

WEST GATE TUNNEL PROJECT ENVIRONMENT EFFECTS STATEMENT
INQUIRY AND ADVISORY COMMITTEE

CITY OF MELBOURNE

TECHNICAL NOTE NUMBER: #9

DATE: 1 September 2017

LOCATION: **Port, CityLink and City Connections**

EES/MAP BOOK REFERENCE: N/A

SUBJECT: **William McDougall transcript and submissions to Senate Inquiry into Toll Roads**

NOTE: 1. In 2015, Mr McDougall was contracted by the Victorian Department of Economic Development, Jobs, Transport and Resources Transport Policy and Planning Division to advise on the business case development for a range of transport projects including a review of the Western Distributor Project.

REQUEST: The statutory approval process invites assessment and comment of the Environment Effects Statement as submitted by the WDA.

RESPONSE: Set out in the attached document is information relevant to the IAC's review and assessment of the EES.

CORRESPONDENCE: N/A

ATTACHMENTS: This Technical Note includes the submissions of William McDougall to the Federal Senate Inquiry into Toll Roads and the transcript of the evidence Mr McDougall gave during that Inquiry.

Submission by William McDougall Transport Planner

7 July 2017

1 Introduction

This submission relates some of my experiences on reviewing traffic forecasts and cost-benefit analyses for toll road projects. As such it has relevance to the first item in the inquiry terms of reference, namely *“financial arrangements of existing and proposed private toll roads, and transparency, accountability and equity aspects of these arrangements”*. I refer to proposed, not existing, toll roads, primarily Melbourne’s West Gate Tunnel project.

I have worked as a professional consulting transport planner and engineer for over 40 years, of which over 30 have been in Australia. I have been involved in project feasibility, transport modelling and traffic forecasting, economic appraisal, strategic planning and business case development. During my career, I have been directly involved in a few toll road projects as a reviewer and advisor on transport modelling, toll revenue projections and cost-benefit analysis. A summary CV is given in Attachment A.

My recent experiences on the West Gate Tunnel project in Victoria are highlighted in some detail herein. I consider that, from my direct involvement as a peer reviewer, the justification for this project is based on flawed traffic modelling and cost-benefit analysis.

This and other experiences through my career strengthens my opinion that the work done to get a toll road project funded often lacks rigour and thoroughness, and is frequently biased.

2 West Gate Tunnel Project

2.1 Background

In 2015, I was contracted by the Victorian Department of Economic Development, Jobs, Transport and Resources (DEDJTR) Transport Policy and Planning Division to advise on business case development for a range of transport projects. Within this division, I worked for a team which, amongst other things:

- undertook continuous development of the Department’s own transport forecasting model (VITM, or the Victorian Integrated Transport Model); and
- ensured, using peer reviewers and internal auditors, that transport forecasting and economic appraisal was carried out to acceptable standards.

One of the projects I was tasked with reviewing was the Western Distributor (WD), now called the West Gate Tunnel Project. My role on this project was to support an externally-appointed peer reviewer for transport modelling, and to undertake peer review of the cost-benefit analysis.

The WD project was submitted to the Victorian Government for consideration by Transurban. It was assessed under Treasury’s ‘market-led proposals’ guidance. A project review team was set up within DEDJTR (separate from the division I was working in) to undertake the review and appoint consultants to do key components of the work. Veitch Lister Consulting (VLC) did the transport modelling and PwC Australia (PwC) did the economic appraisal.

I was surprised that the DEDJTR project review team, and their appointed consultants, were mostly the same people who had worked on the business case for the East West Link (EWL) under the previous state government. The EWL had just been scrapped by the incoming Andrews government as a key pre-election promise. There had been many concerns and problems expressed with the business case for the EWL, including the transport modelling and cost-benefit analysis.

As the work started, significant technical concerns became apparent. As well as this the work was done to a very short programme. Consequently, the results were not produced early enough for proper review, nor was there time for incorporation of peer reviewers' feedback.

After much deliberation, in the face of frustration and concern that the work would not stand up to scrutiny, I raised concerns at a higher level. Shortly after doing this, I was taken off the WD review work without explanation. The modelling peer reviewer's report was never released. Recently-released EES documentation on the traffic modelling implies that the peer reviewer's comments were addressed, but this was not the case (not in full, at any rate).

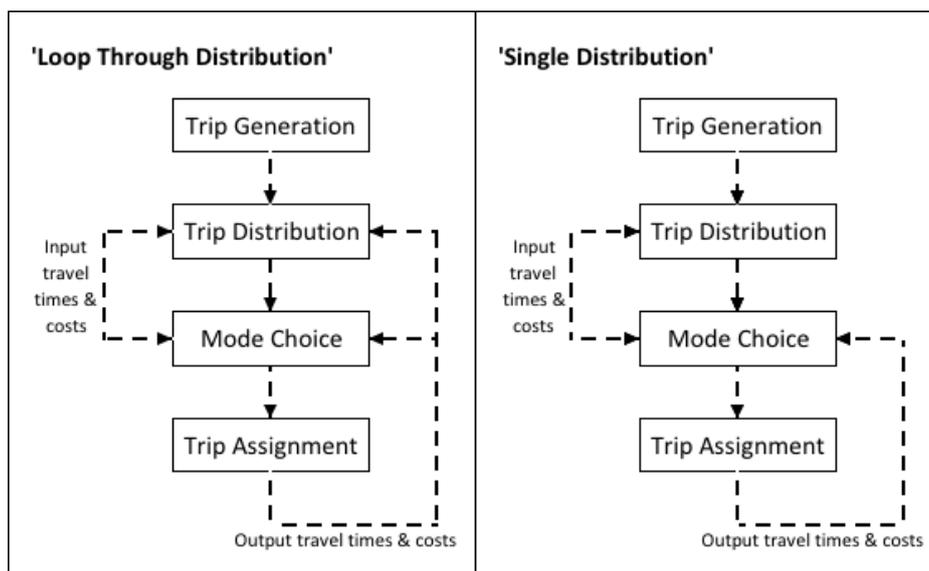
2.2 Transport modelling

At the outset, the four-step transport model to be used for the work (Zenith, developed by VLC and used on the EWL previously) was insufficiently documented and evidence of its validation was incomplete. Proper model validation requires direct evidence of:

- its ability to reproduce relevant recently-observed travel demand and traffic levels;
- its convergence after a suitable number of iterations; and
- the reasonableness of its response to a range of sensitivity tests.

The Zenith team worked to resolve these issues but there were still concerns expressed by myself and the peer reviewer which were never fully addressed, including:

- Zenith produced present-day traffic activity that was significantly higher than recent travel surveys, and results produced by VITM, despite supposedly being calibrated to the same data.
- Zenith used an unusual and untested method to produce future forecasts. VLC call this the 'single distribution' method and maintain that this is better than the way other four-step transport models are used (called a 'loop through distribution' method by VLC). The diagrams below illustrate the difference.



Four-step transport models use an iterative process to reach an answer. This involves loading the forecast demand (from the trip generation step) onto the computerised representation of the network, re-calculating the travel times (using travel time/flow relationships) and re-loading the demand in a loop back through the trip distribution, mode choice and assignment steps. This process is repeated until the results of two successive iterations converge to acceptable tolerances.

Zenith's 'single distribution' method iterates back through the mode choice and assignment steps only, thus keeping trip distribution constant. It does not allow for redistribution of trips due to changes in network conditions.

VLC has presented (for example in the WD EES documentation) a lot of material to justify doing this, mostly concerned with their view that it produces a more accurate result. However, it is illogical to use a four-step model in this way, and to my knowledge no other models are thus used. If a model has been calibrated to replicate existing conditions using full ‘loop-through’ distribution, it is illogical to then omit an essential loop when using the model to represent future years. It is a methodological ‘fudge’ rather than a real attempt to improve the modelling process.

The table below summarises an analysis I did at the time comparing results of using Zenith (in both ‘single’ and ‘loop through’ mode) and VITM in modelled years 2011 and 2031.

Measure	Zenith ¹			VITM ²		Zenith over VITM in 2011	Zenith 'single' over VITM in 2031	Zenith 'loop thru' over VITM in 2031	VISTA 2011
	2011	2031 'single distribution' ³	2031 'loop thru distribution'	2011	2031				
Population (million)	4.89	6.96	6.96	4.11	5.87	19%	19%	19%	
Car trips (million)	8.9	12.1	11.9	7.9	10.7	12%	13%	11%	
<i>increase over 2011</i>		36.0%	33.7%		35.4%				
Average car trip length (km)	14.4	15.4	14.3	10.1	9.8	42%	58%	46%	10.2
<i>increase over 2011</i>		7.1%	-0.6%		-3.6%				
Car km travelled (million)	128	188	171	80.4	104.9	59%	79%	63%	
<i>increase over 2011</i>		46.9%	33.6%		30.5%				
Weekday car km per capita	26.2	27.0	24.5	19.6	17.9	34%	51%	37%	
<i>increase over 2011</i>		2.9%	-6.5%		-8.7%				
Motorised mode share - car	90.5%	85.6%	85.7%	90.8%	86.7%				90.0%
Motorised mode share - PT	9.5%	14.4%	14.3%	9.2%	13.3%				10.0%

