

HIGH SPEED UK

..connecting the nation

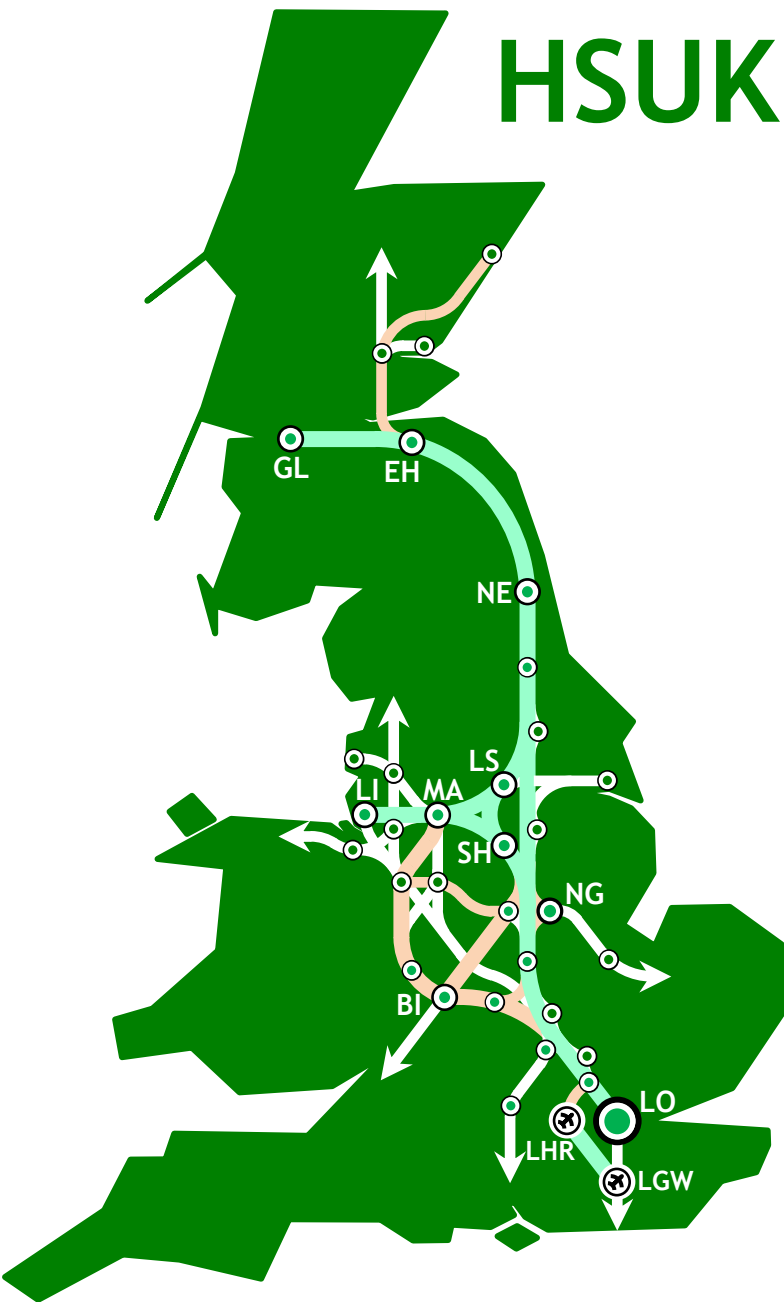
- Colin Elliff BSc CEng MICE
Civil Engineering Principal, HSUK



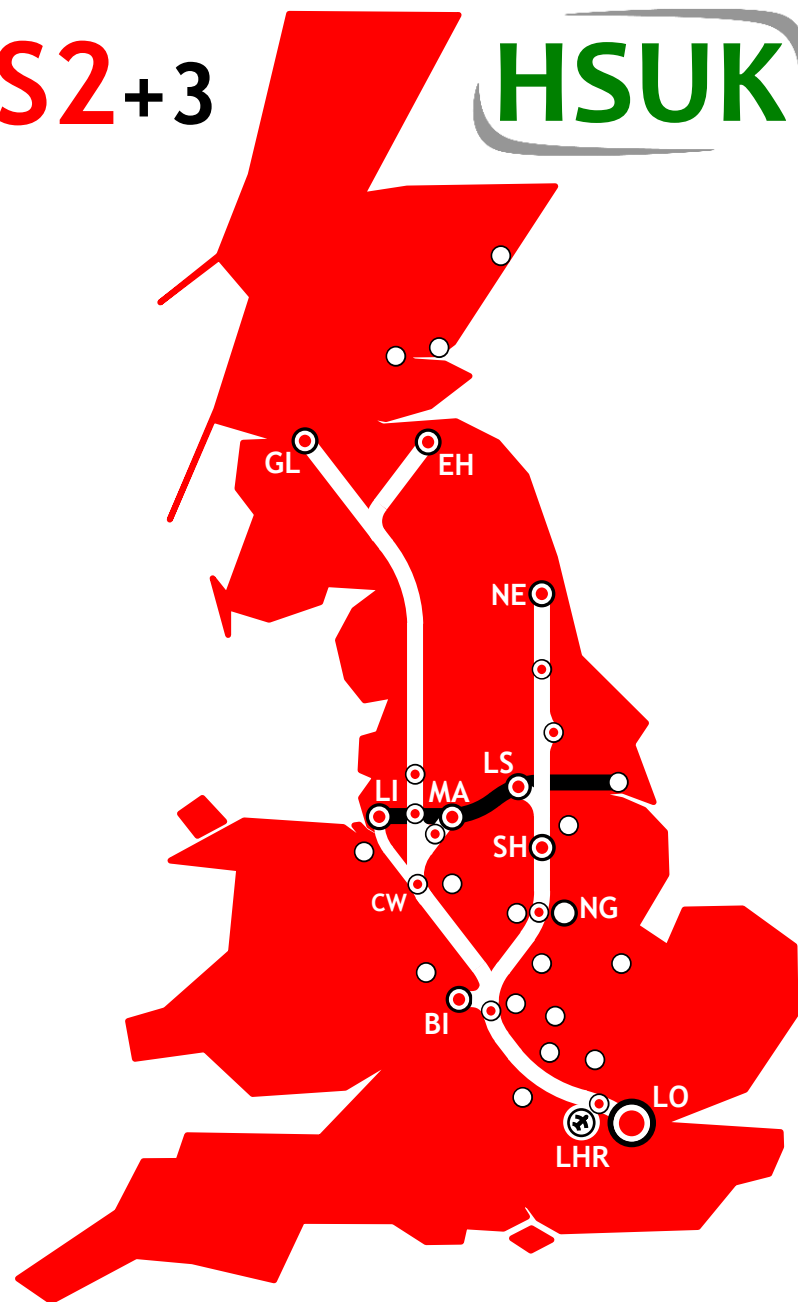
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Systems Engineering Principal, HSUK

www.highspeeduk.co.uk

HSUK



HS2+3



HSUK

HSUK Submission Recap - 1



- Capital Cost: HS2+3 £60B vs HSUK £40B
- Connectivity:
 - HSUK 10 x better than HS2 and 7 x better than HS2+3
- Basket of 528 journeys
 - HSUK improves 488; HS2+3 improves 68
 - HSUK no effect on 40; HS2+3 no effect on 289
 - HSUK worsens 0; HS2+3 worsens 173
- Journey time reductions
 - HSUK Average journey time reduction 40%
 - HS2+3 Difficult since no timetable, probably < 5%
- Network Capacity
 - HSUK has a 4 track stem Leicester to London i.e. double HS2's capacity and that extra capacity will be needed

