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# Sheffield and South Yorkshire Report 2016





## Department for Transport

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# HS2 in South Yorkshire

David Higgins, Chairman, HS2 Ltd

The decision as to where to locate the HS2 station in South Yorkshire has proved one of the most difficult we have faced.

That difficulty, in part, is due to topography. The hills on which Sheffield is built, the Porterbrook, Sheaf Don and Dearne rivers and their flood plains, as well as the industrial legacy of mine workings and heavy industry in the area make building a reliable high speed line and station there both complex and costly.

On top of that are the different political and economic perspectives of the city and the region which have produced different, and conflicting, views on where a station, with its benefits, should be placed. Each of those perspectives is entirely valid from the viewpoint of those who hold them, but they have tended to be incompatible.

I acknowledged those differences eighteen months ago in Rebalancing Britain, but expressed the hope that a consensus would emerge. But I now have to acknowledge that whilst that has been possible in the East Midlands, Crewe and Stoke, and around the Leeds station location, it has not proved possible in South Yorkshire – this despite the ever growing desire for certainty, here and right along the Eastern leg of HS2.

In saying that I do not want to under-estimate the genuine difference of views, and the reasons for them, that exist. Rather it is to explain why I believe the time has now come to make a recommendation on which the Secretary of State can make a decision – and to explain the thinking behind that decision, to him, the local communities and their representatives.

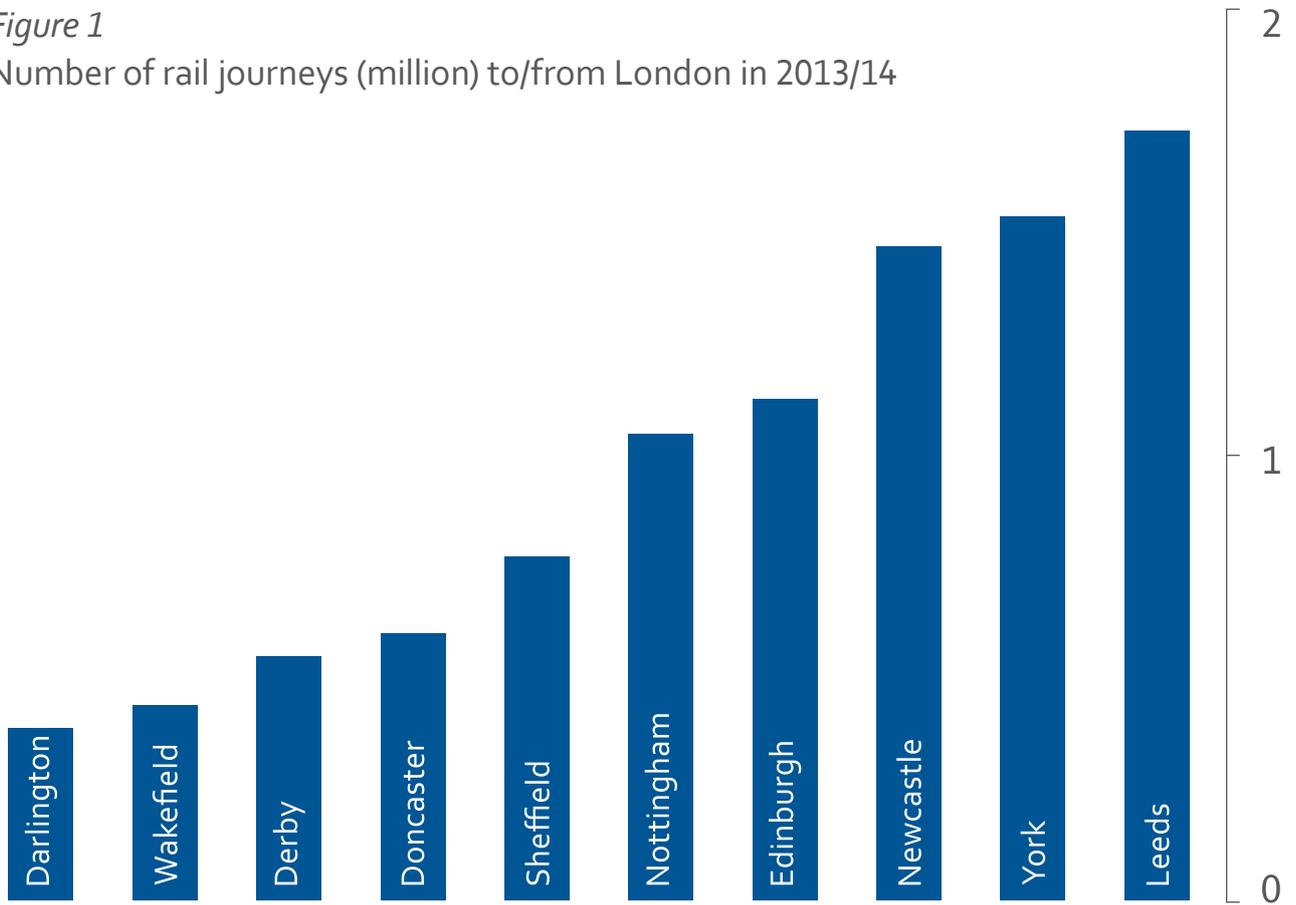
But, first, it is important to understand the factors that any recommendation has to take into account – and then to apply the criteria that emerge from those factors to each of the options to see which, on balance, comes out best. No one option is a perfect fit, so, inevitably, I recognise that this has to be a judgement call which, equally inevitably, will always be the subject of discussion.

