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M4 Corridor around Newport

Revised Economic Appraisal Report Supplement



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Report Supplement

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1 Introduction

1.1 Scope of this Report Supplement

1.1.1 The Welsh Ministers' draft Supplementary Scheme Order (No. 2) dated March 2017 makes provision for the addition of the eastbound off-slip at Magor. The purpose of this report is to update the economic appraisal of the Scheme (as presented in the December 2016 Revised Economic Appraisal Report) to take account of the draft Supplementary Order.

1.1.2 The economic appraisal of the scheme is closely related to the wider economic impact assessment. A supplement to the Revised Wider Economic Appraisal Report has not been provided although a note on the implications of the change for the wider economic impact of the Scheme is provided in this report.

1.2 Report Structure

1.2.1 Following this introduction, the report is structured as follows:

- Chapter 2 sets out the updated results of the economic appraisal.
- Chapter 3 considers the implications of the draft Supplementary Order for the wider economic impact of the Scheme.
- Chapter 4 sets out the overall conclusion of the Revised Economic Appraisal Report Supplement.
- Detailed appraisal tables are included as Appendix A.

2 Revised Economic Appraisal

2.1 Summary of Changes

- 2.1.1** Following the publication of the draft Orders in March 2016, and the publication of the draft Supplementary Orders in September 2016, the need for an additional off-slip has been identified and it has been decided to revise the proposals accordingly.
- 2.1.2** A new eastbound off-slip would be provided, leaving the M4 west of Magor and joining the re-aligned Newport Road roundabout. The Welsh Ministers' draft Supplementary Scheme Order (No. 2) dated March 2017 makes provision for the addition of the eastbound off-slip at Magor.
- 2.1.3** The proposed Newport Road Roundabout (junction of A4810 Steel Works Access Road with B4245 Magor Road) layout has been amended to incorporate a slip road off the proposed M4 mainline. This design would be more convenient for several of the major users of the road in comparison to the original alignment in the published draft Orders.
- 2.1.4** The addition of an eastbound off-slip would allow for improved accessibility to Magor Services and Junction 23A for users travelling eastbound on the new section of motorway.
- 2.1.5** The M4CaN Transport Model has been updated to account for the change and the benefits of the Scheme have been recalculated based on the outputs of the updated model.

2.2 Scheme Costs

2.2.1 Investment Costs

- 2.2.2** The capital cost the eastbound off-slip is an additional £4.8m. This includes Optimism Bias of 44% of scheme costs in accordance with WebTAG guidance for an early stage cost estimate.
- 2.2.3** The Welsh Government's Project Budget already makes allowance for changes to the layout of Junction 23a. Possible changes to this junction formed part of the Quantified Risk Assessment for the Scheme. Therefore, the net result of this change is a reallocation of £4.8m from the risk allowance to the construction cost. The overall Scheme cost remains the same as the published in the December 2016 Revised Economic Appraisal Report.
- 2.2.4** The updated scheme costs are set out in Table 1.

Table 1: Updated Scheme Cost (Q4 2015 prices, £M)

Component	Scheme Costs (December 2016 Revised Economic Appraisal Report	Eastbound Off-slip net additional costs	Updated Scheme Costs (March 2017 Revised Economic Appraisal Report Supplement)
Preliminaries including Traffic Management	£212.0	£1.1	£213.1
Roadworks	£268.0	£1.2	£269.2
Structures	£297.1	£0.1	£297.2
Landscaping and environmental works	£44.8	£0.1	£44.9
Works by other authorities	£38.3	£0.5	£38.8
Land and Compensation costs	£91.9	£0.3	£92.2
Risk and Optimism Bias	£141.3	£1.5	£138.0
Project Estimate excluding VAT and Inflation	£1,093.2	£4.8	£1,093.2
Key Stage 4 Costs	£22.0	NA	£22.0
Reclassification and reconfiguration of Caerleon Junction ¹ (including OB)	£16.2	NA	£16.2
Total Costs for Economic Appraisal	£1,131.3	£4.8	£1,131.3

2.2.5 Maintenance Costs

2.2.6 The economic appraisal takes account of the costs of maintaining both the new section of motorway and the existing M4 during the 60-year assessment period. An outline maintenance schedule was derived for this purpose. The maintenance schedules include a recurring cycle of resurfacing, overlay, and reconstruction of different sections of the motorway, together with major maintenance of structures and annual routine maintenance.

2.2.7 The implications of the inclusion of an eastbound off-slip for future maintenance costs are very slight and therefore maintenance cost estimates have not been updated for the purposes of this supplement.

2.3 Scheme Benefits

2.3.1 Impacts During Operation

2.3.2 Impacts during operation are calculated using the economic appraisal software, TUBA based on outputs from the M4CaN Transport Model. This process is described in the Revised Economic Appraisal Report dated December 2016. The appraisal results set out in the Revised Economic Appraisal Report and this supplement are calculated using TUBA version 1.9.8 Interim which is based on the most up to date WebTAG databook (TAG Databook v.1.6).

