



# Network North

*The railway engineer's  
alternative.....*

*Presented by: **Colin Elliff BSc CEng MICE**  
Civil Engineering Principal, High Speed UK*

# High Speed UK



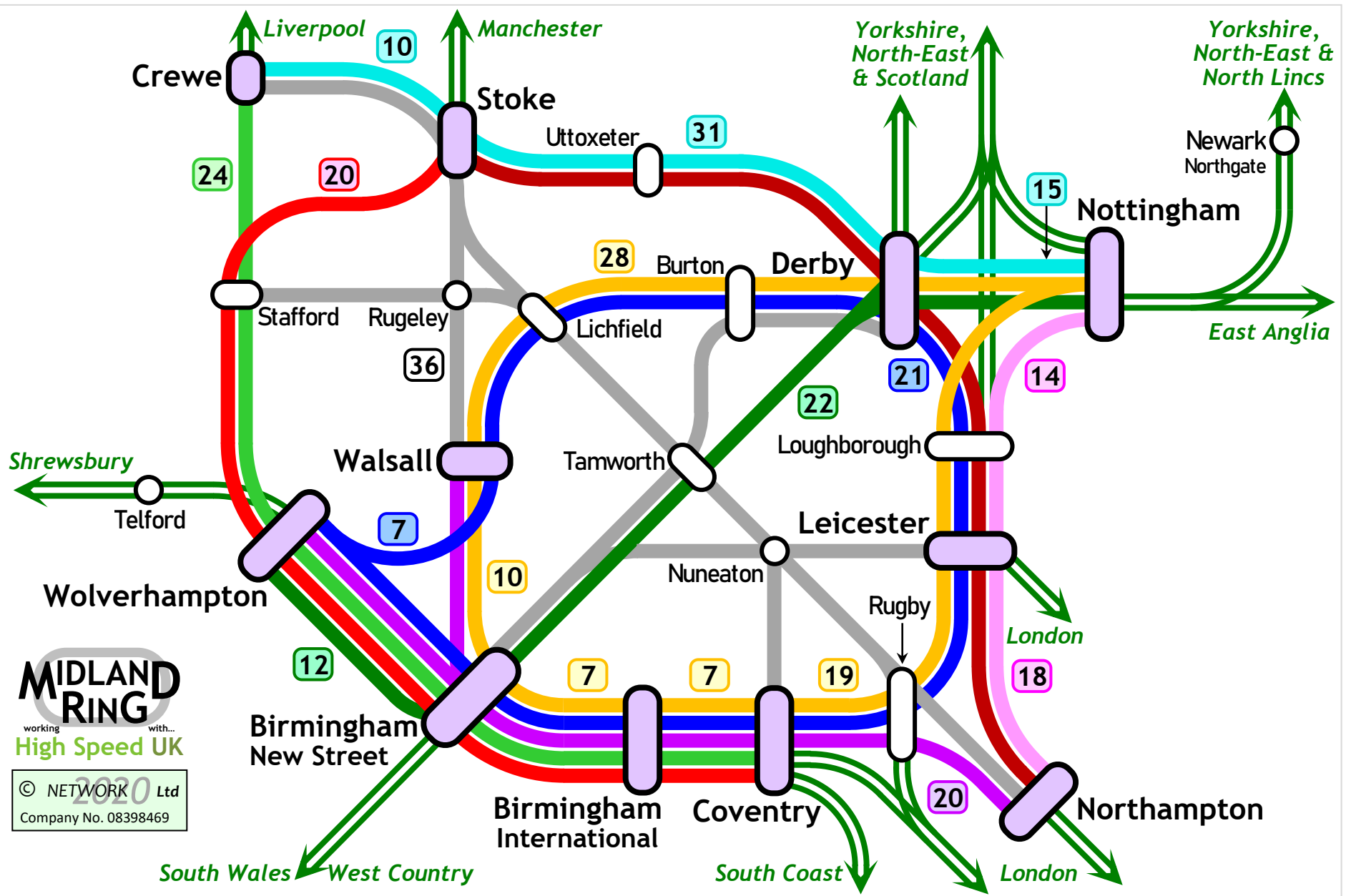
## **An integrated rail plan for the whole UK:**

- Direct intercity connectivity transformed
- Journey time reductions optimised
- Network capacity maximised
- Full integration between intercity & local traffic
- Passenger developments coordinated with freight
- Modular schemes in UK regions/nations



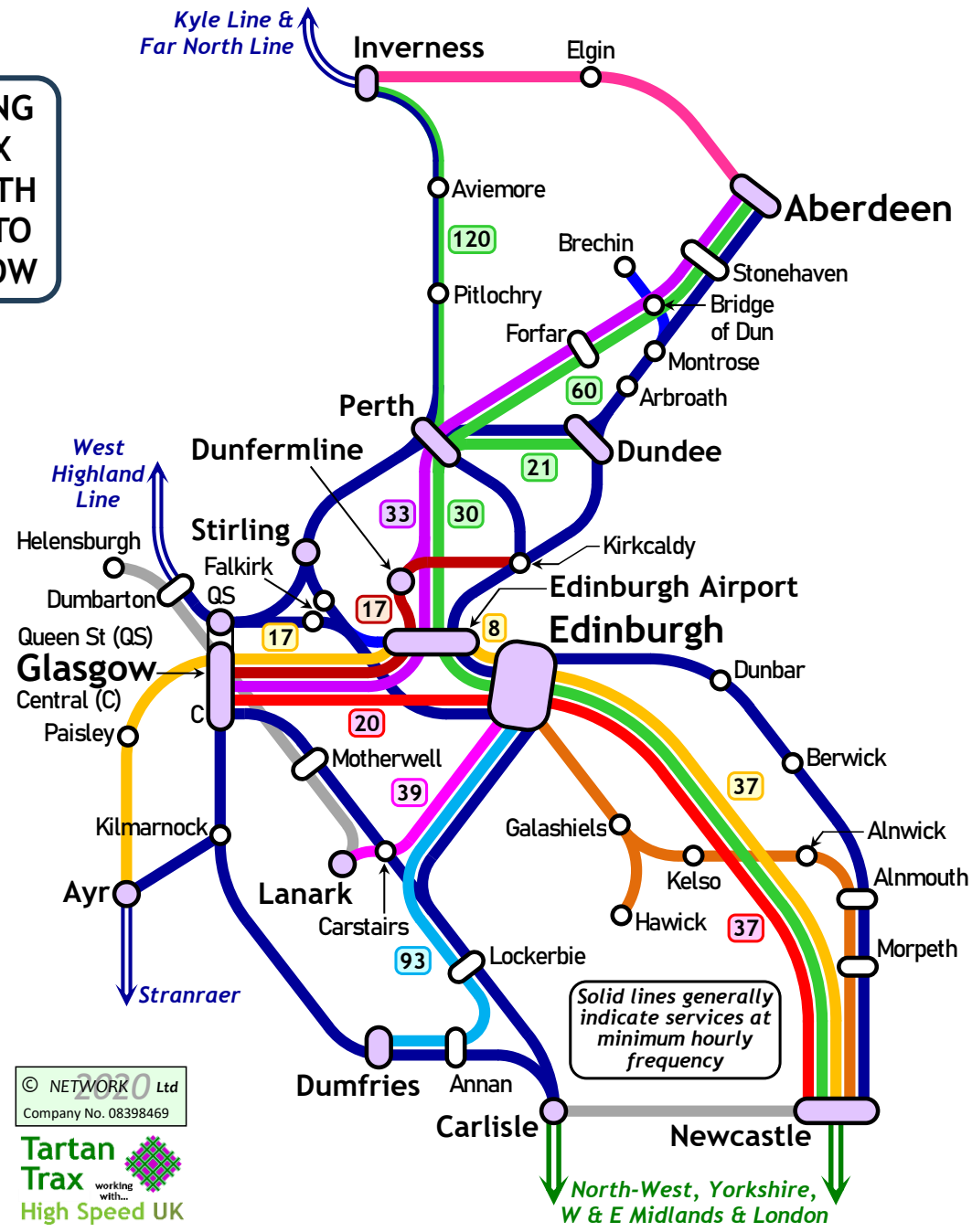
High Speed UK

*Transforming  
the Intercity  
rail network  
of the  
Midlands  
Engine*



**MIDLAND RING**  
working with...  
**High Speed UK**  
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'TUBE MAP' ILLUSTRATING PRINCIPAL TARTANTRAX INTERCITY SERVICES, WITH COMPREHENSIVE LINKS TO EDINBURGH AND GLASGOW



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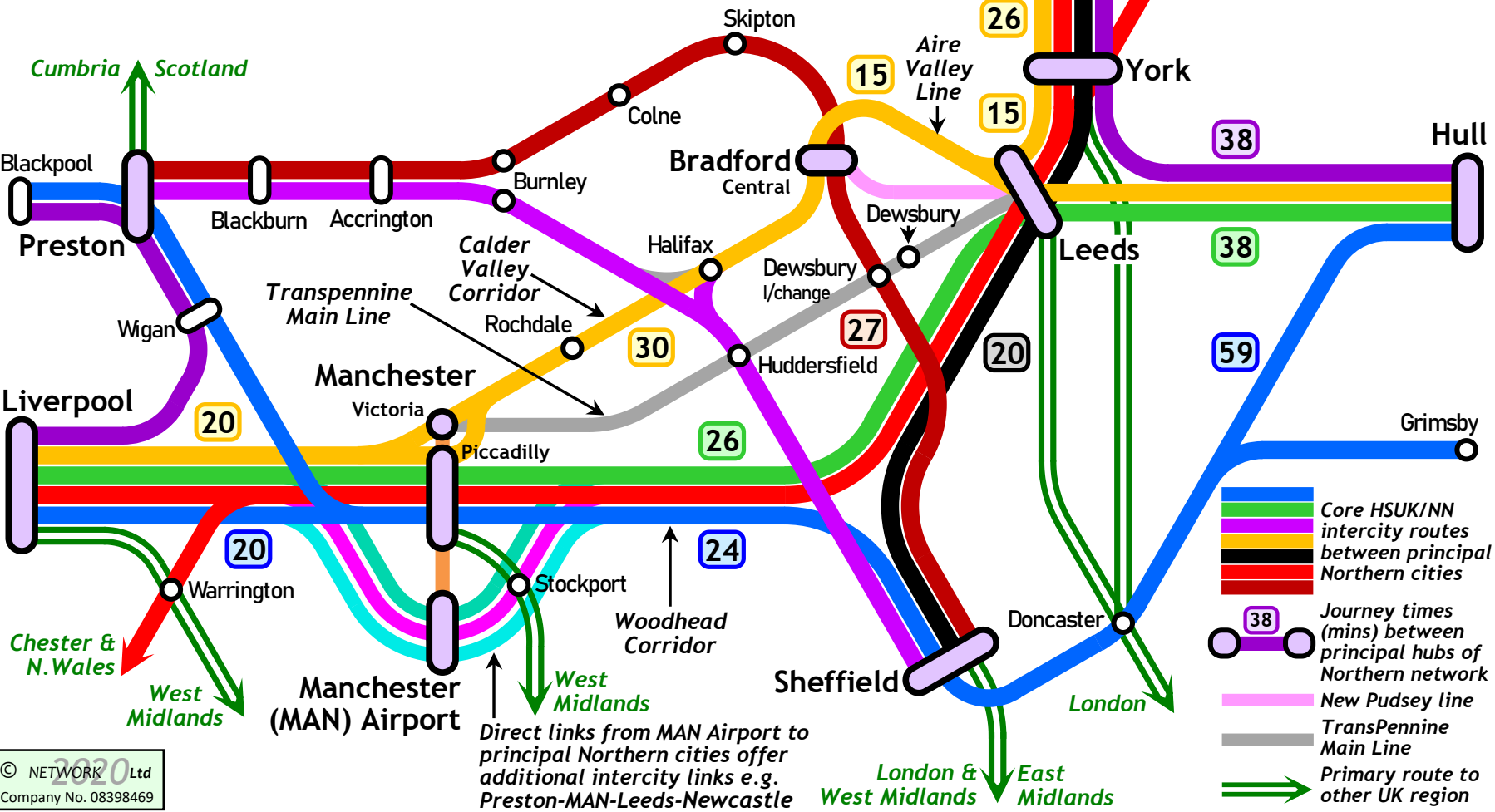
**Tartan Trax** working with...  
High Speed UK

**Tartan Trax**   
High Speed UK

*Transforming the Intercity rail network of Scotland*

**'TUBE MAP' ILLUSTRATING PRINCIPAL TRANSPENNINE NETWORK NORTH INTERCITY SERVICES**

Network North services continue to Edinburgh & Glasgow via new HSUK cross-Border high speed line  
 Newcastle-Edinburgh: 37 mins  
 Edinburgh-Glasgow: 20 mins



# Network North

High Speed UK

*Transforming the Intercity rail network of the Northern Powerhouse*



*Halifax*



*Hebden Bridge*

*Delivering  
Improved  
Local  
Services  
to  
Communities  
Large & Small*

# 4 Engineering Priorities for any railway project



1. Establish the Need
2. Develop the Financial Case
3. Define the Core Principles
4. Develop the Specification



# Need for Network North



*Traffic flow data from Doncaster Metropolitan Borough Council 2019 submission to Transport for the North, citing TfN measured traffic flow data*

## The Transpennine Bottleneck

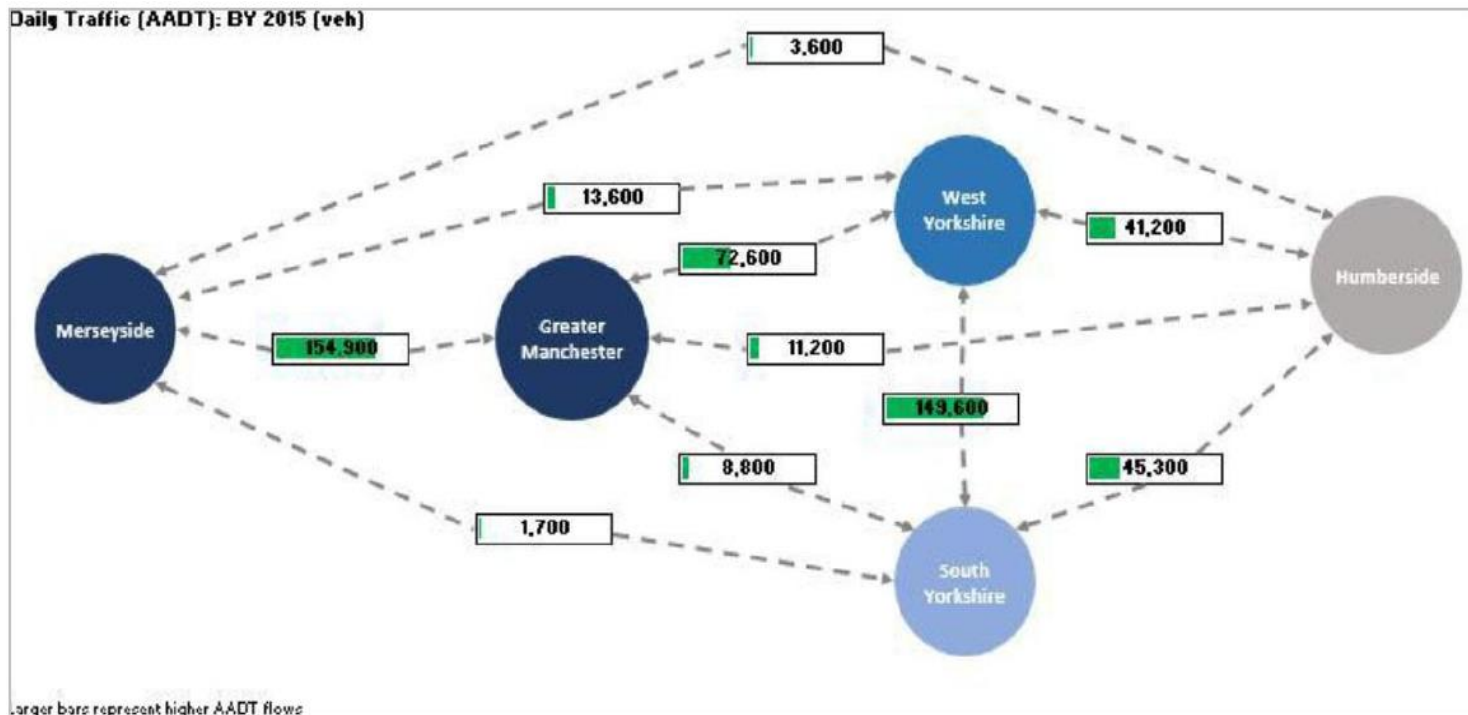


Figure 16: Annual Average Daily Traffic between City Regions in South and Central Pennines

**72,600**

Annual Average Daily (road) Traffic (AADT) flow

**57**

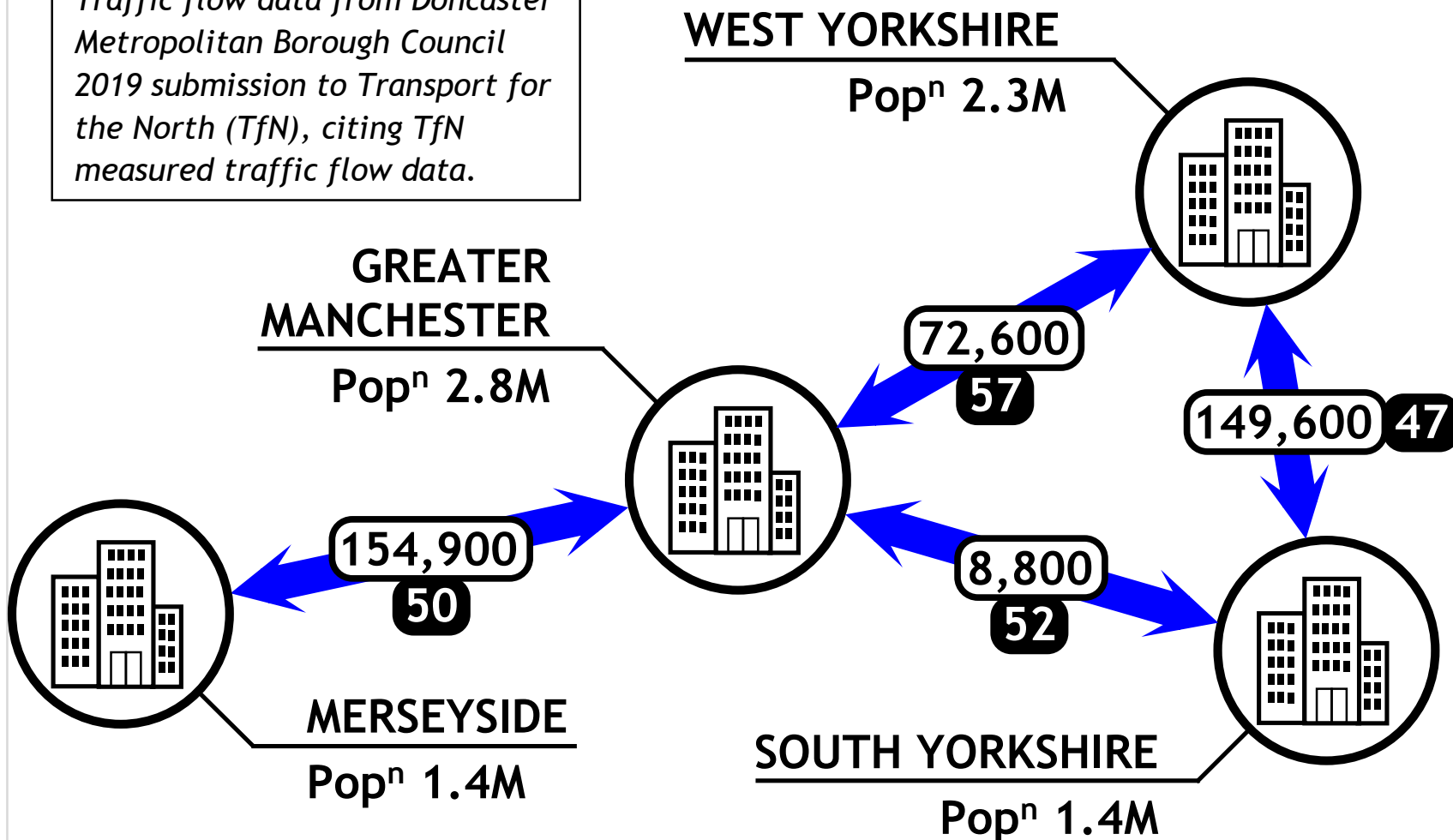
Distance (km) between principal centres

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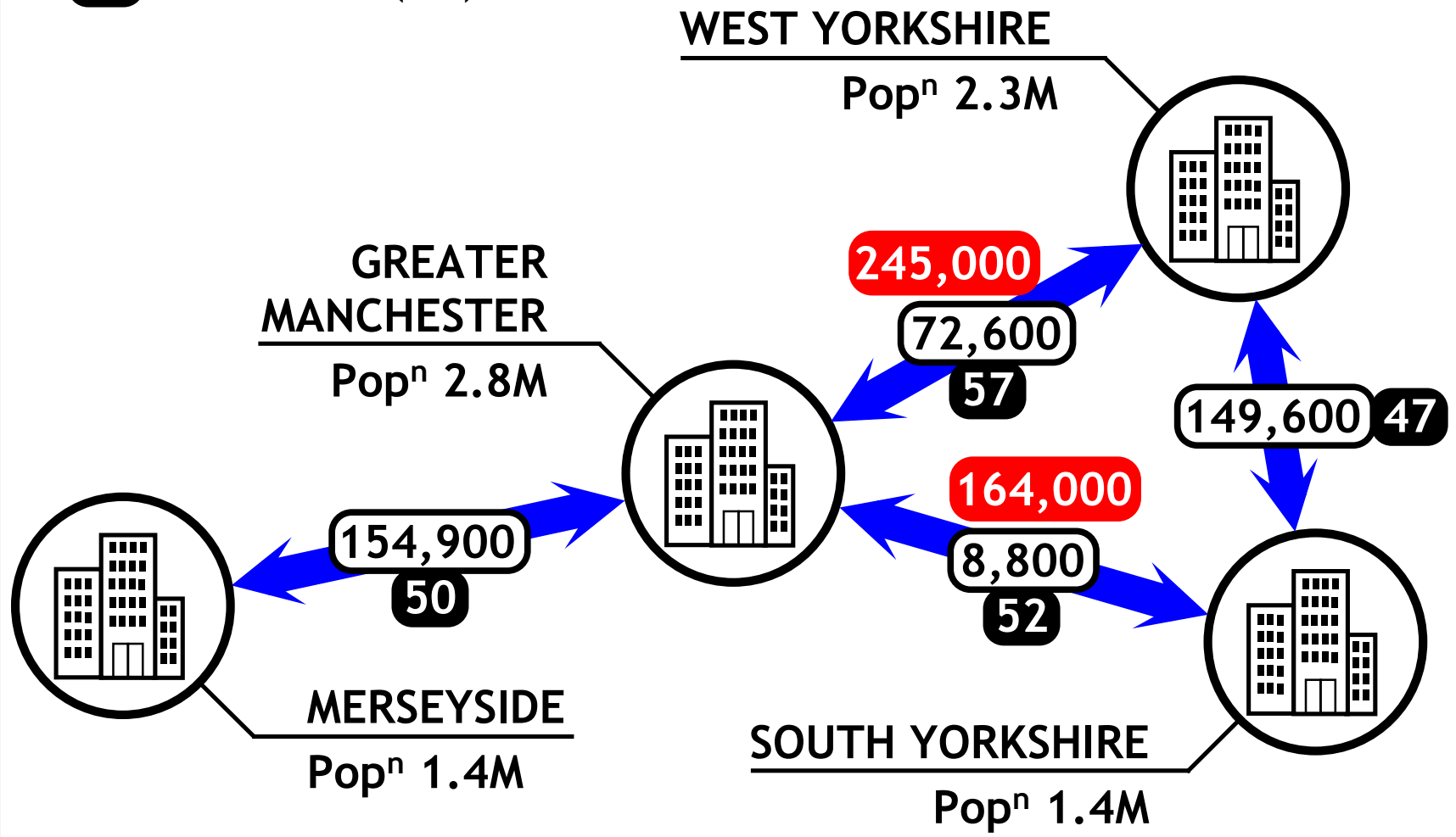
# The Transpennine Bottleneck

Traffic flow data from Doncaster Metropolitan Borough Council 2019 submission to Transport for the North (TfN), citing TfN measured traffic flow data.



