

High Speed 2 - station location analysis

Technical Note

Prepared by Volterra Partners

January 2014

1 Overview

- The current HS2 option minimises cost of delivery but does not maximise outcomes for Sheffield City Region and the UK economy.
- The additional costs if Meadowhall Through is replaced by Victoria Through are £0.9bn.
- However the additional benefits far outweigh this – 6,400 net jobs, worth £6bn to the South Yorkshire economy.
- The existing proposal therefore undermines the local economy and will not attract inward investment, create city centre activities and associated productivity.
- This technical note deals with the following issues:
 - Starts with a summary section on the key facts.
 - Summarises HS2 Ltd's position with regards to station location in South Yorkshire, including the impact that a Victoria Loop would have on the national business case.
 - Considers how HS2 Ltd may have underestimated the case for Victoria, both with regards to aspects which could alter the BCR within the current appraisal framework and also aspects outside of that framework that we believe should be considered.

NB: Sheffield City Council (SCC) supports a Victoria Through route – ie a route with the station at Victoria, and on which all trains travel, with no alternative route through Meadowhall. This is not an option that HS2 Ltd took forward in their consideration. HS2's primary option is the Meadowhall Through and their secondary option was the Victoria Loop (where the station is at Victoria but a line also runs through Meadowhall and non-stopping trains run on that route). Therefore any analysis of HS2's figures can only be done in the context of the Victoria Loop option in comparison to the Meadowhall Through, as this is all that is available to us from HS2. For the purposes of assessing the case for a Victoria station and the associated economic benefits, we believe that the Victoria Loop is comparable with a Victoria Through aside from journey time savings which would need to be considered in more detail.

2 Key facts

- HS2 estimate that the benefits of the Victoria Loop are £480m higher than the benefits of the Meadowhall Through¹. This is almost certainly an underestimate as wider economic impacts (WEIs) are not included.
- The impact of a Victoria Loop compared to a Meadowhall Through route on the national BCR would be negligible. Even without including the WEIs of a Victoria station, the national BCR will only change by 0.03. HS2's own sensitivities suggest that the national business case could range from a BCR of 1.25 to 3.25. In this context of uncertainty, the Victoria Loop altering the BCR by 0.03 is clearly very small.
- HS2's passenger demand figures suggest that new passenger demand from Sheffield to London would be around three times higher from Victoria than Meadowhall – this can be thought of as an indication of the relative new activity that each station might support.
- HS2 forecast that passenger demand to cities other than London would be 44%-217% higher with a Victoria station than Meadowhall. HS2 is not just about fast links to London. One of its objectives is to narrow the north-south divide and improve intercity connectivity. The

¹ MVA (for HS2 Ltd): Options for Phase Two of the high speed rail network – demand an appraisal report, July 2013

passenger demand figures suggest that a station at Victoria would maximise the potential for this.

- HS2 found that potential new employment capacity in the 1km zone around Victoria is almost double that in the 1km zone around Meadowhall².
- Based on typical employment densities and the types of sectors that would be attracted to each location, Genecon estimate that gross new jobs around Victoria would be 9,400 in comparison to 5,200 around Meadowhall.
- Again based on the types of jobs attracted to each area, displacement from the sub region is likely to be higher for jobs attracted to Meadowhall than those attracted to Victoria, meaning a net benefit to the sub region of 6,400 jobs from Victoria.
- Based on commuter patterns from the city region, we estimate that all districts in Sheffield City Region would be better off as a result of the jobs created by the Victoria option than the Meadowhall one – every district would have more residents employed under this scenario. It is therefore the best scenario for the whole city region.
- Genecon calculated the additional economic benefits of the stations over a period of 25 years and concluded that the station located at Victoria had an additional cumulative GVA impact of between £2bn and £5bn, depending on the persistence and decay of jobs.
- We then translated this into a 60 year Net Present Value (NPV), which is standard for transport schemes, which values these economic benefits at up to £6bn to the South Yorkshire economy (60yr NPV).
- Wider Economic Impacts are not included in HS2's assessment of the Victoria Loop option. It is not possible for us to estimate them entirely in line with HS2's own assessment as we do not have access to their models but we consider a range of high level approaches which suggest that the increase in WEIs from a Victoria Loop in comparison to a Meadowhall Through would be in the region of £150m-£300m.
- CBRE estimate that there could be a potential net increase in business rate revenue of £530m (60 year NPV) resulting from locating the station at Victoria. Clearly the station at Victoria would maximise the potential for higher business rates. The city council is keen to consider how the additional uplift generated by a city centre station could assist in part-funding additional costs related to HS2.
- Preliminary estimates carried out for SCC and South Yorkshire Passenger Transport Executive (SYPTTE) suggest that the costs of connecting a station at Meadowhall with the rest of the city region will be significantly higher than at Victoria. This is because it removes the need for an express service between Sheffield City Centre and the south west of Sheffield and Meadowhall, where the key passenger markets reside.
- HS2's assessment of the Victoria Loop results in a BCR of 0.64. We consider various ways in which this could be underestimated. The benefits could be higher for two reasons. Work by Parsons Brinkerhoff suggests that the time penalty to ongoing passengers could have been overstated thus reducing the disbenefits that they experience, and we have considered the potential magnitude of WEIs of the Victoria option which would add to the benefits. The costs could also have been overstated, due to the cost of connecting either station to the wider city region, and the potential for the uplift generated by the station to part-fund either connectivity measures or a station through uplifts in business rates. We cannot estimate these impacts in a detailed fashion but we consider some high level scenarios which show that they could impact significantly upon the BCR (ranging from 1.5-5.0).

