Attachment B: Outline of Statement of outcomes of the expert meeting

Topic: Strategic Transport Modelling

Attendees: Tim Veitch (Veitch Lister Consulting), William McDougall (Banyule, Boroondara and Whitehorse Councils), Peter Dunn (ARUP) Knowles Tivendale (Movement & Place Consulting) and Luis Willumsen (Peer Reviewer)

Date, time and location of meeting: 25/07/2019 11am-5pm, plus 26/07/2019 9:30am-4:30pm, VLC Offices (190 Queen Street, Melbourne)

Introduction

The scope of this conclave is limited to issues relating to the strategic transport modelling, including:

- Methodologies
- Robustness
- Assumptions
- Sensibility or realism of the forecasts

The scope excludes issues related to:

- Traffic engineering and design of the Project
- The strategic transport planning process

except in respect of how the strategic modelling inputs to those streams of work.

In the two days available, we were not able to discuss all of the identified issues. Where issues have not been discussed, we indicate so in the report below.

Key Issues

The following key issues were identified by the participating experts at the meeting:

Facts and opinions agreed and not agreed

1 Validity of the base year (2016) model across the entire modelled area

1.1 Is the amount of travel activity in the EES model materially different to the Business Case model?

We agree that the apparent differences between the EES and Business Case numbers identified by McDougall are due to differences in geographic scope between the two analyses, and due to a mis-labelling of person trips as vehicle trips in the EES Report. When these reporting issues are addressed, the amount of travel activity in the EES and Business Case models is not materially different at a strategic level.

1.2 Does the EES model overestimate current day car travel?

1.2.1 Does the EES model over-estimate daily trips per capita for the current day?

We agree that the model has higher trip rates than the VISTA survey, by around 10%. We agree that all travel surveys such as VISTA under-report trips. We agree that VLC has conducted an analysis which shows that the traffic implied by assigning expanded VISTA vehicle trips (plus Zenith non-resident and commercial vehicle trips) is lower than traffic counts by around 20%. Given the known limitations in VISTA, it is not unreasonable for Zenith to have a higher trip rate than VISTA. We agree that the true trip rate is uncertain, and the difference between VISTA and the Zenith model does not necessarily imply that the Zenith model's trip rates are wrong.

1.2.2 Does the EES model over-estimate average trip lengths for the current day?

We agree that Zenith produces average trip lengths that are slightly longer than VISTA, by around 10%. We agree that given the known limitations in VISTA, the true trip length is uncertain. We agree that there are plausible reasons for why the true trip length could be marginally longer than that implied by VISTA.

1.2.3 Does the EES model over-estimate vehicle kilometres travelled (VKT) per capita for the current day?

We agree that average trip rates and trip lengths are key determinants of aggregate VKT. We agree (as per above) that Zenith's trip rates and trip lengths are higher than VISTA, but there are plausible reasons for this, and it does not necessarily indicate that the model is high in reality, due to the limitations of VISTA.

1.3 Does the EES model under-estimate the share of trips made by public transport in the current day? Is it likely to under-estimate public transport demand in the future?

In terms of the current day, we agree that the modelled share of public transport trips is roughly consistent with a VISTA based estimate, noting that Zenith includes visitor trips while VISTA does not.

In terms of future year forecasts, we agree that future public transport mode shares are uncertain, particularly in light of changes in technology (autonomous vehicles, Mobility as a Service) and changes in urban form (e.g. increasing densities). We agree that these potential technology changes are not accounted for in the core EES runs.

Dunn and Tivendale believe there is a risk that PT mode shares in the future might be under-stated, due to the settings of parameters (such as transfer penalties which are higher than the typical range). In addition the current public transport network relies heavily on transfers for trips to key destinations in the corridor and across the Yarra River. A new network design that eliminates some of these

transfers (as proposed by government) would eliminate the transfer penalties that are affecting some trips within the model.