HSUK Submission Recap - 2

- Integration with Existing network
 - HSUK connects to existing network 55 times
 - HS2 connects 4 times – HS3 not known
 - HSUK uses UK loading gauge trains only so fully interoperable with the existing network
 - HS2's "fat trains" are captive to new build railway
- CO₂ Reduction
 - HSUK forecasts a step change road to rail modal shift resulting in avoiding the emission of 600 Million tonnes of CO₂ over 40 years
 - HS2 is carbon neutral, i.e. 0 tonnes of CO₂ emission avoided
 - 2008 Climate Change Act requires a plan to reduce CO₂ emissions by 80% by 2050
 - Investment in high speed rail **must** make its contribution
- Environmental Impact
 - HSUK follows the M1 and does not touch the Chilterns AONB
 - HSUK noise pollution is restricted to existing noisy corridors
 - HS2 damages the Chilterns and a lot of ancient woodland too

HSUK Rail Philosophy



- We believe new & higher speed railways are essential
- But the whole network – high speed & ‘classic’ – must operate as a single integrated system
- Integration needs to be planned from the start
- This means that:
 - HSUK must operate UK-sized trains
 - HSUK must serve existing city centre stations
 - HSUK must be frequently linked to classic network
 - HSUK must include strategy for a parallel freight network
- HS2 piecemeal approach not appropriate
- HS2 “fat trains” & complete segregation not relevant

HSUK Design Principles



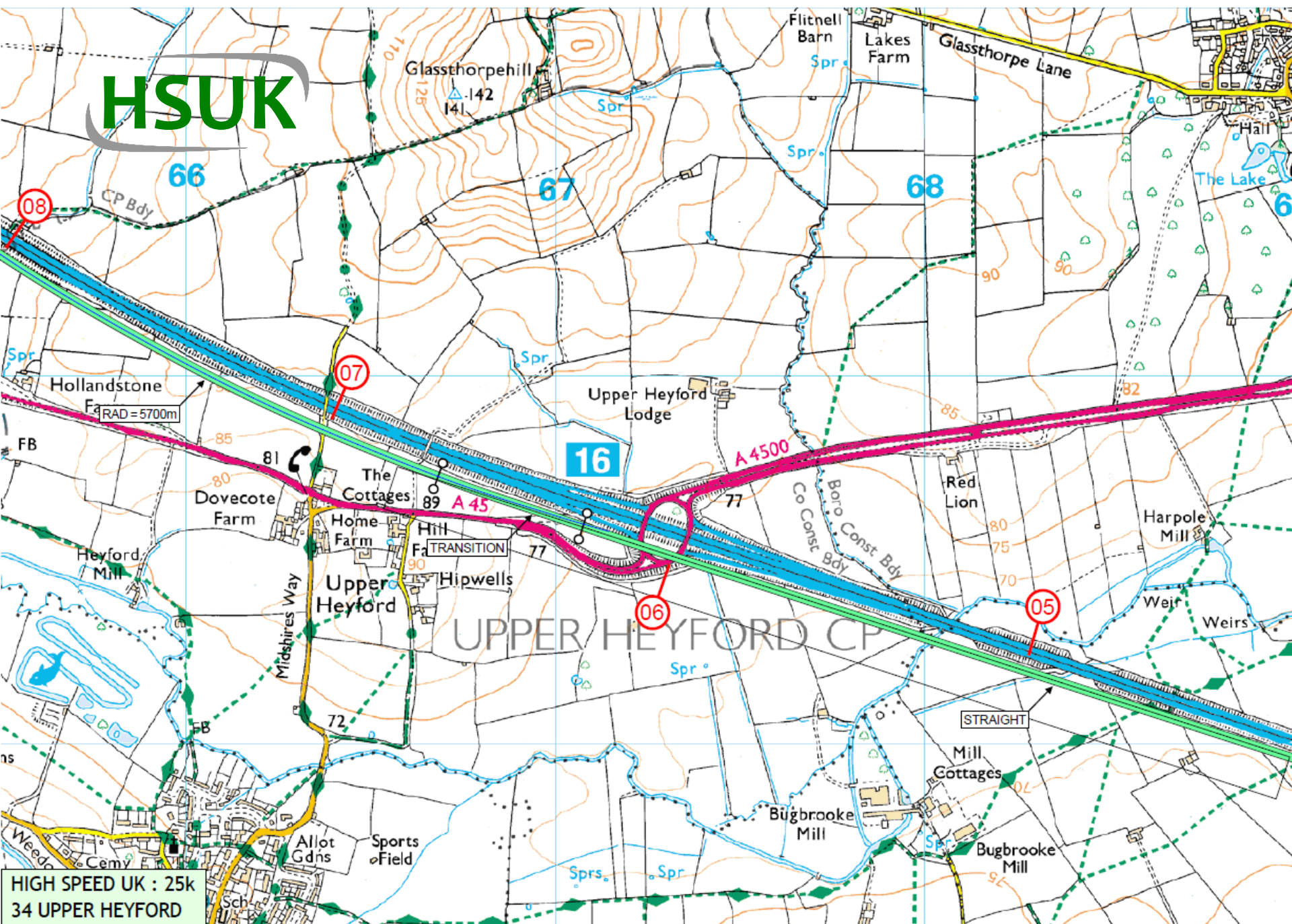
- HSUK is **fully integrated** with the existing rail network at 55 places
- HSUK adopts a **maximum speed** which allows existing road and rail corridors to be **followed**
 - Mostly 360 km/h (224mph) but less in some places
 - Essential for full integration & optimum journey time
- HSUK provides direct intercity quality services between all primary cities operating at hourly or better frequency