² High Speed 2, SIFT 3: Relative Development Impact Assessment (South Yorkshire) –December 2011, Drivers Jonas Deloitte & SKM Colin Buchanan ('DJD SKM')

- The current appraisal methods assume that the levels of economic activity across the UK are fixed and the only impact transport can have is in increasing productivity, along with a marginal movement in where activity occurs. In reality transport can have transformational impacts in attracting more activity to places than would otherwise be the case. This is completely missed by existing appraisal methods. In the example of HS1 it was estimated that if only 5% of the regeneration around stations was actually ‘new’ activity to the UK, then this would be worth £10bn in benefits, which would have fundamentally changed the BCR. We believe, supported by the job creation estimates, that the potential scope for these sorts of transformational impacts would be significantly higher with a Victoria station than one at Meadowhall.

3 Summary of HS2 Ltd’s position

Station location in South Yorkshire:

- HS2 Ltd has settled on the Meadowhall Through option because it maximises the Benefit Cost Ratio (BCR) for the national case, not because it is the best option for Sheffield City Region. The current BCR for the whole network is 2.3 including wider economic impacts.
- They published their options analysis in July 2013³ which detailed the options they considered for serving South Yorkshire.
- This concluded that the second best option would be a Victoria Loop (this has the line still running through Meadowhall but with a loop serving Sheffield city centre and the station at Victoria).
- HS2 Ltd concluded that this would cost an extra £900m, provide extra revenues of £190m and extra benefits of £480m. This gives a Benefit Cost Ratio (BCR) of 0.64 which is lower than the overall HS2 scheme BCR of 2.3, and therefore was not taken forward by HS2 Ltd. This excludes any Wider Economic Impacts (WEIs) which were not estimated at the time of the analysis as the guidance was not yet adopted.

Impact of Victoria on national BCR:

- Even if we simply take the benefit and cost numbers published by HS2 for the Victoria Loop compared to the Meadowhall Through, the impact on the national BCR is minimal. The absolute maximum change to the national BCR is 0.03. This is a very small change to the national BCR. This is simply using HS2’s own figures, making no adjustments for differences in views on the likely costs and benefits of the Victoria Loop option.

Table 1: Impact on the national BCR

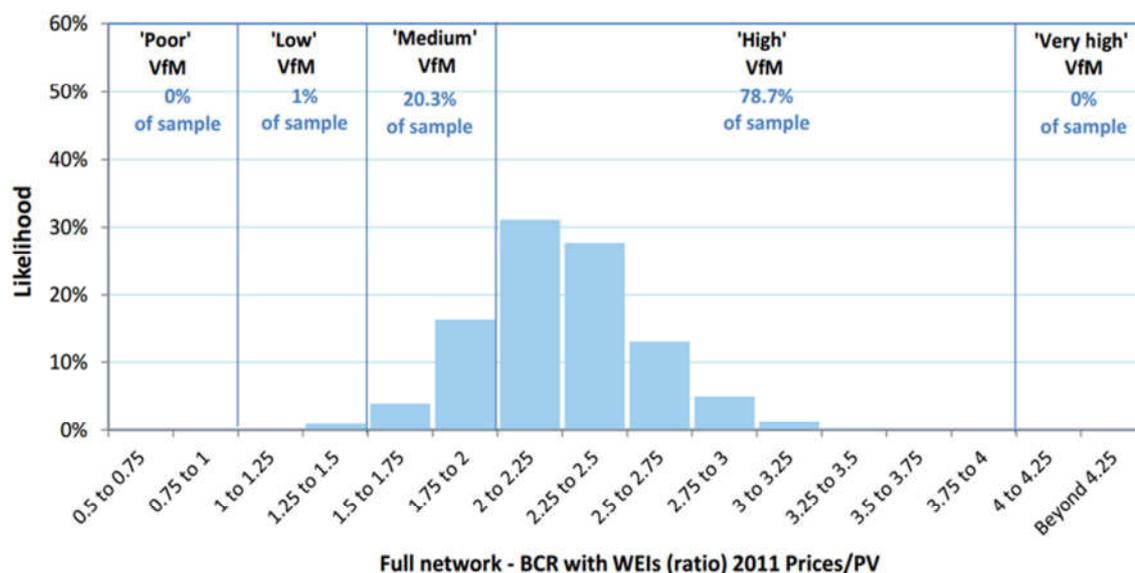
| National impacts (£m) | Published route with Meadowhall | Victoria loop option |
|-------------------------|---------------------------------|----------------------|
| Benefit (including WEI) | 71.0 | 71.48 |
| Cost | 62.6 | 63.5 |
| Revenue | 31.1 | 31.29 |
| National BCR | 2.25 | 2.22 |

NB Figures may not exactly match HS2’s due to rounding

³Options for Phase Two of the high speed rail network – demand and appraisal report (July 2013) MVA Consultancy

- The Economic Case⁴ shows a range of sensitivities for the national BCR resulting from different assumptions underpinning the analysis. As shown in figure 1, these range from 1.25 to 3.25, with the lowest estimates being based on a scenario with higher construction costs, lower economic growth, low values of time and low growth in demand. The impact of changing the route to the Victoria Loop option would therefore have a much smaller impact than some of HS2’s own sensitivities. Indeed, we would expect higher economic growth, resulting in higher demand and higher revenues to be more likely to occur with a station at Victoria, and therefore locating the station at Victoria may in fact be more likely to deliver a better overall value for money investment.

