

HIGH SPEED RAIL REPORT

1. Introduction

- 1.1** Transport Scotland and HS2 in March 2016 released the outcome of two separate studies; The HS2 'Broad Options' report covers the possible extension of High Speed Rail beyond Leeds and Manchester to the north of England and Scotland; the Transport Scotland report covers the possibility of High Speed Rail between Edinburgh and Glasgow.
- 1.2** Regrettably, to a large extent, the two reports lack comparability, particularly in respect of the cost base used. However, a summary has been undertaken and is contained in appendix 1.

2. Reports Objectives

- 2.1** The key (and only specific) objective of the HS2 'broad options' report was to achieve a three hour journey time between London and both Edinburgh and Glasgow. Only the West Coast options achieved this, the best London-Glasgow journey time via the East Coast was 3 hours 5 minutes. However, the studies did not include certain measures (particularly in the Edinburgh area) that could further reduce the Glasgow journey time via Edinburgh.
- 2.2** Options tested varied from £11-19 billion for partial upgrades of either the East Coast or West Coast main lines (with the former being the cheapest) to typically £33-36 billion for a full high speed line, including a high speed line between Edinburgh and Glasgow, with little difference in cost between an East and West Coast option.
- 2.3** A lower cost option (with some reduced criteria in respect of journey speed through 'challenging' topography) was tested – but for a West Coast scenario only. If an Edinburgh-Glasgow high speed line was also included, this option could arguably be around £25-31 billion and, as the Transport Scotland report highlights, a high speed line between Edinburgh and Glasgow is only feasible as part of a wider UK High Speed Rail network.

3. Key points of discussion

- 3.1** The HS2 report contains only limited discussion about the wider benefits of high speed rail and transport benefits from High Speed Rail to Scotland and North of England was estimated at 'only' £7 billion. It is unclear as to what extent this includes benefits to the existing rail network, which could be significant since it would free up capacity for local and freight services on the existing services.

- 3.2** However, previous studies have indicated that the wider social and economic benefits of high speed rail to Scotland should be significant and it is understood that a very recent study undertaken by JMP for the HS2East group suggests that the wider economic benefits of extending the line beyond Leeds to Newcastle and Edinburgh could be £180 Million per year (not including transport benefits).
- 3.3** The only specific target set in the objectives was the 3 hour journey time between Edinburgh/Glasgow and London. Noticeably, no journey time targets were set, for example, between Newcastle and London and between The Central Belt and other cities in the north of England or East Midlands despite the significant populations in these areas. This focus on a single origin-destination analysis misses the clear agglomeration benefits of the route to and between other UK urban areas.
- 3.4** The HS2 report suggests that future estimated cross-border rail flows appear to be significantly higher from Edinburgh than Glasgow; this is the case for London flows and particularly the case for 'intermediate' flows to/from the cities in the north and east Midlands of England.
- 3.5** The Board should be aware that there is also a total lack of discussion in the 'broad option' report about how cross border flows to/from 'rest of Scotland' (north of the central belt) can best be accommodated. (An East Coast alignment would allow 'through services' to continue to Dundee/Aberdeen and Perth/Inverness).
- 3.6** It can therefore be argued that there are significant shortcomings in the analysis published to date and a lot of work lies ahead before any conclusion about high speed rail to the north of England and Scotland can be made and, in particular, if an East Coast or a West Coast route should be pursued.
- 3.7** The report acknowledges that there is much more work to be done in respect of taking account of all the benefits of extending High Speed Rail to north of England and Scotland and previous studies have estimated the benefits of High Speed Rail to Scotland to be considerably higher.
- 3.8** It is therefore imperative that much more work is undertaken in respect of benefits and this must not only deal with direct high speed operational benefits but also include benefits from released capacity on the existing network and not least the much wider economic and social benefits to north of England and Scotland associated with High Speed Rail.
- 3.9** Transport Scotland will begin a 'targeted stakeholder conversation' in June this year to establish the way ahead. There are two stakeholder sessions scheduled for 21st and 28th June and SEStran advisors will be in attendance at both, articulating the Board's agreed positions.

3.10 It is also recommended that office bearers write to the Secretary of State for Transport and the transport minister highlighting these initial concerns and pressing for further work to be undertaken by both the UK and Scottish Governments.

4. Conclusion

4.1 A number of issues have not been dealt with in sufficient detail in the Broad Options report and there is insufficient information provided to enable a full conversation to take place this summer or be the basis of any significant routing decisions.

4.2 There will have to be a significant amount of additional work before the issue of what options to take forward can be fully addressed, in particular should there be any decision regarding an East or West alignment.

4.3 This work should include:

1. The status of Newcastle/North East of England (as well as Carlisle) in the scenario of High Speed Rail to Scotland.
2. Much wider journey time targets than just London – Edinburgh/Glasgow. This should also include intermediate journeys between Scotland and key English cities and the benefits to intermediate rail flows must be taken fully into account.
3. Network comparisons must be on an equal footing, e.g. similar cost base, and should include high speed lines to both Edinburgh and Glasgow and all scenarios should also consider and Edinburgh-Glasgow high speed alignment and service.
4. Should the Edinburgh/Glasgow – London 3 hour journey time target be regarded as ‘sacrosanct’ and, where relevant, what additional measures can be considered in order to achieve this?
5. A detailed analysis and discussion on the benefits of released capacity on the existing rail network.
6. A much broader approach to the estimate of benefits of extending HS2 beyond Leeds and Manchester to Scotland, including wider economic and socio-economic benefits.