NOTES

1. These figures are from VLC report "Review of Travel Forecasting Methodologies", Sep 2015

2. These figures are from VITM output files for September 2015 reference case

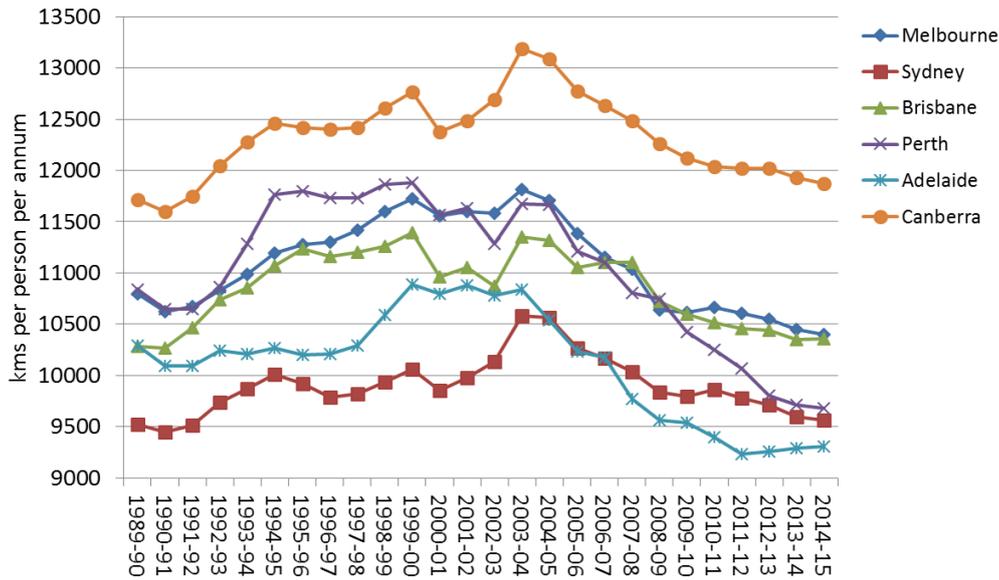
3. This is the method VLC uses on WD (and maybe other projects)

Key issues arising from this comparison are:

- **Population and number of trips:** Zenith covers a wider area than VITM, so encompasses a larger population and produces more car trips (12% more in 2011).
- **Average car trip length:** Zenith has 42% longer car trips in 2011 than VITM, and 58% longer in 2031 ('single distribution'). VITM average car trip length is much closer to VISTA. Zenith's larger modelled area may account for some, but by no means all, of this.
- **Car kilometres travelled:** Zenith has 59% more car vehicle-km in 2011 than VITM, and 79% more in 2031 ('single distribution').
- **Car kilometres per capita:** Zenith 'single distribution' has 51% longer car-km per capita than VITM in 2031. Zenith's car-km per capita increases by 2.9% between 2011 and 2031 (against observed trends for the last ten years; see graph below). It would decrease by 6.5% if 'loop-through' distribution was used, compared with VITM's reduction of 8.7%.

The concern was that Zenith produced more and longer car trips than VITM in 2011, and the 'single distribution' method produced even more (and longer still) trips than VITM in 2031. Therefore, traffic growth projections using Zenith would inevitably be significantly more than those using VITM. VLC have not substantiated their reasons for using the 'single distribution' approach, other than arguing that it does produce more and longer car trips per capita. They assert this to be correct, but it is against observed trends over the last ten years in Melbourne (and indeed in all capital cities in Australia – see graph below).

Estimated car passenger kms per capita - Australian cities



Source: BITRE 2016 Yearbook. chartingtransport.com

2.3 Cost-benefit analysis

PwC prepared a proposed methodology for the cost-benefit analysis, to be undertaken using results from Zenith modelling. There were several concerns with the way this was to be done, which I raised with them as peer reviewer. Perhaps the key issues were:

- Inclusion of **additional congestion relief benefits** using a methodology given in the New Zealand Transport Agency (NZTA)’s 2013 Economic Evaluation Manual, which added \$580m-\$780m of present value to the economic benefits in the business case.
- Presentation of **two different benefit-cost ratios** (supposedly complying with Victorian and Infrastructure Australia guidance), but with some questionable interpretation regarding treatment of induced traffic.
- **‘Streaming’ of benefits in future years**, between fixed and variable matrix modelling approaches, which resulted in higher-than-usual benefits in early years.

These are discussed below.

Additional congestion relief benefits

The NZTA’s economic guidance suggests that drivers in New Zealand attach a higher value to time lost in congested road conditions than in ‘uncongested’ conditions. It proposes that additional disbenefits should be added, on a sliding scale between traffic volumes from 70% to 100% of road capacity, to allow for this. PwC include this effect in the benefit stream for the WD. However, I consider that there are three issues with using this approach on the WD project:

- There is no proof that the effect is observed in Australian capital cities, where congestion levels are much higher than in New Zealand generally. PwC did quote some Australian research but in my opinion it was not conclusive enough to warrant including the effect.
- Even if the effect was shown to be applicable, the traffic modelling does not include it (only the cost-benefit analysis). If it was possible to model it, the effect would route traffic away from higher congestion areas. To apply such an adjustment to the economic benefits without also including it in the traffic modelling is incorrect.
- No other Australian cost-benefit analysis I am aware of has incorporated this effect, and it is not mentioned in any Australian guidance. Therefore, its inclusion has overstated the benefits of WD compared to other projects.

Two different cost-benefit ratios

PwC calculated two different cost-benefit ratios by applying their interpretation of both Victorian and IA guidelines. They identified several differences between the two, including their assertion that the IA guidance did not require inclusion of induced traffic.

The guidance then in force did not explicitly mention induced traffic in the main text but it did in appendices, which required that the treatment of induced traffic should be noted and described. Furthermore, there was draft replacement IA guidance issued at the time, which did include explicit mention throughout of the requirement to include induced traffic.

Finally, there is complete acceptance that induced traffic is indeed a real, observed phenomenon, so to exclude it on such a technicality, without stating clearly that it was incorrect to do so, is misleading.

Streaming of benefits in future years

Induced traffic is generally accounted for in four-step modelling by using a ‘variable matrix’ approach as opposed to a ‘fixed matrix’ approach. This is done by re-running the trip generation step on every iteration, thus changing the number and destination of trips due to a change in the network (i.e. a transport project). This is accepted practice.

PwC further reduced the effects of induced traffic (that is, in their interpretation of Victorian practice) by blending results from fixed matrix and variable matrix traffic modelling, based on their assertions that it takes some time for the land use effects of transport projects to occur, thus implying that this accounts for all of the difference between the fixed and variable matrix approaches.

However, the variable matrix approach does not account for land use changes in any case, just the re-distribution of trips around an area due to changes in travel conditions (but with land use fixed). These types of induced traffic are generally smaller than the longer-term redistribution of land uses.

This ‘tweak’ has the effect of increasing the benefits of a project in the early years, which increases the economic benefits because the discount rate has less effect than in later years. It is not done as a matter of course, and I am not aware of it being done on any other projects.

3 Other project experiences

In the early 1990s I worked on a team preparing traffic and toll revenue forecasts for a consortium bidding for City Link in Melbourne. My role was to ensure that the traffic modelling was prepared with reasonable assumptions, and that the toll revenue calculation process was using the traffic modelling results correctly. I found that the overall mentality of the team was to prepare assumptions which stood up to external scrutiny, but were always on the optimistic side (i.e. to give the best traffic and revenue results for the consortium). This was true of all the key variables affecting future traffic growth, particularly land use (population and employment projections) and sensitivities to toll levels.

I had similar experiences when I was later (briefly) involved in similar work on a team bidding for Melbourne’s Eastlink. On that project, I considered at the time that there were optimistic assumptions made about population and employment projections. It would be very interesting to be able to compare the forecasts made at the time with actual changes since Eastlink opened, but this has never been done to my knowledge.

4 Conclusions

My conclusions from these experiences are that those involved in ‘justifying’ transport projects, especially toll roads, often develop bespoke procedures and general attitudes to the work that are biased towards producing bullish forecasts and optimistic economic and financial projections. They have developed many

justifications for the way they do things, especially when these methods depart from usual practice and accepted guidelines. However, many of these justifications do not survive close scrutiny. Independent peer reviews, on the few occasions that they are undertaken, have been, and continue to be, regarded by project teams as a necessary inconvenience and an impediment to their progress instead of a benefit to the outcome. Very few project justifications have been undertaken with the transparency, objectivity and completeness which is required.

The Western Distributor project is a strong case in point. My direct experience as a reviewer confirmed my long-held suspicions of substantial ‘optimism bias’ in the appraisal process. This is a polite term for what I consider to be deliberate distortion and misrepresentation of traffic forecasts and the economic benefits that flow from them. This was done on what was supposed to have been an impartial assessment of the project from a Government perspective, rather than a proposal by a private proponent or tenderer.

There is much work to be done to bring transport project appraisal procedures up to date in Australia. Recent national efforts to update the procedures under the Australian Transport Assessment and Planning (ATAP) Guidelines are incomplete and do not, in my opinion, address the core issues. It is also unfortunate that there are different guidelines issued by State Treasuries and Infrastructure Australia, for example, instead of establishing a nationally-agreed set of guidelines (with local variations where justified).

Sufficient time and resources must be allocated to accredited independent specialist reviewers to review appraisal work as it proceeds, document any issues arising and ensure that corrections are made where necessary. Their reports should include comments on the reliability of the final results.