**72,600** Annual Average Daily (road) Traffic (AADT) flow  
**245,000** Traffic flow according to gravitational model  
**57** Distance (km)

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Suppressed demand =

Predicted flow minus

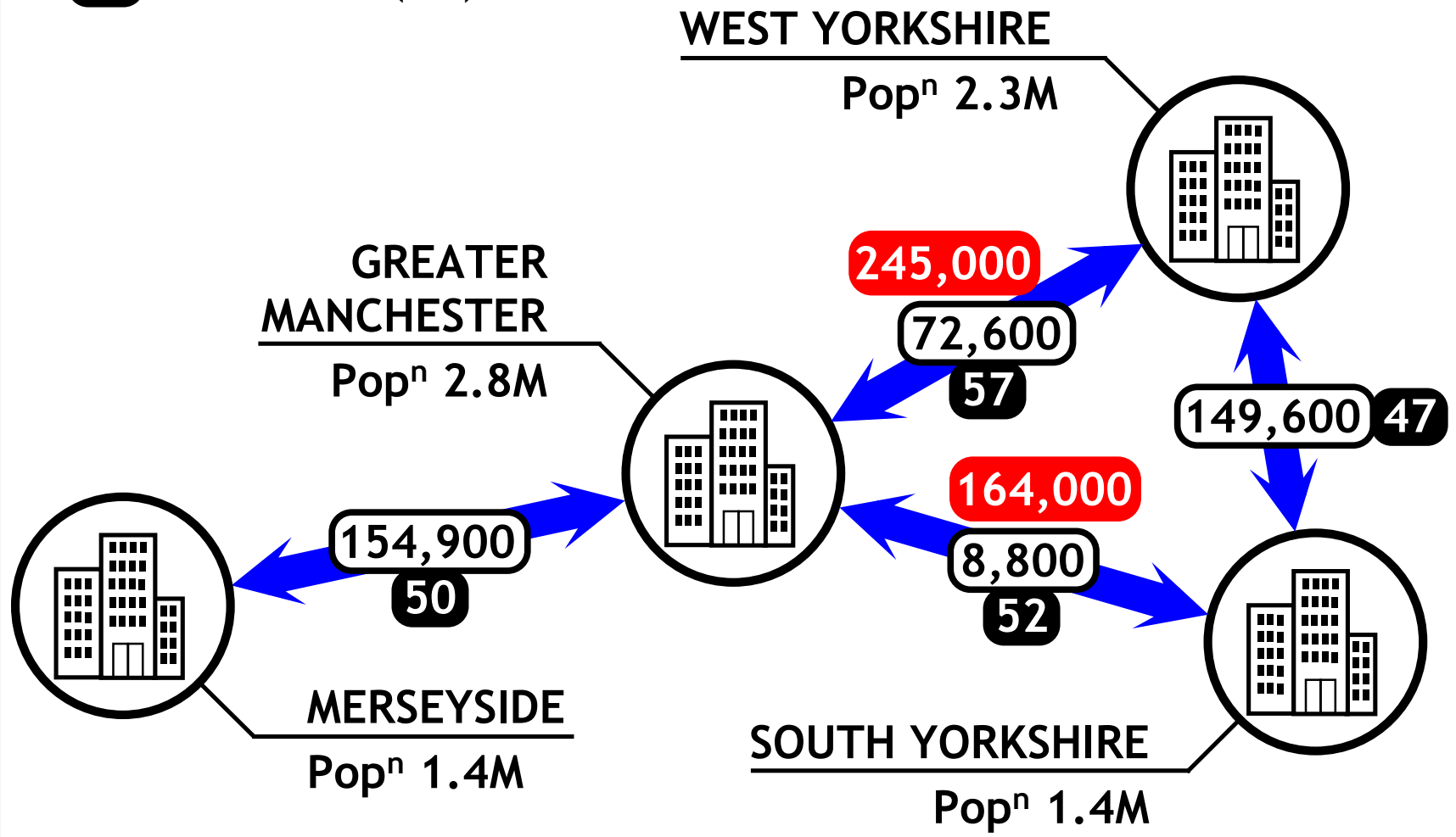
Measured flow =

$$245000 - 72600 + 164000 - 8800 =$$

**327,600 veh/day**

**72,600** Annual Average Daily (road) Traffic (AADT) flow  
**245,000** Traffic flow according to gravitational model  
**57** Distance (km)

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~330,000 suppressed demand on T/P routes - equivalent to:

- 2 new M62's plus
- 2 new transpeak motorways

# What's the Solution??



- New Motorways neither feasible nor acceptable
- New/upgraded/restored railways are the only practicable alternative
- 2 new passenger routes & 1 new freight route required to accommodate suppressed T/P demand
- Transformation of rail connectivity and capacity across the North is vital for Levelling-up and vital for Net Zero

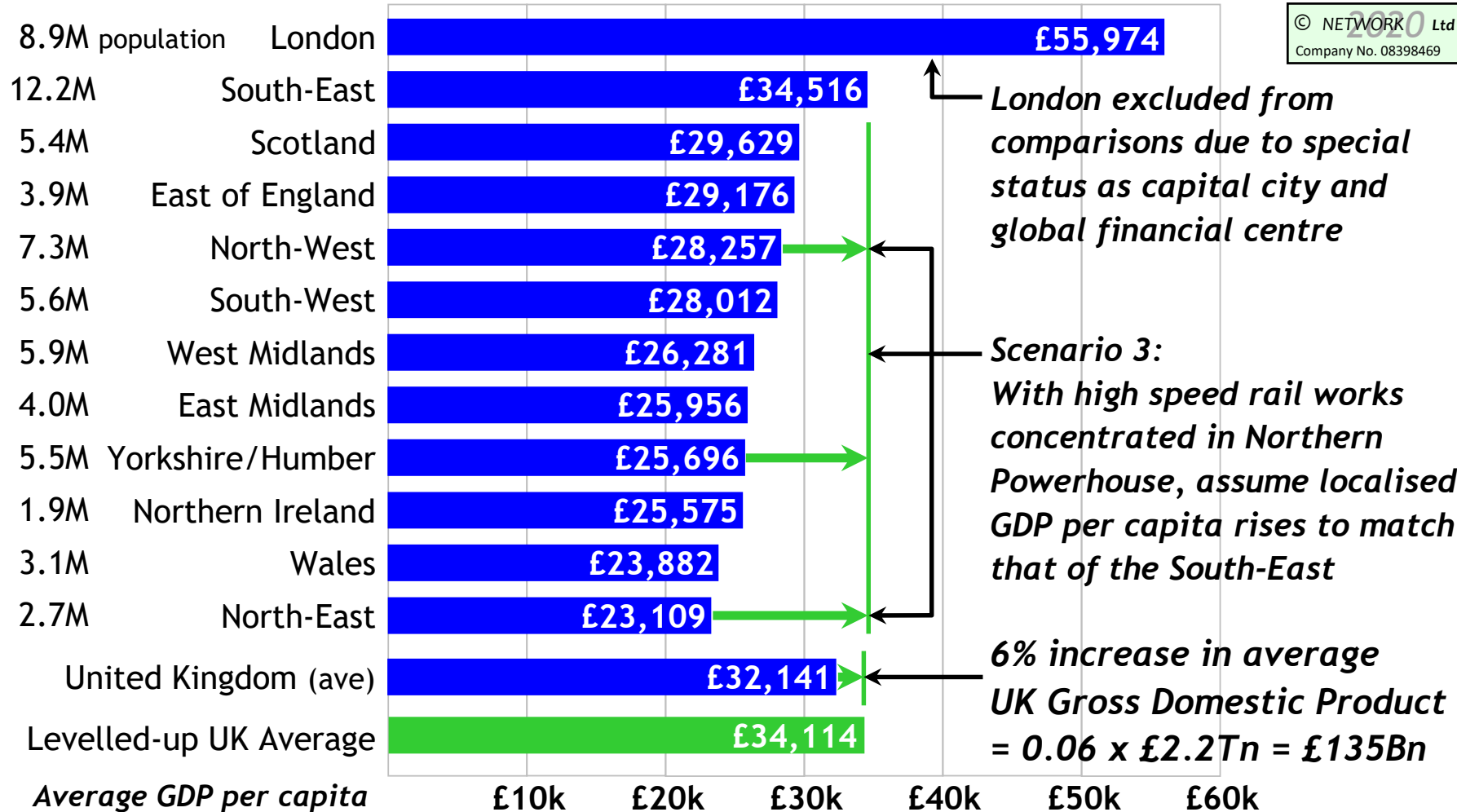
# Network North Financing



## A Levelled-up North:

*Worth >£100 billion per year*

*Only possible with Network North's proposed rail network transformation*



## Variance in regional GDP per capita (2021)

# Network North Principles



1. The network is all-important - lines are only a means to an end
2. Design & optimise to a specification defining network performance
3. Ignore irrelevant externalities & question established projects
4. Integration between all modes is vital for an efficient network, serving all communities large and small
5. Integration is best achieved at a single city centre 'hub' station
6. Avoid terminus stations at all costs (except in coastal cities)
7. Optimisation of connectivity and capacity is vital to achieving both Levelling-up, and the modal shift necessary for Net Zero



# Principles 2 & 3

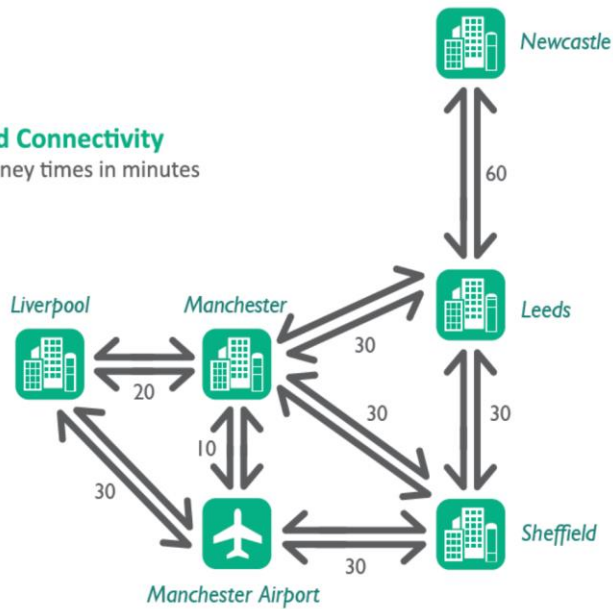


2. Design & optimise to a specification
3. Question established projects

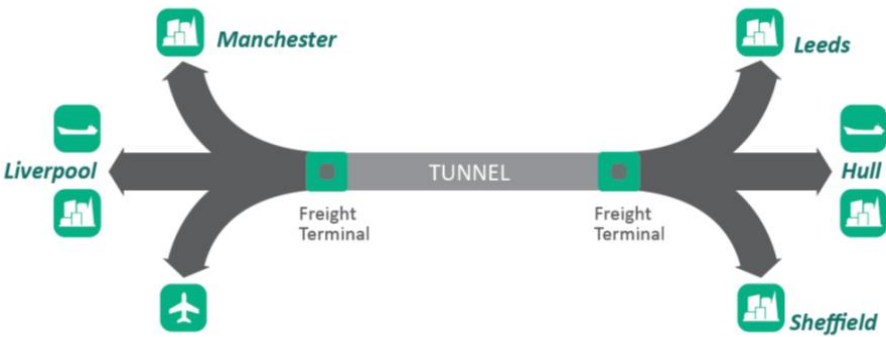
Or...

*How TfN's blind adherence to established HS2 proposals wrecked Northern Powerhouse Rail*

**Transformed Connectivity**  
Target rail journey times in minutes

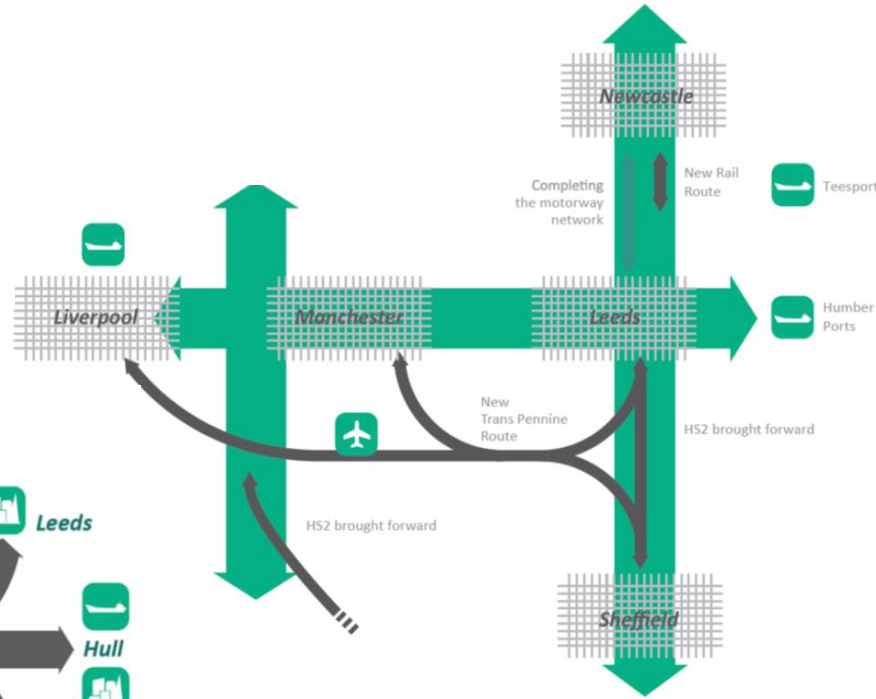


**Targets for Improved Intercity Journey Times**



**Outline Scheme for Improved Transpennine Freight Links**

Extracts from *One North – A Proposition for an Interconnected North*, July 2014. (P26, P27 & P31)



**Outline Scheme for Improved Passenger Links between Northern Cities**

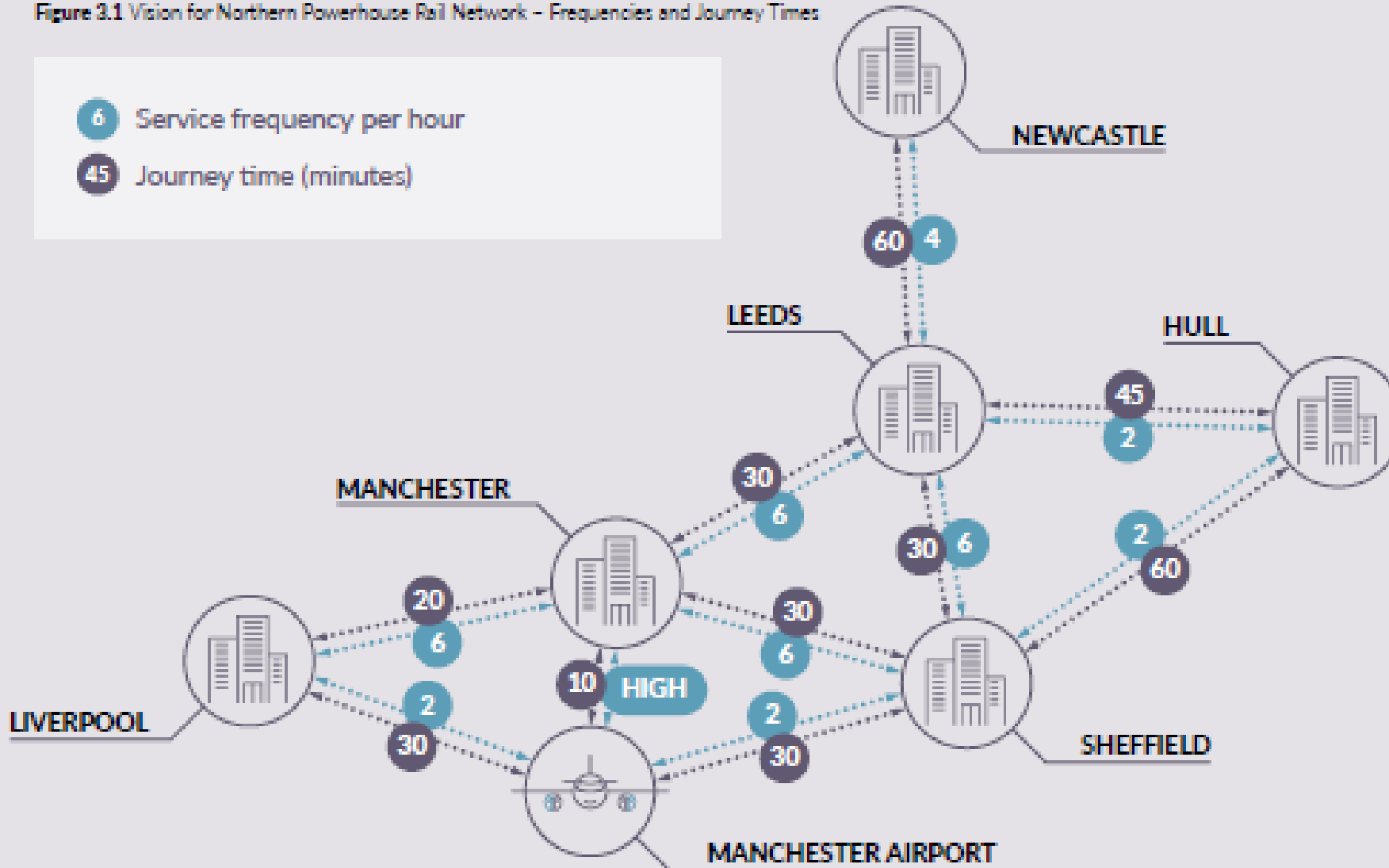
# Network North

## 2014 'One North' Specification

*published by  
Liverpool,  
Manchester,  
Sheffield, Leeds  
& Newcastle  
City Councils*

Figure 3.1 Vision for Northern Powerhouse Rail Network – Frequencies and Journey Times

- 6 Service frequency per hour
- 45 Journey time (minutes)



## 2016 Northern Powerhouse Specification

*adopted by Transport for the North*

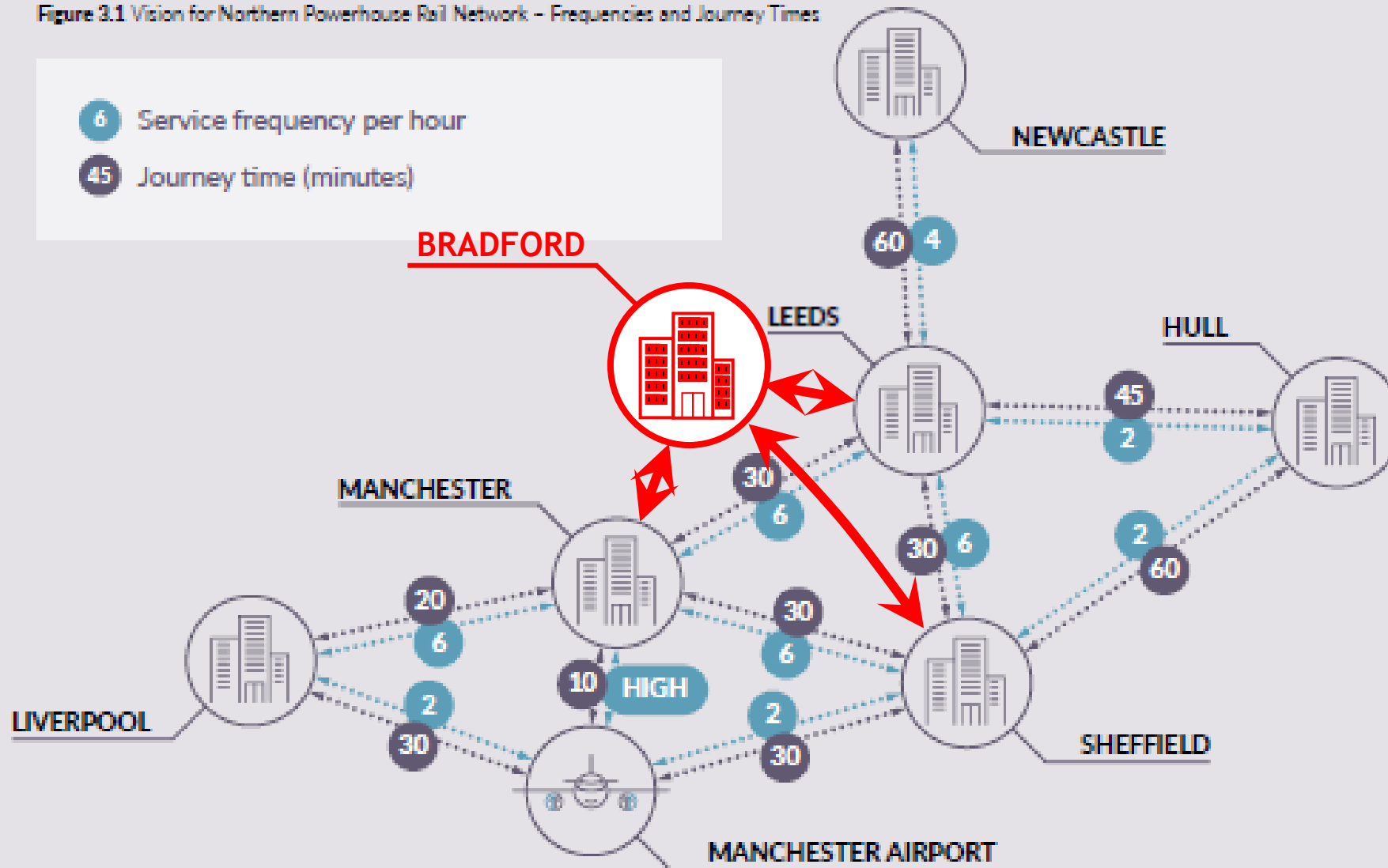
# Network North

## 2016 Northern Powerhouse Specification

*Bradford completely omitted!!*

Figure 3.1 Vision for Northern Powerhouse Rail Network – Frequencies and Journey Times

- 6 Service frequency per hour
- 45 Journey time (minutes)



