ALL/2/1S

Supplementary Proof of Evidence by

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for the

MERSEY GATEWAY PROJECT

PUBLIC INQUIRY

on behalf of

The Alliance

comprising

the North West Transport Roundtable

NW

TAR

and

Friends of the Earth

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1 Introduction

1.1 This Supplementary Proof of Evidence considers two main issues critical to the overall scheme appraisal for the Mersey Gateway Project and in particular the Appraisal Summary Table (AST). These are the social distribution of costs and benefits and the calculation of the value for money of the scheme, notably the Benefit to Cost Ratio (BCR).

2 Social distribution

2.1 The first is the issue of social impact, where there are bound to be important effects on lower income groups because of the tolling system as well as the nature of the scheme. There is no detailed analysis of this presented to the Inquiry, nor any specific scheme to moderate or compensate for such effects. There are aspirations regarding the use of discounts for local residents and the improvement of public transport, but no specific schemes. Most importantly there has been no modelling or other assessment of what impact these would have on the overall costs and benefits and thus on value for money. It should be noted that reducing the social disbenefits through toll discounts would increase traffic, and thus impose extra congestion and carbon costs. It would also reduce toll income and this would have to be reflected in the concessionary agreement, or compensation paid to the concessionaire.

2.2 The preferred option would be to show the distribution of costs and benefits by area and purpose. Such analysis is described in webtag, Unit 2.5, paras 1.5.11-12 (Appendix 1).

2.3 Some data on journey purpose and income is implicit in the analysis of the impact of tolling, through the analysis of low, medium and high income users in the appraisal. This data was requested from the proposers and is set out below. It expands upon the information in Appendix 7 to Mr Pauling's Proof, contained in HBC/8/2A. Area based data, which would reveal the impact on locally deprived areas, is not available.

2.4 As might be expected, the reductions in traffic from tolling are strongest in the lower income groups. It should be noted that the percentage changes in the tables all refer back to the numbers set out in the Do Minimum column. Thus in the first two tables in 2015 the preferred Medium Level (ML) toll produces a 5% reduction in low income commuters compared to the Do Minimum, instead of an 8% increase if the bridge were built with no tolls. For other non-business trips, the reduction is 11% instead of a 7% increase.

Expanded Table A7.15

MerseyGateway
Table 1 - 2015 AAWT Car trips across the river by income and purpose

Trip Purpose	2015 DM	2015 No Toll % Change	2015 ML % Change	2015 Low Toll % Change	2015 High Toll % Change
Commute High	97,541	7%	-1%	0.8%	-7%
Commute Med	65,705	7%	-2%	0.1%	-8%
Commute Low	43,932	8%	-5%	-3%	-11%
Commute	**207,179**	**7%**	**-2%**	**-0.2%**	**-8%**
EB	**32,336**	**5%**	**2%**	**3%**	**0.1%**
Other High	40,685	7%	-5%	-3%	-13%
Other Med	34,392	7%	-7%	-4%	-15%
Other Low	43,260	7%	-11%	-8%	-18%
Other	**118,337**	**7%**	**-8%**	**-5%**	**-16%**
Total	**357,852**	**7%**	**-4%**	**-1%**	**-10%**

Expanded Table A7.16

Table 2 - 2030 AAWT Car trips across the river by income and purpose

Trip Purpose	2030 DM	2030 No Toll % Change	2030 ML % Change	2030 Low Toll % Change	2030 High Toll % Change
Commute High	94,522	11%	3%	4%	-3%
Commute Med	64,428	11%	2%	4%	-4%
Commute Low	44,919	11%	-1%	1%	-8%
Car Commute	**203,870**	**11%**	**2%**	**3%**	**-4%**
EB	**31,316**	**9%**	**6%**	**7%**	**4%**
Other High	41,965	12%	0%	2%	-8%
Other Med	36,189	12%	-2%	1%	-10%
Other Low	46,977	11%	-5%	-2%	-14%
Other	**125,131**	**11%**	**-3%**	**0%**	**-11%**
Total	**360,316**	**11%**	**0.6%**	**2%**	**-6%**

2.5 The next two tables show the impact of the preferred toll level at different times of the day.

Expanded Table A7.17

Mersey Gateway
Table 1 - Impact by journey purpose and income group
2015 cross river car trips

Trip Purpose	AM	IP	PM
Commute High Income	-0.5%	-3%	1%
Commute Medium Income	-2%	-3%	1%
Commute Low Income	-6%	-5%	-3%
Commute	**-2%**	**-3%**	**0%**
Employers Business	**5%**	**0%**	**6%**
Other High Income	-1%	-8%	2%
Other Medium Income	-3%	-10%	0%
Other Low Income	-6%	-13%	-2%
Other	**-3%**	**-10%**	**0%**
Total	**-2%**	**-6%**	**1%**