Veitch believes that the parameter settings are reasonable, and is not convinced that they will result in systematic over or under-estimation in the future. Veitch also points out that future public transport forecasts are un-constrained (i.e. no capacity constraints), meaning that the future public transport forecasts might (in this respect) be over-stated. Willumsen has reviewed the parameters of the model and accepts that on the whole they are reasonable and unlikely to under estimate future public transport patronage. Veitch also points out that the forecasts include an assumption that the perceived cost of public transport time will reduce by 0.2% per annum, which will act to increase the future public transport forecasts. Dunn, McDougall and Tivendale noted that the reasoning behind selecting a 0.2% change is unclear and this could underrepresent future public transport mode share.

1.4 Is the modelled average speed of car travel across Melbourne too high for the current day?

We agree that the average car driver speed in Zenith (45km/hr) is higher than implied by VISTA (29km/hr). We agree that the travel times in VISTA are self-reported times, and that the distances are not the actual distance travelled by the survey respondent, instead they are an estimate based on the "*shortest network path*"; these two effects tend to increase the error of speeds estimated from VISTA data.

We agree that the VicRoads monitor in 2011 reported an average speed on "*monitored roads*" of around 40km/hr [source: https://chartingtransport.com/2010/10/31/trends-in-melbourne-traffic/].

We agree that based on our experience, the VISTA average speed seems unusually low.

McDougall does not consider the Zenith figure implausible, but believes the difference with VISTA should be noted.

Veitch and Willumsen are comfortable with the average car speed in Zenith.

1.5 Is it reasonable for the model's behavioural parameters to be based on VISTA data from 2007-2010?

We agree that the behavioural parameters in the model are based on 10 year old data, and there are plausible reasons to think that travel patterns may be changing (e.g. lower car ownership and higher use of taxis and transport network companies). In this sense, it would be ideal if the model were recalibrated using the more recent HTS data.

Veitch and Willumsen believe that updating the model using recent household travel surveys would be a large undertaking, requiring significant financial and time investment, and it is standard practice in strategic modelling to only update behavioural parameters periodically. Consequently, they believe it was reasonable not to do so in this case. Dunn, McDougall and Tivendale all believe that the project is important enough to spend the time and resources necessary to design it properly based on the best possible inputs.

2 Validity of the base year (2016) model in the study area

2.1 Traffic volumes

Peaks

We agree that in the study area the modelled volumes tend to be higher than the observed traffic counts for the AM peak period (defined as 7-9am) and PM peak period (defined as 4-6pm) by around 10% on average.

We agree that in a general sense, the peak occurs at different times at different places, which is not reflected in the model. Zenith and most strategic models are unable to fully account for this.

Veitch believes that there is some evidence that the peak in at least some regions of the study area often occurs slightly earlier than 7-9am (and later than 4pm-6pm in the afternoon), and that if the model were compared against the actual peak 2 hours at each count location, the model might not be 10% higher than the counts. A longer definition of the peaks is likely to reduce this difference.

We agree that subject to the above issue, the model may be over estimating the modelled peak traffic in the study area (though we cannot say so definitively) and underestimate traffic at other times.

Daily traffic

We agree that on average across the sample counts in the study area, the model does not appear to systematically over or under estimate daily traffic.

Commercial vehicles

We agree that the model appears to over estimate commercial vehicle traffic in the local study area by around 15% on average.

We agree that modelling commercial vehicles is very difficult because of lack of data, and because of limitations in the model (i.e. it ignores construction related traffic which can vary year to year).

2.2 Travel times

We agree that it would be good if more comprehensive travel time surveys had been collected along some of the key routes (e.g. Upper and Lower Heidelberg, Banksia / Bell Street, Plenty Road and the entire Fitzsimons Lane / Williamsons Road route).

We agree that in the peak direction during the peaks, the model does have a tendency to over estimate travel times more often than it under estimates. We agree that ideally the model would better reflect these situations, particularly on competing routes such as the Fitzsimons Lane route.

We agree that the travel times on the Greensborough Road / Rosanna Road route is in aggregate reasonable, though we note that the model's inability to model junctions and queues in detail means that the exact locations of delays are not precisely modelled.

We agree that in congested conditions, travel times can be very sensitive, and exhibit significant day-to-day variation. We agree that it is difficult for a strategic model to accurately predict the average traffic speed in such conditions.

