

# West Gate Tunnel Project EES

## W McDougall comments on transport modelling and traffic effects

Version 1 issued 10 August 2017

- initial reviews of EES traffic Chapters, Transport Technical Report Appendix I and Tim Veitch witness report.

Version 2 issued 15 August 2017

- added review of VLC report “Review of Travel Forecasting Methodologies” – see section 5 herein.

Version 3 issued 16 August 2017

- added reviews of remaining EES Chapters and Transport Technical Report and Appendices

Version 4 issued 31 August 2017

- added review of Affidavit of Paul Malcolm Smith

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Comments below are made on the EES documents as stated. I will add to this document and reissue it, as my reviewing progresses.

I’ve bolded what I consider to be the most important points.

## 1 EES Main report

### 1.1 Executive Summary

Page ES-2 first para: “removing up to 9,300 trucks from residential streets” – over what time period, and in what year? *Does this tie in with more detailed figures presented later in the EES?*

**Page ES-2 third para: “Final toll prices, and structures, are still subject to negotiations...”. What toll prices and structures have been assumed in the traffic modelling? If no information is given on this, how can we judge that the traffic forecasts are made with a realistic setting of tolls? Will the traffic forecasts and impacts be re-assessed once the final toll prices and structures are decided on? Traffic on the WGT – and hence its ability to relieve other roads – will be highly sensitive to toll charges, especially for trucks.**

Page ES-11 fourth para, fifth bullet point: Time savings are quoted between the Princes Freeway/M80 interchange and the central city only. Will the project attract more traffic onto the Princes Freeway west of the M80 (Western Ring Road) interchange, and if so, how will that impact travel times further west? *The time savings between M80 and the city may be eroded by more congestion on Princes Freeway further west. There is no intention to upgrade the Princes Freeway west of M80.*

### 1.2 Chapter 02 Project rationale

Page 2-25 Table 2-2:

Benefits to motorists: “less vulnerable to disruption and delays” – has the assessment considered the effect of disruptions caused by incidents in the WGT itself? Will the overall effect demonstrably be better than the present situation?

Benefits to public transport users: “opportunities to make additional public transport service improvements” – Project “does not preclude” PT improvements, but it also doesn’t facilitate any – nor does it include any PT improvements itself. What, specifically, are the opportunities that the project creates for PT service improvements, if any? *If none, then this cannot be claimed as a project benefit.*

**Page 2-26 third and fourth paras: The benefit-cost ratio of 1.6 includes the Monash Freeway upgrade and the Webb Dock Access Improvements. What is the benefit-cost ratio of the WGT without these inclusions, and what would be the breakdown of direct benefits (fourth para and bullet points) for the WGT alone? What WGT tolling prices and structures were assumed in the benefit-cost calculations?**

Page 2-27 third para: The SGS accessibility modelling was done for the business case. Does it therefore include the Monash Freeway Upgrade and Webb Dock Access Improvements, like the economic benefits do (page 2-26)? If so, what would be the effect without these projects included, i.e. of the WGT alone?

### 1.3 Chapter 03 Project development

This chapter deals with the history and context for the project. I have not reviewed it in detail but make a few general comments as follows:

- Most of the assessment is preoccupied with what I would call post-rationalisation of the project. In particular, the assessment of “strategic interventions” (section 3.5) lists a number of initiatives which are rather cursorily written off one by one (with scant real evidence) to leave the WGT as the only solution. There seems to be no mention of the possible collective effect of multiple interventions, nor of whether any of them could be adopted alongside WGT to improve things further. Are they really ruling out every single one of the interventions listed?
- Complete absence of any discussion on public transport/mass transit options as devices to divert demand from the road system
- Stakeholder and community input (3.6.3) – cites broad support of the project on the basis of its potential to address truck impacts, travel times and free-up traffic movements in and around the West Gate Freeway. Given the growing concerns that (as greater detail and changes to the scope emerge) the project will actually not deliver well (or lastingly) on these things, does the Government really still expect such broad support?

### 1.4 Chapter 04 – EES assessment framework

No specific comments, but I believe the Transport Integration Act puts much stronger requirements on transport and land use planning than the framework seems to suggest. Also the “consequence guide” seems to omit (or downplay) measures that would capture the effect of the project on public transport (not just adverse impacts on existing PT, but also the loss of patronage and adverse effects on future initiatives).

### 1.5 Chapter 05 – Project description

No comments apart from noting that the section on incident management (5.5.5) reminds me that the business case and the economic appraisal implicitly assumed that there would be no incidents on the WGT, only the West Gate Bridge! Another example of optimism bias.

## 1.6 Chapter 06 – Urban design

No comments

## 1.7 Chapter 07 – Communications and engagement

No specific comments but I am surprised that nobody apparently had concerns that not enough was being done to improve public transport as an alternative. Headline concerns of major stakeholders (e.g. Melbourne City Council) are not mentioned specifically.

## 1.8 Chapter 08 – Environmental Management Framework

No comments, but it could be worth scanning through the items in Table 8-6 (Environmental Performance Requirements) and thinking about how the operational performance (look for mentions in the far right column) might be enforced or assessed??

## 1.9 Chapter 09 – Meeting our obligations

No specific comments, but I wonder about the first objective (deliver significant benefits for Melbourne and Victoria) in the light of concerns about the robustness of the business case...

## 1.10 Chapter 10 – Introduction (to the second volume)

No comments

## 1.11 Chapter 11 – Effects on traffic and transport

My detailed comments on the traffic and transport issues are made under the Transport Technical Report and Appendices (section 3 below). They nearly all have a bearing on this Chapter, which I haven't reviewed in detail at this stage.