Expanded Table A7.18

Table 2 - Impact by journey purpose and income group
2030 cross river car trips

Trip Purpose	AM	IP	PM
Commute High Income	4.4%	0%	7%
Commute Medium Income	4%	-1%	6%
Commute Low Income	-1%	-3%	2%
Commute	**3%**	**-1%**	**6%**
Employers Business	**9%**	**4%**	**11%**
Other High Income	4%	-2%	9%
Other Medium Income	2%	-4%	7%
Other Low Income	-1%	-7%	4%
Other	**2%**	**-5%**	**7%**
Total	**3%**	**-2%**	**6%**

2.6 Overall this indicates that the suppression of cross river journeys for low income users is significant when compared to the Do Minimum in all conditions except for the PM peak in 2030.

3 Costs, benefits, BCRs and value for money

3.1 Where there are high costs and benefits from changes in tax income or user charges, BCRs are difficult to compare with those from more conventional schemes. This is widely recognised, and the DfT discusses the issue and how it intends to deal with it in the NATA Refresh document, Chapter 4 "Prioritising using the benefit-cost ratio" (Appendix 2). This also sets out the changes that will be made from April next year.

3.2 In the case of tolling and user charging schemes, BCRs will quite often be negative and when toll income is included are not strictly comparable to "normal" BCRs. However, the cost benefit results are important, because in welfare economics the measurement of value for money is assessed in terms of society as a whole. The issue is how to assess and compare them.

3.3 One of the changes set out in the NATA document concerns the placing of indirect tax revenue. In future this will no longer be set against the capital cost (PVC) of transport schemes (either increasing or decreasing them), but included as a balancing item set against benefits (PVB) such as time savings. User charging is still to be retained in the public sector costs section.

3.4 Applying this new approach would have the effect of turning the current public sector cost negative, and thus the BCR would go negative. Adjusting the TEE table gives negative value for costs of -£59.7million and a BCR of -6.1. NATA recognises that such BCRs are "essentially meaningless"[1] although a positive value for benefits can still represent good value for money.

3.5 In order to produce a more comparable picture of scheme costs and benefits, it is possible to look simply at resource costs in what is called a social cost benefit approach. Such analysis is also supported by the NATA refresh document and is considered useful "particularly where revenues are significant" (para 37).

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[1] TUBA Frequently Asked Questions, page 5, webtag (see annex 1, attached) www.dft.gov.uk/pgr/economics/software/tuba/tubafrequentlyaskedquestions.pdf

3.6 It is possible to get a reasonable estimate of what such an analysis would look like from the TEE table and scheme costs.

3.7 In this regard the use of both 2002 and 2007 prices in the proposers' Proofs has now been clarified. As expected, the TEE table is in 2002 prices as required by DfT guidance. The scheme costs in CD17 and Mr Nicholson's Proof are in 2007 prices. Converting the latter to 2002 prices using RPI gives a PVC of £514million. After removing toll costs, the user benefits in the TEE table amount to £847.6million. However, these include tax benefits. Assuming these are the same as the tax losses in the TEE table, the new benefits would be £714.9million. Adding the accidents, carbon and maintenance benefits the new PVB total is £775.8million. This gives a BCR of 1.51, just within the medium value for money category.

3.8 This calculation still requires caution in its interpretation because the user demand on which it is based has been influenced by pricing. However, the general conclusion, that the scheme's value for money is in the medium category, is confirmed by the detailed work that the DfT has been doing with the proposers. This is contained in one of the answers to my questions, as reported in the Annex to this Proof (Appendix 3)

3.9 It should also be noted that the use of a 60 year time period for benefits has inflated the BCRs of all schemes which have a positive net benefit. This has the effect of moving a greater number of schemes into the "high" category. Thus the DfT are introducing a fourth category of "very high" for schemes with BCRs over 4 and the "high" category will be for BCRs between 2 and 4. About half of the "high" schemes become "very high" and DfT will "encourage promoters to achieve the best VfM and not just "High" VfM". This change came into effect for DfT purposes in April this year.

4 Conclusions and the AST

4.1 The original Proof pointed out that the lack of specific alternatives or any testing which included schemes to improve walking, cycling and public transport meant that value for money could not be properly established. It also means that entries in the AST which are based on the "Sustainable Transport Strategy", and not the proposed new bridge, should be omitted. For example, the entries under "Option values" and Transport Interchange" should be neutral. The "Strong Benefit" in the Accessibility entry should note the adverse impact on low income car users.

4.2 It also pointed out that the fact that the broad area of the North West included in the model predicted serious increases in emissions from today, and thus from 1990 levels. These are the base year for the UK Government's greenhouse gas emission targets. The predicted levels would breach the targets in the Climate Change Act and the draft budgets from the Committee on Climate Change. (Appendix 4). The targets and budgets agreed under the Act will be legally binding.