A handwritten signature in black ink, consisting of stylized initials 'DH' followed by a long horizontal line that ends in a small arrowhead pointing to the right.

*David Higgins, Chairman, HS2 Ltd*

Figure 1

Number of rail journeys (million) to/from London in 2013/14



# Factors of consideration for recommendations

## Factor 1

The first factor is demand: the question of what HS2 is for. In that regard South Yorkshire cannot be considered in isolation. Whilst there is clearly a need for a station stop in South Yorkshire, it also has to be seen in the context of the rest of HS2, the rail network as a whole and the rest of the transport system, particularly on the eastern side of the Pennines.

The best measure of that is the relative level of demand from stations along the Eastern leg. In *Rebalancing Britain* I published a graph which demonstrated this. It showed by quite some distance, the biggest demand comes from a combination of Leeds, York and Newcastle. This is also echoed by figures that show that, coming from London, four times more passengers will travel on to Leeds, York and Newcastle than stop in South Yorkshire (see Figure 1).

That is important because it means that any decision about the service to South Yorkshire has to take into account the impact on services to the North. Every minute lost, or gained, on the timetable does not just permanently affect passengers to those destinations, it also adds or subtracts to the overall business case for HS2 as a whole, and the Eastern leg in particular – and, therefore, the benefit to the nation as a whole over the lifetime of the railway. The legitimate desire to improve, and maximise, the benefit of HS2 for Sheffield and the wider South Yorkshire region has to be measured against and judged in the light of the impact on the rest of the route.

Relative demand, and journey times are, therefore, one combined factor which has to be taken into account.

## Factor 2

The second factor is, undoubtedly, the particular needs of Sheffield and the wider region. The average service from London to Sheffield currently takes around two hours. All options considered here cut around 45 minutes off that average journey time. But, unfortunately, no one station option benefits all areas equally. The real question, therefore, is about which location achieves the best balance of the varying demands of the Sheffield city centre area and those of the rest of the region including Barnsley, Rotherham and Doncaster, without adversely impacting the service to other areas.

Ensuring the best outcome for South Yorkshire's station solution

1

Demand

2

The needs of Sheffield and the wider region

3

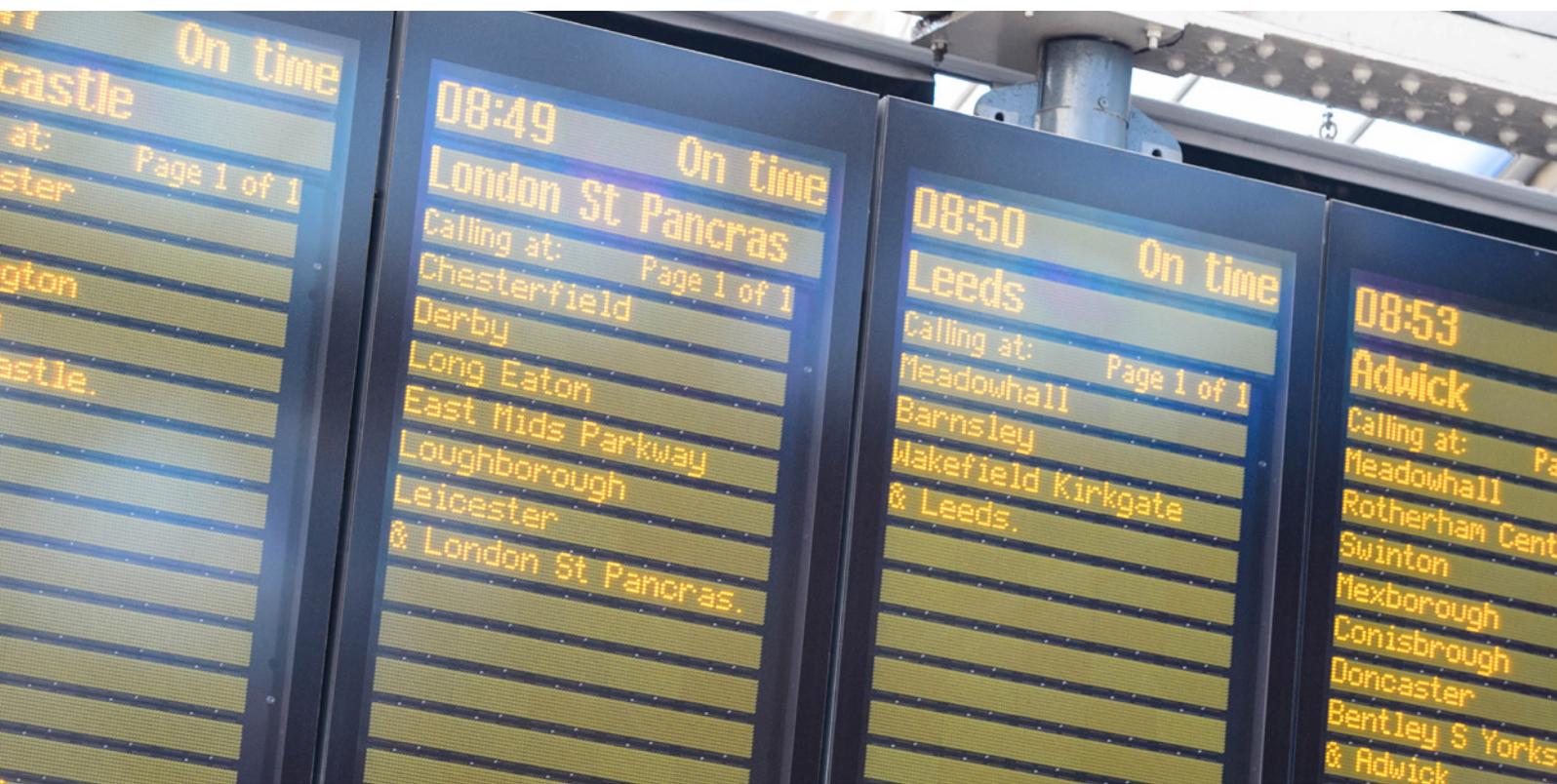
Connectivity with existing rail and wider transport network

