Effect of Melbourne Metro Project at South Yarra

Expert's Report Prepared by William McDougall

12 August 2016

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1 Introduction

1.1 Name, address and qualifications of expert

Name	William Roderick Tritton McDougall
Date of birth	29 September 1954
Address	15 Cooraminta Street, Brunswick, VIC 3056
Qualifications	BSc (Hons) Civil Engineering (City University, London 1977) Chartered Engineer Member of the Institution of Engineers Australia Chartered Member of the Institute of Logistics and Transport in Australia

1.2 Expert's experience

I am a freelance consultant transport engineer and planner with over 40 years' experience in the UK, Asia and Australasia. I have lived and worked in Australia since 1985, with two periods in Melbourne (1988-1991 and 2001-present, except for 2 years 2008-2010 working in London). I have extensive experience in public transport planning, especially in Melbourne. I was personally involved in getting the Melbourne Metro project up and running, both prior to and through my involvement in the East West Link Needs Assessment study by Sir Rod Eddington when I worked with Sinclair Knight Merz.

A summary CV is appended to this report with more information of my background.

1.3 Area of expertise to make this report

I am highly experienced in public transport planning and strategy development as well as project scoping and design. I have extensive knowledge of travel demand forecasting techniques in general, and of the specific transport models used to prepare the demand forecasts for Melbourne Metro. I am also experienced in transport economics, option appraisal and business case development.

1.4 Other significant contributors to this report

N/A

1.5 Documents relied upon

In this report, as well as the published information in the EES and supporting documents, I make reference to:

- pedestrian counts undertaken by Austraffic for Stonnington City Council at South Yarra station in December 2015 and March 2016;
- MMRA report *'Melbourne Metro Rail Project South Yarra Station Options Assessment'* (June 2015);
- PTV report *'Melbourne Metro Rail Project – South Yarra Metro Station Customer Outcomes and Economic Assessment Report'* (June 2015); and

- PTV spreadsheets *'Data for Stonnington - First Release.xlsx'* (1 July 2016) and *'Data for Stonnington - Second Release.xlsx'* (19 July 2016).
- Preliminary population data commissioned by Stonnington City Council prepared by forecast.id (July 2016).
- Other publicly available data referenced in this report.

1.6 Instructions that define the scope of this report

I was instructed to prepare this report by Harwood Andrews Lawyers (acting on behalf of Stonnington City Council) to provide advice and expert evidence regarding transport planning matters. To quote their brief:

"You are instructed to:

1. *Review the EES and other relevant background documents*
2. *Prepare an expert witness statement [this report]*
3. *Review and provide comment on expert witness statements circulated by other submitters and authorities in your area of expertise*
4. *Attend a conclave of experts and assist in preparing an agreed statement of facts (if requested); and*
5. *Present your evidence to the Inquiry.*

"Your expert witness statement should assess:

1. *The adverse and beneficial effects of the Project on current and future transport services, broader network connectivity and patronage at South Yarra and the wider metropolitan area (with a particular focus on the south-eastern region);*
2. *Whether the EES has adequately assessed these impacts; and*
3. *Whether the proposed mitigation measures are adequate."*

It should be noted that I confine my comments to the transport impacts of Melbourne Metro at South Yarra after completion; I do not consider the construction impacts, nor the non-transport legacy impacts of the Project.

Prior to being engaged to provide expert evidence, I provided advice to Stonnington City Council in relation to the Project.

In preparing this report, I have made all the enquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld from the Panel.

2 Effects of the Project at South Yarra station

2.1 Background

2.1.1 South Yarra station at present

Station configuration and facilities

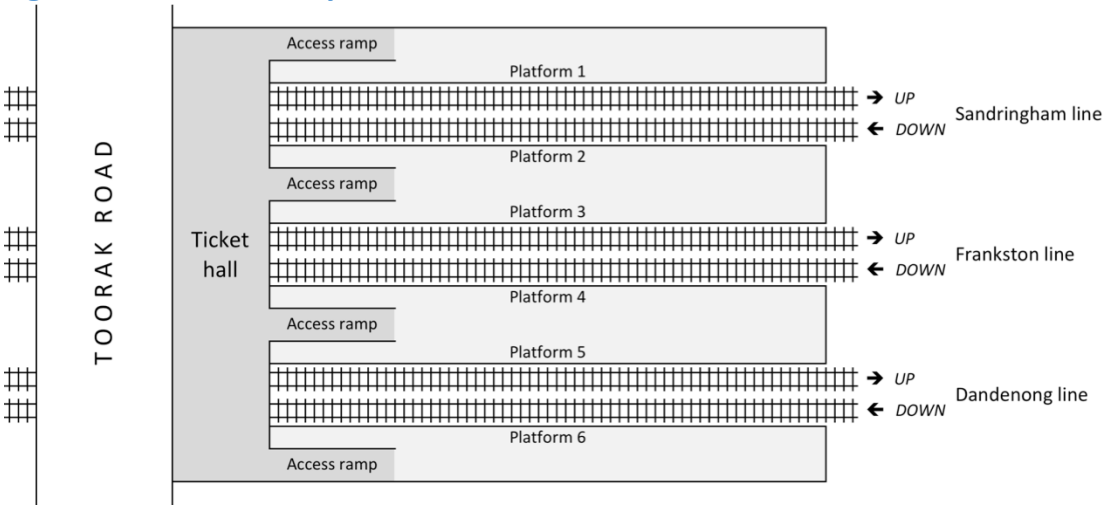
South Yarra station is classified by PTV as a Premium Station, defined as follows:

'Premium Stations are staffed from first train to last. There are 82 Premium Stations in metropolitan Melbourne.

Premium Stations have a customer service centre where passengers can buy tickets and pick up timetables and change for vending machines and payphones. Most Premium Stations have passenger facilities such as indoor waiting areas and toilets.' (PTV website, retrieved 31 December 2015)

There are six tracks through South Yarra station, served by two side and two island platforms. The tracks carry services for the Sandringham, Frankston and Dandenong (Cranbourne/Pakenham) lines (see Figure 2-1).

Figure 2-1 Schematic layout of South Yarra station



Passenger entry and exit to the station is on Toorak Road.

Access to the platforms, which are below street level, is via inclined ramps only. There are no stairs or lifts, and the ramps are steeper than the 1:16 maximum slope required under the Disability Discrimination Act (DDA).

The ticket hall and circulation area at the top of the ramps to/from platforms is small in area and is often crowded with people, especially in the evening when passengers disembark in concentrated numbers.