## 1.12 Chapter 12 – Effects on physical environment

No comments

## 2 EES Technical Report A Transport Part 1 (pdf 413 pages)

### 2.1 Executive summary

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## 3 EES Technical Report A Transport Part 2 (pdf 608 pages)

### 3.1 Appendix A – EPRs

No comments – not reviewed in detail

### 3.2 Appendix B – Risk Register

No comments – not reviewed in detail

### 3.3 Appendix C – Summary of traffic volumes

No comments – not reviewed in detail

### 3.4 Appendix D – One Way Traffic Volume Plots

No comments – not reviewed in detail

### 3.5 Appendix E – Metropolitan Melbourne Statistics

The tables in this appendix are summary outputs from the Zenith model of Melbourne, giving:

- Trips
- Vehicle-kilometres travelled (VKT – no indication if this is all motor vehs or just passenger vehs)
- Vehicle-hours travelled (VHT – ditto)
- Average speed (i.e. VKT divided by VHT)
- Public transport trips and boardings

The figures are given for 2014, and for 2031 with and without the project. They are also broken down by:

- Western LGAs (Brimbank, Hobsons Bay, Maribyrnong, Melton, Moonee Valley and Wyndham);
- the rest of Melbourne; and
- Greater Melbourne as a whole.

I've used some of these figures to comment on the Zenith model's results at the end of my section 5 below.

### 3.6 Appendix F – Traffic Modelling Report

I have reviewed this Chapter and could make many detailed comments, but most of them seem to stem from my comments on Appendix I (my section 3.9 below), Tim Veitch's expert witness report (my section 4) and VLC's Review of Travel Forecasting Methodologies (my section 5). To avoid duplication, please refer to these comments.

### 3.7 Appendix G – Strategic Modelling Summary

I make more detailed comments on the Zenith model in sections following, but some further observations on this Appendix are as follows:

Section 1.2.1 second and last para: Why is the "single distribution" method not mentioned here? Is it used in all work done with the Zenith model of Melbourne, or just the West Gate Tunnel? If only the WGT, then why? Why does the full documentation on VLC's website omit to mention the "single distribution" method which the Zenith model of Victoria uses? Are there any other key elements of the model not given on the website?

Section 1.2.2: Is it correct to say that active modes (walking and cycling) are not fully included in the assignment step, because the model does not have full details of walk and cycle networks? Also that walking and cycling are not modelled separately, but only in aggregate? If so, how are longer-distance cycling trips estimated and modelled, if at all? *The statement that public and active transport is modelled "through all steps of the modelling process" is probably incorrect.*

#### Section 1.2.4 second para:

- Item 2: how can the Zenith model handle changing destination adequately, when the “single distribution” method omits the distribution step in the model’s iterations?
- Item 5: where is the evidence that “the jury is out” on whether additional journeys are generated by transport improvements? It has been well documented that such additional journeys do affect economic benefits, significantly in some cases. Can VLC substantiate their “belief” that “it will not have a significant impact on the West Gate Tunnel Project”?

Section 1.2.5: Zenith in Victoria – the business case forecasts for Melbourne Metro were prepared using VITM, not Zenith (Zenith was only used as a check). A business case was never completed for Melbourne Rail Link (now defunct). Why does VLC claim credit for projects they haven’t done?

Section 1.2.6: Why are toll road forecasts in Sydney and Brisbane at all relevant to the Melbourne model’s performance? How can a 30% overestimate (CLEM 7) be called “accurate” (although it was a lot closer than the winning bid!)? Why is only one volume quoted for each project? Were traffic flows on the other links or elements of these projects also as accurate, or has VLC only quoted the most accurate ones?

Section 3.2.1: Sensitivity tests – the impact of the sensitivity tests is only reported in terms of their effect on WGT traffic volumes (Table 3.3). This is only one of many possible effects that would influence the results of the modelling and its use in the business case. **It is interesting to note that increasing tolls by 20% reduces traffic by 12%, giving a toll elasticity of -0.6 – so traffic volumes are very sensitive to tolls in the model (which is probably good). But what toll levels were assumed as a starting point? How do they compare with toll charges mentioned elsewhere? It would be possible to estimate traffic changes between the assumed values and those now proposed (if there are any), to see if the statements about traffic relief effects in the EES would still be valid.**

### 3.8 Appendix H – Local Area Model Validation Report for 2014 EES Model

Section 1.1 – same boilerplate about Zenith provenance is in other reports (see my comments elsewhere on this). Key issue is that none of it is relevant to the local area validation of the Zenith model for the EES, which is a specific incarnation of the Melbourne Zenith model.

Section 1.3 – lists model improvements since the Bain review in 2012. When were these improvements actually made? Are the results of the improvements documented? How do we know that they did actually improve the performance of the model (its ability to replicate observed travel characteristics, its convergence and its response to sensitivity tests)?

Section 3.1.1 – the %RMSE figures show that the model is much less accurate in predicting AM and PM peak period volumes than all-day traffic volumes. Also the scatter plots show that the model overestimates peak period volumes by 5-6% (Figs 3.1, 3.2, 3.5, 3.6) and underestimates interpeak by about 2% (Figs 3.3, 3.4). Within tolerances, but still produces more peak traffic...

Table 3.9 – table contains confidential toll data from Transurban – now in the public domain... If this table is proportional to traffic volumes, it suggests that Zenith’s accuracy in predicting toll road traffic is reasonable in aggregate but varies quite significantly from one toll gantry to another, and in AM and PM peak periods compared to all-day. Not too unusual, but worth pointing out that the accuracy of toll road forecasting is not as great as they suggest elsewhere...

