

Adran yr Economi a'r Seilwaith
Department for Economy and Infrastructure



Llywodraeth Cymru
Welsh Government

The M4 Motorway (Junction 23 (East of Magor) to West of Junction 29 (Castleton) and Connecting Roads) and The M48 Motorway (Junction 23 (East of Magor) Connecting Road) Scheme 201-

The M4 Motorway (Junction 23 (East of Magor) to West of Junction 29 (Castleton) and Connecting Roads) and The M48 Motorway (Junction 23 (East of Magor) Connecting Road) (Amendment) Scheme 201-

The London to Fishguard Trunk Road (East of Magor to Castleton) Order 201-

The M4 Motorway (West of Magor to East of Castleton) and the A48(M) Motorway (West of Castleton to St Mellons)(Variation of Various Schemes) Scheme 201-

The M4 Motorway (Junction 23 (East of Magor) to West of Junction 29 (Castleton) and Connecting Roads) and the M48 Motorway (Junction 23 (East of Magor) Connecting Road) and The London to Fishguard Trunk Road (east of Magor to Castleton) (Side Roads) Order 201-

The Welsh Ministers (The M4 Motorway (Junction 23 (East of Magor) to West of Junction 29 (Castleton) and Connecting Roads) and the M48 Motorway (Junction 23 (East of Magor) Connecting Road) and the London to Fishguard Trunk Road (East of Magor to Castleton)) Compulsory Purchase Order 201-

The M4 Motorway (Junction 23 (East Of Magor) to West of Junction 29 (Castleton) and Connecting Roads) and The M48 Motorway (Junction 23 (East Of Magor) Connecting Road) (Supplementary) Scheme 201-

The Welsh Ministers (The M4 Motorway (Junction 23 (East Of Magor) to West of Junction 29 (Castleton) and Connecting Roads) and The M48 Motorway (Junction 23 (East Of Magor) Connecting Road) and The London to Fishguard Trunk Road (East of Magor to Castleton)) Supplementary Compulsory Purchase Order 201-

Summary Proof of Evidence

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Contents

1. Author	3
2. Personal Role on the Scheme	3
3. Scope of Proof of evidence	4
4. Economic Appraisal	5
5. Wider Economic Impact Assessment	11
6. Conclusion	16

M4 CORRIDOR AROUND NEWPORT**Summary Proof of Evidence – Economics****1. Author**

1.1 My name is Stephen Bussell. I am an Associate at Ove Arup and Partners Ltd. I have 13 years continuous experience as an economist specialising in the economics of public policy and in particular transport infrastructure. I hold a Bachelor of Science degree (with honours) in Economics and Politics from the University of Warwick. I am a member of the Institute for Economic Development. I specialise in transport economics, cost-benefit analysis and the role of transport in the economy.

2. Personal Role on the Scheme

2.1 I have been responsible for preparing the Revised Economic Appraisal Report (Document 2.4.12) and the Revised Wider Economic Impact Assessment Report (Document 2.4.11) for the Scheme.

2.2 My evidence is informed by other specialists engaged on the project, particularly in respect of traffic forecasting and modelling, Scheme cost information, and impacts on Newport Docks.

2.3 The evidence which I have prepared and provide in this Proof of Evidence is true and I confirm that the opinions expressed are my true and professional opinions.

3. Scope of Proof of Evidence

- 3.1 My evidence concerns the economic justification for the Scheme. The economic justification for the Scheme comprises the following two main elements:
- a) The economic appraisal of the Scheme;
 - b) The wider economic impact of the Scheme.
- 3.2 The economic appraisal of the Scheme is a quantified assessment of value for money which takes into account a range of costs and benefits for which a monetary value can be estimated. The wider economic impact assessment considers how the Scheme could affect the economy and economic performance.
- 3.3 I consider each of these elements in turn.

4. Economic Appraisal

Purpose of the Economic Appraisal

- 4.1 The economic appraisal uses 'cost-benefit analysis' to establish whether the value of the benefits of a scheme justify its costs. Comparing the costs and benefits of a scheme allows decision makers to consider whether a scheme is likely to deliver value for money for the taxpayer.
- 4.2 Because the economic appraisal is a quantitative assessment the analysis is focussed on, but not limited to, impacts on the economic efficiency of the transport sector. There may be other costs and benefits that cannot be quantified in monetary terms. Therefore, the economic appraisal is only one aspect of the overall case for investment and needs to be balanced against other environmental and social costs and benefits.

