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# M4 Corridor around Newport

## Revised Economic Appraisal Report Supplement No. 2



Welsh Government  
**M4 Corridor around Newport**  
Revised Economic Appraisal  
Report Supplement No 2

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# 1 Introduction

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## 1.1 Scope of this Report Supplement

**1.1.1** The Economic Appraisal Report (EAR) sets out the results of the economic appraisal of the Scheme. The economic appraisal (often termed cost-benefit analysis), provides a measure of the value for money of the scheme. The results of the appraisal are summarised in the Net Present Value and Benefit Cost Ratio for the Scheme.

**1.1.2** The purpose of this report is to update the economic appraisal of the M4CaN Scheme (as presented in the December 2016 Revised Economic Appraisal Report and subsequently updated in the March 2017 Revised Economic Appraisal Report Supplement) to take account of the addition of the bridge protection measures in the Draft Amendment (No. 2) Scheme Order and a general update on the works to address the impact upon Newport Docks.

## 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 sets out the overall conclusion of the Revised Economic Appraisal Report Supplement.
- Detailed appraisal tables are included as Appendix A.

## 2 Revised Economic Appraisal

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### 2.1 Summary of Changes

**2.1.1** Since the publication of the original draft Orders for the M4CaN Scheme, the Welsh Government has held discussions with ABP regarding the impact of the proposed Scheme on the water and land based operations that ABP carry out at Newport Docks.

**2.1.2** The Welsh Government are proposing to provide the following works to overcome the impact of the proposed Scheme on Newport Docks:

- a) The phased creation of approximately 303m of new quay on the north side of South Dock;
- b) Refurbishment of 250m of quay on the south side of South Dock (at the eastern end of the Coal Terminal);
- c) Provision of a moveable bridge to facilitate mobile harbour cranes, other port equipment and HGVs to cross the extended junction cut from west to east (and vice versa) of South Dock; and
- d) Preparation of areas of land and provision of premises to facilitate the relocation of ABP, tenants and occupiers of the port that are affected temporarily and permanently by the scheme, including site preparation, new buildings, hardstandings and infrastructure.

**2.1.3** The Welsh Government has also worked with ABP to develop a solution that reduces the level of residual risk of a ship impact to the River Usk Crossing, where it passes over the Junction Cut. The current proposal is to narrow and extend the Junction Cut (within the South Dock only) and revise the entry parameters and protocols for the North Dock.

**2.1.4** The cost estimate for the Scheme has been updated to account for the costs of the above mentioned works. The construction programme and Scheme opening date has also been revised to take account of the timescales of the above works. The Revised Economic Appraisal Report Supplement No. 2 updates the results of the economic appraisal of the Scheme for the revised cost estimates and programme. It builds on and updates Revised Economic Appraisal Report Supplement March 2017 which related to the March 2017 Supplement to the draft Orders (Easbound Off-slip).

**2.1.5** The conclusions of the Economic Appraisal Report have also been updated to take account of the UK Government's decision to abolish the tolls on the Severn Crossings.

**2.1.6** Aspects of the Economic Appraisal not addressed in either this or the previous supplementary reports are unchanged from the December 2016 Revised Economic Appraisal Report.

## 2.2 Scheme Costs

### 2.2.1 Investment Costs

**2.2.2** The capital cost of the Scheme has been updated to account for additional works at Newport Docks in respect of the creation of new quayside, the provision of a moveable bridge to facilitate the movement of vehicles across the Junction Cut, costs related to the relocation of tenants and other facilities and bridge protection works.

**2.2.3** The construction costs (excluding optimism bias) of the bridge protection measures are estimated at £17.5m. The costs of the other works within Newport Docks, over and above existing allocations within the land and compensation allowance, are estimated at £167.5m. This includes specific allowances for risk and contingencies of £31.2m.

**2.2.4** The costs associated with the current design stage (Key Stage 4) have been increased by £22m which reflects the extended Public Local Inquiry process. Although some of this expenditure is effectively a 'sunk cost', costs already incurred during Key Stage 4 have been included in the appraisal in order to retain consistency with previous iterations.