### 3.9 Appendix I – Base Case Model Development for 2014 EES model, version 3.1.0, May 2017

Page 1 (pdf p315), section 1.1 para 1: Zenith model of Melbourne – elsewhere referred to as a model of Victoria – which is it? How detailed is the representation of the area outside metro Melbourne? Are all trips and transport networks modelled in the area outside Melbourne, or just those entering and leaving the metro Melbourne area? *I think the zones are quite detailed, but I don't know about the transport networks and services.*

Page 1 section 1.1 para 2 and Figure 1.1 – why are the CityLink and EastLink business case traffic forecasts not included in Figure 1.1? How close were they to actual? Why are the toll road volumes in Sydney and Brisbane relevant to the performance of the Melbourne Zenith model used on WGT, which is a newer model with (we assume) Melbourne-specific toll diversion sensitivities? *They were produced by different models, probably earlier versions of these models.* Which other toll road projects in Melbourne has VLC worked on, apart from the WGT and the CTW projects (sentence implies there have been more)?<sup>1</sup>

Page 1 section 1.1 para 3 – are reports available from the reviews by Bain, Spiridonos and Carnovale? Bain's review was quite critical – what about the other two? When were they done, which versions of the model did they review, and what did they say? What changes have been made to the model as a result of these reviews?<sup>2</sup>

**Figure 1.1 – why are these relevant to the Melbourne Zenith model performance – were they not done with different (city) models and different toll sensitivity settings? Where (specifically, which road links) on these projects are the comparisons made? How accurate were the forecasts on other links in these projects? One single traffic volume for each project is probably oversimplifying the story.**

Page 2 section 1.2 4<sup>th</sup> para – “all assumptions documented in this report have ‘gone through’ this transport modelling framework” – what does this mean? Who looked at the assumptions and signed off on them? Were any peer reviews carried out? What did they say and where are their reports?

Page 7 section 2.4 – the model was revalidated to 2014 but presumably still used household travel survey data from VISTA07 and VISTA09 (or have there been more recent travel surveys?)? What, if anything, was done to review/update parameters derived from these travel surveys? Surely these would influence trip making? *It is an old model that has been calibrated to 2014 traffic and public transport data, rather than a full update to 2014 conditions throughout.*

Page 9, section 3.1.2 (Total Cars) – was the total number of cars (calculated by applying 2011 Census number of cars to 2014 estimated populations) checked by comparing with other sources of car numbers (such as Vicroads registration data or ABS Survey of Motor Vehicle Use)? If not, why not?

Page 14, figure 3.4 – shows that the NE Link and EW Link were only added to the base network after 2031 (thus not relevant to the 2031 forecasts for the EES). Has any sensitivity testing been done to see what effect the NE Link might have? IV has made it the next-most-important road link, and the

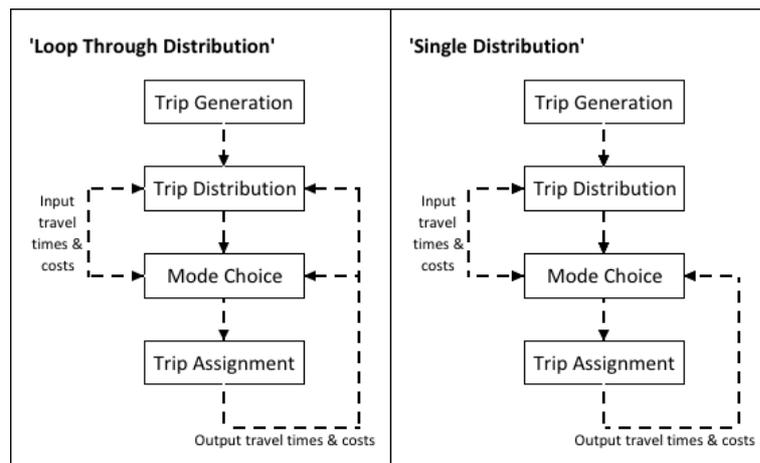
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<sup>1</sup> VLC has a habit of using references to completely different models (of other cities) to support their credentials – these are irrelevant to the performance of the Melbourne Zenith model and its ability to reliably predict traffic on WGTP.

<sup>2</sup> I can ask Fotios Spiridonos (and possibly Frank Carnovale) if you wish?

Govt has just announced planning has commenced – surely it will open before 2031? Why was the EW Link included, when it isn't Govt policy?