Approach

- 4.3 The cost benefit analysis compares the cost and benefits of a situation with the Scheme (the 'Do Something' case) against a situation without the Scheme (the 'Do Minimum' case).
- 4.4 The analysis compares costs and benefits that occur over time during both the construction and operational phase of the Scheme. The duration of the economic appraisal ends 60 years after the opening of the Scheme.
- 4.5 In order to compare streams of costs and benefits that occur at different points in time, values are converted or 'discounted' to a 'present value'. In accordance with WebTAG, all values are converted to 2010 values. The discount rate applied is the HM Treasury Green Book discount rate. In accordance with WebTAG, to account for the effects of inflation, all monetary values are expressed in 2010 prices.

- 4.6 The term ‘benefits’ is applied to a specific set of impacts and is applied consistently whether such impacts are positive or negative. These benefits are made up of the following:
- a) User benefits
 - b) Journey time savings
 - c) Vehicle operating cost savings
 - d) User charges (such as tolls)
 - e) Additional costs to travellers due to disruption during construction and maintenance works
- 4.7 Costs faced by Government (either local or central) to implement the Scheme are presented in the ‘public accounts’ table. They include the following:
- a) Investment costs
 - b) Operating costs (or maintenance costs)
 - c) Revenue (in this case toll revenues)
- 4.8 The overall cost benefit analysis is presented in the Analysis of Monetised Costs and Benefits table. The Analysis of Monetised Costs and Benefits also includes benefits or impacts due to changes in greenhouse gas emissions, and changes in the predicted number of accidents. These benefits would be negative if the situation were to worsen.
- 4.9 Impacts on wider public finances are also included in the Analysis of Monetised Costs and Benefits and are included as a benefit of the Scheme. This relates to changes in indirect tax revenues as a result of the Scheme.

- 4.10 The economic appraisal includes consideration of some of the wider economic benefits of the Scheme, termed 'Wider Impacts'. Such impacts occur as an 'indirect' result of the Scheme and are additional to the 'direct' transport user benefits captured in the Transport Economic Efficiency analysis. The inclusion of Wider Impacts in the economic appraisal recognises that transport improvements have knock-on effects on the wider economy, the benefits of which would otherwise not be captured in the assessment of value for money.
- 4.11 The calculation of benefits relating to the efficiency of the transport network is based on outputs from the M4CaN transport model. The main economic appraisal is undertaken based on the 'Central' traffic growth scenario, although sensitivity testing has been undertaken for 'Low' and 'High' growth scenarios. In accordance with the March 2016 Budget, under the core scenario for the Scheme, it is assumed that the toll charges on the Severn Crossing are reduced to approximately half their current level.

Key Outputs of the Economic Appraisal

- 4.12 Two key measures are used to summarise the results of the cost-benefit analysis. Firstly, the Net Present Value (NPV) is the difference between the Present Value Benefits (PVB) and the Present Value Costs (PVC). In essence, the NPV is the sum of all costs and benefits. If the NPV is a positive number, this indicates that the benefits of the Scheme outweigh its costs.
- 4.13 The second key measure is the Benefit-Cost Ratio (BCR). This is defined as the ratio of the PVB to the PVC (or the value of Scheme benefits divided by the Scheme costs). The BCR is typically used as the primary measure of value for money because it summarises the relative scale of costs and benefits – in effect it measures the efficiency of the investment or the value of benefits generated per pound of public funds invested.

- 4.14 A BCR (benefits divided by costs) in excess of 1 indicates that the benefits of the Scheme outweigh the costs. The higher the BCR, the more efficient the transport investment and the greater the value for money.
- 4.15 The overall appraisal results are presented both with and without Wider Impacts. Where Wider Impacts are excluded from the analysis, the BCR for the Scheme is referred to as the 'Initial BCR'. Where Wider Impacts are included in the analysis, the BCR is referred to as the 'Adjusted BCR'.