5. Recommendation

5.1 That the Board is asked to comment on the issues raised with the report

5.2 The Board is asked to agree that, in the ‘targeted stakeholder conversation’ with Transport Scotland on High Speed Rail, SEStran will pursue lobbying based upon positions raised in this discussion paper

and any additional points agreed by the board as well as any relevant information that otherwise comes to light from other sources

- 5.3** The Board is asked to agree that SEStran office bearers should write to the Secretary of State for Transport and the Transport Minister to ensure the additional work is undertaken to enable a full comparison of benefits of all options.

Trond Haugen

Advisor to SEStran

9th June 2016

Appendix 1: Detailed Analysis

Appendix 2: Extent of Phases 1 and 2 of HS2

Appendix 3: Estimate of travel demand

Appendix 4: Diagram of 2036 Cross-Border rail flows

Appendix 5: Options considered for a high speed line to Scotland

Appendix 6: A lower cost high speed option (West Coast only)

Appendix 7: Current and Target Rail Journey Times

Policy Implications	None
Financial Implications	As detailed in this report
Race Equalities Implications	None
Gender Equalities Implications	None
Disability Equalities Implications	None
Climate Change Implications	None

1. Starting point and remit; Broad options report

1.1 The starting point of the Broad Options report was to develop options for a High Speed Line to serve North of England and Scotland beyond the completion of HS2 Phase 2 to Leeds (and a connection point to the existing eastern network approx.. 10 miles south of York) and Manchester (and a connection point near Wigan on the West Coast Main Line), approximately 18 miles south of Preston. The extent of HS2 Phases 1 and 2 is shown in Appendix 2.

1.2 Under the Phase 2 proposals, both Edinburgh and Glasgow would be served by classic compatible High Speed Trains that would operate on the HS2 network as far as Wigan and then on the WCML. Similarly, Newcastle would also be served by High Speed Trains, utilising the ECML north of York.

1.3 Relative to today's typical journey times from London, the journey times after HS2 completion to Leeds and Manchester (Phase 2) are anticipated as:

	Current	After HS2 Phase 2
London – Newcastle	2 hours 50 minutes	2 hours 17 minutes
London – Edinburgh	4 hours 20 minutes	3 hours 39 minutes
London – Glasgow	4 hours 43 minutes	3 hours 38 minutes

1.4 The remit for the Broad Options study was:

- Deliver options that could deliver improvements to journey times between the North of England and Scotland, including journeys from London to Edinburgh and Glasgow of 3 hours or less
- Develop options that could improve capacity for passengers and freight
- Develop options for upgraded and high speed railways
- Develop options for both the east and west coast
- Be developed in partnership with Transport Scotland and Network Rail

1.5 It should be noted that no targets were set in terms of improved connectivity between Edinburgh/Glasgow and relevant English cities (other than London), nor between London and Newcastle, nor did the remit stipulate what towns and cities (north of Leeds/Manchester) be served by the new line e.g. York, Darlington/Teesside, Newcastle/Tyneside on the East Coast and Preston, Lancashire and Carlisle on the West Coast.

1.6 It should also be noted that the Broad Options report did not cover issues related to a high speed line/high speed service between Edinburgh and Glasgow. In this context, reference would have to be

made to the Transport Scotland “High Speed Rail Scotland” report.

2. Discussion on Travel Demand

- 2.1** There is only limited information on travel demand available in the Broad options report so an estimate is provided in appendix 3 based on what information is provided.
- 2.2** The lack of more detailed information on estimated cross border rail passenger flows makes it much more difficult to undertake an informed stakeholder conversation and we have requested additional information from Transport Scotland.
- 2.3** What is clear though is that total estimated cross-border 2036 rail flows from Edinburgh are around 70% greater than that for Glasgow. This is perhaps also reflected in current cross border rail provision of 4 trains per hour (each direction) in or out of Edinburgh compared with 2.5 for Glasgow. With the most recent franchise and open access ‘commitments’, it is understood these figures may increase to around 6 and 3.5 trains per hour respectively.
- 2.4** Flows to/from London are around 10% higher for Edinburgh than Glasgow. For flows to/from Newcastle it is around four times greater from Edinburgh than Glasgow and, collectively, rail flows to/from for all other English and Welsh cities and towns are around 80% higher for Edinburgh than Glasgow.
- 2.5** It is therefore apparent that, in particular, connectivity between Edinburgh and all the intermediate English towns and cities is of considerably greater importance to Edinburgh and the SEStran area than to Glasgow.
- 2.6** There is no information provided whatsoever about ‘non cross border’ rail travel demand between Newcastle/Tyne & Wear, Darlington/Teesside (on the East Coast), Carlisle and Preston (on the West Coast) and other main cities/regions in England, including London. Many of these journeys will also greatly benefit from extending the High Speed lines beyond Leeds or Manchester and must be included in the overall assessment of the various options.
- 2.7** From the interpretation of the information given in the report it can be assumed that in 2036 (post HS2 to Leeds and Manchester), total estimated rail flow between Scotland and London would only make up around 40% of all trips between Scotland and London.

3. Upgrading of existing routes (ECML and WCML)

- 3.1** The Broad Options report considered the options of upgrading significant sections of either the ECML or WCML to provide reduced journey times to Scotland. In places, this would involve bypassing the

existing main line.

