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Dirprwy Brif Weinidog /Deputy First Minister

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

Eich cyf/Your ref:
Ein cyf/Our ref: DFM 5417 09

Angela Burns AM
Chair, Finance Committee
National Assembly for Wales
Cardiff Bay
Cardiff
CF99 1NA

21 September 2009

Dear Angela,

I am responding to your letter of 30 July requesting additional information to assist with your inquiry into the funding of road infrastructure in Wales.

I have covered all the questions you raised in your letter in the attached annex and tables. Rather than answering each question individually, I have answered them in a narrative fashion; the narrative is divided into the sections identified in your letter.

I hope this covers all the information you require to complete your inquiry. If you do require further information please let me know.

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Response to Finance Committee's Request for additional information

1. Reclassification of the trunk road network

Our current trunking and de-trunking strategy identifies the core network of existing roads which serve a strategic national purpose and which should therefore remain or become the responsibility of the Welsh Assembly Government. The strategy also identifies where non-core routes, which serve only local purposes, should be transferred to local authority management.

The National Transport Plan contains a commitment to review the classification of the trunk road network, so that the strategic network is defined in a way that best meets our transport needs, by 2012.

We will continue to work closely with local authorities, particularly in relation to congested areas where the trunk and local road networks converge. At the moment, where a programme of work is made up of trunked and non-trunked sections, we work closely with the local authorities to deliver the scheme. This is funded either from the budget allocated for the improvement of the trunk road network or from the Transport Grant support given to local authorities, as appropriate.

2. Funding the transport network

As with any Assembly Government Department, when I receive my budget allocation for the Economy and Transport, I prioritise the Department's activities to deliver my objectives in the most efficient and effective manner. With regard to the trunk road forward programme, potential schemes are identified from emerging safety and capacity issues on the network in relation to strategic objectives. The Welsh Transport Appraisal Guidance (WelTAG) is then used to appraise whether a road solution is appropriate or whether the need can be better met by another transport mode. Schemes are then prioritised based on the transport priorities as set out in strategic documents such as One Wales and the Wales Transport Strategy. The end result is an affordable, realistic delivery programme for all our transport schemes.

To ensure we maximise the potential budget available, we explore other funding opportunities, such as the Strategic Capital Investment Fund and the sustainable transport theme of the EU Convergence Programme for West Wales and the Valleys.

As I made clear to the Committee, when I became Transport Minister, I took steps to ensure that my first announcement on the reprioritised trunk road forward programme was deliverable. I therefore took time to go through it line by line with my officials, to explore the true costs and ways of bringing in additional funding. I was also keen to ensure that any over-programming was kept to realistic levels. I also made some changes to take account of the latest position on the statutory processes, which can impact on the timetable for schemes. The reprioritisation was carried out to ensure that the forward programme was more realistic and deliverable, particularly in the light of budget pressures.

It is important to recognise the terminology that has been used in all trunk road forward programme announcements. For example, the 2002 programme talked about phase 2 being "high ranking but in need of more technical work; could be ready

to proceed by March 2008", in the 2004 programme it was described as "could be ready to start by April 2010", and the 2008 programme described phase 2 as "high ranking and programmed to be ready to start by April 2014". For all programmes, all phases were "subject to completion of statutory consent procedures and the availability of finance from budgets approved by the Assembly".

These caveats clearly demonstrate that in order for a scheme or set of schemes to be delivered, both statutory consents and budgets need to be in place. The budget available for the delivery of a programme becomes more difficult to estimate beyond the lifetime of a Comprehensive Spending Review settlement or Assembly Government term.

The following table sets out the historical budget allocations since 2004/05, actual out-turn up to 2008/9, and forecast out-turn for 2009/10 and 2010/11 for the trunk road forward programme, small improvement schemes and schemes whose objective is to make better use of the existing trunk road network.

£ million

		2004/ 2005	2005/ 2006	2006/ 2007	2007/ 2008	2008/ 2009	2009/ 2010	2010/ 2011
New construction and improvement (inc. cost of land)	Budget	42.3	50.4	63.8	78.7	62.6	69.3	60.5
	Out-turn	50.3	40.0	61.5	82.6	79.1	-	-
Upgrade / Making Better Use	Budget	9.3	9.8	9.4	9.1	12.4	17.6	13.6
	Out-turn	7.0	6.6	5.2	6.5	9.8	-	-

Further detail on the trunk road forward programme is provided in the attached table (Table A), which sets out a breakdown of this expenditure by scheme. Also attached is a table (Table B) showing the estimated potential costs of each scheme in the programme based on November 2008 prices.

Within any department there is always a balance between priorities and how finite budgets are spent on those priorities. We always seek to be as flexible as possible within the overall budget for DE&T to ensure that we can deliver our programmes of work in the most cost effective and efficient way. However, as with any organisation there are strict accounting rules that we must follow.

A Resource Allocation Exercise (RAE) for 2010/11 has just been completed. The Welsh Assembly Government undertakes these exercises annually at the start of its Business Planning process. This happens as a matter of routine across all departments within the Welsh Assembly Government to ensure the alignment of Departmental Budgets within available resources and to allocate any additional available funds on a priority basis. The next RAE is due to take place in May/June 2010 which will inform the budget allocations from 2011/12.

During this difficult economic climate, the Welsh Assembly Government has made every effort to bring forward investment in order to help stimulate the Welsh economy. The nature of the investment in road infrastructure means that the schemes are long-term plans to develop the transport infrastructure for our future, therefore, it is not always possible to bring forward projects. However, all schemes to improve transport have a key role to play in supporting economic prosperity.

We have been able to bring forward approximately £1.5m of safety related works on the M4 around Newport, between Junctions 24 (the Coldra) and 28 (Tredegar Park). The majority of this funding will be used to bring forward works to increase the length of new concrete safety barrier that is being installed on this stretch of motorway. A further £1.5m brought forward will be targeted at improving safety across the network, and in particular the A465 Heads of the Valleys road.

MAG report:

We accept the MAG recommendation that we should look at the balance of expenditure between transport and business support, and the potential to pool budgets with other Departments.

In terms of future budget requirements, the estimates in the MAG report were made by the Group and include a number of large schemes for which the Welsh Assembly Government will not need to make budgetary provision, in particular the M4 relief road does not feature in our forward programme and the electrification of the London to Swansea line is being funded by the UK Government. There are many things that factor into our expenditure on and investment in transport and its associated infrastructure. Whilst we undertake long-term planning, it is not possible to accurately predict funding requirements for the next 25 years.

There are currently no plans to form a Public Private Partnership model for transport in Wales. We will be better able to consider the scope for developing such a model once the accounting treatment of private finance schemes has been settled. More generally, we are reviewing the existing arrangements for the operation and maintenance of the trunk road network. Additionally we do consider the role PPPs can play in the delivery of major schemes as a matter of course.

The National Transport Plan will be taken forward in line with the availability of budgetary provision. To ensure we maximise the potential budget availability we will be exploring the opportunities which reside within other sources of funding such as the Strategic Capital Investment Fund and the sustainable transport theme of the EU Convergence Programme.

3. East-West versus North-South

The aim of the trunk road programme is to provide better links between strategic centres of population, improving the opportunities for economic and social development. Phase 1 of the re-prioritised programme included a number of schemes to help improve communications between north and south, through the provision of new by-passes, relieving communities from heavy traffic and providing further overtaking opportunities.

The efficacy of east/west routes will have a significant impact on the whole of the Welsh economy. By improving north/south links we can make it easier for people to access the wider transport network, and the markets and services they need.

The National Transport Plan looks at the Assembly Government's priorities and policies holistically and at the role that transport plays in delivering those priorities. This means that proposals are considered in terms of how well they help the Assembly Government achieve its long-term policy objectives for the environment, economy and society.

The National Transport Plan demonstrates how sustainable, integrated transport will contribute to economic recovery; by helping people to get to jobs and access services and facilities. It outlines how we will develop our transport system to ensure that it continues to support economic prosperity, especially when we are faced with the global challenges of the current economic downturn.

4. M4 relief road

On 15 July I announced my decision not to proceed with the M4 relief road around Newport. The attached Outline Business Case (OBC) for the project confirmed that although there is a need for improvements along the south-east Wales transport corridor, the proposed M4 relief road could not be fully financed from user tolls, and given the current budget allocations, is unaffordable.

The estimated cost of the scheme in 2004 was reported at 1998 prices, whereas the current figure of £1 billion is estimated at outturn prices. The effects of inflation alone in that period effectively doubles the 2004 figure. In addition, the application of Optimum bias at 15% adds a further circa £150m. The remaining additional forecast of circa £100m can be attributed to additional construction costs such as increases in land fill/aggregate taxes, higher materials and labour rates, as well as more demanding environmental mitigation requirements.

Optimum bias refers to the known tendency for the costs of projects to be under-estimated, particularly in the early stages of developing and costing projects. The Treasury's Green Book requires an adjustment to be made for optimism bias for all public sector investments.

The OBC provides details of why tolling would not raise sufficient funds for the construction of the new road. Based on the OBC, I made a policy decision that it would not be acceptable to double toll the primary route into south Wales (that is the Severn Crossings and the M4 at Newport), and I believe this policy decision would be backed by businesses.

I accept the need to urgently address safety and capacity issues on the existing route, which is why over the next two years, we will seek to commence the introduction of a range of measures to tackle congestion around the Tredegar Park area and reduce the congestion through the Brynglas tunnels. The package of measures are:

Making the Best Possible Use of the Existing Capacity	Improving the Resilience of the Network	Improving Public Transport
Upgrade to Steelworks Access Road (Magor to Queensway Meadows)	Incremental Widening between Junctions 27 (High Cross) and 26 (Brynglas)	Park & Ride / Share Option East of Cardiff
At-grade improvement to the A48 Southern distributor Road (SDR)	Incremental Widening between Junctions 29 (Castleton) and 28 (Tredegar Park)	Park & Ride / Share Option at Coedkernew
Improvement to Junction 28 (Tredegar Park)	Improvements to Junction 29A (St Mellons)	Park & Ride / Share Option at Llanwern
Update to Controlled Motorway between Junctions 28 (Tredegar Park) and 24 (Coldra)	Modifications to Junction 27 (High Cross)	Park & Ride / Share Option at Severn Tunnel Junction
Improvements to B4245 junction west of Magor	Modifications to Junction 26 (Brynglas)	
	Modifications to Junction 25 (Caerleon)	

*All works are subject to completion of statutory consent procedures and the availability of finance from the budgets approved by the Assembly

Further work is required before definitive estimates of costs for these measures can be provided. Stakeholders will be engaged as part of the appraisal process of each measure, including public consultation where appropriate. At this early stage in the development of this package of measures it is not possible to provide exact details.

The decision not to proceed with the M4 relief road will have no impact on the remaining schemes in the transport programme, as the assumption was that it would have been financed by tolling and PPP.

5. A465 Heads of the Valleys road

The National Transport Plan contains a commitment to complete the dualling of the A465 Heads of the Valleys road from Brynmawr to Tredegar, and start from Gilwern to Brynmawr, by 2014. There is also a commitment to complete the two remaining sections, from Dowlais Top to the A470, and from A470 to Hirwaun, by 2020. We are currently working up proposals for interim safety improvements along the A465. The Welsh Assembly Government confirms that the A465 programme has not slipped.

Subject to completion of statutory consent procedures and the availability of finance from the budgets approved by the Assembly we plan to:

Section	Timetabling	Estimated Potential Cost (Nov 2008 prices)
Brynmawr to Tredegar	Publish draft statutory orders in 2011, which would allow us to start work in 2012.	£116m
Gilwern to Brynmawr	Start work by 2014	£166m
Dowlais Top to A470	Complete by 2020	£119m
A470 to Hirwaun	Complete by 2020	£132m

6. Cardiff Airport access road

The Cardiff Airport and Culverhouse Cross Access Improvements Study concluded that Corridor C[i] would best satisfy the Transport Planning Objectives as a whole and had most support. Route C1[ii] would best deliver beneficial impacts for the Welsh economy by widening the Airport's catchment area, improving international connectivity and improving accessibility to Barry and St Athan. The Benefit to Cost ratio of Route C1 was estimated as between 3.21 and 3.51.

However, the study highlighted that while the proposed Route C1 could provide benefits to the area, only a fraction of those benefits were associated with access to the Airport. Therefore, route C1 does not meet all of the Transport Planning Objectives, in particular those to improve public transport and reduce the level of car dependency. The consultation exercise also suggested that any difficulties in accessing the Airport were more perceived than real, as well as raising significant concerns about the environmental effects along the proposed route. The optimal outcome would therefore be a package of measures that would combine road improvement with short, medium and long-term public transport measures.

I therefore announced:

"*The conclusion of the report and consultation was that Route C1 provided a reasonable to good cost benefit ratio and on balance was the best road scheme considered. However, the benefits felt, were mainly in the geographic area surrounding the Airport, rather than as a result of access to the Airport itself. This was backed up by views expressed by 275 respondents that access to the Airport was not a real problem, but more an issue of perception. Additionally there were significant concerns raised by non-statutory bodies and local residents about the negative effects on the environment of the Route C1. As such, the Welsh Assembly Government does not intend to protect the line of Route C1. The Assembly Government will however fund the Vale of Glamorgan Council to carry out substantial*

[i] Corridor C: a link from the M4 at Junction 34

[ii] Route C1: a link from the M4 at Junction 34 to the airport with an outer western bypass of Pendoylan, junction improvement at Sycamore Cross and improvements to Five Mile Lane (A4226).

safety improvements to the A4226 (Five Mile Lane), the southernmost section of Route C1.

These improvements will be supported by a package of short- and medium-term public transport measures."

We will work with the Vale of Glamorgan Council to deliver the proposed Safety Improvements to Five Mile Lane. Options for these improvements are still under consideration and a Public Consultation has still to be held. I am therefore not yet in a position to provide details of the likely costs for this scheme.

7. Consultation and engagement with stakeholders

On 2 October 2007, I set out my vision on how we intended to deliver the One Wales commitments and announced that I was reviewing the timetable for planned schemes. Honouring that pledge, in December 2008 I set out the trunk road and rail forward programmes. The 2008 reprioritisation of the trunk road forward programme was an exercise to realign those schemes already in the programme with our One Wales commitments.

This was an interim measure pending the development of the National Transport Plan. As it was an interim measure to realign schemes already identified and therefore robustly assessed, there was no formal consultation. However, my decisions were influenced by the views of key stakeholders, Assembly Members and their constituents, through meetings, correspondence received and views expressed to me.

The National Transport Plan, which outlines our five year plan for a fully integrated and sustainable transport system, is currently out for consultation. The Plan builds on previous published programmes, adding and integrating public and community transport, walking and cycling, so that our investments help to deliver One Wales.

All road schemes are subject to public consultation. During public consultation the Welsh Assembly Government initiate an ongoing dialogue with a wide range of stakeholders, such as statutory bodies, representative groups, lobby groups interested parties and individuals. Consultation is embodied in the WelTAG appraisal process, and as schemes move forward and specific solutions are identified the dialogue with stakeholders continues, whether a public inquiry is required or not. With regards to the specific schemes referred to in your letter:

- A465 Dualling between Abergavenny and Hirwaun – No public consultation has been held since the Line Order for the scheme was made in 1999. It is however planned to inform the public of the scheme proposals as part of the statutory consent procedures needed to obtain approval for construction of each section.

- M4 Relief Road – Full public consultations were held in both 1993 and 1994 to determine the Preferred Route for the scheme. In 2006 a series of Public Information Exhibitions were also held in to show revisions to the Preferred Route. During each of these events, MPs, AMs and local and community

councillors were invited to preview sessions where the scheme was described in more detail.

- Cardiff Airport and Culverhouse Access Improvements Study – Public exhibitions were held in autumn 2007 to seek views about the issues we should be addressing and the potential options. Formal public consultation was held between July and October 2008. I shall shortly be publishing the Statement of Results from the Public Consultation.