4

Topography, urban density and environment

5

Consideration of cost



Departure board at Sheffield station

Image: HS2 Ltd/Emily Pain

# Factors of consideration for recommendations *(cont...)*

## **Factor 3**

The third factor is connectivity with the existing rail and wider transport network. HS2 is not a stand-alone railway and integration with existing and future networks is one of our key operating principles. The integration of HS2 has been a major factor shaping decision making at the East Midlands and North West hubs, as well as at Leeds station.

A new strategic element has also been added to this equation by the ambition set by Transport for the North in planning for Northern Powerhouse Rail services to improve journey times and train frequencies linking the six principal city regions and the North's biggest airport, with the right connections to the wider network. Northern Powerhouse Rail's aspirations for Sheffield to Leeds (Sheffield's second busiest route) is 6 trains every hour with a journey time of 30 minutes that would mean a reduction of ten minutes from the current fastest time of forty minutes, and much more on the average time of 55 to 65 minutes.

Achieving that ambition was not in HS2's original remit, or budget, but it is now a significant factor which has to be taken account of and reflected in our decision making process.

## **Factor 4**

A fourth factor is a combination of topography, urban and industrial density, as well as environmental impacts.

The area around Sheffield is both hilly, and vulnerable to floods, as well as densely urbanised and industrialised with large scale manufacturing plants. There are also some individual buildings which are of historic value which need to be protected.

In considering both the Meadowhall option, and the alternative city centre proposals we have to be sensitive, particularly to the latter point, and aim to reduce our impact, not just on buildings but on established communities and businesses as well, particularly the complex heavy industry plants and steel works which are such an important part of the modern industrial landscape in this area.

# Factors of consideration for recommendations *(cont...)*

## **Factor 5**

And, finally, there is one further factor: consideration of cost.

Decisions which cost more in Sheffield mean that we have to find savings elsewhere on Phase Two – and some of the proposed additional costs in Sheffield in particular are substantial in nature.

## **A different way forward**

Those are the factors against which, in equal combination, each option outlined below has to be judged. The judgement cannot be absolute because no one option unequivocally meets each criteria. It is a balanced judgement, but precisely because it is so finely balanced we have also tried to be imaginative and think again about our original preference for an interchange station at Meadowhall on the main line on a route that aligns to the M1.

As a result we have examined a proposal to run what is known as a classic compatible service into Sheffield city centre as an integral part of the core HS2 service. This would mean up to two trains per hour coming off the high speed line to run on a dedicated link to join the existing line into Sheffield, with the additional option of a station stop at Chesterfield.

This would remove the need for a HS2 station at Meadowhall and in turn also allow us to exploit the possibility this opens up to take the main HS2 line through the comparatively less populated, and geologically easier, eastern part of South Yorkshire – a route which runs as far as possible parallel to the M18.

This would be a more cost effective approach which also delivers, depending on the service pattern, an additional saving of between one and five minutes for Leeds, and the cities further North, with all that implies for the overall business case and benefit to the nation.

Whilst this would mean a change in the service proposition for Doncaster, Barnsley and Rotherham they would still benefit from the overall proposition.

Doncaster would continue to gain from the extra capacity that will be freed up on the East Coast Mainline, particularly with the introduction of the Intercity Express.