# Transport for the North

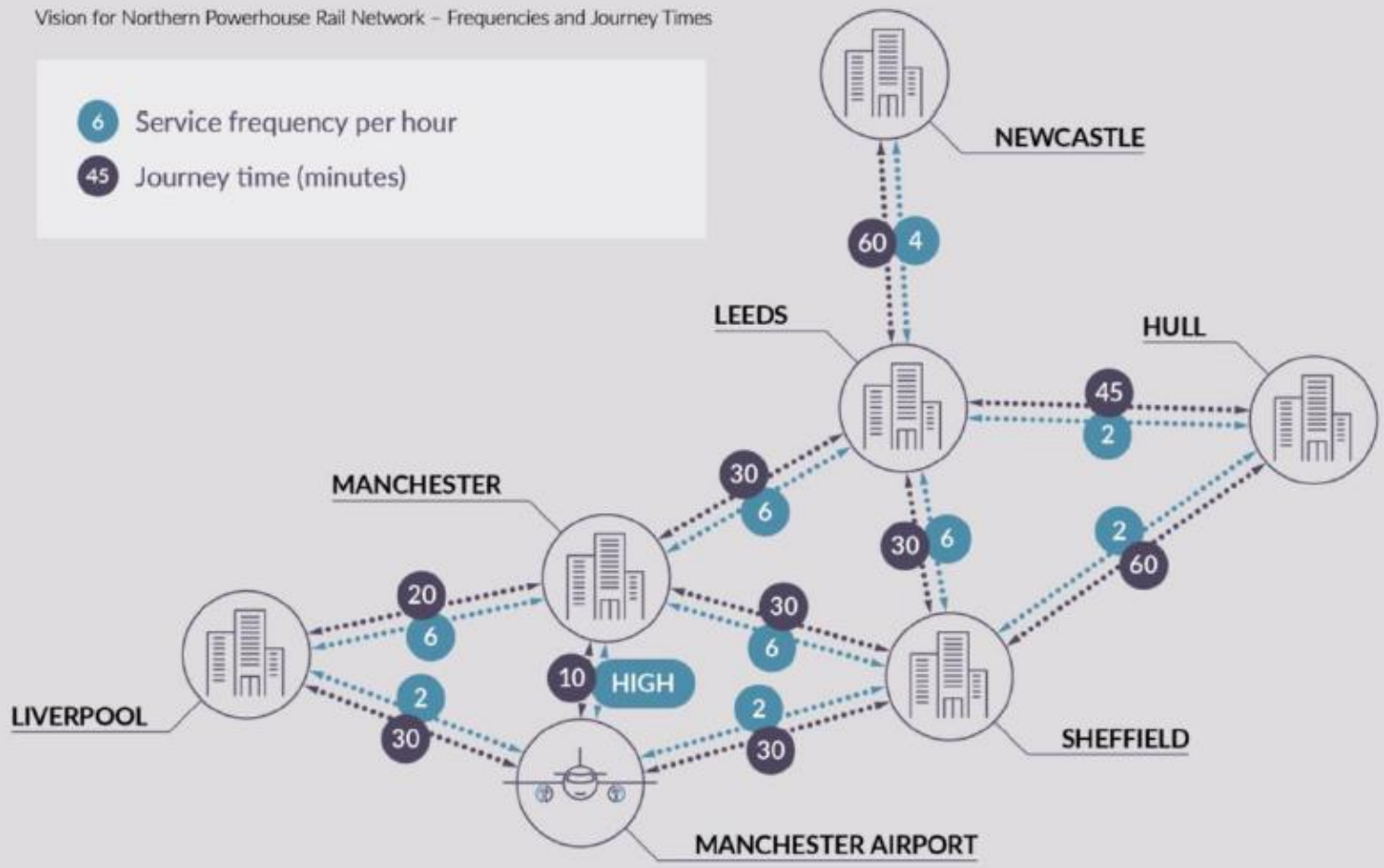
## *Network Design Epic Fail*

*Selected slides from 2017 ICE presentation  
by TfN staffer*

# Northern Powerhouse Rail Ambitions

Vision for Northern Powerhouse Rail Network - Frequencies and Journey Times

- 6 Service frequency per hour
- 45 Journey time (minutes)



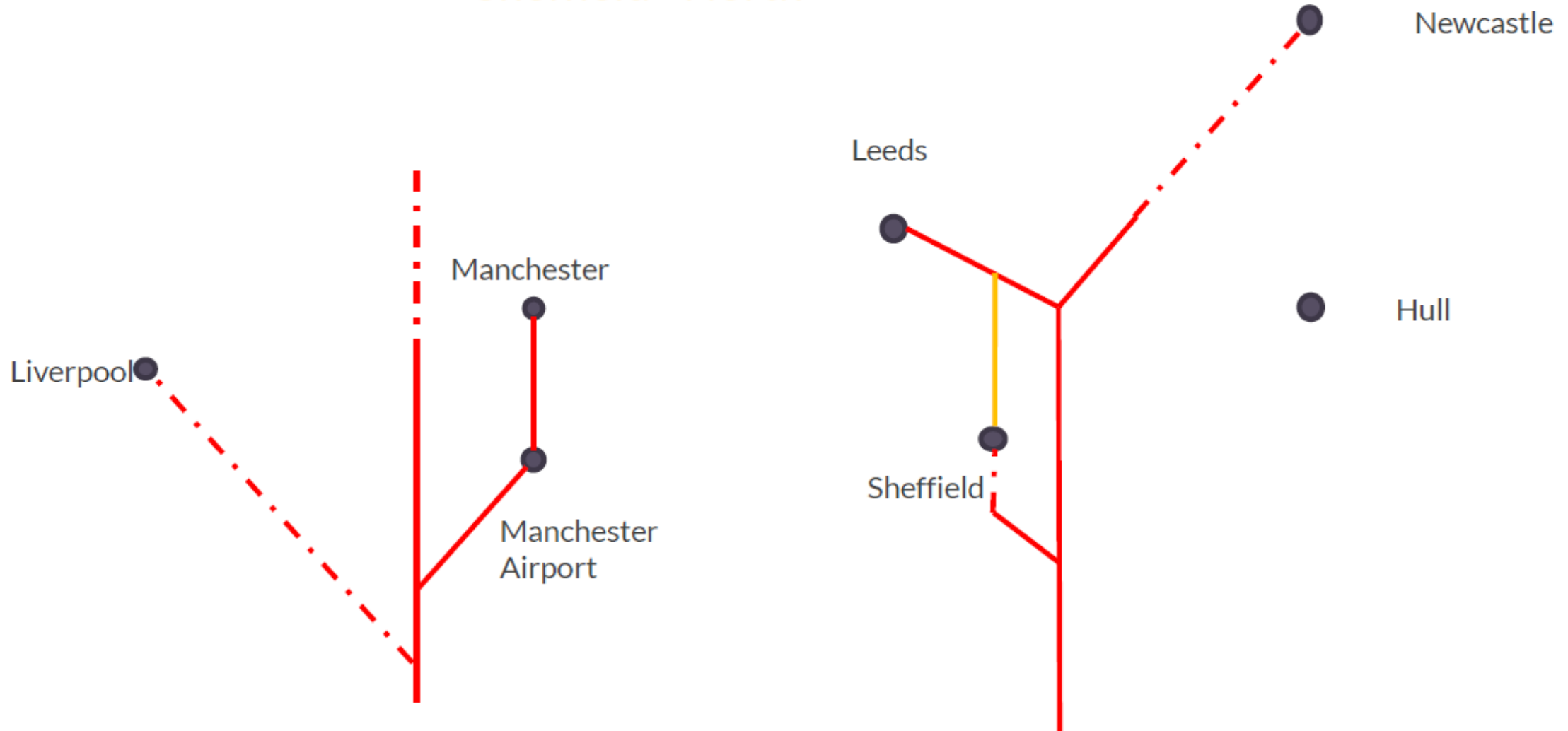
## What might the NPR Network look like?



# What might the NPR Network look like?

HS2 Network

Sheffield - North



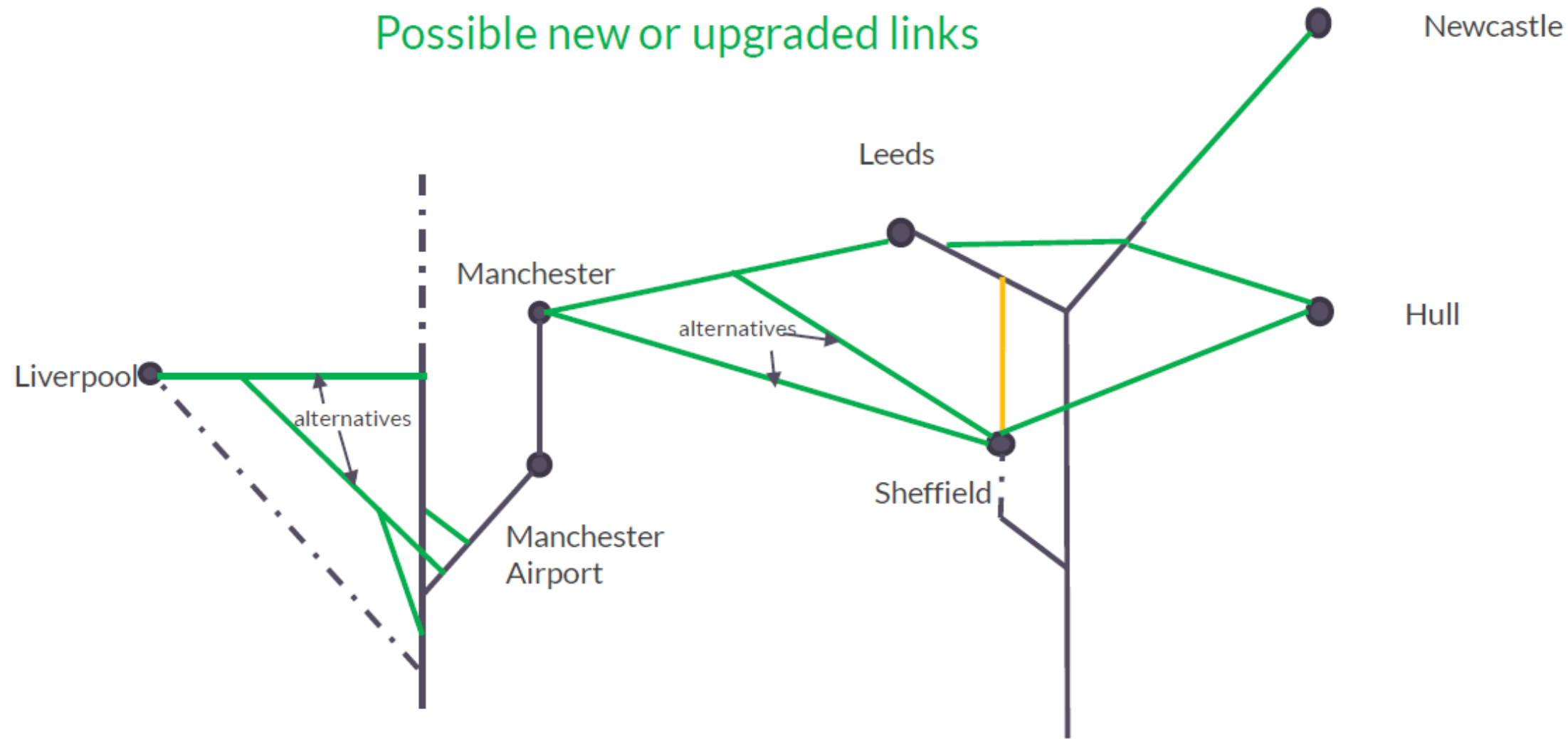


# What might the NPR Network look like?

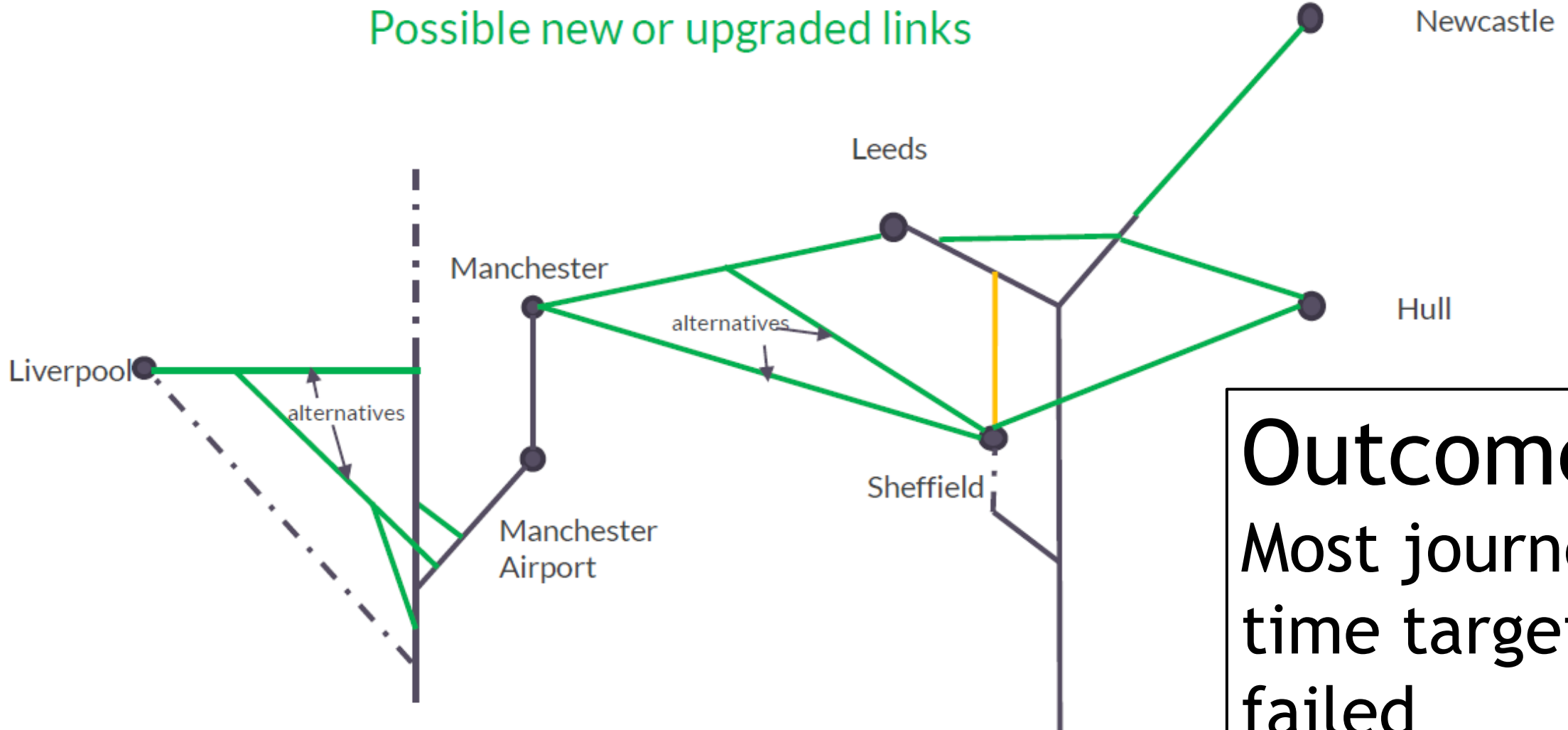
HS2 is a planned new rail network

Sheffield – North

Possible new or upgraded links

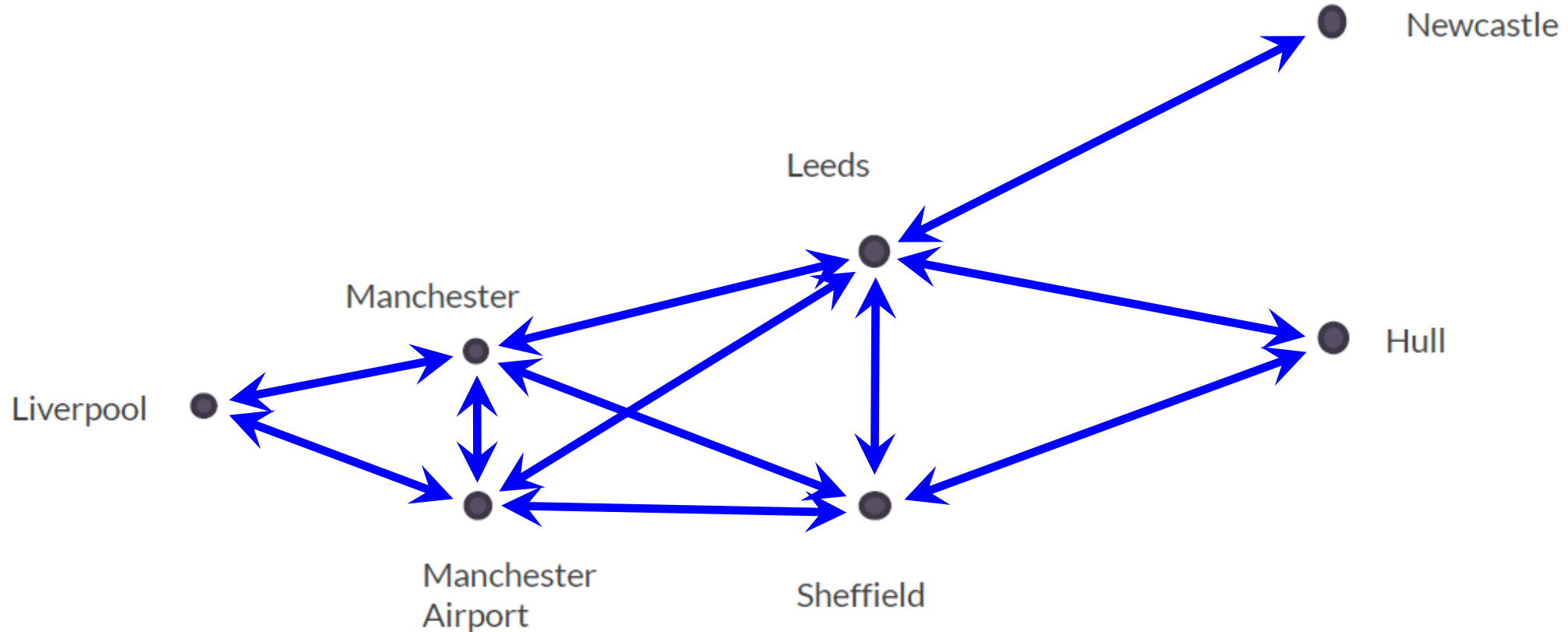


What might the NPR Network look like?  
HS2 is a planned new rail network  
Sheffield – North  
Possible new or upgraded links



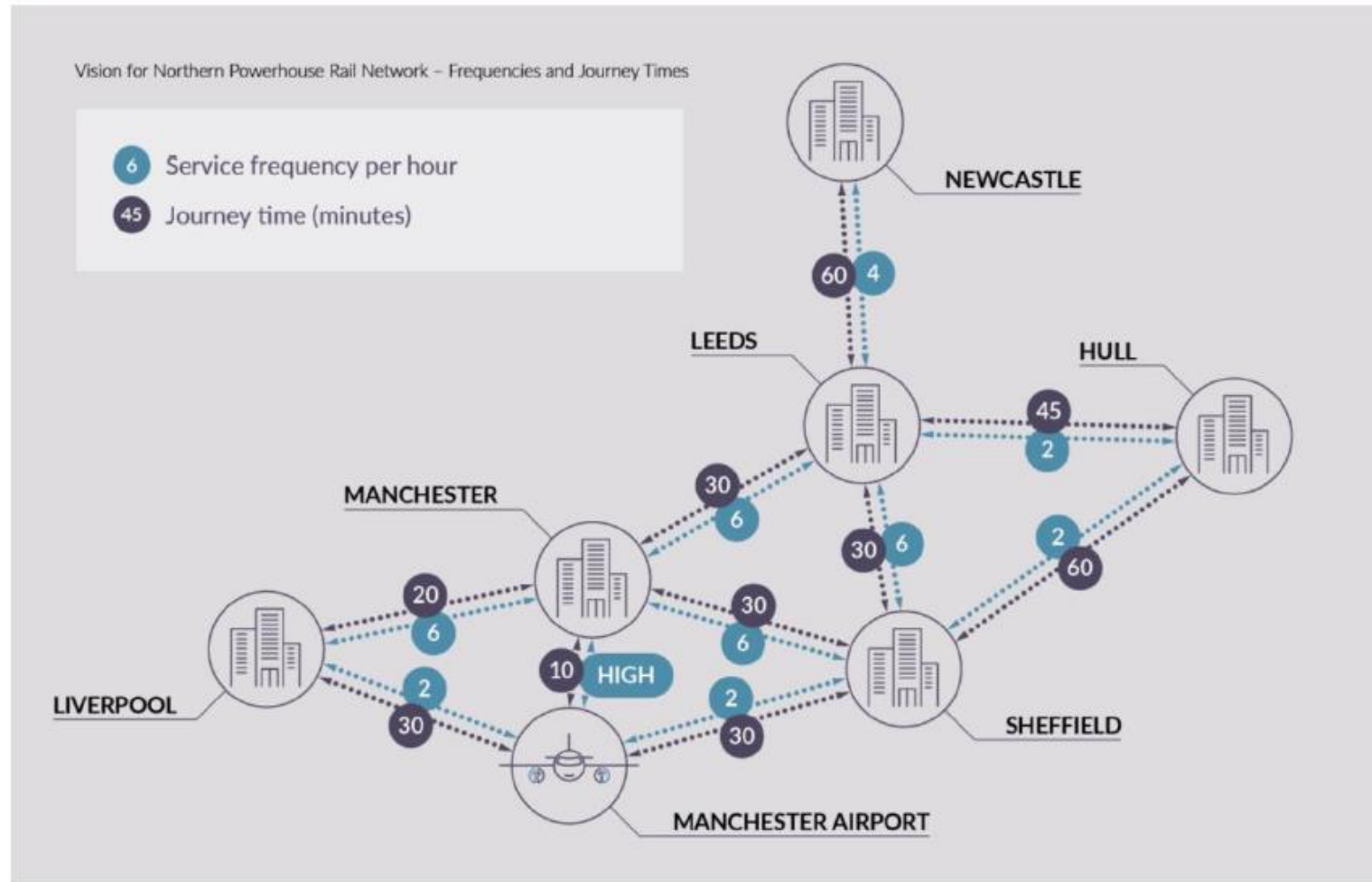
**Outcome:**  
Most journey  
time targets  
failed

What might the NPR Network look like?