People wishing to change trains at South Yarra are required to walk up the ramps at the end of each platform to the ticket hall and then walk down to their chosen platform. They do not

have to pass through any ticket barriers to do so, but they share the ramp accesses with passengers entering and leaving the station.

Myki validation machines are installed at the top of the ramps for both entry and exit. Myki top-up machines are also provided, but there are no separate 'check balance' readers. Myki cards can also be topped up at the ticket office when staffed.

Male, female and disabled toilets are provided at the entrance hall.

Access to the station is provided primarily by walking and tram (there is a tram stop in Toorak Road at the front of the station, but it is not a level access stop). There is no designated commuter car parking, nor any bicycle parking or storage. There are no designated taxi ranks either.

Train services

Sandringham line services use platforms 1 (City bound) and 2 (Sandringham bound). All Sandringham trains run to and from Flinders Street station and do not use the City Loop on weekdays. They stop at all stations in each direction. There are 8 trains an hour in the peaks (every 7.5 minutes on average) and 4 trains an hour between the peaks.

Frankston line services join the Dandenong line at Caulfield station. At South Yarra, they use platforms 3 (City bound) and 4 (Frankston bound). In the morning, Frankston trains use the City Loop (anticlockwise) and in the evening alternate trains start from Flinders Street (via the City Loop clockwise) or Southern Cross (via Flinders Street). Trains stop at all stations, and some services start/finish at Carrum or Mordialloc instead of Frankston. There are 12 trains an hour in the morning peak (every 5 minutes on average), 10 trains an hour in the evening peak and 6 trains an hour between the peaks.

Dandenong line services run between Cranbourne and the city, Pakenham and the city, or Dandenong and the city.

V/Line's Gippsland train services run through South Yarra station using the tracks on platforms 5 (city bound) and 6 (country bound). These services stop at Caulfield and Richmond but do not stop at South Yarra.

Various freight rail services operate through South Yarra station, outside peak periods, to use the Dandenong and Frankston lines.

The Cranbourne Pakenham Line Upgrade (CPLU) project will allow more trains to be run on the line. No details are available of the specific service levels proposed, but the Government press release of 31 March 2015 stated that the project would deliver an increase in capacity of 11,000 passengers in the morning peak. The new trains being ordered to provide this service will have a greater service capacity than the existing trains (I estimate 900 instead of the current 800 passengers). With this assumption, Table 2-1 summarises the existing and future train service capacities at South Yarra station, demonstrating that the AM peak service capacity will increase from 52,800 to 63,800 passengers.

Table 2-1 Existing and future AM peak service capacities at South Yarra station

Line	0700-0900 train services		0700-0900 passenger capacity	
	2015	After CPLU	2015	After CPLU
Sandringham	16	16	12,800	12,800
Frankston	20	20	16,000	16,000
Cranbourne/Pakenham	30	*39**	24,000	35,000
Total	**66**	**75**	**52,800**	**63,800**

** Estimated assuming service capacity of 900 passengers per train for the 11,000-passenger capacity increase that the Government has announced for the CPLU project.*

Station patronage

Information on current station patronage is summarised from published station usage statistics downloadable from PTV's website[1], and from pedestrian counts at the station undertaken by Stonnington City Council in 2015 and 2016.

South Yarra station catered for nearly 4 million passenger boardings a year in 2013/14, making it the sixth-busiest station in Melbourne (and the busiest outside the City Loop).

On a typical weekday in 2013/14, about 40% of the boardings at South Yarra station were people changing from other trains (5,400 passengers), with the remaining 60% from people entering the station from the street (8,000 passengers). Of these, 76% walked, 14% came by tram, 6% by car and 4% cycled.

About 20% of the weekday boardings occur in the 2-hour morning peak (7-9am), and about 40% occur in the evening peak (4-6pm), reflecting the significant local employment in the station catchment as well as the high number of train-train transfers made at South Yarra station by passengers coming out of the city.

In 2013/14 South Yarra station was the sixth-busiest station in Melbourne for weekday boardings, and the busiest outside the City Loop. Furthermore, in the morning peak it was the second-busiest station of all, for boardings.

It is noteworthy that South Yarra station has nearly as many train-train transfers as Richmond station, but significantly more people access the station from the street.

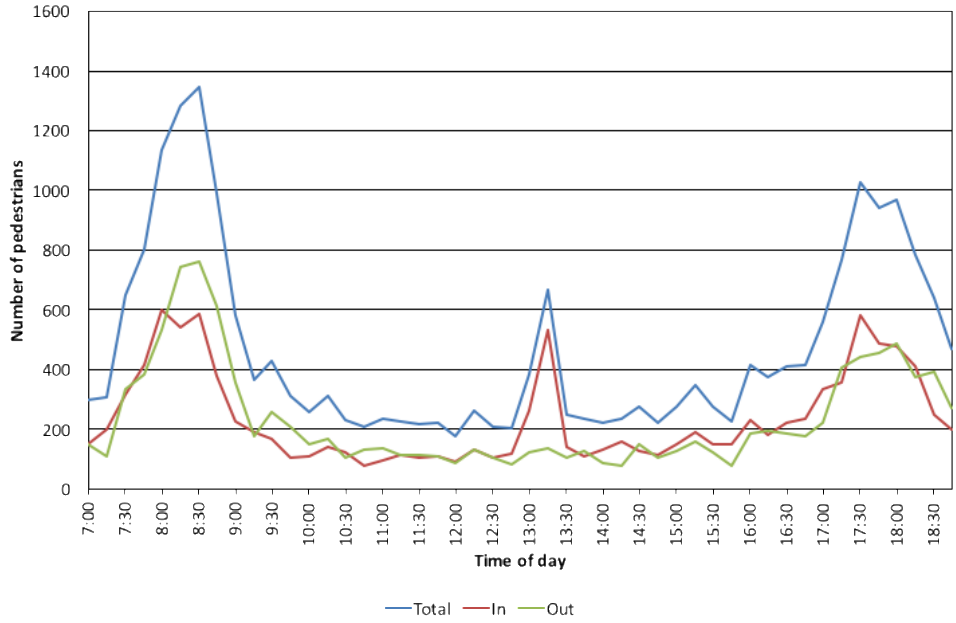
Counts were undertaken of pedestrians in and out of the station on Tuesday 8 December 2015 and Wednesday, 2 March 2016. The December 2015 count showed 11,400 entries and 11,300 exits from the station between 7am and 7pm, and the March 2016 counts showed 12,000 entries and 12,300 exits, substantially more than the 8,000 entries (in 24 hours) given in PTV's 2013/14 data reported above. These numbers indicate that further, significant growth has been under way.