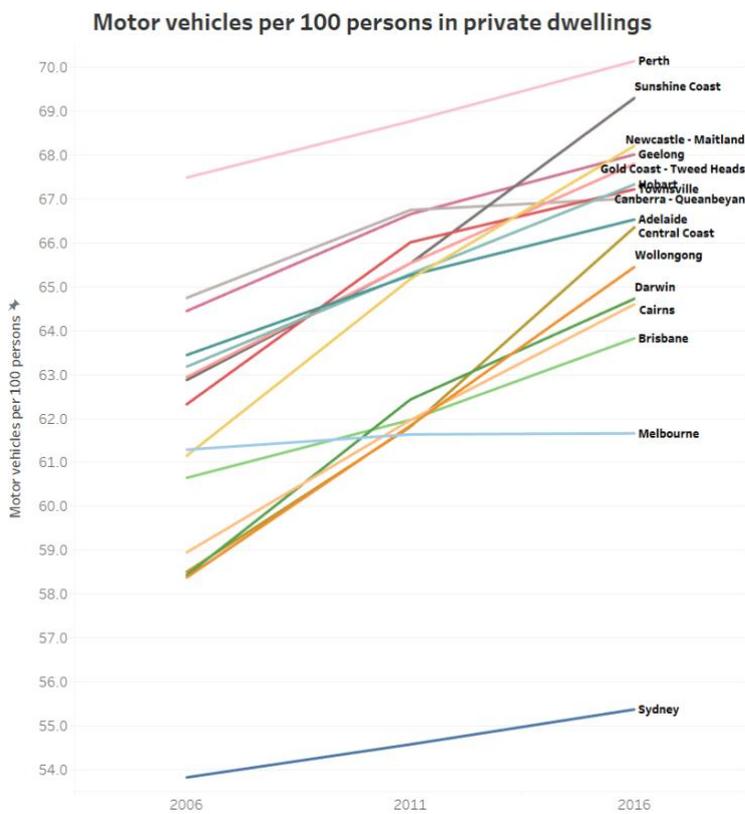
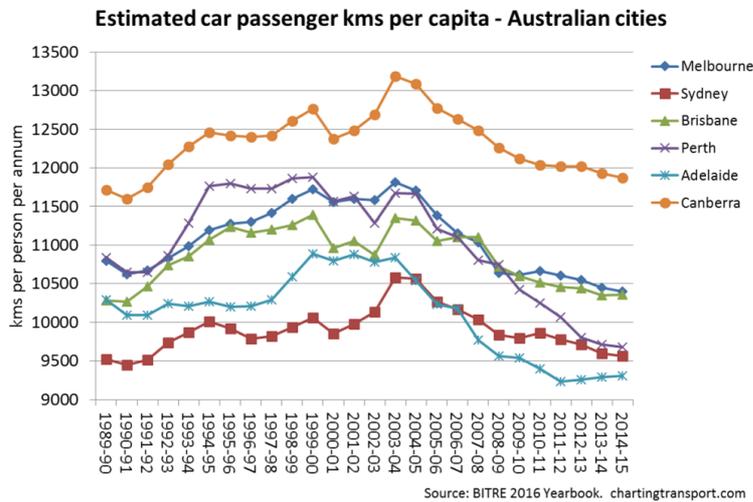
**Page 31 (pdf p345), Section 4.2.1 – this is the section that describes the “single distribution” approach which VLC uses – see my diagram below.** As far as I know, everyone else uses what VLC calls the “loop through distribution” approach, in which trips are redistributed on every iteration of the model. As far as I know, the “loop through” method is used by VLC to calibrate the model against observed data in the base year (2014 in this case), so why then omit the distribution step in future years?



**Section 4.2.1 para 1: Where is the VLC “Review of Travel Forecasting Methodologies” report?** It was not released as part of the EES documentation – I’ve seen an earlier copy dated September 2015 when I was working at DEDJTR. That report is specific to the Melbourne Zenith model.

**Section 4.2.1 para 2: how exactly does the single distribution approach “assume that trip makers respond to increasing congestion by changing their departure time, rather than changing destination”?** Where is the evidence that this is what people do? In the long term, they change their destinations as well; this is well documented (for example) in literature on Wider Economic Benefits. In modelling different scenarios, the intention is to compare them as alternative futures and thus they should surely reflect long term effects.

**Section 4.2.1 para 3: where is the evidence that the single distribution approach “best reflects the change in observed average trip lengths in future scenarios”?** How can it do that, since we cannot ‘observe’ the future? Does the evidence quoted (household travel surveys “all around Australia” apply to Melbourne? When was the most recent travel survey done in Melbourne, and what does it show in this regard? How does all this correlate with evidence that average car kilometres travelled per capita is declining, and has done so for the last ten years in Melbourne (and other cities – see 1st graph below)? Also evidence that Melbourne vehicles per capita is not growing like in other cities (2nd graph)?



**Section 4.2.1 para 4: VLC states that they use this method in their “standard modelling practice”. When did they start doing this? Do they use it in all their models (including Sydney and Brisbane) or only in the Melbourne Zenith model? Did they use it in other work with the Melbourne Zenith model, such as EWL? Has the method been used by any other transport modellers elsewhere? To my knowledge, such a method is not used by anyone else. One of Australia’s most experienced modellers says (to me) that VLC’s method does not make sense, and current schools of thought are that the post-distribution mode split modelling hierarchy which VLC uses is unlikely to be correct – theoretical tests tend now to lead to either a) simultaneous distribution and mode split, or b) pre-distribution mode split structures.**

### 3.10 Appendix J – Melbourne Wide Model Validation Report

I have not had time to provide detailed comments on this report. Note that there is repetition between the previous report (Appendix I) in Section 1. Again, most of this is actually irrelevant to the model's performance, and its use on the WGTP.

Overall I think the model validates reasonably well (within guidelines). It would certainly be worth asking a general question, though, which is not documented here: Was the 2014 model used in "loop-through" or "single distribution" mode? I suspect the former, which further begs the question why they use "single distribution" in the future years (see my critique of the *Review of Travel Forecasting Methodologies* report (my section 5 below).

### 3.11 Appendix K – Peer Review Report

No detailed comments. This report was prepared by Stephen Pelosi, who knows very little about transport models. It is a very short report that goes into little detail and there is no evidence that he was engaged during the development of these reports, or just to review them after they were a *fait accompli*.

Noter his statements in 3.1 (page 10) about the Zenith model. He says "I have not assessed the adequacy of the VLC traffic modelling forecasts for the purposes of technical peer review in the analysis and procedures adopted for the Impact Assessment Report".

How on earth can he then go on to say "In conclusion, it is my opinion that the process, methodology and assessment undertaken in the Impact Assessment Report are comprehensive and technically sound, and provide both integrity and credibility for the report's findings"??

Because this peer review looks as though it was carried out after the event, and didn't assess the adequacy of the forecasting tools used, it cannot be relied upon to give confidence in the work at all.

## 4 Transport Modelling for West Gate Tunnel Project Report by Tim Veitch, August 2017

Page 5, Figure 2: the figure indicates that Zenith model outputs were post-processed, amongst other things to move excess demand out of the peak periods into the interpeak and off peak periods. How much demand was moved in this way? If the so-called 'single distribution' modelling approach is used partly to address peak spreading, as claimed in EES Technical Report A Appendix I (*which is questionable*), why was it necessary to move demand out of the peak periods in this way? What was the resulting effect of these adjustments on levels of congestion, and hence travel times, in all the time periods? How do the travel times from the VISSIM modelling compare with those from the Zenith modelling (which was used for the economic appraisal)?