- 3.2 A West Coast upgrading could achieve a 3 hour journey time from London to both Glasgow and Edinburgh at a cost of around £17 – 19 billion. This would not include any upgrading between Edinburgh and Glasgow to enable a separate high speed service between the two cities.
- 3.3 An East Coast upgrade could only achieve the 3 hour journey time to Edinburgh, with a cost tag of around £11 – 13 billion, not including any upgrading between Edinburgh and Glasgow.
- 3.4 The benefits of the individual upgrades would be higher in the North of England compared with further north due to the higher passenger loadings and the report highlights that a particularly high benefits and revenue impact would be achieved by upgrading the section of the ECML between York and Newcastle.
- 3.5 This ‘upgrading’ option would enhance capacity where the existing line would be bypassed, but capacity would be reduced where the line would have to be shared with freight and local services due to the increased speed differential incurred.
- 3.6 The cost between an East Coast and a West Coast upgrade differs significantly by around £6 billion. However, in either estimate, the costs do not take into account the cost of upgrading relevant sections of one of the lines (most likely the Carstairs line) between Edinburgh and Glasgow in order to provide a high speed service between the two cities – and, indeed, provide a further reduced journey time between London and Glasgow via the East Coast.

4. New High Speed Line to Scotland

- 4.1 Four different options were considered for a full high speed route (largely 400kph design speed) all the way to Scotland (beyond Leeds and Manchester/HS2 Phase 2) as shown in Appendix 5 (Figure 11 in the Broad Options report), with one option up the West Coast and three options up the East Coast.
- 4.2 It should be noted that the Broad Options report only looked into providing a high speed line to either Glasgow and Edinburgh (option A) or only to Edinburgh (Options B, C and D). It will therefore be necessary to add to this work by using outcomes from the Transport Scotland’s “High Speed Rail Scotland” report in order to:
 - Provide a High Speed Route to both Glasgow and Edinburgh, and
 - Provide a High Speed Line between Edinburgh and Glasgow (in order to provide a local high speed service between the two cities)

- 4.3** Regrettably, this is not straight forward since the cost bases used differs between the two reports; the Broad Options report includes construction costs (including contingencies and land) whereas costs in the High Speed Rail Scotland report also includes operating and maintenance costs over a 60 year operating period. It is also the case that the High Speed Rail Scotland report did not test a Glasgow-Edinburgh route on its own but also included a southward extension to link in with the WCML south of Carstairs.
- 4.4 Option A** The line would continue from end of Phase 2 near Wigan (Manchester) to Glasgow and Edinburgh up the West Coast.
- 4.5** The alignment would straddle the Lake District National Park/Yorkshire Dale National Park and, in Scotland, would cross the Southern Uplands. It would split in 2 near Carstairs into a Y-shape, with each end of the Y serving Glasgow and Edinburgh.
- 4.6** This line would serve Glasgow and Edinburgh equally well with a London journey time of 2 hours and 30 minutes. It could potentially also serve Preston, Lancaster and Carlisle.
- 4.7** The cost was estimated at around £32 – 34 billion. In addition, in order to provide and Edinburgh – Glasgow high speed service, it would be necessary to ‘close the top of the Y’ and, based on the High Speed Rail Scotland report, this could be assumed to be around £2 billion making the total cost (for comparison with the other options) around £34-36 billion.
- 4.8 Option B**
The line would continue from the end of Phase 2 near York and follow and East Coast alignment until north of Newcastle where it would go more inland via the A197 corridor and Wooler before crossing the Lammermuir Hills and entering Edinburgh from the East.
- 4.9** The estimated London – Edinburgh journey time would be 2 hours 30 minutes whereas the London – Glasgow journey time would be 3 hours 5 minutes, assuming an Edinburgh – Glasgow high speed link was also implemented.
- 4.10** The line would also serve York, Darlington/Teesside and Newcastle/Tyne & Wear.
- 4.11** The cost was estimated at around £27 – 29 billion. In addition, the construction cost of an Edinburgh – Glasgow high speed link could be guessed at around £6 billion (based on the High Speed Rail Scotland report), making the total cost (for comparison with the other options) around £33 – 35 billion.
- 4.12 Option C**
The line would be reasonably similar to Option B but would largely

follow the existing East Coast Rail transport corridor rather than a short-cut via Wooler and the Lammermuir Hills. Journey times would also be similar to Option B.

4.13 Costs would be marginally higher than Option B, at £28 – 30 billion, increasing to an estimated £34 – 36 billion with the inclusion of the Edinburgh – Glasgow leg.

4.14 Option D

The line would cross inland north of Newcastle and largely follow the A72 corridor (Peebles), before heading north and splitting with one leg to Glasgow and one to Edinburgh, entering the city from the West.

4.15 The estimated London – Edinburgh journey time would be 2 hours 50 minutes whereas the London – Glasgow journey time would be 2 hours 45 minutes.

4.16 Estimated construction costs at £41 – 43 billion (excluding an Edinburgh – Glasgow element) is considerably higher than for the other options.

4.17 A new High Speed Line Lower Cost Option

Due to the high costs associated with the above options A – D, HS2 Ltd was asked to consider a lower cost option by lowering the 400kph design speed in specific topographically challenging locations to allow the line to follow the topography and existing transport corridors – but still capable of a max 3 hour journey time between London and Glasgow/Edinburgh.