HISTORICAL SCHEME COSTS FOR TRUNK ROAD FORWARD PROGRAMME SINCE 2002

Expenditure Forecast (Current Prices)

Out-turn	Out-turn	Out-turn	Out-turn	Out-turn	Out-turn	Out-turn	Out-turn	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast

Scheme	Scheme No.	Pre 2002/03	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	Later Years	Works Total
A487 Llanwnda - Llanllyfni	910170	15.7	1.2	0.9	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.2
A465 Tredegar - Dowlais Top	910182D	4.2	16.3	15.3	8.0	1.4	2.0	-0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
A470 Lledr Valley Stage 2	860154A	1.6	4.3	8.5	6.4	0.5	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
A494/A550 Deeside Park - Drome Corner	900233	1.3	0.7	7.5	7.9	0.3	0.1	0.1	0.1	0.6	0.1	0.0	0.0	0.0	0.0	0.7
A479 Talgarth Relief Road	986052	0.1	0.4	1.0	0.7	0.8	6.2	2.8	0.4	0.0	0.0	0.0	0.2	0.0	0.0	0.2
A550 Deeside Park - A5117	900170	0.4	0.0	0.0	0.0	0.0	1.0	1.6	1.6	0.6	0.0	0.0	0.0	0.0	0.0	0.6
A465 Abergavenny - Gilwern	910182A	0.1	0.2	0.9	1.9	12.2	17.5	15.5	7.9	5.0	0.1	0.1	0.1	0.2	-1.1	4.4
A470 Blaenau Ffestiniog to Cancoed	860154C	0.0	0.2	0.2	0.2	1.0	2.1	7.8	2.8	0.7	0.3	0.1	0.0	0.0	0.0	1.1
A5 Pont Melin Rug	780032	0.0	0.2	0.1	0.3	0.1	0.6	3.2	1.8	0.2	0.0	0.0	0.0	0.0	0.0	0.2
M4 Castleton - Coryton Widening	910193	0.0	0.0	0.2	0.6	3.5	5.9	24.0	30.7	23.1	0.8	0.3	0.3	0.3	0.3	24.9
A470 Llanrwst to Hafod	001058	0.0	0.0	0.0	0.0	0.0	0.1	0.5	4.0	0.5	0.1	0.0	0.0	0.0	0.0	0.6
A483 Four Crosses Improvement	956054	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6	3.7	2.0	0.0	0.0	0.0	6.3
A470 Penloyn - Tanlan	780030	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	2.5	3.1	0.1	0.0	0.0	0.0	5.7
A487 Porthmadog Bypass	890245	0.7	0.1	0.3	0.6	0.5	1.0	1.2	2.6	3.7	23.9	18.9	2.7	1.5	0.0	50.5
A470 Cwmbach	946067	0.0	0.0	0.3	0.1	0.2	0.2	1.1	0.0	4.8	23.0	8.0	0.6	0.0	0.1	36.5
A470 Alltmawr	810029	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	3.0	6.0	0.8	0.0	0.0	10.5
A470 Gelligemlyn	780048	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.3	0.7	4.1	0.6	0.1	0.0	5.7
A470 Cross Foxes	780050	0.3	0.1	0.1	0.2	0.1	0.1	0.3	0.2	0.3	0.3	4.0	1.9	0.1	0.0	6.7
A470 Pentrefelin Croesau	780055	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.4	0.7	4.5	3.6	0.2	9.5
A40 The Kell	952061	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.3	0.3	0.0	0.0	0.0	2.0
A40 Penblewin - Slebech Park	042034	0.0	0.0	0.0	0.2	1.3	1.7	1.1	3.7	17.0	10.0	1.5	0.4	0.1	0.2	29.2
A470 Plas Maenan - Bodhyf Improvement	024054	0.0	0.0	0.1	0.3	0.0	0.3	0.0	0.1	0.1	0.3	0.3	0.8	0.8	13.5	15.8
A487 Caernarfon to Bontnewydd	910228	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	1.0	0.4	0.4	0.4	56.8	59.0
A470 Builth Wells	890166	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.4	1.1	0.9	14.0	18.0
A483/A489 Newtown	810043	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.0	0.5	1.1	15.0	10.0	0.5	27.1
A470 Rhayader Relief Road	910172	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.2	1.1	1.3	10.0	14.0
A477 St Clears - Red Roses	942055	0.0	0.0	0.1	0.4	0.4	0.0	0.0	0.3	1.9	1.2	15.3	26.8	15.0	0.2	60.3
A465 Brynmawr - Tredegar (Section 3)	910182C	0.0	0.1	0.2	0.5	0.4	0.1	0.1	0.1	1.7	3.6	23.1	42.7	42.7	1.1	114.9

Expenditure Forecast (Current Prices)		Out-turn	Out-turn	Out-turn	Out-turn	Out-turn	Out-turn	Out-turn	Out-turn	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	
A465 Gilwern - Brynmawr (Section 2)	910182D	0.0	16.3	15.3	8.0	1.4	2.0	-0.1	0.2	0.0	1.4	5.1	5.9	13.4	138.7	164.5
Cardiff International Access Road	057030	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
New M4 - Magor to Castleton	910175	6.9	0.0	0.0	0.2	1.7	2.0	4.4	4.1	0.9	0.0	0.0	0.0	0.0	0.0	0.9
A483 Llandeilo Eastern	750151B	1.8	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.4	1.6	5.6	22.5	31.6
A470 Llanrwst Bypass	760004	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	18.8	19.0
A40 Llanddewi Velfrey - Penblewin	042035	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	1.5	13.0	13.0	7.0	36.5
A4042 Llanellen Bypass	770021	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.2	1.1	8.0	10.9
A465 Dowlais Top - A470 (Section 5)	910182E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	118.6	118.8
A465 Hirwaun - A470 (Section 6)	910182F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	131.7	132.0
A494 Drome Corner - Ewloe	910192	0.5	0.0	0.1	0.1	1.9	1.9	2.3	1.0	0.6	0.5	0.5	0.5	1.0	50.0	60.7
A55/A494 Ewloe Interchange	910191	0.0	0.0	0.3	0.3	0.2	0.2	0.0	0.0	0.1	0.3	0.3	0.5	0.5	100.2	101.8
A55 Ewloe - Northop	910189	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.1	24.7	25.8
A55 Abergwyngregyn to Tai'r Meibion	004052	0.1	0.2	0.0	0.1	0.2	0.3	0.0	0.2	0.0	0.0	0.0	0.0	0.0	11.0	12.5
A458 Buttington Cross	780084	0.0	0.0	0.4	0.3	0.1	0.0	0.0	0.0	0.3	1.3	0.7	0.3	0.5	37.0	40.1
Grand Total		**34.2**	**40.5**	**51.8**	**37.6**	**28.6**	**46.0**	**67.2**	**64.3**	**67.1**	**84.0**	**98.3**	**123.3**	**112.4**	**763.9**	**1259.8**

Notes:
1). Forecast Costs are Nov 2008 Price Base
2). Estimated Costs are subject to change as scheme development continues.
3). Negative figures on A465 Abergavenny to Gilwern scheme relate to incentive mechanism costs due to the Welsh Assembly Government at the end of the Contract Period.

2008 REPRIORITISED TRUNK ROAD FORWARD PROGRAMME

Estimated Potential Scheme Costs

Schemes	Estimated Potential Cost (£m - Nov 2008 prices)
SCHEMES IN PHASE 1 TRFP	
A483 Four Crosses Improvement	6
A470 Penloyn - Tanlan	6
A487 Porthmadog Bypass	50
A470 Cwmbach	40
A470 Alltmawr	11
A470 Gelligemlyn	6
A470 Cross Foxes	8
A470 Pentrefelin Croesau	10
A40 The Kell	2
A40 Penblewin - Slebech Park	37
SCHEMES IN PHASE 2 TRFP	
A470 Plas Maenan - Bodhyfryd Improvement	17
A487 Caernarfon to Bontnewydd	59
A470 Builth Wells	18
A483/A489 Newtown	27
A470 Rhayader Relief Road	14
A477 St Clears - Red Roses	61
A465 Brynmawr - Tredegar (Section 3)	116
A465 Gilwern - Brynmawr (Section 2)	166
Cardiff International Access Road	0
New M4 - Magor to Castleton	0
SCHEMES IN PHASE 3 TRFP	

Schemes	**Estimated Potential Cost (£m - Nov 2008 prices)**
A483 Llandeilo Eastern	32
A470 Llanrwst Bypass	19
A40 Llanddewi Velfrey - Penblewin	37
A4042 Llanellen Bypass	11
A465 Dowlais Top - A470 (Section 5)	119
A465 Hirwaun - A470 (Section 6)	132
A494 Drome Corner - Ewloe	61
A55/A494 Ewloe Interchange	102
A55 Ewloe - Northop	26
A55 Abergwyngregyn to Tai'r Meibion	13
A458 Buttington Cross	40

Cost estimates are provisional and will subject to revision as schemes are developed.

Department for the Economy and Transport
Welsh Assembly Government

New M4 Project
Magor to Castleton

Outline Business Case

September 2009

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Executive Summary

Introduction

1. In December 2004, following the publication of *People, Places, Futures – The Wales Spatial Plan*, the decision was taken to advance the New M4 Project (previously known as the M4 Relief Road) within the Trunk Road Forward Programme from the "On hold" category to Phase 2, projects that could be ready to start by 2010.

   As part of the project development, the Welsh Assembly Government undertook the development of an Outline Business Case for the project. The Outline Business Case (OBC):

   - Presents the background to the project, discussing and confirming the need for the project.
   - Defines the scope of the project, including measures for dealing with the existing M4.
   - Appraises options in terms of economic, environmental and social benefits and disbenefits, including the consideration of tolling.
   - Presents the findings in relation to tolling.
   - Provides details of costs and options in terms of procurement, financing and funding.
   - Discusses deliverability, project governance and identifies the next steps to be taken.

Problems

2. The over-riding problem on the existing M4 in south east Wales is one of congestion during peak periods of travel.

3. The design of the M4 around Newport was first commissioned in 1945, with the works being completed in 1967. The alignment and layout of the motorway is not to current standards.

Evolution of the New M4

4. The New M4 is the result of investigations into how best to provide relief to the problems presented above. The conclusion of these investigations and studies is to provide a new dual 3-lane motorway between Magor (Junction 23) and Castleton (Junction 29) of the existing M4 with the new road becoming the new route of the M4, hence the 'New M4'. This new road would be approximately 24km long, passing to the south side of the Llanwern steelworks and Newport and includes two crossings of the Great Western main railway line and a significant structure across the Rivers Usk and Ebbw and Newport Docks.

5. The initial proposal for the New M4 resulted from South Wales Area Traffic Survey (SWATS), commissioned in March 1989 by the Secretary of State for Wales to review traffic patterns over part of the trunk road network in South Wales. The outcome of the 1990 SWATS report was the inclusion of a proposal for a new dual 3-lane motorway (to be known as the M4 Relief Road) in the Welsh Trunk Road Forward Programme (TRFP) in 1991. This proposal was the subject of public consultation during 1993 and 1994, following which the Preferred Route for the M4 Relief Road was announced in 1995.

6. Complementary multi-modal research and appraisal was undertaken and reported during 1997 to 1999. This work, referred to as the Common Appraisal Framework (CAF) and subsequent considerations and appraisal concluded that none of the alternatives investigated would relieve the M4 around Newport to the same degree as the New M4 and hence the New M4 would be the appropriate scheme to implement if increased capacity is needed. *People, Places, Futures – The Wales Spatial Plan*, confirmed the need for this additional capacity.

Vision and Objectives

7. The development and appraisal process has led to the definition of the overarching project vision and objectives as being as follows:

Vision

To provide, as part of a wider integrated transport strategy for South East Wales, enhanced capacity and resilience on the transport corridor between Magor and Castleton.

Objectives

To deliver enhanced accessibility to services and employment opportunities for people, whilst retaining a choice for road users.

To deliver a more efficient transport capability for road traffic on the primary economic gateway to South Wales, to facilitate growth in regional and national prosperity.

To prevent, reduce and where practicable offset any significant adverse effects on environmental receptors.

Options Considered

8. The Scheme Options considered by the Outline Business Case include the New M4 with and without tolling and with and without the inclusion of measures intended to complement the scheme and assist with delivery of the project objectives (referred to as 'Associated Measures'). In all cases the options considered also encompassed not only the operation and maintenance of the New M4 but also the operation and maintenance of the existing M4 and M48 motorways in south east Wales.

Economic Effects

9. The Transport Economic Efficiency (TEE) analysis compared the discounted value of transport benefits of the Scheme Options with the discounted value of costs of implementing and operating the Scheme Options. The performance of the various Scheme Options in terms of Net Present Value (NPV) and Benefits to Costs Ratio (BCR) is presented below. The results indicate that:

- The effect of introducing tolls on the New M4 is expected to reduce substantially the benefits.
- The introduction of associated measures is seen to increase the value in economic terms as the presence of a connection between the M48 motorway and the B4245 east of Magor reduces local network delays.
- In pure transport economic terms, the provision of the New M4 would be expected to result in substantial positive benefits. Tolling would negate many of these benefits.

Summary Results from TEE Analysis

	Net Present Value (NPV) £Billion*	Benefit / Cost Ratio
New M4 untolled	1.45	4.07
New M4 tolled	-0.09	0.56
New M4 untolled with associated measures	1.66	4.47
New M4 tolled with associated measures	0.04	1.22

** 2002 prices in accordance with WebTAG guidance*

Environmental Effects

10. The New M4 could have significant environmental effects focusing on the Preferred Route corridor and arising from the construction of the road and its subsequent use. The main impacts are summarised below:

- **Ecology** — The Preferred Route will cross 8.5km of Sites of Special Scientific Interest (SSSI) resulting in the loss of up to 60 hectares (less than 1.5% of total SSSI). The primary interest of the SSSI stems from the flora and fauna of the reen network, and whilst (subject to design changes) up to 2.4km of reens will be lost, there will be a net increase in length of new reens created by the provision of 3km of new ones. The route also crosses the River Usk SAC (Special Area of Conservation) and is close to designated SPAs (Special Protection Areas). New planting for wildlife is proposed to mitigate the loss of valuable terrestrial habitats. Tunnel crossings and specialist fencing is proposed to mitigate the barrier effect of the road to animal movements.
- **Geology and Soils** — Construction of the road would have an effect on the natural landform. A major cutting up to 45m deep will be required at Castleton to accommodate the new interchange. A lesser cutting will be needed at Magor. Low embankments will be constructed across the Gwent Levels. Some areas of contamination along the path of the road have been identified requiring removal or stabilisation on site.
- **Landscape** — Across the coastal levels the road would cut across the grain of the landscape. Proposed new planting of hedgerows and woodland blocks will partially mitigate the impact. Hillier topography at either end means cuttings and an elevated approach embankment at Castleton. It is proposed that the high embankment would be graded out to alleviate the appearance of an engineered slope and allow some return to agriculture. A major new bridge feature with potential for iconic design is proposed across the Rivers Usk and Ebbw and Newport Docks.

- **Heritage** The route cuts across the registered historic landscape, however, the alignment along the northern edge of the Gwent Levels minimises fragmentation of this landscape. An ancient standing stone is situated close to the edge of the route and regard must be had to its location. A Grade II listed building, formerly a vicarage but now a private dwelling, would need to be demolished.
- **Land use** One other residence would also be lost while the permanent land take for the road will be approximately 224 hectares. Just under 72% of this is ALC (Agricultural Land Classification) grades 3a and 3b while 26% is classified non-agricultural or urban. Businesses premises likely to be affected are located mainly within the Docks area.
- **Water resource** Cross drainage will be maintained through 26 culverts to ensure that flow paths across the highway embankment of the New M4 are not altered. The surface water run off from the carriageway will be discharged to the reen system after going through stringent attenuation and treatment processes in the 12 Water Treatment Areas provided along the route. The Gwent Levels are classified as protected flood plains. The road will be placed on an embankment so that in the event of a catastrophic breach of the defences coinciding with an extreme tide event, the road will not be inundated.
- **Noise** The new route will introduce a new source of continuous noise which will affect properties along its length. The number of properties and the significance of the effects have yet to be assessed; those properties likely to qualify for noise insulation have therefore yet to be identified. The decrease in noise levels along the existing M4 is not likely to be significant.
- **Air Quality** The new route is also likely to lead to deterioration in local air quality, although air quality objective limits are unlikely to be exceeded. Reductions in air pollution levels will be experienced adjacent to the existing M4.
- **Climate Change** An improvement in motorway operating conditions has been forecast to lead to reduced CO_2 emissions for that part of the network.