We agree that it would have been ideal to invest more time and money in fine tuning the modelled travel times.

Veitch and Willumsen consider that the level of travel time validation is adequate for the purposes of the EES. Dunn, McDougall and Tivendale believe that more work should be done to improve the travel times in the local study area of the model.

2.3 Public transport patronage

We agree that the model tends to over estimate rail boardings in the study area. We also agree that the model does a better job of modelling rail demand from these areas to the CBD.

3 Future year travel demands for the entire modelled area

3.1 How well do gravity models reflect how trip patterns (including average trip lengths) change over the long term, as cities grow and average travel speeds reduce?

Veitch and Willumsen believe that while gravity models are the most commonly used approach to trip distribution, they are limited in their ability to predict how travel patterns will evolve over the long term

in response to effects such as changes in travel costs. Veitch and Willumsen believe that it is reasonable to acknowledge this limitation and take pragmatic steps to ensure that the model produces realistic and stable forecasts. McDougall agrees with this in principle, but has a different opinion about what level of future VKT growth is most realistic, and what pragmatic steps should be taken.

3.2 Does VLC use the 'dampened single distribution' methodology on other projects, or only in the NEL model? How long has this been the case?

Veitch clarified that the "dampened single distribution" method has been standard practice within VLC across all of Australia, as long as he has worked at VLC (i.e. since 2002).

3.3 How different would the modelling results have been if the 'undampened loop through distribution' method had been used instead?

Veitch provided evidence which showed that the 'dampened single distribution' approach used by VLC produces aggregate VKT estimates that are roughly 4% higher than the 'undampened loop through distribution' method in 2036 over the whole modelled area. In terms of the impact of the Project:

- the forecast demand for North East Link is approximately 7% higher using the "dampened single distribution" method;
- the impacts on other roads in the vicinity of North East Link are on average around 10% larger using the "dampened single distribution" method; and
- the increase in model-wide VKT is approximately 21% higher using the "dampened single distribution" method.

3.4 Is the level of forecast growth reasonable in light of historical trends?

The "dampened single distribution" method used by VLC results in a small increase in car use per capita (i.e. VKT per capita) in the future.

Recent data from BITRE suggests that in the last 4 years, VKT per capita in Melbourne has declined slightly by an average of -0.17% per annum.

Veitch and Willumsen believe there is uncertainty over how VKT per capita will change in the future, and that there are potential reasons why VKT per capita could increase, such as on-going increases in population in outer Melbourne, potential reductions in vehicle operating costs, increases in usage of ride-sharing services (such as taxis) and improvements in traffic management. This uncertainty is acknowledged by BITRE, who in their 2015 report produced a range of forecasts including potential increases and decreases in VKT per capita. Given this, Veitch and Willumsen believe that the forecast growth underpinning the EES is reasonable.

McDougall, Dunn and Tivendale believe that VKT per capita is likely to continue to decline in the future, due to factors such as increasing densification and concentration of economic activity, and would have expected the EES to be based on modelling that produced a reduction or slower growth in future VKT per capita than that forecast by VLC. They also observe that the effects noted above, such as reduced vehicle operating costs, ride-sharing services and traffic management improvements could all be modelled explicitly (and the forecasts on which the effects of NEL are based do not do this).

3.5 Is the 'dampened single distribution' method a reasonable method to use?

We recognise the limitations of all current distribution models to accurately represent an average pattern of trips in a study area. Therefore, the implementation of distribution models should be combined with tests to ascertain the reasonableness and realism of the responses represented in future years. Willumsen states that in the UK and other countries the use of distribution models is

moderated by the need to dampen their response in future years so as to avoid delivering unrealistic changes to the trip patterns. The methodology to implement this dampening is more pragmatic than theoretical. In Willumsen's view the approach adopted by VLC is a reasonable one to obtain this moderating effect.

VLC has undertaken tests to estimate the actual effect of running the model in both the 'dampened single distribution' and 'undampened loop through distribution' approaches. These results are described above. Veitch and Willumsen believe that because the 'dampened single distribution' method produces slightly larger estimated impacts, it provides a reasonable and conservative basis for the EES.