HSUK Design



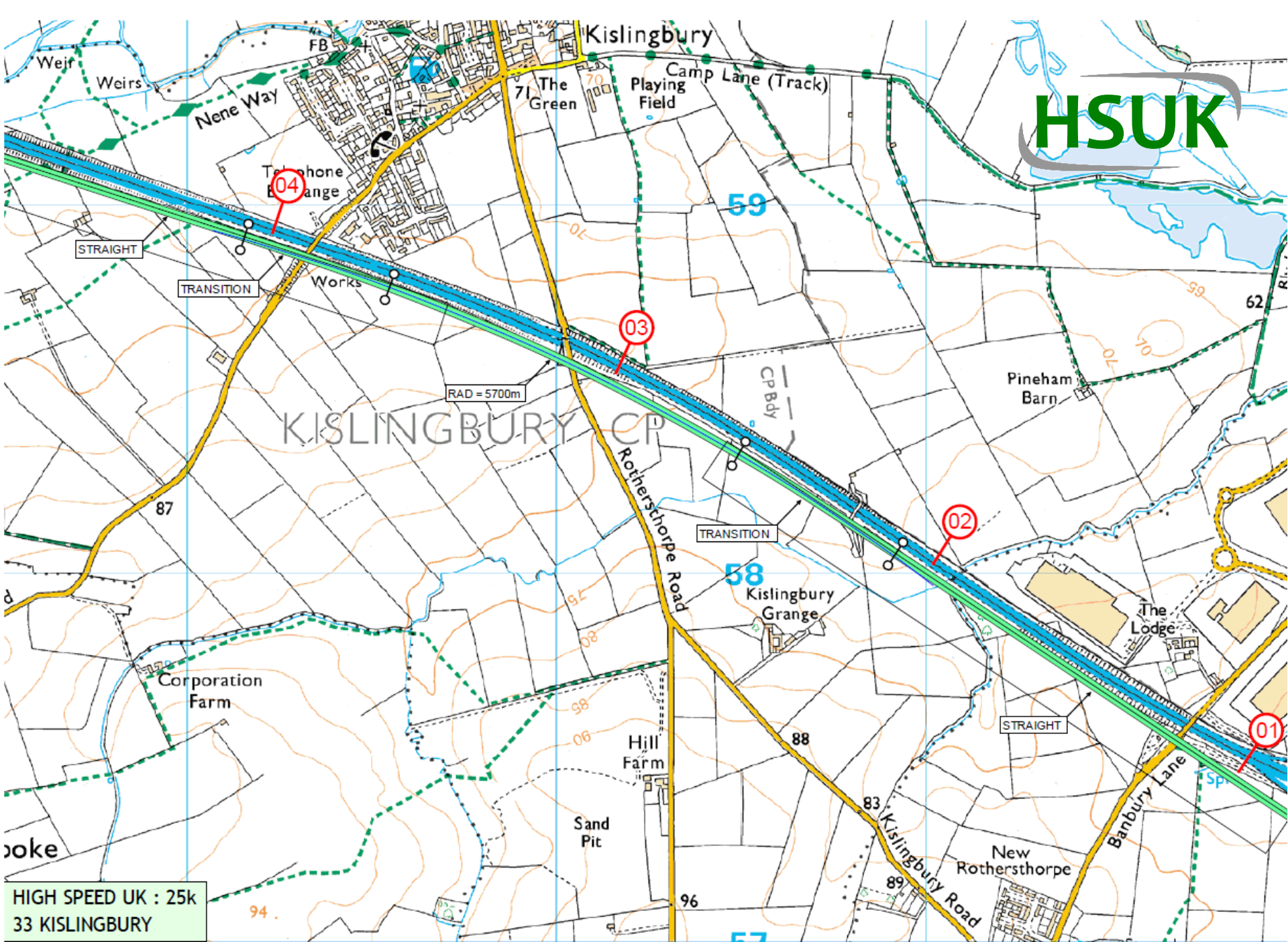
- HSUK horizontal alignments designed to 1:25,000 scale for nearly 1000km of new railway
- Corresponding vertical alignments also designed
- Timetable developed to prove journey time savings & capacity gains
- Regional integration strategies developed
- Airport access strategies developed for Heathrow, Gatwick, Luton, Birmingham, Manchester & Edinburgh
- 'Prime user' freight network strategy developed
- HS2 has done none of above

HSUK



HIGH SPEED UK : 25k
34 UPPER HEYFORD

HSUK



HIGH SPEED UK : 25k
33 KISLINGBURY

Connectivity Compared - 1

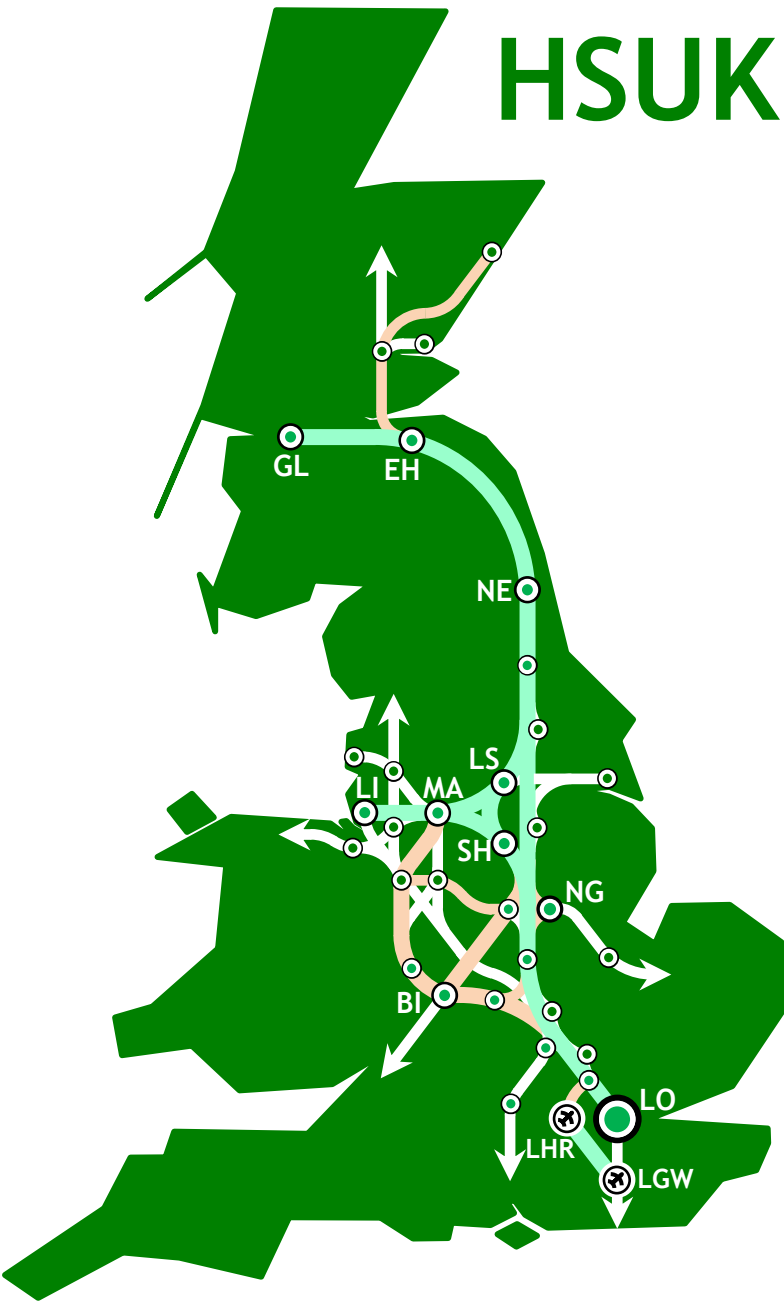


- HS2's Y design is a flawed concept because it is not possible to travel on the new high speed line between all cities served
- HSUK provides **direct links between all regional cities** to avoid the London gravitational attraction