Social Effects

11. The provision of the New M4 (untolled) will divert a considerable volume of through traffic onto the new section of motorway which is to be designed to a high standard. The accident rate for the new section of motorway is likely to be lower than the actual current accident rate for the existing M4 motorway between J28 (Tredegar Park) and J25 (Caerleon).

12. Modelling suggests that the New M4 will lead to improvement in accessibility, by car, to jobs. The areas that gain most due to the New M4 are Magor, the A467 and A449 corridors, and areas of Newport closest to motorway junctions, Chepstow, eastern Cardiff and the A4042 corridor.

13. Accessibility by car between homes and employment would improve generally with marginal/slight improvement to mid Valleys communities and in the Greater Bristol area as a consequence of the New M4 Project.

Tolling

14. Consideration of tolling of the New M4 has highlighted the following:

    a. Even at relatively low toll levels, a substantial proportion of potential users of the New M4 would choose to remain on existing untolled roads, this would have an adverse effect on the achievement of the objectives for the scheme;

    b. With less traffic benefiting from the savings and efficiencies associated with the New M4, and more traffic remaining on the existing network, the economic benefits of the scheme would be greatly reduced, and the environmental benefits for communities along the existing route would be less.

    c. Less use of a tolled New M4 would mean that the revenue raised by tolling, £16.8m pa (Nov 2005 price base) would be modest in comparison to the costs of the scheme.

Cost and Risk

15. The current cost estimate for the construction works, including Optimism Bias, is £667m (Nov 2006 base year) which includes £105m allowance for reasonable foreseeable risks but excludes VAT and the cost of land and compensation.

Procurement Methods

16. The project may be procured conventionally, that is where the Welsh Assembly Government establishes a contract with a suitable provider to complete the designs and construct the New M4. On completion of the works, the asset and its maintenance and operational requirements transfer to the Welsh Assembly Government. Alternatively, the project could be delivered via the establishment of a suitable partnership with the private sector where the private sector finances the completion of the design, then builds and operates the network for a concession period, typically 25 – 35 years, with the Assembly paying an annual Unitary Charge for the service.

Affordability and Value for Money

17. The appraisal of the potential procurement options has been based upon the HM Treasury guidelines. This has led to both a qualitative and a quantitative Value for Money assessment. The conclusion of the qualitative assessment is that on all three counts of Viability, Desirability and Achievability, a Public Private Partnership (PPP) approach has the potential to offer the best value means of procurement. The quantitative assessment indicates the preferred Scheme Option, if procured as a PPP would have an NPV of £58m which equates to an indication of Value for Money of 5.37% in favour of PPP when compared with a more conventional procurement route.

18. The New M4 Project if procured conventionally, would require the Welsh Assembly Government to fund the construction and assuming a 4 year construction period, this would require approximately £145 to £167 million per annum (in 2006 prices) from 2013. Additional to this would be any land and compensation costs and any VAT which may be due. On completion of construction, the Welsh Assembly Government would be liable for operational and maintenance costs which would be of the order of £133 to £153 million over the 30 years following opening of the new road.

Timescales

19. In terms of PPP, the procurement of the necessary partnership to deliver the New M4 will be governed by EU processes and likely be subject to the Competitive Dialogue process. This will require that the anticipated Public Local Inquiry is completed before tenders are invited and hence the earliest start date would be 2013 with opening of the road some time in 2016.

Project Delivery

20. Delivery of the New M4 Project would be managed by the Department for the Economy and Transport at the Welsh Assembly Government and subject to OGC gateway processes. The Department for the Economy and Transport would be assisted by legal, financial, technical and contract specialists.

CONTENTS

Appendices

Glossary of Financial Terms

Annual Debt Service Cover Ratio (ADSCR)	ADSCR assesses the Project Company's ability to service its debt from its annual cash flow: Cash flow available for debt service (CFADS) *divided by* Debt Service.
Blended IRR	The Internal Rate of Return on the total equity, the equity loan stock and the subordinated debt investment combined. This is the IRR measure that will be key to project investors.
Cash flow available for debt service (CFADS)	Is the term used to describe the cash available for payments to debt holders i.e. after taking account of operating costs and taxation
Equity	Ordinary shares and Subordinated debt.
Equity bridging Facility	The term given to a loan, usually from the provider of senior debt which is drawn down ahead of the senior debt, but which is repaid at the end of construction, by draw down of the equity.
Gearing	Gearing is the term used to measure the ratio of debt to equity within the total financing requirement of the project company. Typically between 80% and 92.5% (debt).
Internal Rate of Return (IRR)	The IRR is the % return generated by a series of cash flows over time. Specifically, it is the rate which, if used as a discount rate to calculate the NPV of that given series of flows, generates an NPV of £0.
Loan Life Cover Ratio (LLCR)	A similar calculation to ADSCR but taken over the whole term of the loan: Projected cash flow available for debt service over loan life discounted to its NPV at debt interest rate *divided by* Debt outstanding on the calculation date.
Margins on senior debt	The additional amount added to the debt interest rate by the lender to take account of the risk profile of the deal. Often differentiated between the construction period, when risk is perceived to be higher, and the operation stage of a contract.
PSC Tax Adjustment	The Green Book recommends that the adjustment of market prices is appropriate where it may make a material difference to the appraisal decision. One such instance is in the comparison of PFI procurement against traditional public sector procurement where taxation differences can be material to the appraisal. These differences typically arise under a PFI procurement since a proportion of the unitary charge paid over by the public sector will usually be subject to taxation in the Project Company and will therefore flow back in to the public sector. In this case such differences should be stripped out to ensure like-for-like comparisons. This is known as the PSC tax adjustment.
Senior Debt	This term is generally used to describe loans from third party funding institutions, frequently banks, which have a priority over other investors in terms of their claim on the free cash flows generated by the Project Company.
Senior debt interest rate (swap rate)	The fixed interest rate applying to the senior debt loan before taking account of margins.
Subordinated Debt / Equity Loan Stock	This term is generally used to describe loans, which have a lesser priority over other funders in terms of their claim on the free cash flows generated by the Project Company. Payments to subordinated debt or equity loan stock providers would usually be made after payments to senior debt providers, but before payments of dividends to real equity investors.
Unitary Charge	The charge payable to the project company by the project promoter for the provision of the facility or service.

1 Introduction

The 'New M4' is a long-standing proposal for the construction of a new dual 3-lane motorway between Magor (Junction 23) and Castleton (Junction 29) of the existing M4.

In December 2004, following the publication of *People, Places, Futures – The Wales Spatial Plan*, the decision was taken to advance the New M4 Project (previously known as the M4 Relief Road) within the Trunk Road Forward Programme from the "On hold" category to Phase 2, ie projects that could be ready to start by 2010.

Details supporting the announcement of this decision included the following statements:

- *Studies will be carried out to investigate funding and procurement methods for the Scheme. These studies will include an analysis of private/public funding partnerships. The current proposal is that the new motorway will be tolled, giving users a premium service with flexibility to allow it to be incorporated into any national road pricing scheme later. The existing motorway will not be tolled and will provide local connections. By this means, the benefits of the additional road capacity can be locked into the M4 Corridor but there will still be a choice for road users. The proposals will go through the normal statutory procedures to determine whether they should be implemented.*
- *With the New Road, major maintenance of the existing motorway can be carried out. These works, which are being deferred to minimise disruption to traffic, will accompany measures to encourage car sharing and modal shift to keep Wales' economy flowing while reducing the growth of commuter car traffic. Proposals include using some of the existing M4 for only Buses, Coaches, etc and vehicles carrying more than one person. There will also be investment in park and ride facilities and enhancement to the local rail network.*

The Minister's briefing also stated that the New M4 would be financed through user charges.

This Outline Business Case (OBC) examines the issues highlighted as part of the December 2004 announcement and also:

- Presents the background to the project, discussing and confirming the need for the project.
- Defines the scope of the Project, including measures for dealing with the existing M4.
- Appraises options including the consideration of tolling, in terms of economic, environmental and social benefits and disbenefits.
- Provides estimates and forecasts of funding requirements.
- Discusses financing and procurement options based upon HM Treasury Value for Money appraisal guidelines.
- Discusses deliverability, project governance and identifies the next steps to be taken.

To assist with the definition and development of the New M4 Project and this Outline Business Case, the Welsh Assembly Government appointed Arup and KPMG to act as technical and financial advisors respectively.

2 The Issue

2.1 The Transport Problem

Figure 2/1: The Trans European Road Network
(*Source: EUROPA the portal site of the European Union) (http://europa.eu)*

The M4 is the principal economic lifeline of South Wales. It provides the strategic link into the industrial metropolitan area of South Wales and forms part of the internationally designated transport corridor (TEN) from Ireland to England and on to mainland Europe.

Traffic has grown substantially since 1990, and a comparison of current flows (2008) with the theoretical capacity for urban motorways[1] has shown that sections of the existing M4 around Newport are operating at, or approaching, capacity during weekday peak periods of travel. As flows approach the theoretical capacity, the following characteristics are likely to become increasingly evident:

- The speeds of individual vehicles will not be constant.
- Lane changing still occurs although opportunities are very limited.
- Off-side speeds will be similar to the near-side and may over short periods be slightly lower.

Any minor incident is likely to result in unrecoverable flow breakdown and queuing traffic and will lead to a reduction in throughput.

2.2 Poor Highway Standards

Invitations for the commission to design the motorway section to the north of Newport were issued in March 1945. Following this, the M4 between junctions 24 and 28 was opened in 1967 as a dual 2-lane motorway bypass and included the first tunnels to be part of the UK motorway network. The existing M4 was designed and constructed to the geometric standards of the day but for much lower traffic flows than are currently experienced. Widening to dual 3-lane standard took place in the early 1980s as a short-term measure to relieve congestion. The widening compromised geometric design standards further, so there are now two sections which have a 50mph advisory speed limit and a section where a mandatory 50mph limit is planned. In broad terms, the bends are tighter, forward visibility is reduced and in places gradients are steeper than desirable. There are some sections which only have two lanes and considerable lengths of the motorway have discontinuous hard shoulders.

1 Design Manual for Roads and Bridges, Volume 5, Section 1, Part 3, TA 79/99 "Traffic Capacity of Urban Roads"

3 Vision and Objectives

In response to the issues set out in Chapter 2, a Vision for the transport system in south east Wales has been developed:

> *To provide, as part of a wider integrated transport strategy for South East Wales, enhanced capacity and resilience on the transport corridor between Magor and Castleton*

High level objectives have been developed and published to enable delivery of this Vision. These are:

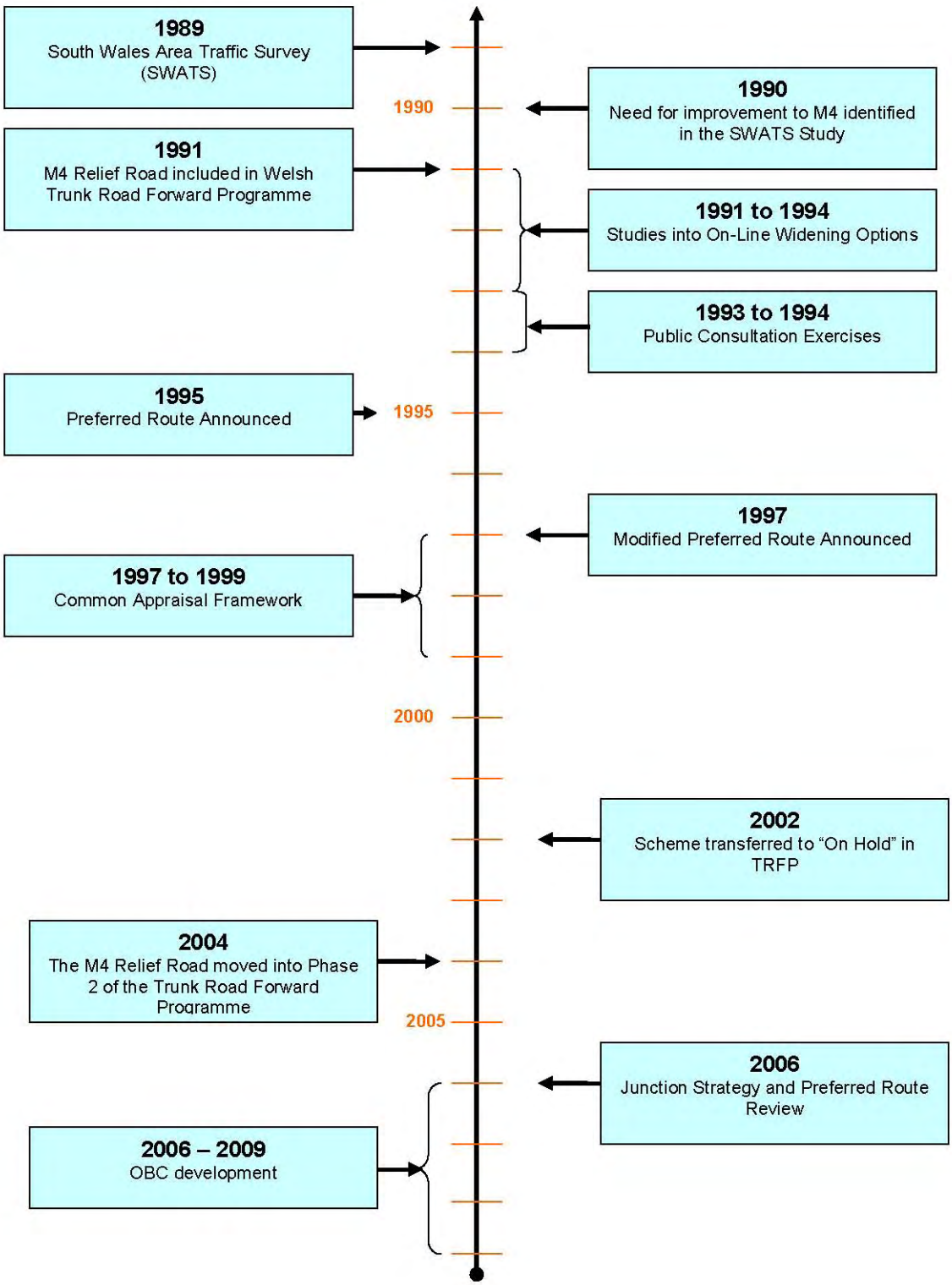
- *To deliver enhanced accessibility to services and employment opportunities for people, whilst retaining a choice for road users.*
- *To deliver a more efficient transport capability for road traffic on the primary economic gateway to South Wales, to facilitate growth in regional and national prosperity.*
- *To prevent, reduce and where practicable offset any significant adverse effects on environmental receptors.*

4 Background and Context

4.1 Earlier Studies

In March 1989, the Secretary of State for Wales commissioned the South Wales Area Traffic Survey (SWATS) to review traffic patterns over part of the trunk road network in South Wales in order to identify problem areas and propose possible solutions. The SWATS Report (1990) identified the need for substantial improvement to the M4 to address a growing capacity issue on the motorway, in particular the section between Magor and Castleton.

The following diagram and sections explain how the project developed from original concepts to its current form.



4.2 Proposal for an M4 Relief Road

The outcome of the earlier studies was the inclusion of a proposal for a new dual 3-lane motorway (to be known as the M4 Relief Road) in the Welsh Trunk Road Forward Programme (TRFP) in 1991.

This proposal was the subject of public consultation during 1993 and 1994, following which the Preferred Route for the M4 Relief Road was announced in 1995.

The Preferred Route was subsequently modified in 1997 to allow for development of the LG site at Duffryn.

4.3 The Common Appraisal Framework 'CAF'

As well as pursuing the new road proposal as a possible solution to predicted traffic problems on the M4, a more broadly-based study of solutions was undertaken, known as the Common Appraisal Framework Study (CAF). This study was undertaken between 1997 and 1999, and sought to assess the advantages and disadvantages of alternative solutions to the congestion problem against acceptable environmental, financial, economic and safety criteria.

The criteria used for the evaluation were whether:

- The solution could provide relief to the M4 around Newport; and
- The costs were commensurate with the likely benefits of the scheme.