Figure 1: The standard case national BCR



Source: The Economic Case for HS2 (October 2013) HS2, DfT

4 Reasons why HS2 may have underestimated the case for Victoria

Underestimating the BCR:

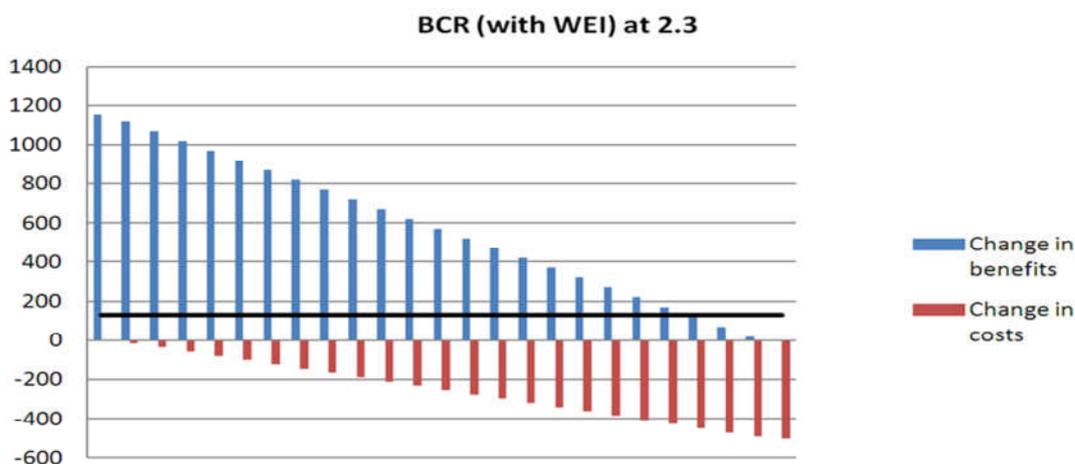
- The current framework for appraising transport schemes prescribes methods for estimating the costs and benefits of transport investments. Later in this note we discuss why we believe this method fails to capture some of the transformational impacts that HS2 is intended to have. However in this section we focus on the framework available to us and consider ways in which the case for Victoria may have been underestimated within this framework.
- A Benefit Cost Ratio (BCR) is calculated by dividing the benefits of a scheme by the net costs. The benefits are typically made up of standard transport benefits and wider economic impacts (WEIs). The net cost is calculated by considering the gross cost minus any revenues. A BCR can therefore be underestimated either as a result of benefits being higher or costs being lower. In the next section we consider how much the benefits and costs would need to change in order to retain the national BCR at 2.3. We then go on to consider the benefits and costs individually and specific ways in which they may have been under/overestimated.

- It should be noted that everything discussed in this section refers to the net difference of a Victoria Loop in comparison to a Meadowhall Through and no absolute figures are given. This is because while HS2 signed off on the differences figures which were published, they are not confident that the absolute values given by their model are accurate and are therefore unwilling to provide us with any absolute values. This does limit our ability to consider how these numbers could change with different underlying assumptions.
- This suggests there is an issue with basing significant decisions, such as station location, on these figures, particularly when other evidence is so supportive of a Victoria station.

Changes needed to keep the national BCR at 2.3

- Figure 2 shows the combination of increases in benefits or decrease in costs needed to keep the BCR with WEIs at 2.3. The base level is the published costs and benefits of the Victoria Loop compared to the Meadowhall Through route mentioned above. As shown in figure 2, in order to keep the national BCR at 2.3 the benefits of the Victoria Loop option need to increase by £1,153m or the costs need to decrease £501m or there needs to be some combination of an increase in benefits and a decrease in costs. For example, if the benefit of the Victoria Loop increased by £370m and the costs reduced by £340m then the national BCR will remain at 2.3.

Figure 2: Changes in the benefits and costs needed to keep the BCR at 2.3 (with WEI)



1. Higher Benefits

- Despite the additional cost, it is clear from HS2’s own analysis that the Victoria Loop would provide larger benefits, even without inclusion of WEIs, and only using the DfT’s conventional approach to appraising transport schemes (based on time savings and productivity benefits).
- This section considers the impact of the time penalty assumed in HS2’s models, and the potential scale of WEIs and how both could feed through into higher benefit estimates.

Time penalty

- The additional benefit of the Victoria loop option, as estimated by HS2, is £480m. We were advised by HS2 that this additional benefit was the net impact of disbenefits to those passengers travelling further north as a result of the time delay, set off against the extra benefits to

passengers travelling to/from Sheffield. This means that even on HS2's own analysis the additional benefits to Sheffield travellers are higher than £480m. HS2 were unable to provide us with a breakdown of the relative size of this difference. For example it could be that the disbenefits to ongoing travellers are £120m offset against benefits to Sheffield users of £600m, or it could be £500m and £980m.

- The Victoria Loop would delay any passengers that are travelling on further north past Sheffield on a service which stops at Victoria. For example those going from London to Leeds on a service which stopped at Sheffield would be delayed by 4 minutes⁵ due to travelling on the Victoria Loop versus the Meadowhall Through.
- Work by Parsons Brinkerhoff suggests that this time penalty could have been overestimated. If the time penalty is in fact lower then the net benefits of the Victoria Loop would be higher.
- For the reasons set out above regarding the availability of only differences figures, we are unable to consider how this would affect the BCR, but by way of example if the time penalty is in fact only half that suggested by HS2, and if the split between disbenefits to ongoing passengers and benefits to Sheffield passengers is £500m and £980m, and assuming that the disbenefits are directly proportional to the time penalty⁶, then the net benefits would rise to £730 with the reduced time penalty. This would increase the BCR to 1.0.

Wider Economic Impacts

- WEIs were not included in the original options appraisal carried out by HS2 because the guidance to estimate WEIs was not yet adopted when the appraisal was carried out. We do not have access to the WEIs models used by HS2 so we cannot undertake like-for-like estimates but instead we consider a few high level scenarios.
- We estimate that the WEIs of the Victoria station would be around £150m-£300m higher than a Meadowhall station. We have undertaken some high level scenarios using a variety of assumptions to estimate the WEIs and they result as follows:
 - Pro-rata increase in WEIs in line with the whole of HS2 would imply WEIs of a Victoria station would be £130m higher than WEIs of a Meadowhall station. This is almost certainly an underestimate since the types of jobs that would be attracted to Victoria would be more likely to benefit from productivity benefits, and thus we would expect the uplift in benefits due to WEIs to be more than proportionally higher with a Victoria station than with a Meadowhall one.
 - Using the KPMG⁷ 'high' business location importance relative to 'low' importance as a proxy for the difference in location would result in an estimate of £198m.
 - Using an uplift calculated from the relative GVA per job of Victoria jobs in comparison to Meadowhall jobs would result in an estimate of £265m.
 - Using the locally estimated pure agglomeration impacts estimate (see below) would result in an estimate of £350m, but whilst this uses the same parameters, this method is not directly comparable with the WEIs modelling and potentially overstates the benefits.
- Adding in WEIs of between £150m and £300m would increase the BCR of the Victoria Loop to 0.9 and 1.1.