Results

- 4.16 The results presented in Table 1 are based only on direct transport benefits and exclude Wider Impacts. The total discounted costs (PVC) of the Scheme is £0.95bn (Present Value 2010). The total discounted benefits (PVB) of the Scheme is £1.54bn (Present Value Benefits). The difference between benefits and costs (the NPV for the Scheme) is £0.59bn resulting in an Initial BCR for the Scheme of 1.62. This indicates that, before wider economic benefits are considered, the Scheme represents value for money as the costs of investment will be more than offset by the improvements in transport economic efficiency, safety and carbon emissions.

**Table 1: Summary of the Economic appraisal Excluding Wider Impacts
(Central Growth)**

		Results (£000) (2010 market prices, discounted to 2010)
User Benefits	Consumers	851
	Business	697
Construction Benefits	Consumers	-21
	Business	-14
Maintenance Benefits	Consumers	28
	Business	10
Accident Benefits		4
Greenhouse Gas Benefits		6
Indirect Tax Revenues		-19
Present Value of Benefits, PVB (£000)		1,540
Present Value of Costs, PVC (£000)		952
Net Present Value, NPV (£000)		589
Benefit-to-Cost Ratio, BCR		1.62

4.17 Table 2 shows the results of the economic appraisal if Wider Impacts are included in the analysis. When Wider Impacts are included, the NPV of the Scheme increases to £1.17bn and the BCR increases to 2.22. This result demonstrates that the benefits of the Scheme outweigh costs by a ratio in excess of two to one.

4.18 The assessment of Wider Impacts is associated with a higher degree of uncertainty than the assessment of direct impacts on users. However, by excluding Wider Impacts, the Initial BCR fails to capture a range of important economic benefits of the Scheme. Therefore, the Adjusted BCR provides a better measure of the overall balance of costs and benefits and therefore the value for money of the Scheme.

**Table 2: Summary of the Economic appraisal Including Wider Impacts
(Central Growth)**

	Results (£000) (2010 prices, discounted to 2010)
Present Value of Benefits, PVB (£000) <i>(conventionally assessed benefits only)</i>	1,541
Wider Impact 1: Agglomeration Impacts	504
Wider Impact 2: Increased Output	69
Wider Impact 3: Labour Market Impacts	5
Total Wider Impacts, PVB (£000)	577
Adjusted Present Value of Benefits, PVB (£000)	2,118
Present Value of Costs, PVC (£000)	952
Adjusted Net Present Value, NPV (£000)	1,166
Adjusted Benefit-to-Cost Ratio, BCR	2.22

4.19 Under a low traffic growth scenario, the benefits of the Scheme are reduced such that the initial BCR for the Scheme falls slightly below one to 0.94. However, if Wider Impacts are included, the low growth BCR remains above one at 1.38. The high growth BCR is 2.81 if Wider Impacts are excluded, or 3.64 including Wider Impacts. As the Adjusted BCR provides the more realistic assessment of quantifiable costs and benefits it can be seen that the Scheme provides benefits in excess of costs even under the low growth traffic scenario.

5. Wider Economic Impact Assessment

- 5.1 The purpose of the wider economic impact assessment is to consider the impact of the M4CaN proposals on the local and regional economy. Undertaking an assessment reflects the strategic economic importance of the M4 to the economy of Wales, as well as the objectives of the Scheme.
- 5.2 The economy of South Wales is highly reliant on the M4 as the primary east-west road link. The M4 is the main route in and out of the country for over 70% of the country's population and economy¹.
- 5.3 The M4 in South Wales is the most heavily used road in Wales. It connects the major urban centres in South Wales. It plays a key strategic role in connecting South Wales with the rest of UK and Europe, providing links to Ireland via the ports of South West Wales as well as providing the gateway link between South Wales, England and mainland Europe.
- 5.4 Given the strategic importance of the M4, the area of influence of the Scheme is considered to extend beyond the immediate surrounding area of Monmouthshire, Newport and Cardiff. For the purposes of the economic impact assessment, a study area has been defined which comprises 12 local authority areas in Wales, covering the urban conurbation of South Wales as far West as Swansea, and four counties and unitary authorities in the South West of England which covers the area often referred to as 'Greater Bristol'.
- 5.5 There are significant differences in economic performance across the study area. South Wales exhibits lower levels of Gross Value Added (GVA²) per head than neighbouring areas in the South West of England or indeed the UK average. Notably, GVA per head in Cardiff and the

¹ Based on the population and economies (as measured by Gross Value Added) of Local Authorities in South West and South East Wales.