William McDougall

Personal details

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Telephone: [REDACTED]

Email: [REDACTED]

Date and place of birth: [REDACTED]

Citizenship status: [REDACTED]

Qualifications and affiliations

BSc (Hons) Civil Engineering, City University (London), 1977

Chartered Civil Engineer

Member of the Institution of Engineers Australia

Member of the Chartered Institute of Logistics and Transport

Overview

I am a freelance transport planner, engineer and economist with over 40 years' experience in the UK, Australasia, Asia and the Middle East. I cover all aspects of transport planning and I have directed studies across all transport modes with an emphasis on technical complexity and strategic importance. I have extensive experience in strategy and policy development/analysis, multi-modal studies, economics and financial analysis, multi-criteria appraisal, stakeholder and community consultation, traffic and pedestrian simulation, survey design and transport demand modelling.

Fields of Special Competence

Public Transport and Highway Strategy; Sustainability in Transport; Planning and Feasibility Studies; Management Consulting and Facilitation; Traffic, Economic and Environmental Evaluation; Financial Modelling; Market Research and Surveys; Transport Modelling and Economic Appraisal; Report and Article Writing; Community Consultation; Presentations, Media Articles and Interviews.

Selected Recent Activities

South Yarra Station (2016) – as an expert witness at the EES hearings I presented a case for including platforms at South Yarra on the Melbourne Metro project.

Grattan Institute (2016) – I temporarily joined the Grattan Institute as a Transport Fellow, working on research reports into transport policy and helping to shape the research agenda.

Appraisal Reviews (2015/16) – Advisor to the Victorian Department of Economic Development, Jobs, Transport and Resources on transport modelling and economic appraisal of major projects.

Transport in Cities (2011-2014) – In 2011, my then-employer SKM acquired Colin Buchanan and Partners, which Sir Colin Buchanan founded after writing a seminal White Paper for the UK Government called *Traffic in Towns* in 1963, addressing the dramatic rise in car ownership and use after WW2. To commemorate *Traffic in Towns*' fiftieth anniversary, with Sir Colin's grandson Paul Buchanan, I wrote a series of articles exploring future drivers of change in urban transport. We covered social and demographic trends, technological developments and governance issues.

Melbourne Metro Tram Plan (2013-14) – I managed a study to prepare operating plans for the tram system during and after construction of the Melbourne Metro Rail Tunnel. Construction required temporary closure of Swanston Street, so we developed plans to divert the trams to Elizabeth Street. We also developed a post-Metro tram network which formed the basis for longer-term planning.

Melbourne Airport Land Access Strategy (2012-13) – I directed a landside access strategy for Melbourne Airport. We explored different future growth trajectories and landside transport task requirements, and developed a strategy to provide a context for decision-making on the Airport Rail Link.

Northern Rowville and Doncaster Rail Studies (2011-13) – I led the Victorian Government’s Rowville Rail Study and peer-reviewed the concurrent Doncaster Rail Study. Alongside technical and planning work, I did regular ministerial briefings and public presentations to explain the study findings and recommendations.

Vauxhall Nine Elms Battersea Transport Study (2008-9) – I directed a study into transport needs for a major redevelopment of a large inner London area, including the iconic Battersea Power Station, to accommodate an extra 40,000 people and 20,000 jobs. We demonstrated that the best solution would centre on extending the Underground from Kennington to Battersea Power Station to serve the development area.

Oman Surface Transport Strategy Study (2008-9) – I provided specialist input to a review of the transport sector in Oman, including development of a travel demand model and reporting on future strategic transport needs and policies. My focus was on ways to develop public transport in Muscat, the capital.

Melbourne Metro Rail Tunnel early studies (2006) – I led the development of early concepts for the alignment and design of a new rail tunnel to relieve Melbourne’s inner city loop, and an operating strategy for the rail system to reorganise the services into grouped lines. This work shaped the Rail Network Development Plan released by PTV in 2013.

Melbourne Metropolitan Tram Plan (2003) – I prepared a comprehensive forward plan for the tram network, including route extensions, accessibility measures (platform stops and low-floor trams), tram fleet renewal, depot and power supply upgrades.

North Central City Corridor Study, Melbourne (2001-2) – I managed this study which involved extensive community consultation, frequent ministerial briefings and comprehensive technical studies. We explored a range of scenarios and initiatives and proposed a strategy to develop public transport in Melbourne’s inner north, promote walking and cycling and encourage alternatives to car use.

Summary career history

2014 - present	Sole practitioner exploring new opportunities to contribute to better planning for transport
2016	Transport Fellow, The Grattan Institute (temporary placement)
2010 - 2014	Principal, Sinclair Knight Merz (now Jacobs Engineering), Australia
2008 - 2010	Principal and Project Director, Sinclair Knight Merz UK, London
1997 - 2008	Associate and Team Leader, Sinclair Knight Merz, Australia (Sydney and Melbourne)
1994 - 1997	Director, ODB Consulting, Sydney
1985 - 1994	Director and Project Leader, Travers Morgan Australia (Perth, Melbourne and Sydney)
1977 - 1985	Project Manager and Transport Planner, Travers Morgan and Partners UK (London-based)
1972 - 1977	Bachelors degree student sponsored by Travers Morgan and Partners

Recent Papers and Presentations

- *Politics, funding and transport – the need for systematic reform.* Australian Institute of Traffic Planning and Management National Conference, Adelaide, 2014.
- *Plan Melbourne: will it deliver integrated transport and land use?* Institute of Transportation Engineers (Australia & New Zealand Section) Seminar, Melbourne, 2014.
- *Societal shifts – cities on the move.* SKM Transport in Cities program article, 2013.
- *Autonomous vehicles – the next revolution.* SKM Transport in Cities program article, 2013.
- *2013 in Review.* Engineers Australia Victorian Transport Branch Seminar, Melbourne, 2013.
- *Guiding Melbourne’s Urban Growth: Transport Futures.* UrbanMelbourne Seminar, Melbourne 2013.
- *Rowville Rail Study.* Australian Institute of Traffic Planning and Management, Melbourne, 2012.
- *Vauxhall Nine Elms Battersea Transport Study – Demand Forecasting Methodology.* Transport for London Railplan Forum, London, 2009.
- *Integrated transport planning – what is it and why do we need it?* Victorian Planning and Environmental Law Association Conference, Melbourne, 2007.

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COMMONWEALTH OF AUSTRALIA

Proof Committee Hansard

SENATE

ECONOMICS REFERENCES COMMITTEE

Operations of existing and proposed toll roads in Australia

(Public)

THURSDAY, 3 AUGUST 2017

MELBOURNE

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SENATE

ECONOMICS REFERENCES COMMITTEE

Thursday, 3 August 2017

Members in attendance: Senators Hume, Ketter, Rice.

Terms of Reference for the Inquiry:

To inquire into and report on:

Operations of existing and proposed toll roads in Australia, including:

- a. financial arrangements of existing and proposed private toll roads, and transparency, accountability and equity aspects of these arrangements;
- b. interaction of commercial considerations of private toll road operators with federal and state transport and infrastructure policy; and
- c. any other related matters.

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McDOUGALL, Mr William, Private capacity

CHAIR: Welcome. Thank you very much for appearing before the committee today. Your credentials tell us that you are a person with some knowledge of this industry. Can you tell us about that?

Mr McDougall: Certainly. I've been involved as a transport planner in modelling, forecasting and cost-benefit analysis that is specialised and particular to transport—it's a particular form of appraisal and cost-benefit analysis—since the 1970s in the UK. Back then I was working fairly closely with people who were some of the first to write four-step transport models on computers, so I've had a very early and long involvement. There was the Standing Advisory Committee on Trunk Road Assessment in the UK which came up with a framework approach which included cost-benefit analysis. A software program called COBA, Cost Benefit Analysis, was prepared by the Department for Transport in those days. I was very familiar with that and its operation, and then I came to Australia in 1985 and applied a lot of what I knew and learnt from my earlier years in the UK, and I continue to learn and gain more experience on projects of all types in transport.

CHAIR: The committee has an interest in your involvement with the West Gate Tunnel Project, particularly whether you were a peer reviewer for strategic transport demand modelling or economic appraisal.

Mr McDougall: Yes. I was employed under a contract and worked within the department. At that stage, I was working on several projects. I was doing what was called audit assurance work on business case development, particularly the transport modelling and economic appraisal, cost-benefit analysis, of a few projects which were going through that process at the time, back in 2015. One of those was the Western Distributor—as it was called then—my involvement was to support the independent peer reviewer. We worked together very closely on reviewing the outputs of the work as it was becoming available and providing feedback to the team preparing that data.

CHAIR: The time frame of your involvement was between June and September 2015?

Mr McDougall: Yes, that is correct. It was in September 2015, as I think I mentioned in my submission, that I was unexpectedly, to me, taken off the project and put onto something else in the department.

Senator RICE: It was 'audit assurance' supporting the independent peer reviewer. Was there just one peer reviewer? What was the process? How was the peer review process set up?

Mr McDougall: There was an administrative committee within the department, which was reviewing, and was really required to sign off internally, the work being done on the business cases, primarily the transport modelling and the economic appraisal. That committee was responsible for appointing peer reviewers. The projects themselves would pay for any external costs associated with those. The external reviewer on the Western Distributor project was John Allard. He is from New Zealand and is a quite well-known transport planner and economist who has done this kind of work for a long time. I was involved earlier in his appointment, internally within the department, and then was helping him on the West Gate project and also on the Melbourne Metro project, which he was peer reviewing at the same time. He and I worked very closely together on those things. On the Mernda Rail Extension Project I was an internal peer reviewer. It was regarded as smaller and not needing an external, independent, peer reviewer in quite the same way. But on the Melbourne Metro and West Gate we shared the roles, particularly on West Gate. I would have to check back on my terms of reference specifically, but, when I last looked, my memory was that I was peer reviewing the economics, John Allard was peer reviewing the modelling and we were providing support to each other because those two things were very closely linked.