⁵ Options for Phase Two of the high speed rail network – demand and appraisal report (July 2013) MVA Consultancy

⁶ Experience of transport models suggests that this may be a reasonable high level assumption for illustrative purposes

⁷ HS2 Regional Economic Impacts (September 2013) KPMG

2. Lower Costs

- This section considers how the increase in costs due to the Victoria Loop could have been overstated. As mentioned previously, we are only able to consider the differences in Cost between the Victoria Loop and the Meadowhall Through route and not the absolute differences.
- There are two factors which affect this – firstly connectivity costs of connecting the station (Meadowhall or Victoria) to the wider city region, and secondly, the extent to which the city could potentially contribute towards this funding through some form of Tax Incremental Financing (TIF) mechanism.

Connectivity costs

- Work completed by SYPTE suggests that the cost of connectivity at Meadowhall is estimated to be up to £1.5 billion. Ongoing work for Sheffield City council suggests that the same degree of connectivity could be achieved at Victoria for a fraction of the cost, due to its city centre location.
- This is because it removes the need for an express service between Sheffield City Centre and the south west of Sheffield and Meadowhall, where the key passenger markets reside. The cost of the diversion of the Supertram is also already accounted for in HS2 Ltd's station costs.
- The analysis is not yet available for us to consider this in any detail but if the connectivity cost differential was £400m (ie that connectivity measures at Meadowhall would be £400m more expensive than connectivity measures at Victoria), and if we netted this off the difference in cost of the Victoria Loop in comparison to the Meadowhall Through, then the BCR would rise to 1.55.

Business rate uplifts

- CBRE undertook analysis to consider the potential business rate uplift that could be associated with a Victoria station versus a Meadowhall one. They estimated that the business rate revenue around Victoria would be £286m without HS2, or £847m with HS2, compared to £155m without HS2 and £187m with HS2 at Meadowhall, resulting in an estimate that there could be a potential net increase in business rate revenue of £530m (60 year NPV) resulting from locating the station at Victoria.
- The city is keen to consider how they may be able to use the uplift generated by the station to assist in part-funding additional costs related to HS2. Clearly the station at Victoria would maximise the potential for higher business rates which could be captured by the city to enable them to do this.
- Cities can keep 50% of business rate uplifts, and there is precedent in Sheffield to retain 100% through a TIF scheme. There is therefore potential that this could be borrowed against to use as investment to fund either part of the station or wider connectivity improvements that would be needed for either station location option (see above).
- Therefore, based on CBRE's numbers, and assuming a 25 year repayment period with a 4% interest rate, SCC could theoretically justify borrowing £445m if it keeps 50% of business rate uplifts and £887m if it keeps 100%⁸.

⁸ In reality there would be some build up in revenue over time and therefore if SCC wanted to borrow against uplifted business rate revenue, they would need to assess their own borrowing potential before committing to any funding agreement. The numbers included in this assessment are for illustrative purposes only.

- This assumes that all of the business rate uplift that occurs in Sheffield and is linked to the HS2 station at Victoria could be captured and used in this way. In reality there may be other investments that SCC need to finance using this revenue stream. Therefore, we have included a prudent scenario for SCC using 25% of business rate uplifts to account for some of the business rate uplift being used elsewhere in the city. On this basis the city could theoretically borrow £222m.

Table 2: Potential borrowing potential associated with business rate uplift

| % of business rate uplift used | 25% | 50% | 100% |
|---|------|------|------|
| Average annual business rate income (£m) | 14 | 28 | 56 |
| Annual repayment on £1m for 25 years 4% (£m) | 0.06 | 0.06 | 0.06 |
| Amount borrowed against business rate uplift (£m) | 222 | 445 | 887 |

NB Figures may not exactly match HS2's due to rounding

- The cost of the station, including the £60m diversion of the Supertram, is £400m⁹
- Table 3 shows the effects of using the business rate uplift to finance some or all of the costs, thus reducing the costs borne by HS2, of the station on the BCR. If the business rates uplift is used to support a contribution of £200m, the relative BCR would increase to 0.9 and if the contribution is £400m the relative BCR would rise to 1.5.

Table 3: Resulting BCRs if Business Rate Uplift used to fund part of station

| Benefits | Cost covered by... | | Revenue | Relative BCR |
|----------|----------------------|-----|---------|--------------|
| | Business Rate Uplift | HS2 | | |
| 480 | 0 | 900 | 190 | 0.64 |
| 480 | 100 | 800 | 190 | 0.8 |
| 480 | 200 | 700 | 190 | 0.9 |
| 480 | 300 | 600 | 190 | 1.2 |
| 480 | 400 | 500 | 190 | 1.5 |

NB Figures may not exactly match HS2's due to rounding

3. Potential overall impact on BCR

- If we combine the impacts discussed in this section, and assume that:
 - The time penalty for ongoing passengers is able to be reduced to half that estimated by HS2 (and the split of disbenefits to ongoing passengers and benefits to Sheffield passengers is £500m/£980m)
 - Additional WEIs from a Victoria station are £225m
 - Connectivity costs of Victoria could be £150m cheaper
 - £200m of funding towards connectivity or station costs could be supported through business rate uplifts
- The BCR of the Victoria option would rise to 2.65.