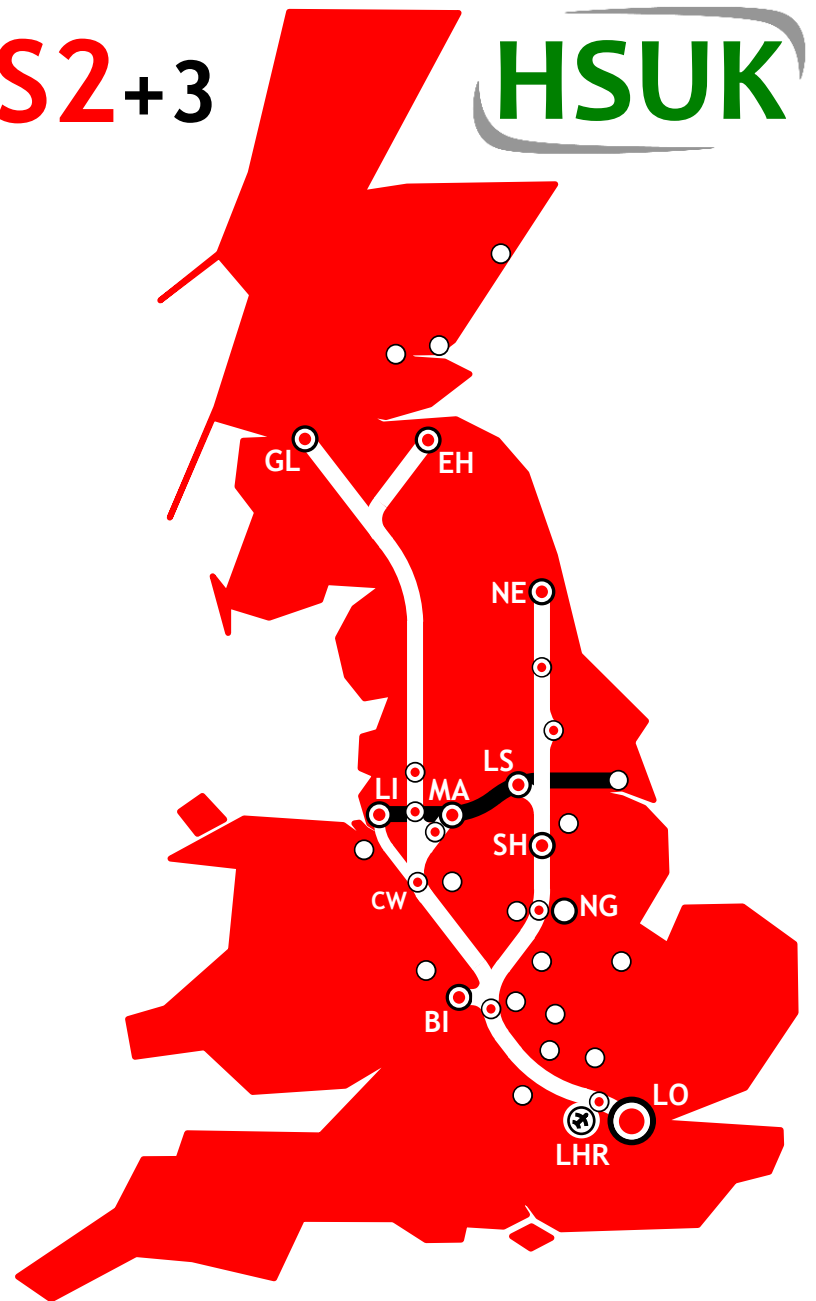
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- The HS3 proposal fails to link northern cities comprehensively and just adds cost
- The HSUK trans-Pennine link has been an integral part of the design right from the start
- It uses the abandoned Woodhead rail corridor to fully connect all the northern cities and Manchester airport

HSUK



HS2+3



HSUK

Connectivity Compared - 2

- HS2 has no effective integration with the existing network linking only 4 times. Effect of HS3 not known
- HSUK links at 55 places allowing high speed services to call at existing intercity stations where one can connect with local services unlike HS2

- HS2 serves 3 new terminus stations which are operationally very inconvenient, 4 out-of-town parkway stations which are inconvenient for users, plus Old Oak Common and an expanded Euston
- HSUK uses existing city centre stations everywhere plus a reopened Sheffield Victoria station
- HSUK uses standard UK loading gauge trains

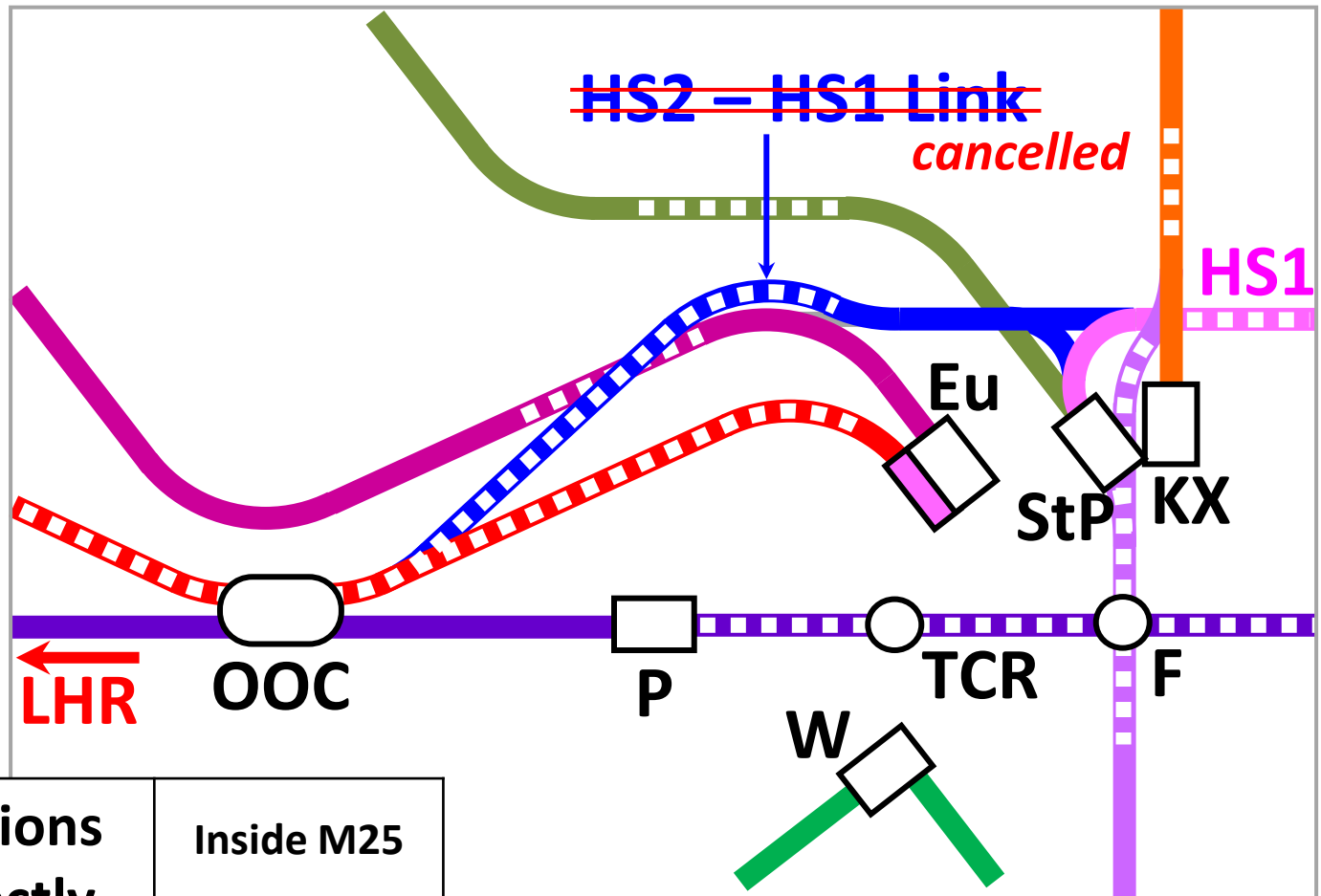
Connectivity Compared - 3

- A connection to HS1 was in the HS2 remit from the start
- It was dropped recently as it cost £700M and would badly damage Camden Market
- The UK will not join the Schengen area soon
- Border controls will be needed at St Pancras
- HSUK can connect directly with the international platforms at St Pancras and hence to HS1
- The required changes to the rail infrastructure will cost less than £500,000 and will be confined within the existing railway boundary