*What TfN's 'experts' might have designed if they hadn't taken the 'HS2 Shilling'...*

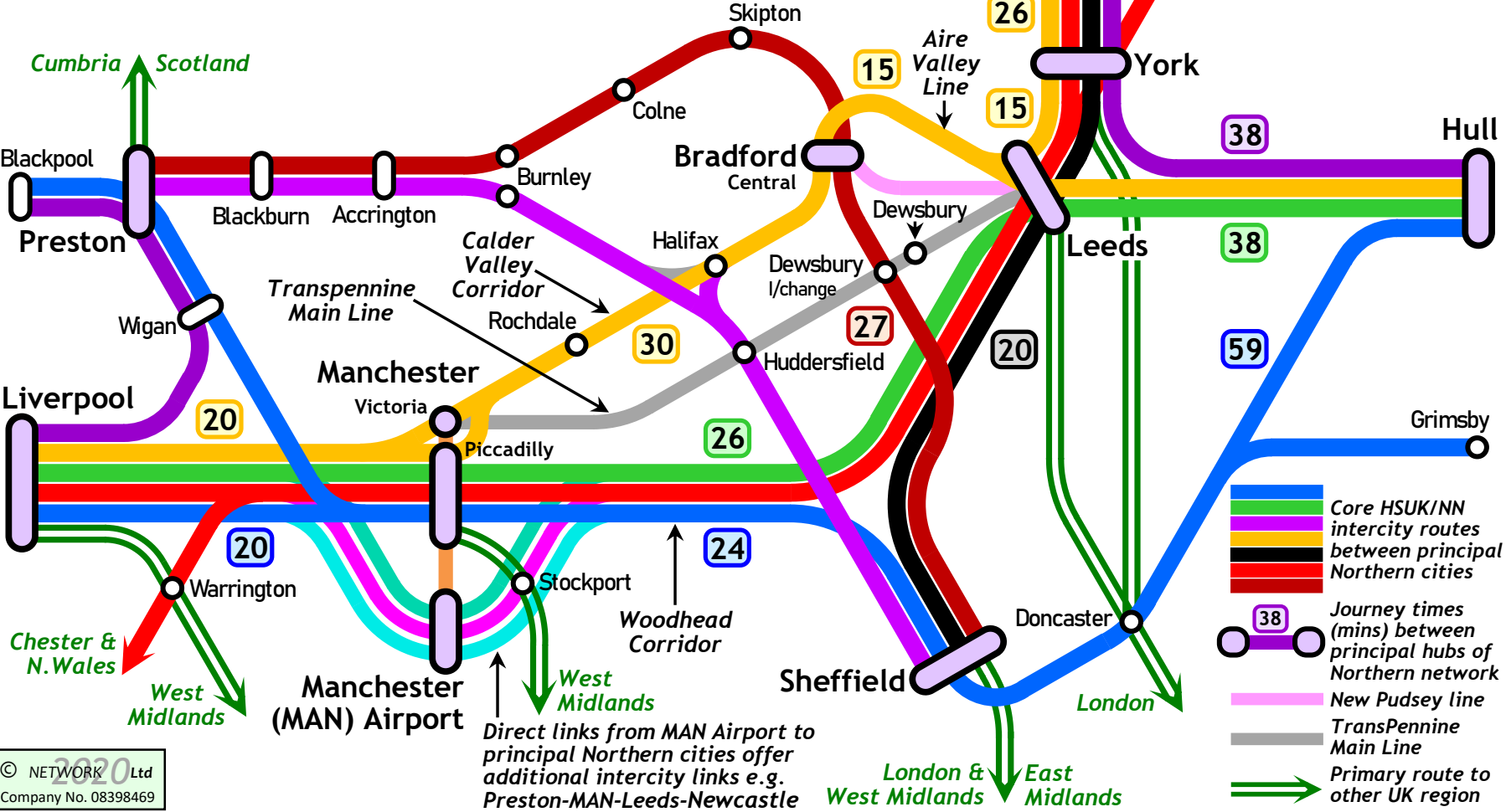
# Northern Powerhouse Rail Ambitions



*...almost exactly matching the TfN specification!!*

**'TUBE MAP' ILLUSTRATING PRINCIPAL TRANSPENNINE NETWORK NORTH INTERCITY SERVICES**

Network North services continue to Edinburgh & Glasgow via new HSUK cross-Border high speed line  
 Newcastle-Edinburgh: 37 mins  
 Edinburgh-Glasgow: 20 mins



# Network North

*Specification delivered, irrelevant HS2 proposals ignored, **Bradford included***

# Principles 5 & 6



5. Integration is best achieved at a single city centre hub station
6. Avoid terminus stations at all costs

*Let's look at Bradford...*

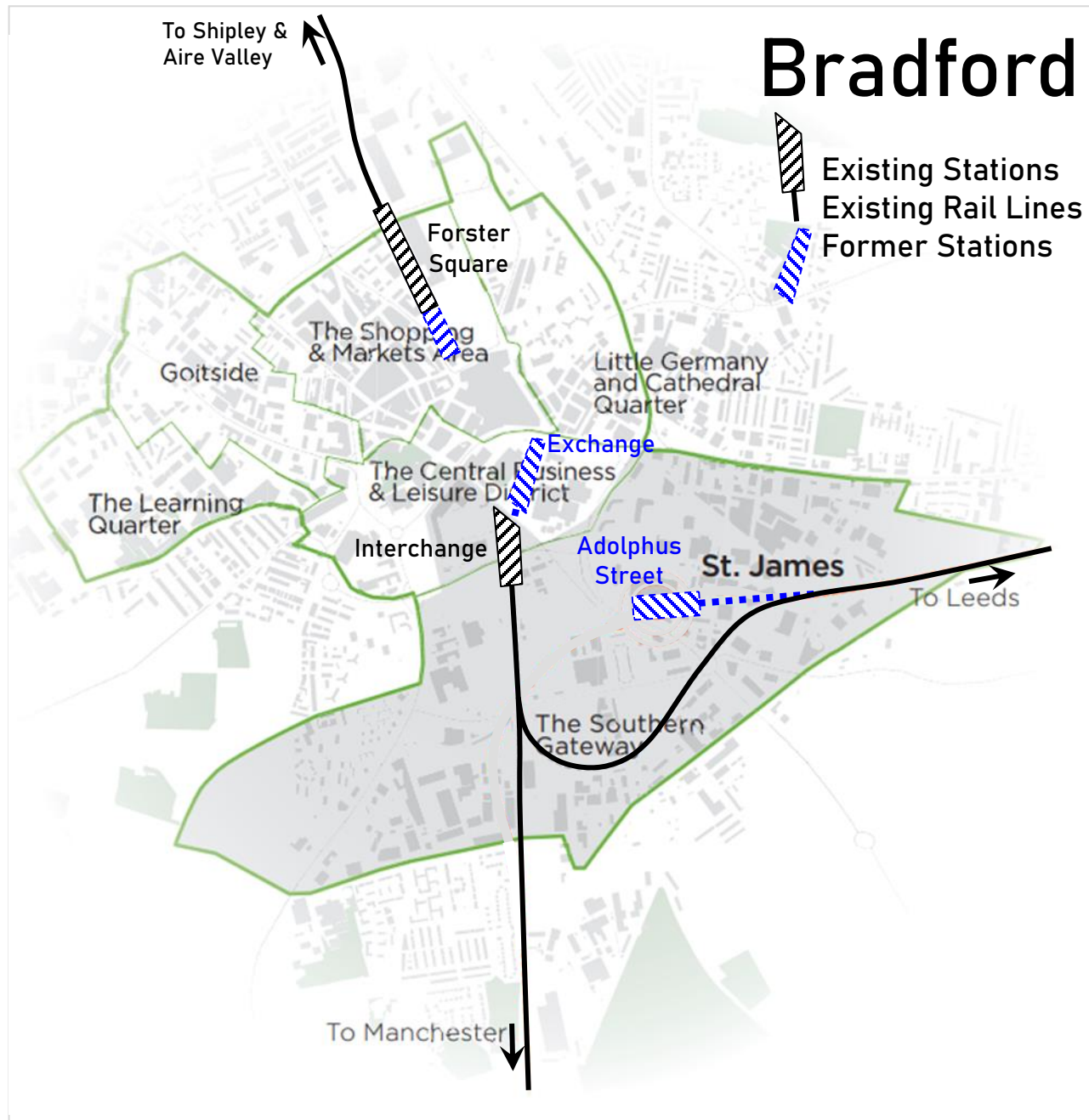
# The Bradford Conundrum

## *Getting the Station Solution Right and Creating a Network*

*Slides developed from image on HADRAG website*

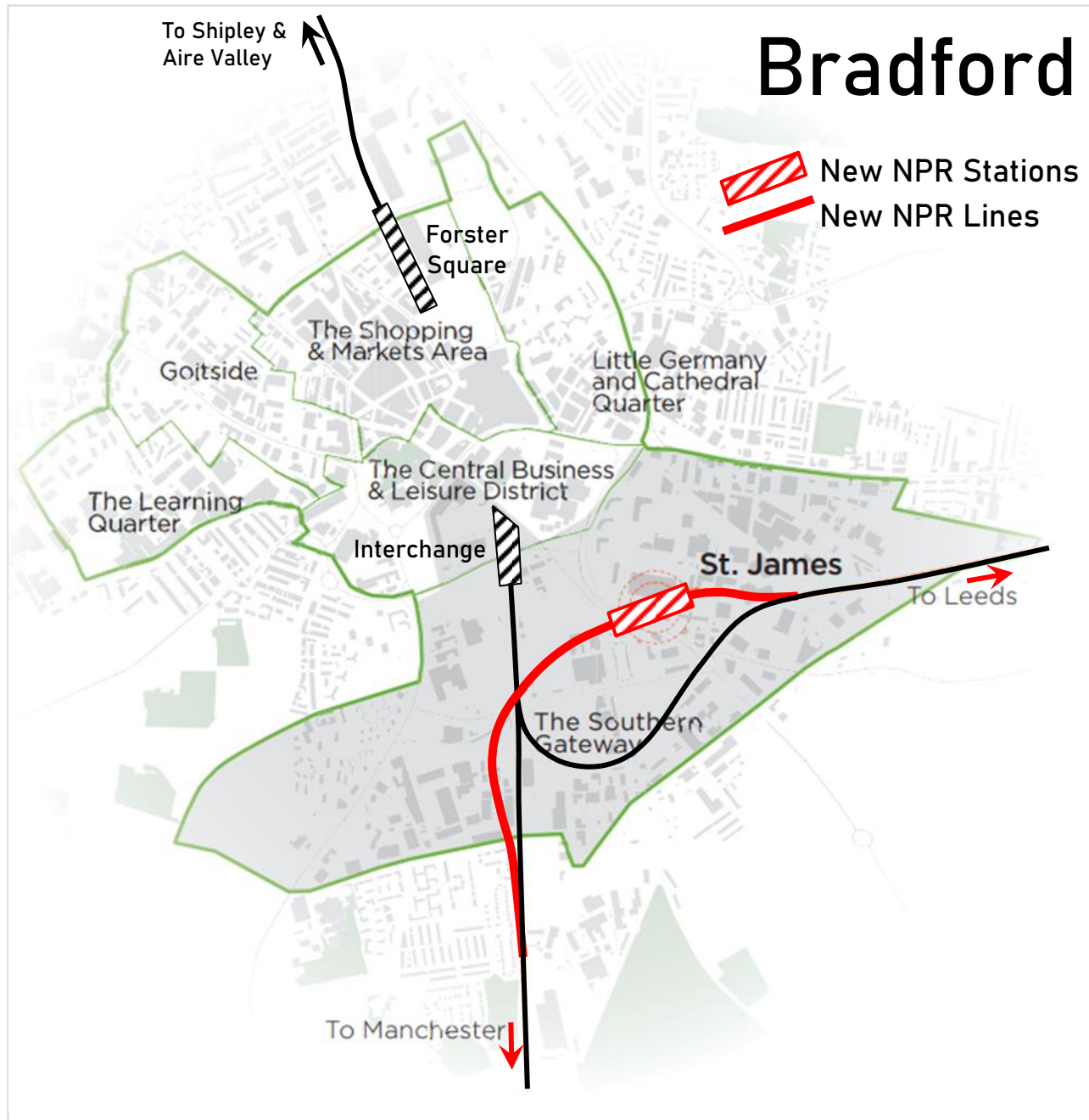
## Bradford's Rail System - existing

*Disconnected & opposed termini - unique in UK inland cities*





## Bradford's Rail System - TfN/NPR



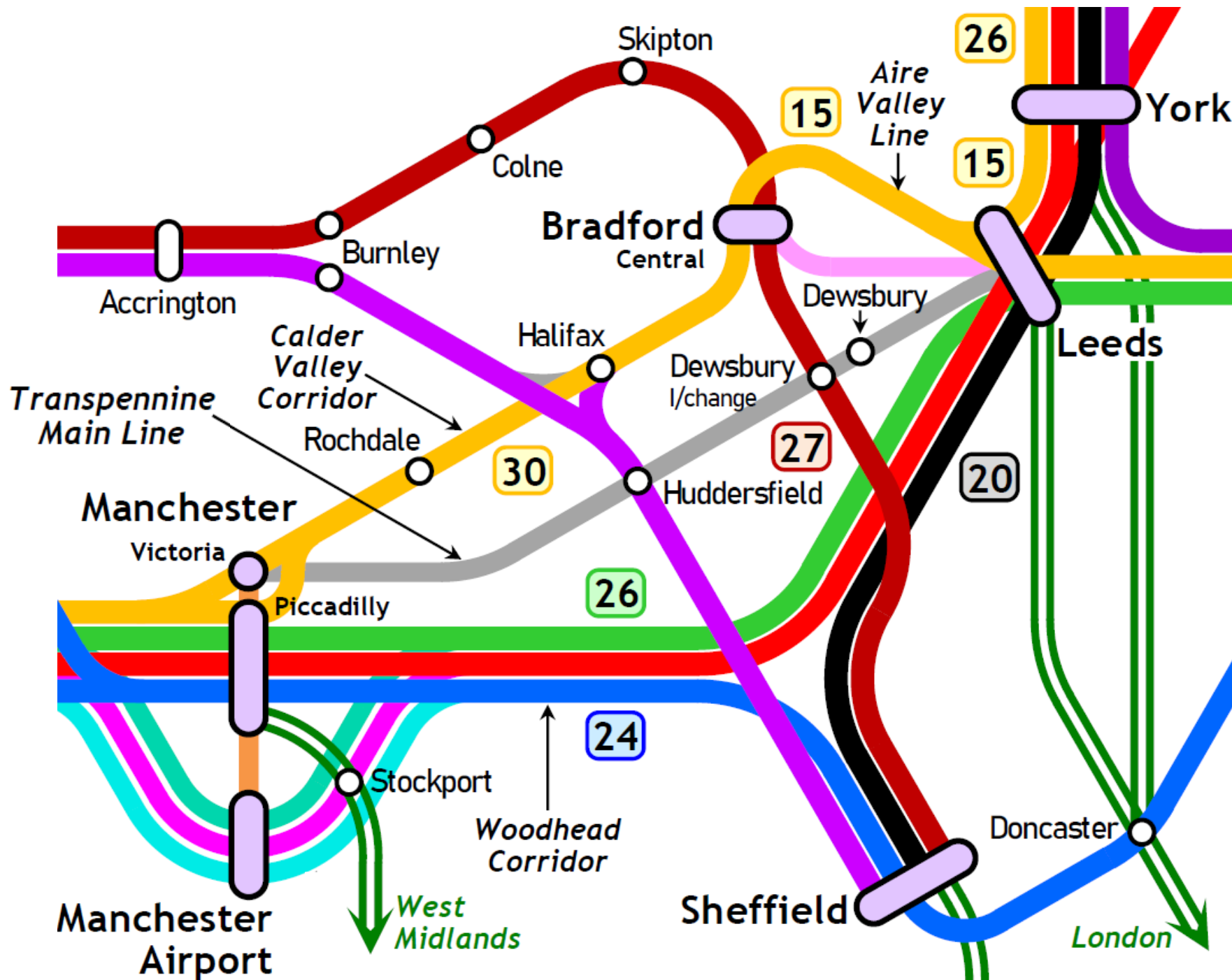
- *Disconnected termini remain*
- *3 separate stations, no integration*
- *NPR station outside city centre*

## Bradford's Rail System - Network North

- *New Bradford Central on Exchange site*
- *Transpennine & London through trains*
- *Transformed local network*



# Network North



*Bradford at heart of Network North, E-W and N-S routes intersecting*

# Network North Promises



1. Direct intercity links between all principal NP cities
2. Journey times reduced in line with Northern Powerhouse Spec
3. Manchester Airport directly linked to all principal NP cities
4. 2 new Transpennine routes for passenger traffic
5. A dedicated Transpennine freight route from Liverpool to Humber
6. Bespoke schemes developed at all principal network hubs for  
a) dedicated through I/C routes and b) doubling of local capacity
7. New intercity routes fully integrated with existing network at city centre stations, extending connectivity benefits to 'small towns'

# NN : Promise 1



Network North offers comprehensive direct intercity links between 11 principal centres of the Northern Powerhouse:

- Manchester
- Liverpool
- Preston
- MAN Airport
- Sheffield
- Bradford
- Leeds
- Hull
- York
- Darlington
- Newcastle

# Existing Direct Links



MAN Airport	<b>MAN</b>												Direct existing journey	Light Blue
Manchester		<b>MA</b>											1 change required	Yellow
Preston			<b>PR</b>											
Liverpool				<b>LI</b>										
Sheffield					<b>SH</b>									
Bradford						<b>BD</b>								
Leeds							<b>LS</b>							
Hull								<b>HU</b>						
York									<b>YO</b>					
Darlington										<b>DL</b>				
Newcastle											<b>NE</b>			
	MAN	MA	PR	LI	SH	BD	LS	HU	YO	DL	NE			

# Direct Links via NPR






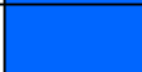


























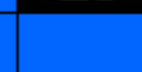







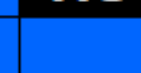








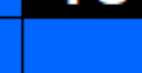









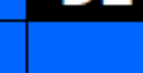
MAN Airport	<b>MAN</b>											
Manchester		<b>MA</b>										
Preston			<b>PR</b>									
Liverpool				<b>LI</b>								
Sheffield					<b>SH</b>							
Bradford						<b>BD</b>						
Leeds							<b>LS</b>					
Hull								<b>HU</b>				
York									<b>YO</b>			
Darlington										<b>DL</b>		
Newcastle											<b>NE</b>	
	MAN	MA	PR	LI	SH	BD	LS	HU	YO	DL	NE	

Direct NPR journey	
Direct existing journey	
1 change required	

# Direct Links via NN



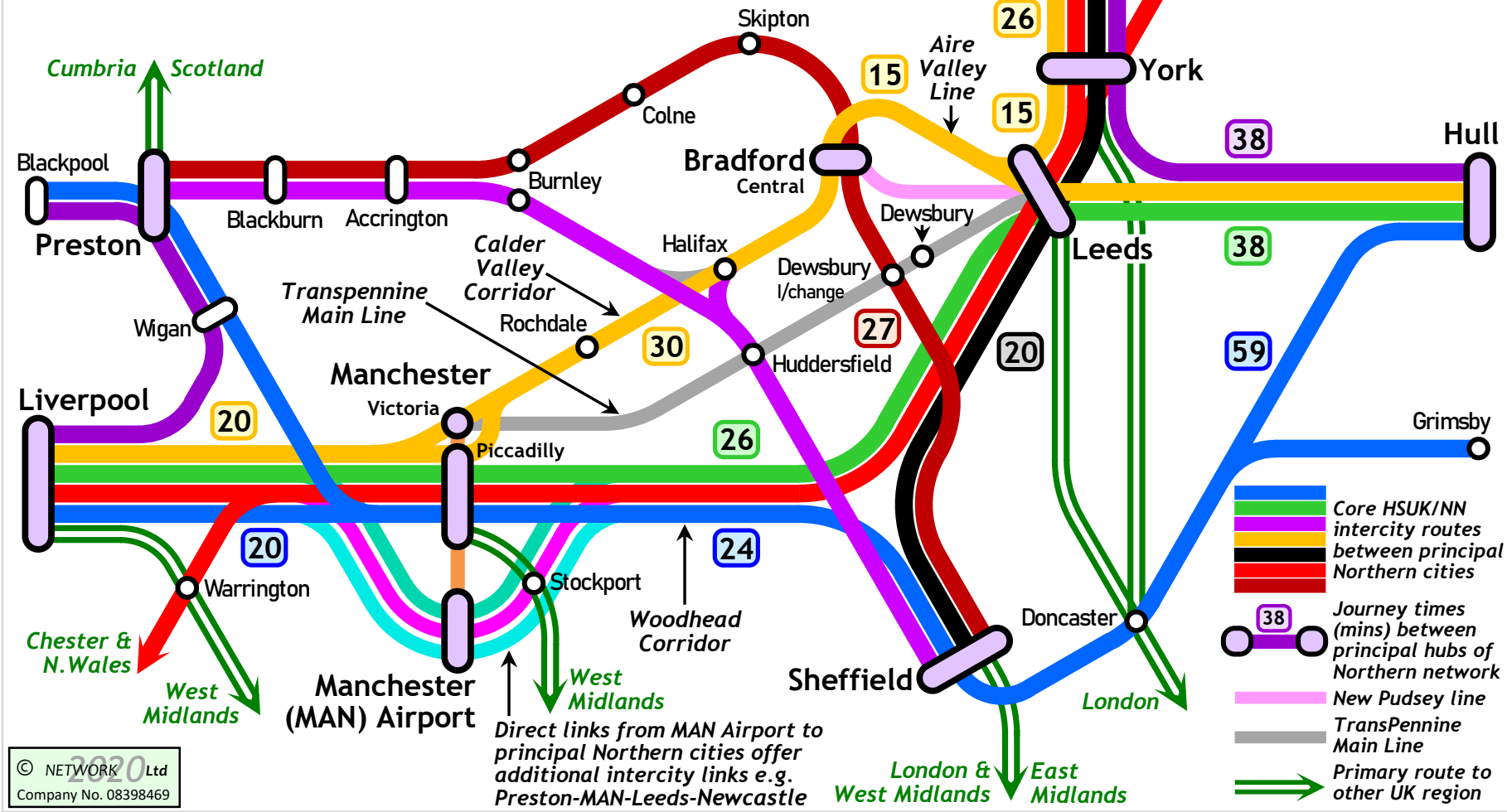
MAN Airport	<b>MAN</b>												Direct NN journey	
Manchester		<b>MA</b>											Direct existing journey	
Preston			<b>PR</b>										1 change required	
Liverpool				<b>LI</b>										
Sheffield					<b>SH</b>									
Bradford						<b>BD</b>								
Leeds							<b>LS</b>							
Hull								<b>HU</b>						
York									<b>YO</b>					
Darlington										<b>DL</b>				
Newcastle											<b>NE</b>			
	MAN	MA	PR	LI	SH	BD	LS	HU	YO	DL	NE			



**'TUBE MAP' ILLUSTRATING PRINCIPAL TRANSPENNINE NETWORK NORTH INTERCITY SERVICES**

Network North services continue to Edinburgh & Glasgow via new HSUK cross-Border high speed line  
 Newcastle-Edinburgh: 37 mins  
 Edinburgh-Glasgow: 20 mins

# Network North



*All principal centres directly interlinked*

# NN : Promise 1



Network North offers comprehensive direct intercity links between 11 principal centres of the Northern Powerhouse:

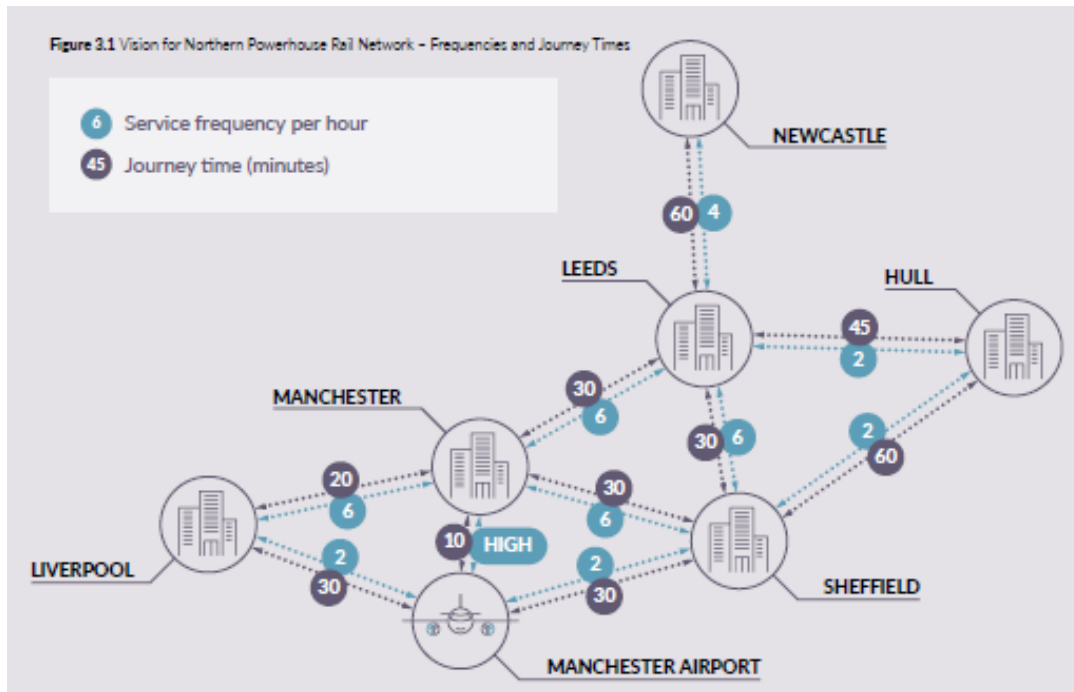
- Manchester
- Liverpool
- Preston
- MAN Airport
- Sheffield
- Bradford
- Leeds
- Hull
- York
- Darlington
- Newcastle

*This far outperforms both the existing railway system and any future Northern Powerhouse Rail 'network'*


# NN : Promise 2




Network North will reduce intercity journey times in line with the specification set by Transport for the North.