4.18 Only a West Coast option was worked up, with a new High Speed Line from the end of HS2 Phase 2 near Wigan and joining the existing Scottish network near Carstairs. This could achieve a 2 hour 50 minutes journey time from London to both Glasgow and Edinburgh. This is shown diagrammatically in appendix 6 (figure 11 in the Broad Options report)

4.19 The implementation cost of this option was estimated at £22 – 25 billion. This figure would not include upgrading of lines between Edinburgh and Glasgow which could possibly add more than £6 billion which could arguably be interpreted as a saving of around £5 billion or thereabout when compared with options A,B and C

4.20 No East Coast option was considered in respect of this scenario, perhaps based on the reasoning that a London – Glasgow journey time of 3 hours would probably not be achieved.

4.21 Discussion

It is of concern that the West Coast and East Coast options investigated are not directly comparable due to the different destinations assumed (Glasgow and Edinburgh in respect of Options A

and D and the Low Cost Options but Edinburgh only in respect of Options B and C).

- 4.22** In addition, in order to compensate for this anomaly, the different cost bases used for the two studies (construction and land costs only for the Broad Options study but the total cost, including operating and maintenance cost over a 60 year period in the High Speed Rail Scotland study) makes the comparison even more complicated.
- 4.23** It may appear to some that since none of the East Coast options tested (with the exception of the much more expensive Option D) did achieve the target of a three hour journey time between London and Glasgow, the whole study may appear 'in favour' of a West Coast solution.
- 4.24** It is somewhat surprising that the only journey time target set was that between London and Glasgow/Edinburgh – with the 3 hour target representing a journey time saving of around 38 mins when compared with the estimated journey time post HS2 phase 2. Why wasn't there also a journey time target for the London – Newcastle journey? A reduction in the estimated 2 hrs 17mins journey time post HS2 Phase 2 to a target of around 2 hrs would not have been unreasonable.
- 4.25** It could indeed be argued that there may be a good business case for extending the High Speed Line from Leeds/York (end of HS2 Phase 2) to Newcastle. The Broad Option report suggested that "a particularly high benefits and revenue impact would be achieved by upgrading the section of the ECML between York and Newcastle". Should the High Speed Line be extended to Newcastle as a separate scheme, the starting points for extending High Speed Line to Scotland would be Newcastle in the east and Wigan/Manchester in the west.
- 4.26** It would appear that travel flows and the 3 hour journey time target between London and Edinburgh/Glasgow appear to have governed much of the Broad Options study. In particular, the 'difficulty' in achieving the 3 hour London-Glasgow target with an East Coast option was strongly noted although there was little discussion how this could be mitigated.
- 4.27** For example, it has been assumed that access into the cities would be via the current classic network rather than new and costly urban high speed alignments. It was also assumed that a Glasgow bound service up the East Coast would also stop and serve Edinburgh whereas, with a possible Edinburgh high speed rail bypass (with the Glasgow/Edinburgh train being split at Newcastle, with the individual portions serving Glasgow and Edinburgh separately) it is most likely that a Glasgow – Edinburgh journey time of less than 3 hours could be achieved via the East Coast.
- 4.28** It is also of concern that, apparently, only scant attention has been

given to the quite significant 'intermediate' cross border flows between Edinburgh / Glasgow and the other major conurbations in the English Midlands and North of England. And the impact on other 'intermediate flows' affected (e.g. from Newcastle to other cities further south, including London) has apparently not been given much 'attention' at all.

- 4.29** Another issue is the more recent proposals for the development of a high speed line (HS3) in the North of England between Liverpool / Manchester in the south-western corner of the larger Transport for the North (TfN) Region, to Leeds and beyond in the north-eastern end. There could be considerable synergy between this proposal and the proposal to extend HS2 to Scotland – and the impact would be particularly relevant to 'intermediate' flows (i.e. non-London flows).

5. Discussion on Connectivity with English Cities

- 5.1** The East Coast and West Coast options differ quite significantly in respect of High Speed Rail connectivity between Edinburgh/Glasgow on the one hand and between major English Cities on the other.
- 5.2** They both provide High Speed connectivity with Birmingham and London although the East Coast option will add half an hour + extra journey time to/from Glasgow.
- 5.3** On the other hand, an East Coast option would provide high speed connectivity between Edinburgh/Glasgow and Newcastle/Tyne&Wear, Darlington/Teesside, Leeds, Sheffield and East Midland.
- 5.4** Should HS3 between Leeds and Manchester/Liverpool become reality, then an East Coast option would also provide High Speed connectivity between Glasgow/Edinburgh and Manchester/Liverpool.
- 5.5** With an East Coast option, Newcastle would also enjoy the High Speed connectivity with all the other major English cities mentioned above.
- 5.6** With a West Coast option, Edinburgh/Glasgow would get High Speed connectivity with Carlisle, Preston, Manchester and Liverpool whereas Newcastle would not gain at all.
- 5.7** As mentioned earlier (Section 2), 'Intermediate' rail passenger flows to/from Edinburgh is considerably higher for the Edinburgh region than the Glasgow region and when adding the intermediate flows to/from the Tyne and Wear and the Teesside regions, it is arguably the case that this issue will be of significantly greater concern to East Coast Authorities than for West Coast authorities.
- 5.8** It could therefore be argued that, in the same way that there are targets for maximum journey time between Edinburgh/Glasgow and

London (and arguably, a max journey time Newcastle-London should also be set), there should also be targets in respect of maximum journey times for 'intermediate' journey between Edinburgh /Glasgow and major North of England Cities.