¹ These costs are not being delivered as part of the contract to construct the proposed new motorway.

2.3.3 As noted, the M4CaN Transport Model has been updated to include the new slip road and impacts during operation have been recalculated based on outputs from the updated model.

2.3.4 Impacts During Construction and Maintenance

2.3.5 The economic appraisal takes account of the impact on users of disruption resulting from traffic management measures during the construction of the Scheme and during periods of maintenance of both the proposed motorway and reclassified existing M4.

2.3.6 The inclusion of the slip road has very minor implications for impacts during construction and maintenance and therefore the analysis has not been updated.

2.3.7 Accident Benefits

2.3.8 The safety impacts of the Scheme have been assessed quantitatively and monetised to be incorporated into the overall economic appraisal. Since the publication of the Revised Economic Appraisal Report, the monetised accident assessment has been updated such that it is based on the most up to date version of the software programme COBA-LT (Costs and Benefits to Accidents – Light Touch).

2.3.9 Accident benefits derive mainly from changes in link flows as predicted by the traffic model. In the context of this analysis, changes in flows resulting from the inclusion of the slip road are very slight and therefore this analysis has not been updated.

2.3.10 Wider Impacts

2.3.10.1 In WebTAG, 'Wider Impacts' is the term given to a range of quantifiable 'wider economic benefits' of transport improvements. The approach to updating the Wider Impacts analysis is set out below for each individual impact area.

2.3.10.2 Wider Impact 1 (agglomeration effects) – Agglomeration effects derive from changes in access (as measured by the generalised costs of travel) between zones which are based mainly on local authority areas. The changes to the scheme have limited implications for accessibility at this level and therefore the model used to calculate agglomeration effects has not been updated. However, agglomeration effects are closely correlated with direct user benefits during operation. Therefore, agglomeration effects have been adjusted on a 'pro-rata' basis.

2.3.10.3 Wider Impact 2 (output change in imperfectly competitive markets) – Wider Impact 2 is calculated as 10% of business user benefits and this value has been updated accordingly.

2.3.10.4 Wider Impact 3 (labour market impacts) – Wider Impact 3 is a relatively minor benefit. In view of the minor change made to the Scheme, the value of Wider Impact 3 has not been updated.

2.4 Results

2.4.1 The results of the updated economic appraisal are given in Tables 2 and 3.

2.4.2 The results presented in Table 2 are based only on direct transport benefits and do not take account of the expected wider economic benefits that are an indirect impact of the scheme. The BCR calculated on this basis is referred to as the 'Initial BCR' for the Scheme.

2.4.3 The Scheme, including the eastbound off-slip at Magor, shows a Net Present Value (NPV) of £0.6bn and an Initial BCR of 1.66.

Table 2: Summary of Economic Appraisal: Core Scenario (Excluding Wider Impacts)

		Results (£m) (2010 prices, discounted to 2010)
User Benefits During Operation	Consumers	875.4
	Business	711.2
Construction Phase Impacts	Consumers	-21.0
	Business	-14.4
Maintenance Impacts	Consumers	27.7
	Business	10.1
Accident Benefits		3.8
Greenhouse Gas Benefits		6.3
Indirect Tax Revenues		-19.7
Initial Present Value of Benefits, PVB		1,579.4
Present Value of Costs, PVC		954.3
Initial Net Present Value, NPV		625.1
Initial Benefit-to-Cost Ratio, BCR		1.66

2.4.4 Table 3 shows the results of the economic appraisal if Wider Impacts are included to give an 'Adjusted BCR' for the Scheme. If wider economic benefits are included, the NPV for the Scheme increases to £1.2bn and the Adjusted BCR is 2.27.

Table 3: Summary of Economic Appraisal: Core Scenario (Including Wider Impacts)

	Results (£m) (2010 prices, discounted to 2010)
Initial Present Value Benefits, PVB	1,579.4
Wider Impact 1: Agglomeration Impacts	516.2
Wider Impact 2: Increased Output in Imperfectly Competitive Markets	70.7
Wider Impact 3: Labour Market Impacts	4.6
Total Wider Impacts, PVB	591.5
Adjusted Present Value of Benefits, PVB	2,170.9
Present Value of Costs, PVC	954.3
Adjusted Net Present Value, NPV	1,216.6
Adjusted Benefit-to-Cost Ratio, BCR	2.27

3 Conclusions

- 3.1.1** The Welsh Ministers' draft Supplementary Scheme Order (No. 2) dated March 2017 makes provision for the addition of the eastbound off-slip at Magor. This report includes an update to the economic appraisal of the Scheme (as presented in the December 2016 Revised Economic Appraisal Report) to take account of the draft Supplementary Order.
- 3.1.2** The Initial BCR for the Scheme is 1.66 and the Adjusted BCR for the Scheme is 2.27. This compares with 1.62 and 2.23 respectively as reported in the Revised Economic Appraisal Report dated December 2016. As an incremental change, the eastbound off-slip delivers benefits in excess of costs. The BCR for the scheme is improved although the difference is relatively slight and therefore there is no material change to the conclusions of the December 2016 Revised Economic Appraisal Report.