Old Oak Common & HS2-HS1 Link



Proposed
primary
London
network
with **HS2**

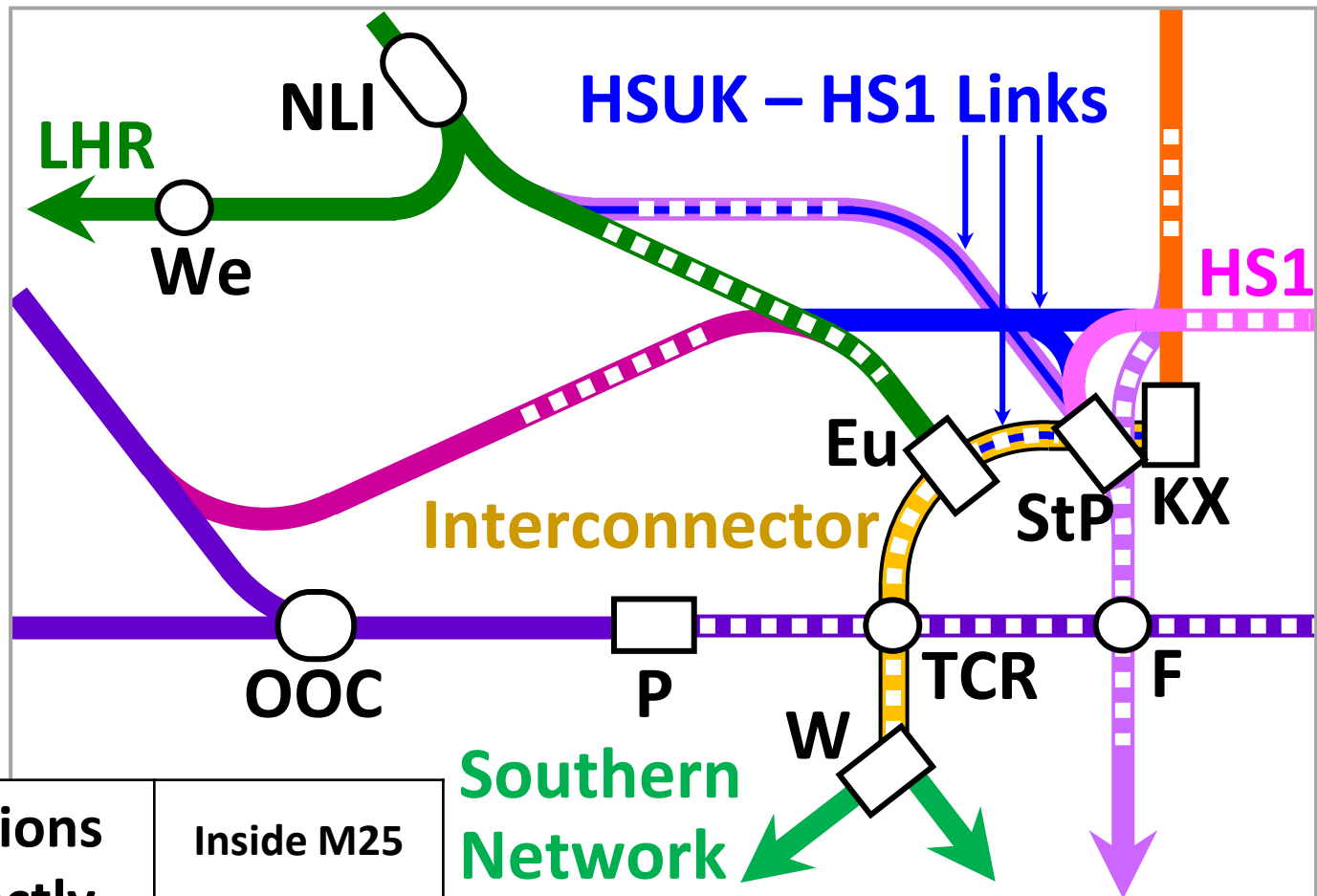


175	Stations directly connected	Inside M25
188		Outside M25

Old Oak Common & HSUK-HS1 Link

HSUK

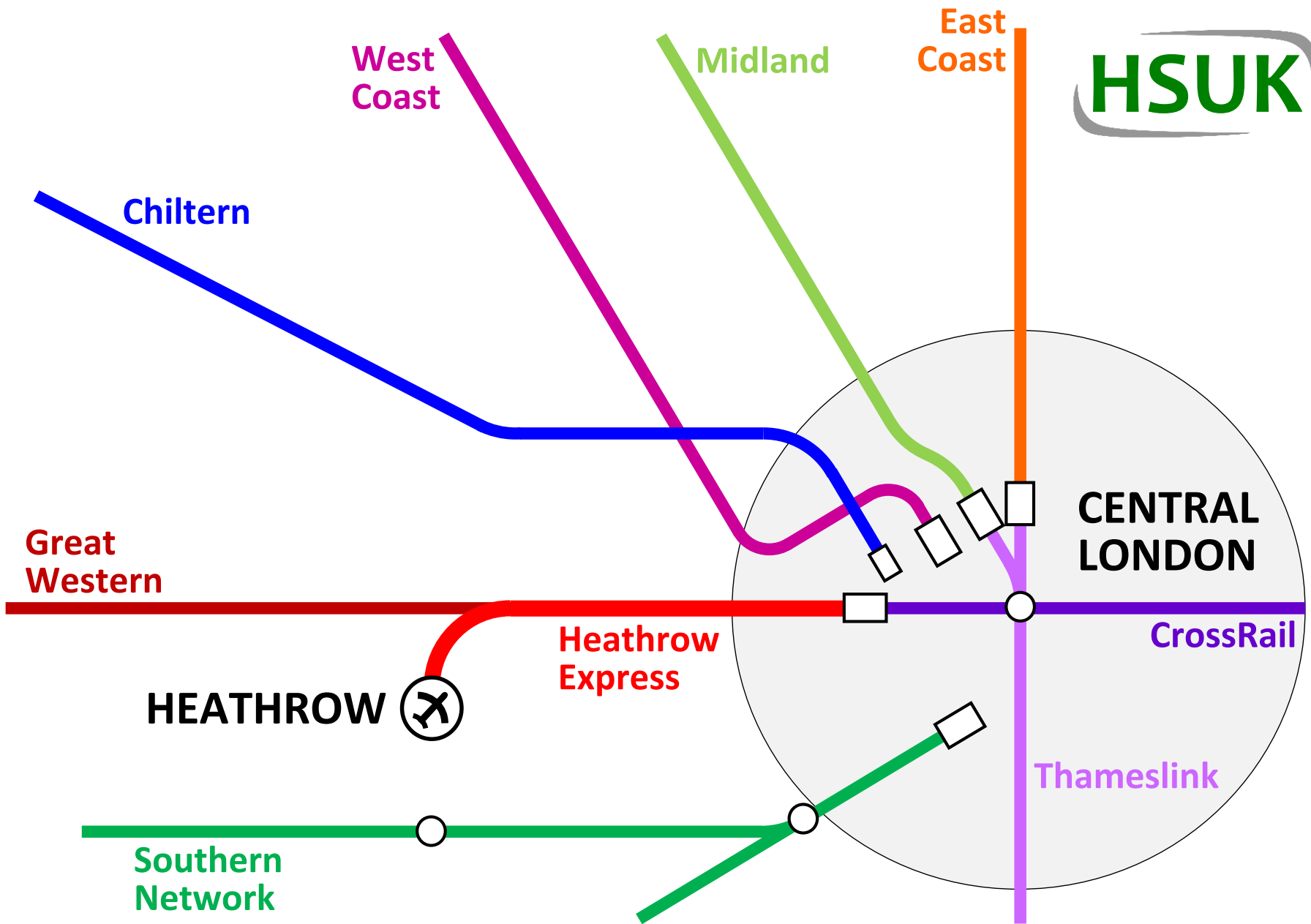
Proposed
primary
London
network
with **High
Speed UK**

