Wellington Regional Council

Wellington Transport Strategy Model: Peer Review

Forecasting Report

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1. INTRODUCTION

Arup was appointed by Wellington Regional Council to peer review the development of the Wellington Transport Strategy Model (WTSM). The development of the model was undertaken by Beca Carter Hollings & Ferner (Beca) and Sinclair Knight Merz (SKM) for Wellington Regional Council. In addition to Arup's in-house modelling expertise, John Fearon, an international multi-modal model specialist based in the UK, was included in its review team.

1.1 Review Objectives

The objectives of this commission were:

- to peer review the new transportation model in a timely and cost effective manner
- to ensure the satisfactory conclusion to the model construction process
- to sign off on behalf of the Council (and Transfund New Zealand) the full model and development documentation with respect to the modelling
- to test the final model to ensure a robust structure and results are available.

1.2 Outputs

The outputs of the peer review were:

- Stage 1, review preliminary reports and advise the Council with regard to the reliability of the processes used
- Stage 2, review the model once the calibration process is complete and report on the model structure, robustness and validity of the processes utilised within the software
- Stage 3, test model sensitivity and response with a view to future use of the model and future year forecasting and option testing
- Stage 4, the Consultant will produce a report summarising the whole peer review process and signing off on the model.

A series of progress reports have been prepared by Arup, these include:

- Preliminary Studies Review: A review of a report that addressed 17 key issues raised in the Technical Specification and Function Design of WTSM
- Calibration Review: A review of the sub model calibrations. The sub-models were reviewed as they were calibrated
- Model Testing Report: A review of the validation and detailed model testing undertaken by Arup
- Final Report: Documenting the Peer Review process and the review of the base model.

1.3 This report

This report is an addendum to the final report and outlines our review of the forecasting model report. During the course of the base model review we undertook detailed testing of the base model including response to transport demand and network changes and made conclusions about the model structure and its forecasting capability based on those tests. We therefore provide these comments in the context of the application of the model to forecasting as

presented in the Beca/SKM Forecast Report dated 2 February 2004. We have not been provided with the forecasting model for testing.

Our sub headings generally follow those used in the Forecast Report.

2. FUTURE YEAR NETWORKS

The future year network assumptions are outlined in this section, based on those agreed with Greater Wellington. The details of the future road projects are outlined in Table 1. Generally this section provides sufficient detail.

3. PLANNING DATA FORECASTS

The report refers to the projections for each of the key planning variables as provided by Mera.

It seems unusual that the forecast education enrolment growth to 2011 is 7%, but beyond 2011 it decreases below 2001 levels, reducing by 8.9% from 2011 levels. We understand that this is an agreed assumption based on the forecast of ageing population.

4. OTHER DATA INPUTS

The assumptions that value of time, vehicle operating cost, fares and parking costs remain unchanged are reasonable. Increase in airport passengers has been based on WIAL figures and real income growth on historical trends.

5. FORECAST RESULTS

5.1 Matrix Estimation

The methodology for incorporating matrix adjustments to forecast demand from the model runs is documented in the Matrix Estimation Report. Our review of the strategic model and its appropriateness is based on the base model before matrix estimation is applied. We provide the following advice and comments on the approach used in WTSM.

Matrix estimation is an accepted approach to address limitations of the demand model to meet assignment accuracy requirements. When applying matrix estimation the modeller needs to balance the level of accuracy required for validation and the potential to compromise the demand forecasts at a zone-by-zone level. The report presents an appropriate level of documentation at an aggregate level, showing profiles of the magnitude of demand changes across the model are small.

The report recommends that the matrix adjustment factors be applied to the forecast year matrices, by multiplying by an adjustment factor. Table 12 in the Forecast Report presents the impact on demand with and without matrix estimation. The results suggest that at an aggregate level the matrix factors have similar impacts when applied to future year models.

It is not reasonable to examine every zone-to-zone pair across the extent of the WTSM model. Therefore disaggregate demand issues are best addressed when developing a project model and in this context it is recommended that the modeller should review the impact of changes on forecast demand. Even where small changes are predicted, counterintuitive results are possible in future years at a disaggregate level. For example the impact of applying factors to a large development zone can produce unrealistically high forecasts. In such cases matrix capping may need to be applied on if this is found to be an issue for a specific project. When undertaking a project, the modeller should confirm the consistency in estimation of

productions and attractions for each time period for individual zones in terms of total 24-hour attractions and productions after matrix estimation.

In the matrix estimation report the attached table shows one screenline, W1A, greater than 10% in the IP and PM. Whilst this does not conform to the guidelines in Transfund's PEM for model validation, W1A is a partial screenline and the difference is due to one link, Adelaide Road. It is not unusual and accepted for there to be some imbalances on individual links across screenlines in a strategic model.

5.2 Car Ownership

The car ownership forecasting issues were discussed in the review of the base model.

5.3 Peak Spreading

The peak spreading parameter is specified on Page 15. Table 9 demonstrates that the impact of the peak spreading parameter on the 2011 and 2021 forecasts is very small over the whole model. The results are consistent with more trips transferring from the peak to the interpeak in 2021 compared to 2011.

5.4 Traffic Forecasts

The reduction of speeds on the motorway network discussed in Section 5.8 is consistent with the sensitivity tests we carried out at the model testing stage of the project. The growth in the counterpeak direction is not surprising given the capacity constraint in the peak direction.

We have assessed the performance of the forecasting model with respect to intersection delay during the model testing stage of the project and this is commented upon in our review of the base model.

The reductions in screenline traffic volumes presented in Figures 8 to 10 are generally consistent with the planning forecasts presented in Figures 1 to 4.

5.5 Public Transport Forecasts

The public transport forecasts are shown in section 5.9. We note that public transport trips are forecast to reduce between 2011 and 2021. This is not surprising given the reduction in enrolments forecast between 2011 and 2021 of 8.9% shown in Table 3 of the report.

The increases in the rail and bus demand to 2011 (11.7% and 7.8% respectively) shown in Table 16 of the report are consistent with the forecast growth in enrolments and CBD employment (10.2% and 7% respectively) shown in Table 3 and the captive market growth (of about 10%) shown in Table 5.

Figures 11 and 12 of the report show the public transport boarding growth by area and mode for the morning and inter-peak periods respectively. The results suggest variability across the region, however such variations are explainable with some corridors experiencing reductions in passenger transport demand due to roading improvements increasing traffic speeds.

As an overall comment, as in all strategic models, when undertaking a project the modeller should be aware of the strengths and weaknesses of the validation. For example the growth in the Johnsonville corridor shown in Figure 11 needs to be interpreted in the context of the imbalance of rail and bus demand in the Johnsonville corridor in the validation.

5.6 Slow Modes

The mode split for slow modes in 2011 and 2021 scenarios seem reasonably stable compared to 2001. Given the majority of slow mode trips are short one would expect them to be relatively inelastic to the projects listed in section 2.

Overall the aggregate results seem reasonable given the growth and the combination of rail and road projects.

5.7 Trip Distribution

Table 11 shows that the car trip length increases over time, reflecting the impact of new road projects and demographic trends.

6. CONCLUSION

Based on the information presented in the Forecast Report the forecasts are reasonable and explainable. The forecast reduction of enrolments and captive market between 2011 and 2021 result in a reduction of public transport trips between 2011 and 2021. In this report we have provided further advice on use of the future year model for projects where appropriate.