4 Wider Economic Impacts

- 4.1.1** To a large extent, the wider economic impacts of the M4CaN Scheme derive from the effect of the Scheme on transport costs and accessibility. In these respects, the addition of an eastbound off-slip at Magor represents a relatively minor change which does not substantially affect the conclusions of the December 2016 Revised Wider Economic Impact Assessment Report.
- 4.1.2** One of the mechanisms through which the Scheme is expected to affect the economy is by stimulating land use change and new investment by improving access to key employment sites in the south of Newport. At a local level, the revised layout around Magor improves access to the Wales 1 Business Park, Magor Brewery and Magor Services, albeit only for traffic travelling in an eastbound direction. The improvement in access afforded by the off-slip would benefit existing businesses in this area and would enhance the attractiveness of these sites for potential investors. Therefore, in respect of impacts on the economy, the supplemental draft Orders are slightly preferred to the original Scheme.

Appendix A

Table 4: Transport Economic Efficiency

Non-business: Commuting	ALL MODES	ROAD	BUS and COACH	RAIL	OTHER	
<u>User benefits</u>	TOTAL	Private Cars and LGVs	Passengers	Passengers		
Travel time	250,665	250,665				
Vehicle operating costs	-5,231	-5,231				
User charges	-228	-228				
During Construction & Maintenance	5,210	5,210				
NET NON-BUSINESS BENEFITS: COMMUTING	250,416 (1a)	250,416				
Non-business: Other	ALL MODES	ROAD	BUS and COACH	RAIL	OTHER	
<u>User benefits</u>	TOTAL	Private Cars and LGVs	Passengers	Passengers		
Travel time	625,955	625,955				
Vehicle operating costs	5,922	5,922				
User charges	-1,746	-1,746				
During Construction & Maintenance	1,543	1,543				
NET NON-BUSINESS BENEFITS: OTHER	631,674 (1b)	631,674				
Business		Goods Vehicles	Business Cars & LGVs	Passengers	Freight	Passengers
<u>User benefits</u>						
Travel time	586,048	90,295	495,753			
Vehicle operating costs	128,501	99,359	29,142			
User charges	-3,337	-2,190	-1,147			
During Construction & Maintenance	-4,295	-1,021	-3,274			
Subtotal	706,917 (2)	186,443	520,474			
Private sector provider impacts				Freight	Passengers	
Revenue	0					
Operating costs	0					
Investment costs	0					
Grant/subsidy	0					
Subtotal	0 (3)					
Other business impacts						
Developer contributions	0 (4)					
NET BUSINESS IMPACT	706,917 (5) = (2) + (3) + (4)					
TOTAL						
Present Value of Transport Economic Efficiency Benefits (TEE)	1,589,007 (6) = (1a) + (1b) + (5)					

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are discounted present values, in 2010 prices and values

Table 5: Public Accounts

	ALL MODES	ROAD	BUS and COACH	RAIL	OTHER
Local Government Funding	TOTAL	INFRASTRUCTURE			
Revenue	0	0			
Operating Costs	0	0			
Investment Costs	0	0			
Developer and Other Contributions	0	0			
Grant/Subsidy Payments	0	0			
NET IMPACT	0 (7)	0			
Central Government Funding: Transport					
Revenue	-17,016	-17,016			
Operating costs	66,363	66,363			
Investment Costs	904,920	904,920			
Developer and Other Contributions	0	0			
Grant/Subsidy Payments	0	0			
NET IMPACT	954,267 (8)	954,267			
Central Government Funding: Non-Transport					
Indirect Tax Revenues	19,693 (9)	19,693			
TOTALS					
Broad Transport Budget	954,267 (10) = (7) + (8)				
Wider Public Finances	19,693 (11) = (9)				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.
All entries are discounted present values in 2010 prices and values.

Table 6: Analysis of Monetised Costs and Benefits
Analysis of Monetised Costs and Benefits: M4 CaN Core Scenario

Noise	0	(12)
Local Air Quality	0	(13)
Greenhouse Gases	6,258	(14)
Journey Quality	0	(15)
Physical Activity	0	(16)
Accidents	3,778	(17)
Economic Efficiency: Consumer Users (Commuting)	250,416	(1a)
Economic Efficiency: Consumer Users (Other)	631,674	(1b)
Economic Efficiency: Business Users and Providers	706,917	(5)
Wider Public Finances (Indirect Taxation Revenues)	-19,693	(11) - sign changed from PA table, as PA table represents costs, not benefits
Present Value of Benefits (see notes) (PVB)	1,579,351	(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)
Broad Transport Budget	954,267	(10)
Present Value of Costs (see notes) (PVC)	954,267	(PVC) = (10)
OVERALL IMPACTS		
Net Present Value (NPV)	625,084	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	1.66	BCR=PVB/PVC