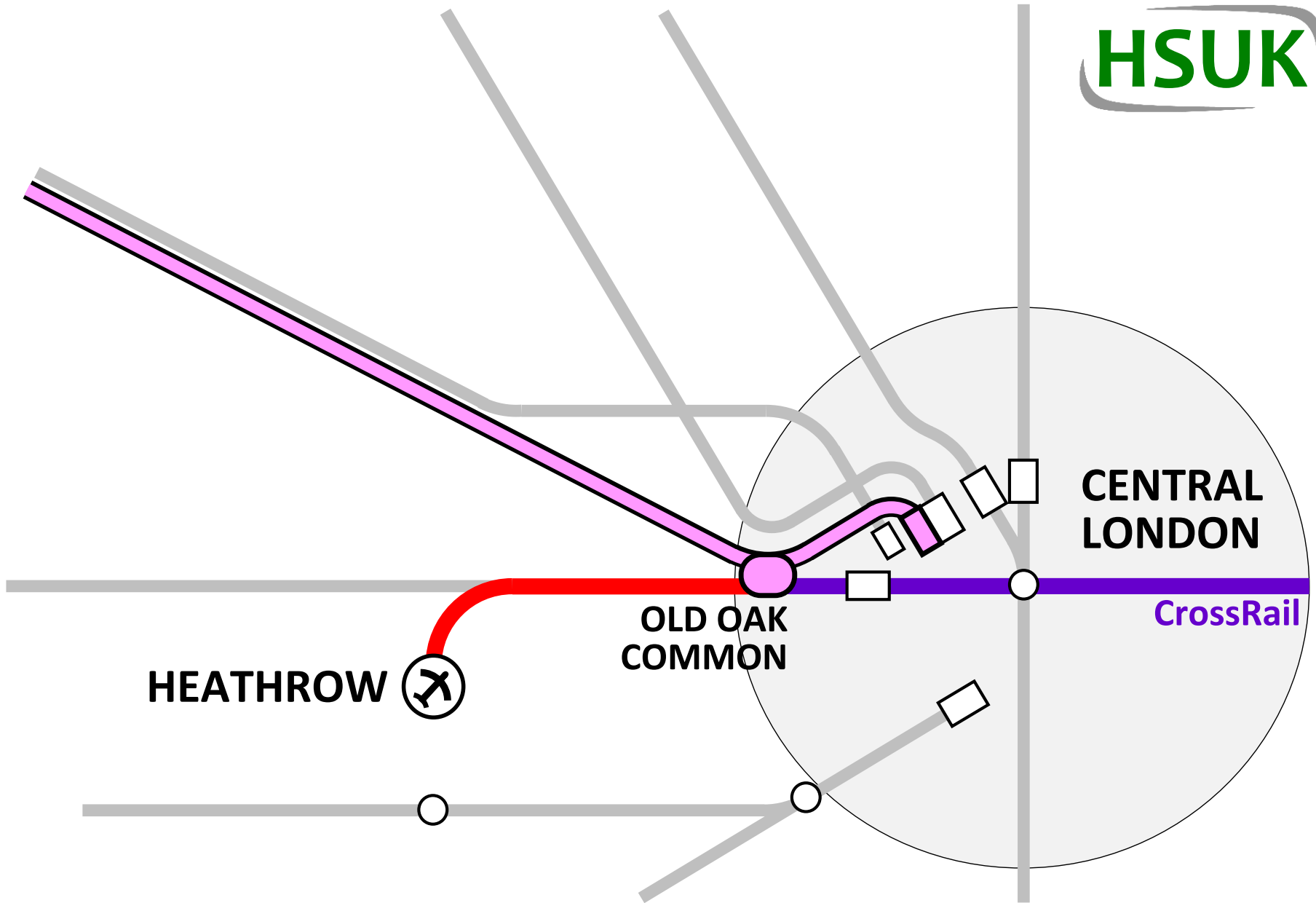


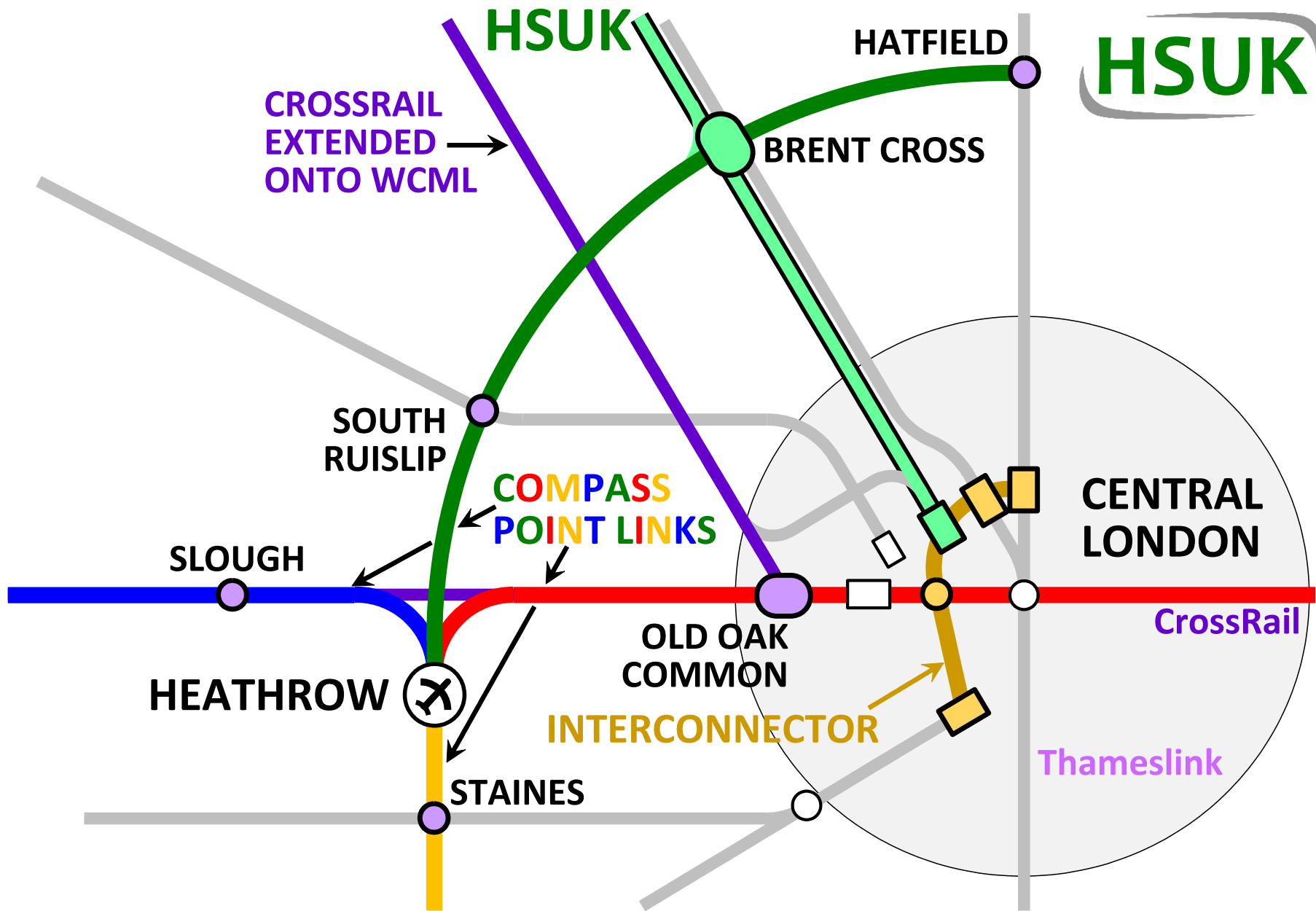
395	Stations directly connected	Inside M25
594		Outside M25