Senator RICE: You say that you were taken off the project at the end of September 2015.

Mr McDougall: Yes.

Senator RICE: At the end of that time, were those peer reviews of the business case completed?

Mr McDougall: They were still underway and the business case hadn't been released. But we understood that the first cut of the business case at that last point, more or less at the end of September 2015, was complete and was being sent up internally, although it was not released publicly until some months after that, in 2016.

Senator RICE: The peer review wasn't actually of the business case. You were doing the peer review of the economic modelling and John Allard was doing the peer review of the transport modelling.

Mr McDougall: Essentially, yes.

Senator RICE: I know that in questions that I've asked at Senate estimates about those peer reviews—we've had the Victorian government acknowledge that those peer reviews do exist, but they've never been made public—

Mr McDougall: Yes.

Senator RICE: Do you have any sense of whether they were completed? Was it standard practice then to complete peer reviews to make them public?

Mr McDougall: I wouldn't say it was standard practice. The internal committee that I mentioned was striving to make that the case, was striving to improve the process and ensure that peer reviews were done. The important thing to me about peer reviews is not that they're just done and there's a report released but that there is evidence that the comments the peer reviewers make during the process are taken on board and any issues that they raise or have concerns with are amended or reworked, or whatever is required, so that the ultimate result and answer of the work is as good as it can be. The peer reviewers may still have some reservations on the work that's been done, but at that point they would also, I think, be required to make some sort of statement about the reliability of the estimates that have gone into the work.

Senator RICE: At the stage that you finished up on the project the peer reviewers had made comments back to the proponents?

Mr McDougall: Yes.

Senator RICE: And had those comments been taken on board?

Mr McDougall: That was the point at which I was taken off the project. We were both extremely concerned and exchanging emails between each other to that end. We were very concerned about the issues that I've mentioned in my submission primarily, and a few other things, but the ones that I've mentioned were the key points that we had concerns with. I know that a number of those issues haven't been changed, because of the information that has been put out more recently in the EES documentation, but I don't know how much some of the other issues were amended or changed.

Senator RICE: I understand that there are concerns about that being made public at the moment, so we will talk to you some more in camera, but I just wanted to outline that process. So, you had concerns that hadn't been taken on board?

Mr McDougall: Yes.

Senator RICE: Can you outline what happened? Did your contract end at the end of September?

Mr McDougall: No.

Senator RICE: What was the process by which you were then taken of the project?

Mr McDougall: As I mentioned in my submission, I had raised some concerns after considerable frustration between myself and the peer reviewer and those we were working for in the department—concern recognising the concerns that we had with the work. Everyone was wondering how we could get these issues resolved, because nothing was happening. I did raise my concerns at a higher level, and it was about a week or so after that that I was taken off the project. I was still under contract. In fact, my budget was still under the same contract—the unused budget of my time—so the project was still paying for me, but I was working on different work within the department.

Senator RICE: On other duties.

Mr McDougall: Yes.

Senator RICE: You say you raised your concerns at a higher level. Who did you raise those concerns with?

Mr McDougall: It was a direct conversation with the Victorian Treasurer, Tim Pallas, who I knew professionally from previous work.

Senator RICE: And then after that you were taken off the project?

Mr McDougall: Yes.

Senator RICE: Thank you.

CHAIR: No further questions? Thank you very much for that, Mr McDougall.

The following evidence was taken in camera but at the request of the committee was made public—

CHAIR (Senator Ketter): I must advise the witness that it is not the intention of the committee to publish or present to parliament all or part of the evidence you are about to give. However, you need to know that it is within the power of the committee to do so and that parliament has the authority to order the production and publication of undisclosed evidence. You should also note that an individual committee member may refer to in camera evidence in a dissenting report to the extent necessary to support the reasoning of the dissent. However, we would try to seek your view on such proposed disclosure. The committee has had a brief meeting this morning, so what you've seen happen this morning is the result of the committee's deliberation. I think it's the will of the committee

that we review the *Hansard* of what comes out of the in camera session, and then we'll make a further decision sometime early next week on what part of your submission or the evidence is made public.

I know Senator Rice has a number of questions. I'll just kick it off. You told us about your work history. I'm just interested in understanding the single distribution method and the loop-through method in simple terms. What are the benefits and risks of each method?

Mr McDougall: The diagram on page 2 is probably the simplest way to explain it. The modelling process that's used for these projects—the strategic transport modelling process—involves four steps. It starts from land use information, population and employment distribution around an area that's being modelled. The first step in the process is trip generation, where the number of trips produced by, for example, residential areas and the number of trips attracted by employment areas are estimated. There are well-known estimates of trip generation per household and other numbers which are used in that process. The next step is—

CHAIR: Would that be informed by traffic counting?

Mr McDougall: Yes, and particularly, in that case, by the household travel surveys, which are done in Victoria—the VISTA surveys, as they're called. I've forgotten what the acronym stands for now. Anyway, they are the travel surveys that are done on a regular basis.

The next step is trip distribution, which uses varying forms of mathematical techniques and algorithms to pair off the trip ends, so you have trips being produced in some areas and attracted by other areas, and there are various methods to develop from that a pattern of trips between all the origins and destinations so you have what's called a trip matrix of demand in and through an area. Usually these models are done on time periods, so there are morning peak, afternoon peak, between the peaks and the rest of the day. There are typically four time periods that they estimate these trips for, and they're aggregated to give an annual average day or a typical weekday, usually.

CHAIR: But there would be a seasonal component to that trip distribution.

Mr McDougall: Yes, there is, and all the numbers are estimated, as I said, on an annual average weekday, usually, although I would also describe it, in the case of these models, as an annual average term-time weekday, because school travel is included in the estimates. So they represent a typical day, and there is a lot of evidence about how seasonal variation takes place, particularly in relation to school holidays but also through the year in general. These represent a typical annual average, so the sum of the total travel on all those particular days in the year divided by the number of days of that type, if you see what I mean. The models represent an annual average situation. One of the keys to that is that the data is grossed up to a year in the cost-benefit analysis process that follows, so that that annual average weekday traffic scenario leads to the use of what they call annualisation factors to factor it all up to a typical year and, therefore, to start the process of doing the discounted cashflow analysis that forms the cost-benefit analysis.

The next step, which is the mode-choice step, is, given what trips are available, to then use an assembled representation of the transport network itself—the services and the roads and the infrastructure that exist—to estimate which transport people will choose. The models typically start with a knowledge of what the car availability is in given households, how many cars are available to people living there and so on, and the proximity of other modes of transport, public transport in particular. Walking and cycling are not usually explicitly modelled in these four-step models—not at this stage. Some of them are getting closer to doing that now, but primarily in the past they have modelled motorised modes of transport only, or walking as access to and from those modes—the last link in the chain from your front door or your place of work to the point where you access the transport itself.

Having worked out how many of those trips are going to go by different modes, those trips are assigned to the network, so that you have a demand of trips from point A to point B and which route they are going to take through the network on the mode that is chosen. Again, there are algorithms that spread them out. They do not just put everything all on the same route or use an all-or-nothing approach; they are often allocated in a way that puts the proportion of the traffic on the shortest route and then spreads it out over other routes as well. That whole four-step process—typically in this modelling and in the standard way of doing this kind of modelling, I should say—what is called the loop-through distribution in that box, is where the model is iterated back through to step 2 again. The trip generation always stays the same, if your land use patterns stay the same in the model, and the trip assignment results in volumes of traffic on the roads and numbers of passengers on trains, trams and buses. That then results in some re-estimation of the travel times, because roads will get different travel times and different levels of traffic on them, and those new travel times are fed back through into the trip distribution and mode-choice processes again. The model is then iterated round and round through those last three steps.

CHAIR: I am not quite sure I understand what each iteration represents.

Mr McDougall: Each iteration is a process of reloading the trips onto the network, recalculating the travel times and so on and then using those recalculated travel times to recalculate the trip distribution and mode of choice. That is done several times—typically, in these models, I would say maybe between 15 and 20 times—iteratively until the last two iterations are close enough to each other to be satisfactory in the eyes of the modellers. Usually that closeness is judged to ensure that the noise, if you like, the differences, between one iteration and the next are small enough not to be of concern when you are using that model to predict changes due to a particular project or initiative, if you see what I mean.

Senator RICE: So you have basically bedded down the behaviour?

Mr McDougall: Yes. The model is iterated round and round until it has reached a stable result.

CHAIR: And you are adjusting parameters within the model in order to reduce that modulation?

Mr McDougall: Yes, that's right.

Senator HUME: What you're suggesting here is that, with the two different types of distribution models, if you have constant reiterations through the two, the final result will be very different between the two?

Mr McDougall: That's right. And going to the single distribution method, which VLC use and have used on the Western Distributor—incidentally, the discussion about that process is documented in the EES, and one of the transport reports or technical appendices does confirm that they use that single distribution method—as I say in my submission, as far as I am aware, they are the only people who do that. Their justification for doing it seems to me to be primarily that it produces more traffic—and the EES documentation spells that out. This is what we had concerns about at the time. When we discovered that they were doing this, we had to quiz them before they actually revealed this process to us. Once we did, they produced a report which showed why they did it. And their assertion was that the main reason they did it was that it produced more traffic and that was the right thing to do despite the fact that the trends were going in the other direction in Melbourne. But the key differences—

Senator HUME: What are the implications of producing more traffic?