**2.2.5** In accounting for these costs, the Welsh Government has undertaken a review of the risk allowances in the project cost estimate. A number of risk items, which had previously been identified in the Employers Risk budget, have now been realised and further work has been undertaken on developing the design of the proposed Scheme.

**2.2.6** An uplift of 4% has been applied to the project cost estimate to account for the potential for Optimism Bias in the estimation of Scheme costs. This amount is derived from the default uplifts provided in WebTAG for a highway scheme at a mature stage of development. Specific and additional Optimism Bias allowances are included in the costs for the bridge projection works, the eastbound off-slip (added to the Scheme subsequent to the appointment of the ECI contractor) and the proposed reclassification works (which sit outside the ECI contract). The net result of these changes is a reduction in the Risk and Optimism Bias allowances of £17.5m, although this does not take into account the additional £31.2m of risk associated with the Docks.

**2.2.7** The net effect on the capital costs of the Scheme is an increase in total Scheme costs of £189.5m from £1.131bn to £1.321bn. The expenditure profile has also been updated to take account of delays in the Public Local Inquiry process and the requirement to undertake additional works in Newport Docks in advance of the construction of the proposed Usk Crossing.

**2.2.8** 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)	Newport Docks Mitigation and Bridge Protection Works net additional costs	Updated Scheme Costs (December 2017 Revised Economic Appraisal Report Supplement No.2)
Preliminaries including Traffic Management	£212.0	+£1.1	£213.1	-	£213.1
Roadworks	£268.0	+£1.2	£269.2	-	£269.2
Structures	£296.9	+£0.1	£297.0	£17.5	£314.5
Landscaping and environmental works	£44.8	+£0.1	£44.9	-	£44.9
Works by other authorities	£38.3	+£0.5	£38.8	-	£38.8
Land and Compensation costs	£92.0	+£0.3	£92.3	-	£92.3
Risk and Optimism Bias	£141.3	(+£1.5 less £4.8) = - £3.3	£138.0	-£17.5	£120.4
<b>Project Estimate excluding VAT and Inflation</b>	<b>£1,093.2</b>	-	<b>£1,093.2</b>	-	<b>£1,093.2</b>
Key Stage 4 Costs	£22.0	NA	£22.0	£22.0	£44.0
Reclassification and reconfiguration of Caerleon Junction <sup>1</sup> (including OB)	£16.2	NA	£16.2	-	£16.2
Newport Docks Works	-	-	-	+£136.3	£167.5
Newport Docks Works – Risk and Contingencies	-	-	-	+£31.2	
<b>Total Costs for Economic Appraisal</b>	<b>£1,131.3</b>	-	<b>£1,131.3</b>	<b>+£189.5</b>	<b>£1,320.8</b>

## 2.3 Scheme Benefits

**2.3.1** Scheme benefits are calculated over a 60 year period from the scheme opening year. The December 2016 Revised Economic Appraisal Report assumed an opening year of 2022 and as such benefits were calculated for the period 2022 to 2081. Due to the additional works within the Newport Docks, the new section of motorway will not be open to traffic until December 2023. In view of this, the appraisal period has been revised such that it spans the period 2024 (the first full year of operation) to 2083. This change has been applied to impacts occurring during operation. Given that they have a lesser impact on the overall appraisal, no equivalent adjustment has been applied to impacts occurring during the

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

construction of the Scheme and the costs and benefits of periods of maintenance. Similarly, no changes have been applied to the monetised benefits of reducing accidents.

**2.3.2** The calculation of Scheme benefits is based on outputs from the M4CaN Transport Model. The changes outlined in Section 2 have no impact on the alignment of the proposed Scheme or on traffic conditions. Therefore, apart from the change in appraisal period, the calculation of Scheme benefits is unchanged from the December 2016 Revised Economic Appraisal Report, as amended by the March 2016 Revised Economic Appraisal Report Supplement.