- 5.9 The Transport for the North consortium have set journey time targets for connectivity between all the main Northern Cities(Newcastle, Leeds, Sheffield, Hull, Manchester and Liverpool as well as Manchester Airport as shown in Appendix 7. Much of this would be achieved with the implementation of HS3.
- 5.10 To this I have added potential journey time targets for Edinburgh – Glasgow, Edinburgh – Newcastle and Edinburgh/Glasgow – Preston – Manchester / Liverpool. Targets south of the northern cities (e.g. the East Midlands) could of course also be added to the diagram.
- 5.11 Combined, this would give journey time targets for almost all cross border 'intermediate' journeys and the extent of how this can be achieved should form part of any further work regarding high speed rail to Scotland.
- 5.12 The impact of High Speed Rail on cross border journeys to/from towns and cities **north of the Central Belt** was not looked into in the Broad Option report. Such services could be achieved by extending some classic compatible high speed trains serving Edinburgh or Glasgow to also serve, for example, Dundee/Aberdeen and Inverness.
- 5.13 It is however most probably the case that any high speed service to Glasgow and Edinburgh up the West Coast would have to be reversed out of Waverley and Glasgow Central respectively in order to continue further north - whereas a high speed service up the East Coast to Edinburgh could continue further north without a change of direction.

6. Operation of an Edinburgh – Glasgow High Speed services

- 6.1 There should be more work associated with how an Edinburgh - Glasgow high speed service could be operated. With a West Coast alignment, an Edinburgh – Glasgow service would have to be a stand-alone service whereas, with an East Coast alignment, the service could form part of Anglo-Scottish services operating to Edinburgh and Glasgow; this would also include any regional high speed services commencing, for example, in Leeds or Manchester.

7. Capacity

- 7.1 The report makes reference to the great benefits of creating a separate track for high speed services and thereby providing significant added capacity for freight and local services. The report

does not however dwell into any analysis where the benefits of released capacity would be greatest – the East Coast or the West Coast – and this must form an important part of any further work.

8. Benefits

- 8.1** Benefits have been estimated but, arguably, only to a limited extent. Although no specific demand modelling has been undertaken, journey time savings with a 3 hour London-Scotland journey time has been estimated at £3 bn with additional revenue benefits of a further £3 bn. 'Wider' economic impact benefits was estimated at £1 bn, leading to a total benefit estimate over the lifetime of the project at £7 bn.