4.3 Not to mention this fact in the AST is a major omission. At the very least it should be included as major adverse in the Other Government Policies section. It should at least be flagged up in the Greenhouse Gases section. While there could be some discussion about where such a conclusion is best situated, leaving out this very serious conclusion altogether is completely inappropriate.

4.4 This Supplementary Proof points to further omissions – the lack of a social distribution analysis using the results from the traffic model, and thus related to the proposers' best estimate of the future, is particularly unfortunate given the needs of the local area. If the intention to give local discounts is genuine, they should be modelled. They will have a significant impact on traffic flow and long term costs. The final issue is the difficulty in comparing the BCR with other schemes. The entry should be "Medium" value for money in the AST, not "High", the third out of four categories.

Annex 1

Mott MacDonald

Department for Transport

TUBA
FAQs

October 2006

Doc ref: 211477/03/C

TUBA FAQs

Contents

Data input

Q: Can I run TUBA for just one modelled year?

Yes, but your first appraisal year and horizon year must then be the same as your single modelled year.

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Q: I am using charges in my model. What price base should these be in?

All charge matrices must be deflated to the economic base year (currently 2002). This can be done by entering an appropriate value in the factor column of the INPUT_MATRICES table. For example suppose the matrix has charges in 2004 prices. The RPI for 2004 is 186.7 and for 2002 it is 176.2 so the 2004 charges need to be multiplied by $\frac{176.2}{186.7} = 0.944$ to convert them to 2002 prices.

Remember also that charges should be input in perceived costs, i.e. for business trips any element of VAT should be removed first. Again this can be done using the factor column. If the charge matrix includes VAT at 17.5% then it needs to be multiplied by $\frac{1}{1.175} = 0.851$ to remove VAT.

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Q: Is it possible to have the scheme open after the first modelled year?

This is most likely to happen when there are delays in starting construction of the scheme, compared with when the modelling work was first undertaken. TUBA will not allow you to enter a modelled year that is before the first year for which benefits should be calculated (defined by the 'first year' parameter in the scheme file).

If scheme opening is only 1 or 2 years after the first modelled year then the modelled year data can be used to represent the scheme opening year. Suppose the first modelled year is 2006 and the scheme opening year is 2008. You can specify the first modelled year in TUBA as being 2008, but use your model data from 2006.

If scheme opening is between 3 and 7 years after the first modelled year then a more complicated workaround is required. Suppose the first modelled year is 2006 and the scheme opening year is 2010. The TUBA scheme file parameters should be set up as follows:

- horizon year should be 2069 (i.e. 60 year appraisal period from scheme opening)
- first year should be 2006 (i.e. the first modelled year, even though this is before actual scheme opening)

TUBA will calculate benefits and revenues for the period 2006 to 2069 (inclusive). It is then necessary to remove the benefits for the years 2006 to 2009 from the results presented in the TEE, Public Accounts and AMCB tables. Total revenues and benefits for these years can be found in the MODE table in the output file. These should then be subtracted from the relevant cells in the TEE and Public Accounts table. Summary statistics (e.g. PVB and PVC) in these tables will need to be recalculated and the results carried through to the AMCB table, where NPV and BCR will also need to be recalculated.

If a more detailed breakdown of benefits and revenues is required (such as those provided in the SUBMODE, PURPOSE etc. tables) then it will be necessary to extract the data using the detailed results analysis facility (Analysis->Export option).

If scheme opening is more than 7 years after the first modelled year then you must update your model.

In all cases it will be necessary to give proper consideration to how any delays may affect scheme construction costs.

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Error messages

Q: I'm getting a warning message that there isn't enough memory. What should I do?

Two things to try (either separately or together) are:

- In the Run Settings template select the 'Run one user class at a time' check box
- Use sectoring. The fewer sectors the better. If you are not interested in analysing the spatial distribution of benefits you can put all zones into one sector. This can be achieved by setting the scheme parameter 'user zones as sectors' to 'No'; there is no need to define a sector file explicitly.

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Interpretation of results

Q: I have summed the TUBA output undiscounted costs (e.g. in DS_SCHEME_COSTS table) but the total is different from the costs I have input

A: Although these costs have not been discounted TUBA has adjusted them to base year prices. It does this using the RPI values that were input with the scheme costs as follows:

$$base\_year\_scheme\_cost = input\_scheme\_cost \times \frac{RPI\_base\_yr}{RPI\_scheme}$$

If the input costs were in factor costs it will also adjust them to market prices by applying the *(1+t)* adjustment (i.e. multiply by 1.209).

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Q: My scheme includes a developer contribution but the PVC looks a bit low

The definition of PVC in TUBA (consistent with WebTAG, i.e. official DfT guidance) includes only *public* sector costs and revenues. Costs to the *private* sector, such as developer contributions, appear in the PVB calculation and will reduce the PVB.