Barnsley, Rotherham and the existing Meadowhall station could benefit from high speed trains continuing beyond Sheffield on existing lines which would deliver an even greater benefit on top of that if a transfer at Sheffield Midland is required. The current



Peace Gardens and Sheffield Town Hall



Advanced Manufacturing Park, Sheffield

Images: HS2 Ltd/Bob Martin

fastest journey time from Barnsley to London is just over two and a half hours with a change of trains – and most services take longer. Changing at Sheffield via HS2 in future could save up to forty five minutes on most services and the transfer at Sheffield Midland would be considerably easier than at Meadowhall.

I also believe that HS2 should undertake a study to make recommendations to the Secretary of State on the potential for a parkway station on the M18/Eastern leg which could serve the South Yorkshire area as a whole.

At the same time I recognise this will impact those who live along this new M18/Eastern route (*see map*) and create both uncertainty and concern for them and their families. I apologise for that. I can only stress that the proposal has not been arrived at lightly. I recognise that those affected will want as much information as soon as possible, both about the actual route and the compensation they will receive. That is a legitimate concern and HS2 will work with government to address both points as a matter of urgency.

I also apologise to those who live along the original Meadowhall route who may not now be affected, but face a further period of uncertainty. We will work with government to clarify the position as soon as possible.

I set out below our reasoning, taking into account each of the factors outlined above, for each of the possible options. A long list of possible alternatives was considered, but these were, by far, the most feasible and, therefore, the ones we have focused on.



# Meadowhall – main line interchange station

In our initial thinking this was the option which most clearly satisfied the balance of criteria outlined above.

It carried the least time penalty in terms of balancing the need to provide a stop in South Yorkshire without compromising the service to the areas of greatest demand in Leeds and further North.

It also provided connectivity to the main areas of regional demand in Sheffield, Doncaster, Barnsley and Rotherham.

And, whilst building a station on a viaduct is not easy, it avoided the pitfalls of the densely urbanised nature of inner Sheffield. It is constructible.

But a number of new factors have emerged which also need to be considered in any balanced judgement.

The most significant is the stated desire of Transport for the North's Northern Powerhouse Rail project to reduce the journey time between the major city centres in the North. And in the case of Leeds city centre to Sheffield city centre to 30 mins, whilst also increasing the frequency of such services. Whilst that is not part of our remit, it clearly sets a strategic context which we need to take account of in reaching any recommendation.

Whilst Meadowhall does provide good connectivity to Sheffield city centre it does not provide a context which helps achieve that further ambition.

The NPR ambition also throws a different light on another element: the recognition that whilst Meadowhall does meet the demand needs of the region as a whole, including Doncaster, Barnsley and Rotherham, it is less suited to reflect the main sources of demand in Sheffield itself, which are from the city centre, and the South West area of the city and Chesterfield. How to handle that differential has always been a balanced judgement.

The third emerging factor is to do with Meadowhall itself. One of the advantages of the site is its connectivity, particularly the road network, but it risks becoming the victim of its own success. Congestion is already an issue, and is likely to become more so once the planned IKEA store opens and other planned projects become reality. Access to the station is an issue.

## Meadowhall route

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### Journey times\* London to Sheffield

68 minutes

*to Meadowhall*

78 minutes

*to Sheffield Midland*

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### Journey times\* London to Leeds (non-stop)