Page 6: third para: key assumptions:

- Why was the West Gate Tunnel coded with only two lanes in each direction in the Zenith traffic modelling, when the actual proposal is to have three lanes in each direction? Will three lanes lead to more traffic using the tunnel, and hence more traffic entering the city?
- There seem to be some inconsistencies in the lane capacities assumed in the modelling, as summarised here. West Gate Tunnel capacity of 1600 vphpl<sup>3</sup> seems low compared with

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<sup>3</sup> Vehicles per hour per lane

observed figures and Austroads guidance, which suggests saturation flows can significantly exceed 2000 vphpl).

- Also Wurundjeri Way extension has a capacity of 900 vphpl whilst connections to/from Port of Melbourne and the city have capacities of 1400 vphpl, yet all have the same free flow speed (40km/h).
- Why does the West Gate Tunnel have a free flow speed equal to the proposed speed limit (80km/h), while the West Gate Freeway upgrade has a free flow speed below its speed limit (95km/h)?
- What modelled capacities and free flow speeds have been assumed for the West Gate Bridge? This is not given in the report.

Page 11 second para: Were the 2031 forecasts for the EES the same as those prepared for the business case? If not, why not? Were the 2031 traffic volumes and travel times for the EES generally higher, or lower than the business case forecasts, and by how much (on key existing and proposed new roads)?

Page 14 third para: “the traffic flows/speeds forecast by Zenith will not be completely reliable in cases of extreme traffic congestion, where traffic demand significantly exceeds capacity”. Where and in what time periods/directions do Zenith traffic volumes ‘significantly exceed’ capacity? What is the effect on modelled travel times, and hence on the reliability of the model to predict traffic volumes in a constrained network situation?

Page 15: fifth para and bullet points: Induced demand queries:

- Changing route – no comment
- Changing destination – how can this be “handled adequately” when the destination choice sub-model is not run, due to the ‘single distribution’ modelling technique?
- Changing mode – no comment
- Changing departure time – there are current strategic models elsewhere (for example in New Zealand) that do predict changes in departure time (i.e peak spreading). Why does Zenith not do this? Where is the evidence that this limitation of the model will have a “fairly minimal impact” on the West Gate Tunnel Project? *If we knew how much traffic was moved from peaks to shoulders during post-processing, we’d be able to judge this more easily*
- Making additional journeys – where is the evidence that “there is no consensus on whether this actually occurs to a scale that has any material impact on the capacity consumption of roads and/or economic benefit assessments”? the VicRoads guidance quoted is quite old (2012) and there is plenty of evidence online about this phenomenon and its effect on economic benefits.
- Land use changes – where are the results of the “sensitivity testing of land use scenarios reflecting WGT Project uplift effects”? Why was this not included in the demand forecasts and economic benefits of the project (it was on Melbourne Metro, why not on WGT)?

Page 16 and 17: Information indicates that VLC’s assessment of induced demand increased the 2031 forecast daily traffic in the WGT by 6.5% overall. This is not insignificant, and would have a material effect on congestion levels, travel times and economic benefits. Was this level of induced demand included in the EES traffic forecasts, and if not, why not?

Page 19 section 6.3.1.9, third bullet: If interstate rail freight shifts to the WIFT in 2032, yet it was not included in the 2031 modelling, that would lead to its benefits being underestimated? Surely it would have been better for such a material project to have been included in 2031 modelling?

Page 20 section 6.3.1.12: as the modelling does not distinguish Dangerous Goods Vehicles (presumably meaning placarded loads, which would not use the tunnel), was any separate research

done to estimate how many such truck trips will exist, and what effect they might have on truck volumes in the WGT and modelled area roads? If not, why not?

**Page 20 section 6.3.1.13: Why is it appropriate to assume in the Zenith modelling that public transport vehicles have no capacity constraints, whilst roads do? Doesn't this result in an overstatement of public transport mode shift, thus understating the traffic forecasts? What differences occur between constrained and unconstrained public transport Zenith model runs of the Wets Gate Tunnel Project? I consider this to be a potentially significant issue – it is highly unusual (and contrary to standard practice) to omit PT capacity constraint in modelling for project appraisal; it is only really appropriate in strategic planning, when one is trying to estimate the latent demand.**

Page 20 section 6.3.1.14: No account taken of new vehicle technologies, especially autonomous vehicles – the potential effects of autonomous vehicles are enormous. On the one hand, they will allow many more vehicles to flow on roads (moving much closer together and with much shorter reactions to changes around them). On the other hand, they will promote more car trips, including positioning trips by empty cars as well as more trips by non-drivers. They may also promote higher average vehicle occupancies, and much more efficient vehicle routing in response to delays etc. It is very simplistic, given the potential timing of their introduction, to ignore their influence completely. A lot of research is starting to emerge, and their impact on decisions about major infrastructure needs is being considered seriously elsewhere. Why not here?

**Page 29: comments about accuracy of toll road forecasts using four-step models – the last paragraph states that the Zenith model has a strong track record of predicting demand for toll roads, yet the examples given are not in Melbourne, so how can we conclude that they show that the Melbourne model “provides a reasonable basis for forecasting demand on the West Gate Tunnel Project” (page 30)?**

Page 31: Here we have some more info on the testing of land use effects, but it is quite superficial. Says that “traffic impacts were generally similar to the land use impacts (e.g. generally an increase of 1% to 2% in the study area).” How were the modelled traffic increases distributed between the roads in the study area, including the WGT and roads experiencing noticeable traffic changes as a result of the WGT?