Developer contributions appear as a negative cost in the PVC as they are actually a receipt for the public sector, not an expenditure.

You have to be careful that you have defined the input scheme costs correctly. The cost to the public sector entered into TUBA should be the full scheme cost. TUBA will then take into account the transfer of funds from the developer to the public sector. For example, assume the total scheme cost is £100k of which £70k is paid by developer contribution. Then you should enter the cost to the public sector as being £100k and the amount of developer contribution as being £70k. In calculating the PVC TUBA will subtract the £70k from the £100k to show the net cost to the public sector is £30k.

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Q: I am appraising a public transport scheme and am looking at PT passengers only. PT fares are not subject to VAT yet the scheme seems to have an impact on government indirect tax revenues. What is going on?

The formula for the calculation of the change in government indirect tax revenue assumes that, for consumer trips, an increase (or decrease) in expenditure on transport is offset by a decrease (or increase) in expenditure elsewhere in the economy.

Assume the scheme increases PT patronage and there is an increase in expenditure on fares. These fares are not subject to indirect taxes. However, there is assumed to be a corresponding decrease in expenditure elsewhere in the economy which, on average, has an indirect tax rate of 20.9%. The government therefore loses tax revenue as a result. For more details of indirect tax revenue calculations please see Section 5 of WebTAG 3.5.3.

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Q: How come I'm getting a negative BCR or PVC?

A negative BCR is the result of either a negative PVC or a negative PVB, but not both.

Some schemes will generate significant revenues to the public sector, e.g. through road tolling or an increase in indirect tax revenues. In certain cases this might be sufficient to more than offset the public sector costs of implementing the scheme and the PVC will be negative. If the PVB is positive then the scheme represents good value for money; the BCR will be negative but is essentially meaningless.

A negative PVB indicates that there is a net disbenefit to transport users and private sector providers, for example high private sector investment costs which are not offset by user benefits.

Note that if the PVB and PVC are both negative then the BCR will be positive but meaningless.

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Q: Why is the change in indirect tax revenues bigger than the user fuel operating cost benefits?

Given that fuel taxes are around 75-80% of the market price of fuel some users expect tax revenues to be around 75-80% of the user fuel cost benefits. There are two reasons why the change in indirect tax revenues may be greater than the user fuel cost benefits.

Firstly, changes in indirect tax revenues depend on changes in all transport expenditure (e.g. non-fuel operating costs, PT fare, road tolls and parking charges), not just expenditure on fuel. However, it is true that in a highway-only TUBA run with no user charges then the change in indirect tax revenues is primarily determined by fuel expenditure.

The second reason is that indirect tax revenues and user benefits are calculated using different formulae.

The user fuel (dis)benefit is calculated using the rule of a half:

$$\frac{1}{2}\left(T^0 + T^1\right)\left(F^0 - F^1\right)$$

where

T^0 is the number of trips in the DM
T^1 is the number of trips in the DS
F^0 is the fuel cost per trip in the DM
F^1 is the fuel cost per trip in the DS

On the other hand the change in fuel tax revenue depends on the change in expenditure on fuel:

$$T^1 \times F^1 - T^0 \times F^0$$

(The formulae have been simplified slightly so they do not include the adjustment to market prices)

If there is a small change in the cost per trip between the DM and DS but a large change in the number of trips then it is possible for the change in tax revenues to be larger than the user fuel cost benefits. The two quantities can have the same sign (e.g. both positive), or they may have different signs, depending on the relative size and direction of the changes in T and F.

For more details of indirect tax revenue calculations please see Section 5 of WebTAG 3.5.3.

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Q: I am appraising a road tolling scheme. The user (dis)benefit and the increase in toll revenue are very different. Why?

The two results are calculated in different ways.

The user (dis)benefit is calculated using the rule of a half:

$$\frac{1}{2}\left(T^0 + T^1\right)\left(C^0 - C^1\right)$$

where

T^0 is the number of trips in the DM
T^1 is the number of trips in the DS
C^0 is the charge in the DM
C^1 is the charge in the DS

On the other hand the increase in revenue is calculated using:

$$T^1 \times C^1 - T^0 \times C^0$$

(The formulae have been simplified slightly so they do not include the adjustment to market prices)

The two measures can give results of different magnitudes and the same, or opposite, sign. The simplified formulae are only the same in the case of a fixed trip matrix (i.e. $T^0 = T^1$) but even then user benefits and revenues reported by TUBA may be of different magnitudes because of the different way they are converted to market prices.

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Q: Although I am modelling a significant change in passenger numbers there is no user benefit for PT users.

If there is no change in travel time or fare per trip for PT then there will be no user benefit. This may be the case if the change in passenger numbers is a result of changes in highway costs. However, there will still be an impact on operator revenues (see above question on tolling).

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