Journey between Northern Powerhouse centres	Existing journey time (mins)	Specified journey time (mins)	NPR journey time (mins)	NN journey time (mins)
Liverpool - Manchester	32	20	35	20
Manchester - Sheffield	48	30	42	23
Manchester - Leeds	49	30	30	26
Sheffield - Leeds	40	30	40	20
Manchester - MAN Airport	13	10	15	15
Leeds - MAN Airport	62	40	51	38
Sheffield - MAN Airport	73	30	66	34
Liverpool - MAN Airport	65	30	41	26
Leeds - Newcastle	87	60	73	51
Leeds - Hull	55	45	45	38
Sheffield - Hull	86	60	67	59

 Journey time meeting specification

 Journey time failing to meet specification

Notes:

1. Timings to MAN Airport (Manchester Airport) assessed to existing centrally-located station.

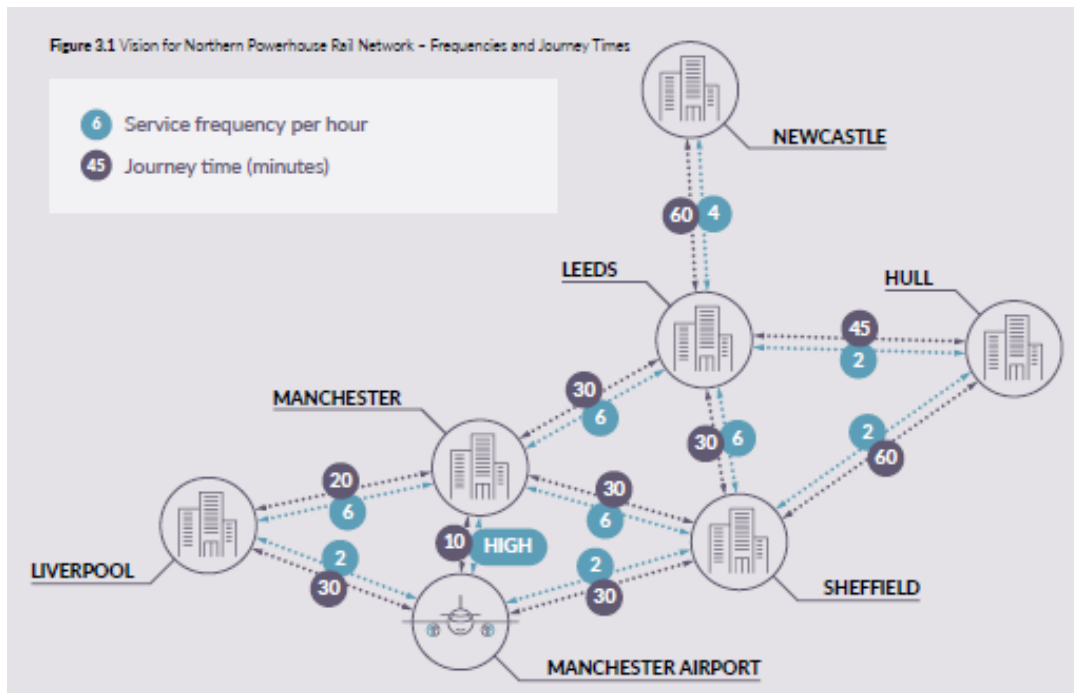
## 11 Journey Time targets set by Transport for the North

**NPR : 2/11**

**NN : 9/11**

# NN : Promise 2

Network North will reduce intercity journey times in line with the specification set by Transport for the North.



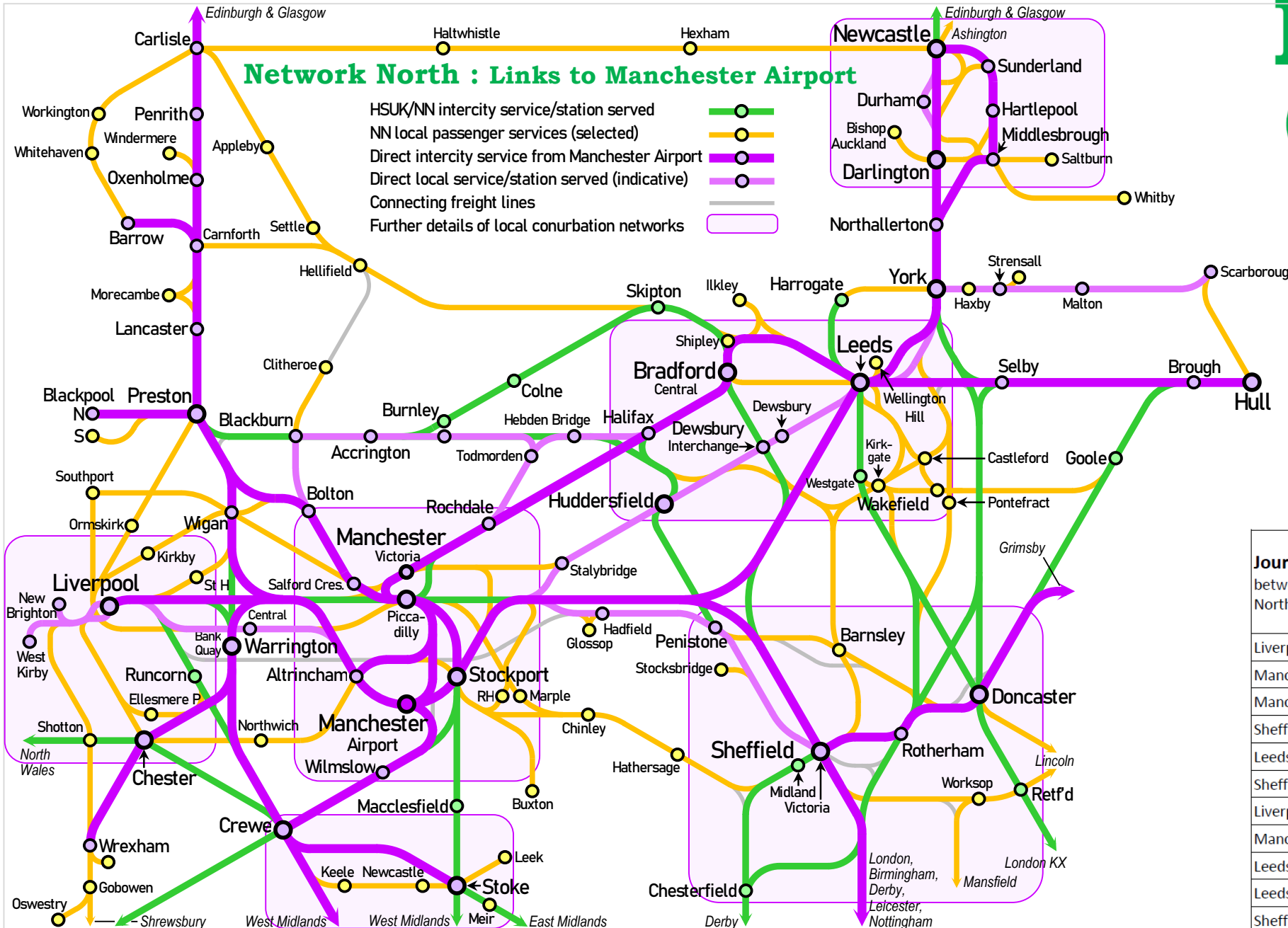
*Regrettably, TfN's priority has always been to conform with the established (and now abandoned) HS2 scheme - rather than comply with their own specification*

# NN : Promise 3



Network North will provide direct links from the existing station at Manchester Airport to most major communities of the Northern Powerhouse.

# Network North

Journey time meeting spec.  
 Journey time failing spec.

Journey time (mins) between key centres of Northern Powerhouse	Existing	Specified	HSUK/NN
Liverpool - Manchester	32	20	20
Manchester - Sheffield	48	30	23
Manchester - Leeds	49	30	26
Sheffield - Leeds	40	30	20
Leeds - MAN Airport	62	40	38
Sheffield - MAN Airport	73	30	34
Liverpool - MAN Airport	65	30	26
Manchester - MAN Apt.	13	10	13
Leeds - Newcastle	87	60	60
Leeds - Hull	55	45	38
Sheffield - Hull	86	60	59

# NN : Promise 3



Network North will provide direct links from the existing station at Manchester Airport to most major communities of the Northern Powerhouse.

*Whereas Northern Powerhouse Rail services will run to a limited number of destinations from a 'Manchester Airport' station on the wrong side of the M56, one mile and one tram stop away from the existing terminus station*



# NN : Promise 4



Network North will deliver 2 new Transpennine routes for passenger traffic:

- Manchester - Leeds via Bradford and Calder Valley Corridor
- Manchester - Leeds & Sheffield via Woodhead

# NN : Promise 5



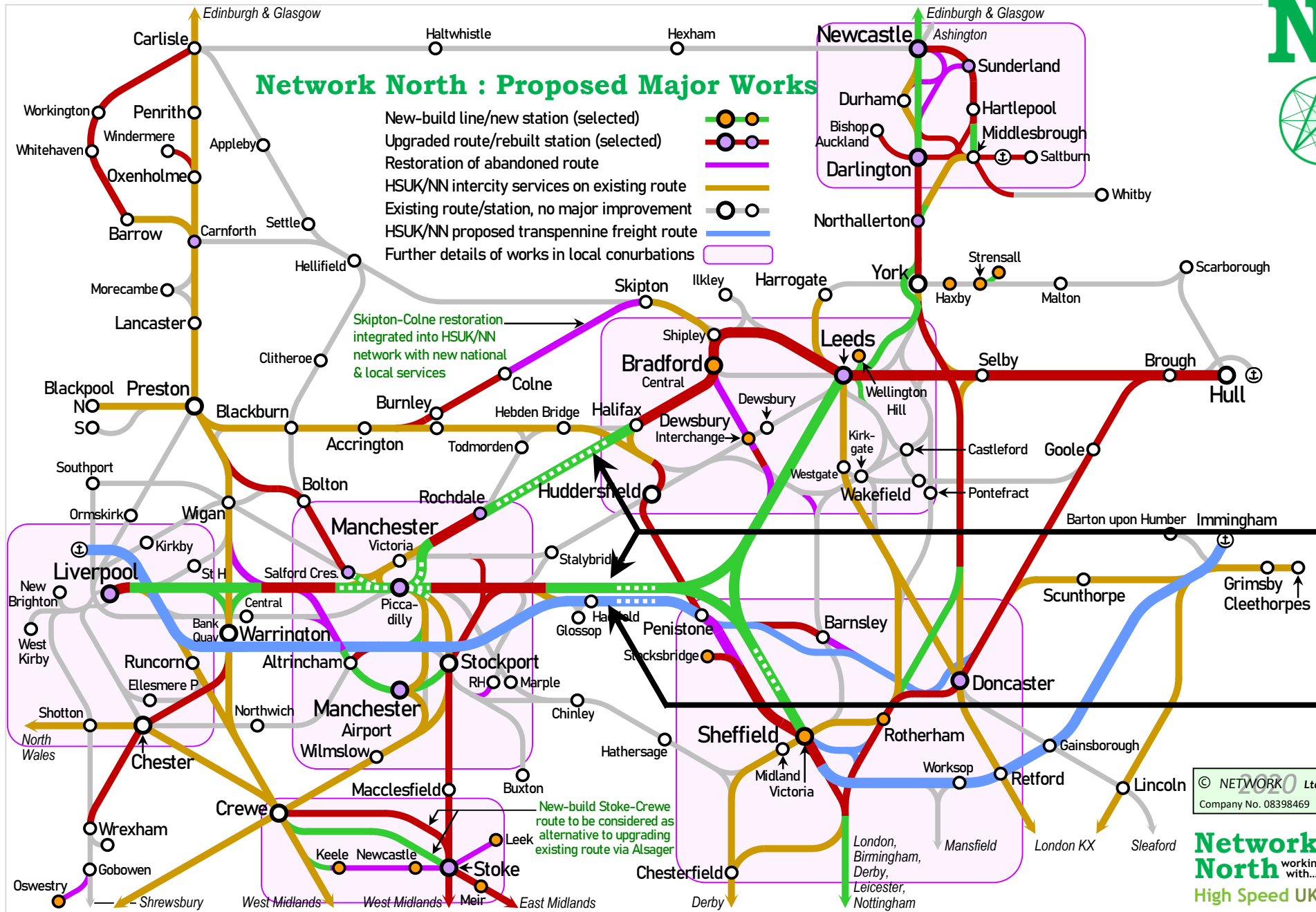
Network North will deliver 2 new Transpennine routes for passenger traffic:

- Manchester - Leeds via Bradford and Calder Valley Corridor
- Manchester - Leeds & Sheffield via Woodhead

Network North will create a dedicated route via the restored Woodhead Line for Transpennine freight:

- extending from Liverpool to the Humber (UIC-C gauge)
- providing a Transpennine lorry shuttle from M60 to M1

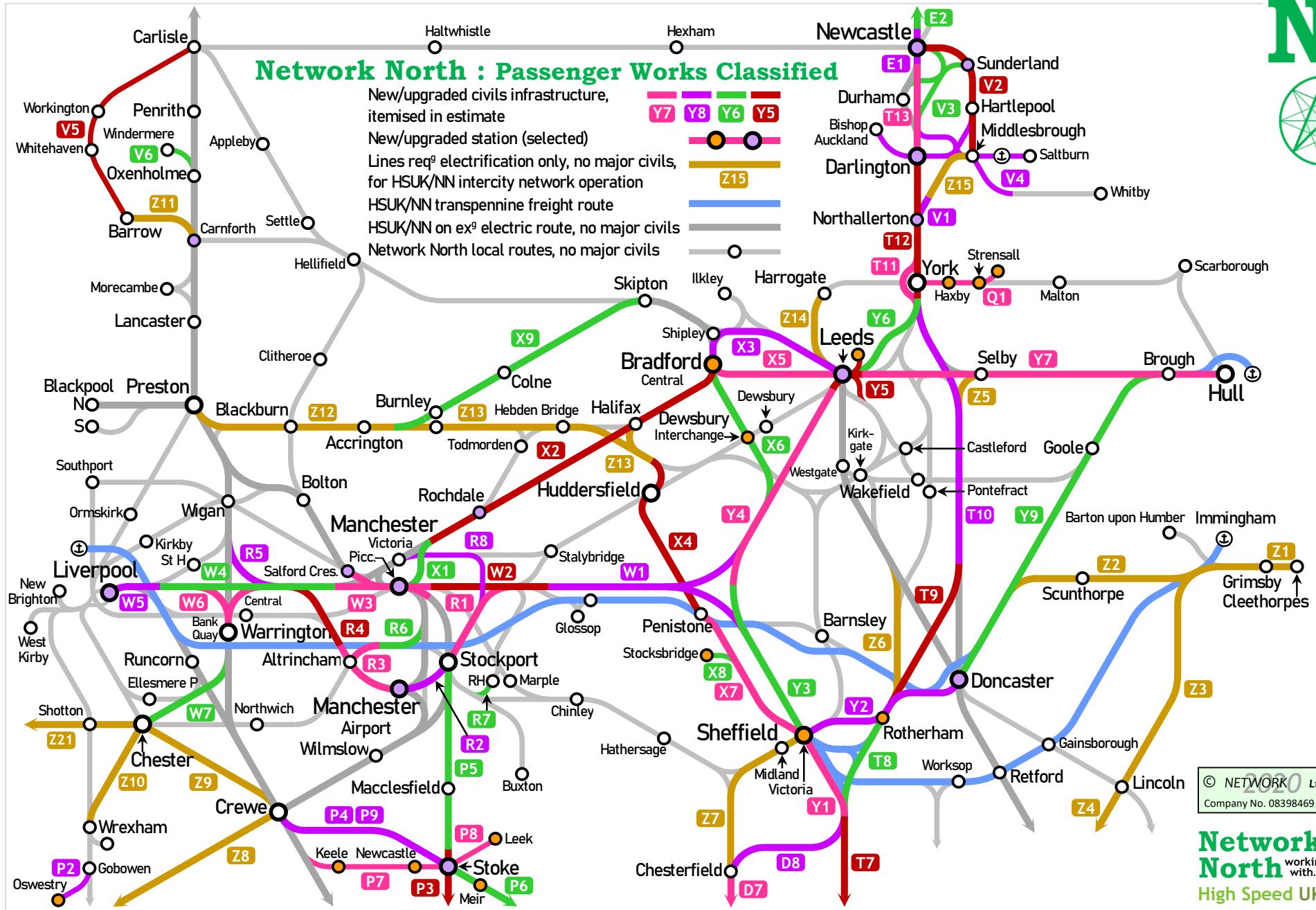
# Network North



2 new T/P routes for passengers

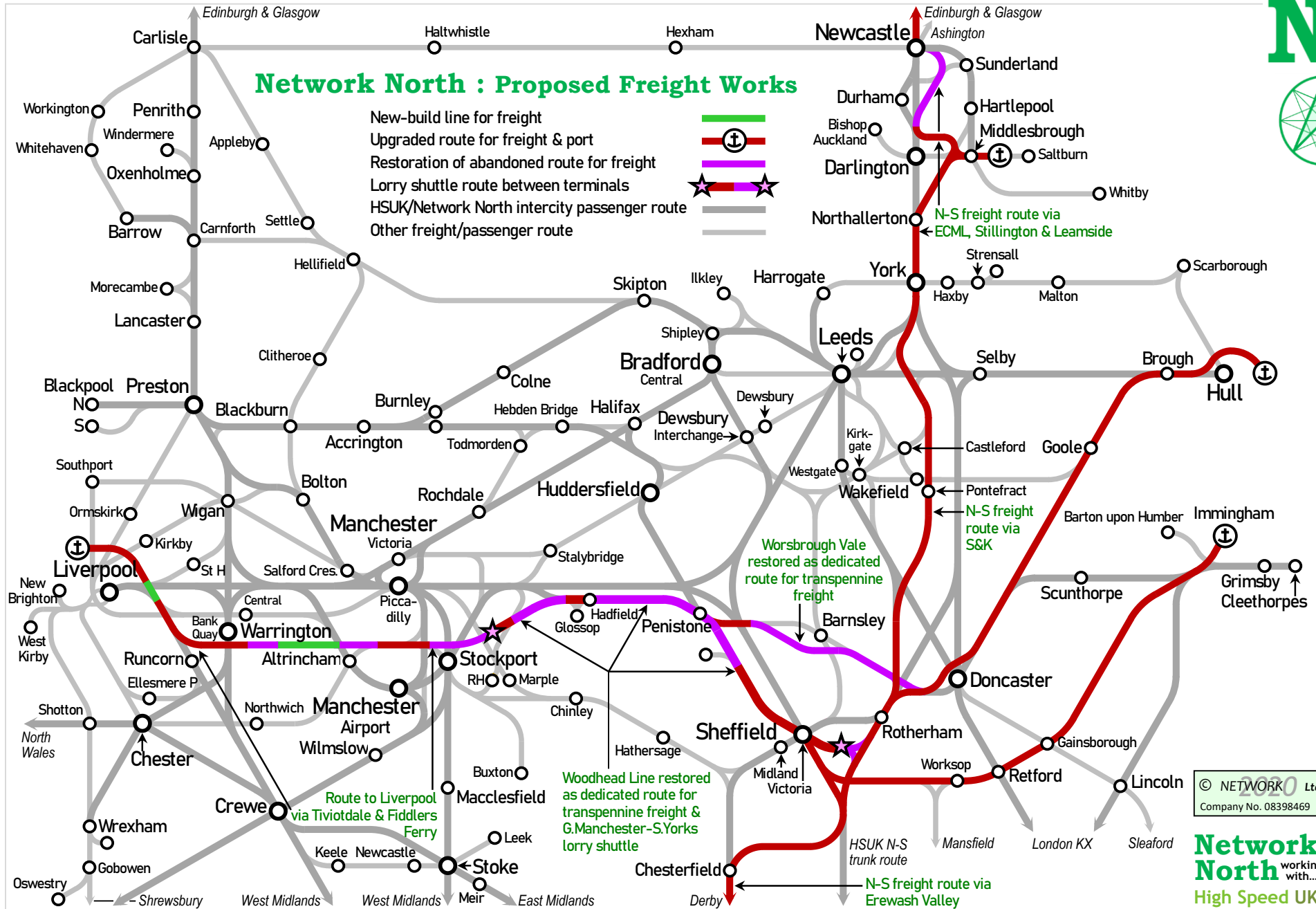
1 new T/P route for freight

# Network North

Detailed route design, 1:10k scale, itemised for costing

# Network North



**Dedicated  
T/P route  
for freight**

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**Network North** working with...  
High Speed UK

# NN : Promises 4 & 5



Network North will deliver 2 new Transpennine routes for passenger traffic.

Network North will create a dedicated route via the restored Woodhead line & other abandoned or underused routes for Transpennine freight.