81 minutes

*Plus stopping time for those services stopping at Meadowhall*

*\* best possible times*



Sheffield Meadowhall shopping centre

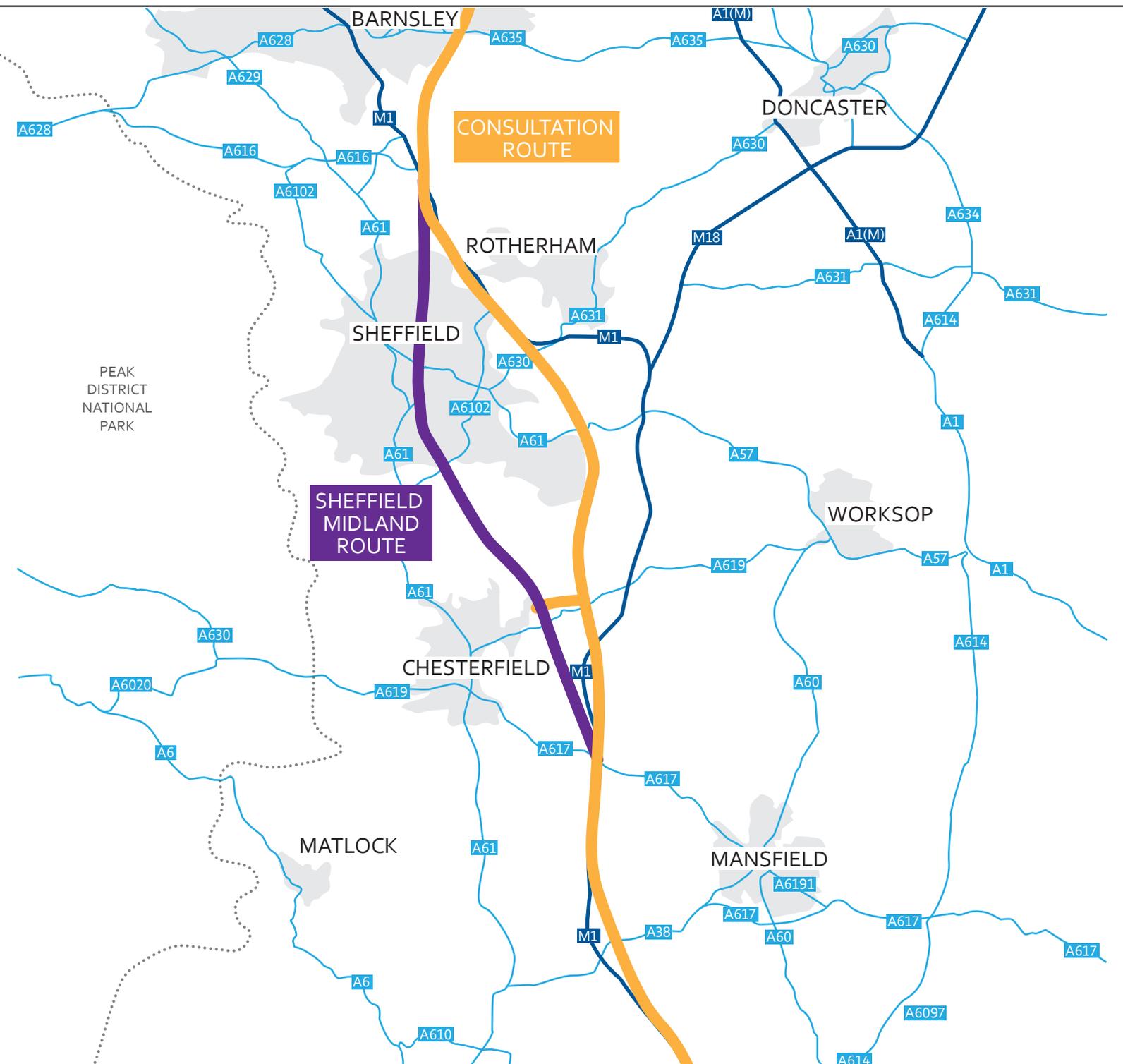
Image: HS2 Ltd/Emily Pain

## Meadowhall – main line interchange station

The presence of the shopping centre and associated businesses means that there is also a substantial price to pay in terms of demolition of properties and the subsequent compensation. Major local employers such as Outokumpu, Alcoa and British Land who own the Meadowhall shopping centre would be affected. Increasing awareness of the likely scale of that disruption is another factor to be taken into account.

The existing M1 viaduct does establish a context against which any impacts should be measured, but the sheer scale, height and length of the proposed station does pose design challenges which appear daunting. The HS2 Independent Design Panel also has concerns about the constraints at Meadowhall, including the highways infrastructure, air quality, microclimate and station design challenges.

Whilst Meadowhall, therefore, could serve the interests of the region as a whole, in terms of demand, whilst maintaining the integrity of the project's goal of meeting the demands of the entire Eastern leg of HS2, there have been sufficient new elements to make us pause and re-consider if it still meets our two primary criteria as a project: standing the test of time and being the right strategic answer. After careful analysis, the answer is no.



## Midland – main line interchange station

The second option would be to divert the main HS2 line to take it into the existing Midland classic railway station in Sheffield city centre.

This would involve the construction of a new line into and out of the city, including boring several long tunnels to the south of the city. Whilst this would be a huge undertaking, even more challenging would be the exit from the station to the north given the inevitable multiple impacts on the city's existing railway and road infrastructure.

In terms of local demand it would, however, better serve the main areas of demand in Sheffield city centre and to the South West including Chesterfield and is well positioned to meet the Northern Powerhouse Rail strategic ambition of a 30 minute journey time to Leeds.

Against that are serious issues associated with topography and urban density which result in both severe disruption and, therefore, substantial additional cost.

Midland sits in the flood plain of both the River Sheaf and the Porter Brook. To construct the HS2 main line there would, therefore, make it subject to that risk of delay and disruption not just for those passengers travelling to and from Sheffield, but for HS2 passengers as a whole, whether travelling further North, or South.

The second factor is the lack of space in the existing station which is insufficient to accommodate the needs of existing local services, a new through station High Speed line, and new services resulting from Northern Powerhouse Rail.

That would necessitate building a new station with the inevitable disruption to the existing station and services lasting for several years. It would also impact historic listed buildings of importance in the area.

For all those reasons it is estimated that building a new high speed line into Midland the South Yorkshire HS2 station would cost at least an additional £2 billion – money which would have to come from some other element of Phase Two.