4.4 Initial Conclusions of CAF

The CAF study concluded that there were two main ways in which relief could be provided from the effects of increasing traffic on the M4 around Newport whilst minimising any disbenefits:

- The construction of the M4 Relief Road. This was considered to be economically beneficial but would cause environmental damage to nationally important resources and would encourage more car journeys.
- A hybrid strategy which combined some car restraint (ie tolling the existing M4) with significantly improved public transport. This strategy had both local environmental benefits and disbenefits with overall economic benefits.

4.5 The Development of a Second Hybrid Scenario

The National Assembly for Wales Local Government and Environment (LGE) Committee considered the findings of the CAF study in February 2000. Most Members did not support the M4 Relief Road, but neither did the Committee support tolling of the existing M4. Instead they sought further information on whether the Newport Southern Distributor Road (SDR), intended to improve the local highway network around Newport, could be upgraded to take strategic traffic and thus obviate the need for the M4 Relief Road.

The findings of comparison studies conducted in May/June 2000 found that an upgraded SDR would not relieve predicted congestion on the M4 as much as the M4 Relief Road.

Given the LGE committee did not support the introduction of tolls, a second Hybrid scenario was developed (Hybrid 2). Hybrid 2 provided additional capacity at the Brynglas Tunnels (and associated widening of the motorway to the west of the Tunnels) replacing the tolling measure in the previous Hybrid scenario (Hybrid 1). The assessment of this Hybrid 2 scenario showed that it would provide a lesser degree of congestion relief compared to the Road Building scenario, but that, considering only those costs attributable to south east Wales, it would perform better economically and in the policy terms of the day.

4.6 Overall Conclusion of CAF

In considering the overall conclusions of the CAF Study, the Transport Directorate (now the Department for the Economy and Transport) found that none of the alternatives investigated would relieve the M4 around Newport to the same degree as the M4 Relief Road.

Without significant traffic restraint, such as motorway tolling, the Directorate found that either new road building or motorway widening would be the only effective measure to reduce traffic congestion. However, motorway widening had been discarded during earlier feasibility work in favour of building the Relief Road because of the impact on the built environment, the high cost and the poor economic return.

The conclusion was to:

- Discard Hybrid 2.
- Discard widening of the existing M4 around Newport as a means of increasing capacity.
- Accept that the M4 Relief Road would be the appropriate scheme to implement if increased capacity is needed, but not to proceed at this stage.

In 2002, the proposal for an M4 Relief Road was put "On Hold" in the Trunk Road Forward Programme, pending the conclusion of the Wales Spatial Plan.

4.7 The New M4 Project

In November 2004, "People, Places, Futures – The Wales Spatial Plan" was published. It included the intention to:

"*…increase the transport capacity of the corridors and gateways to Europe and beyond. This will include capacity enhancements on the M4 and A465 corridors through the Trunk Road Forward Programme as well as development of routes from Cardiff International Airport*".

In December 2004, following a review of transport programmes, proposals to develop a New M4 south of Newport between Magor and Castleton were announced. This included the objective to include priority measures for public transport and multiple occupancy vehicles on the existing route. The announcement also stated that the New M4 would be financed through user charges.

The M4 Relief Road scheme was renamed as the New M4 Project and advanced from the 'On Hold' category into Phase 2 of the Trunk Road Forward Programme, ie schemes that could start on site by 2010, subject to the satisfactory completion of statutory procedures and availability of finance.

4.8 Development of the Route since 2004

The return to active development of the New M4 meant it was important to re-examine the project to ensure fit with current policies and take account of physical and legislative changes. Three key activities were undertaken:

- A re-examination of route corridors, considering in particular the implications and consequences of legislative changes and physical developments within the original project study area.
- An holistic review of the previously published Preferred Route (published 1997).
- A review of the junction strategy taking into account current traffic flows and predictions and an initial assessment of the impact of tolling.
- The conclusion of the both the Preferred Route Review and Junction Strategy Review was to publish a TR111 (April 2006) to protect a revised route corridor.

A series of public exhibitions were held in April and May 2006 to explain the changes to the public and other stakeholders.

5 Scheme Options and their Appraisal

The conclusion of the previous studies confirmed the route to the south of Newport as the favoured solution. This current Preferred Route for the New M4 is a combination of the 1995 preferred route and amendments in 1997 and 2006. The New M4 Project also includes additional measures to provide benefits in accordance with the vision of a wider integrated transport strategy for south east Wales. These additional measures are grouped as follows.

- ***Associated Measures***, those additional elements of the transport network which could be delivered as part of the New M4 Project.
- ***Enabled Measures,*** those elements of the transport network which would be enabled or facilitated by the New M4 Project and likely delivered via complementary transport programmes such as the 'Regional Transport Plans'.

When the New M4 Project was announced in December 2004, a commitment was made to investigate the viability of tolling the new section of road. This business case considers tolling, the effect on the scheme economics, likely revenues raised, effects on users and fit with Transport Planning objectives.

This business case also considers the lifecycle costs and benefits associated with the delivery of the New M4 and its operation and maintenance. To provide for an efficient operational and maintenance structure such considerations will include the maintenance and operation of the existing section of M4 and M48 which extends from Castleton in the west to the Severn River crossings in the east. The configuration of the provision, maintenance and operation of the New M4 and the maintenance and operation of the existing section will be referred to as the New M4 Network.

The remainder of this business case will discuss the benefits and disbenefits of a range of configurations, referred to as Scheme Options, which include the New M4 Network, with and without tolling of the new section of road and with and without Associated Measures.

Base-line for Evaluation – Do Minimum Scenario

In order to evaluate the likely impacts of any proposed transport intervention, it is necessary to define a base-line situation against which comparisons can be made. This base-line situation is referred to as the Do Minimum scenario. For any particular future year, the Do Minimum scenario will include committed transport network and service modifications and/or developments that are likely to be in place by that year.

In the case of the New M4 Project, the Do Minimum scenario has the following features:

- Does not include the New M4;

- Includes the following road improvements:
  - M4 Castleton to Coryton Widening
  - A465 Heads of the Valleys Dualling (Abergavenny to Hirwaun)
  - Cardiff Eastern Bay Link
  - M4 Junction 24 Coldra Roundabout Improvement
  - Traffic Management in Newport including signalisation of various junctions and city centre redevelopment;
- Newport Eastern Expansion; and
- Tolls on River Severn Crossings

High and Low Development Scenarios

The inclusion of future land use developments in traffic forecasts depended upon their status within the planning system at the time of the assessment. From consultations with Newport City Council, Newport Unlimited and Monmouthshire County Council, developments that were almost certain to go ahead by the forecast year were included in the low development scenario. Developments that were less certain were included in the high development scenario.

5.1 Associated Measures

The Associated Measures considered as part of the project are highlighted in the following table and have resulted from consideration of their contribution to the delivery of the project objectives.

Table 5/1: Short List of Possible Associated Measures

Measure	Comments	Outcome
High Occupancy Vehicle (HOV) lanes on existing M4	Research has shown that there are significant safety concerns regarding the use of HOV lanes on the existing motorway	Deferred for further consideration of safety issues. The proposed ITS system will enable the introduction of HoV lanes.
Junction Improvements at High Cross (M4 J27)	Considered in isolation, it is unlikely that this measure would have a material impact on traffic.	Deferred.
B4245/ M48 Junction east of Magor	Likely to have a material traffic benefit and improve accessibility	To be included in initial package of associated measures
Corporation Road Link	Likely to have a material traffic benefit and improve accessibility	Further consideration needed on deliverability.
Improvements at Magor	This measure is not deliverable as a part of the New M4 project as the necessary powers are not available	Not deliverable as part of this project but subject to further consideration
Coldra Interchange Improvements	Timing issues exist such that this work is required to be completed before 2010 and as such will be progressed separately	Will be undertaken prior to this project

Measure	Comments	Outcome
De-classify to non-motorway status the existing M4 between Castleton & Magor	Likely to have a material traffic benefit	To be included in initial package of associated measures
Caerleon Road Western Connection	There are significant safety concerns regarding this work	Deferred for further consideration of safety issues
Provide cycleway, footway bridleway along New M4 Corridor.	If delivered in isolation, likely to cause significant cost increases without equivalent benefits	Potential for inclusion as part of service roads / access provision

The Associated Measures to be included (see shaded rows above) in this business case are:

- To de-classify the existing M4 from motorway status between Junction 23 (Magor) and Junction 29 (Castleton).
- The construction of a new junction between the B4245 and M48 east of Magor.
- The cycleway and bridleway Associated Measure are likely to be met by making use of access routes provided as part of the new highway.

5.2 Approach to Scheme Options Appraisal

There are two major facets of appraisal of the Scheme Options in this Outline Business Case. The first being a sustainability appraisal considering the various options to determine economic, environmental and social impacts. The second facet of scheme options appraisal was a Value for Money assessment, following HM Treasury guidance, of the New M4 Project if delivered as a Public Private Partnership (PPP) project and an assessment of the financial implications for the Assembly of the New M4 Project.

Both these forms of appraisal consider risk adjusted scheme costs and any revenues (tolls) that such a scheme might attract. As such 'costs' include the costs of construction, operation and maintenance of the scheme and allowances for risk and 'Optimism Bias'[2].

The 'stepwise' approach to appraisal of the New M4 Project is as follows:

- Consideration of Transport Economic Efficiencies, Wider Economic Benefits, Environmental and Social impacts.
- Calculation of toll revenue and the effect of tolls on network demand.
- Assessment of scheme costs, taxation treatment and financial implications.
- Assessment of procurement options including value for money assessments and financial implications.

5.2.1 Tolling

Two key considerations have been uppermost in the approach of the Department for the Economy and Transport to tolling strategy.

[2] Optimum Bias refers to the known tendency for the costs of projects to be underestimated, particularly in the early stages of developing and costing projects. The Treasury's Green Book requires an adjustment to be made for optimism bias for all public sector investments.

- First it is considered that if tolls are to be introduced on the New M4 expressly for the purpose of funding a new high quality route around Newport, the existing M4 should be left untolled as a free but lower standard alternative route.
- Second is that it is not considered appropriate to introduce tolls on the New M4 until any major construction and maintenance works which are required on the existing M4 have been completed.

Traffic modelling, using a Toll Choice Model, has been undertaken to show how users would respond to different levels of average tolls for use of the New M4. The model has taken into account the findings of interview surveys carried out in 2005/2006 to assess the willingness of road users in South Wales to pay tolls to use a New M4.

The Toll Choice Model takes inputs of trips, times and costs from the traffic model developed for the New M4 project and identifies the effect that introduction of tolls would have on route choice throughout the region and also determines a revenue maximising toll for each situation. The results of these modelling and other financial considerations are discussed in Chapter 7.

5.2.2 Financial Appraisal

The financial appraisal undertaken for this business case has been used to assess the likely cost to the Department for the Economy and Transport/Welsh Assembly Government and the Value for Money of different approaches to financing and procurement of the scheme. This could involve the private sector taking on a long-term operating concession, covering both new construction and maintenance activity. The financial appraisal has followed HM Treasury Guidance on Value for Money Assessment.

Financial modelling has been used to analyse the payments required from the public sector over a typical long-term contract period, based on estimates of project costs. The assessment also compares those payments to potential toll revenue income where appropriate. The procedures employed in the financial modelling are designed to produce a shadow bid model which replicates the bids that could be expected from the market based on current project parameters and assumptions. The appraisal has taken into account the costs of the potential risks associated with the concession and allowance has been made for optimism bias. The assessment of value for money has been made in both quantitative and qualitative terms, as required by HM Treasury Guidance.

The assumptions underpinning the financial analysis of scheme options, and the findings and conclusions from that analysis are presented in Chapter 10.

5.2.3 Economic, Environmental and Social Appraisal

The economic, environmental and social appraisal considers the merits of different options against Government policies and criteria relating to economic, environmental and social impacts.

The assessment of transport economic impacts has been based on the application of tried and tested traffic models which have been successfully validated to national requirements. The environmental and social appraisals are largely qualitative at this stage, drawing on the findings from consultation with key environmental bodies and highlighting where significant impacts would arise.

Table 5/2: Scheme Options for further appraisal

Make-up of Scheme Options		**Option 1: New M4 Network - Untolled**	**Option 2: New M4 Network - Tolled**	**Option 3: New M4 Network – Untolled; with Associated Measures**	**Option 4: New M4 Network – Tolled; with Associated Measures**
New M4	A new Dual 3-lane motorway between Magor (Junction 23) and Castleton (Junction 29). The maintainable network will extend from Castleton in the West to the Second Severn Crossing on the M4 and the original Severn Crossing on the M48 to the East. The existing M4 remains untolled.	✓	✓	✓	✓
Associated Measures	1. The de-classification of the existing M4 to non-motorway status between Magor and Castleton			✓	✓
	2. A new roundabout junction connecting the M48 and B4245 to the east of Magor			✓	✓
M4 Toll	New M4 is tolled		✓		✓

6 Economic, Environmental and Social Impacts

6.1 Introduction

Current guidance for transport proposals in Wales requires that planning should be objectives driven; and the appraisal of transport proposals should focus on impact in three key areas, namely, *the economy, the environment and society.*

In this Chapter, the appraisal of scheme options for the New M4 Project is discussed in terms of the relative economic, environmental and social impacts and relative performance against the high level objectives.

Appraisal, under the Economy impact area, has two components, namely:

- Transport Economic Efficiency (TEE), which covers the impacts ordinarily captured by standard cost-benefit analysis: and
- An assessment of Wider Economic Benefits (WEB) has been undertaken.

The purpose of the TEE analysis is to summarise the costs and benefits incurred by users and operators of the transport system and those providing funding.

In line with current Department for Transport Guidance, the WEB assessment captures consequences beyond the transport user benefits covered in the TEE. Wider economic benefits relate to productivity effects linked to reduced transport costs.

6.2 Traffic Predictions

A number of different options for the New M4 Project were assessed using a traffic model that was specifically developed for the purpose. The preferred option comprises the New M4 motorway with a new junction between the M48 and the B4245 east of Magor with re-classification of the existing motorway to trunk road around Newport. It has been assumed that the New M4 would be open in 2016. Consideration has also been given to the traffic effects of tolling the New M4, in which case tolls would be introduced in 2021, after clearance of the maintenance backlog.

The design year for the New M4 has been taken as 2031, which is 15 years following opening as advised in the Design Manual for Roads and Bridges. Traffic forecasts with and without (Do Minimum) the New M4 Project have been prepared for 2031 in order to evaluate the potential transport benefits of the scheme against the estimated costs. This evaluation has shown that the scheme with a new junction between the M48 and the B4245 is likely to increase benefits to costs ratio compared to the scheme without this junction.

Capacity assessments have shown that, with the New M4 in 2031, both the existing route and the New M4 would be expected to operate within capacity.

Introducing tolls on the New M4 would reduce the demand to use the new motorway as only those road users willing to pay for the time savings and the better alignment would travel on the toll road. With reduced demand to use the New M4, traffic would divert back onto the existing network resulting in traffic congestion, although this would not be as severe as the situation without the New M4.

6.3 Transport Economic Efficiency (TEE)

The TEE analysis is designed to make explicit the impact of each of the scheme options for the New M4 Project on the economic efficiency of the transport system.

As a basis for appraisal of the transport impacts, a New M4 Traffic Model has been developed and is based on observed traffic movements and road network details collected in 2005. It has been shown to be capable of replicating the existing situation on the roads in the Newport area for the base year of 2005. The traffic model has been used to prepare traffic forecasts for the New M4 Project. These traffic forecasts provide information on likely future traffic flows on the motorway and other roads in the Newport area for each of the scheme options.

Local market research was conducted in 2005/06 involving users of the M4 motorway around Newport in order to gauge willingness to pay tolls for the use of a new section of motorway. To this end, around 1000 car drivers and some 50 heavy goods vehicle (HGV) drivers were interviewed. This is considered a robust sample size. Based on the results of the market research (Stated Preference surveys), a Toll Choice Model was developed. Output from the New M4 Traffic Model and Toll Choice Model provided input for the Transport Economic Efficiency (TEE) analysis. For this purpose, standard Department for Transport TUBA software was used.