*Whereas Northern Powerhouse Rail will deliver only 1 new Transpennine passenger route, and offers no transformational gains for freight*

# NN : Promise 6



Network North has developed bespoke solutions for all principal network hubs allowing:

- dedicated through routes for intercity traffic, generally comprising 300 metre long trains on primary routes
- doubling of capacity for local traffic on existing network

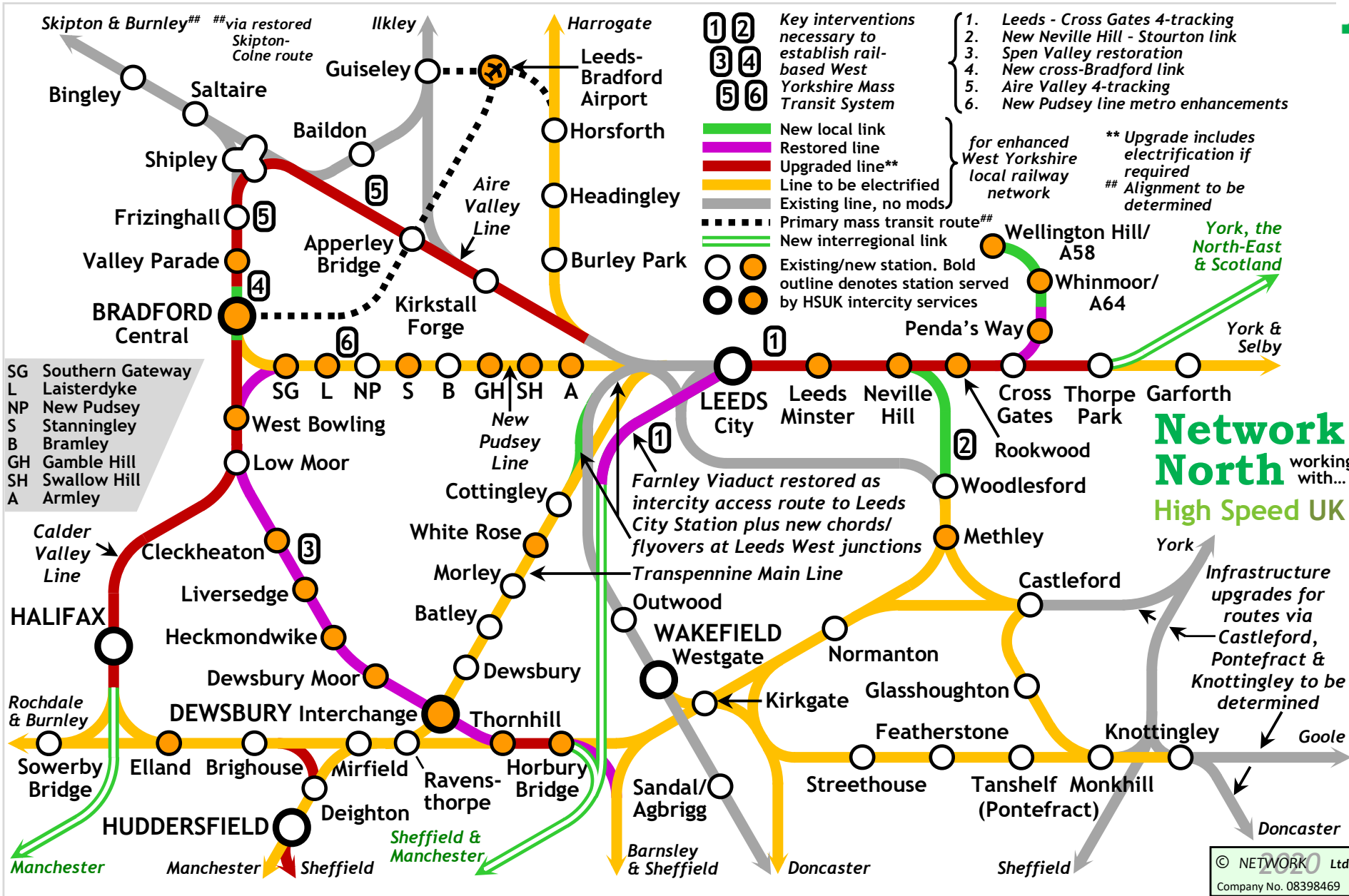
# Network North



## Proposed Infrastructure:

## West Yorkshire

## 6 Key Interventions in Leeds & Bradford

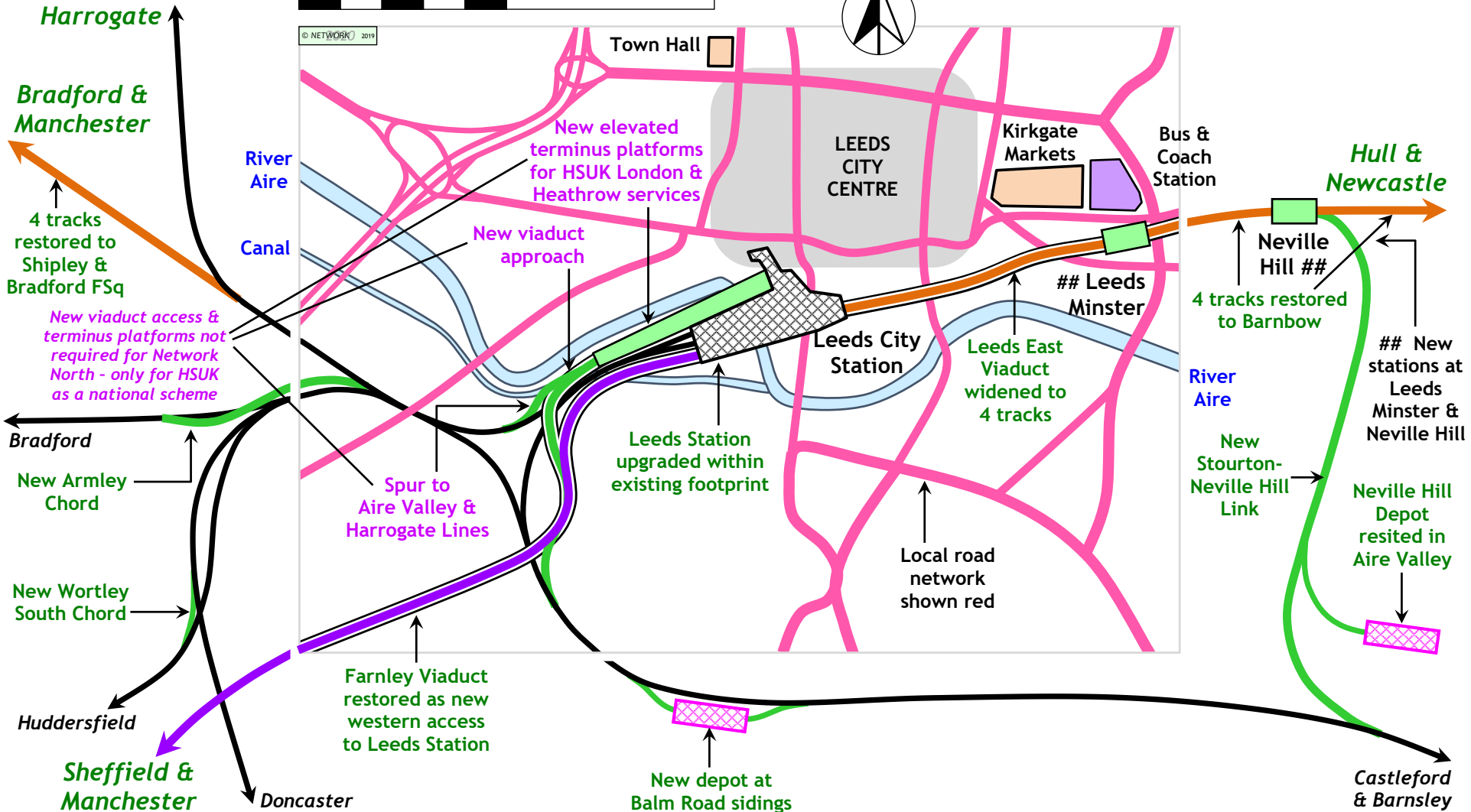




# Leeds

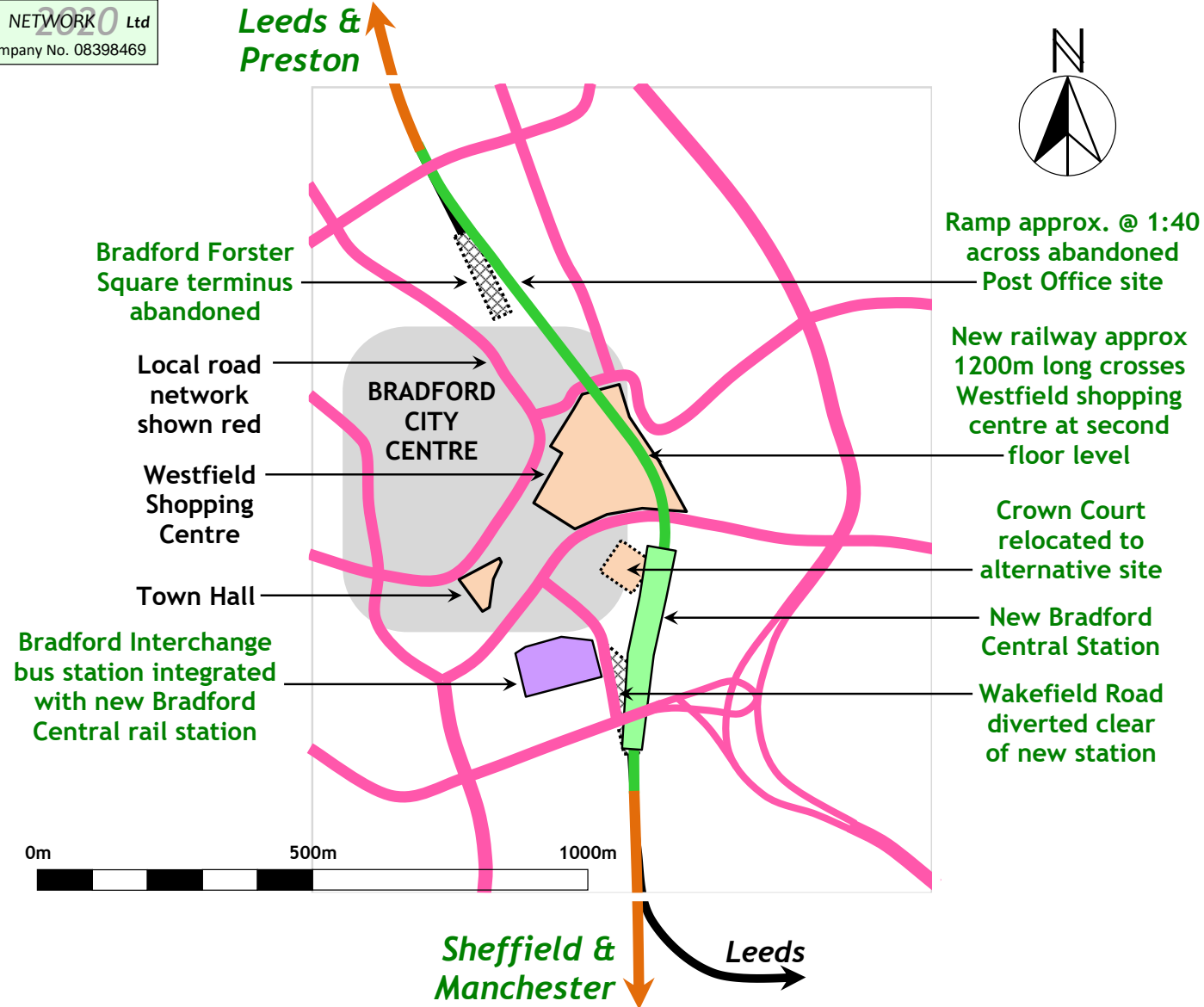


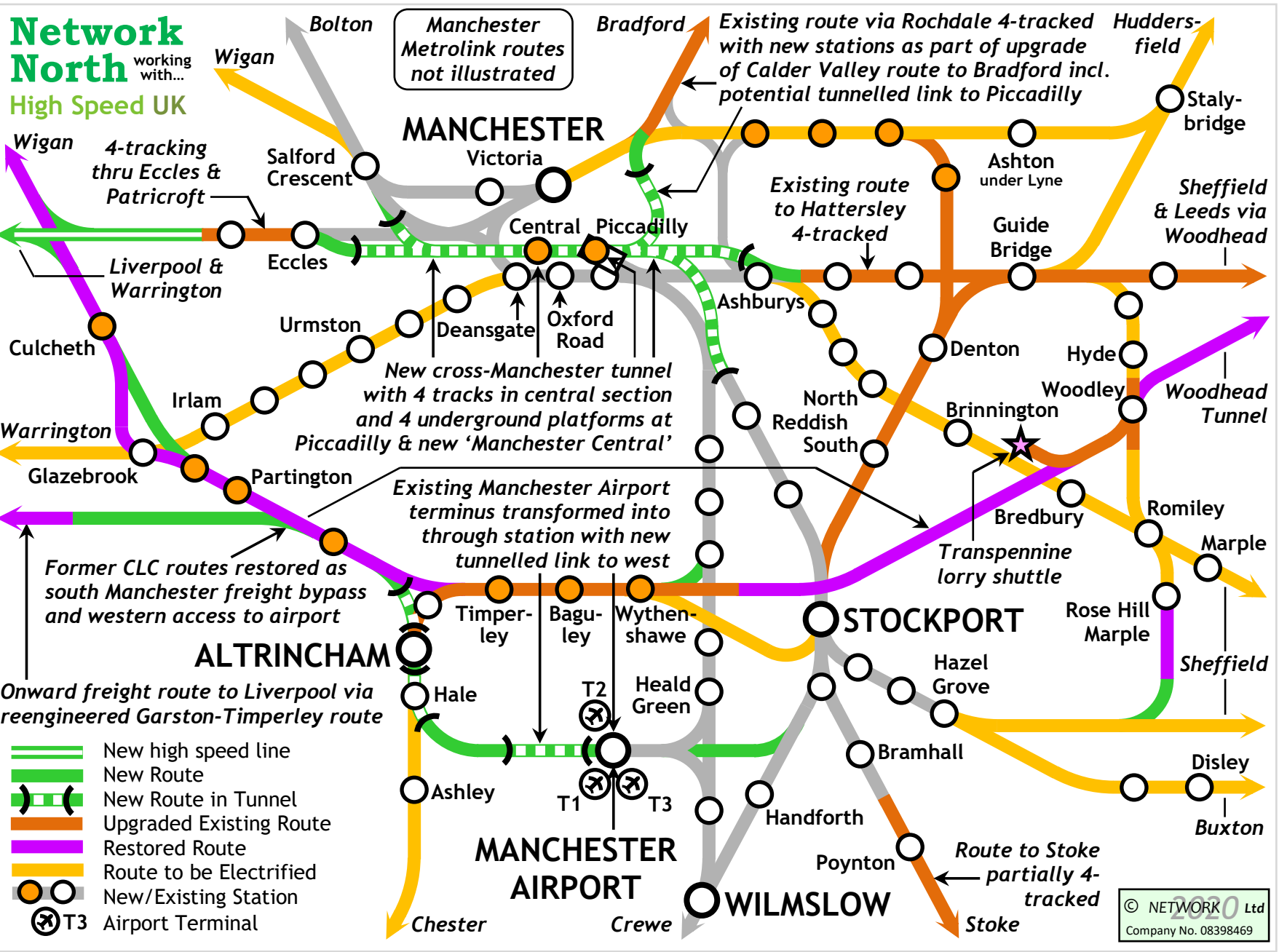
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# Bradford

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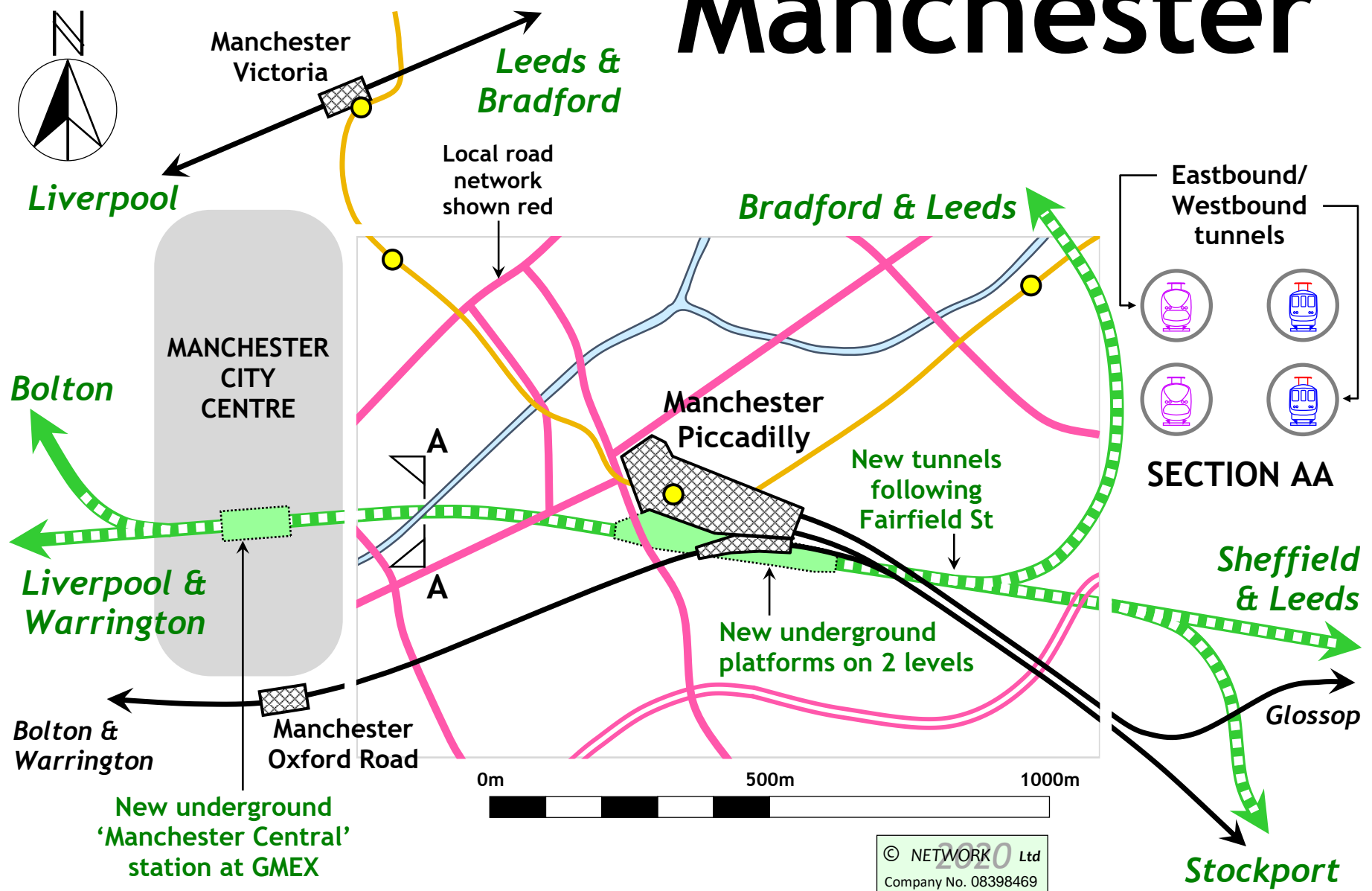
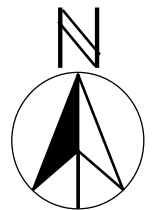


# Network North

## Proposed Infrastructure: Greater Manchester

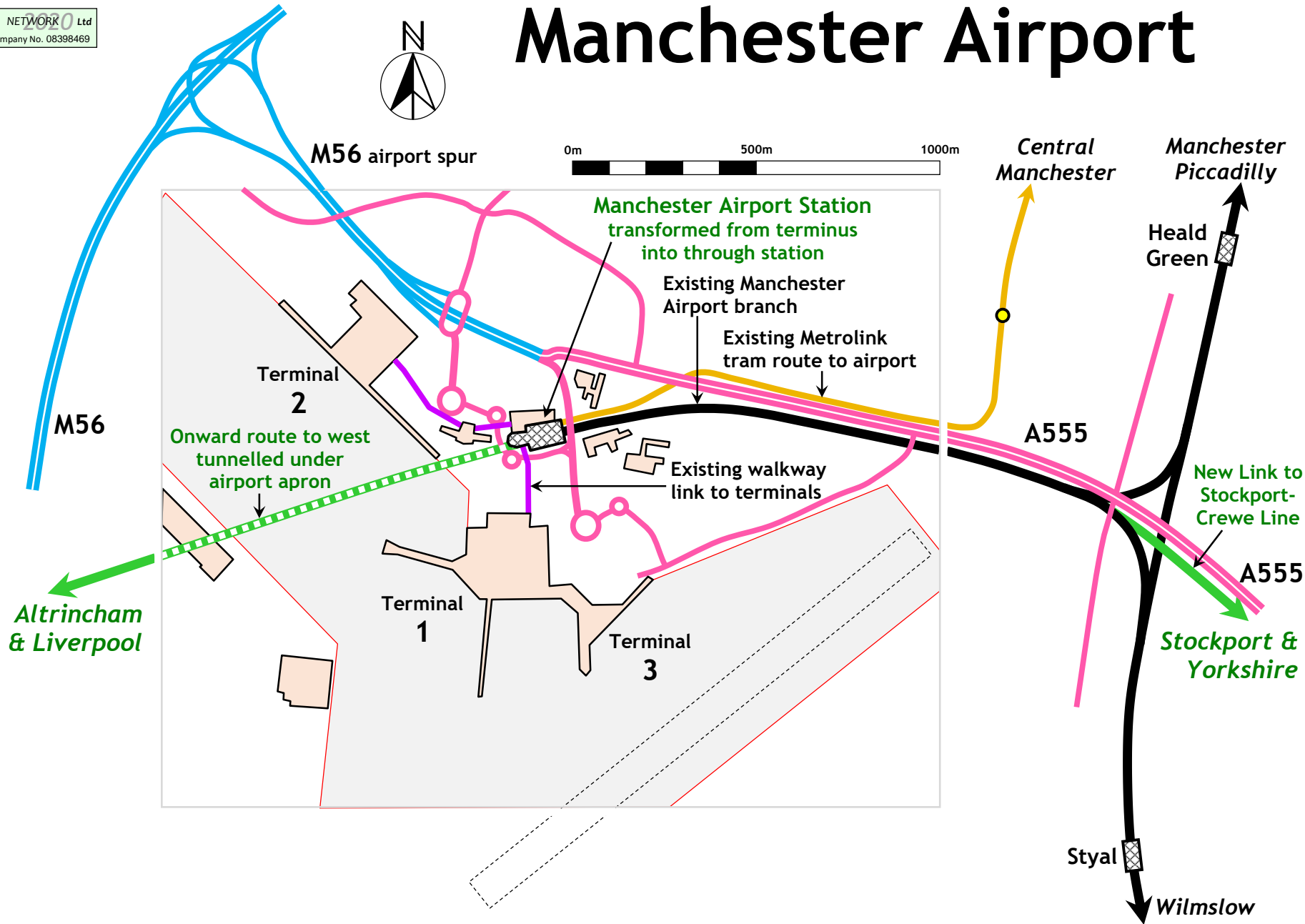
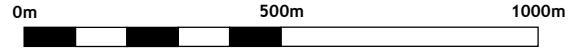
- Cross-Manchester Tunnel
- South Manchester Loop via Airport
- Freight Bypass

# Manchester



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# Manchester Airport



# NN : Promise 6



Network North has developed bespoke solutions for all principal network hubs allowing:

- dedicated through routes for intercity traffic, generally comprising 300 metre long trains on primary routes
- doubling of capacity for local traffic on existing network

*Whereas TfN has put forward no detailed schemes for any major network hub*

# NN : Promise 7



Network North's capacity gains at principal network hubs will allow step-change improvements to local services extending to 'small town' communities, with:

- New Stations
- New Routes
- Capacity approximately doubled

# Network North

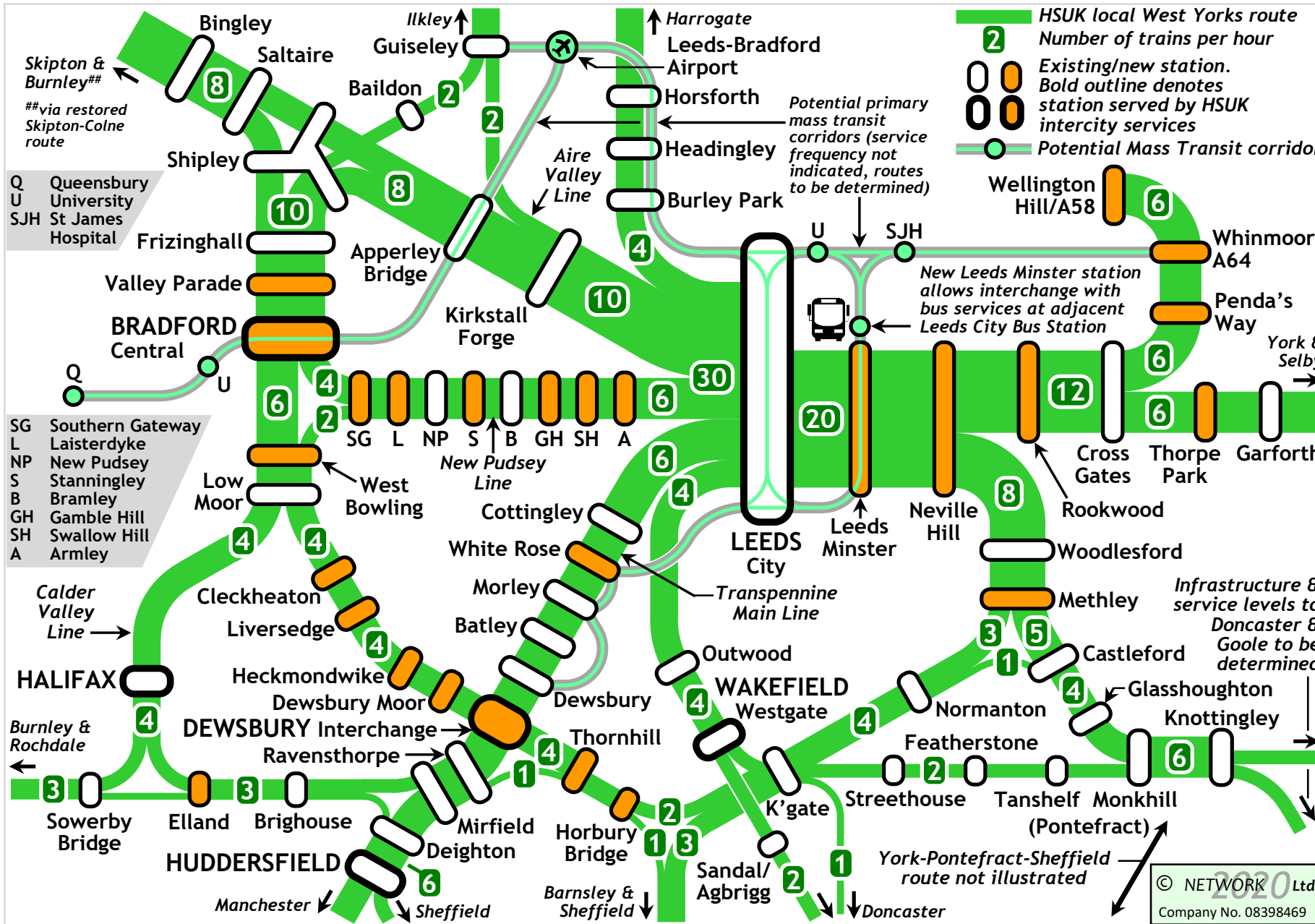


## West Yorkshire

22 new stations

New routes

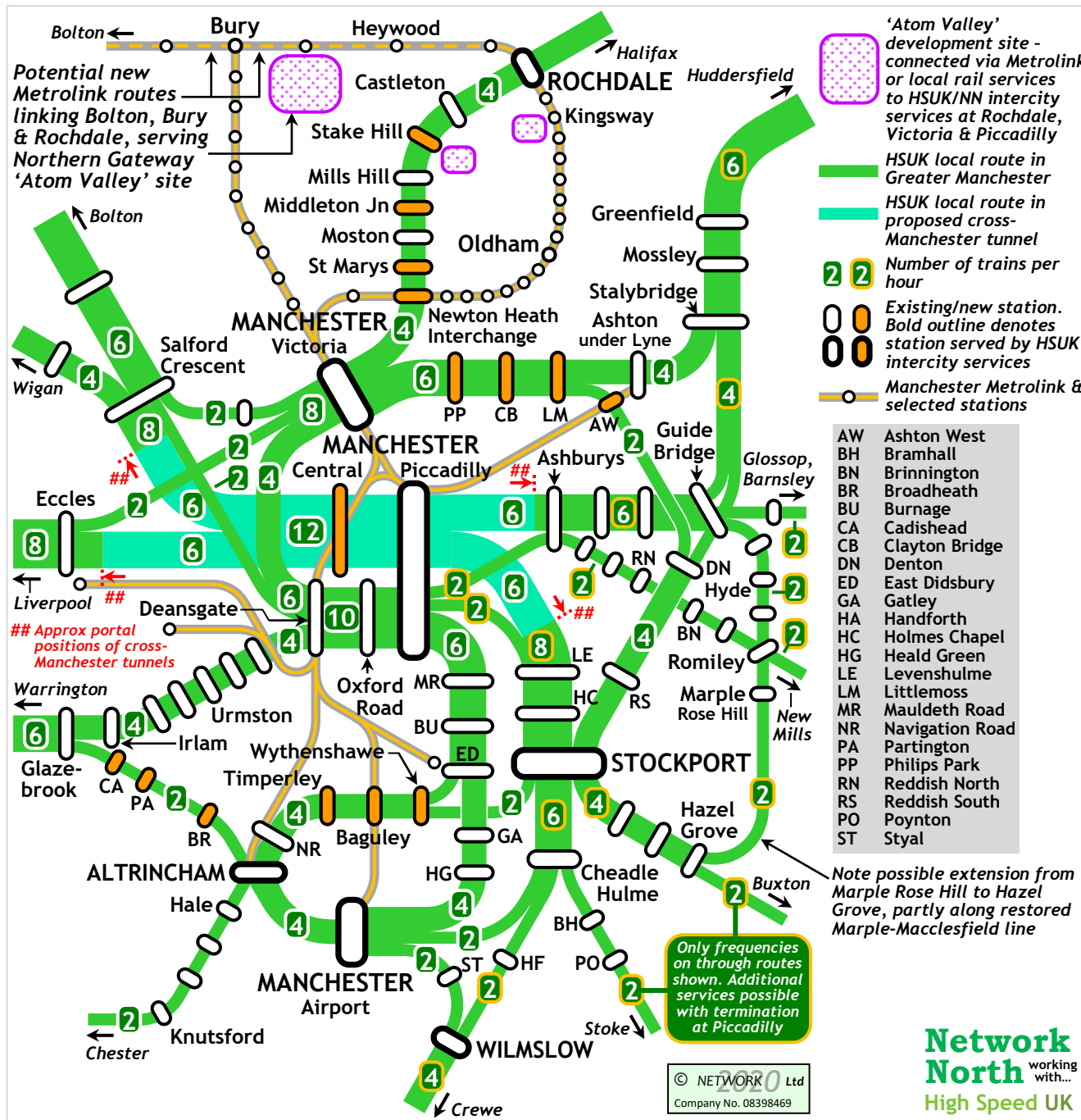
Capacity approx doubled





# Network North

Greater Manchester  
15 new stations  
New routes  
Capacity approx doubled



# NN : Promise 7



Network North's capacity gains at principal network hubs will allow step-change improvements to local services extending to 'small town' communities, with:

- New Stations
- New Routes
- Local network capacity approximately doubled

*Whereas Northern Powerhouse Rail can offer no meaningful gains for local services*

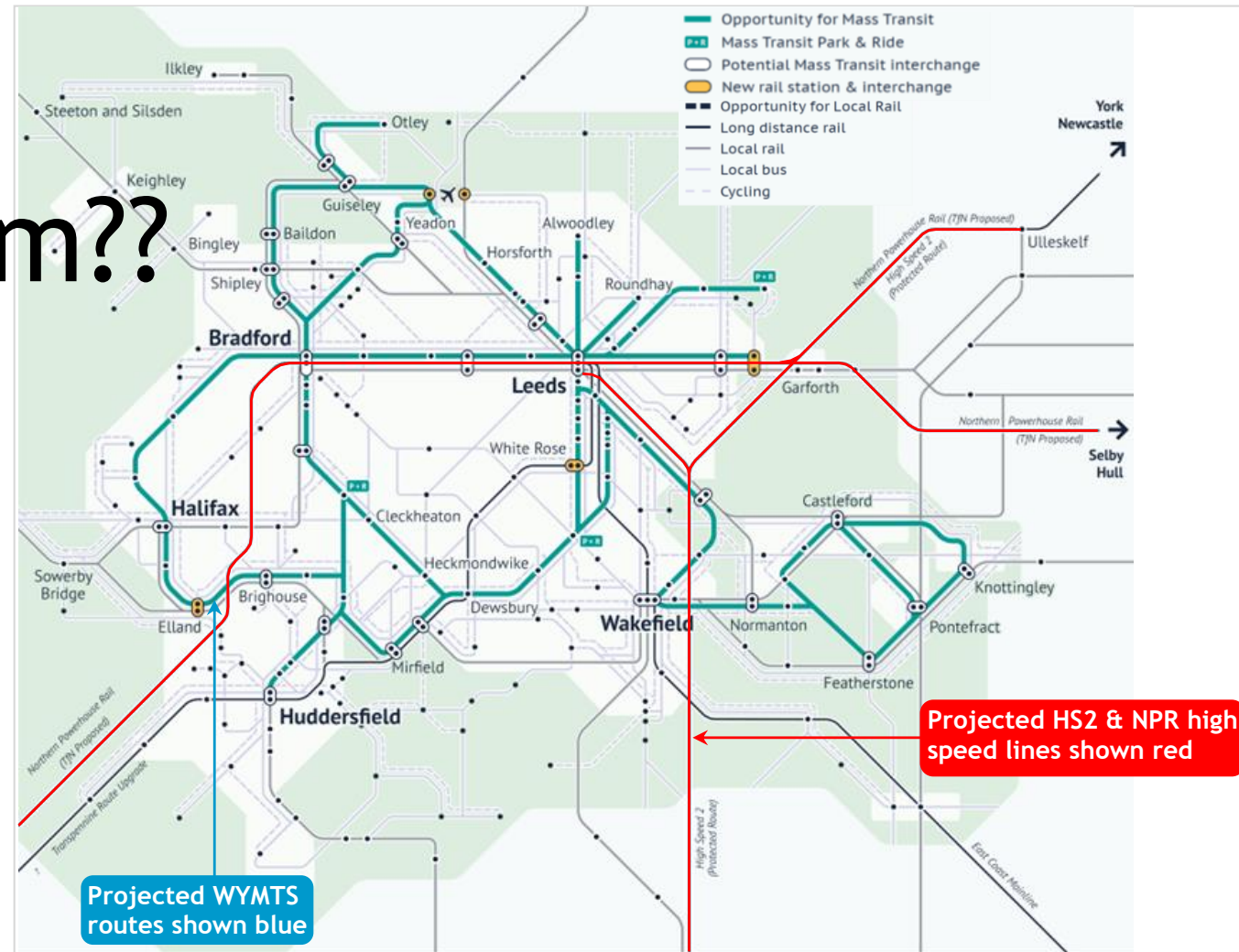
# Future Issues - 1



## West Yorkshire Mass Transit System??

*Is this the best way to interlink West Yorkshire communities??*

*Note predication upon established HS2 & NPR!!*



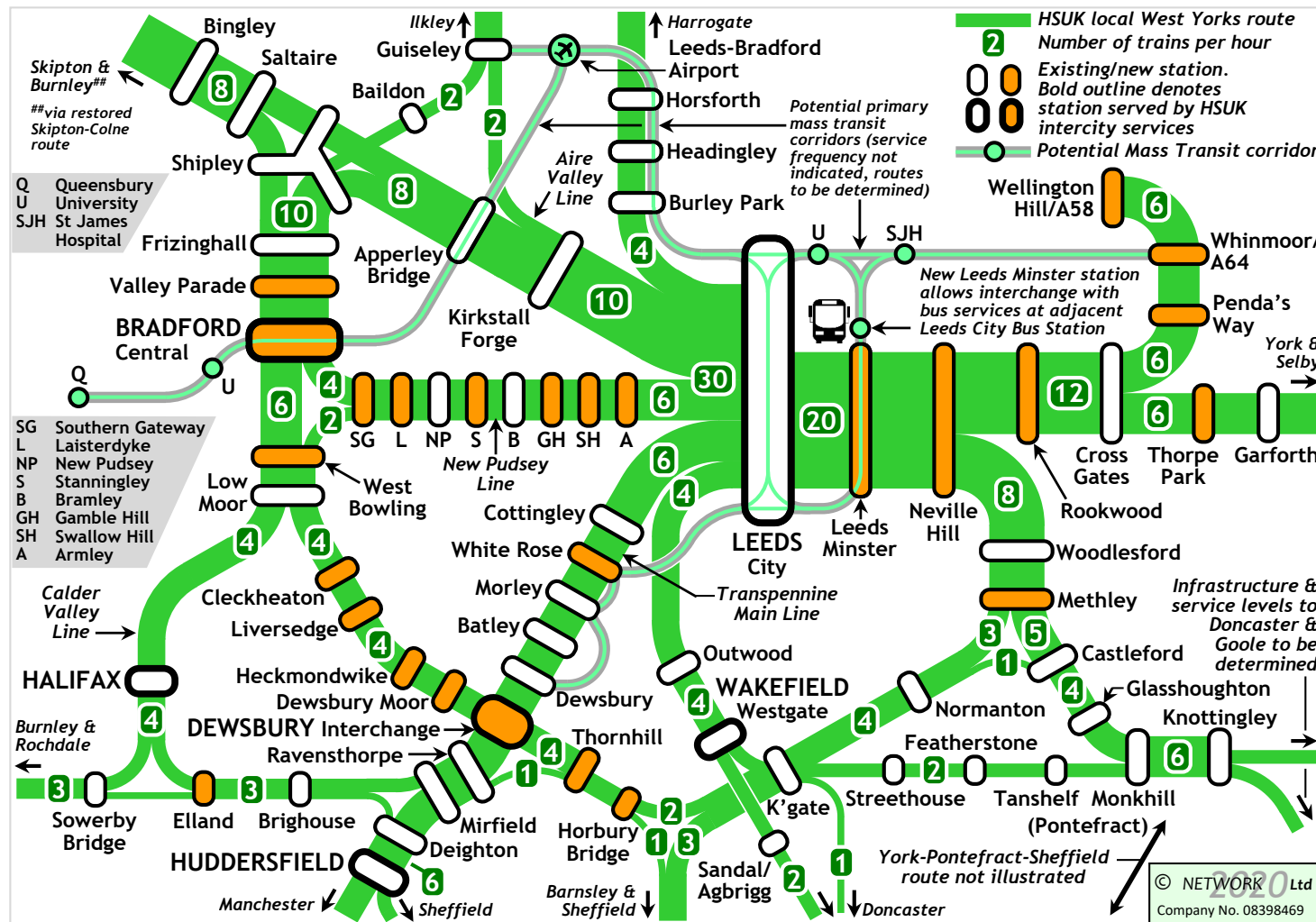
# Future Issues - 1



## Network North as WYMTS??

*Superior connectivity between West Yorks communities!!*

*Heavy Rail does the heavy lifting - Light Rail as infill routes!!*



# Future Issues - 1



## Direct Connectivity in West Yorkshire: Network North vs official WYMTS??

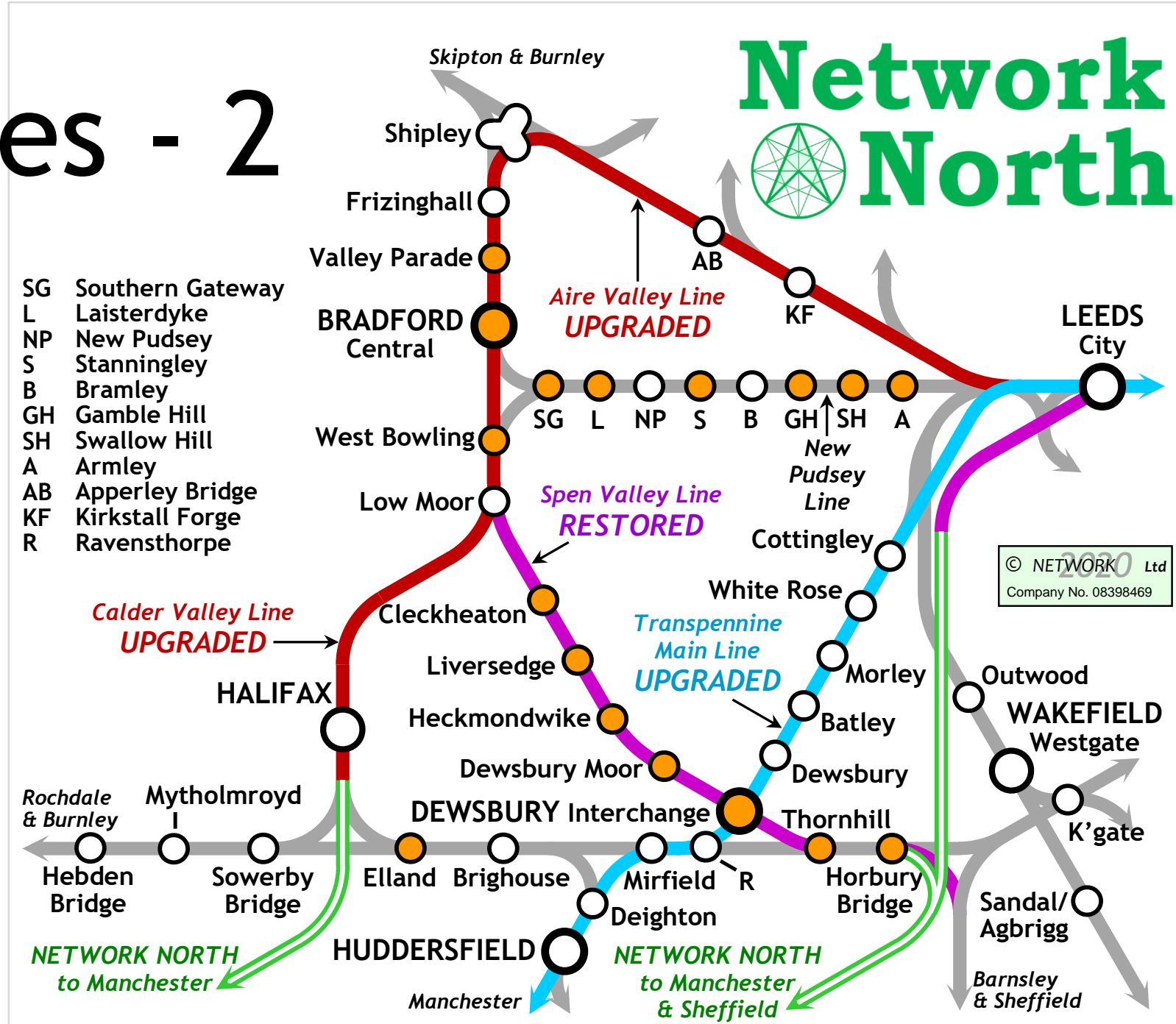
Leeds	LS				14	Ex <sup>8</sup> direct link		
Aire Valley		AV			9	New direct link		
Bradford			BD			No direct link		
Halifax				HX		Total links <b>23</b>		
Huddersfield					HD			
Dewsbury						DB		
Wakefield							WF	
Pontefract								PF
	LS	AV	BD	HX	HD	DB	WF	PF
No of direct links	7	5	7	4	5	7	6	5

Leeds	LS				14	Ex <sup>8</sup> direct link		
Aire Valley		AV			2	New direct link		
Bradford			BD			No direct link		
Halifax				HX		Total links <b>16</b>		
Huddersfield					HD			
Dewsbury						DB		
Wakefield							WF	
Pontefract								PF
	LS	AV	BD	HX	HD	DB	WF	PF
No of direct links	7	2	5	4	5	4	3	2

# Future Issues - 2

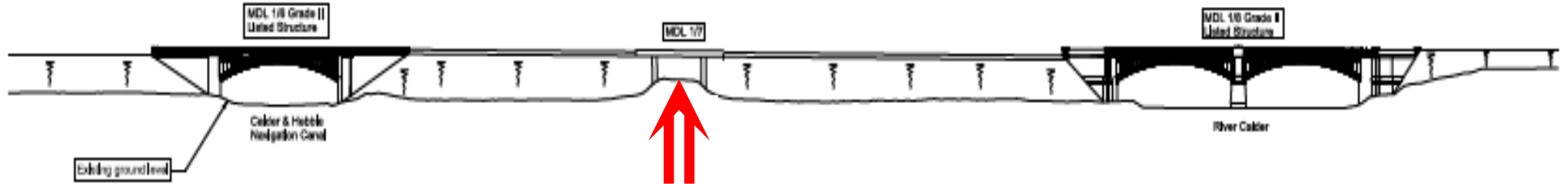
Spenn Valley  
Restoration/  
Dewsbury  
Interchange

*Crucial southern  
access to Bradford/  
hub of West Yorks  
future rail network*



# Future Issues - 2

Existing

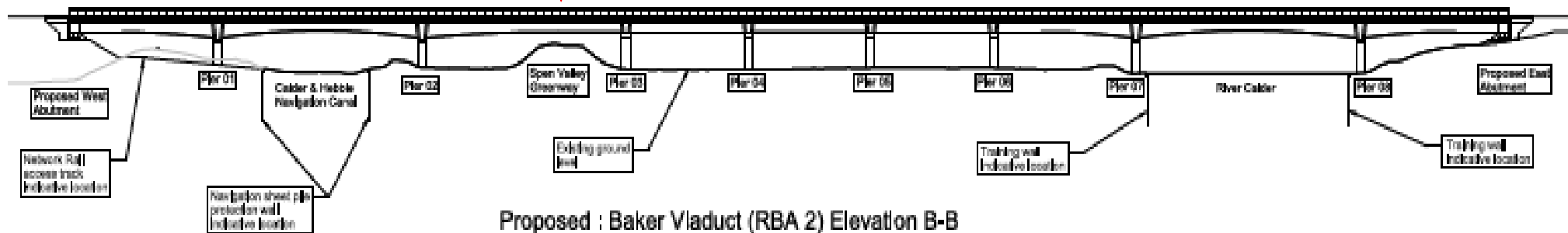


Existing : Calder & Hebble Navigation (MDL1/6) and River Calder (MDL1/8) Elevation A-A  
Scale 1:750

*Spen Valley restoration blocked by TRU proposals*

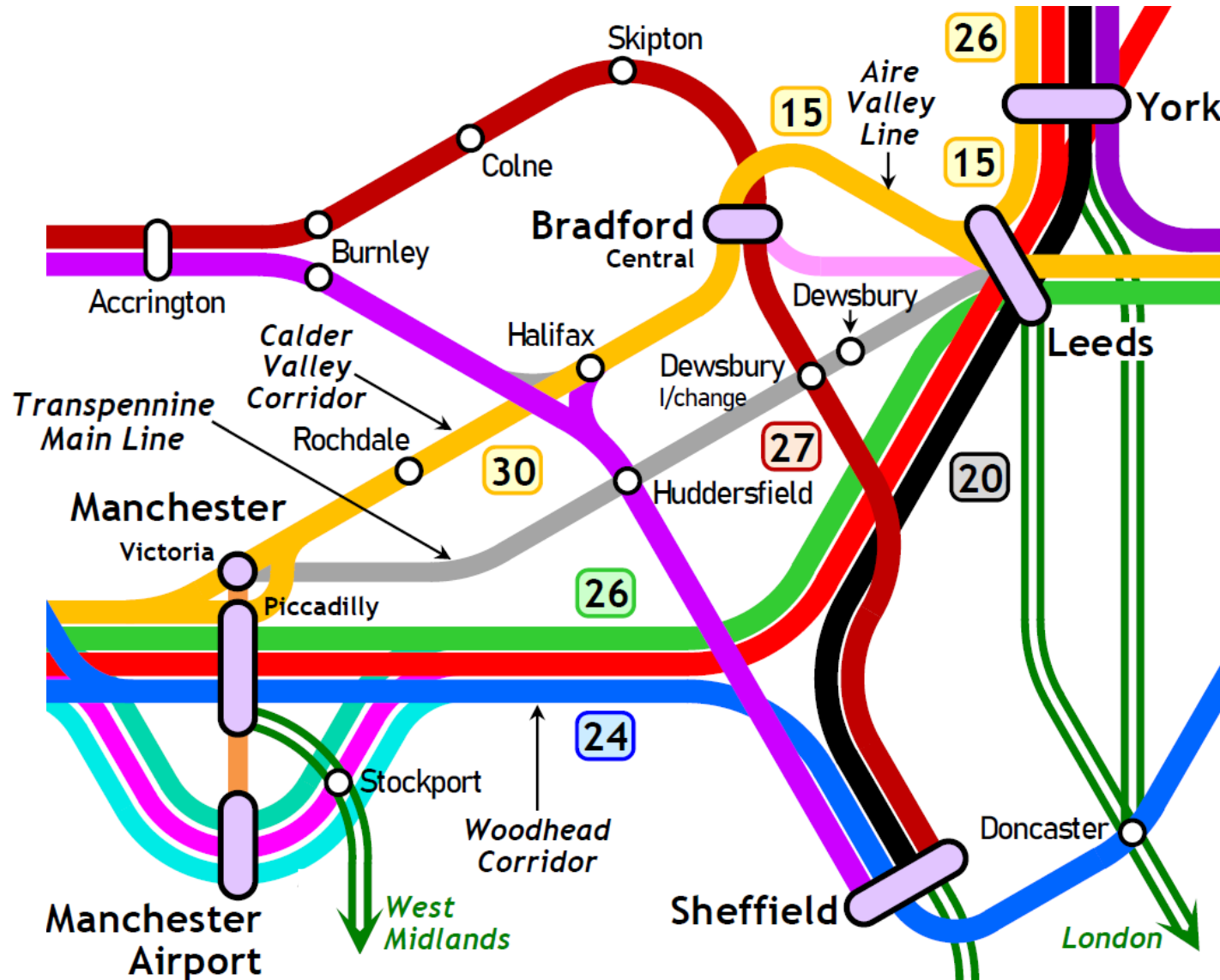
*TRU tracks must be aligned to suit Dewsbury Interchange*