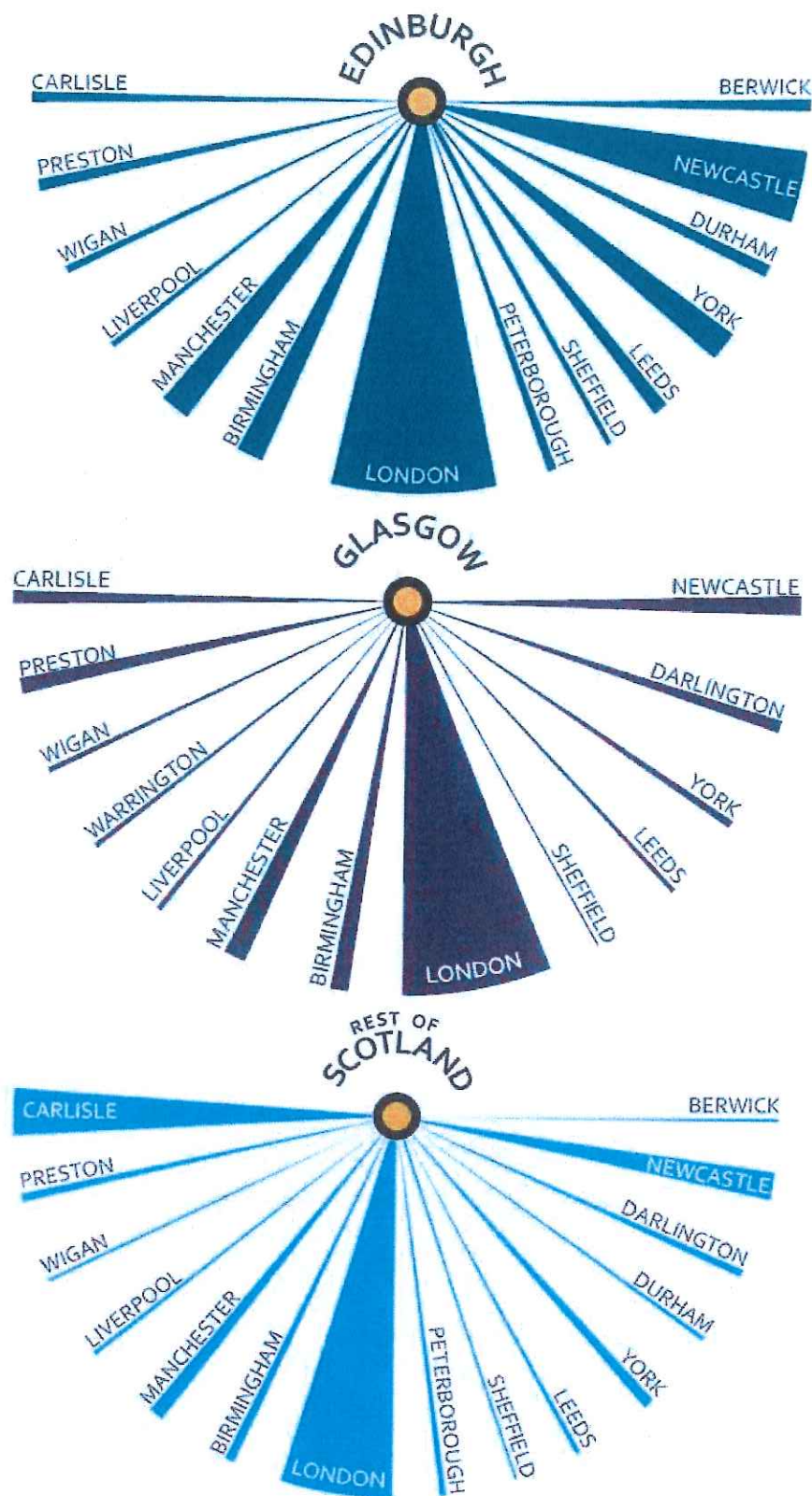


Appendix 2 East and West Coast Main Lines to Scotland and Extent of HS2 (Phases 1 & 2) to Leeds and Manchester