Traffic forecasts have been prepared for both high and low development scenarios. The actual traffic volumes that might occur in the future are expected to be within the range of flows predicted by the scenarios tested. However, in order to provide input to the TEE analysis, a central traffic growth scenario has been assumed which is an average of the high and low forecasts. This is because traffic volumes are likely to depend on national factors, such as fuel prices and economic activity, as well as on local factors, such as the extent of development which takes place locally. Forecasting future growth is not a precise science and, whilst every effort has been made to obtain robust results, the outcome of such a modelling exercise inevitably includes some uncertainty and hence risk.

The purpose of the TEE analysis is to summarise the costs and benefits of each scheme option; for the New M4 Project, the indicators are:

- Capital Costs.
- Annual operating costs (e.g. maintenance).
- Travel time savings.
- Vehicle operating costs.
- Impacts during construction and maintenance.
- User charges.
- Accident savings.

The TEE analysis compares the discounted value of transport benefits of the scheme options (compared with a base-line situation, based on forecast traffic growth, often referred to as Do Minimum) with the discounted value of costs of implementing and operating the Scheme Options. All entries in the TEE table are quoted as Present Value, i.e. discounted to a base year (which under current guidance is 2002).

The Net Present Value (NPV) for a scheme option is calculated by subtracting the Present Value of Costs (PVC) from the Present Value of Benefits (PVB); the Benefit to

Cost Ratio (BCR) is the PVB divided by the PVC. In the most general terms, a positive NPV (and thus a BCR greater than unity) indicates that the monetary benefits when measured against the base-line are more than the costs of the option.

6.3.1 Results of Transport Economic Efficiency Assessment

Table 6/1 presents a comparison of the relative performance in transport economic terms of the Scheme Options on the basis that the scheme would be procured through conventional capital investment by the Welsh Assembly Government. For Scheme Options 2 and 4, it has been assumed that tolling would take place from 2021 for the remainder of the evaluation period.

Table 6/1: Summary Results from TEE Analysis (Central Growth)

	Net Present Value (NPV) £000*	**Benefit / Cost Ratio (BCR)**
Option 1	1,446,497	4.07
Option 2 (tolled)	-85,469	0.56
Option 3 (with associated measures)	1,659,772	4.47
Option 4 (tolled, with associated measures)	44,237	1.22

** 2002 prices in accordance with WebTAG guidance*

The results indicate that:

- In pure transport economic terms the provision of the New M4 would be expected to result in substantial positive benefits.
- The effect of introducing tolls on the New M4 is expected to reduce substantially the benefits.
- The introduction of associated measures is seen to increase the value in economic terms as the presence of a connection between the M48 motorway and the B4245 east of Magor reduces local network delays.

6.4 Wider Economic Benefits

Traditionally, the assessment of transport improvements has been limited to the quantification of direct welfare benefits to the consumer (business travel/commuters/ leisure travellers) in terms of time savings, cost savings and improved reliability. Whilst such elements are clearly central to the decision process, an appraisal of a proposed transport intervention is incomplete without reference to 'Wider Economic Benefits' (WEB). Addressing wider economic benefits takes the analysis of transport interventions a step further. Wider economic benefits relate to effects not captured through conventional transport appraisal. In essence, it is an attempt to establish and/or quantify the impacts of improved accessibility and reduced transport costs on productivity and headline economic performance, in particular GDP[3].

Department for Transport guidance has been adopted to estimate the potential wider economic benefits and GDP impacts of the New M4.

[3] Gross Domestic Product (GDP) is the value of all goods and services produced in an economy in a given year.

6.4.1 Estimating Wider Economic Benefits (Option 3, Associated Measures)

Department for Transport guidance provides a framework for estimating wider economic benefits based on changes in transport costs. The framework is based on the following elements:

- Agglomeration economies – productivity benefits for firms of reduced *effective distance* and improved connectivity within and between urban areas.
- Increased output – market/turnover impacts of lower transport costs for firms.
- Increased labour supply – lower commuting costs encouraging increased participation and changing patterns of employment.

The benefits of the New M4 Project can be summarised according to welfare and GDP effects. Welfare effects relate to the gains and losses that people experience, for example, based on the value placed on time. GDP effects relate to the financial effects on the real economy.

Initial estimates of the wider economic benefits of Option 3 suggest that, in welfare terms, the New M4 has wider economic benefits of £695m PV for the 60 year appraisal period. This represents an increase in scheme benefits of approximately 33%. The 'wider' benefit / cost ratio, once these benefits are included, increases from 4.47 to 5.93.

6.5 Environmental Impacts

6.5.1 Introduction and Purpose

The environmental impacts of transport proposals are distinguished by those attributable to the physical components of the development (land take, drainage and so on) and those that follow from changes in the pattern of traffic movement (resulting, for example, in changes in air quality or noise). The main impacts broadly occur:

- Along the existing route;
- In association with proposed development (New M4 Preferred Route); and
- On the remainder of the transport network experiencing change.

These may be termed the three principal "environmental impact areas".

Whilst secondary impacts can occur outside these three areas the purpose of this business case is to distinguish the main environmental differences between options and to understand the implications of measures which might be required to mitigate any adverse effects in each case. This purpose can be largely satisfied by focussing on the main areas of change.

Considerable consultation has taken place with the environmental agencies, through both informal and formal mechanisms and consequently there is a good understanding of the mitigation expectations of relevant stakeholders.

6.5.2 Environmental Characteristics of the Area

Existing M4

The existing M4 passes through complex topography and built up areas on the north side of Newport, being most constrained in the areas of St Julians, around the Brynglas Tunnels and at High Cross where housing areas lie adjacent to and/or above the road.

High traffic volumes along the M4 contribute not only to poorer air quality but also noise pollution, compromising the aural amenity of neighbouring residential communities.

New M4

The environs of the Preferred Route are characterised by flat coastal lands (Gwent Levels) to the south of Newport which are sparsely developed and populated. The Gwent Levels are a man-made landscape created by systematic reclamation, since Roman times, of salt marsh alongside the Severn Estuary. The reen drainage system supports a diversity of flora and fauna, largely protected by SSSI (Site of Special Scientific Interest) designations. In addition, the Levels are registered as landscape of Outstanding Historic Interest in Wales, acknowledging their evolution and archaeology.

Land in the Gwent Levels is mainly agricultural, in moderate to good categories, comprising a mixture of dairy, arable, poultry and mixed livestock units. Air quality is good and the Levels meet many of the criteria for a “tranquil area” – denoting low disturbance from urban influences – particularly true closer to the coast but not so further inland where their part of the boundaries are adjacent to both light and heavy industries.

The New M4 follows the northern edge of the designated areas, where the countryside interfaces with those industrial areas of Newport and the urban regeneration site (former steelworks) at Llanwern. The alignment of the road has been selected to minimise its impact on the integrity of the Levels landscape and unique character.

Transport Network

The transport network potentially affected by changes to the M4 round Newport is variable and can best be characterised as predominantly urban, with housing areas and local communities potentially affected by changes to amenity, accessibility and severance caused by an increase or decrease in traffic volumes or change in the type of traffic.

Summary Evaluation

There is a clear distinction between the environmental qualities of the existing M4 and New M4 corridors which allow characterisation of impacts along the former as predominantly “people” related and along the latter as predominantly affecting “natural and historic” resources. In the wider transport network area the picture is less consistent but tends towards more residential amenity effects.

6.5.3 Do Minimum

The “do minimum” scenario, whilst resulting in some trip suppression due to congestion effects, means that annual traffic growth (vehicle kilometres) will be distributed across the existing road network. For through trips this is expected to lead to more congested conditions on the M4 and diversion onto local roads such as the A48 Newport Southern Distributor Road (SDR).

Assuming no improvements to vehicle emissions technology the increased flows and stop start conditions will give rise to more vehicle emissions along these routes.

The primary environmental advantage of the “do minimum” scenario is the absence of environmental impacts from the construction of the new road (see below).

6.5.4 Significant Environmental Effects of the New M4

The construction of the New M4 has significant environmental effects which focus on the Preferred Route corridor and arise from the construction of the road and its subsequent use. The main impacts are summarised below:

- **Ecology** The Preferred Route will cross 8.5km of SSSI resulting in the loss of up to 60 hectares (less than 1.5% total SSSI). The primary interest of the SSSI stems from the flora and fauna of the reen network, and whilst (subject to design changes) up to 2.4km of reen will be lost, there will be a net increase in length of new reens created by the provision of 3km of new ones. The route also crosses the River Usk SAC (Special Area of Conservation) and is close to designated SPAs (Special Protection Areas). New planting for wildlife is proposed to mitigate the loss of valuable terrestrial habitats. Tunnel crossings and specialist fencing is proposed to mitigate the barrier effect of the road to animal movements.
- **Geology and Soils** Construction of the road will have an effect on the natural landform. A major cutting up to 45m deep will be required at Castleton to accommodate the new interchange. A lesser cutting will be needed at Magor. Low embankments will be constructed across the Gwent Levels. Some areas of contamination along the path of the road have been identified requiring removal or stabilisation on site.
- **Landscape** Across the coastal levels the road will cut across the grain of the landscape. Proposed new planting of hedgerows and woodland blocks will partially mitigate the impact. Hillier topography at either end means cuttings and an elevated approach embankment at Castleton. It is proposed that the high embankment will be graded out to alleviate the appearance of an engineered slope and allow some return to agriculture. A major new bridge feature with potential for iconic design is proposed across the Rivers Usk and Ebbw and Newport Docks.
- **Heritage** The route cuts across the registered historic landscape, however, the alignment along the northern edge of the Gwent Levels minimises fragmentation of this landscape. An ancient standing stone is situated close to the edge of the route and regard must be had of its location. A Grade II listed building, formerly a vicarage but now a private dwelling, would need to be demolished.
- **Land use** One other residence would also be lost while the permanent land take for the road will be approximately 224 hectares. Just under 72% of this is ALC (Agricultural Land Classification) grades 3a and 3b while 26% is classified non-agricultural or urban. Businesses premises likely to be affected are located mainly within the Docks area.

- **Water resource** — Cross drainage will be maintained through 26 culverts to ensure that flow paths across the highway embankment of the New M4 are not altered. The surface water run off from the carriageway will be discharged to the reen system after going through stringent attenuation and treatment processes in the 12 Water Treatment Areas to be provided along the route. The Gwent Levels are classified as a protected flood plain. The road will be placed on an embankment so that in the event of a catastrophic breach of the defences coinciding with an extreme tide event, the road will not be inundated.
- **Air Quality** — Reductions in pollution levels will be experienced in areas alongside the existing M4 in Newport. The road will give rise to a deterioration in air quality near the new route but standards will not be exceeded and there are relatively few receptors.
- **Climate Change** — Improvement in motorway operating conditions with has been forecast to lead to reduced CO2 emissions for that part of the network.
- **Noise** — The operation of the motorway would change much of the character of the Gwent Levels by introducing a new source of noise which is likely to increase ambient levels by up to 10db at distances of 1km or more. Whilst traffic flows on the existing motorway will reduce, the decrease in noise levels, in most cases is predicted to be less than 2dB and therefore not likely to be significant. Noise barriers are proposed to reduce noise impacts in certain locations on the new route.

6.5.5 CO_2 Generation

The traffic models developed for the scheme have been used to prepare preliminary estimates of the total CO_2 produced by vehicles on the motorway network in south east Wales. Previous research has identified that a vehicle's instantaneous speed and the product of its speed and engine loading (acceleration) are the factors that have greatest influence on emissions for a particular vehicle type. Greater acceleration and increasing speed will increase vehicle emissions. Thus, stop/start conditions would be likely to result in greater CO_2 emissions than Free Flow vehicle speeds. Improvements in network efficiency for motorway traffic are predicted to result in a decrease in CO_2 emissions on the motorway network between J23 and J29.

However, it should be noted that there are strong views that if the model were re-run on a wider geographic area, these findings may not be replicated.

6.6 Social Impacts

6.6.1 Introduction and Purpose

This section provides a summary of the social impacts of the scheme options, focusing on transport safety, permeability and social inclusion. These impacts are described in more detail below. Personal security will not be considered as there are unlikely to be any significant variations between options on actual or perceived personal security. Similarly, physical fitness will not be assessed as the effects of the New M4 Project on physical fitness are likely to be negligible as journeys using the existing M4 are generally too long for walking or cycling to be a feasible alternative.

6.6.2 Transport Safety

The safety of a highway network can be measured in terms of accident rates, which is the number of personal injury accidents (pias) occurring or likely to occur per million vehicle kilometres: damage only accidents are not recorded.

The Design Manual for Roads and Bridges[4] provides default accident rates; these are considered reasonable average rates for particular categories of road. However, for the existing M4 around Newport, local accident rates have been calculated based on reported accident data and traffic flows for the period 2002 to 2005. These observed accident rates for the existing M4 around Newport, compared to the default value for the same standard of road are summarised in Table 6/2 below.

Table 6/2: Accident Rates for Existing M4 around Newport

Section of Existing M4	Highway Standard	Accident Rate[1]	Length (m)
J29 to J28	D3M 'Good'	73%	3,880
J28 to J26	D3M 'Poor'	184%	4,980
J26 to J25	D2M 'Poor'	141%	1,920
J25 to J24	D3M 'Poor'	133%	4,850
J24 to J23	D3M 'Good'	43%	8,160

[1] *The accident rate is expressed as the observed accident rate as a percentage of the average accident rate for the particular category of road.*

In terms of relative performance, Options 1 and 3 provide the greatest improvement as these options encourage greatest use of the New M4. For Options 2 and 4, less traffic is expected to use the tolled section of motorway, which reduces the safety gains.

6.6.3 Permeability

Permeability relates to any change in the ease with which people in the affected area can travel by non-motorised modes eg on foot, by bicycle or on horseback. It is also referred to as "severance".

The existing M4 runs to the north of Newport on a tight alignment such that it has severance effects upon established residential areas such as High Cross, Bettws,

[4] Design Manual for Roads and Bridges, Volume 13, Part 2, Chapter 4

Malpas, St. Julians, Christchurch and Caerleon. The provision of the New M4 to the south of the city would reduce traffic volumes on the existing M4. However, this would have no impact on the severance effect of the existing M4. The New M4 alignment avoids built-up areas such that the severance impact would be minimal.

There is little scope to improve permeability as a result of the New M4 Project. However, with the introduction of the associated measures under Options 3 and 4, the de-classification of the existing M4 could result in uses which improve permeability.

The introduction of a new junction between the M48 and B4245 to the east of Magor (Option 3 and 4) would be expected to relieve the B4245 of traffic through Magor and Caldicot, which would positively impact upon permeability in these urban areas.

6.6.4 Social Inclusion

For people without access to a car, the quality of transport connections to learning, employment, healthcare, food shops and cultural, social and sporting activities essentially means the quality of the public transport network. The introduction of the New M4 alone is likely to have a neutral impact on public transport services. With the introduction of the associated measures, there is potential for reallocation of road space on the existing M4.

An Accessibility Model has been developed with capability to predict ease of access to jobs, shopping, leisure and other activities across the study area. It provides an indication of the likely changes in access opportunities, mainly for those with a car available, as a result of the New M4 Project. For this purpose, two measures of accessibility are used, namely:

- A measure of accessibility to jobs (referred to as “origin accessibility”); and
- A measure of catchment population from destinations within the region (referred to as “destination accessibility”).

The areas that gain most due to the New M4, in terms of accessibility from origins, are Magor, the A467 and A449 corridors, areas of Newport closest to motorway junctions, Chepstow, eastern Cardiff and the A4042 corridor. The Magor area receives the greatest benefit of around 33% (ie residents of Magor benefit from 33% more employment opportunities within reasonable reach, with the New M4). Nevertheless, there are very slight improvements throughout the study area, including the greater Bristol area, with the New M4 in place.

The areas that would experience most improvement, in terms of catchment population from destinations as a result of the New M4, would be Magor, east Newport, Risca, south-west Newport, eastern Cardiff and Chepstow. For example, in the east Newport area (Queensway Meadows and the Llanwern development area) there would be a 15% increase in potential employees and customers with the New M4 in place. Accessibility by car between homes and employment would improve generally with marginal/slight improvement to mid Valleys communities and in the Greater Bristol area as a consequence of the New M4 Project.

