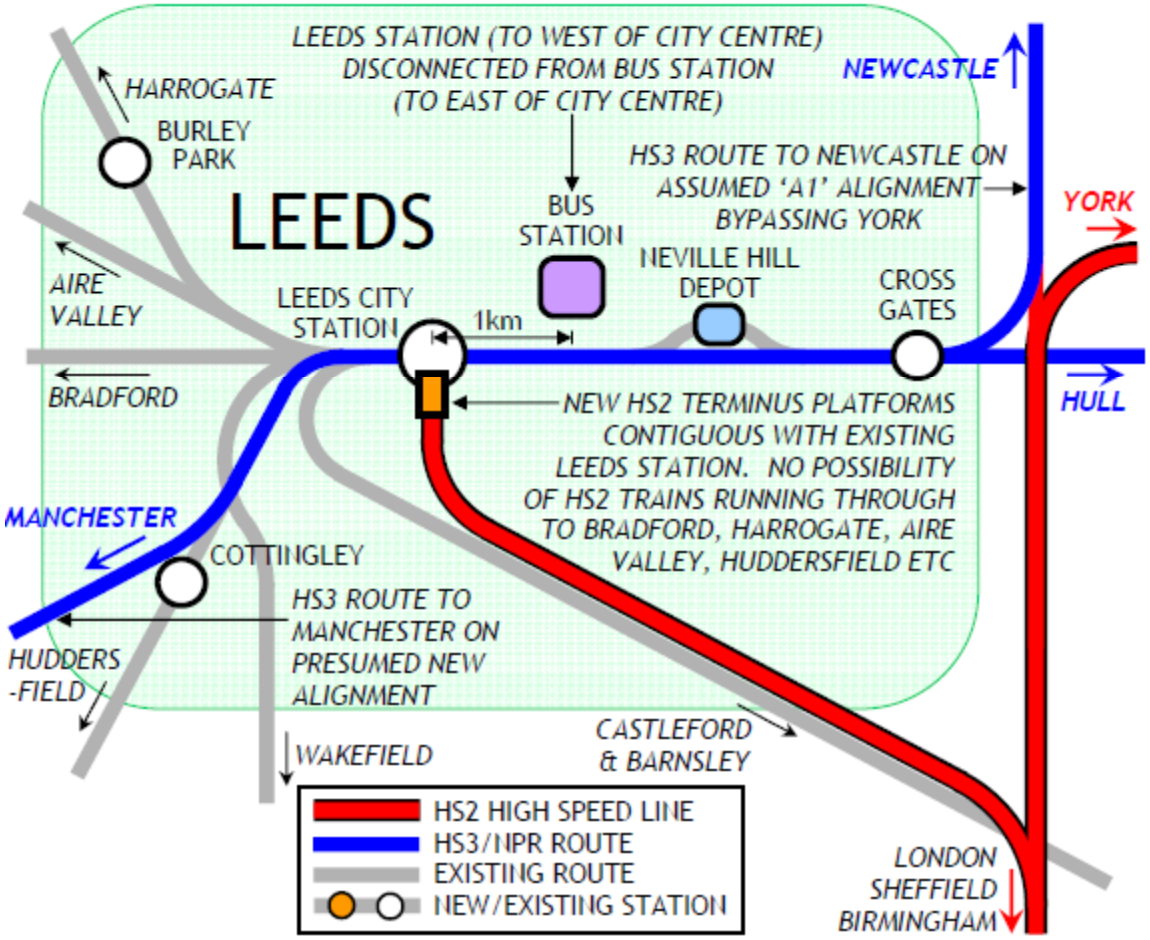
High Speed Rail in Wakefield

HSUK enables huge gains in local services to Westgate & Kirkgate. *Note new stations* •