**2.3.3** The modelled years are 2022 (scheme opening year), 2037 (scheme design year) and 2051 (the last year for which NTEM traffic growth forecasts are available). The M4CaN Transport Model has not been updated to account for the change in Scheme opening year from 2022 to 2024. Impacts occurring in intervening years – including for 2024 – are calculated using straight-line interpolation of the outputs of the 2022, 2037 and 2051 model years. This is considered a proportionate approach given that the implications for traffic conditions of a single year of additional traffic growth is likely to be slight.

**2.3.4** Forecast growth in traffic and therefore congestion on the existing M4 means that the benefits of the Scheme in the period 2024 to 2083 are higher than the benefits of the Scheme in the period 2022 to 2081. Whilst the benefits of the Scheme will be realised later than anticipated (and thus will be discounted more heavily<sup>2</sup>), this is more than offset by the effect of traffic growth. Therefore, the net effect of postponing the scheme opening year is a slight increase in Scheme benefits.

## **2.4 Results**

### **2.4.1 The Severn Crossing Tolls**

**2.4.2** The December 2016 Revised Economic Appraisal Report (and the March 2017 Supplement) was based on an assumption that the Severn Crossing Tolls will be reduced to approximately half their current level. This assumption was adopted following the March 2016 Budget, within which the UK Government announced its intention to retain tolls on the Severn Crossings at half their current levels.

**2.4.3** Subsequently, in January 2017, the UK Government published a Consultation Document on the future of the Severn Crossing Tolls. This document set out the UK Government's proposals for the future of the Severn Crossing Tolls and continued to suggest that the tolls would be halved. However, during the run up to the 8th June General Election, most of the major political parties in the UK indicated their intention to remove the tolls from the Severn Crossings.

**2.4.4** The final outcome and government response to the Severn crossing tolls consultation was released on 15th September 2017. The outcomes were that the

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<sup>2</sup> In accordance with transport appraisal guidance, costs and benefits are discounted to a base year of 2010. Discounting is a technique used to compare costs and benefits that occur in different time periods. Therefore, the economic appraisal places greater weight on costs and benefits that occur in earlier years of the appraisal than impacts which occur in later years.



Severn crossings will be given over to public control on 8th January 2018 and the tolls will be removed no later than 31st December 2018.

**2.4.5** To retain consistency with previous iterations of the economic appraisal of the Scheme, Tables 2 and 3 below include the results of the appraisal under both the half toll and no toll scenarios. However, in view of the UK Government's position, the economic appraisal of the Scheme is now based on the assumption of no tolls which now represents the most likely scenario.

#### **2.4.6 Results**

**2.4.7** 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.

**2.4.8** With tolls removed, the Scheme shows an Initial Net Present Value (NPV) of £0.8bn and an Initial BCR of 1.70. This compares to an Initial NPV of £0.5bn and a BCR of 1.50 under a half toll scenario.

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

		<b>Results (£m)</b>	
		<b>(2010 prices, discounted to 2010)</b>	
		<b>Half Tolls</b>	<b>No Severn Crossing Toll Scenario</b>
User Benefits During Operation	Consumers	883	1,008
	Business	713	815
Construction Phase Impacts	Consumers	-21	-22
	Business	-14	-16
Maintenance Impacts	Consumers	28	32
	Business	10	11
Accident Benefits		4	4
Greenhouse Gas Benefits		6	-1
Indirect Tax Revenues		-16	-0.4
<b>Initial Present Value of Benefits, PVB</b>		<b>1,592</b>	<b>1,830</b>
<b>Present Value of Costs, PVC</b>		<b>1,059</b>	<b>1,075</b>
<b>Initial Net Present Value, NPV</b>		<b>533</b>	<b>755</b>
<b>Initial Benefit-to-Cost Ratio, BCR</b>		<b>1.50</b>	<b>1.70</b>

**2.4.9** Table 3 shows the results of the economic appraisal if Wider Impacts are included to give an 'Adjusted BCR' for the Scheme. Under the no toll scenario, the NPV of the Scheme increases to £1.4bn (2010 prices and values) and the BCR increases to 2.29. Under the half toll scenario, the Adjusted BCR for the Scheme is 2.06.