The proposed link/junction between the M48 and the B4245 as part of the associated measures included in Options 3 and 4 is also likely to improve further accessibility, especially for the areas around Magor and Caldicot.

6.6.5 Tolling

Tolling the New M4 alone would impact severely on transport economics; the NPV's would be negative (the benefits of the tolled project would not outweigh the costs) and the BCRs would range between just above 0 to 0.9, ie for every £1 invested, less than £1 is returned. In pure transport economic terms, there is no justification for tolling the new road.

Tolling would divert traffic away from the new motorway onto the existing motorway or local road network. The congested peak time conditions currently experienced on the existing motorway would likely return within the 'Design Year' [5] of the New M4 Project. The anticipated reduction in journey times and improved reliability, and the reduced frequency of incidents and accidents on the existing motorway would not be realised to the same degree if the New M4 were tolled.

Tolling would have the effect of suppressing some car trips compared with the untolled situation. Nevertheless, more CO_2 would be generated in the tolled situation due to reduced network efficiencies and local air quality emissions would be worse along the existing route as through traffic elects to use the untolled route.

Overall, tolling would negate many of the benefits of the new road and would not meet the Transport Planning Objectives to the same degree as an untolled option.

5 The Design Year is defined as 15 years after opening.

7 Tolling

7.1 Introduction

The following section identifies the issues associated with tolling of the New M4, highlighting the effects on network demand if tolls are introduced, the potential revenues raised and the impacts on project economics.

The results presented have been developed through application of the Toll Choice Model and based upon surveys with potential users.

7.2 Revenue and Demand

Figures 7/1 and 7/2 below illustrate how users would respond to different levels of average tolls for use of the New M4. Tolls are assumed to start after the major maintenance activities planned for the existing section have been completed and as such a viable 'free to use' alternative is available. This is estimated as being 2021.

Figure 7/1: Traffic Demand for different average toll rates

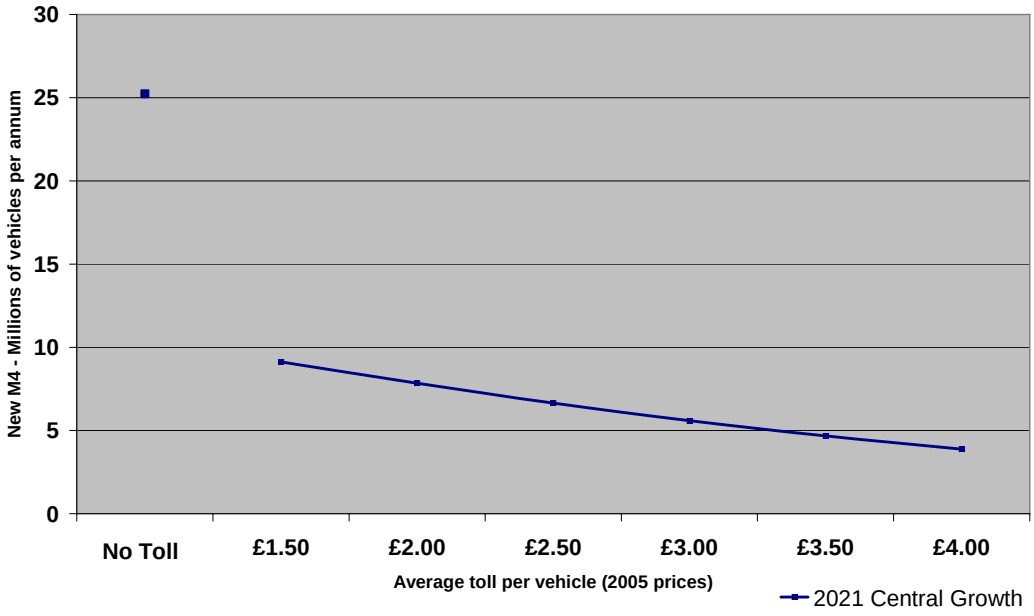
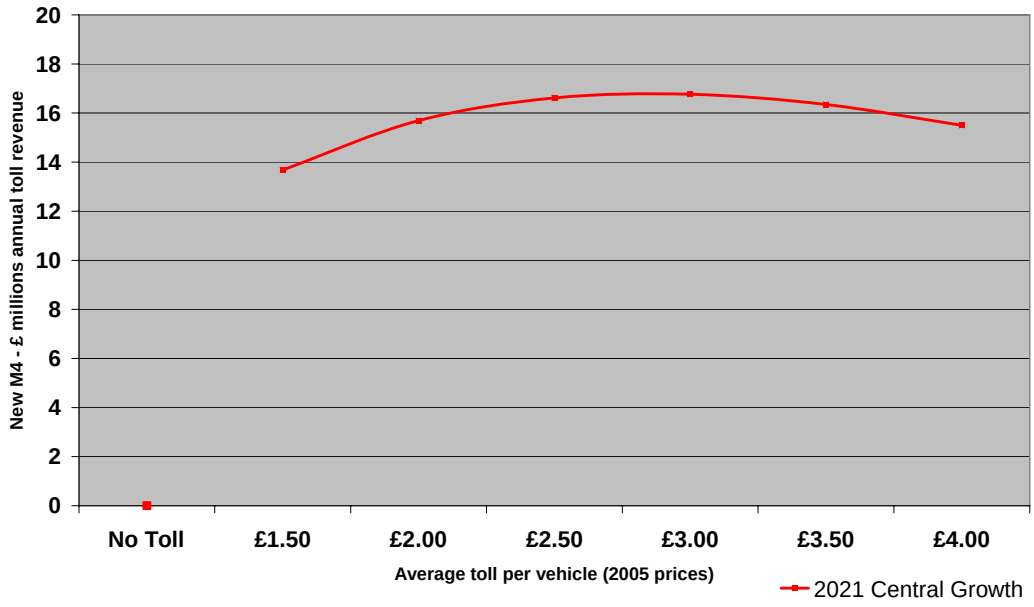


Figure 7/1 shows clearly the substantial impact of imposing tolls on the new road. Introducing an average toll of say £1.50 results in nearly two-thirds of all potential users of an untolled New M4 to revert to using the existing road.

Figure 7/2: Toll Revenue for different average toll rates



For the purposes of assessing the contribution which tolling of the New M4 could make towards meeting the estimated costs of the project, the financial analysis has been based on income forecasts associated with the revenue-maximising toll charges, as shown by the traffic modelling. However, as the appraisal work has progressed it has become clear that tolling of the New M4 alone, even at the revenue-maximising toll rate (shown in Figure 7/2), will yield only relatively modest levels of toll revenue when compared with the funding needs of the project. Also, tolls would seriously erode the economic benefits of the scheme and hinder the achievement of the scheme objectives.

7.3 Toll Revenue

The tolling option involves tolls on the new road, but with the existing M4 around Newport left as a free, untolled alternative. The analysis has assumed that tolls would not be introduced on the New M4 until such time as the planned major maintenance works on the existing M4 have been completed, which is expected to be in 2021.

The revenue forecasts for Options 2 and 4 are based on the central growth traffic forecasts, and assume the revenue maximising average toll rates per vehicle of £3.00 in 2021 and £3.50 in 2031 (expressed in 2005 prices the year of the stated preference surveys which assessed drivers' willingness to pay).

7.4 Economic, Environmental and Social Considerations

One of the themes which emerged from the public exhibitions in 2006 was the concerns regarding the proposal to toll the New M4 motorway with many commenting that placing a toll on the road would 'cancel out' any positive economic benefits the road may bring.

In terms of the Transport Economics and Efficiency (TEE) modelling, the introduction of tolling will lead to a reduction in overall economic benefits for the project. Lower demand for the New M4 as a result of tolling and consequent greater continuing use of the existing M4 will limit the savings and efficiencies obtained from the scheme. As shown in Chapter 6, in terms of TEE analysis the introduction of tolls on the New M4 section reduces the Net Present Value (Present Value of Benefits less the Present Value of Costs) of the project by approximately £1.5 Billion.

When considering the potential economic consequences of the project for Wales, the effect of tolling has also been investigated. The modelling of GDP and employment effects indicates that imposition of a toll on the New M4 would serve to reduce significantly the overall scale of the GDP impacts which might be expected to accrue. Initial modelling based upon the use of a spatial economic model suggests that tolling the New M4 would significantly reduce total GDP impacts in the long term.

In terms of traffic volumes, tolling has the effect of suppressing overall car trips, but with lower diversion to the New M4. The overall effect for all air quality parameters is that the tolled motorway scenario is worse than the untolled option, albeit in totality the percentage differences are small.

Tolling also has implications for the environmental benefits of the scheme. Tolling will result in greater levels of through traffic continuing to use the existing M4 and other routes in the local transport network. With the exception of CO_2 most emissions are experienced locally so that tolling gives rise to a disproportionate impact on the environmental conditions of communities along the existing route and the rest of the network – an effect which is likely to be exacerbated as toll levels increase. Tolling, therefore, reduces the benefits for communities along the existing road/existing network which might otherwise be derived from the New M4.

7.5 Conclusions

Consideration of tolling of the New M4 highlights the poor value for money which would result from introducing tolls:

- A substantial proportion of potential users of the New M4 would choose to remain on existing untolled roads, thereby undermining to a significant extent the achievement of the objectives for the scheme;
- With less traffic benefiting from the savings and efficiencies associated with the New M4, and more traffic remaining on the existing network, the economic benefits of the scheme would be greatly reduced, and in particular the environmental benefits for communities along the existing route would be less.
- Less use of a tolled New M4 would mean that the revenue raised by tolling would be modest in comparison to the costs of the scheme.

8 Capital Cost and Risk

8.1 Capital Cost

Cost estimates have been prepared for the New M4 (and formerly the M4 Relief Road) since the project's inception in the early 1990's. Estimates have been reviewed and updated as the scheme details have changed and to reflect increases due to construction inflation.

The base cost estimate for the current project is derived from preliminary designs completed in 1999. This estimate was scrutinised as part of the design development process leading to the Preferred Route Review in June 2006. Certain major elements of the project, such as structures, earthworks, landscaping, environmental and pavements were re-assessed where there had been significant changes, with other areas being subject to construction price index adjustments.

Key factors in the revised cost estimate are:

- Between Q4 2004 and Q4 2006 the Road Construction Indices increased by some 20%.
- The costs for structures included for a 250m span crossing of the River Usk with a pier in the river rather than a 450m span with piers outside the river channel.
- Landscaping and environmental mitigation costs increased and now included for aftercare.
- The estimate now includes for a concrete central reserve barrier throughout the project.
- The cost allowances for Statutory Undertakers and Land were not updated as these aspects were the subject of on-going review.
- The estimated costs for Preparation, Site Supervision and Head Office OH & P were increased to be compatible with the Construction Price indices adjustments.

To ensure a robust cost estimate, an experienced civil engineering contractor was employed to review the construction methodology and provide a cross check on the cost estimate. The review resulted in a reasonable correlation with the Scheme Cost Estimate providing a construction cost estimate of **£516m** (Nov 2006 prices) compared to the baseline figure of **£474m**[6] - a 9% (£42m) difference.

8.2 Risk

8.2.1 Optimism Bias

The quantification of risk costs needs to be considered alongside the application of 'Optimism Bias'. The concept of Optimism Bias was introduced into public sector investment appraisal when HM Treasury issued new Green Book guidance in 2003. This requires that an Optimism Bias adjustment should be applied to overall project costs to counter the "demonstrated, systematic, tendency for project appraisers to be overly optimistic". The Treasury guidance sets out recommended upper bound levels of Optimism Bias (in the form of percentage increases in costs) derived for the OBC stage of projects, but notes that upper bound optimism bias can be reduced according to the extent to which contributory factors have been mitigated.

For the purposes of appraisal a two-stage approach to the treatment of optimism bias has been adopted. When considering the cost benefit analyses for the scheme, values

[6] excludes VAT, Risk, Land, Compensation, preliminary design, survey costs, Employers Costs, Operation & Maintenance and Optimism Bias

have been amended to reflect an Optimism Bias (OB) of 15%. When considering affordability, budget impacts and likely costs, the values are expressed as a range to demonstrate the effect and quanta of the 15% OB.

8.2.2 Expected Risk Allocation

The following tables set out the typical risk allocation and transfer that can be achieved under a standard commercial contract or via the establishment of a Public Private Partnership (PPP)[7]. These tables demonstrate the risk that would remain, wholly or in part with the Welsh Assembly Government when establishing a contract to deliver the New M4 and then the risks associated with the ongoing operational responsibilities.

The tables highlight that under standard PPP arrangements, the ongoing operational risks pass to the private partner and the contract and means of delivery also mean that the private partner adopts the risks associated with construction costs and timescales.

Table 8/1: Typical Risk Allocation under Standard Contract Documentation

Risk Type	The Department for the Economy and Transport	Contractor
Approval risk of statutory procedures	✓	
Environmental Risks	✓	✓
Increase in construction costs	✓	✓
Completion risk	✓	✓
Department for the Economy and Transport risks[1]	✓	
Political risk	✓	
Legal Risk	✓	
Force Majeure	✓	✓
Operational risk	✓	
Traffic Volume Risk	✓	
New technical / environmental standards	✓	✓
Increase in operational costs	✓	

[1] *Action from WAG which affect the costs of undertaking the project.*

Table 8/2: Typical Risk Allocation under Standard PPP Contract Documentation

Risk Type	The Department for the Economy and Transport	Private Partner
Approval risk of statutory procedures	✓	
Environmental Risks	✓	✓
Increase in construction costs		✓
Completion risk		✓
Department for the Economy and Transport risks i.e. action from WAG which affect the costs of undertaking the project	✓	
Political risk	✓	
Legal Risk	✓	
Force Majeure	✓	✓
Operational risk		✓
Traffic Volume Risk	✓	✓
New technical / environmental standards	✓	✓
Increase in operational costs		✓

[7] PPP is the name given to a range of initiatives which involve the private sector in the operation of public services.

8.2.3 The Current Risk Estimate

Risks will evolve in two key stages as part of this project before and after signing the contract.

Those risks that occur pre-contract close will be retained by the Welsh Assembly Government in any event and those which occur post-contract close would all be retained by the Welsh Assembly Government but would be transferred as far as possible to the private sector under a suitable contract arrangement; the key issue being that the risk resides with those best placed to deal with it.

Table 8/3: Estimated risk costs (construction)

	50 Percentile (£m)	**80 Percentile (£m)**
Pre-contract risk	£47.7	£51.1
Post-contract risk at full value	£49.2	£54.9
Post-contract risk after private sector pricing adjustment [1]	£32.5	£36.2
Risk cost included in the PSC[2]	**£96.9**	**£106.0**
Risk cost included in the PPP Shadow Bid Model	**£80.2**	**£87.3**

[1] *For the purposes of financial analysis it is assumed that the private sector is able to manage and mitigate certain risks better than the public sector and as such for the purposes of bidding for the project would price it at 66% of its full value. This assumption is based on market evidence and discussions with the Highways Agency.*

[2] *PSC – Public Sector Comparator: an estimate of what the project would cost if traditional procurement methods were used.*

For the sake of prudence, the model used to undertake the financial analysis of the project has included risk at the 80th percentile. In addition, an allowance for risk of 10% has been added to the forecasted operating, maintenance and lifecycle costs.

8.3 Risk Adjusted Capital Cost

The estimated capital costs of the New M4 Project are shown in the table below:

Table 8/4: Estimated Capital Costs for the New M4

Description	**Cost** (£ million, Nov 2006 prices)
	Option 3 (PSC price)
Construction Cost	474
Allowance for Risk	106[1]
Total Capital Cost	**580[2]**

[1] *Does not take account of private sector pricing of risk discussed in 8.2.3*

[2] *An additional downside case with an allowance for Optimism Bias of 15% has also been the subject of financial analysis, the results of which are included as a sensitivity in Section 10 (Table 10/6).*

These costs are presented in real terms in November 2006 prices and exclude VAT, land and compensation costs.