Figure 2-2 shows the distribution of pedestrian movements in and out of the station through the December 2015 survey day. It is notable that there are more people exiting than entering in the morning, and vice versa in the evening peak. The counts indicate that this is

[1] PTV Station by Station Fact Sheet (http://ptv.vic.gov.au/assets/PTV/PTV%20docs/research/PTV-Station-by-Station-Fact-Sheet-accessible-version-2015.xls, retrieved 10 August 2016)

caused mainly by peaks in school students, presumably attending local schools such as Melbourne High School.

Figure 2-2 Pedestrians in and out of South Yarra station, 8 December 2015

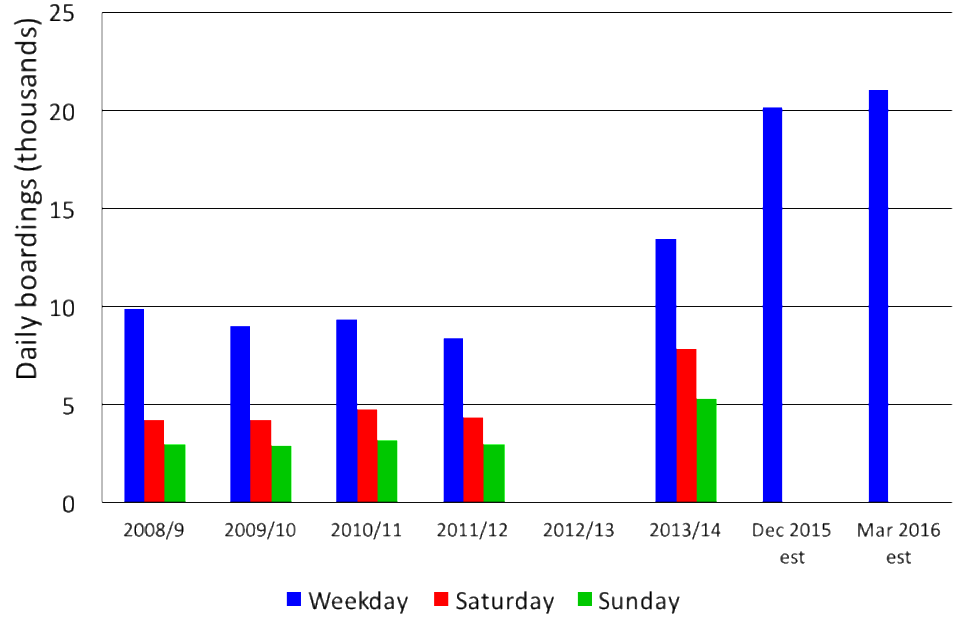


Source: Austraffic pedestrian counts for Stonnington City Council, December 2015

Station patronage growth

According to PTV figures, passenger activity at South Yarra station increased significantly in 2013/14 after being relatively stable from 2009 to 2012. Estimated daily boardings from the 2015 and 2016 pedestrian counts (making assumptions about increased transfers as well) suggest that this growth has continued unabated since 2013/14. (see Figure 2-3).

Figure 2-3 Patronage growth at South Yarra station 2009-2016



Source: PTV Station Patronage Fact Sheet (2008/9-2013/14) and my estimate from Austraffic pedestrian counts (2015 & 2016)

The recent growth has coincided with increased urban development in the station catchment, especially in the Forrest Hill precinct.

Arriving and departing loads

It is difficult to establish the arriving loads at South Yarra station in the morning peak from available information. From the 2013/14 I have taken the total boardings at all stations 'downstream' (away from the city) on each line and assumed that 80% of them are still on the trains entering South Yarra between 0700-0930, and 88% of these figures are occurring between 0700-0900. With these and other assumptions, I estimate that the inbound arriving and departing train loads in the 2013/14 2-hour morning peak are as shown in Table 2-2.

Table 2-2 Estimated 2013/14 AM peak train loads at South Yarra station

Line	0700-0900 train services				
	Arriving load	Alighting	Boarding	Departing load	% of 2015 capacity
Sandringham	9,400				
Frankston	14,700				
Cranbourne/Pakenham	20,200				
Total	**44,300**	**2,100**	**2,600**	**44,800**	**85%**

Estimated assuming 80% of 0700-0930 boardings downstream of South Yarra station are on trains entering South Yarra in the city-bound direction, and 88% of these occur between 0700-0900. Alighting passengers are assumed to be about 80% of boarding passengers at South Yarra.

Whilst this is a rough estimate, it suggests that the departing loads in 2013/14 were at about 85% of 2015 capacity (52,800 over the 2-hour AM peak period, see Table 2-1). Assuming demand in the busiest peak hour is about 66% of the peak 2 hours (this is a good rule of thumb and is confirmed by the pedestrian counts at South Yarra station), the AM peak hour departing loads were about 110% of available capacity. This is borne out by other evidence that trains leaving South Yarra towards the city in the peak are generally occupied at or above service load capacity (as are many other train services, for example as described in The Age on 26 January 2016 (http://www.theage.com.au/victoria/1200-people-on-a-train-is-50-per-cent-too-many-rail-overcrowding-getting-worse-20160126-gmecgy.html)).

Summary

South Yarra station does not have full disabled access to and from the platforms (there are no lifts or stairs, only ramps which are steeper than the DDA requirement). The station facilities are below average for a Premium Station (although there is no set minimum standard); they are certainly below what should be expected for a station with the current and expected future usage levels of South Yarra.

Train services are frequent and will increase further when the CPLU project is completed.

Despite the very poor station facilities and frequently crowded trains in the peaks, patronage has grown considerably in recent years. On an average weekday it is the busiest station outside the City Loop, and the second-busiest of all in terms of morning peak boardings, as well as catering for large numbers of alightings in the mornings (due to the importance of South Yarra as a destination). At present I estimate there are probably over

27,000 station entries and exits and about 7,000 transfers between trains at the station on a typical weekday.

The large opposing passenger flows create pedestrian congestion, conflicts and hazards on the platform access ramps, and in and around the sole entry/exit points on Toorak Road.

The lack of bicycle facilities means bikes are chained to the footpath railings outside the station, adding further to the hazards and congestion there.

The substandard facilities are in urgent need of improvement.

2.1.2 Projected future demand

Population and jobs

Population and jobs in the South Yarra station catchment will continue to grow. The latest (preliminary) population growth figures are given in Table 2-3. The South Yarra area is centred on South Yarra station and is a good representation of its walking catchment.