**Table 3: Summary of Economic Appraisal (Central Growth)**

	<b>Results (£m)</b> <b>(2010 prices, discounted to 2010)</b>	
	<b>Core Scenario (Half Tolls)</b>	<b>No Severn Crossing Toll Scenario</b>
<b>Initial Present Value Benefits, PVB</b>	<b>1,592</b>	<b>1,830</b>
Wider Impact 1: Agglomeration Impacts	519	542
Wider Impact 2: Increased Output in Imperfectly Competitive Markets	71	81
Wider Impact 3: Labour Market Impacts	5	5
<b>Total Wider Impacts, PVB</b>	<b>595</b>	<b>628</b>
<b>Adjusted Present Value of Benefits, PVB</b>	<b>2,186</b>	<b>2,458</b>
<b>Present Value of Costs, PVC</b>	<b>1,059</b>	<b>1,075</b>
<b>Adjusted Net Present Value, NPV</b>	<b>1,128</b>	<b>1,383</b>
<b>Adjusted Benefit-to-Cost Ratio, BCR</b>	<b>2.06</b>	<b>2.29</b>

#### **2.4.10 Comparison with the March 2017 Economic Appraisal**

**2.4.11** The March 2017 Revised Economic Appraisal Report Supplement showed an Initial BCR of 1.66 and an Adjusted BCR of 2.27. The increased costs of the Scheme has a negative effect on the BCR although this has been offset by the increase in Scheme benefits now predicted following the UK Government's decision to abolish the Severn Crossing tolls. As a result, the updated BCR for the Scheme is broadly unchanged at 1.70 (Initial) and 2.29 (Adjusted).

## 3 Conclusions

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- 3.1.1** 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 amendment to the Scheme Order to include proposals for bridge protection measures in the vicinity of the Junction Cut and the works required to address the impact upon Newport Docks.
- 3.1.2** This report sets out the results of the economic appraisal of the M4CaN Scheme. The economic appraisal (often termed cost-benefit analysis), provides a measure of the value for money of the Scheme.
- 3.1.3** The December 2016 Revised Economic Appraisal Report demonstrated that, the M4CaN Scheme offers value for money with an Initial BCR of 1.62 and an Adjusted BCR of 2.23. The inclusion of the eastbound off-slip resulted in a slight increase in the BCR for the Scheme to 1.66 and 2.27 respectively. These results were estimated on the basis of a half toll scenario for the Severn Crossing tolls.
- 3.1.4** The range of measures now proposed by the Welsh Government to mitigate the impacts of the Scheme on Newport Docks require an update to the both the Scheme costs and programme. It is also necessary to take account of the UK Government's decision to remove tolls from the Severn Crossings in their entirety. As a result of these changes, the Initial BCR for the Scheme has been revised to 1.70. This increases to 2.29 when wider economic benefits are taken into account.
- 3.1.5** In conclusion, the assessment continues to show that, for a range of assumed future conditions, the provision of a new section of motorway to the south of Newport represents value for money in respect of the investment needed to deliver the Scheme.