Page 37: Appendix A – item b (ii) D – which of the project traffic forecasts listed were done for the private sector and which for government? Which ones (if any) were done after opening? Which iterations of the Zenith models for the relevant cities were used for each of the forecasts (i.e. how old are the forecasts)? *Actually I think Tim's CV (Appendix B) answers this question.*

## 5 VLC Review of Travel Forecasting Methodologies, September 2015

This report elaborates on the reasons behind VLC's use of what they call a 'single distribution' method (see earlier comments on the EES Technical Report under section 3.9 above).

This is a very weak report, in my opinion, and critiquing it is one of the key ways to undermine the traffic forecasting done for the project.

### 5.1 Summary

Overall, this report is highly questionable:

- At first, it appears to compare VITM and Zenith, but it does not, so the differences between the two model forecasts are unknown.

- Zenith’s VKT forecasts are evidently highly sensitive to the use of a single distribution cycle – it raises queries over Zenith’s specification and certainly confirms that the omission of distribution cycles is very serious.
- It is wrong to attribute the problem to peak spreading and then correct it via distribution – note that VLC says that no strategic models in Australia do peak-spreading, but they are no doubt aware that the strategic models for both Wellington and Auckland in NZ do include peak-spreading.
- The analysis does not present any convincing evidence on the rate of increase in VKT in Melbourne and how it compares with the different Zenith options.

## 5.2 Detailed comments

Page 4 (Introduction): The intro suggests that this report will compare Zenith and VITM, but it doesn’t do that, as it turns out – it only compares two alternative modelling approaches (which they call “loop through distribution” and “single distribution”) in Zenith, to support their (weak) argument to use “single distribution”. In my submission to the Senate toll roads inquiry, I compare the numbers in this report with those from VITM.

Page 6 first para: “an important practical consideration is what travel times and costs to use in the first iteration.” And third para: “because of this approach [i.e. VLC’s “single distribution” approach] the travel times and costs used as input to the process are very important.” *This (correctly) emphasises the importance of selecting realistic travel times and costs, which is even more important in VLC’s single distribution method.*

**Page 8 – here VLC attempt to explain what travel times and costs they actually use. I challenge anyone to comprehend what they are describing here. It is poorly and scantily described, and finishes with an unsupportable assertion. They need to provide full details of exactly what they do and how it achieves what they claim it does, supported by model outputs to illustrate the effects they’re claiming.**

First and second paras: these reiterate that in their method the input travel times and costs are more important than in a more conventional (“loop through distribution”) approach.

Third para: They go on to explain that they assign “base year” trip matrices to the network. But what exactly do they mean by a “base year” trip matrix? The wording is very incomplete and unclear. Usually, “base year” is the year in which the model has been calibrated (in this case 2014). If so, then in their quoted example they assign 2014 trips to the 2031 base case network to generate a first cut of the travel times and costs, which are then used as input to the distribution step before looping through the mode split and assignment steps to achieve convergence? (this doesn’t make much sense!) Very few details are given. How many times do they iterate the model to arrive at the first-cut travel times and costs? Which matrix is used in the first iteration of the full model? Is it correct to assume that there is subsequently only one iteration of the distribution step, followed by multiple iterations of the mode split and assignment steps?

Fourth para: This is unintelligible. One would be forgiven for thinking that some text has been removed from this section. Exactly how does the process described in the first three paragraphs “take account of the new accessibility provided by improvements to road and public transport”? How does this in turn demonstrate that “the Zenith process does consider the induced demand caused by a new infrastructure project”? There is absolutely nothing in this description that explains these bald statements.

Page 9 – the discussion on this page is largely correct, but has many sloppy statements:

- In para1: “...the rationale behind the “loop through distribution” approach used in VITM...” – and every other four-step strategic transport model I am aware of – do they have any examples of others who use their “single distribution” approach, and for what purpose? Why do they believe that their approach is better than (probably) everyone else’s?
- They state in several places, incorrectly, that four-step models are unable to directly model peak spreading. Actually, there are examples of models which do this (e.g. Wellington and Auckland, in New Zealand). Why has VLC never developed such a capability for Zenith, if they consider it so important?
- They also state (para 2) that destination-switching due to congestion results in shorter trips, but this is not necessarily so. Many people might actually make longer (but quicker) trips to other destinations, using routes where there is less congestion. In any case they do not substantiate or provide any evidence that destination-switching results in aggregate trip-shortening, nor that peak spreading results in aggregate trip-lengthening. If anything, assuming all trips are the same, but just the departure times vary (in peak-spreading), then there would be no change in trip lengths at all.

Page 10, second para: here is another non-sequitur – they state that their “single distribution” approach “essentially assumes that trip makers respond to increasing congestion by changing their departure time, instead of changing destination”. There is no explanation of exactly how their approach does this. Seeing as it still keeps the aggregate demands in each modelled time period separate from each other, it demonstrably doesn’t do this at all. Finally, notwithstanding all this, there is no substantiation that this is actually what people do, exclusively, in response to congestion in the long run.