Table 2-3 Projected population growth in South Yarra

Area	Total population			Change in population	
	2011	2016	2031	2011-2016	2016-2031
Forrest Hill	500	4,600	11,600	4,100	7,000
CrVSA	2,800	5,200	8,100	2,400	2,900
Balance	12,500	13,600	14,300	1,100	700
South Yarra total	**15,800**	**23,400**	**34,000**	**7,600**	**10,600**

Extracted from projections made by forecast.id for Stonnington City Council, July 2016.

forecast.id's figures show that South Yarra's population grew by 7,600 people between 2011 and 2016. Most of this growth was in Forrest Hill, adjacent to South Yarra station.

Over the same period (2011-2016), I estimate that total weekday train boardings (station entries only, excluding transfers) at South Yarra station increased by about 8,500 (from 5,500 to 13,500). Some of this growth comes from patronage outside the walking catchment (for example, by tram to the station), which would explain why the growth in patronage is greater than the growth in local population.

If this growth relationship continues but at a slower rate (boardings at say, 80% of population growth), then the population growth from 2016 to 2031 (10,600) could give rise to an increase of about 8,500 boardings at South Yarra station, making the 2031 projected demand around 22,000 boardings a weekday.

Employment growth is likely to be somewhat slower. I have been instructed that employment growth in the South Yarra station catchment is estimated to be about 2.3% a year from now until 2031, totalling 40% over the period (I was instructed that this corresponds with projections done in 2014 by forecast.id). Thus alightings at the station could increase from about 13,500 today to 18,900 in 2031, if they grow in proportion to employment.

Total projected station demand (entries and exits), driven by land use growth in the station catchment, could therefore be about 41,000 a day in 2031. It should be noted that this would probably represent an upper limit, achievable if there was sufficient capacity provided in train services.

Comparison with PTV/MMRA projections

PTV figures (August 2016) indicate their 2031 forecast for South Yarra Station as shown in Table 2-4 (compared with my estimate described above).

Table 2-4 Forecast patronage at South Yarra station in 2031

Daily patronage	PTV modelled forecasts		W McDougall estimate
	2031 without Melbourne Metro	2031 with Melbourne Metro	2031 projected demand
Entries and exits	39,000	33,000	41,000
Transfers	7,000	3,000	7,000
Total	**46,000**	**36,000**	**48,000**

PTV forecasts (August 2016).

PTV's 'without Melbourne Metro' forecast is slightly less than mine, which might be explained by the fact that PTV's modelled forecast is capacity-constrained, while mine is not (at least in theory). However, the difference is not material.

2.1.3 Effect of the Project

The Project will remove the Cranbourne/Pakenham train services from South Yarra station, because they will be diverted into the Melbourne Metro tunnel just south of the station. In order to compensate for this, some of the Werribee line trains will extend from Flinders Street to South Yarra station (described as the South Yarra 'short starters').

Table 2-5 shows the resulting services and their capacities at South Yarra with the Project.

Table 2-5 2031 AM peak service capacities at South Yarra station with and without the Project

Line	0700-0900 train services		0700-0900 passenger capacity	
	Before MM	After MM	Before MM	After MM
Sandringham	16	21	12,800	18,900
Frankston	20	30	16,000	27,000
Cranbourne/Pakenham	39	-	35,000	-
South Yarra 'short starters'	-	8	-	7,200
Total	**75**	**59**	**63,800**	**53,100**

'Before MM' figures are from Table 2-1 herein, including the effect of the CPLU project; 'After MM' figures are from the Project Business Case Appendix 4 Table 2-2, assuming service load capacity of 900 passengers per train.

The Project will reduce the 2031 service capacity at South Yarra by 10,700 passengers in the AM peak. It is noteworthy that the 2031 passenger capacity at South Yarra station with the Project is only 300 more than the 2015 figure (see Table 2-1).

As shown in Table 2-4, PTV's forecast suggests that, with Melbourne Metro in place, 2031 patronage at South Yarra station will drop from 39,000 to 33,000 entries, and from 7,000 to 3,000 transfers. This is due to the removal of Cranbourne/ Pakenham trains from the station by the Project. As will be seen, the EES is silent on this issue; it does not describe how these displaced passengers will travel, which I consider is a significant omission.

Planned future services without the Project – adequacy for projected demand

Without the Project, in 2031 trains departing South Yarra inbound will have AM peak 2-hour service capacity of 63,800, as shown in Table 2-1.

PTV has not yet provided figures for arriving and departing loads at South Yarra station without the Project. Therefore it is not possible to calculate the available train capacities for those boarding and alighting at South Yarra in this scenario.

Planned future services with the Project – adequacy for projected demand

With the Project, in 2031 trains departing South Yarra inbound will have AM peak 2-hour service capacity of 53,100.

PTV has provided figures to enable calculation of the arriving and departing loads in the 2031 morning peak for the Project. The results are summarised in Table 2-6.

Table 2-6 Arriving and departing loads compared with service capacities with the Project

Line	Service capacity		Passenger loads		% of capacity used	
	Arriving	Departing*	Arriving	Departing	Arriving	Departing
2031 AM peak citybound (0700-0900) with Melbourne Metro						
Sandringham	18,900	26,100	17,000	16,900	90%	65%
Frankston	27,000	27,000	20,500	20,300	76%	75%
Total	**45,900**	**53,100**	**37,500**	**37,200**	**82%**	**70%**
2031 AM peak HOUR citybound with Melbourne Metro						
Sandringham	10,800	14,400	11,400	11,300	106%	78%
Frankston	15,300	15,300	13,700	13,600	90%	89%
Total	**26,100**	**29,700**	**25,100**	**24,900**	**96%**	**84%**

** Departing capacity includes South Yarra 'short starters'*
Calculated from figures provided by PTV to Stonnington City Council, August 2016. Peak hour demand is assumed to be 66% of the peak 2 hours.

Arriving and departing capacities are different because of the South Yarra 'short starters' which have been added to the Sandringham line capacities. The arriving and departing loads are very similar; this is because similar numbers of passengers alight and board at South Yarra station.

My analysis suggests that, in the peak hour, arriving Sandringham train services will be occupied over-capacity by 6%, and Frankston trains under-capacity by 10%.

Departing load/capacity ratios are lower due to the 'short starter' services, which will travel direct to Flinders Street (like the Sandringham services). Frankston services will travel

through the City Loop, and remain highly patronised (89% of service capacity in the peak hour).