⁹ HS2 Ltd

- Table 4 shows the effect on the BCR if we change the assumptions made above. Scenario 1 represents the assumptions outlined above. Scenario 2 represents more pessimistic assumptions and scenario 3 represents more optimistic assumptions.

Table 4: Impact on the BCR

| Scenario | Reduction in time penalty (£m) | Additional WEI (£m) | Connectivity costs (£m) | Uplift contribution (£m) | BCR |
|----------|--------------------------------|---------------------|-------------------------|--------------------------|------|
| 1 | 250 | 225 | -150 | 200 | 2.65 |
| 2 | 125 | 150 | -100 | 100 | 1.48 |
| 3 | 300 | 275 | -200 | 300 | 5.02 |

- These calculations are based on a series of high level illustrative assumptions because we are not able to undertake the detailed assessments required. However these illustrative calculations demonstrate that only a few relatively uncertain factors have to change by relatively feasible amounts for the BCR to be in line with the national one.

Wider Economic Benefits

- In the previous sections we considered ways in which the case for Victoria could in fact be more positive, when presented within the framework of how transport appraisals are undertaken in the UK. In the next sections we consider the wider economic benefits that we believe could be associated with a station at Victoria, estimated in ways that do not neatly sit within the government’s appraisal framework.

4. Employment creation

- Work by Drivers Jonas Deloitte (DJD Sift 3) for HS2 Ltd found that the potential new employment capacity in the 1km zone around Victoria is almost double that in the 1km zone around Meadowhall. Work by Genecon built on the DJD Sift 3 work to estimate how the available employment capacity would translate into actual floorspace and jobs.
- Due to the nature of employment attracted to the two locations, they found that the capacity around Victoria was more likely to attract Grade A offices and the Meadowhall capacity would attract lower value activity.
- Genecon estimated that the gross jobs generated around Victoria would be 9,400 versus 5,200 at Meadowhall. In addition they estimated that there would be 650 residential units at Victoria and 350 at Meadowhall.
- Based on the types of employers that would be attracted to the two areas, Genecon estimate that the Meadowhall demand would be more likely to be activity displaced from elsewhere within the sub region whereas the Victoria employers are more likely to be attracted in from further afield – providing a greater net benefit to the sub region. Genecon estimate that displacement from the South-Yorkshire sub region for Meadowhall would be 50-70%, in comparison to 35-50% at Victoria.
- This results in a net difference in employment generated by Victoria versus Meadowhall of 6,400 jobs.
- Figures 3 and 4 illustrate the geographical breakdown of the net additional jobs within the Sheffield City Region, if take-up of jobs matches the current distribution of residence of those who currently work at the two station locations. This is based on the 2001 Census Travel to

Work data as this is the latest available data. The 2011 Census Travel to Work data has not yet been published (expected March 2014).

- These figures show that all districts in the Sheffield City Region would benefit from more residents being in employment under the Victoria station scenario than the Meadowhall one.

Figure 3: Net additional jobs created at Victoria by area of Residence (ie where workers commute from)

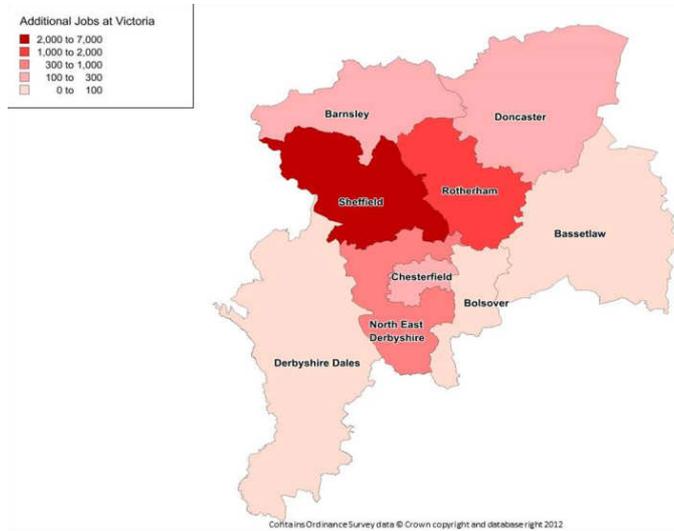
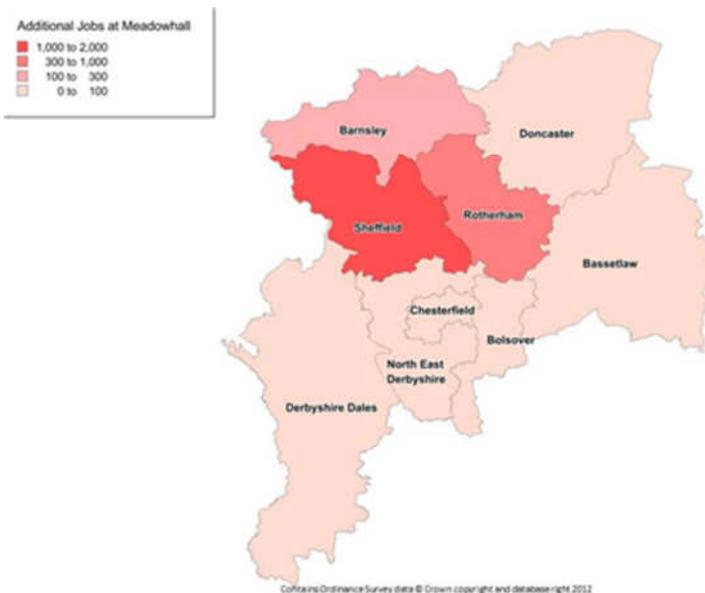


Figure 4: Net additional jobs created at Meadowhall by area of Residence (ie where workers commute from)



5. GVA of additional employment

- Genecon then go on to value the employment, based on the types of jobs created, which gives an annual value of the net increase in activity of £328m.
- Table 5 shows the geographical breakdown of the net additional jobs and the GVA of these net jobs based on the 2001 Census Travel to Work data. The jobs numbers are consistent with the maps shown in figures 3 and 4. As with jobs, this shows that the GVA benefit to all districts in the SCR is higher for the Victoria station option in comparison to the Meadowhall one.