McDougall and Tivendale believe VKT per capita is likely to reduce or grow more slowly than is forecast by VLC, and are more comfortable with the forecast growth produced by the 'undampened loop through distribution' method, and would have preferred this method to have been used in the EES (and the preceding Business Case).

4 Model limitations

4.1 Is it reasonable to not model hard capacity constraints and the detailed effects of junctions? What impact would these limitations have on the modelling?

We agree that the model has limitations in how it models the details of road intersections, and dynamic effects such as queuing and spill back. We agree that these effects are important effects in the real world and in the context of this scheme.

We agree that adding these details makes modelling more complex and time consuming and makes convergence to stable flows more difficult to achieve.

We agree that more detail could have incorporated, either within the strategic model, or in a separate highway model of the study area, and that this would have provided more granular insight into the local traffic movements in the study area.

Dunn, McDougall and Tivendale believe that more effort should have been invested into adding this detail particularly given the significance of the NEL project. They noted that traffic assignment inaccuracies along the project corridor from the strategic model would impact the accuracy of traffic forecasts used in the micro-simulation model.

Veitch and Willumsen are comfortable with the approach that was taken, on the basis that while adding these details makes models more "*sensitive*", it does not always make them more accurate for medium-to-long term forecasting (and can actually make them less accurate), can reduce their stability, and is challenging over the scale of area impacted by North East Link.

5 Future year assumptions

5.1 Reasonableness of future assumptions for road and public transport networks, population and employment, transport costs and future technologies

We agree that the core future year assumptions included in the model are stipulated by Transport for Victoria, and not decided by the modellers. These assumptions are set out in the Government's Transport Modelling Reference Case.

Dunn, McDougall and Tivendale believe that the Reference Case is more comprehensive in its inclusion of road projects than public transport projects and relatively simple network improvement options.

We agree that in principle, a range of scenarios should be tested as part of the planning of projects such as this. These include scenarios related to road projects, public transport projects, population and employment growth, transport costs (such as fuel prices and road pricing), and future technologies (e.g. autonomous vehicles and mobility as a service). We also agree that major

transport projects should not be planned in isolation, but should instead be developed as part of a holistic, integrated strategy for the metropolitan area as a whole.

Dunn, McDougall and Tivendale believe that a wider range of alternative scenarios should have been tested in order to fully understand the relative economic, environmental and social merit of this project, including scenarios in which the public transport network in the study area is significantly upgraded, and that these tests may have led to alterations to the design of the Project. Veitch and Willumsen do not have a strong opinion on this.

Veitch clarified that in the modelling of the project, bus lanes in the study were not removed, except on the Eastern Freeway where they were replaced by the busway. Tivendale, Dunn and McDougall observed that, therefore the modelling underestimates the effect that the NEL Project will have on bus services and the loss of patronage (and additional traffic congestion) that would result.

5.2 Impact of new population forecasts (VIF2019)

We agree that the VIF2019 population forecasts were published after the EES was completed, and show higher population growth, and a different distribution of growth across the region with higher growth rates in inner Melbourne and lower rates of growth in Banyule and Nillumbik. Corresponding employment forecasts are not available. The relative importance of employment forecasts and ways to account for likely growth were discussed but not agreed.

We agree that the revised population forecasts would change demand for the project and change its impacts. Veitch and Willumsen believe that the revised forecasts would lead to a small positive increase (a few percentage points) in the demand for NEL and a similar positive increase in the impacts of the project on other roads, and would not materially alter the EES. Dunn, McDougall and Tivendale believe that the impact of these changes could be material for the EES (including increasing public transport patronage), and warrants further investigation for a project of this scale and importance. Tivendale, Dunn and McDougall observed that the shift of growth into inner areas and the western suburbs in particular would be likely to increase densities further, adding weight to the need for a forecasting method which produces less growth (or even reduction) in VKT per capita in future.