Adverse and beneficial effects in South Yarra vicinity

Apart from the physical impacts of the Project and its construction in South Yarra, the transport effects are summarised briefly as follows:

- 2031 train service frequencies and capacities at South Yarra station go down (by 21% in the morning peak) with the Project, due to removing the Cranbourne/Pakenham trains.
- This results in reduced train patronage of about 6,000 entries and exits per weekday at South Yarra station.
- It also results in reduced transfers of about 4,000 a day.

The patronage reductions will improve conditions for remaining station users and pedestrians in the vicinity, but as will be seen, no information is given in the EES on the effects of the loss of access and rail network connectivity caused by the Project at South Yarra.

3 Whether the EES has adequately addressed these impacts

3.1 Information in the EES documents

The most detailed information in the EES on the impacts of the Project on South Yarra station and environs is given in EES Technical Appendix D – Transport (EES TA-D). In the following text I highlight areas where I consider there are gaps or inadequacies in the information presented.

The primary issue to me is the lack of evidence about the loss of rail network connectivity caused by the Project at South Yarra, and its consequences for the rest of the transport system.

3.1.1 Chapter 6 – Risk Assessment

EES TA-D Table 6-5 (Page 39): Risk register for impact assessment (extract)

Impact Pathway			Initial Risk			Residual Risk			Risk No.
Category	Event	Precinct	Consequence	Likelihood	Risk	Consequence	Likelihood	Risk	
Operation									
Legacy transport network outcomes reduce network connectivity or increase congestion	Increased congestion and reduced connectivity for transport modes within the vicinity of the project area at eastern portal (South Yarra)	8 - Eastern Portal	Negligible	Unlikely	Very Low	Negligible	Unlikely	Very Low	T011

This risk assessment apparently does not account for the removal of Dandenong line train services from South Yarra station with the Project, which will result in fewer train services and reduced train connectivity for station users. In my considered opinion this is not a 'Negligible' consequence; the likelihood and risk of this occurring is very high (in fact it is guaranteed, by the nature of the Project).

3.1.2 Chapter 8 – Construction Phase Impact Assessment by Precinct

EES TA-D Section 8.11.1.3 - Rail network (Page 147)

"South Yarra station is the eleventh busiest station in the metropolitan network by number of annual boardings, and the sixth busiest transfer station in the Metropolitan network [reference: PTV, 'Train Station Patronage Fact Sheet', http://ptv.vic.gov.au/about-ptv/ptv-data-and-reports/research-and-statistics/, Accessed 1 May 2015]. The principal journey purposes for South Yarra station users are work related followed by education [reference: ibid]."

The year is not given for these figures; it is in fact 2013/14 according to the Train Station Patronage Fact Sheet referred to as the source. Furthermore, this statement is incorrect – according to the Fact Sheet, South Yarra station was actually the sixth-busiest station (after the five City Loop stations) by number of annual station entries, and the fifth-busiest transfer station (after Flinders Street, Southern Cross, Flagstaff and Richmond). The same fact sheet also demonstrates that South Yarra was also the second-busiest station (after Flinders Street) by AM peak station entries in 2013/14.

EES TA-D Section 8.11.1.4 - Tram network (Page 148)

"Route 8 (stop 30) has almost 2,000 daily boardings and alightings at South Yarra station."

The date of this data is not given, nor is the source.

City of Stonnington pedestrian counts at South Yarra station indicate 1,300 pedestrian movements from trams to the station and 1,400 movements to trams from the station (0700-1900, weekday) in March 2016. This totals 2,700 movements and does not include tram passengers who are not using the station (which were not counted in the survey), nor users outside the hours of 0700-1900. Therefore, current (2016) daily usage of the tram stop is likely to be substantially more than the EES suggests.

EES TA-D Section 8.11.1.6 - Pedestrian Environment (Page 148)

"In 2012, there were nearly 3,000 passenger entries and around 3,500 passenger exits at South Yarra Station in the AM peak period. In addition, there were around 1,100 passengers transferring at South Yarra Station in 2012."

In the Train Patronage Fact Sheet, the weekday AM peak period is 0700-0930 whereas in the VITM and ClicSim modelling it is 0700-0900 hours.

In the Train Patronage Fact Sheet, weekday 0700-0930 entries are 3,671 passengers in 2013/14, including those transferring from other trains (the transfers are not given for the AM peak, only daily). Stonnington City Council's pedestrian counts show 3,607 people entering the station 0700-0930 in December 2015, and 3,691 in March 2016, both excluding transfers.

There is no mention of the substantial pedestrian crowding that occurs at peak times on the footpaths outside South Yarra station, around the pedestrian crossing and tram stop.

3.1.3 Chapter 9 – Operational Phase Impact Assessment by Precinct

EES TA-D Table 9-1 - Key transport operational issues associated with Melbourne Metro by precinct [extract relating to the eastern portal precinct] (Page 161)

Description	Issue
Precinct 8 – Eastern portal	
Road transport issues	There are no road transport related issues in this precinct that are relevant to the transport impact assessment.
Public transport issues	The implementation of Melbourne Metro would result in only the Frankston line and Sandringham line services operating through South Yarra giving improved capacity and efficiency benefits.
Active transport issues	There are no road transport related issues in this precinct that are relevant to the transport impact assessment.

This assessment is incorrect in relation to public transport issues. The removal of Dandenong line (Cranbourne and Pakenham) train services from South Yarra station would worsen the train capacity, not improve it. Network loss/connectivity impacts at South Yarra are not discussed; this is a major gap in the impact assessment. Figures provided by PTV have shown

that in 2031, compared to the Base Case, there would be fewer passengers using South Yarra station with the Project, which is a direct consequence of removing the Dandenong line trains. No indication has been given as to where and how the estimated 6,000 passengers a day displaced by the Project would travel. I have been instructed that MMRA officers have advised Stonnington City Council verbally that many of them might use the Route 8 tram to access Melbourne Metro train services at the new Domain station, but this tram route is already very heavily patronised and there are no plans to improve it as part of the Project.

I would expect that some of them would also choose to use cars or active transport instead of public transport. No information has been provided about this.

EES TA-D Section 9.3.2.1 - Future Conditions – 2031 No Project Case (Page 166)

"There may also be some other changes to rail, tram and bus timetables, and changes to tram capacity on various routes as a result of the roll out of Class E trams across the network."

No details are given of what assumptions have been made in this respect in order to assess the impacts of the Project. Assumptions would have been made in developing the 'no Project' scenario for the Business Case, and patronage modelling would be available for this scenario.