# Appendix A

**Table A.1: Transport Economic Efficiency (No Toll Scenario)**

Economic Efficiency of the Transport System (TEE): M4 CaN No Toll Scenario						
<b>Non-business: Commuting</b>	<b>ALL MODES</b>	<b>ROAD</b>	<b>BUS and COACH</b>	<b>RAIL</b>	<b>OTHER</b>	
<b>User benefits</b>	<b>TOTAL</b>	<b>Private Cars and LGVs</b>	<b>Passengers</b>	<b>Passengers</b>		
Travel time	292,047	292,047				
Vehicle operating costs	-11,720	-11,720				
User charges	0	0				
During Construction & Maintenance	7,323	7323				
<b>NET NON-BUSINESS BENEFITS: COMMUTING</b>	<b>287,650</b>	<b>287,650</b>				
	(1a)					
<b>Non-business: Other</b>	<b>ALL MODES</b>	<b>ROAD</b>	<b>BUS and COACH</b>	<b>RAIL</b>	<b>OTHER</b>	
<b>User benefits</b>	<b>TOTAL</b>	<b>Private Cars and LGVs</b>	<b>Passengers</b>	<b>Passengers</b>		
Travel time	732,047	732,047				
Vehicle operating costs	-4,264	-4,264				
User charges	0	0				
During Construction & Maintenance	2,132	2,132				
<b>NET NON-BUSINESS BENEFITS: OTHER</b>	<b>729,915</b>	<b>729,915</b>				
	(1b)					
<b>Business</b>		<b>Goods Vehicles</b>	<b>Business Cars &amp; LGVs</b>	<b>Passengers</b>	<b>Freight</b>	<b>Passengers</b>
<b>User benefits</b>						
Travel time	686,293	123,036	563,257			
Vehicle operating costs	128,869	101,247	27,622			
User charges	0	0	0			
During Construction & Maintenance	-5,058	-1,306	-3,753			
<b>Subtotal</b>	<b>810,103</b>	<b>222,977</b>	<b>587,126</b>			
	(2)					
<b>Private sector provider impacts</b>				<b>Freight</b>	<b>Passengers</b>	
Revenue	0					
Operating costs	0					
Investment costs	0					
Grant/subsidy	0					
<b>Subtotal</b>	<b>0</b>					
	(3)					
<b>Other business impacts</b>						
Developer contributions	0					
	(4)					
<b>NET BUSINESS IMPACT</b>	<b>810,103</b>					
	(5) = (2) + (3) + (4)					
<b>TOTAL</b>						
Present Value of Transport Economic Efficiency Benefits (TEE)	1,827,669					
	(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 A.2: Public Accounts (No Toll Scenario)**

<b>Public Accounts (PA) Table: M4 CaN No Toll Scenario</b>					
	<b>ALL MODES</b>	<b>ROAD</b>	<b>BUS and COACH</b>	<b>RAIL</b>	<b>OTHER</b>
<b>Local Government Funding</b>	<b>TOTAL</b>	<b>INFRASTRUCTURE</b>			
Revenue	0	0			
Operating Costs	0	0			
Investment Costs	0	0			
Developer and Other Contributions	0	0			
Grant/Subsidy Payments	0	0			
<b>NET IMPACT</b>	0 (7)	0			
<b>Central Government Funding: Transport</b>					
Revenue	0	0			
Operating costs	66,363	66,363			
Investment Costs	1,008,779	1,008,779			
Developer and Other Contributions	0	0			
Grant/Subsidy Payments	0	0			
<b>NET IMPACT</b>	1,075,142 (8)	1,075,142			
<b>Central Government Funding: Non-Transport</b>					
Indirect Tax Revenues	428 (9)	428			
<b>TOTALS</b>					
<b>Broad Transport Budget</b>	1,075,142 (10) = (7) + (8)				
<b>Wider Public Finances</b>	428 (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 A.3: Analysis of Monetised Costs and Benefits (No Toll Scenario)**

**Analysis of Monetised Costs and Benefits: M4 CaN No Toll Scenario**

Noise	0	(12)
Local Air Quality	0	(13)
Greenhouse Gases	-1,234	(14)
Journey Quality	0	(15)
Physical Activity	0	(16)
Accidents	3,778	(17)
Economic Efficiency: Consumer Users (Commuting)	287,650	(1a)
Economic Efficiency: Consumer Users (Other)	729,915	(1b)
Economic Efficiency: Business Users and Providers	810,103	(5)
Wider Public Finances (Indirect Taxation Revenues)	-428	(11) - sign changed from PA table, as PA table represents costs, not benefits
<b>Present Value of Benefits (see notes) (PVB)</b>	<b>1,829,785</b>	$(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)$
<b>Broad Transport Budget</b>	<b>1,075,142</b>	(10)
<b>Present Value of Costs (see notes) (PVC)</b>	<b>1,075,142</b>	$(PVC) = (10)$
<b>OVERALL IMPACTS</b>		
<b>Net Present Value (NPV)</b>	<b>754,643</b>	$NPV = PVB - PVC$
<b>Benefit to Cost Ratio (BCR)</b>	<b>1.70</b>	$BCR = PVB / PVC$