Table 5: Net additional jobs and Net additional GVA of jobs by area of residence

| Area of Residence... | Victoria | | | Meadowhall | | |
|-------------------------------------|-------------|---------------------|--------------|-------------|---------------------|--------------|
| | Percentage | Net additional jobs | Net jobs GVA | Percentage | Net additional jobs | Net jobs GVA |
| SCR | 96% | 9022 | 429.1 | 96% | 2921 | 115.9 |
| Bassetlaw | 1% | 88 | 4.2 | 1% | 34 | 1.4 |
| Bolsover | 1% | 58 | 2.8 | 1% | 17 | 0.7 |
| Chesterfield | 1% | 124 | 5.9 | 1% | 34 | 1.4 |
| Derbyshire Dales | 1% | 57 | 2.7 | 0% | 7 | 0.3 |
| North East Derbyshire | 4% | 354 | 16.9 | 3% | 98 | 3.9 |
| Barnsley | 3% | 270 | 12.8 | 4% | 126 | 5.0 |
| Doncaster | 2% | 210 | 10.0 | 3% | 86 | 3.4 |
| Rotherham | 13% | 1209 | 57.5 | 23% | 705 | 27.9 |
| Sheffield | 71% | 6652 | 316.4 | 60% | 1814 | 72.0 |
| Victoria | 8% | 790 | 37.6 | 2% | 70 | 2.8 |
| Meadowhall | 6% | 582 | 27.7 | 15% | 443 | 17.6 |
| Rest of Sheffield | 56% | 5281 | 251.2 | 43% | 1301 | 51.6 |
| Rest of East Midlands | 1% | 105 | 5.0 | 1% | 24 | 1.0 |
| Rest of Yorkshire and Humber | 2% | 214 | 10.2 | 2% | 63 | 2.5 |
| Other | 1% | 79 | 3.7 | 1% | 25 | 1.0 |
| Total | 100% | 9420 | 448.1 | 100% | 3034 | 120.3 |

NB. Totals may not add up due to rounding

- GenEcon calculated the additional economic benefits of the stations over a period of 25 years and concluded that the station located at Victoria had an additional cumulative GVA impact of between £2bn and £5bn, depending on the persistence and decay of jobs.
- We then translated this into a 60 year Net Present Value (NPV) which is standard for transport schemes. This gives an overall net benefit of Victoria versus Meadowhall of £6bn. This is a very significant potential boost to the Sheffield City Region.

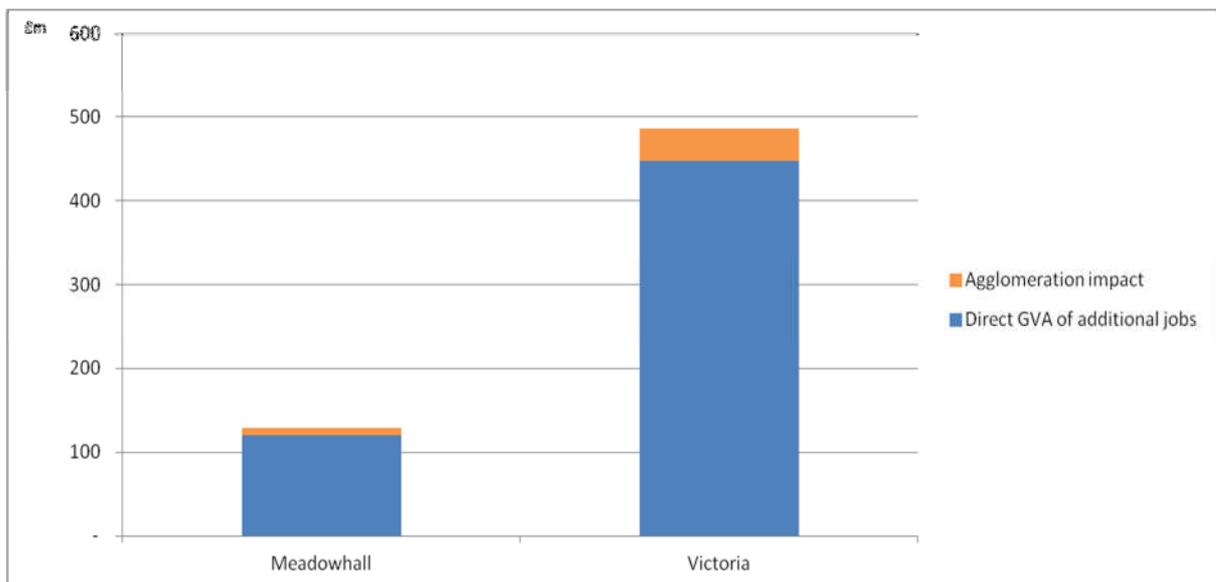
6. Agglomeration impacts

- The objective of High Speed Two is to connect the Northern Cities in order to encourage economic growth nationally, rather than growth that is just concentrated in London. A station in Victoria will provide the potential for significant economic growth in Sheffield City Centre which would benefit the SCR as a whole.
- This potential is reflected in the pure agglomeration impacts, which would be much more significant for a station in Victoria compared to Meadowhall due to the high density of people already working in the City Centre in jobs which will benefit from agglomeration impacts.
- A station in Meadowhall threatens to displace economic activity from the centre of Sheffield, thereby reducing the city agglomeration impacts, without delivering the equivalent agglomeration impacts in Meadowhall. Therefore, this is effectively a double negative.
- We estimate the pure agglomeration impacts using the original definition – that is to estimate the density of employment in each location in different sectors, and then use the elasticities which estimate how much productivity in those sectors increase as density rises. We use the DfT elasticity parameters, but they are applied differently because they are applied to actual

employment density in the two locations, and not effective density, which is a measure of density used in WEIs calculations to estimate density also allowing for the travel distance between places.