### Route via city centre

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#### Journey times\* London to Sheffield

66 minutes

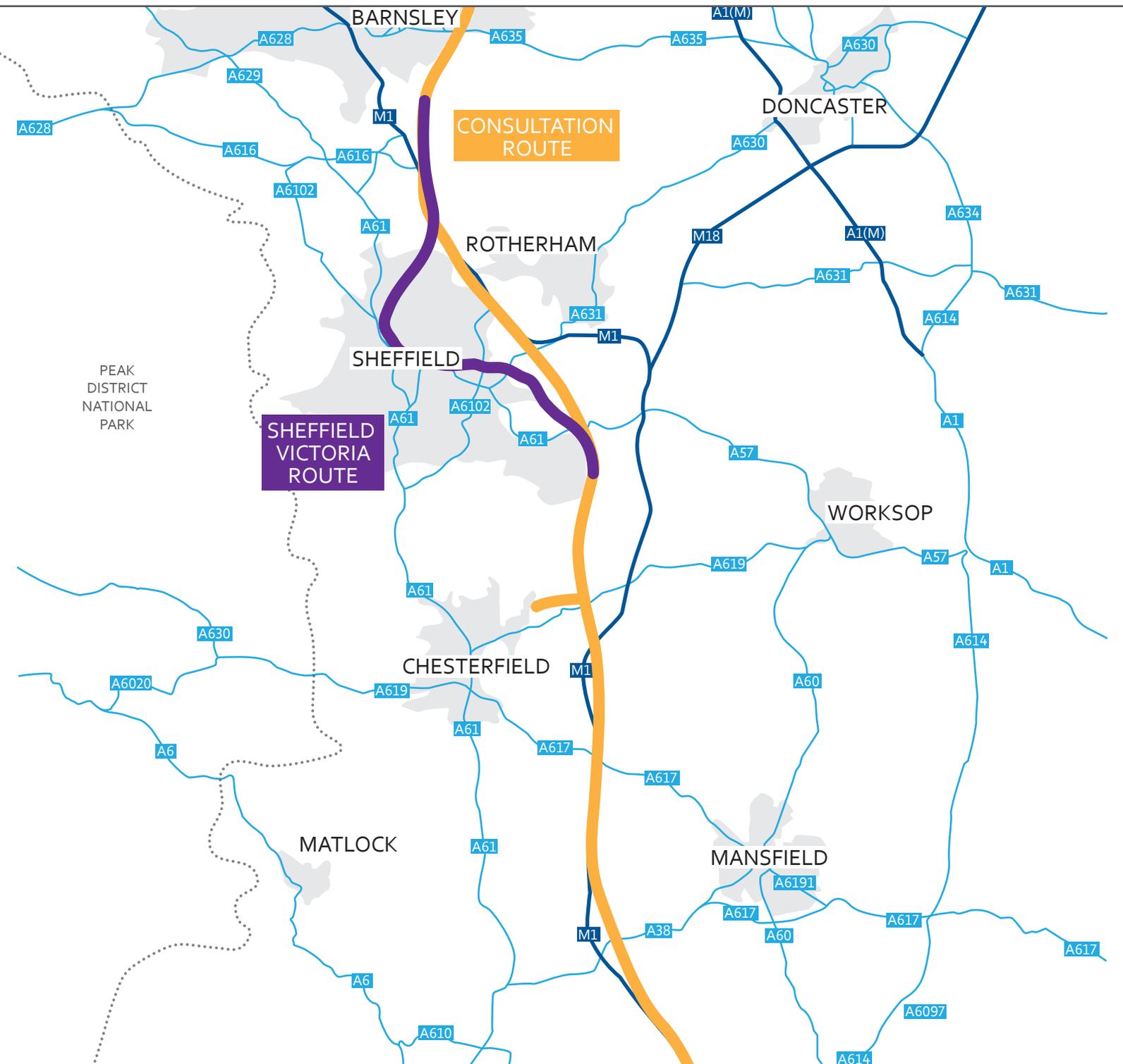
to Sheffield Midland

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Estimated  
cost impact

  
£2bn

\* best possible times



# Victoria – main line station

The third option is to divert the main HS2 line to Victoria, the disused station on the northern side of Sheffield city centre.

Like the Midland station option, Victoria would benefit from additional passenger demand from Sheffield city centre and the area to the South West of the city, including Chesterfield. That, however, would, again, be at the expense of fewer passengers from the wider South Yorkshire region.

It would also incur a time penalty for the larger market in Leeds, York and Newcastle because the line would be 5km longer. The latest estimate is that, at a minimum that would be three minutes for through trains and two minutes for stopping trains. That, again, would have a permanent impact on both passengers and the overall Eastern leg business case.

In terms of connectivity, Victoria is not currently part of the existing rail network – and is a thirteen minute walk from the existing Midland station, which would pose issues in terms of providing an easy transition from high speed to local services. In reality it would probably mean having to construct a new station for local services on a site seven minutes walk from Victoria. That would cost at least £50m to construct.

Due to the local constraints, the through lines in an HS2 station at Victoria would have to be curved. This would result in a station which would need to be 100m in width, with all that implies in terms of land take.

The route on the approach from the south would entail realigning 7km of existing railway with a tunnelled exit to the north. The station would impact historic listed buildings as well as disrupt local services for a prolonged period.

The cumulative effect would be a station which, because of the complexities involved in its rail architecture and operation, would be permanently highly constrained, and sub-optimal.

As an option for resolving the conflicting needs and demands of existing services, future ambitions and the requirements for HS2 it is far from ideal, and would also involve an additional cost of some £700m or more. That, again, is money which would have to come from savings on some other part of the Phase Two route.