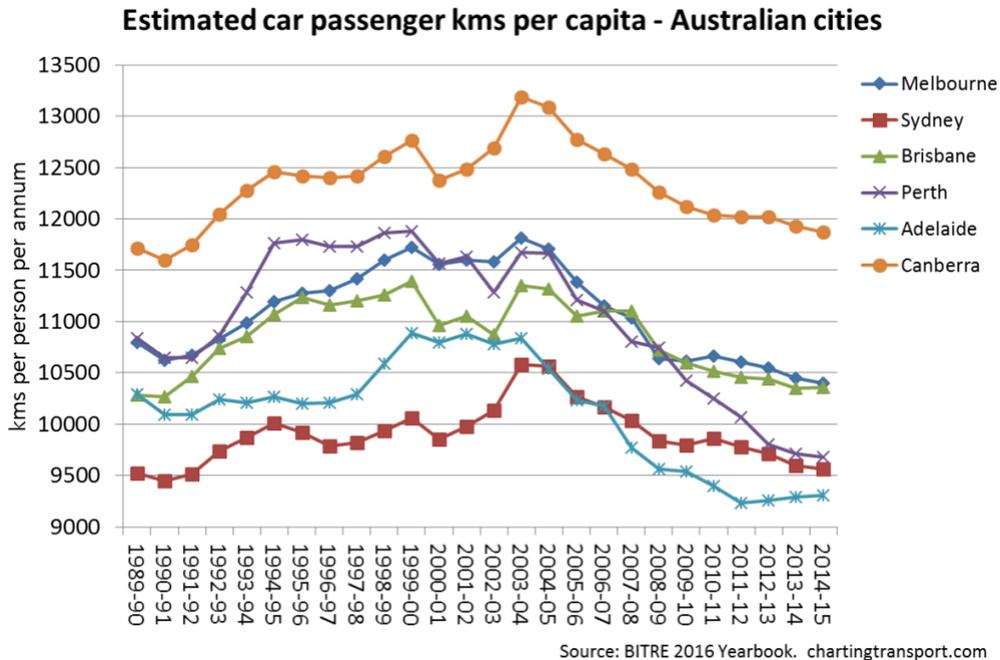
It has long been recognised that, in reality, there is actually a mixture of both peak spreading and destination-changing occurring. However they claim that their method eliminates destination-switching altogether, replacing it with peak spreading (which, incidentally, it actually doesn’t do). Why would they want to do this (which they actually don’t), when they acknowledge that there is a mixture of both? Can they substantiate any of these claims that they make?

Page 11/12 (section 2.3) – here they show the difference between their “single” and “loop through” methods, using Zenith (not, as they stated at the outset, comparing it with VITM).

Table 1: there is no indication whether the car trips and car kilometres travelled are person-trips, or vehicle-trips. Which are they? The model distributes person-trips, then estimates vehicle trips on the road network with assumptions about vehicle occupancy. How does vehicle occupancy change between the two methods, if at all? Furthermore, how does it change over time (between 2011 and 2031)? Are these model-wide comparisons, or only for metropolitan Melbourne? If the former (and I think they are), what are the equivalent figures for metro Melbourne only (so that we can compare directly with trends quoted in Chapter 3)?

Why does omitting the distribution step (the difference between the two approaches) lead to such large differences in the resulting car kilometres travelled (CKT)? How much does it have to do with the choice of travel times and costs used in the first (and only?) distribution step in their model approach?

Finally (and in anticipation of the following Chapter), why do they believe that CKT per capita will increase over time from now on, when trends in Melbourne and other Australian cities have shown the reverse for the last 10 years at least (see graph below)?



Page 13: Figure 3: Why does this only show aggregate figures for all Australian capital cities? Zenith is specifically a model of Melbourne, so why doesn't it only show the Melbourne figures? What happens in other cities is irrelevant. Also, these are vehicle kilometres, not car kilometres. What growth is attributable to light and heavy commercial vehicles, which are included in this total? Also, what has been the trend in car occupant-km (in other words, what influence has changing car occupancy had to these figures) over time? Are we comparing apples with apples, between this graph and Table 1?

Page 14, Figure 4: this shows the levelling-off of growth in VKT per capita from about 2000 onwards. Again, this is total vehicle-km, so what about cars? Car-occupants? What has happened since 2012 (i.e. the end of this graph)? What happened in Melbourne only? Why are other cities relevant to a model of Melbourne?

Page 15 and onwards (discussion on spatial pattern of growth) – Using only Melbourne to explain growth in all capital cities – again not comparing like with like. The maps show continued expansion of Melbourne. What explains the downward trend in car passenger-km per capita in all capital cities, especially Melbourne? This has occurred while many of the cities have continued to expand geographically, so what is the point here? There may no longer be a relationship between city size and car vehicle-km per capita.

Page 20 (Figure 7 and surrounding text): Given the substantial difference in car use between inner and outer areas, is the growth in outer areas sufficient to increase the average CKT across the whole city? There is growth in inner areas too. Has VLC done a calculation to check this? The weighted average is what counts here. Without that, it is not possible to simply assume that average car use per capita will grow because of the growth in outer areas. Again, this is inconsistent with trends over the last ten years, in Melbourne and other cities. How can this be explained?

Page 21 (Figure 8) – How is the average distance between people and jobs calculated to create this graph? Does it account for transport provision? If so was it done with the Zenith model, or some other means? (if it was done using Zenith then how can it be used to support the contention that trip lengths should increase?).

Page 22 – this is a highly over-simplified example which proves nothing. Melbourne and most other cities are far from circular, and their growth is never always only at the outer edge. Also their transport networks are not homogenous; the quality of access between different parts of the city is not governed only by distance.

Page 23 onwards (changes in vehicle ownership and licence holding) – the very real trend in younger people driving less over recent years is written off by saying (page 25) that it's too early to say how this trend will play out. That is strangely convenient, because it also doesn't fit the argument being presented in the rest of the report.

Page 26 (increasing car use among older people) – older people travel a lot less than working-age people, mainly because a large proportion of them are not working. Where is the calculation that proves that an aging population will result in more car travel? How much more will older people have to travel, to increase the average per capita? I suspect it's a very large amount, well beyond any trends or expectations. This whole argument about older people is very loose and unsubstantiated.

**Finally, and very importantly** – according to the figures given in Transport Technical Report Appendix E (pdf page 75 onwards) and Appendix I (pdf page 381), the Zenith model apparently only produces a **0.3% increase** in trips per capita in metro Melbourne between 2014 and 2031. Why is this so small, when this report goes to such length to argue (incorrectly, what is more) that VKT per head is going to grow, and this is the reason for using the “single distribution” method? Apparently, this method does not achieve the VKT per capita growth that VLC wishes to see anyway. This confirms that the method is simply a “fudge” which does not even do what they intend it to do (and claim it should do). It is in fact an incorrect use of the four-step modelling procedure (omitting the distribution step), contrary to established international and national practice, which results in inaccurate forecasts that go against recent trends without justification. There is therefore no way that the results of the modelling can be trusted, either to produce sensible traffic forecasts on roads in the study area, or to provide reliable inputs to the economic benefit calculations that supposedly demonstrate the economic return on investment.