- Using this method, we estimate that the annual pure agglomeration impact of the additional jobs created at Victoria would be £38m compared to £8m at Meadowhall. Therefore, the difference in the GVA of the additional jobs, including agglomeration effects, is £358m. Figure 5 shows the GVA created directly by the additional jobs and the impact of agglomeration at the two station locations.
- This difference doesn't take into account the loss of agglomeration impacts of a Meadowhall station displacing employment from the city centre and therefore the difference in the GVA of the additional jobs is likely to be even higher than £358m in reality.
- We can convert the annual pure agglomeration impacts into a 60 year NPV. If we assume a linear take up of jobs over a 10 year period and discount in line with guidance, this results in an estimate of agglomeration benefits of £350m (60 year NPV).

Figure 5: GVA of additional jobs, including agglomeration impacts



7. Industry breakdown

- Table 6 shows the industry breakdown of the net additional jobs as published by Genecon¹⁰. This shows the main differences between the economic activity that is likely to be created by a HSR station in the two different locations. A station at Victoria would create higher proportions of service based jobs due to the attractiveness of a city centre to the financial, professional and business services industries: 91% of additional jobs would be service based in Victoria compared to 68% at Meadowhall. While a station at Meadowhall would create 765 net jobs (25% of additional jobs created at Meadowhall) in manufacturing, compared to none at Victoria.

¹⁰ Genecon: Maximizing the economic impact of HS2 investment in Sheffield (2012)

Table 6: The industry breakdown of the net additional employees as broken down by Genecon

| | Victoria | | Meadowhall | |
|--|--------------|-------------|--------------|-------------|
| | Number | Percentage | Number | Percentage |
| Retail | 511 | 5% | 194 | 6% |
| Wholesale and retail trade; repair of motor vehicles and motorcycles | 511 | 5% | 194 | 6% |
| Services | 8,581 | 91% | 2,075 | 68% |
| Accommodation and food service activities | 380 | 4% | 482 | 16% |
| Information and communication | 604 | 6% | 107 | 4% |
| Financial and insurance activities | 2417 | 26% | 299 | 10% |
| Real estate activities | 220 | 2% | 237 | 8% |
| Professional, scientific and technical activities | 1410 | 15% | 124 | 4% |
| Administrative and support service activities | 1645 | 17% | 548 | 18% |
| Public administration and defence; compulsory social security | 1375 | 15% | 37 | 1% |
| Arts, entertainment and recreation | 334 | 4% | 168 | 6% |
| Other service activities | 196 | 2% | 73 | 2% |
| Other | 327 | 3% | 0 | 0% |
| Education | 327 | 3% | 0 | 0% |
| Manufacturing | 0 | 0% | 765 | 25% |
| Manufacturing | 0 | 0% | 765 | 25% |
| Total | 9,420 | 100% | 3,034 | 100% |

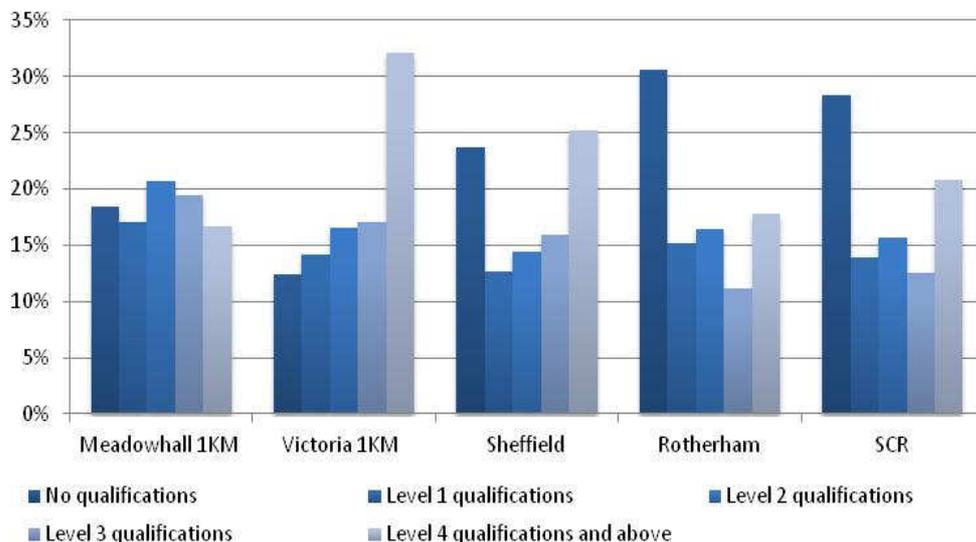
Source: Volterra, Genecon. Totals may not add up due to rounding

8. Qualifications of workday population

- Considering the level of qualification, and therefore the level of education, in the area is useful to match the prospective workforce with the additional jobs. The data is taken from the 2011 census highest level of education for the workday population. The workday population includes those who are employed in the area or those who are not employed.
- Figure 6 shows the highest level of education held by the workday population. It clearly shows that the level of education of people who are employed in Victoria have a higher level of education than those employed in Meadowhall, or indeed in Sheffield, Rotherham or the SCR. 32% the workday population of Victoria have a qualification level of four or higher, compared to 17% in Meadowhall, 25% in Sheffield, 18% in Rotherham and 21% in the SCR. This fits with the sectoral breakdown of additional employment published by Genecon. The higher qualification level in Victoria fits with there being a higher concentration of office based activities with significant potential for agglomeration impacts.
- It is notable that the proportion of the workday population who have no qualifications is significantly lower in both Meadowhall (18%) and Victoria (12%) than in the SCR (28%), Sheffield (24%) or Rotherham (31%). This could be explained by two reasons. Firstly, the qualifications needed for the jobs in the Victoria and Meadowhall areas may be higher than elsewhere. Secondly, there is a high concentration of economic activity in these areas and so the proportion of people not in employment is likely to be lower. This will have a knock on effect, reducing the number of people with no qualifications. The difference between the proportion of people in Victoria and Meadowhall with no qualifications can also be explained by the same reasons: a higher level of economic activity and jobs requiring higher qualifications mean that the qualification level of the workday population of Victoria is higher than Meadowhall.