9 Procurement

9.1 Procurement Options

The procurement options available to the Welsh Assembly Government are broadly as follows:

- A conventional procurement exercise where the Welsh Assembly Government enters into a contract with a constructor to provide the asset. The Welsh Assembly Government finances the construction and then, on completion of the works, the asset transfers to the Welsh Assembly Government who then adopts maintenance and operational responsibilities. Currently, the Welsh Assembly Government procures these services in accordance with Restricted Procedures as defined in the EU Public Sector Procurement Directive for Works. Current thinking favours the terms of an Early Contractor Involvement (ECI) Contract.
- The establishment of a partnership with a private company to finance, deliver and operate the project for a period of, in this case, 34 years. The terms of such an arrangement would be formed around the latest Standardisation of PFI Contracts (SoPC) documentation issued by HM Treasury. Given the complex nature of the terms to be developed for such an arrangement, it is likely that the Competitive Dialogue Procedures as defined by the EU Public Sector Procurement Directive would govern the procurement exercise.

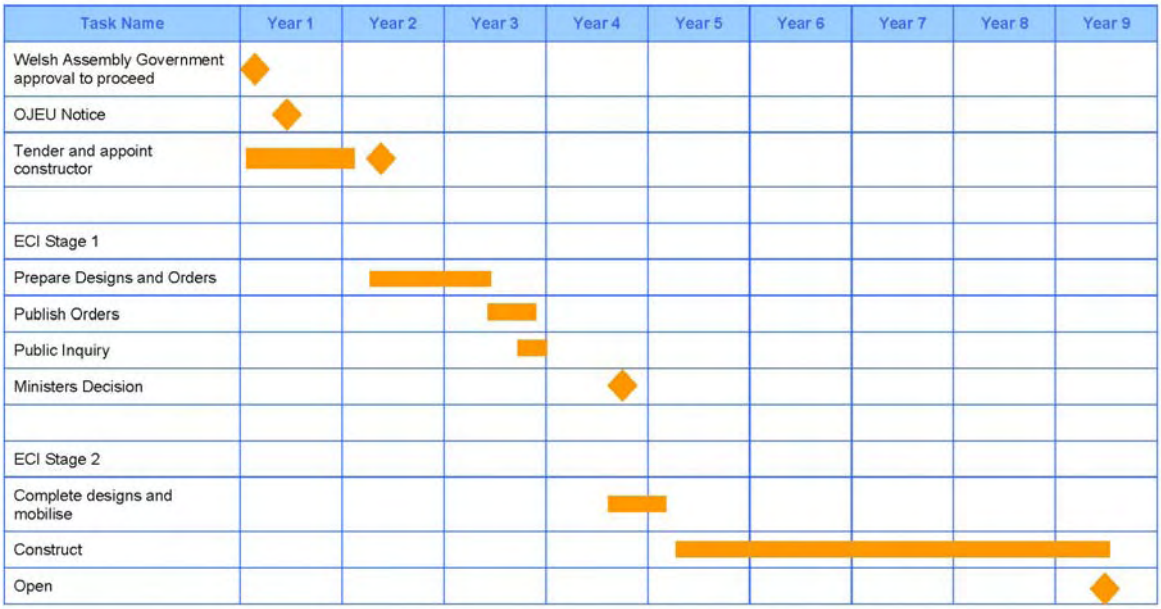
9.1.1 Early Contractor Involvement (ECI)

The ECI contract form would engage the constructor in two stages, the first would be to assist with completion of the design, enhance buildability and complete the scheme costs estimates and budgets. The constructor would also assist with the preparation and publication of the draft Orders needed to obtain the powers to construct the scheme. Should publication of the draft Orders result in objections that lead to a Public Local Inquiry (PLI) being held, the constructor would be an integral part of the team representing the scheme at any such Inquiry.

The second stage of this process would commence once the necessary powers were obtained, when the procuring authority and the constructor would agree the target cost and then build the scheme, generally incentivised with a pain-gain share mechanism operating against the agreed target cost. On completion, the asset would transfer to the procuring authority who would then become responsible for ongoing maintenance and operations.

An advantage of this form of procurement is that the process of procurement and PLI continues in parallel thus, assuming agreement of the target costs providing for an earlier start to works.

Figure 9/1: PPP procurement using the Early Contractor Involvement approach



9.1.2 PPP and Competitive Dialogue

As mentioned above, the establishment of a suitable PPP is likely to be governed by the Competitive Dialogue procedures. The following provides an overview of the process, for further detail reference should be made to the EU Public Sector Procurement Directive.

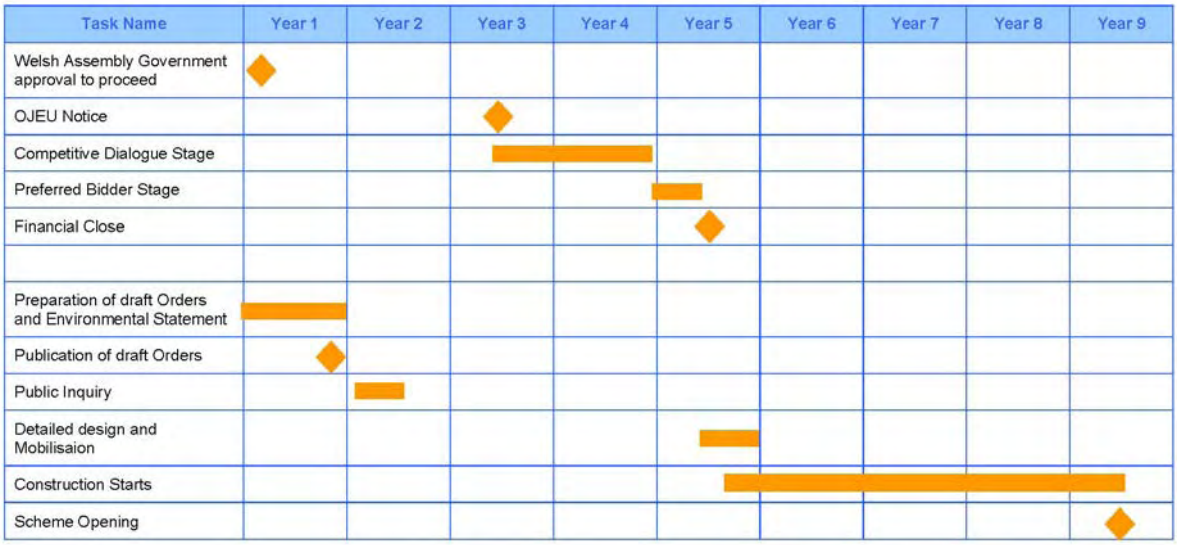
Competitive Dialogue is fundamentally a two stage tendering process during which candidates are invited to partake in dialogue. This represents the first phase of the tendering exercise, during which the procuring authority undertakes concurrent negotiations with at least three potential suppliers. During these negotiations, issues of the contract may be reviewed and/or amended; this is referred to as the 'dialogue phase'. Once all relevant details have been introduced and reviewed within the dialogue phase, dialogue is 'closed' and the procurement moves in to the second stage where candidates are invited to submit their final tenders. Once the dialogue is closed and final tenders are received, no further negotiation or amendment of contract terms or specification can take place; issues may be clarified but not negotiated. The procuring authority can then select the preferred bidder and proceed to contract award.

The key issue to recognise with this process is that all amendments and changes that may occur must be resolved prior to the completion of the dialogue phase. In terms of the New M4, where a Public Local Inquiry will undoubtedly occur, no appointment of preferred bidder would be possible prior to completion of the Inquiry and publication of the report of the independent Inspector as doing so could lead to amendment of the contract or specifications details. This would be considered as further negotiation and provide grounds for invalidating the procurement process and put the Welsh Assembly Government in breach of the EU Directive. Furthermore, due to the costs of bidding for a large infrastructure project such as the New M4 under the competitive dialogue procedure, market experience suggests that it is unlikely that key potential concessionaires would be willing to incur such costs 'at risk' in advance of a planning decision.

In short, the use of Competitive Dialogue procedures will mean that the procurement process should not occur until the PLI and Inspector's Report are complete.

It is also worth noting that the nature of the concurrent negotiations requires a considerable level of resource to be provided by the procuring authority.

Figure 9/2: PPP procurement using the Competitive Dialogue approach



9.2 Appraisal of Procurement Options

The appraisal of procurement options has been based upon the HM Treasury guidelines. This work has been further augmented by considering sensitivities that include earlier start dates or delayed start dates to account for the timescales associated with either the ECI process or the Competitive Dialogue process.

9.2.1 Value for Money Assessment

A key part of the analysis required to determine whether a project is likely to be suitable for PPP procurement is an assessment of whether the PPP route is expected to offer Value for Money (VfM) when compared to the Public Sector Comparator. This process includes both a quantitative and qualitative assessment. So as to ensure that these assessments are undertaken in a consistent manner, HM Treasury in conjunction with Partnerships UK have developed standard approaches.

9.2.1.1 Qualitative Assessment

A qualitative assessment has been undertaken following HM Treasury guidelines. The conclusion of this assessment is that on all three counts of Viability, Desirability and Achievability, a PPP approach has the potential to offer the most appropriate means of procurement.

9.2.1.2 Quantitative Assessment

In terms of the quantitative assessment, HM Treasury in conjunction with Partnerships UK have developed the Quantitative Evaluation Spreadsheet (QES). In developing the business case for the New M4 Project an initial run of the QES has been undertaken.

The key parameters and the headline results extracted from the initial quantitative VfM assessment are provided in Appendix A, Table A/1.

Based on the agreed project assumptions, the base case demonstrates positive quantitative VfM when analysed using the HMT QES model. Sensitivity tests suggest the potential for VfM to be significantly higher and that VfM is maintained even after a combination of downside events. The full range calculated from best case to worst case is approximately 1% - 9% positive quantitative VfM for PPP procurement, see Appendix A, Table A/2.

This provides preliminary evidence that from a quantitative perspective, the New M4 Project appears to be capable of delivering VfM as PPP procurement.

Both the quantitative and qualitative assessments concluded that the establishment of a PPP to deliver the project and subsequent service would provide best value. The analysis provided shows that based on current assumptions the VfM savings associated with the PPP approach would more than offset the reduced construction costs which may result from an earlier start date, if the ECI route were adopted.

10 10 Financial Implications

10.1 Project Costs

For the purposes of this preliminary financial analysis, the underlying project costs and the assessment of risk and optimism bias have been assumed to be the same regardless of procurement approach, with the only key difference being in relation to private sector efficiencies that are assumed to arise when a PPP is established and the pricing of risk.

For the purposes of PPP financial analysis it is assumed that all land and compensation costs are outside of the PPP concession. It is assumed that all land would be paid for separately and made available to the concessionaire when required for construction to commence, on the assumption that best value would be obtained if these costs were met directly by the Department for the Economy and Transport.

Should the New M4 be procured conventionally then the capital cost to the Department for the Economy and Transport is expected to be £667m (2006 prices), including risk and Optimism Bias. Under this form of procurement, the Department for the Economy and Transport would need to fund these costs during the estimated 4 year construction period and as such the expected average annual cost for each of those 4 years is approximately £145m to £167m (in 2006 prices) from 2013, plus land and compensation costs, although in practice this would vary in line with the actual construction expenditure profile. In addition, the Department for the Economy and Transport would need to meet the lifecycle and maintenance costs described below.

10.2 Optimism Bias

As presented previously, the construction cost figures do not include a direct allowance for Optimism Bias but the QRA risk figure does include a value based upon the spread of prices generated during the costing exercise that was completed in 2007. This figure is approximately 3% of the capital value. A downside case which takes account of Optimism Bias at 15% (as discussed in section 8.2.1) on top of the risk-adjusted cost is presented as a sensitivity in section 10.8 and the figures quoted in the affordability section 10.11 are presented as a range.

10.3 Lifecycle and Maintenance Costs

The expected costs of the ongoing lifecycle maintenance programme for the period up to 2046 are shown in Table 10/1 below.

Table 10/1: Expected ongoing lifecycle maintenance costs (PSC prices)

Description	**Timing**	**Whole life Cost** (£ million)
Routine Inspections and Maintenance on the New M4	Commencing 2016, £0.64 million per year.	19.2
Re-surface New M4	2029 – 2031	4.8
Overlay and structures major maintenance New M4	2041 – 2044	30.1

Description	Timing	Whole life Cost (£ million)
Routine Inspections and Maintenance on the Existing M4	Commencing 2016, £1.12 million per year.	33.6
Re-surface Existing M4	2032 – 2034	7.7
Overlay and structures major maintenance Existing M4	2044 – 2046	38.0
Total lifecycle and maintenance costs		**133.4**

These costs are presented in real terms in November 2006 prices.

It should be noted that only the first three items in the above table (totalling £54.1m) represent new cost burdens in relation to the construction of the New M4. The last three items (totalling £79.3m) relate to expenditure on the existing network that will have to be incurred whether or not the New M4 Project proceeds.

In addition to the costs above there is a significant programme of major maintenance planned for the existing M4 between Junctions 23 and 29, which it is assumed will be carried out when the New M4 is open to traffic. However, it is currently assumed that these works will sit outside of the New M4 Project and, as such, the associated costs (expected to be £45.3 million in 2006 prices) have not been included in this analysis.

10.4 Operating Costs

For the purposes of PPP financial analysis assumptions have been made for the operating costs of the Concession Company as set out in Table 10/3 below. If the project were to be procured as a D&B contract, the operating costs that would be incurred by the Department for the Economy and Transport in the administration and management of the New M4 would need to be considered but would likely differ from those set out in Table 10/2:

Table 10/2: Operating costs assumptions for PPP financial analysis

Operating Cost Type	Value £ million per year.
Administration of PPP Company	1
Operational Insurance	0.5

10.5 PPP Efficiencies

In addition, private sector efficiency factors are applied to the construction, lifecycle and maintenance costs in the financial model. These efficiency factors were determined at a project workshop and are designed to take account of the expectation that in a PPP environment the private sector will be able to drive efficiencies out of the design, construction and whole life maintenance cost of the asset compared to a standard public sector project. There is evidence for these efficiencies in previous PPP projects where significant savings have been achieved relative to the Public Sector Comparators. These efficiency assumptions are presented in Table 10/3:

Table 10/3: PPP Efficiency Assumptions

Cost Type	Efficiency %
Capital	7%
Lifecycle	10%
Routine Inspection Costs	0%

Routine Maintenance Costs	17%
Annual Insurance Costs	0%
PPP Administration Costs	0%

10.6 Timing and Financing Assumptions

Table 10/4 summarises the key timing and financing assumptions used when developing the PPP financial model.

Table 10/4: Key timing and financing assumptions for the PPP Model

Description	**Assumption**
Financial close / start of construction	31 December 2012
Construction completion / opening of new road	31 December 2016
Total concession length including construction	34 Years
End of Concession	31 December 2046
Gearing (debt:equity)	90 : 10
Senior debt interest rate	5.50%
Margin during construction	1.00%
Margin during operations	Years 1 – 10 0.85% Years 11 – 20 0.90% Year 21 – end 0.95%
Target minimum ADSCR	1.175
Target IRR (post tax, nominal)	12.00%

Refer to the Glossary for financial terms definitions.

10.6.1 Timing Assumptions

The timing assumptions are based on the expected project timetable for a PPP option that is presented in Chapter 9. The total concession length is assumed to be 34 years; within that the construction period is assumed to last for 4 years (including a 6 month mobilisation and initial detailed design period). The potential benefits of alternative concession lengths will continue to be reviewed, as the project develops to ensure that the payment profile is optimised to meet the needs of the Welsh Assembly Government.

10.6.2 Financing Assumptions

The financing assumptions have been estimated based on precedents from other schemes after having regard to the specific risk characteristics of the New M4 Project and prevailing market conditions. It should be noted that the financing assumptions have a significant impact on the forecast unitary charge from a PPP, and are subject to changes in market conditions and attitudes to risk as well as the underlying interest rate. Throughout the project development process these assumptions will be monitored and amended when necessary to ensure that they remain robust.

10.7 PPP Financial Modelling Results

The potential schemes that may be delivered by the private sector either via conventional or PPP procurement are fundamentally the same with slight variation in

capital and operational content. Therefore the relevant financial results for Scheme Option 3 (New M4 Network, including Associated Measures but excluding tolling) can be considered as robust approximations of the financial implications of the other options.

The key results of the preliminary PPP financial analysis are presented in table 10/5..