Furthermore, the rollout of Class E trams will also require many more accessible tram stops to be built, affecting the traffic capacity of the roads in question. This would presumably apply to Toorak Road. No assumptions appear to have been made about this in assessing the traffic impacts.

EES TA-D Section 9.3.2.2 Future Conditions – 2031 Melbourne Metro Legacy Project Case (Page 166)

The loss of network connectivity caused by the Project at South Yarra station is not mentioned here.

For example, no mention is made here about changes to the Route 8 tram, which might take more passengers to and from Domain station. This would accentuate the need for more frequent, larger trams.

EES TA-D Section 9.11 Impact Assessment Precinct 8: Eastern Portal

EES TA-D Section 9.11.2.1 Future conditions – 2031 No Project Case (Page 230)

"At the time of this report, there are no committed changes to the rail network in the 2031 No Project Case from the existing 2015 rail network. There are no proposed changes to tram routes or bus routes from the existing situation."

This statement does not acknowledge the changes to Cranbourne/Pakenham services that will result from the Cranbourne Pakenham Line Upgrade. This will increase service levels and capacity of trains servicing the existing South Yarra station over 2015 levels. This is relevant

because when the Cranbourne/Pakenham trains are removed from South Yarra station by the Project, the train service levels there will be significantly reduced.

EES TA-D Section 9.11.2.2 Future conditions – 2031 Melbourne Metro Legacy Project Case (Page 231)

Table 9-58 suggests that tram-train transfers at South Yarra station would be reduced significantly because of the removal of Cranbourne/Pakenham line trains from South Yarra station. The text states that *"Passengers who wish to connect to this line would need to either travel to Caulfield or Flinders Street / CBD South (dependent on their direction of travel)."* I suspect that many would also choose to access the line at Domain station, which would explain the reduction of tram/train transfers at South Yarra – some tram passengers would instead stay on the tram to Domain. No indication is given of the direction of the train/tram transfers at South Yarra before and after Melbourne Metro, which would be needed to enable a full understanding of the effect of the Project on Route 8 tram patronage. Furthermore, no mention is made of the train passengers displaced by the loss of rail network connectivity the Project causes at South Yarra, many of whom may choose to use the tram to/from Domain, adding further to its passenger loads.

EES TA-D Table 9.59 South Yarra station – 2031 No Project Case passenger entries, exits and transfers (Page 231)
Combined with data from
Table 9.60 South Yarra station – 2031 Melbourne Metro passenger entries, exits and transfers (Page 232)

Station Entrance	AM Peak (7:00am - 9:00am)		PM Peak (4:30pm - 6:30pm)	
	Total Entries and Exits	Transfer	Total Entries and Exits	Transfer
2012	6.300	950	5,200	300
2031 No Project	9,350	1,610	8,540	1,460
Difference 2031 No Project – 2012	+3,050 (+48%)	+660 (+70%)	+3,340 (+64%)	+1,160 (+387%)
2031 Melbourne Metro	7,480	990	7,450	410
Difference 2031 Melbourne Metro - 2031 No Project	-1,870 (-20%)	-620 (-39%)	-1,090 (-13%)	-1,050 (-72%)

This data shows that the Project will reduce the number of train patrons at South Yarra station in 2031 significantly, due to the network connectivity lost by the removal of Cranbourne/Pakenham train services. PTV has advised City of Stonnington that, on a daily basis, this is equivalent to about 6,000 entries and exits and 4,000 transfers at the station.

There is no indication given of how these displaced travellers would travel to and from the South Yarra area, or make their train transfers elsewhere. The text after Table 9-60 says that *"The predicted reduction in pedestrians using South Yarra station (compared to the 2031 No Project Case) is expected to have a beneficial impact on the pedestrian network around South Yarra station, increasing available capacity, although it would still be much higher than current activity levels."*

Whilst this is true, it does not acknowledge that the existing facilities are already inadequate for the pedestrian activity there (let alone the expected increase), nor does it recognise that

the reduced station patronage will result in displaced trips to other transport modes in the area.

PTV provided figures to the City of Stonnington in August 2016 that confirm these figures, and also give more detailed insight into the directions of entries, exits, transfer movements and arriving/departing passenger loads on the different lines at South Yarra station. Unfortunately, full details were only provided for the Project case, making it impossible to compare the detailed effects between it and the 'no Project' case properly. Partial details were later provided of entries, exits and transfers in 2012, but I have not had time to assess the information in this report.

EES TA-D Section 9.11.5 Conclusion (Page 233)

Under this heading there is the following statement: *"Once construction of the eastern portal is complete the road and pedestrian network around this site* [meaning the eastern portal and South Yarra station] *would be reinstated to the 2015 conditions."*

Given the projected growth in transport activity in South Yarra (due primarily to projected land use changes) this is not an adequate solution to the problem.

I consider the proposed solution at South Yarra to be inadequate for projected travel demands. As the EES demonstrates, removal of Cranbourne/Pakenham trains from South Yarra station by the Project reduces the use of South Yarra station significantly. Compared to the No Project scenario, approximately 6,000 passengers a day would need to find other means of travel to and from the area (while a further 4,000 transferring passengers would presumably need to find other locations to change trains, unless they too choose other modes of transport). However, the EES gives no indication of how these travellers would reorganise their journeys.

Furthermore, if Melbourne Metro train services were able to stop at South Yarra, I expect the use of trains would increase further, relieving the other parts of the transport network locally whilst bringing the South Yarra area back into much closer connection with other parts of the city.

Added to this, when the Airport Rail Link is built, airport trains could stop at South Yarra, which will further improve public transport there as well as increasing the patronage and viability of the Airport Rail Link itself. From research I directed into the Airport Rail Link whilst with Sinclair Knight Merz, I am aware that a significant number of outbound airport passengers originate from the inner eastern suburbs, for which South Yarra station has the potential to be a key focal point.

3.1.4 EES TA-D Appendix D – Transport Modelling Summary

EES TA-D Appendix D Chapter 2 (Methodology)

EES TA-D Appendix D Section 2.7.4 (Peer Review Process) (Page 18)

No mention is made of whether the transport demand model peer review reports and reviews by VicRoads, PTV, MMRA are available for perusal, and they are not available

amongst the EES documentation. In their absence it is not possible to judge the scope, accuracy and suitability of the transport demand models for the tasks they have been used for in the Transport Impact Assessment. From my personal experience with the VITM and ClicSim models, I consider them to be the best models available of their kind, but all such models inevitably have some shortcomings; they need to be revealed and understood by all who are involved in or interested in the Project. The peer review reports should normally be issued as a matter of record.