Mr McDougall: In the case of this particular project, this meant the model was quite a long way adrift from the government's own forecasting model; the forecasts diverged into the future quite significantly. Our concern as peer reviewers was that the whole process of doing this modelling and reviewing it is to establish that your modelling process produces an answer for the present day using this process. And the convergence of the model—as I explained during these iterations to a good answer—is one of the things you look for as a peer reviewer of these models. In the process that VLC used, they would only do the mode choice and trip assignment steps; they would not go back through the trip distribution step. That meant the trip distribution was not changing. But there is plenty of evidence to show that it does and should change, and that is why these models were built this way in the first place.

Once we had dug into the numbers—they provided us with figures for both models, which I have given in the table that I put into my submission—we could see clearly that the single distribution method was producing more traffic. I guess the implication was that it obviously may have resulted in more traffic and longer individual trips by car than you might expect from using the full model process which is the usual procedure. It is difficult to explain what difference it might make to the results for the toll road, but it meant our confidence in its use in forecasting the traffic on the Western Distributor was under question. We were not confident that it was going to produce reliable, predictable results when they were changing the method in future years from the method they had used to calibrate and demonstrate the model's validity in the current year, the calibration year.

CHAIR: The outputs you have here are travel times and costs. You are saying the number of trips is also one of the outputs?

Mr McDougall: Yes. The number of trips is output at the first step in the trip generation stage—that is, the total number of trips in the area that is being modelled. And that stays constant provided that, in any particular modelling problem, you are not changing the land use. The assumption there is that trip generation, the number of trips wanting to be made if you like, is constant; it is just that their distribution around the network changes as the network changes.

CHAIR: If the number of trips being generated is constant, how does it end up leading to more traffic if you use the single distribution method?

Mr McDougall: The concerns were twofold. If you look at the table on page 3, the problems we could see with the model were that, first of all, at the trip generation stage the number of car trips produced by Zenith was somewhat more than that being produced in 2011 by VITM. More importantly, as shown in the third row down,

the average car trip length was 14.4 with Zenith but it was only 10.1 in the government's model, the VITM model. If you go to the far right hand side of that table, the actual surveyed number of 10.2 is very close to the VITM figure. So we already had concerns that, for some reason, the Zenith model was resulting in car trips that were a lot longer. Most of that would probably be in the trip distribution stage, because that is the point at which the calculation is done to generate the travel that occurs between origins and destinations. The first step is simply the production and attractions of trips if you like—where they start and finish—and the second part of the loop is the part which results in distribution. Do you see what I'm saying?

CHAIR: The car trips row shows 8.9 versus 7.9 for 2011. Can you explain how those two are different?

Mr McDougall: That is simply the number of car trips that the model has estimated around the area as a whole in 2011.

CHAIR: I presume we are comparing apples with apples so that we have the same number of trips generated.

Mr McDougall: As I have noted in the bullet points below, on the population and the number of trips, there is another difference between the two models: the Zenith model covers a somewhat wider area than the government's model does. So it does encompass a larger population, as you can see from the population figures for 2011. It is 4.89 for Zenith and 4.11 for VITM.

CHAIR: Wouldn't it naturally follow that—

Mr McDougall: Yes. That does result in more car trips because it is covering a larger area. But I do not think the longer car trips are explainable by the change in area because the difference in the area is not so great overall.

CHAIR: That is factored out by the fact that it is—

Mr McDougall: Yes.

Senator RICE: You have 13 per cent more car trips because it is a bigger area, but the number of car kilometres is massively more—58 per cent more—and the number of car kilometres travelled is 79 per cent more. So it is a much greater proportion of extra trips than just through the bigger area.

Mr McDougall: Yes, absolutely.

Senator HUME: And because the population is being counted from a wider geographical area, that increased length of car trip doesn't match up to that?

Mr McDougall: I don't think that would explain it. And that was our concern: if it's covering a wider area, it doesn't necessarily mean the trips are going to be longer overall. The added population in that wider area is much smaller than the increase in length. And a lot of those trips would be local anyway, as they are in all areas. So there would be a lot more short trips, as well as long trips, occurring in that added area.

Senator HUME: So it would average out?

Mr McDougall: Yes. Our concern with the mix of all these figures was that Zenith had a starting point in terms of car kilometres per capita, which is the second last line in the table. In Zenith, it was 26.2 in 2011 and in VITM it was 19.6. So it was a starting point that was considerably higher. It grew over time. In fact, using the single distribution method—the second column of the table, where it goes up to 27—car kilometres per capita actually increases whereas in the VITM model it goes down from 19.6 to 17.9. Now, that's actually consistent, although that's over 20 years, from 2011 to 2031. That's the forecast. That is consistent with trends over the last 10 years, which have shown clearly, as in the graph on page 4, that the car kilometres per capita—although this is an annual figure, not a daily figure—have been going down in all Australian capital cities for the last 10 years at least. Again, one of our concerns was that this result—and, in particular, the single distribution method, which they were pushing and using on the Western Distributor—was producing growth in car kilometres per capita when all the other sources were telling us there's actually a reduction in car kilometres per capita.

CHAIR: Before I hand over to Senator Rice, could you take us through your concerns about the cost-benefit analysis?

Mr McDougall: Yes, of course. There were a number of concerns. I think the ones I've mentioned here were the primary concerns. The first one is about additional congestion relief benefits. The economic appraisal was done by PricewaterhouseCoopers using the outputs from the traffic modelling done by Veitch Lister using the Zenith model. Once they had calculated the time differences and the overall time savings that the project produces on the network, one of the things they did was to add an additional congestion benefit. This was taken from this New Zealand methodology and, at that stage, added quite a significant additional value to the economic benefits. I think, in the final numbers published in the business case later on, those figures were a little smaller, but they were still there; the principle was still there.

Their rationale for including this additional congestion relief benefit was the evidence that drivers in congested traffic will assign a higher value to their time—in other words, their lost time—than in free-flowing conditions, and the New Zealand agency's manual outlines a methodology to do that, and that they've just lifted that methodology and added it onto the benefits they were calculating from the transport model. We had some concerns. Our main concern with that was that, apart from the fact that there was no or very little research demonstrating that the same effect was observed in Australia, the base against which this additional time was assessed in New Zealand was very difficult to understand.

The other concern was that the traffic modelling doesn't and can't allow for that additional perceived time. If it were able to, that would mean that people who were driving on more congested links would have higher and higher values of time the more congested that road link became. In the transport model, that would perhaps tend to divert more traffic away from those links and onto other less congested routes as it reaches equilibrium, so we felt that having this additional congestion benefit just added into the economics without including it in the modelling was flawed in the first place. We were also very clear that this hasn't been done in any other Australian cost-benefit analysis; it was newly added in. And when the peer reviewer—who was from New Zealand, and he didn't know about it either—did some research with some of his colleagues and peers back in New Zealand, they said, 'Well, we don't use that particular clause very much, if at all. And when we do it produces very, very small changes in the results.' So we felt that just to lift that piece of methodology, rather conveniently, in our view, from somewhere else and add it into the benefits without demonstrating that it was valid and clear—to our satisfaction, at any rate—was really a flawed part of the process. So that was the additional congestion relief benefits.

The other thing that was done was producing two different benefit-cost ratios by applying their interpretation of the Victorian and Infrastructure Australia guidelines as they stood at the time. Now, guidelines are really only guidelines; they are not rules. Our issue with that was primarily around the inclusion of induced traffic. When you change the transport provision through adding new infrastructure or services that will induce changes in travel patterns and more traffic, meaning many people will shift from one mode to another.

There has been quite a lot of work done to classify different types of induced traffic. The main and longer term effect is when the land use changes as a result of a project, and it does happen. You cannot assess that with a four-step model because the land use is held constant. You need a more sophisticated model, which is really hard to build and operate—a LUTI model, a land use and transport integration model. There are a number around, but there has not been one built and running effectively in Australia.

They had fixed and variable matrix approaches. The fixed matrix approach was without allowing for induced traffic—in other words, the amount of travel demand was held constant—and the variable matrix approach was one in which the model was used to its full extent and included the types of induced traffic which are not related to land use changes but only to changes in those last three steps of the process—in the distribution, in the mode choice and so on. People might change their mode. If you build a road, you might attract people off public transport onto that road, and that is regarded as one of the types of induced traffic.

Anyway, they read the IA guidance as saying that it did not require the inclusion of induced traffic at all in their assessments. When I read the guidance it was mentioned in the appendices and it was required that the treatment of induced traffic should be noted and described in the modelling process, but the main text did not mention it at all. At the time there were some draft replacement IA guidelines—and I think they are probably several iterations older now—and that revised guidance did include explicit mention throughout of a requirement to include induced traffic.

