Our ref:
Your ref:

Simon Kirby & Lynne Stinson
Major Projects Directorate
The Cube
Birmingham

via E-mail

cc: Richard Bradley, Mouchel
Steve Werrett, Mouchel

From: Louise Wootton
NetServ NPPD Traffic Appraisal Modelling & Economics
GC
Federated House
London Road
Dorking RH4 1SZ

GTN: 3904 8323

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LOCAL MODEL VALIDATION REPORT FOR M3M4 MODEL

We refer to the latest version of this report, dated 1st May 2013, referenced: 1044049-D04-006 issue 6. This model is used for the Stage 3 assessment of the M3 J2 – 4a MM-ALR scheme and the Stage 2 assessment of the M4 J3-12 MM-ALR scheme.

Data

The main change undertaken to the model was the addition of origin-destination data, sourced from Trafficmaster, to the demand matrices to improve the flow validation and minimise the impact of matrix estimation. It was only possible to use the new data for intra-zonal movements. Therefore there is still a dependence on data from the M25 model for longer distance trips. This data is from 2001, older than the recommended six year cut-off.

The data for the HGV matrices was sourced from the Great Britain Freight Modal. This data compared poorly against the screenline traffic counts. The reason for the discrepancy was investigated, but the outcome was that a factor of two was applied. This underlying issue with the HGV data means that the model is less robust with regard to HGV forecasts.

Model parameters

The speed flow curves used in this model are taken from NAOMI and use a factor of 2.0 to convert vehicles into PCUs. WebTAG states that on motorways and all-purpose dual carriageways a factor of 2.5 should be used. This will have an impact on the results of the model as the webTAG factors would increase link capacities by 5% (refer to paragraph 4.3.1 of the LMVR).

Matrix estimation was used in the preparation of this model. The changes in mean trip length distribution as a consequence of the matrix estimation were generally within the guidance level of 5% (with the exception of lights in time period P2). The standard deviation of trip length distribution changed by more than the 5% guidance level, particularly for heavy vehicles. Considering the poor quality of the underlying heavy vehicle data, this isn't surprising.

The matrix estimation brought about changes in sector to sector movements greater than 5%, but this is not surprising in a large model. Although the percentage changes are large in some places, these tend to be from a low base.

Regression statistics comparing prior and post matrix estimation matrices, do not meet the R^2 criteria, but for light vehicles are close. The intercept and gradient criteria are met for light vehicles. All regression statistics are poor for heavy vehicles, again reflective of the poor quality of the underlying data.

The modelled turning movements at junctions were validated against observed data. Overall, the level of turning movement validation is poor and for the two key junctions (M4/M25 and M3/M25) data was not available.

The LMVR does not include information on the variable demand model.

Performance of the model

The independent validation of the model was poor, refer to tables 7.2 and 7.3 below.

Criteria	AM1	AM2	IP	PM
GEH Below 5	18	16	20	19
GEH >5 & <=10	11	10	10	12
GEH >10 & <=20	5	8	5	4
GEH >20 & <=25	2	2	1	1
Total	36	36	36	36
Percentage GEH Below 5	50.0%	44.4%	55.6%	52.8%
Percentage GEH Below 10	80.6%	72.2%	83.3%	86.1%

Table 7-2: Link Flow Comparisons Light Vehicles Independent North-South Screenline

Criteria	AM1	AM2	IP	PM
GEH Below 5	26	26	28	30
GEH >5 & <=10	8	7	6	5
GEH >10 & <=20	2	3	2	1
GEH >20 & <=25	0	0	0	0
Total	36	36	36	36
Percentage GEH Below 5	72.2%	72.2%	77.8%	83.3%
Percentage GEH Below 10	94.4%	91.7%	94.4%	97.2%

Table 7-3: Link Flow Comparisons Heavy Vehicles Independent North-South Screenline

As a consequence, it was decided that all traffic count data would be used in the matrix estimation. This means that there is no independent flow validation. This resulted in calibration statistics are in tables 8.15 and 8.16 below.

Criteria	AM1	AM2	IP	PM
GEH Below 5	33	30	34	33
GEH >5 & <=10	2	4	1	1
GEH >10	1	2	1	2
Total	36	36	36	36
Percentage GEH Below 5	91.7%	83.3%	94.4%	91.7%

Table 8-15: Individual Link Flow Comparisons Light Vehicles Dependent North-South Screenline

Criteria	AM1	AM2	IP	PM
GEH Below 5	32	32	32	35
GEH >5 & <=10	4	4	4	1
GEH >10	0	0	0	0
Total	36	36	36	36
Percentage GEH Below 5	88.9%	88.9%	88.9%	97.2%

Table 8-16: Individual Link Flow Comparisons Heavy Vehicles Dependent North-South Screenline

In reviewing these statistics it must be born in mind that they do not relate to independent validation.

In general, the modelled flows and journey times are similar to those observed. Areas where the model is weaker are:

- journey times on the M25, especially in the PM peak show poor validation, with journeys 48% and 24% faster in the model than observed (clockwise/anti-clockwise respectively). The links which perform especially poorly are J13-16 clockwise and J15-12 anti-clockwise, particularly in the evening peak period. This means that the impact of the scheme on the M25 cannot be modelled with confidence. Other macro-assignment models have also experienced difficulties in representing observed congestion on the M25 This means that the model will not be able to replicate the operation of the network in this location.
- The performance of the model in Air Quality Management Areas (AQMAs) is variable, refer to tables 8.21 – 8.24 in the report for detailed results.

For a managed motorway scheme, the network change will be small and therefore it could be reasonable to assume that the journey pattern is less likely to change. Performance of the model on the scheme links is acceptable. Modelled journey times are within 12% of observed and the modelled flows on these key links are close to those observed.

Key Risks

1. In general, less confidence can be placed in the modelled outputs and in turn on the dependent assessments
2. The effects of the scheme on the operation of the M25 will be difficult to assess
3. Robustness of air quality assessments may be compromised by the modelled speeds being higher than observed

4. The basis for HGV flows is compromised by the application of a correction factor of two to the base year matrices.

Whilst this model has made use of the latest version of WebTAG guidance, it cannot be said to be WebTAG compliant for the reasons outlined above. To improve compliance would be both costly and time consuming. If it is used for forecasting and economic appraisal, the weaknesses noted above should be considered when using the outputs of those exercises.

Louise Wootton
Appraisal Certifying Officer