EES TA-D Appendix D Chapter 3 (Road Network Analysis by Precinct)

EES TA-D Appendix D Section 3.9 (Precinct 8: Eastern Portal (South Yarra)) (Page 71)

"Modelling has not been undertaken…. As there is no material change in traffic demand or supply in the local network resulting from the 2031 Melbourne Metro Legacy Project when compared with the 2031 Base Case."

The expectation that the Project reduces train services and demand at South Yarra station (by about 6,000 passengers a day in 2031) is not mentioned here. At least some of the reduced/displaced demand might transfer to car use; this should be quantified and commented upon, to demonstrate whether it is a significant issue.

EES TA-D Appendix D Chapter 4 (Active Transport Analysis by Precinct) (Page 84)

Table 4-26 and Table 4-27 detail the entries, exits and transfers at South Yarra station in the 2031 No Project and Project cases. This corresponds to the information in Chapter 9 of the Technical report, already discussed. No comments are given on what happens to the reduced/displaced demand at South Yarra station in the Project case (i.e. which transport modes and routes carry this displaced demand).

Given the indication that about 6,000 people a day are no longer choosing to travel via South Yarra station in 2031, I would expect that there must be some significant impacts on tram patronage, road traffic and active transport in the area. It is surprising, therefore, that no modelling or other assessment has been done to assess the effects of the redistribution of these trips on the local transport network.

EES TA-D Appendix G – Peer Review Report

The peer review report of the TIA by Smedley Technical & Strategic does not give any views on the suitability or validity of the transport models to predict the effects of the Project, but simply states that *"the transport modelling undertaken was appropriate for the task, the methodology and analysis appears sounds* [sic] *and was suitable to inform an assessment of transport impacts"*. The report suggests that Smedley was not given access to the model validation reports, peer review reports and other information to understand the nature, assumptions, accuracy and reliability of the transport models, so I am surprised that they are able to make this statement.

Furthermore, Smedley does not comment at all on the permanent loss of network connectivity the Project causes at South Yarra, the significant reduction in the use of South Yarra station with the Project, nor the omission of information on where this reduced/

displaced travel occurs. This is a significant omission when compared with the lesser significance of some of the items that the review does comment on (which all relate to the construction phase, not the operation phase, of the Project).

4 Whether the proposed mitigation measures are adequate

The relevant mitigation measures (termed environmental management measures) in the EES documentation is in Chapter 11 (Table 11.2 – Environmental Performance Requirements by Precinct – operational phase) of Technical Appendix D (Page 265). The extract for the South Yarra precinct reads as follows:

Draft EES Evaluation Objective	Asset/Value	Environmental Performance Requirements	Possible management measures
Precinct 8: Eastern portal (South Yarra)			
Transport Connectivity – To enable a significant increase in the capacity of the metropolitan rail network and provide multimodal connections, while adequately managing effects of the works on the broader transport network, both during and after the construction of the project.	Road transport	Design all roadworks and shared path works to relevant design standards to maintain safety of movement in consultation with the relevant road management authorities as required. Determine the optimal parking provision in the area and replace any lost parking where possible.	Prepare car parking management plan for each precinct. Consult with relevant authorities. Design all works to relevant standards.
	Active transport	Where practicable to do so, reinstate on-road bicycle lanes and bicycle parking provisions removed during construction in cooperation with the relevant road management authority and the local council.	Consult with relevant authorities.

The 'Draft EES Evaluation Objective' mentions the need to 'enable a significant increase in the capacity of the metropolitan rail network and provide multimodal connections', yet the Project demonstrably worsens public transport provision in South Yarra (and the use of South Yarra station is reduced as a result).

These Environmental Performance Requirements make no mention at all of public transport, so they do not acknowledge either the displacement of 6,000 passengers a day from South Yarra station by the project, or their possible redistribution onto other transport modes (tram, car or active transport). The measures listed above appear quite generic and have no specific requirements for the South Yarra precinct at all.

I consider this is primarily because it has not accounted for the disbenefits of displacing about 6,000 station users a day, nor the benefits of attracting back more station users (about 11,000 a day) if the network connectivity is maintained at South Yarra; this option is not canvassed or assessed in the EES at all.

Network capacity is not merely about passenger numbers. Opportunity to make network connection is a vital consideration when assessing how to increase network capacity.

5 Assessment of network impacts at South Yarra

Because the EES documentation does not include consideration of network connectivity impacts at South Yarra, I have referred to the Business Case documentation, which does cover an option to retain (and indeed improve) rail network connectivity there.

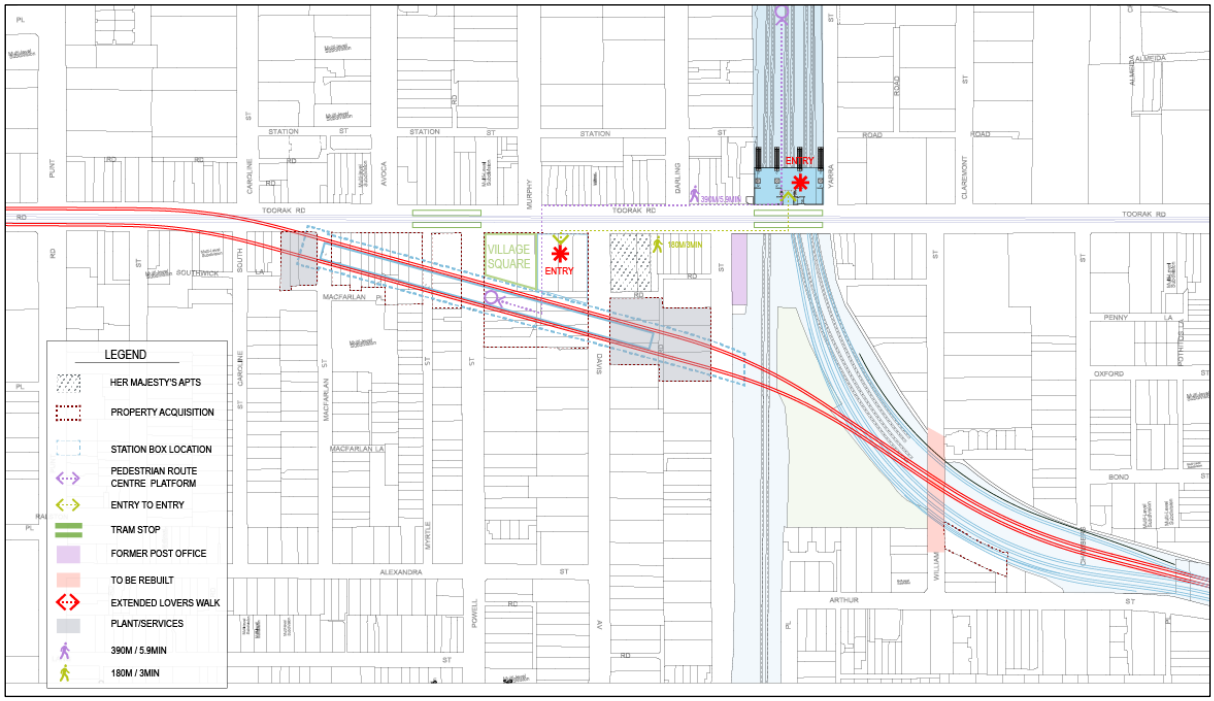
In the Business Case documentation, the option was canvassed of providing platforms at South Yarra where the new tracks enter the tunnel. The assessment concluded that these platforms were not desirable, based on an estimated cost range of $700-970 million and significant additional property and land take in the area. The Business Case also included a simplified assessment of 'winners and losers' for train passengers, but this did not account for the likely increase in passenger demand if the platforms were built. In my opinion this is far too simple an assessment to base the decision on. Compared to the Base (no Project) Case, the Project as it stands displaces about 6,000 passengers a day from South Yarra station. If the platforms were built it is likely that more than this number would return (because of the increased capacity and rail network connectivity provided by Melbourne Metro services), providing a better public transport outcome overall and relieving other parts of the transport network in the vicinity as well.