Table 10/5: Key results for the preliminary PPP Financial Analysis of Scheme Option 3

Description	£ million
Initial construction cost including risk (2006 prices)	580
Adjustment for PFI efficiency and risk pricing	(58)
Net PFI construction cost (2006 prices)	522
Inflation up to the start of construction period	170
Non construction costs and finance fees	26
Interest rolled up during construction	127
Pre funding of debt service reserve account	33
Net VAT cash flows	1
Total Funding Requirement (nominal)	879
Unitary Charge (pa) 2006 prices	58.7

10.7.1 Unitary Charge

The Unitary Charge is indexed at 1% p.a. reflecting the fact that only a small proportion of the ongoing project costs are subject to inflation, for example debt service costs, which typically represent up to 85% of net income, are usually fixed.

10.8 Sensitivity Analysis

Option 3 has been subjected to thorough sensitivity analysis to provide an indication of the robustness of the project cash flows to changes in assumptions. Table 10/6 sets out the sensitivity tests that have been undertaken, the impact on the key financial parameters and the impact on the indicative quantitative VfM assessment.

Table 10/6: Impact of the sensitivity analysis on the base unitary charge and NPV

	Total Funding Required (nominal)	Unitary charge (pa) 2006 prices	Value for Money
Case Description	**£m**	**£m**	**%**
Option 3	**879**	**58.7**	**5.37**
Inclusive of Optimism Bias at 15%	1,010	66.4	4.62
Capital cost +10%	966	63.9	5.20
Capital cost -10%	793	53.6	5.57
Operating and routine maintenance costs +10%	879	58.9	5.50

	Total Funding Required (nominal)	Unitary charge (pa) 2006 prices	Value for Money
Case Description	**£m**	**£m**	**%**
Lifecycle costs +10%	880	59.1	5.55
Interest rate (senior debt) +1%	901	64.9	-2.87
Construction cost inflation rate +1%	932	61.8	5.26
RPI +1%	880	59.7	14.60
1 Year delay in construction start	913	59.3	5.40
Construction start 1 year early[1]	846	57.9	5.34

[1] *The earliest construction start estimated for a PPP procurement route is 2012.*

It can be seen that the scale of the proposed New M4 Project is such that relatively small changes in key parameters such as capital cost, inflation and senior debt interest rate can have a significant impact on the potential unitary charge of the project.

10.9 Summary Wholelife NPV of costs

A summary of the capital and lifecycle cost of the scheme, and potential toll revenue is as follows in 2006 prices:

	PSC			PPP						
	Construction Cost (£m)	Wholelife Lifecycle / Maintenance / Operating Costs (£m)	NPV of total wholelife project costs (£m)	Construction Cost (£m)	Wholelife Lifecycle / Maintenance / Operating Costs (£m)	NPV of total wholelife project costs (£m)	Unitary Charge (£m pa)	Procurement VFM (per HMT QES)		Toll Revenue (£m) Per annum / Total in as NPV
New M4 untolled	573.9	196.8	881.0	516.0	173.3	833.0	58.2	5.4%		NA
New M4 tolled	579.9	196.8	886.0	522.0	173.3	838.0	58.2	5.4%		16.8 / 245
New M4 untolled with associated measures	579.9	196.8	893.0	522.0	173.3	845.0	58.7	5.4%		NA
New M4 tolled with associated measures	585.9	196.8	899.0	528.0	173.3	851.0	58.7	5.4%		16.8 / 245

In terms of the toll revenue it should be noted that the figures above represent the annual toll revenue in 2021, the first year of tolling and are presented in 2006 prices to

enable comparison with the annual unitary charge. It should be noted that the Unitary Charge indexes at less than RPI and therefore over time the gap between the toll revenue and the unitary charge will reduce.

10.10 VAT Treatment

All of the costs and unitary charges presented in this section are exclusive of VAT. The VAT position in relation to the New M4 Project is complex and will present a real and significant project cost to the Welsh Assembly Government. VAT liabilities are additional to the costs already outlined in this section.

10.11 Affordability (2006 price base)

The New M4 Project if procured conventionally would require the Welsh Assembly Government to fund the initial construction cost (£667m including Optimism Bias). Assuming a 4 year construction period; this would require approximately £145 million to £167m per annum (in 2006 prices) from 2013. On completion of construction, the Welsh Assembly Government would be liable for lifecycle and maintenance costs which would be of the order of £133 million to £153 million over the 30 years following opening of the new road, plus the costs of procuring, administering and monitoring ongoing short term contracts.

Should the scheme be procured as a PPP project if it is to be accounted for as 'on-balance sheet' the PPP capital cost of the asset (£522 million to £600m including Optimism Bias) although not paid out in cash terms would need to be taken account of in the year of completion.

Delivery of the New M4 via a PPP scheme option will require the Welsh Assembly Government to pay the total Unitary Charge of approximately £58m p.a. (2006 prices), plus any irrecoverable VAT on that unitary charge.

For the project to proceed the Welsh Assembly Government will need to confirm that the necessary finance is available. Based on the current programme, if the project were to go forward as a conventional procurement, confirmation of the intention to fund would be required before draft Orders are published and certainly before any Public Local Inquiry i.e. early to mid 2010.

11 Deliverability

11.1 Introduction and Purpose

This section sets out how the New M4 project should be developed, procured and delivered on time and to budget, taking account of the early stages of development of the project.

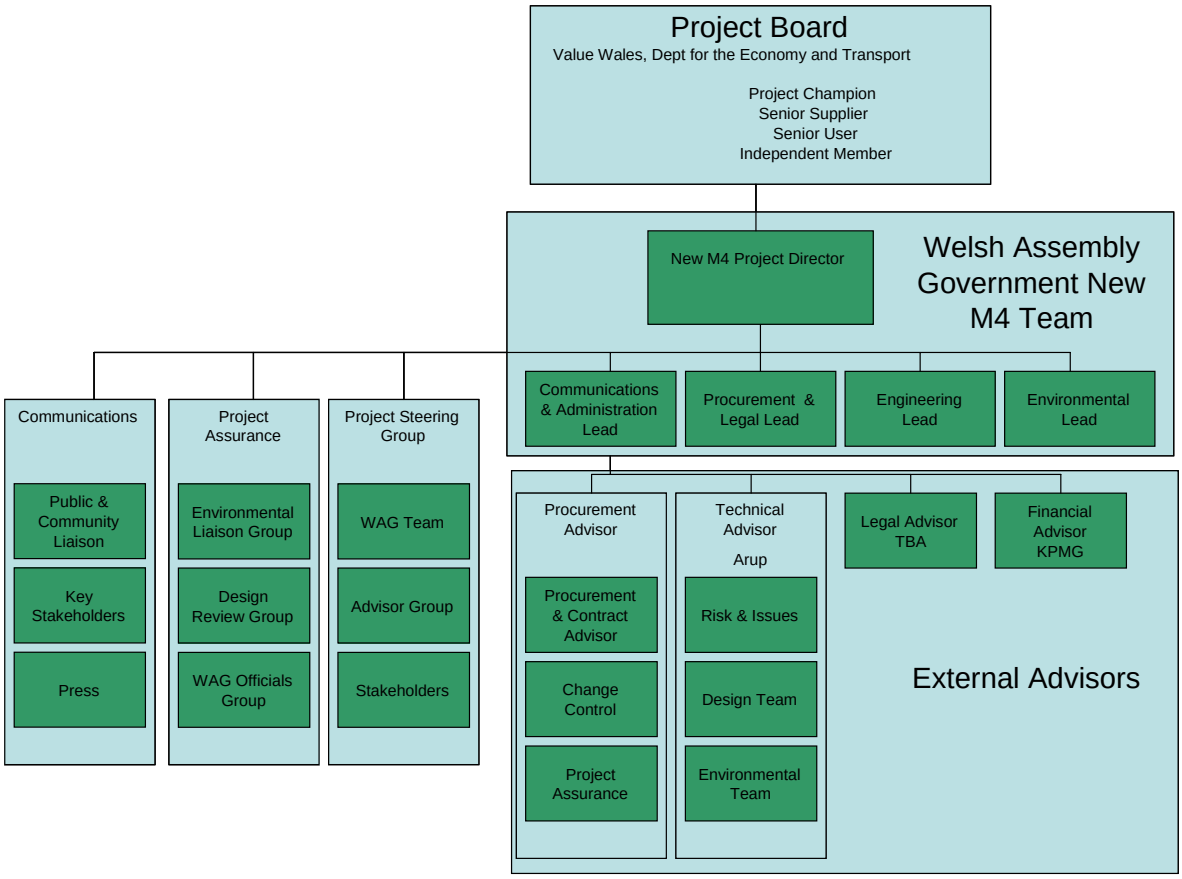
11.2 Project Management and Governance Arrangements

11.2.1 Project Management Arrangements

Management of the New M4 Project is the duty of the Welsh Assembly Government's, Department for the Economy and Transport. The Project Team will report to a Project Board of Senior Management who will oversee the strategic direction of the project. The Project Board will comprise senior personnel from the Department for the Economy and Transport.

The organisation structure for the project is shown in Figure 11/1.

Figure 11/1: Organisational Structure for the New M4 Project



11.3 Roles and Responsibilities

11.3.1 Project Board

The Project Board will comprise senior personnel from the Department for the Economy and Transport responsible for defining the direction of the Project and ensuring its smooth progression. The role of the Project Board is to:

- Consider and approve the Outline Business Case (OBC) to enable project development to continue;

- Consider and approve the Project Business Case (PBC);
- Agree the final procurement option;
- Approve the preferred bidder;
- Agreem on a high level project timetable for delivery.
- Create an environment in which the project can thrive
- Advise and support the Project Team;
- Review the project against Policy objectives at agreed milestones and provide continued commitment and endorsement where appropriate;
- Agree on a high level project timetable for delivery.

11.3.2 Core Project Team

The Core Project Team is provided by Welsh Assembly Government staff and is responsible for the day-to-day detailed management of the project. The primary activities include:

- Promoting the project both internally and to external partners and stakeholders;
- Ensuring the project delivered is the optimum solution;
- Ensuring project activities comply with Welsh Assembly Government policy;
- Exercising appropriate executive control over Consulting Engineers, Procurement Advisors, Financial and Legal Advisors;
- Ensuring the project is delivered to programme;
- Ensuring the project delivers Value for Money within delegated financial commitments;
- Ensuring the project is designed to appropriate standards and value engineering principles;
- Ensuring the Statutory Process is implemented in the delivery of the project;
- Reporting to the Project Board and Deputy First Minister on progress at agreed milestones, and seeking approval for project development to continue; and
- Dealing with queries on project related matters.

11.4 Advisors

Reporting to the Core Project Team, the Advisors are responsible for providing specialist advice on all of the aspects of the New M4 Project. Initial activities contribute towards the development of the OBC with further detailed investigations to be undertaken for the approved option from the OBC to inform the preparation of the draft Orders and Project Business Case. Following acceptance of the business case the advisor group will lead the development of the preferred procurement contracts and also begin to conduct the market testing and surveys. On acceptance of the OBC the remaining advisors (legal and procurement) will be appointed. The ultimate structure of the team will depend on the procurement route chosen and will also involve Employers Agents (EA) to assist with the development and delivery of the works.

11.5 Project Governance

The Project Management within the Department for the Economy and Transport will be governed via its Roads Procedures Guidance for the delivery of highways schemes. The Guidance is structured along a linear 7-stage Key Stage Approval (KSA) System

which provides a financial approval gateway review for schemes in the TRFP through to construction and opening. Each key stage will be subject to a review by members of the Project Board to seek approval to continue to the next stage.

The Project Assurance group will provide quality assurance and control for all stages of the project and will involve functional experts, officials, stakeholders and environmental groups.

In parallel to the KSA reviews, the project will be subject to periodic Gateway Reviews at key decision points to provide assurance that the project can progress successfully to the next stage. The Department for the Economy and Transport has introduced four Gateway Reviews in evaluation of its projects and programmes and will broadly follow the process for projects described by the Office of Government Commerce (OGC). Gateway Reviews will be carried out prior to, and the results reported as part of, the Key Stage Approval submission. Once the OBC is accepted, the project will be subjected to an OGC Gateway that will involve independent review of the case for the project and the governance and management arrangements.

11.6 Next Steps

Subject to the approval of this Outline Business Case and confirmation of funding, the next steps in the delivery of the project would be as follows.

a. Stage 1

- Market testing
- Completion of the scheme design, Environmental Statement and draft Orders under the Highways Act 1980.
- Publication of draft Orders and Environmental Statement

b. Stage 2

- Public Local Inquiry (anticipated)

c. Stage 3

- Full Project Business Case and Start Construction

d. Stage 4

- New M4 open to traffic

Appendix A

HM Treasury VfM Details

Table A/1: Key Parameters for Value for Money assessment

Description	PSC value (£000)	PPP value (£000)	Comment
Base Capital Cost of construction	473,950	473,950	Base date November 2006, presented as a bid price therefore no inflation of costs post financial close.
Allowance for Risk (pre and post FC[8])	105,983	87,327	PPP post financial close risk estimated at 66% of PSC value to reflect private sector pricing.
PPP efficiency	-	7%	Per Shadow Bid Model (Table 10/4).
Cost inflation	5% / 4%	5% / 4%	5% to 31/12/2010, 4% thereafter.
Pre FC Optimism Bias	-	-	Nil in base case, 15% used in sensitivity case.
Post FC Optimism Bias (construction and lifecycle)	5%	-	
Lifecycle costs	80,600	80,600	Base date November 2006, whole life, real.
Allowance for Risk on lifecycle costs	12,212	8,060	PPP risk estimated at 66% of PSC value to reflect private sector pricing.
PPP efficiency	-	10%	Per Shadow Bid Model.
Operating Costs (p.a.)	4,371	3,793	Base date November 2006, comprises routine inspection and maintenance, insurances and operating costs. Includes 10% allowance for risk and 17% PPP efficiency on maintenance element only.
PSC tax adjustment	7%	-	Calculated in line with Green Book guidance. In the case of a project considered 'risky' due to the sector or specific characteristics the PSC adjustment should be 8%. In the case of a project considered 'non risky' then the adjustment is reduced to 6%. For the New M4 a value in the middle of the two has been adopted to represent a project with a degree of risk; i.e. a project in a well established sector but with some characteristics that increase risk such as ground conditions, elevated structures and interfaces. The PSC tax adjustments are indicative and per the Green Book are subject to a +/- 3% variance.
Quantified non financial benefits	-	-	None assumed at this time.
Senior debt swap rate	-	5.25%	The Shadow bid model contains a swap rate of 5.50% which contains a buffer of 0.50% to protect against future rate rise that could significantly affect affordability. The current market rate of 5.14% and a downside VfM case at 5.50% have been tested as sensitivities.

Table 8/3 presents the key results from the initial runs of the QES together with key downside and upside sensitivity tests on the variables most subject to change.

[8] FC – Financial Close

Table A/2: Results of Value for Money assessment of the New M4 project.

Description of case	Indicative VfM %	Indicative VfM NPV	Comment
Scheme Option 3	**5.37%**	**£48m**	**Base case**
Sensitivity tests on base case			
Post FC Optimism Bias +2%	6.86%	£63m	2% increase in Post FC optimism bias on construction cost.
Post FC Optimism Bias -2%	3.84%	£34m	2% decrease in Post FC optimism bias on construction cost.
PSC Tax adjustment revised from 7% to 8%	6.25%	£57m	If the project were considered 'risky', for example due to the ground conditions, contaminated land, number of structures or any other reason the PSC tax adjustment should be increased to 8% per Green Book guidance.
PSC Tax adjustment revised from 7% to 6%	4.48%	£40m	If the project were considered 'non risky' then the tax adjustment would be 6%
Senior debt swap rate reduced to 5.14%	6.25%	£55m	The actual swap rate per the FT on 16 October 2007 is 5.14%.
Senior debt swap rate increased to 5.50%	3.35%	£30m	As noted above the swap rate in the Shadow Bid Model is maintained inclusive of a 'buffer' for prudence and to protect the affordability position from interest rate movements.
Combination of all upside sensitivities above	8.58%	£78m	A combination of all of the upside cases occurring creates a potentially very strong quantitative VfM result.
Combination of all downside sensitivities above	0.86%	£8m	Even in the scenario where all downside sensitivities manifest together the VfM result remains positive.