To us it was rather misleading to say that you could just stick to the guidelines and produce two different answers without any advice on which one might be the best one to use. There is complete acceptance that induced traffic is a recognised phenomenon, it does happen, and there are ways of calculating it. All the guidance in place does require you to do it. So there were two different cost-benefit ratios. The point there being that, if you don't include induced traffic, you generally get a better benefit-cost ratio because you are just moving traffic around rather than changing the amount of traffic in the model. As soon as you build some new infrastructure that attracts more people onto that mode of transport, that would tend to reduce the benefits over time of the project because it is the victim of its own success in a way. That is all extremely well known and understood. Our concern was that just presenting two different cost-benefit ratios without giving some advice as to which might be more reliable, better or whatever, or that the guidance did actually include a requirement to put the induced traffic in, was rather misleading.

Senator HUME: Do you have any idea of how significant the effect of induced traffic would be on those cost-benefit ratios?

Mr McDougall: Those two numbers were published. The actual numbers that were published I can't remember, I'm sorry, but there were significant differences. The one under the IA guidance, as interpreted by them, was significantly higher than—I'm afraid without the numbers in front of me, I can't remember what they were.

Senator RICE: Is that still being quoted as the benefit-cost ratio?

Mr McDougall: It's still in the business case when it was released, yes, and a significantly higher benefit-cost ratio for federal eyes, I suppose you could say, as opposed to Victoria eyes perhaps.

In regard to the third point about streaming of benefits in future years, having had all of this discussion about induced traffic and the use of variable and fixed matrix approaches, we were also rather concerned to discover that PwC actually blended the results from fixed matrix runs. Even under the Victorian guidelines, they used fixed matrix runs from day one and then blended those into the results from variable matrix runs over a period of 10 years, on their assertion that it takes 10 years or so for people to amend their travel habits and changes and so on. Remember: because all of this modelling was done with fixed land use that component of induced traffic wasn't included anyway, and that's the part of induced traffic that probably could take up to 10 years, as people relocate homes and jobs over time and so on.

The other types of induced traffic, which the modelling did allow for, were phased in over 10 years when in fact all evidence and standard modelling practice using a full three-step approach or a three-step iteration rather than a single-loop distribution shows that people do amend their travel habits and patterns quickly when a new project is added into the mix, partly because they know it's coming and also because they can see the changes almost immediately and make their travel patterns change. If they're not changing houses and jobs, they're changing their travel patterns quickly—it doesn't take 10 years for it to happen.

The problem with that is that the first 10 years of the benefit stream is the one that has the biggest effect under the discounting process of cash flows. In a cost-benefit analysis, there is a seven per cent discount rate applied in every future year. It seemed to us to be another device to increase the benefits in early years where they have the most impact on the benefit-cost ratio—to in fact ignore induced traffic and phase it in over 10 years rather than have it starting from day one, year one or two or over an excessive time, in our view.

This is something which is not normally done and was a particular technique that PwC used and we had never seen it done anyway before. We had to dig it out of the depths of the reports that we were given and look at it for a while to understand what they were doing and then quiz them about it, all in very short time frames as they were busy pulling all the numbers together. That was another thing that was left in the air when I finished. I don't know whether that was resolved or changed in any way. It was hard to estimate, but there was a significant impact on the benefit stream of doing that particular thing in the benefit-cost analysis.

Senator RICE: And as far as you know the benefit-cost ratio that is still being touted today is the same as was being touted at the time you were on the project?

Mr McDougall: Yes, it has all those things.

Senator RICE: They haven't reduced it.

Mr McDougall: I don't know whether they've reduced it or not. Some of the figures may have been reduced but the process is still in there. They are still using variable and fixed matrices results and mixing them together to produce, in my view, a more favourable benefit stream.

Senator HUME: Are these anomalies or unusual methodologies highly uncommon? Is this the first time that you have seen these methodologies being used in various infrastructure projects, specifically toll road projects, in other states or other projects?

Mr McDougall: Yes, definitely—the first and the last, in particular. The congestion relief benefits, as I say, are really, to our view, imported in from another jurisdiction. As far as I know, New Zealand is the only jurisdiction that has that kind of guidance. As I said before, it's seldom used there and produces very small numbers when it is, perhaps because there is a lot less congestion in New Zealand. But importing it in and using it—I've never seen that done before without a lot of research and collective agreement by the industry and through, for example, the ongoing process of updating the national guidelines of transport appraisal.

Senator HUME: So it couldn't be seen as a sort of natural evolution of the way these projects are assessed and the guidelines haven't quite caught up with that evolution?

Mr McDougall: I was reflecting on that this morning actually, because some of these things are being looked at—and particularly that one about congestion relief, I gather. But the guidance says that, until better research is done and a better way of modelling and incorporating it in the process is available, it should only be estimated as

a sort of below-the-line or an add-on, not as part of a core appraisal—as an additional sensitivity test or something like that. But I'd never seen it used that way before, and it was really presented to us as a *fait accompli*. It was a body of evidence that was questionable, and so we questioned it.

Senator HUME: When you say, 'We questioned it,' who was 'we' and who did you question about it?

Mr McDougall: 'We' meaning myself and the peer reviewer, John Allard, and we questioned the project team, the PWC and the department's project team that were actually preparing all of this work.

Senator HUME: When you say, 'We questioned it,' did you do it in writing?

Mr McDougall: Yes.

Senator HUME: Was there an assessment that you presented them with, in writing, and did they respond in writing? Did you get a response?

Mr McDougall: Yes, that was in writing and also in meetings. But we did have an exchange of views by email as well. And not so much on the economics but on the modelling side—and John Allard's peer review report was primarily concerned with the modelling only, not the economics; my concern was more centred on the economics. But we were working together, as I said. His report does document a lot of concerns. Earlier versions of his report at the time did document all of his concerns with the modelling that I outlined earlier on.

To finish answering your question: the other item which I've never seen done before is this blending of benefits from fixed and variable matrices to produce more benefits in the early years. I've never seen that done before in a cost-benefit analysis, and I've seen plenty.

Senator HUME: Sorry; can you explain that one a little bit further?

Mr McDougall: That is the last one of my points, where they took results from a fixed matrix approach, meaning no induced traffic, for the early years, and then blended that in over a period of about 10 years, as I recall, in the cost-benefit streaming of benefits so that induced traffic effectively was coming in over a period of 10 years rather than happening much more quickly. That particular process or tweak has never been done on any other projects, to my knowledge. It may have been done by the same team on the East West Link, but that detail isn't available, as far as I know, and I wasn't involved in that particular project so I don't know from personal experience there.

Senator RICE: All of these tweaks and factors served to increase the economic case for the road?

Mr McDougall: Yes.

Senator RICE: So, in summary, your evidence is that there were quite unusual and unjustified mechanisms that were used which ended up increasing the case for building the road?

Mr McDougall: That's right. It's difficult—until you've got a more conventional or, in our view, correct way of doing it at the time—to know the overall effects of all the combined add-ons and adjustments. It was also our concern that there was one set of numbers being produced with all of the add-ons and no more conventional assessment for us to compare it with to know how big the differences would be. That was also a significant concern. You can't really judge the reliability and the accuracy of a process unless you've got a few sensitivity tests and different methods incorporating more usual things.

Senator RICE: The Victorian government, in their response to your submission, said that they've got guidelines in place for transport and economic modelling and that they followed the guidelines and therefore everything is fine. Can you respond to that? Are you familiar with those guidelines? Are these sorts of unusual ways of dealing with things covered by the guidelines?

Mr McDougall: I was involved in helping to prepare those guidelines while I was at the department earlier on. So I've seen earlier versions. I haven't tracked how they've developed over time. I'm not sure how publicly available they are. Senator Hume asked about this. To some extent, the guidance adapts itself over time. The problem we had with these approaches is that they seem to be methodologically flawed. If the guidance incorporated these sorts of ideas, I would question the guidance until it was corrected. This has been true over many years—for example, wider economic benefits. That has been a subject area of great debate over many years in transport projects. It is now becoming more and more accepted, but still with caution, that they are included in cost-benefit analysis and in benefit-cost ratios. It takes a long time for these things to be bedded down, properly researched and applied to the Australian situation. Our concern was that they were lifting things from elsewhere and plonking them into this appraisal with very little substantive justification that we could agree with as reviewers.

CHAIR: To follow on, I understand the governance and oversight audit of the Victorian Auditor-General's office may have involvement in particularly the high-value, high-risk infrastructure projects.

Mr McDougall: Yes.

CHAIR: Do you have any knowledge of the involvement of the Auditor-General's office?

Mr McDougall: Not at the time. They produced a report on the East West Link business case work and project development work, which included quite a lot of comments about induced traffic and how to deal with it and the different types and so on, and that was being used as a bit of gospel. It was important to make sure that the work was agreeing with the view of the Auditor-General's report. Their reviews are usually looking backwards in time rather than actively at the time that a project is being assessed or developed. At the time we were doing the work, there was no involvement from the Auditor-General's office, if that's what you're asking.

Senator RICE: Looking at those guidelines—they sent us a link to them so I looked at them last night—a critical part is the role of independent peer reviewers to pick up on things. When you left, the independent peer reviews hadn't been completed. What happened to John Allard's work?

Mr McDougall: I don't know. I had no more communication with John after that point. I really don't know what happened. I perhaps should have asked somebody, but with the situation as it was and because of the way that I had raised my concerns I didn't want to create any more waves at that particular point. Looking back on it maybe I should have done, but that was how I dealt with it at the time. Anyway, I really don't know what happened, whether his report went any further than the last draft I saw at the end of September 2015, and, if so, whether his concerns were dealt with or allayed in any way I really don't know.