² Gross Value Added (GVA) is often used as a measure of economic performance at a regional level. GVA is closely related to GDP. GVA is the value the output of an industry or region, less the value of intermediate inputs.

Vale of Glamorgan is less than that of its counterpart in the South West, Bristol.

- 5.6 In large part, Wales' poor relative economic performance is explained by a longstanding 'productivity gap' between Wales and the UK average. Research commissioned by the Welsh Government indicates that improved transport infrastructure has a role to play in reducing the productivity gap, both in respect of intra-regional transport and by improving connectivity between Wales and other UK regions, particularly London.
- 5.7 Traffic congestion on the M4 Corridor around Newport results in longer journey times for users. Traffic incidents can exacerbate delays and cause disruption to businesses and other users, resulting in poor journey time reliability. Given the reliance on the M4, any disruption to the smooth operation of the motorway in South Wales imposes costs on individuals and businesses and has a negative impact on the economy as a whole.
- 5.8 The M4CaN proposals will improve the functioning of the road network by providing a faster and more reliable route for strategic journeys, whilst also strengthening the resilience of the road network in South Wales.

Impacts During Construction

- 5.9 The construction of a scheme of this nature will have economic impacts in its own right. During the construction phase, the Scheme is expected to employ an average of 1,400 people per month over the 42 month construction period. The contractor has committed that 20% of the total labour requirement for the Scheme will be made up of new entrant trainees who have an apprenticeship, trainee or employment contract with the contractor or a subcontractor, and are engaged in a training programme. Although the direct employment effects of the Scheme are temporary, the investment in training associated with the Scheme is

expected to have a lasting impact on the construction sector in the region.

5.10 Further to the direct jobs, the construction of M4CaN would require the procurement of approximately £523m value of goods and services, of which around £356m would be materials and associated works, and around £167m would be equipment costs. The project team has expressed a commitment to local purchasing policies when possible and appropriate. This would have a substantial positive, albeit temporary, impact on the level of output and employment in the construction sector in the study area.

Impacts During Operation

5.11 A range of ‘transmission mechanisms’ have been identified through which the Scheme will impact on the economy of the study area once operational. The transmission mechanisms have been identified on the basis of my understanding of the impact of the Scheme on transport conditions and the economic geography of the study area. The transmission mechanisms are as follows:

- a) Reducing transport costs for businesses in the study area by providing faster and more reliable transport for business travellers and for the movement of goods;
- b) Improving the functioning of the labour market in South Wales by increasing access to employment opportunities for workers and improving access to a suitable workforce for firms;
- c) Improving productivity by fostering agglomeration effects within South Wales and the South West of England and reducing travel times to London and other UK regions;
- d) Stimulating land use change and new investment by improving access to key employment sites in the south of Newport;

- e) Improving perceptions of South and South West Wales as a place to visit and do business.

- 5.12 The M4CaN Scheme will result in lower journey times and reduce transport costs for businesses in the study area defined for this assessment. Even before the effects of traffic incidents and atypical delays are considered, cost savings for businesses in the study area are estimated to in the region of £30m per annum by the design year of 2037 (expressed in 2016 prices). Businesses in South Wales will be the main beneficiaries, receiving £24m of cost savings per annum. In practice the Scheme will also improve journey time reliability and will reduce the delays associated with traffic incidents which will result in further cost savings and efficiency benefits for businesses.
- 5.13 In addition to the direct effects of reduced transport costs, the improved accessibility afforded by the Scheme will have further positive impacts on productivity.
- 5.14 Agglomeration effects occur where lower transport costs bring firms close together. The Scheme would enable improved interaction between businesses across the study area and would the effective pool of labour and skills available to firms. Agglomeration effects are expected to contribute a further £26m (2016 prices) to the GVA of the study area by 2037, £17m of which would accrue to South Wales.
- 5.15 The Scheme will reduce travel times to London and other UK regions. This will act to reduce the actual and perceived peripherality of the South Wales economy. Further benefits are expected to result from the improvement in connectivity that would result. Whilst it is difficult to be precise about the magnitude of such benefits, applying evidence from academic research suggests that the impact on the GVA of South Wales would be in the region of £25m (2016 prices) per annum by 2037.
- 5.16 Combining these impacts together, the Scheme is expected to deliver higher GVA (Gross Value Added) of £81m (2016 prices) per annum in