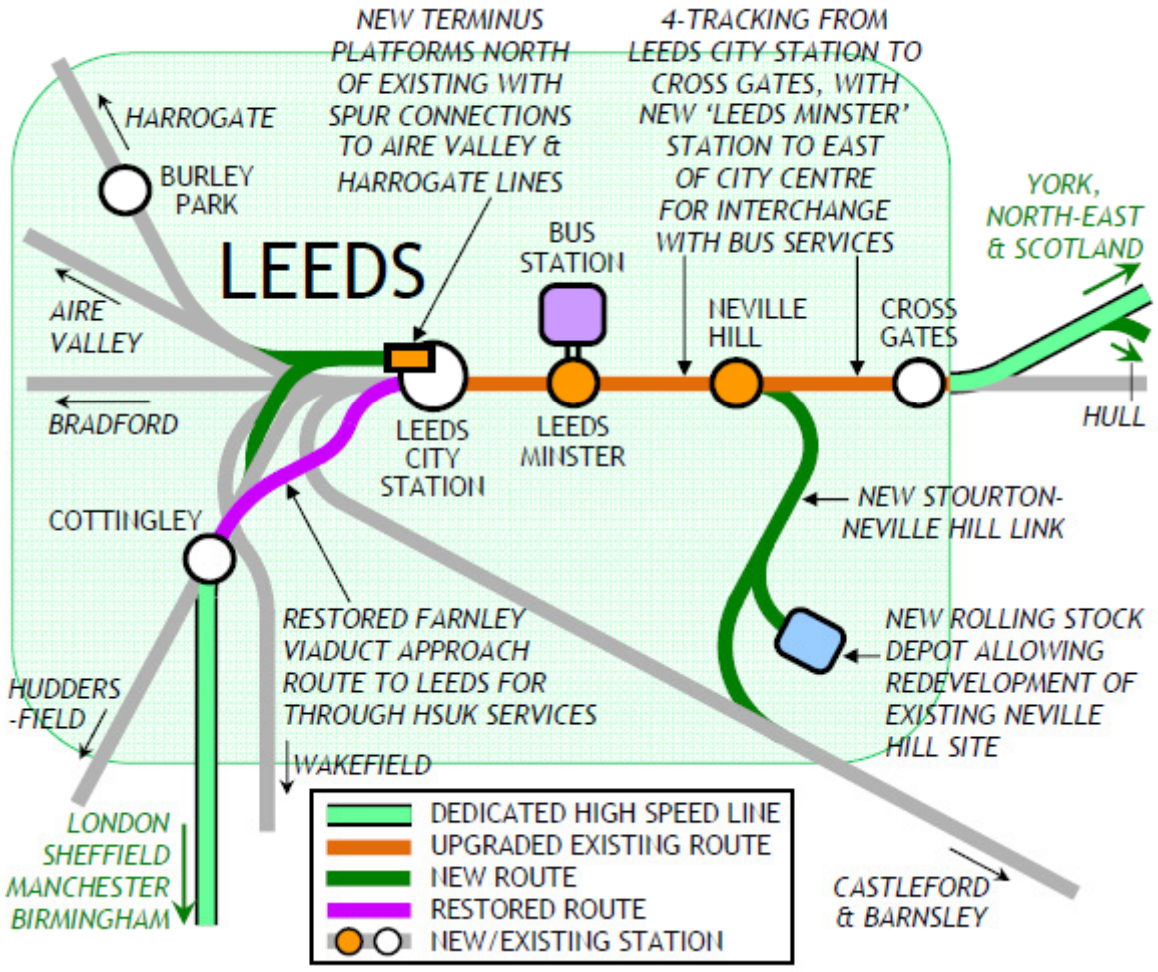
High Speed Rail in Leeds

HS2 offers no local capacity benefits at congested Leeds Station



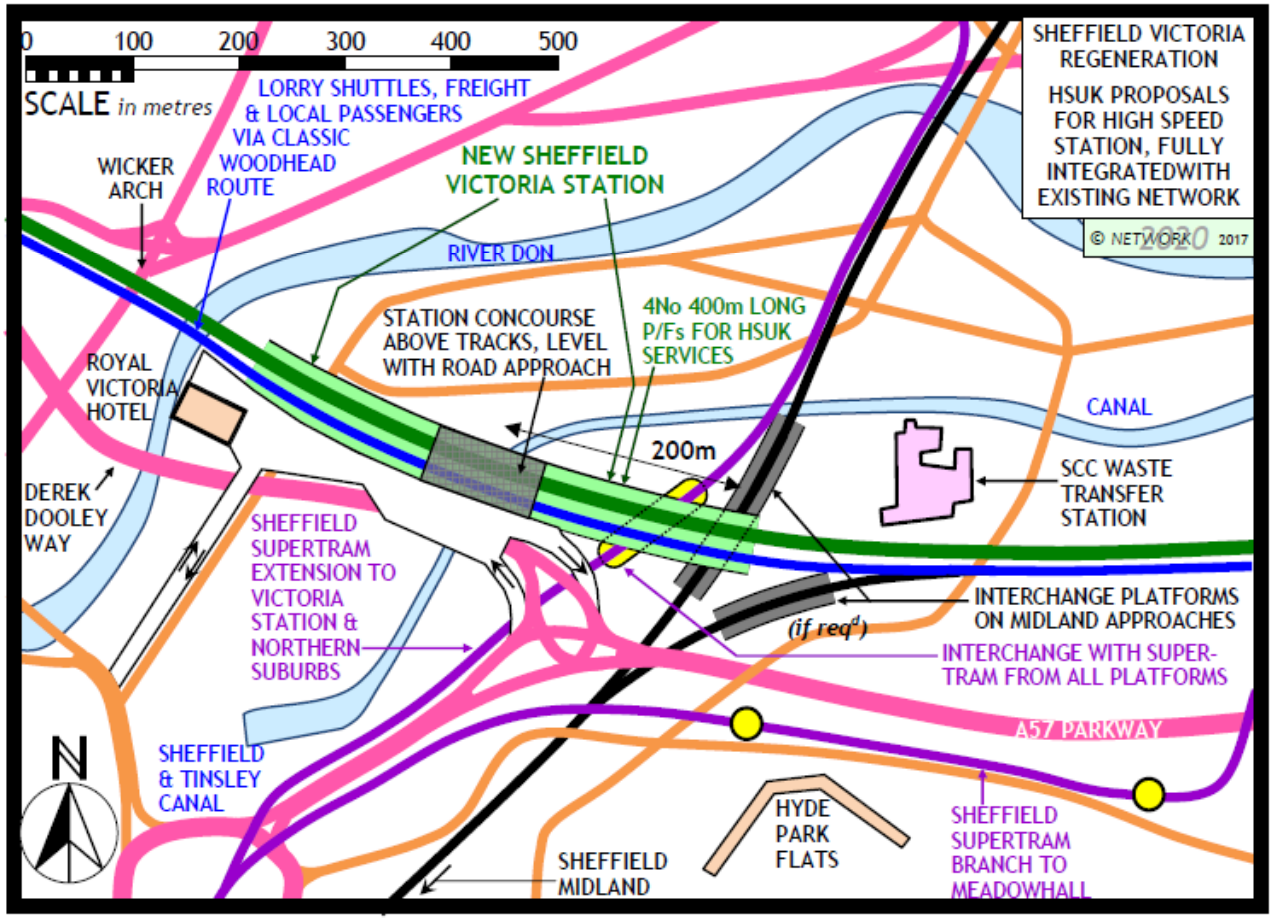
High Speed Rail in Leeds

HSUK doubles capacity at Leeds with huge benefits for local services



High Speed Rail in Sheffield

HSUK Scheme for Restored Victoria Station



Final Checklist for Wakefield

	HSUK	HS2
Direct links to other major UK cities	17	0
Average Journey Time Reduction	40%	3%
Direct links to the other cities of the Northern Powerhouse	5	0
Local capacity/connectivity gains	Yes	No
Full integration between local and national networks	Yes	No

So why are we putting up with the nonsense of HS2??

A Few Concluding Points...

- It should not be possible for 2 independent railway engineers, no matter how experienced, to develop a scheme that so comprehensively outperforms official proposals.
- This indicates a systemic failure of every aspect of the HS2 process.
- The concerns raised by HSUK will not go away.
- If the Government and HS2 Ltd fail to answer these concerns, and instead press ahead with the HS2 scheme, their conduct would be bordering on the criminal.

HSUK's Challenge to HS2

If HS2 is to have any legitimacy, HS2 Ltd and the Government must show that their proposals comprise:

- The technical solution best able to deliver the UK high speed rail project's overall objective of "hugely enhanced capacity and connectivity" between the UK's major conurbations
- A genuine 'low impact' solution that respects the communities that lie in its path and to either side, providing collateral benefits for the local transport system and the local economy

We are confident that HSUK hugely outperforms HS2 on both criteria. But will Mr Grayling be listening??...

HSUK's Challenge to the UK Public

HS2's multiple deficiencies and dysfunctionalities carry huge costs for every UK citizen:

- >£100bn of pounds of public money squandered.
- Half a billion tonnes of needless CO_2 emissions.
- Treasured landscapes destroyed forever.
- A lost chance to reverse the North-South Divide.
- A unique opportunity to create a balanced and fully connected national rail network lost forever.

All the checks and balances of our democratic system have failed to bring HS2 under control.

Every UK citizen must stand up and be counted.

High Speed UK

www.highspeeduk.co.uk