- Overall, it is clear that the qualification level of people who work in Victoria is higher than in Meadowhall or the average for SCR, Sheffield or Rotherham. This supports the sectoral breakdown of additional jobs published by Genecon which allocates a majority of the additional jobs (90%) to ‘services’ industries, which tend to require a higher level of qualification.

Figure 6: The highest level of education held by the workday population



Source: ONS: Census 2011 Highest qualification level of workday population

9. Passenger demand

- HS2 Ltd’s modelling predicts that weekday passenger demand from Victoria or Meadowhall to main HS2 destinations in 2043 would be:

Table 7: Expected passenger demand

| | Meadowhall | Victoria | Victoria Increase over Meadowhall |
|--------------|------------|----------|-----------------------------------|
| London | 3,700 | 4,700 | 27% |
| East Mids HS | 300 | 700 | 133% |
| Bham | 900 | 1,300 | 44% |
| Leeds | 1,700 | 3,000 | 76% |
| North East | 600 | 1,900 | 217% |

Source: MVA Options for Phase Two of the high speed rail network (2013)

- This shows that demand would be higher to all destinations with a Victoria station.
- It also shows that the largest relative increases are journeys between cities in the north and midlands, not just London. Connecting northern cities and narrowing the north-south divide is a key objective of HS2.
- The Sheffield-London demand is made up as follows:
 - Of those passengers that would have travelled on conventional services from Sheffield Midland to London, 100% would use a Victoria station, 93% would use a Meadowhall station.

- Of those passengers that would have travelled on conventional services from Doncaster to London, 27% would use a Victoria station, 29% would use a Meadowhall station.
- This means that overall, of conventional demand, around 3% more would use Victoria than Meadowhall – there is not much difference here
- The difference arises from the new demand that would be created. Of all passengers, 11% of the Meadowhall demand and 28% of the Victoria demand would be ‘new passengers’. This means that HS2 predict that the new demand created by a Victoria station would be over three times higher than the new demand from Meadowhall. This can be thought of as some indication of the level of new economic activity that the station options would support, and is consistent with the relative magnitude of the Genecon estimates of job creation.

Transformational Impacts:

- The DfT’s guidance includes two main aspects for appraising the benefits of transport investment – conventional assessment and WEIs. The conventional transport assessment values the “user” benefits of journey time savings, frequency improvements, safety and reliability, using measures of generalised journey time and valuing savings in journey time by using values of time. WEIs expand this to capture the productivity benefits that may result from transport schemes. They are also based upon measures of time savings (not M2MPJ), and the relationship between employment density and productivity.
- The largest two components of WEIs are pure agglomeration and move to more productive jobs (M2MPJ). The first of these is aimed at capturing the productivity benefits of jobs being clustered together – agglomeration. Transport enables this to occur through places being effectively denser in activity as a result of reduced journey times between them. The second impact values the potential for transport to encourage workers to make different decisions about where they will work, as a result of additional capacity on crowded routes, or shorter journey times making certain commuter trips more appealing.
- The DfT’s central assumption is that transport can enable jobs and workers to be more productive, but that activity levels remain the same regardless of transport. This means that the economic activity occurs in the same place, irrespective of transport, and the only impact transport can have is in improving productivity. In this central scenario, M2MPJ impacts are non-existent.
- The DfT allows a sensitivity to be considered where a Land Use Transport Interaction (LUTI) model is available to assess how economic activity may locate in different places as a result of transport investment. This enables M2MPJ impacts to be estimated.
- In all of these scenarios however, the total number of jobs remains fixed – ie there are a finite number of jobs that can occur across the UK and transport enables those jobs to be more productive, and in some instances, to be located to slightly different places. But transport is not able to actually increase levels of economic activity.
- In their latest business case, as well as during discussions, DfT and HS2 Ltd have acknowledged that the existing appraisal methods do not appropriately capture the types of benefits that HS2 is intended to create. The aim of HS2 is to better connect the UK’s cities, enabling them all to grow better and attract more investment. This investment could be both movement of domestic investment but also attracting international growth and inward investment.

- A goal of HS2 is to narrow the north-south divide and regenerate northern cities, transforming growth rates and attracting investment. These sorts of transformational benefits are not captured in existing guidance.
- In the example of HS1, an assessment revealed that the regeneration around stations would support the delivery of over 15,000 new homes and 70,000 jobs. If all of these are simply activity that would have been located elsewhere in the absence of HS1, then the only value that can be placed on them is any productivity uplift along with any inherent benefit of them being located in regeneration zones rather than elsewhere. However if only 5% of this additional activity was actually completely new to the UK, then the value (60yr NPV) to the UK economy was estimated at £10bn. This considerably exceeded the cost of the project and would have fundamentally altered the BCR. However our appraisal methods do not currently allow for any new activity to be completely new or additional, they only allow for marginal uplifts to be captured.
- These are exactly the sorts of benefits that are currently missed by existing guidance and sometimes require the use of judgment by policymakers. We believe, supported by the job creation estimates, the potential scope for these sorts of transformational impacts would be significantly higher with a Victoria station than one at Meadowhall.
- HS2 Ltd and DfT are still publicly relatively tied to supporting the route which delivers the highest business case, although they also acknowledge the desire to incorporate other objectives (such as regeneration and transformation) into their decision making.