Connectivity Compared - 4

- Improved access to Heathrow is essential for regional growth
- HS2 can only offer a change of trains at Old Oak Common
- No proposals have ever emerged for a direct HS2 route to Heathrow
- HS2's desire to serve Heathrow makes intrusion into Chilterns inevitable and dictates London-centric Y-configuration of HS2
- HSUK proposes independent development of Heathrow Express into 'Compass Point' system, extending to east, south, west & north – Submitted to Airports' Commission
- Northern arm will intersect with HSUK spine at Brent Cross
- HSUK offers direct services to Heathrow's terminals from all primary regional cities and many other locations







528 Journeys Compared - 1

- We looked at every possible journey between 33 places to start from and the same 33 places as destinations. Discounting the return journey in every case, there are 528 possible different journeys.
- The places selected were: Aberdeen, **Birmingham**, Bradford, Chester, Coventry, **Darlington**, Derby, Doncaster, **Edinburgh**, **Glasgow**, Heathrow, Huddersfield, Hull, **Leeds**, Leicester, **Liverpool**, **London**, Luton, **Manchester**, Milton Keynes, **Newcastle**, Northampton, Nottingham, Oxford, Perth, Peterborough, **Preston**, **Sheffield**, Stoke, Walsall, **Warrington**, Wolverhampton and **York**.
- This was felt to be representative of the principal places which can be served from either HS2 or HSUK. Places in red are directly served by HS2; HSUK serves them all.
- Each journey was ranked as **Improved** or **Not Improved** or **Made Worse**. We have kept HS2 and HS3 separate and then added them together to make a comparison with HSUK.

528 Journeys Compared - 2

Basket of 528 Inter-City Journeys

	Services Improved	Not Improved	Made Worse	Total	Cost £B
HS2	49	306	173	528	50
HS3	+19	-17	-2		+10
HS2+HS3	68	289	171	528	60
HSUK	488	40	0	528	40
				Saving	20

Connectivity

HSUK vs HS2 = $488/49 = 10$ times better

HSUK vs HS2 + HS3 = $488/68 = 7$ times better

That is a startling difference. Why is Government proposing to spend even £1 on a project which does so much harm to existing services and speeds up so few?

528 Journeys Compared - 3

- The KPMG report “HS2 Regional Economic Impacts” in table 23 on page 91 identifies fewer and slower services on existing main lines after HS2 opens. This explains why HS2 will make **171** journeys worse than today
- **HSUK makes no journeys worse**

- HS2’s shortened journey times are largely confined to journeys on the high speed lines
- HSUK’s frequent connections (55) with the existing network allow all of the 488 improved journeys to have an average journey time reduction of 40%
- On HSUK two thirds of the 528 journeys will be possible without changing trains compared with one third at present

Capacity Compared - 1



- A single track equipped with ERTMS will reliably provide 18 train paths per hour or one train every 3.33 minutes
- This is fewer than the theoretical maximum but in practice a maximum of 18tph is a safe figure to rely on and is used by HS2
- The problem which HS2 faces is that its maximum capacity of 18tph in each direction south of Birmingham is not enough to serve all cities of the Midlands, the North and Scotland currently served by intercity trains
- All HS2's capacity will be used up as soon as the line is fully open
- Once the western arm of the Y is in full use will there even be sufficient capacity for the eastern arm?
- Two busy 2-track railways feeding into one 2-track railway does not make operational sense
- No capacity gains in Regional Cities



Capacity Compared - 2



- We have calculated that 4 tracks are necessary to serve all cities and allow for future growth
- As a result of this calculation HSUK has been provided with a four track London stem going as far as Leicester for the moment
- 4-track railways cost 30% more per km in the open and 100% more per km in tunnel
- 4 tracks are essential future proofing
- Would you really have built the M1 with a single lane in each direction and no interchanges?

Journey Times Compared - 1 HSUK

- It has been said that the spine and spur configuration and the 360km/h top speed of HSUK will result in longer journey times
- We tested this by calculating the journey times from London, Birmingham, Manchester and Leeds to 11 places, namely London, Birmingham, Manchester, Leeds, plus Nottingham, Sheffield, Liverpool, Newcastle, Edinburgh, Glasgow and Heathrow. We felt that this was a broad enough sweep of places to make a fair comparison.

Journey Times Compared - 2 HSUK

	LONDON			BIRMINGHAM			MANCHESTER			LEEDS		
	HS2	HSUK	HSUK mins. better/ worse	HS2	HSUK	HSUK mins. better/ worse	HS2	HSUK	HSUK mins. better/ worse	HS2	HSUK	HSUK mins. better/ worse
London	-----	-----	-----	59	56	3	69	74	-5	86	75	11
Birmingham	59	56	3	-----	-----	-----	51	55	-4	69	61	8
Nottingham	85	51	34	63	37	26	113	41	72	58	37	21
Sheffield	62	56	6	45	42	3	51	21	30	22	17	5
Manchester	69	74	-5	51	55	-4	-----	-----	-----	49	26	23
Liverpool	90	94	-4	94	66	28	33	18	15	88	46	42
Leeds	86	75	11	69	61	8	49	26	23	-----	-----	-----
Newcastle	103	94	9	99	113	-14	143	77	66	81	41	40
Edinburgh	143	123	20	162	150	12	136	115	21	179	79	100
Glasgow	142	144	-2	162	172	-10	136	136	0	269	100	169
Heathrow	-----	-----	-----	97	90	7	108	99	9	124	98	26