## Route via city centre

### Journey times\* London to Sheffield

69 minutes

to Sheffield Victoria



Walk to Sheffield Midland

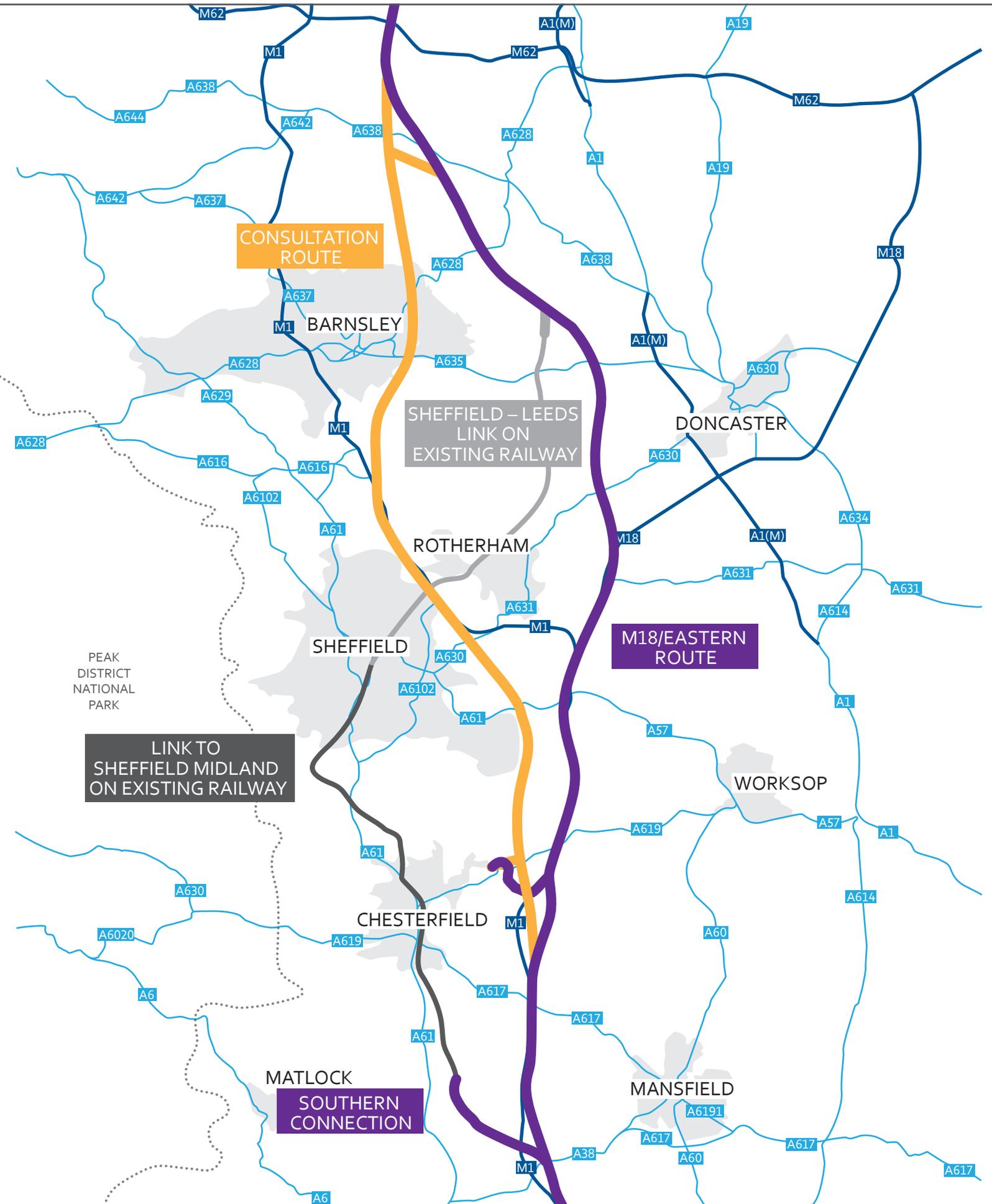
### Journey times\* London to Leeds (non-stop)

84 minutes

Estimated  
cost impact

£700m

\* best possible times



# A different approach

Given the substantial question-marks and caveats that now surround all three of these options we have considered a different way forward – a proposal which would separate the issues of providing a core HS2 service to South Yorkshire whilst maintaining the integrity of the service to the larger markets in Leeds, York and Newcastle. The advantage of this approach is that it separates the two questions of what is best to meet demand across the Eastern leg as a whole, from the more balanced judgement of what is the best solution to meet the very real demand in South Yorkshire.

## Sheffield/South Yorkshire HS2 service

The best way to separate the two issues is to physically separate the service to South Yorkshire from that to the route further North. That can be achieved by what is termed a classic compatible service – a dedicated link taking high speed trains off the main line and running up to two trains per hour into Sheffield on existing lines whilst the main HS2 line continues to carry trains serving Leeds and further North.