All the evidence suggests they haven't changed very much. The sorts of issues we had concerns with are still there. Whether they are contributing to the benefits of the project to the magnitude that we saw at that time, in those earlier figures, I just don't know. My hunch is that some of them are still making a big difference, like this issue of using fixed and variable matrices to stream the benefits and so on, but it's difficult to judge.

Senator RICE: And the single-step distribution which results in increased kilometres?

Mr McDougall: Yes, definitely. That is still being used, and I would say still producing the same differences in figures that we see in this table.

Senator RICE: I have pursued the issue of these independent peer reviews through Senate estimates and questioned Infrastructure Australia. The Victorian government have refused, despite requests from Infrastructure Australia, to forward those peer reviews to Infrastructure Australia, which, at the last estimates, they expressed their frustration about but said there was nothing they can do. The evidence seems to be that it is not as if there were other peer reviews that they did after you left or that they ever completed them. There is no evidence of them.

Mr McDougall: No, I gather.

Senator RICE: In the Victorian government's response they have proposed that your submission shouldn't be made public because it contains commercial-in-confidence and cabinet-in-confidence information. Do you have any views as to whether, indeed, there are confidentiality issues with the information you have put in your submission?

Mr McDougall: In terms of the arrangements under which I was doing the work—under a confidentiality agreement—I would say that whilst it would be possible to dig into various other reports and other uses of these models over time on other projects and find some of these numbers or confirm some of these numbers through other sources, the figures, perhaps, in the table on page 3 are directly from the models as being used at the time we were reviewing them on the Zenith model on the Western Distributor and the VITM model in its base forecasting form, supposedly with all the same input data for 2031 that was being put into Zenith as well. That all comes from the numbers which were valid at the time that work was being done on the Western Distributor. Perhaps that table and the numbers in it and the comments relating to it would be closer to confidential. They were produced from data provided confidentially to me in my role at that stage. However, from my point of view, none of the data in that table would actually, as I think the department's letter implied, enable anyone to work out any traffic volumes on the project or toll revenues or anything like that. These are just general figures around Melbourne as a whole. The critical issue to me is that they draw out differences between two models and between two techniques. There is single and loop-through distribution on the Zenith model, and that is what I am questioning and concerned about, as we were at the time.

The other issue for me is that I wonder whether terms of confidentiality under my obligation and views as a professional engineer and planner—I feel concerned that what is being done is inconsistent with accepted practice. I feel quite passionately about that, and I wonder about the issues of confidentiality, when you are actually put in a position of feeling compromised professionally. So, from my point of view, I would have no problems with these numbers being released publicly, if that was the committee's decision.

Senator RICE: Basically, the reason you are here today is that you felt it was your responsibility as a professional to share this information with us?

Mr McDougall: Yes, and to share it in a way which, hopefully, you can put to good use. So if there are any restrictions on what you may be able to do with the information, as a committee, due to the public nature or otherwise, that I guess is something to raise concerns. Another point to make, if I may. I talked very briefly in my submission about other project experiences, and a couple in particular. I worked for one of the bidding teams on CityLink and then I worked briefly on another team bidding for EastLink, on modelling and forecasting processes. And that was on the other side of the fence, if you like, working for private sector teams bidding to win a contract to build these projects. And in those processes there was a lot of concern that we had about the way the modelling and forecasting was being made to look as optimistic as possible. I think that sort of issue is well known, but I had never really come across it before, on this side of the fence in particular. On the government side of the fence, where this was supposed to be an independent assessment by the government of a proposal presented to them by Transurban, the private sector, it seemed to me to be geared up as a process really of seeking ways to get the project up rather than doing a properly independent and impassioned assessment of the project's benefits. The way I was taken off the work when we did raise those concerns confirmed, for me anyway, that there was more interest in getting the project through than on doing the work properly.

Senator RICE: Do you reject the Victorian government's assertion that release of this information, as they say, may assist Transurban to back-solve the state's revenue benchmarks or that it would directly compromise the state's negotiation position and ability to achieve a value for money outcome from Transurban's proposal?

Mr McDougall: I can't see how the figures in this table or my comments on them would enable that sort of back-casting or reverse engineering of the figures like that. I would be interested to know how one might do that from the data in this table. I don't really understand how that could happen.

Senator RICE: I want to go to the timing of this Western Distributor project and its relationship with the scrapping of the East West Link. The East West Link was scrapped when the Victorian government came to power in November 2014. When you joined this team in June 2015, did you get any sense of how long this project had been germinating for and how long the negotiations had been going on? Did it relate back prior to the state election, do you believe?

Mr McDougall: I don't know and I couldn't say. I was in the department earlier. My contract with the department, working on other projects started early June. I was only involved in the Western Distributor from June to September that year, but I started working with them earlier in 2015. At that stage the Western Distributor was mentioned, and I think it was actually made public quite early in the piece as a proposal by Transurban, but the process started only really a matter of days or weeks before I got involved in June 2015. As I said in my submission, it seemed to me that a lot of the people on the team were people who had been on the Linking Melbourne Authority team working on the business case for East-West Link beforehand, and a lot of their attitude seemed to be: 'Well, we didn't manage to get that one through. We've got to try and get this one through.' It was a mystery to me why it was set up that way, because that to me wasn't an impassioned, independent assessment to make sure that the government was making a good decision to go with this project or not; it seemed to me a process of demonstrating that the project was a good idea, sort of at all costs, in some ways. That was at the root of our concerns throughout.

Senator HUME: You said you had a personal relationship with Minister Pallas—

Mr McDougall: Yes.

Senator HUME: and that you approached him about these particular issues. Did you outline these issues in the same way you've outlined them to us?

Mr McDougall: Not in full detail; in a fairly short telephone conversation. I had been involved with Treasurer Pallas in the lead up to the election when he pulled together a bit of a brains trust of people to help with transport, land use planning and strategies and so on in the election campaign. Afterwards, I went to a meeting that he held as Treasurer with leaders of the engineering and construction industry. I think I was the only person there representing myself.

Senator HUME: So you were part of Treasurer Pallas's inner coterie before the election that was looking at infrastructure projects.

Mr McDougall: Yes. We were providing advice, anyway. There were a number of people who were providing advice to the team at that stage.

Senator HUME: Yet after the election, once you saw potentially the flaws of the modelling that had gone into this project and you spoke to Treasurer Pallas about those potential flaws, was when you found your services were no longer required.

Mr McDougall: Yes. I phoned him and left a message. He got back to me a couple of days later—I think he was on holiday, and he called me on his way home. I outlined that I felt that there were significant concerns with transport modelling and the economic appraisal. I think I told him—in fact, I know I told him that I felt that the work being done was as bad as, if not worse than, the work that had been done on the East-West Link that had been so widely criticised at the time. He expressed a lot of concern about that and said, 'Well, we don't want to get ourselves in a situation. I'll get someone to contact you as soon as we can to talk through all this and see what can be done.' That was the last I heard from him, and then no contact from him or his office after that, and it was within a week that I was taken off the work, with no explanation.

CHAIR: You were reassigned to other duties.

Mr McDougall: Yes.

CHAIR: Did it result in the termination or shortening of your contract?

Mr McDougall: No. There was remaining budget that was allocated to my time from the Western Distributor project, and that remaining budget was used for me to be reassigned onto a team—the Network Development Strategy; a broader look at long-range futures for Melbourne and transport in Melbourne—looking at things like the advent of autonomous vehicles and other changes in transport. It was a much more strategic piece of work that I was assigned to do.

Senator HUME: How long was it between speaking to Treasurer Pallas and finding out that you were being transferred?

Mr McDougall: From memory, it was about a week. I was told that I wouldn't be needed on the Western Distributor anymore.

Senator HUME: Who told you that?

Mr McDougall: That was the leader of the team I was working with. Fiona Calvert is her name. She was the executive director of the transport modelling team at that stage.

Senator HUME: Thank you.

CHAIR: Thank you very much, Mr McDougall, for appearing before us.

Mr McDougall: Sorry, I've created some extra work for you, by the looks of it. I've certainly had a lot of concerns about the process.

CHAIR: We'll be in contact with you in relation to how we proceed with the matter.

HALL, Ms Jessica, Acting Executive Director, Infrastructure Investment Division, Department of Infrastructure and Regional Development

PITTAR, Mr Roland, General Manager, Major Infrastructure Projects Office, Department of Infrastructure and Regional Development

SPENCER, Ms Nicole, General Manager, Land Transport Market Reform Branch, Department of Infrastructure and Regional Development

Evidence was taken via teleconference—

[12:32]

CHAIR: Welcome. I remind officials that the Senate has resolved that an officer of a department of the Commonwealth or of a state or territory shall not be asked to give opinions on matters of policy and shall be given reasonable opportunity to refer questions asked of the officer to superior officers or to a minister. This resolution prohibits only questions asking for opinions on matters of policy and does not preclude questions asking for explanations of policy or factual questions about when and how policies were adopted. Thank you for appearing before the committee today.

Ms Spencer: I will just mention to the committee that the audio is quite difficult at this end, so that may be a factor.

CHAIR: Thank you very much. I invite you to make a brief opening statement, should you wish to do so, and then we'll open it up for questions.

Ms Spencer: Thank you. Toll roads in Australia have generally been delivered via a public-private partnership, whereby the private sector is paid to deliver the road infrastructure and the road related services on behalf of state and territory governments. Toll charges are applied to specific parts of the road network, such as particular routes or corridors, as part of a cost recovery or financing arrangement. Motorists can, in most cases, choose to pay a toll—an immediate cost—based on the benefits of using the road or elect to take an alternative route. The toll charges paid by road users are generally reflective of the cost of delivering and operating an individual section of road infrastructure and a commercial rate of return based on the risk profile of the infrastructure assets.