A9. HSR Appendix 3

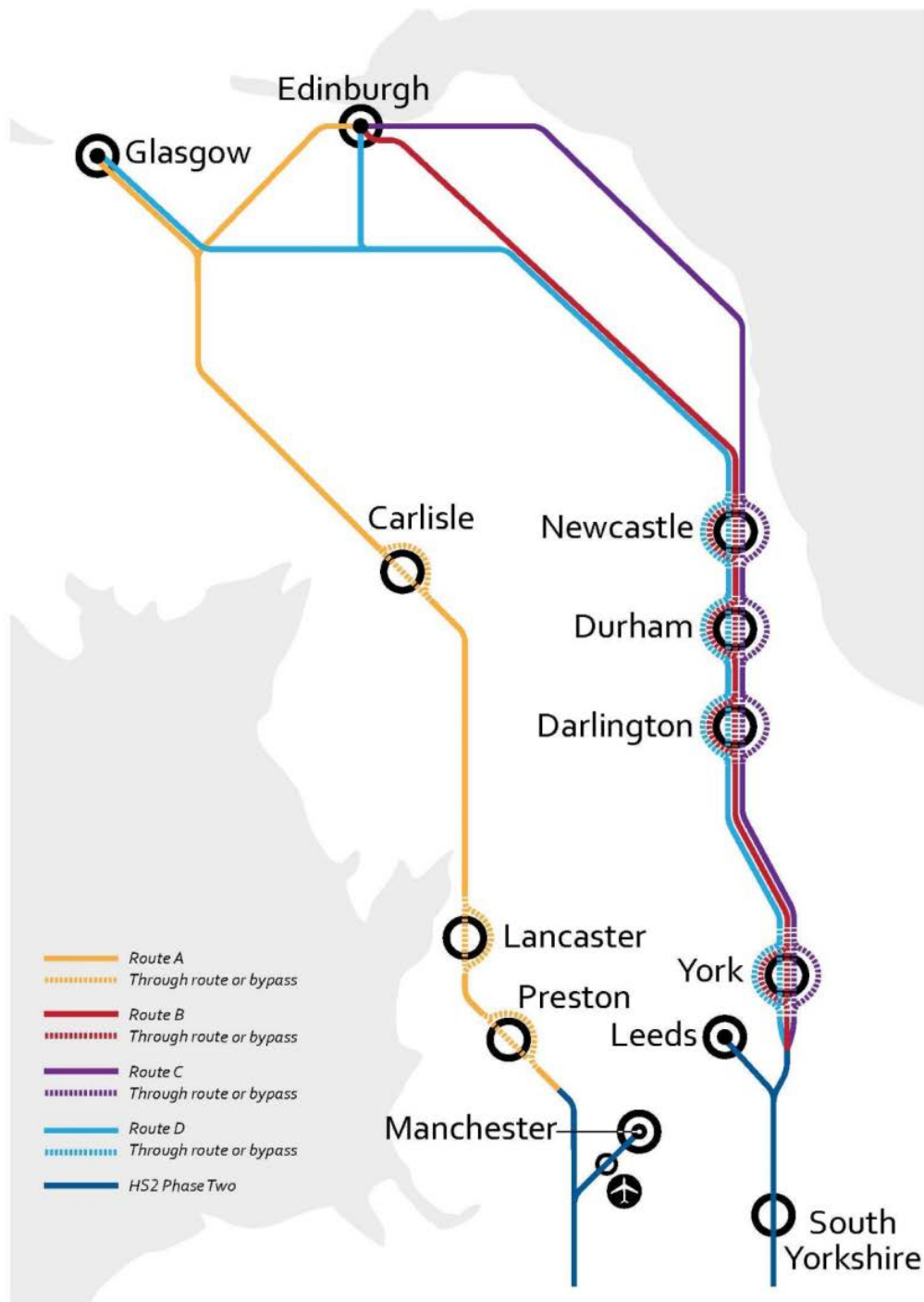
1. Estimate of Travel Demand

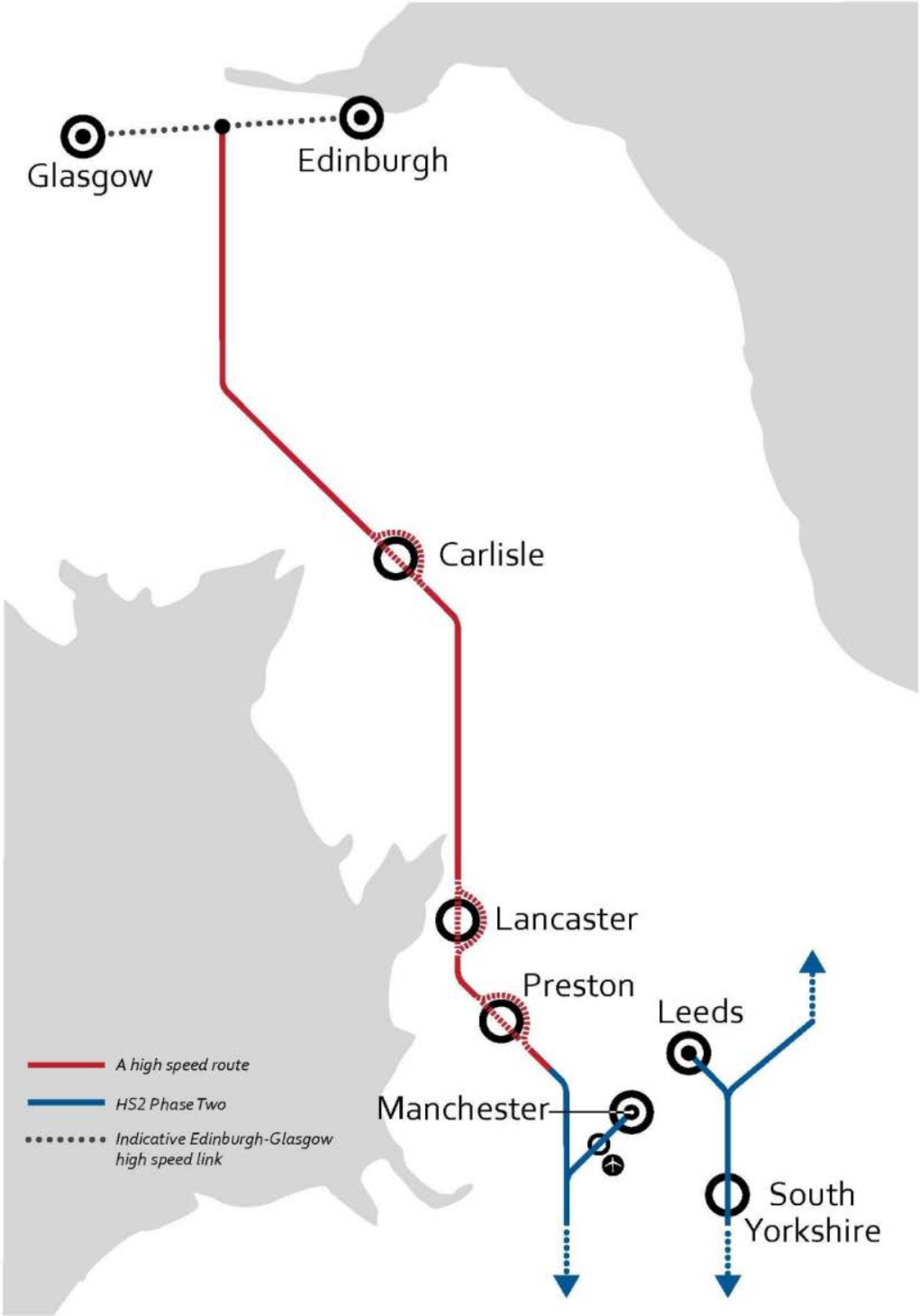
- 1.1 Only very limited information on travel demand was made available in the Broad Options report so a significant amount of assumptions and 'rough' estimates was undertaken for this discussion report.
- 1.2 Some of the information provided is also misleading. In section 2.2.1 of the 'broad option' report, it states that by 2036 (when HS2 phase 2 to Leeds and Manchester will be in place and with High Speed services provided all the way to Edinburgh and Glasgow) "there will be around 163,000 trips per day between stations in Scotland and stations in England and Wales (including trips in both directions)". This must therefore mean rail trips only.
However, in Figure 6 of the 'broad option' report, total 2036 cross-border travel demand (all modes) is quoted as 163,000 trips per day (without splitting this figure between the modes).
In this discussion paper, it is assumed that the latter figure is correct and that the cross border rail travel demand is significantly less than 136,000 trips in both directions per day.
- 1.3 The only 'semi-specific' figure provided was for the second largest (after London) cross-border rail flow, which is to/from Newcastle with "more than 3,000 rail trips per day" in 2036 when HS2 would reach Leeds and Manchester and HS2 services would continue on the classic network to Scotland.
- 1.4 A diagrammatic break-down of predicted 2036 cross-border rail trips to/from Edinburgh, Glasgow and 'rest of Scotland' on the north side of the Border and London and the other main Cities and Towns in the +Midlands and North of England is shown in Appendix 3 (Figure 7 in the main report).
- 1.5 From Figure 7 of the report (Appendix 3 of this discussion paper) it was estimated that the sum of the width of the three segments for cross-border flows to/from Newcastle was around 17.1 mm. It was then assumed that each 1 mm = 200 daily passengers, making the total cross-border Newcastle flow 3,420 passengers of which 2,100 would be to/from Edinburgh and 540 to/from Glasgow
- 1.6 From the same estimate of 1 mm 'segment width' = 200 passengers (in the Appendix 2 Diagram), it could be assumed that total cross-border daily flow to/from London would be 12,540 (width of the three segments = 62.7 mm), of which 4,880 to/from Edinburgh and 4,420 to/from Glasgow
- 1.7 The 'broad option' report also states that 30% of cross-border rail trips (whatever that total is) is to/from London station. In the Scottish end, 46% of all cross-border trips is estimated to be to/from Edinburgh, with Glasgow and 'rest of Scotland' having a 27% share each.
- 1.8 Total Cross Border flows could therefore be estimated at 41,800 passengers, of which 19,230 would be to/from Edinburgh and 11,285 to/from Glasgow.
- 1.9 Finally, it could therefore also be estimated that cross-border flows to/from all other English Cities and Towns (other than London and Newcastle) would be around 25,840, of which 12,250 would be to/from Edinburgh and 6,325 to/from Glasgow, i.e. the Edinburgh flow can be assumed to be around 80% greater than that for Glasgow.