the study area in 2037 or £1.6bn (2010 prices and values) over a 60 year appraisal period. In South Wales specifically, the impact on GVA would be £66m per annum by 2037 or £1.3bn (2010 prices and values) over 60 years.

- 5.17 It should be noted that the GVA estimates described here underestimate the total impact of the Scheme given that they are based on changes in average journey times under typical operational conditions on the highway network. The quantitative analysis does not reflect those occasions when a major incident has occurred which results in severe reduction in network performance. Such incidents will impose additional costs on the economy. Neither does it include the benefits of improved reliability of journey times. The additional capacity and resilience afforded by the Scheme will further reduce the costs to businesses of unreliable journeys and incident related delays, resulting in higher productivity gains than those quantified above.
- 5.18 The GVA estimates also exclude the impacts of changes in land use and investment resulting from the Scheme. The M4CaN, by creating two new junctions to the south of Newport, will provide improved access to a number of currently allocated employment sites in Newport and Monmouthshire. It has been estimated that these sites have the capacity to cater for in the region of 15,000 jobs. The impact of the M4CaN proposals will be to make these sites more attractive for investment.
- 5.19 More generally, the M4CaN is expected to contribute positively to perceptions of South and South West Wales as a location for investment. This conclusion is supported by many in the business community. Furthermore, the vast majority of overnight holidaymakers to Wales travel by car. Therefore, it would be reasonable to assume that the majority of tourists visiting South and South West Wales will experience the M4 around Newport during their visit. Delays caused by disruption on the M4 corridor will impact negatively on visitor's perceptions of South and South West Wales as a place to visit.

5.20 Whilst the direct measurable impacts of M4CaN are likely to be concentrated in South East Wales, the economies of a much wider area are dependent on the route for the movement of people and goods. Although more difficult to measure, the benefits that the Scheme will deliver in improving perceptions of the ease of access to Wales could be felt more widely across the whole of South and South West Wales.

6. Conclusion

- 6.1 The economic appraisal compares the costs of constructing and maintaining the Scheme with the benefits of the proposed Scheme in relation to user benefits, indirect taxation, accident benefits, greenhouse gas emissions and wider economic benefits (termed Wider Impacts).
- 6.2 When Wider Impacts are included in the appraisal, the Adjusted BCR for the Scheme is 2.22. In other words, the benefits of the Scheme outweigh its costs by a ratio of over 2 to 1.
- 6.3 In my opinion, the economic appraisal demonstrates that the benefits of the Scheme will substantially outweigh its costs and therefore confirms that the Scheme represents value for money.
- 6.4 Furthermore, the Scheme will have a substantial positive economic impact both during the construction phase and the operational phase.
- 6.5 During the construction phase, the Scheme is expected to employ an average of 1,400 people per month over the 42 month construction period and will require the procurement of approximately £523m value of goods and services. The approach to construction is geared towards the delivery of local economic benefits through employment and training.
- 6.6 Once operational, the Scheme will deliver a range of economic benefits, only some of which can be measured through quantitative analysis. Based on outputs from the traffic model, it is estimated that the Scheme would have a positive impact on the GVA of South Wales in the region of £66m per annum by the design year of 2037. Over the 60 year appraisal

period, the GVA impacts of the Scheme would total £1.3bn (PV 2010) in South Wales.

- 6.7 In my opinion there is a range of further economic benefits linked to the perception of South Wales as a place to visit and invest that are less easily quantified but nonetheless significant.