All figures are journey times in minutes

94 Time of journey made on existing network in the absence of improvement by HS2

34 Number of minutes HSUK is quicker than HS2

-5 Number of minutes HS2 is quicker than HSUK

59 Journey excluded from numbers to avoid double counting

HS2 journey times have had to be calculated by us in the absence of an HS2 timetable

They have then been then adjusted to take account of non central stations, services at 2 hourly frequencies and changing trains

For 1 journey HS2 and HSUK times are the same

For 6 journeys HS2 is quicker than HSUK by an average of 6.5 minutes

For 26 journeys HSUK is quicker than HS2 by an average of 31 minutes

Cost - HSUK vs HS2+3



- We understand the cost of HS2 to be roundly £50B and that HS3 will add at least £10 B more
- So we have taken £60B as the cost of HS2+3
- We turned the HS2 figures into unit rates and so estimate HSUK to cost £40B
- HSUK is cheaper for 3 principal reasons:
 - HSUK follows existing transport corridors and generally less severe topography on the eastern side of the UK
This makes construction easier and more accessible and therefore cheaper
 - The HSUK new build route is 200km shorter than HS2
 - HSUK requires 100km less tunnel than HS2

BCR - HSUK vs HS2+3



- If we assume that the BCR for HS2+3 is 2.3 and the Cost is £60B then the net Benefit is £138B
- Reduce the cost to £40B and keep the same Benefit then the minimum BCR for HSUK is 3.45
- Assume that the Benefit actually rises by 50% then the HSUK BCR rises to 5.18
- Assume that the Benefit rises by 150% (we believe this is credible) then the HSUK BCR rises to 8.63

This is all based on the validity, or otherwise, of the HS2+3 BCR of 2.3

Public Policy Compared



- We believe that any public investment must conform with current Public Policy

Public Policy	HS2+3	HSUK
Provide Integrated Public Transport		✓
Promote Regional Development		✓
Rebalance the economic North South Divide		✓
Protect the Natural Environment		✓
Reduce CO ₂ Emissions		✓
Secure Best Value for Money		✓

- That is our view of the winner in every case and we hope that you agree

HS2 Procedural Issues



- Unbalanced remit
- Unverified assumptions
- Biased option selection procedure
- Consultation responses ignored
- Suppression of alternatives
- Suppression of dissenting voices

What we ask your Lordships' Committee to consider



- We believe that Government must conduct a far-reaching and independent Inquiry whose terms of reference would include but not be limited to:
 - Establishing whether the claims made by HSUK in its submission to your Lordships about the deficiencies of HS2 and the superiority of HSUK are justified;
 - Establishing the reasons why the HS2 proposals have progressed so far towards legislative powers without adequate technical or procedural scrutiny;
 - Establishing how other apparently superior proposals have been dismissed, without justification;
 - Then, if the HSUK claims are shown to be justified, recommending a strategy to deliver the properly integrated High Speed rail system that the UK needs and deserves.

HIGH SPEED UK

Investing Responsibly in High Speed Rail

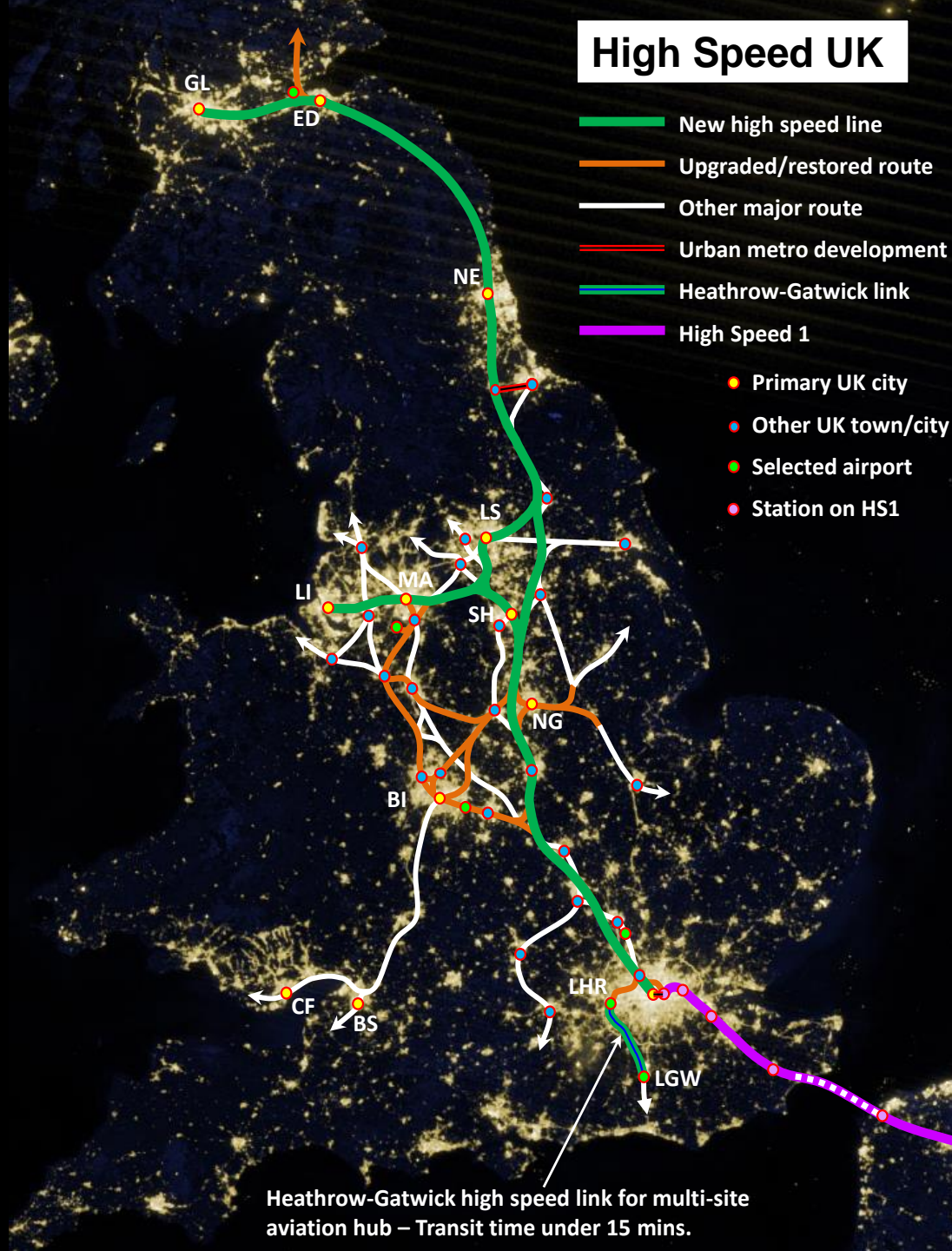
**Why is Government proposing to spend even
£1 on HS2 which speeds up so few journeys
and does so much harm to existing services?**

High Speed UK



- New high speed line
- Upgraded/restored route
- Other major route
- Urban metro development
- Heathrow-Gatwick link
- High Speed 1

- Primary UK city
- Other UK town/city
- Selected airport
- Station on HS1



Heathrow-Gatwick high speed link for multi-site aviation hub – Transit time under 15 mins.