One option would be for these classic compatible trains to also stop at Chesterfield. Compared to the fastest existing service of 120 minutes, this would result in a fastest London to Sheffield service of around 83 minutes for those trains which stop at Chesterfield and of 79 minutes for those that do not.

The advantage of this approach is that it better reflects the demand picture in South Yorkshire, where Sheffield city centre, and the area from it to Chesterfield, pre-dominate without impacting on the services to the areas of greater demand to the North: Leeds, York and Newcastle.

It also allows for core HS2 services to run into Sheffield Midland without necessitating the cost and environmental impacts associated with building a dedicated high speed station in a dense, urban environment, whilst at the same time allowing an easy, cross-platform interchange to places across the city region by rail, and across the city on the tram network.

It would also create the possibility of these classic compatible services running through Sheffield Midland to other destinations, including Barnsley, Meadowhall and Rotherham.

**Main line via eastern route;  
southern connection to  
Erewash Valley line via  
city centre**

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**Journey times\***  
**London to Sheffield**

83 minutes

*to Sheffield Midland including  
stopping at Chesterfield*

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**Journey times\***  
**London to Leeds (non-stop)**

80 minutes

*no intermediate stop in South  
Yorkshire for through services*

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*Estimated  
cost impact*

**£1bn**  


*\* best possible times*

## Sheffield to Leeds services

The use of Sheffield Midland for HS2 services also opens the possibility of running high speed trains from Sheffield to Leeds via a dedicated link to the main HS2 line. This link would deliver the NPR ambition for a frequent 30 minute journey time between Leeds and Sheffield. This link might also be used by Birmingham-Leeds HS2 services, allowing them to route through Sheffield. It is being considered by Transport for the North as part of their work on Northern Powerhouse Rail.

## M18/Eastern route

A further advantage of separating services to South Yorkshire from those which go further North is that it also allows a re-appraisal of the main HS2 route.

Looked at from this perspective the original proposed alignment via Meadowhall and the M1 is not the optimal route to meet the demand needs of Leeds and further North.

The route to the East, initially parallel to the M18, would avoid not only the complexities associated with the Meadowhall viaduct, the problems of air quality and congestion – and therefore access – at the shopping centre, as well as the substantial compensation risk associated with demolition of businesses in the area, it would also carry much less risk from the legacy of mining in the area and involve fewer potential watercourse diversions.

In short, it would be easier, result in less overall expected noise impact, and be less expensive to build, though there would be an impact on a new housing development between Mexborough and Conisbrough, some existing communities and impact on the landscape in parts of the Rother and Dearne valleys. Overall, though, it is expected fewer properties would need to be demolished.

It would, also, save between one and five minutes on journey times further North with the resulting benefits in terms of both meeting passenger demand and upgrading the business case for the project. That is an overall benefit of between four and seven minutes over the proposal to divert HS2 via Victoria.

Whilst it would mean Doncaster has longer journeys from the HS2 services at Midland, it would continue to benefit from the released capacity HS2 will liberate on the existing East Coast Mainline, particularly with the introduction of the Inter-City Express Programme.

As outlined above, Barnsley would still benefit from a reduction of at least forty five minutes on most services to London with an easier transfer at Midland than would have been the case at Meadowhall where

the transfer would have been at different levels. This will considerably compensate for the longer journey time to Sheffield. The current fastest journey time of over two and a half hours to London would come down to under two hours. As mentioned above, I also believe that HS2 should carry out a study to make recommendations to the Secretary of State on the potential for a parkway station on the M18/Eastern leg route which could serve the South Yorkshire area as a whole.

The delivery of HS2's Eastern leg as well as the Northern Powerhouse Rail network with frequent, fast services linking key city centre locations such as Sheffield to Leeds will allow the use of the existing rail network to be re-evaluated in order to optimise the services delivered to places such as Barnsley and Wakefield. Work is already underway as part of Transport for the North's planning of the Northern Powerhouse Rail network, to examine the opportunities to serve those locations.

Reflecting its less congested nature, this route would also be around £1 billion less expensive even when the links to the existing line and the necessary upgrades have been paid for.

## Conclusion

The decision as to where to locate HS2 services in South Yorkshire is, ultimately, a matter for the Secretary of State. That is how it should be, but what I have tried to do in this report is set out the context for that decision and the principles that I believe should guide it.

For me the top two of those principles has been the absolute need to provide a stop for HS2 services in South Yorkshire as a core part of the network and, secondly, to preserve the integrity of the service to Leeds, York and Newcastle.

I believe our new proposal meets those two key objectives as well as opening the possibility of running high speed services to and from Barnsley and Rotherham via Sheffield and creating a context in which the NPR ambition to cut the Sheffield to Leeds journey time to 30 minutes can be realised.

Finally, however, I also recognise that this proposal will create fresh uncertainty for some residents along the M18/Eastern route. I apologise for that and will do all I can to ensure that their questions and concerns are addressed as quickly as possible, not least by working with government to do everything we can to allow the Secretary of State to consult on this new proposal and take a final decision on the Phase Two route. Only that will give residents, businesses and local authorities the certainty they need to get on with planning their future.

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