Proposed



Proposed : Baker Viaduct (RBA 2) Elevation B-B  
Scale 1:750

# Future Issues - 2



*Bradford at heart of Network North, E-W and N-S routes intersecting*

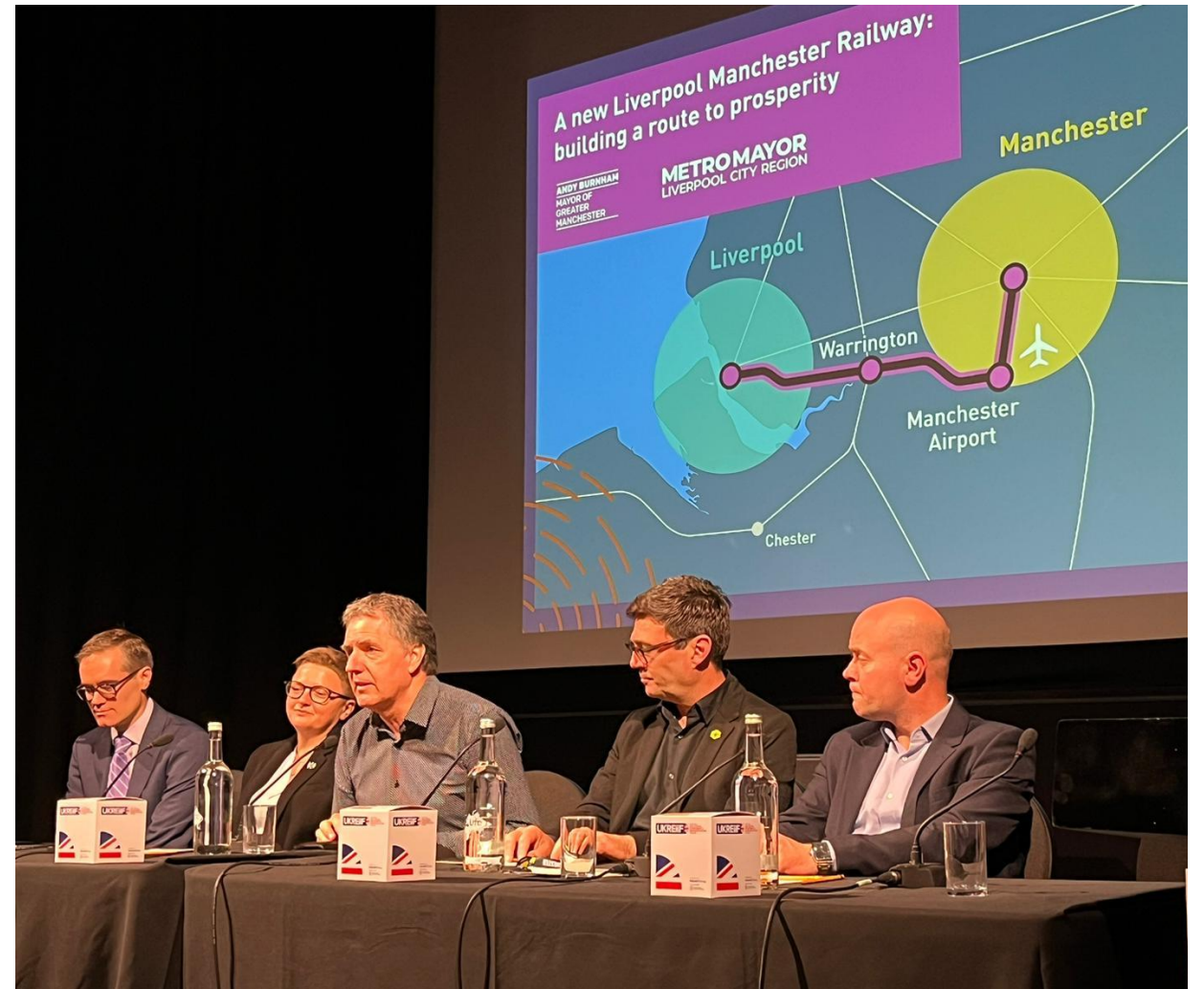


# Future Issues - 3

## Liverpool- Manchester Railway Board

*Is this the best way to link  
Liverpool & Manchester??*

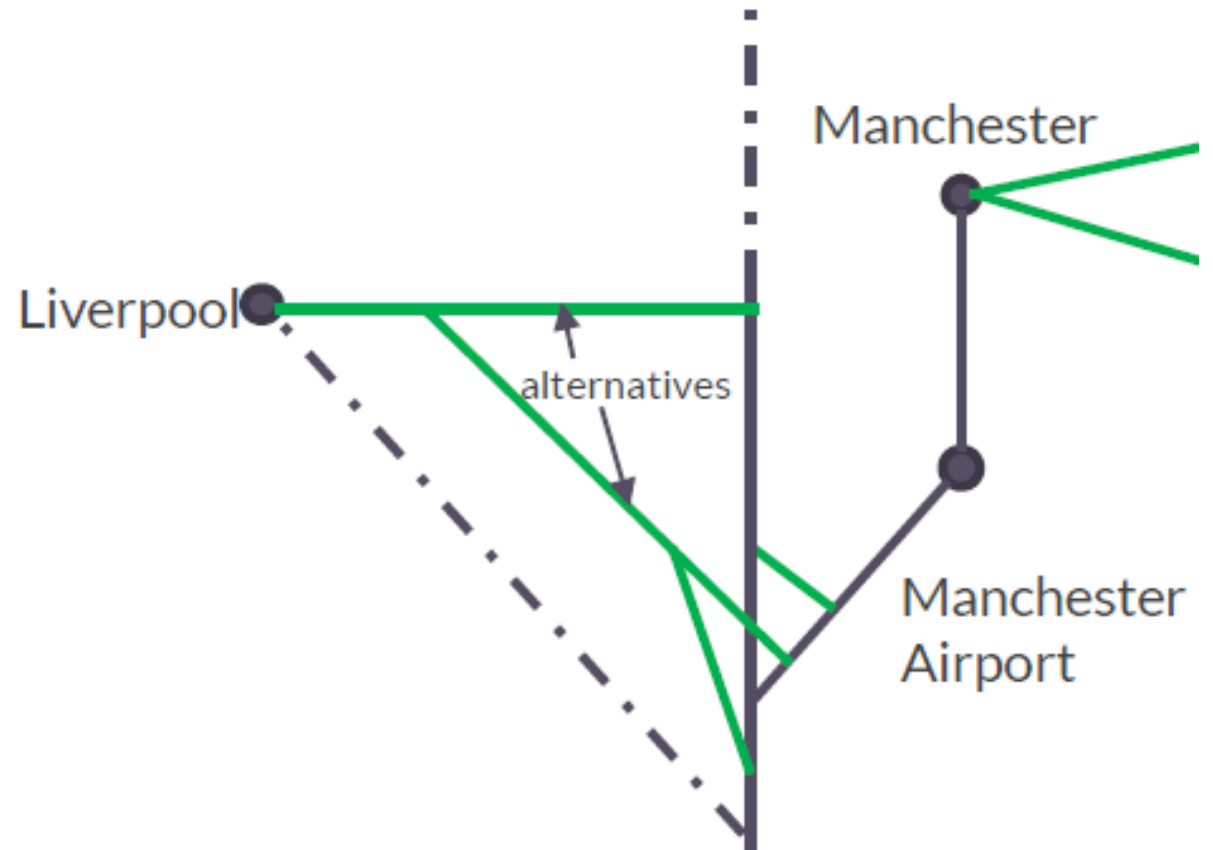
*‘World-class connectivity’??*



# Future Issues - 3

## Liverpool- Manchester Railway Board

*Close similarities  
with dysfunctional  
TfN NPR scheme  
based on HS2!!*

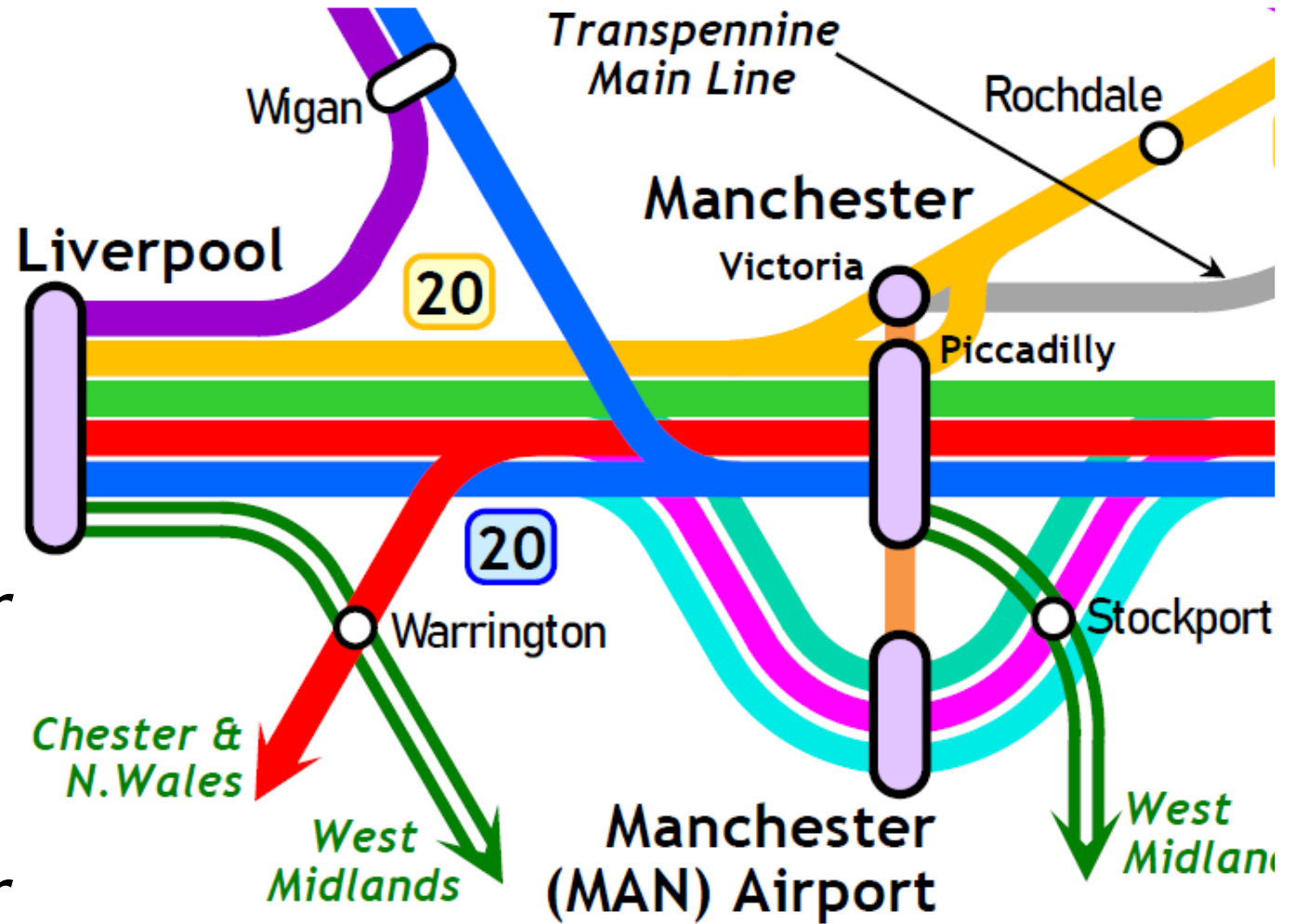


# Future Issues - 3



## Liverpool- Manchester Railway Board

*NN achieves far superior connectivity between Liverpool-Warrington-MAN Airport-Manchester*



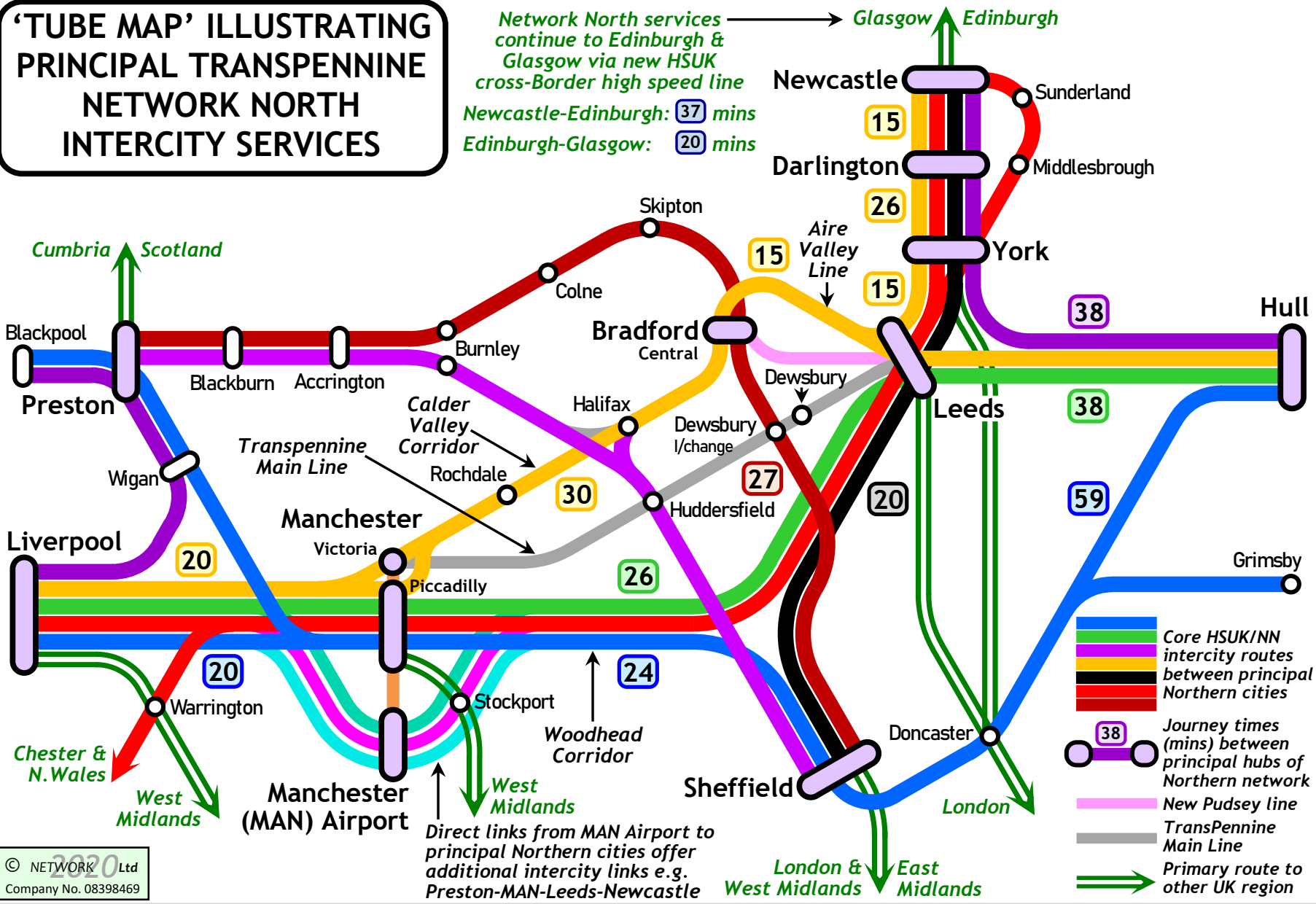
# 4 final thoughts...



- ➔ The North needs the best possible railway system if we are to achieve Levelling-up and Net Zero.
- ➔ ‘Best’ means best-connected, highest capacity, greatest integration, greatest economic gains, largest emissions reductions etc.
- ➔ Second best is not an option.
- ➔ The only option is Network North.

**'TUBE MAP' ILLUSTRATING PRINCIPAL TRANSPENNINE NETWORK NORTH INTERCITY SERVICES**

Network North services continue to Edinburgh & Glasgow via new HSUK cross-Border high speed line  
 Newcastle-Edinburgh: 37 mins  
 Edinburgh-Glasgow: 20 mins

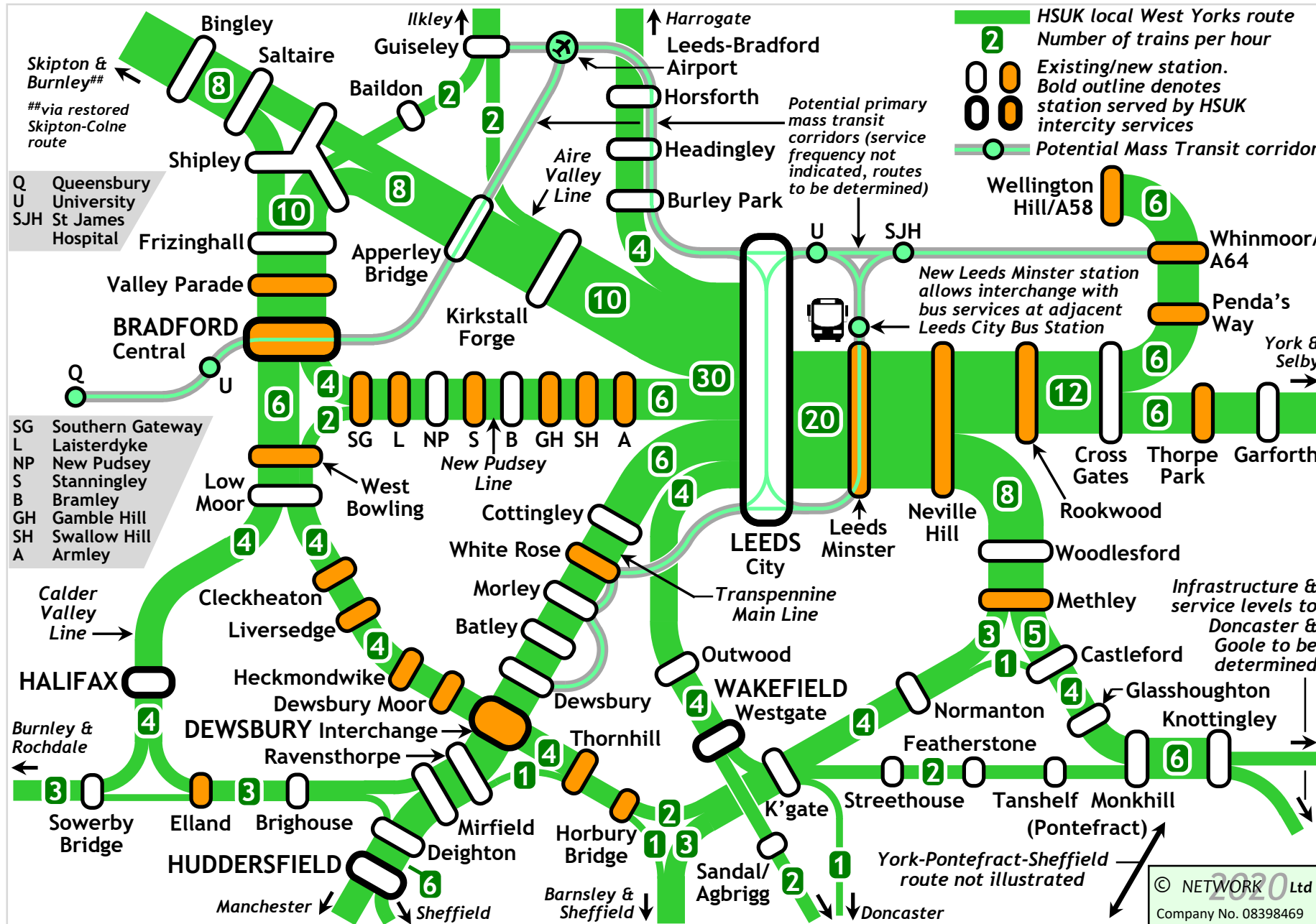


# Network North

High Speed UK

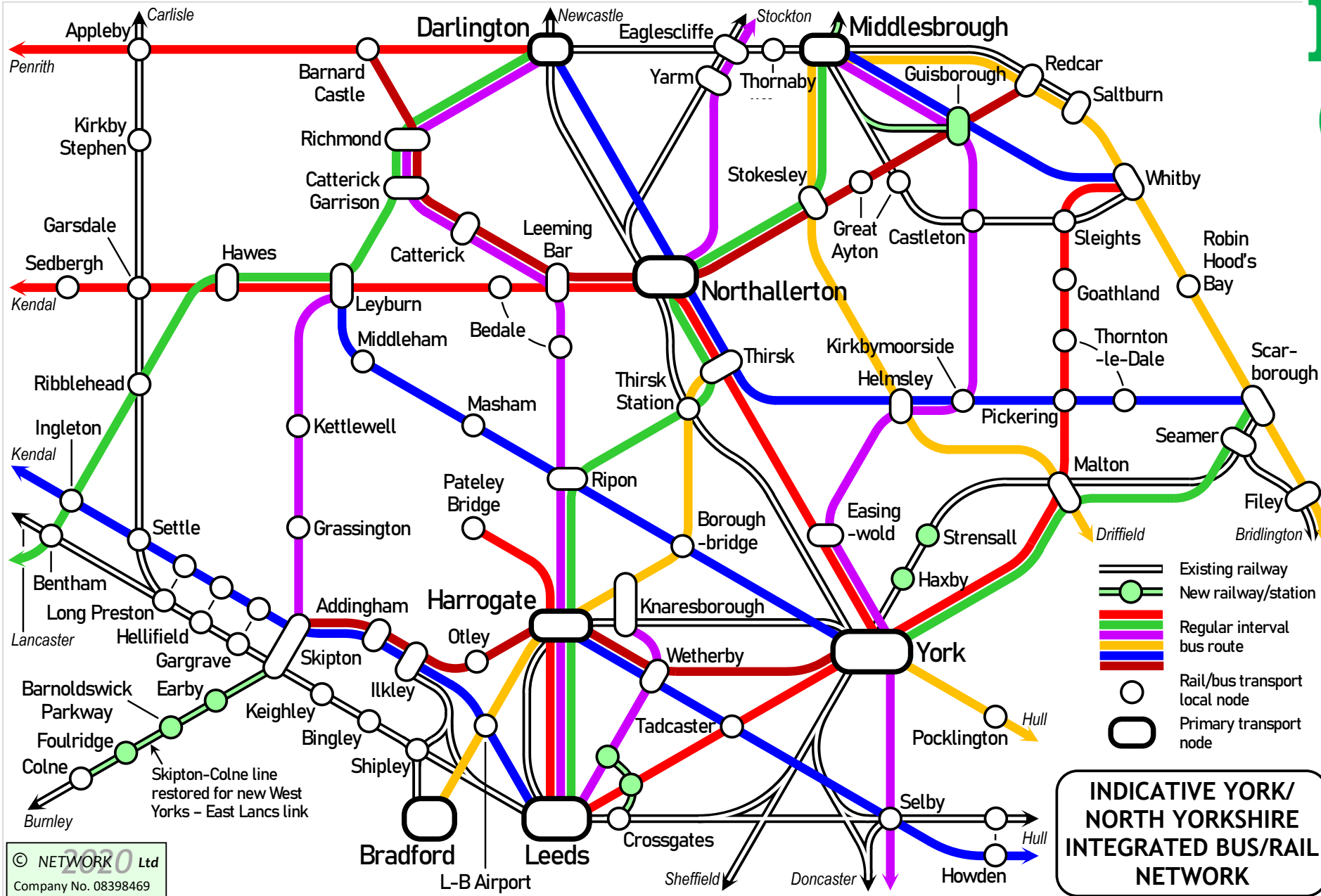
*Transforming the Intercity rail network of the Northern Powerhouse*

# Network North



Delivering improved local services to 'Small Town' communities

# Network North

*Enabling fully-integrated bus/rail public transport*

*Thank you for listening*

*Any questions??*

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