5.3 Assumptions about real wage growth and its effect on drivers' willingness to pay tolls

We agree that driver value of time is assumed to increase by 1.55% p.a., which progressively increases drivers' willingness to pay tolls. The purpose of this increase is to reflect increases in real wages, and is based on the average rate of growth between 1995 and 2017 (see Appendix Table C.9 from Technical Report A). Veitch has clarified that this increase was not applied to mode choice (i.e. car vs public transport). We agree that real wages have grown more slowly in recent times, and that there is a risk that the future rate of wage growth will be lower than assumed. If this were to occur, the forecast traffic for North East Link (and corresponding impacts on other roads) would be smaller than the model forecasts.

5.4 Assumptions about public transport value of time

Tivendale was concerned that public transport value of time was assumed to reduce by 0.2% p.a., and that applying this rate to the NEL Project benefits would favour car travel over public transport.

We now agree that the way this is implemented in the model is to reduce the perceived cost of time spent on public transport by 0.2% p.a., which has the effect of progressively increasing the attractiveness of public transport over time. This addresses Tivendale's concern. However, Tivendale noted that the reason for selecting 0.2% p.a. was not clear and the actual effect could be greater.

5.5 Are the forecasts of car ownership in the study area reasonable?

We agree that the future base assumptions within the model about car ownership and future transport technologies and modal options are effectively business as usual, with car ownership per adult assumed to remain constant into the future.

We agree that with future increases in densities, transport options (including public transport provision) and new modal options (such as taxis and car sharing), car ownership may reduce in the future. We also agree that the traditional relationship between car ownership and car use may also be affected by ride-sharing and car-sharing options, and that these collective effects may have a corresponding impact on traffic demand.

We agree that modelling these effects is difficult and uncertain, but there is value in sensitivity testing car ownership levels into the future.

6 Forecasts impacts of the Project

6.1 Induced demand

6.1.1 Is VLC's trip distribution methodology likely to understate the scale of induced demand caused by North East Link?

Based on the modelling results produced by VLC, this is not the case. Rather, VLC's 'dampened single distribution' method produces slightly larger estimates of induced demand.

6.1.2 Does VLC's model account for induced commercial vehicle demand caused by North East Link?

We agree that VLC's modelling does not account for the inducement of entirely new truck trips, but it does account for the re-distribution of them.

6.1.3 What assumptions were made about induced land use?

In the EES, there was no induced land use. However, a sensitivity test was done as part of the Business Case which indicated that induced land use would cause an increase in demand for North East Link of approximately 1%. We agree that induced land use is very difficult to predict accurately.

6.1.4 Is it reasonable to not account for the impact of North East Link on trip generation rates?

Veitch and Willumsen agree that given that the model accounts for modal shifts to and from active modes (i.e. walking and cycling), it is reasonable not to account for induced trip generation. McDougall, Dunn and Tivendale do not have a strong opinion on this issue.

6.2 Are the forecasts of North East Link usage reasonable?

We did not have time to discuss this issue.

6.3 Are the forecasts of Eastern Freeway usage reasonable?

We did not have time to discuss this issue.

6.4 Are the forecast travel time savings as a result of North East Link reasonable?

We did not have time to discuss this issue.

6.5 Are the forecasts of modal shift reasonable?

We did not have time to discuss this issue.

6.6 Is the model of commercial vehicle toll diversion too inelastic, resulting in an under-estimate of truck toll diversion?

We did not have time to discuss this issue.

7 General

7.1 Does the Zenith model produce more "*bullish*" forecasts of economic benefits than the Government's VITM model?

We agree that Zenith is likely to produce higher estimates of growth in travel activity (i.e. VKT) than VITM, due to its use of the "dampened single distribution" method for trip distribution. However, we agree that this does not necessarily imply that Zenith will produce higher estimates of economic benefit than VITM, because there are other factors which affect economic benefits such as speed flow curves, which are known to be significantly different between the two models.

Relevant standards or criteria

We did not have time to discuss this issue.

EPRs and other approval documentation

We did not have time to discuss this issue.

Signed by:

Tim Veitch (Veitch Lister Consulting)

William McDougall (Banyule, Boroondara and Whitehorse Councils)

Peter Dunn (ARUP)

Knowles Tivendale (Movement & Place Consulting)

Luis Willumsen (Peer Reviewer)