Technical Note

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Prepared by	Bruce Johnson	Date	4 June 2018
Subject	Review of TN16 – Hybrid Forecast Model Results		

1 Introduction

Arup has been appointed by NZTA, on behalf of the Project Partners (Wellington City Council, Greater Wellington Regional Council and NZTA), to act in an Independent Advisor role in relation to the development of the Ngauranga to Airport Transport Model (the N2A Model). The model development is being undertaken by the consultant team Beca and GHD. Part of the Independent Advisor role entails peer review of aspects of the model development and documentation.

This Technical Note provides comments in relation to TN16.

2 Review of TN16

2.1 Context and purpose of TN16

TN16 documents the performance of the N2A model in representing the 2026 Do Minimum network and compares this to 2016 base year model results.

2.2 Items reviewed

The review has been based on:

- Technical Note 16 – Hybrid Forecast Model results – 13 March 2018, V5.8
- Supplied appendices to TN16

2.3 Issues raised

The following comments are provided for inclusion in the Peer Review Register.

1. Overall TN16 is considered to provide a good level of detail on model performance and, based on presented results, the model appears to be providing a tool that is sensitive to key network

capacity and operational issues which arise from increased travel demand in a future year scenario. The following comments are provided within that overall context. These comments either seek clarification on some aspects of reporting or pose questions that may need consideration as the model is applied to specific forecasting tasks. In the latter case comments of this nature are provided as items that should be borne in mind as the model is used, not as pointing to the need to improve any specific aspect of the model or documentation now.

2. Executive Summary. The Background section notes that the peak spreading process creates the situation that *"for individual motorists this shifting of departure time away from an assumed desired time does itself represent an economic impact"*. This is one of a number of issues that may require further consideration in how the model is applied and/or results interpreted.

3. Section 2, Forecasting process. Various parts of this section note the requirement to apply critical review and judgement in processes such as identifying unrealistic queues or delays, adjusting signal timings and determining what is plausible behaviour. This is acknowledged as a typical part of a modelling process in operational models of this type. Given this, while not strictly a limitation of the model, it is suggested that Section 8 of the document should highlight the need for experienced users (users with knowledge of the models behaviour and of the local road systems operational characteristics) to apply the model in a consistent and "well-judged" way. It may also be useful to describe in more detail how unrealistic or implausible operations can be identified.

4. Section 2.1.1 Signal adjustment process. It should be clarified if this process simply involved the adjustment of existing (base year model) signal timings, or may also have involved inclusion of alternative phasing arrangements (such as right turn phases etc). It would also be useful to clarify if the timing adjustments respected various constraints such as minimum green times for pedestrian movements etc. It would also be helpful to provide some details identifying the number and locations of sites where timings were adjusted. Further it is unclear from the discussion whether any signal timing adjustments were made for specific 15 minute time periods within a period of the day, or applied across the whole period. Such details would help identify the level of effort that may be required to satisfactorily specify details of a future year scenario.

5. Section 3, 2036 is excluded. The inability of the network to cater for 2036 demand is not an unexpected result. For future use of the model this raises various issues such as:

    a. If there is a need to include various network improvements to obtain *"usable information from the model"* then how will it be determined what is the minimum level of improvement required to get to this position?

    b. Is there a need for some form of feedback process to WTSM to further dampen road demand (beyond the existing peak spreading process) to enable a realistic road demand to be generated.

6. Section 5 Meso forecast network results. In light of the discussion in Section 7 (multiple Model Runs) it should be clarified if all of the results reported in Section 5 and Section 6 are the results of one specific model simulation (which appears to be the case) or the aggregate results of multiple simulations.

7. 5.1 Peak spreading. The approach implemented is consistent with previous documentation and discussion with the peer reviewer.

8. Peak Spreading – all of the reporting, in the main document and Appendix A provides details of the outcomes of the peak spreading in terms of the overall network performance (density or delays). Given the peak spreading is implemented on a sector to sector basis it would be useful to identify changes in the input profiles and/or describe:
    a. to what differing degrees peak spreading changed across respective sector pairs
    b. Whether peak spreading is more pronounced in AM or PM peaks
9. Peak spreading. Appendix A states: "*The peak spreading process is largely automated so is reasonably easy to apply to other scenarios. When applying the peak spreading process for scenario testing, or other forecast years, the input parameters should be reviewed for appropriateness, and revised if required. Consideration should also be made of whether there is need to run additional iterations of the process to further refine the profiles."* Whilst this is reasonable advice some questions arising from this for future model use include:
    a. What constitutes "appropriateness"
    b. Does every scenario need the peak spreading step undertaken, or can the model be used where the spread demand profiles can be established for one scenario and transferred to other scenarios?
    c. In evaluating and comparing scenario performance how will the disbenefits of peak spreading, or benefits of contracting the peak, be quantified in a consistent way with the overall network performance measures like VHT or delay levels?
10. Peak spreading – graphs in figures 4 to 9, and equivalent graphs in for the micro model in figures 13 to 18, should include units for the vertical axes. [It is assumed the graphs use same units as those presented in Appendix A]
11. Section 6.1 Micro model overall network performance. Comparison of Table 9 and Table 6 for the meso model indicates that the AM peak has more significant differences than the PM peak for the results at the different model levels. Is there any particular explanation for the cause of such differences?
12. Section 6.2.1 Micro model light vehicle travel time consistency. The data in tables 10 to 12 indicates variability generally (but not always) increases in the higher demand 2026 scenario and that the variability range increases to a greater extent than for the differences in the average travel times across the two years. These are considered reasonable results. It is unclear how such results would be used to determine on a consistent basis any user benefits associated with reducing travel time variability.
13. Section 6.3 Key corridor performance. This section provides useful insights into model performance and the complexity of interactions occurring in sections of the network. For future use of the model it highlights (along with various other comments around signal timesettings) the importance of the need to sensitivity test around specific assumptions in model inputs and how they may change results for a given scenario.
14. Section 7 Multiple Micro Model runs. The paragraph referring to 10 replications, and the process of removing unacceptable results, provides another example indicating where some judgemental aspects are required. It is unclear what criteria might be used to judge the acceptability or otherwise of less obvious cases of aberrant results, or (linking to comments in

item 5) when overall demand levels rise to a point where acceptable performance cannot be achieved in multiple simulation cases.

15. Section 8 Model limitations. This section is considered to provide good coverage of apparent key issues. As noted under item 3 above, it would be useful to highlight the importance of experienced users being involved where "judgmental" aspects of model review and interpretation are required in the modelling process.

DOCUMENT CHECKING (not mandatory for File Note)

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