There will always be more projects that can be funded through traditional grant funding. The government is looking to partner with private sector investors where possible to encourage private sector investment through innovative funding and financing approaches and to drive efficiencies in project development and delivery. The 2017-18 budget reflected the government's deliberate shift in the way it is funding and financing major infrastructure, with a greater use of equity and loans. Through the budget the government established a 10-year allocation for funding road and rail investments, recognising that many transformational projects are planned and built over many years. This is expected to deliver over \$75 billion in infrastructure funding and financing from 2017-18 to 2026-27.

It's important to note that the Australian government has no role in setting toll road costs and is not a party in toll road contracts or concessions. All levels of government are aware, however, that the costs of funding roads are increasing at the same time as demand for road services is growing and road-related revenue is forecast to decline. Looking ahead, governments will need alternative ways of providing the road services Australia needs into the future.

The department plays a key role in two relevant streams of work, including exploring medium- and long-term charging, funding and investment reforms for road transport services, beginning with heavy vehicle road reform; and investigating the potential benefits and impacts of cost-reflective road pricing for light vehicles. Both areas of reform are being progressed jointly by the Commonwealth with states and territories, given the split of functions between levels of government in providing land transport services. The Australian Local Government Association is also involved in this work. Both streams of work share similar objectives focused on creating sustainable, transparent and fair arrangements for funding Australia's roads into the future.

The end point of both reforms, depending upon government decision making, would see a market for roads with users charged for the services they use, as is the case in other utilities. No decision has been taken to pursue network-wide pricing for all vehicles. Whilst we are many steps away from any introduction of market-based road services, work can progress now on no-regrets reform elements which improve the efficiency of current funding arrangements, such as: forward-looking expenditure and investment plans; a forward-looking cost base to inform heavy vehicles charges; asset registers and data on levels of services for roads; common assets and financial metadata standards; and independent price regulation.

There are a range of other reforms that are already underway to improve the way infrastructure projects are identified, assessed and funded, including the release of principal for innovative financing in February 2016, through which the Australian government is seeking to optimise the level of private investment in transport infrastructure through public-private partnerships which can be supported by user-pay arrangements on road corridors and prudent use of innovative financing. The department is also becoming involved in infrastructure projects earlier to help deliver not only the best long-term economic return but the desired outcomes for users in the wider community. We welcome questions from the committee.

CHAIR: Thank you very much, Ms Spencer. Firstly, in terms of the evidence we have heard from the ANAO and in relation to some of the criticisms in connection with WestConnex and the East West Link project, can you give us an update on how compliance is going currently for the projects you have talked about in your submission and particularly in relation to tying the federal grants or payments to milestones on those projects.

Mr Pittar: I would open by saying that the department has responded to the ANAO's audit of both the WestConnex project and the East West Link project, as well as responding to the JCPAA hearing on both of those projects. We understand that JCPAA report was finalised in June and the department is in the process of preparing its response to that latest report.

A key element in the department's response to the WestConnex was that it agreed with the broad findings and would continue a process of continual improvement in the administration of new concessional loans, and that process is ongoing with new concessional loans. The administration of the WestConnex concessional loan is also an important element of all of that. We maintain strict arrangements around the administration of that loan through our arrangements with the Sydney Motorway Corporation. But the key thing from the ANAO audit of the WestConnex loan was to ensure that lessons were learned in the workshops that the department ran and that it is implementing findings from that on future concessional loans.

CHAIR: What we heard from Mr Boyd was that, where there were milestones established, discussions subsequently took place and there were arbitrary changes to the nature of the milestones in order to facilitate payments being made earlier than what would otherwise have been envisaged. I take it that sort of thing is not happening now?

Mr Pittar: The department's view in relation to milestones was that it would always ensure that appropriate physical completion of work occurred and that sufficient expenditure had occurred in order to result in a milestone payment. The nature of the actual milestone may change, and the department has previously, in its advice to the JCPAA and also to the ANAO, explained that the physical nature of a milestone may need to change as a project matures. But the key point is the payment will be tied to actual physical progress of the project and be tied to the amount of expenditure that the project has consumed.

CHAIR: What about the recommendation in the WestConnex report to make the processes more robust in the administration framework and advising ministers of options when considering financing arrangements?

Mr Pittar: We have also continued to improve those processes to ensure that in making those payments or in recommending payment that that information is provided clearly. In responses to questions on notice that we provided to the JCPAA, we outlined steps that we have taken in another concessional loan where we have ensured that we have implemented a number of the recommendations that came from the ANAO in the administration of concessional loans.

CHAIR: So can you tell us in what way you have made those processes more robust in line with that recommendation.

Mr Pittar: Firstly, concessional loans go to ensuring that in providing advice to the government that it should make only in-principle commitments to concessional loans, with approval to only follow once due diligence outcomes have been completed. Secondly, the creation of concessional loan term sheet should only be done in conjunction with legal advice. Thirdly, we want to ensure that proponents are sufficiently prepared for due diligence activities to commence so that they are prepared earlier in the process for that.

CHAIR: What was the advice given to the minister about the \$500 million advance payment in regard to WestConnex?

Mr Pittar: I don't have that information at my fingertips, but I think that's all a matter of public record in the ANAO report. I just don't happen to have that at my fingertips. We can come back to you on notice if you like.

CHAIR: Yes, could you take that on notice. Thank you very much. Your submission talks about the very long history of toll roads in Australia. Can you tell us about how they've been managed, typically, at state level and federal level, with federal involvement and that sort of thing?

Mr Pittar: I think Ms Spencer's opening statement touched on that, and our submission goes to that. Essentially, they've been handled in different ways depending on the nature of the road. There's generally a fairly bespoke, merit based approach, depending on the road and the problem that the project's trying to solve.

CHAIR: When did federal involvement start occurring?

Mr Pittar: That will depend on the project, but in many cases that will commence around the preparation of business cases and consultations between a state government and the federal government as those business cases are prepared, recognising that projects seeking \$100 million or more in federal government funding need to be considered by Infrastructure Australia.

CHAIR: In your submission, there's a table that refers to the fact that volumes on toll roads seem much lower than expected. Can you tell us what's been happening there? Do you have an explanation or a view about that?

Ms Spencer: That comes from the report by the Bureau of Infrastructure, Transport and Regional Economics. It's a well-documented matter of record that, in the early stages of toll roads in Australia, some of the patronage forecasts were optimistic, and there were some issues around that. The bureau itself actually has quite a substantial paper that it's published separately on patronage forecasts, and it's since become involved in influencing some of that around the world. We can certainly provide that to you, but this is to do with demand forecasts simply being too optimistic at the time, and this is something that governments have sought to ensure proposals have a much better focus on.

CHAIR: Does the department have a view as to whether toll roads have had a net overall benefit to Australia?

Ms Spencer: Certainly toll roads have assisted in bringing many projects to market earlier than they would have been if they were fully reliant upon government grant based funding. They've certainly dealt with some of the congestion issues in our cities and provided more infrastructure much quicker than would have been the case previously. There's work that's been done by other consultants that's referenced in the bureau paper, by KPMG and, I think, by Ernst & Young, which talks about the net benefits. I guess the key message is that it's about bringing those road services to the community much quicker than would have otherwise happened.

CHAIR: Finally from me, what are the implications for the operation of a road network of removing a toll on a previously tolled road?

Ms Hall: I think it would really depend on what the agreement is with the concessionaire. Unfortunately, as Ms Spencer said in her opening statement, we're not party to those agreements. It might be something that you may wish to ask some of the other attendees later this afternoon.

Senator HUME: I have a couple of questions under the heading 'Future challenges'. I'm wondering whether you can specify the reservations that the private sector has towards creating more toll roads. You cite a study by Magner in 2016 and you specifically mention the structure of public-private partnerships being under pressure. Can you elaborate on that please.

Ms Spencer: This goes back to the previous issue around demand forecasting. The history of demand forecasting resulted in a lot of attention from both the bureau and many other consultants. There were many studies done into some of the mistakes and lessons to be learned in Australia from demand forecasting, with some particularly high-profile projects that had occurred in the early days. What the study there is referring to is the private sector being much more careful in that regard, in the way they allocate risk against the structure of tolling arrangements, especially taking into account the reliability of demand forecasting.

Senator HUME: PPPs are obviously only useful if they either reduce the cost to the taxpayer or mitigate the risk. Is that natural reluctance now on behalf of the private operators making PPPs a less relevant structure?

Mr Pittar: We would say that each project needs to be considered on its merits and that a public-private partnership will need to address the particular characteristics of the project. There will be certain projects where a PPP may well be unlikely to be the appropriate model. In other circumstances, we would expect that a PPP would be explored as part of a suite of options for the delivery of a project, which would take into account a range of factors such as the appropriate allocation of risk and management of that risk, such as driving innovation in the delivery of the project, particularly where there are high levels of engineering complexity that you would want to draw into the design and delivery of a project, and so on. In bigger, more complex projects you might have a combination of different procurement methods within a project. So it is something that needs to be considered on a case-by-case basis.

Senator HUME: One of the things you've also mentioned is the lack of competition in the toll road operators. Certainly Transurban is by far the gorilla in the room there. What can be done to improve the competitive position of toll road operators?