## 6 Affidavit of Paul Malcolm Smith dated 29 August 2017

This document is provided by Paul Smith, who managed the process of developing the WD Business Case within DEDJTR.

Para 5: The project team “comprised membership from both DEDJTR and the Department of Treasury and Finance with assistance from other government agencies and organisations such as VicRoads” – Smith omits to mention that a significant proportion of the team (himself included) were transferred from the Linking Melbourne Authority team which had produced the Business Case for the East West Link, widely criticised by the incoming Labor State Government.

Para 6 & 7: The Market-Led Proposals Interim Guideline dated February 2015 – how does this differ from the Guideline now on DTF's website (dated November 2015)? The current Guideline talks about preparation of an “Investment Case” but the Government produced a “Business Case” for WD. What is the difference between the two? Why was the WD document called a “Business Case”?

Para 8: VLC “was requested by the Transport Network Development Branch of DEDJTR to undertake transport modelling” – was there a competitive tendering process? Were other models and/or modellers considered, including VITM? Why was VLC selected? Who authorised the appointment of VLC, following a process that was (presumably) outside the usual Government requirements of open tendering?

Para 9: Note that VLC had started work by early April 2015 (when their personnel entered into confidentiality deeds).

Para 11: "It is common... for traffic modelling inputs into the Business Case to be independently peer reviewed." Really? At the time it was a relatively new step in the process, I think. Common in other countries, but not in Victoria (or Australia in general). "The purpose of undertaking peer reviews of this kind is to support and strengthen the robustness of the Business Case..." – but only if the peer reviewer's comments and concerns are actually acted upon, to improve the quality of the work done. There is little or no evidence that this was done. Tim Veitch has already said that there were ongoing, unresolved differences between himself and John Allard.

Para 13: Why was it as late as July 2015 that the decision was made to appoint a peer reviewer? VLC had already been working for 3 months. If it is "usual" procedure, why was the peer reviewer not appointed at the same time as the transport modellers? How could the transport modellers have prepared for, and incorporated properly in their work programmes, the inputs from a collaborative peer reviewer who was appointed later in the process?

Para 14: Smith omits to mention that, although the peer reviewer was appointed by the Transport Information and Analysis Branch, his fees were paid for out of the WD assessment team's consulting budget.

Para 17: the "Initial Allard Assessment" was "provided to VLC for consideration" – were VLC required or instructed to take the peer reviewer's concerns on board and make corrections or adjustments to the model? Were any adjustments made to the modelling for the Business Case? If not, why not, and what is the value of a peer reviewer if their comments are not addressed?

Para 19 & 20: Allard produced "the Allard Status Report" on 21 September 2015 which was provided to and discussed with VLC prior to finalisation of the Business Case – how long after this Status Report was the Business Case finalised? Was there sufficient time to address Allard's concerns (Veitch suggested not)?

Para 21: Note that Allard produced his "Final Comments" in December 2015. This was AFTER the WD Business Case was released in November 2015.

Para 22-24: VLC was asked to produce a written response to Allard's comments in January 2016, which they did not produce until September 2016 (the "VLC Response"), a full year after Allard's second report, which (as Veitch has acknowledged) contained major concerns about the Zenith model's suitability for assessing the WD. Smith lists eight issues but provides no information on whether VLC had accepted and addressed any of these concerns about the transport model, either in time for the Business Case (highly unlikely, given the extent of the concerns) or later for the EES. All we know is that the Zenith model was validated to updated (2014) data, yet the model run methodology (the "single distribution" method) was not changed and VLC have provided flimsy reasoning to support using it, against accepted practice in the four-step modelling community.

There is no proof in Smith's affidavit that the concerns of the peer reviewer were addressed adequately to improve the modelling for the Business Case, and there was little or no time to do so. Allard was appointed late, his comments raised significant concerns and the Business Case was apparently finalised without taking those concerns on board in the transport modelling.

Para 25-28: There is no evidence given to support Smith's assertions about the need for confidentiality, the robustness of the Business Case or the discouragement of provision of "frank and fearless advice".

In fact, if it is known that peer reviews are done late, not heeded and cut short early, surely this will actively discourage reputable reviewers from getting involved and providing the required frank and fearless advice to Government. This was certainly the case for William McDougall (!) and probably for Allard as well.

Para 29: if the model was considered unsuitable for the Business Case, what specifically has been done to improve it for the EES modelling? No further peer review has been undertaken (and Allard has not been given an opportunity to review how his concerns might have been addressed). The highly questionable and non-standard “single distribution” modelling approach has been maintained, and is shown to produce more and longer car trips than the correct use of a four-step model.

Overall, Smith’s affidavit demonstrates that the WD peer review process was not effective in intercepting and addressing the concerns with the transport modelling. It does not provide compelling reasons for keeping the peer review documents (all of them – Allard’s four reports as well as VLC responses) confidential. The peer concerns with the Business Case modelling have been carried over into the EES modelling. If anything, it sheds light on a process – as described by William McDougall’s submission to the Federal Senate Economics Committee’s toll roads inquiry – that is only going to discourage worthy professionals from providing peer review services to a Government that doesn’t listen to them.

I wonder why the Government was prepared to release the Melbourne Metro modelling peer review – also by Allard – whilst keeping the WD review secret. The precedent has been set, and Smith’s affidavit only shows more reasons why the IAC should insist that it be released in full so that everyone can understand the shortcomings of the traffic modelling on which so much of the EES is based.