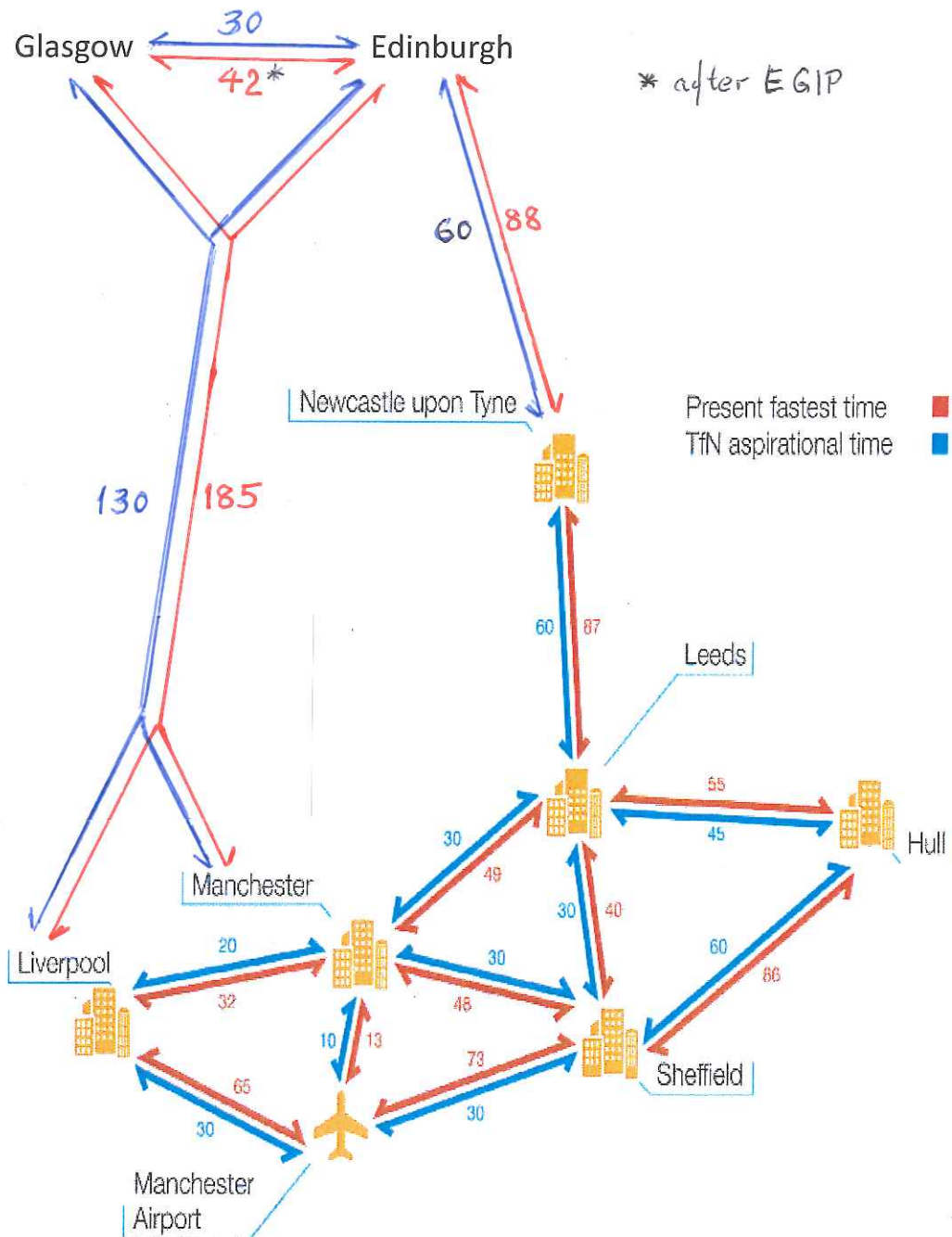
Appendix 4 Relative demand for cross-border rail trips

(Based on forecast volumes of passengers for 2036 with Phase 2; Figure 7 in Broad Options report)





Appendix 6 A lower cost high speed rail option



Appendix 7 Current and potential future 'target' rail journey times