5.1 MMRA options

MMRA has examined a range of options in two reports:

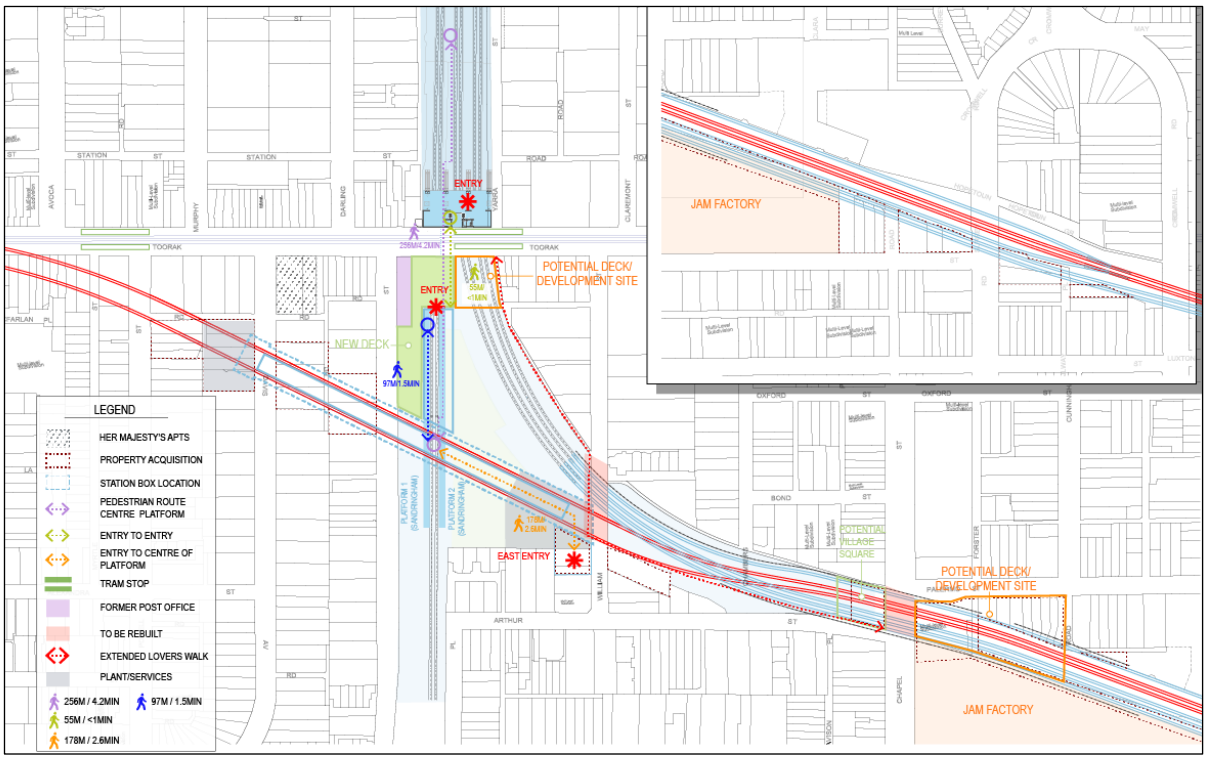
- **South Yarra Station Options Assessment** (MMRA, June 2015) – presented two options (A and B) as illustrated in Figure 5-1 and Figure 5-2 below.
- **South Yarra MM Platforms – Technical Options Study** (AJM JV for MMRA, September 2015) – expanded on the earlier report to examine four options:
  Option 1. Similar to MMRA option A
  Option 2. Like Option 1 but with the Dandenong and Frankston tracks 'flipped' further east (to the west of Caulfield station)
  Option 3. Similar to MMRA option B
  Option 4. Like Option 3 but with rail widening on the south side east of Chapel Street.

Figure 5-1 South Yarra Melbourne Metro station - MMRA option A



Source: South Yarra Station Options Assessment, MMRA, June 2015

Figure 5-2 South Yarra Melbourne Metro station - MMRA option B



Source: South Yarra Station Options Assessment, MMRA, June 2015

MMRA option A involves new Melbourne Metro platforms south of Toorak Road and west of Osborne Street, with a separate pedestrian entry on Toorak Road just west of Davis Avenue.

MMRA option B involves new platforms on the Melbourne Metro alignment south of the existing station with new Sandringham line platforms above them (moved south from the

existing station). Pedestrian access is more integrated with the existing station as well as having new surface entrances south of Toorak Road.

Compared to the Melbourne Metro Project case, both options involve more land and property take and different rail alignments to ensure the required clearances and platform positioning.

In order to take the Dandenong tracks into the Melbourne Metro tunnel, they must cross the Frankston tracks before the tunnel entrance. In MMRA option A, this crossover occurs largely in the same place as it does in the 'baseline' Melbourne Metro design (i.e. all to the west of Chapel Street). However, MMRA option B takes considerably more land and property than MMRA option A because the design requires that the Dandenong and Frankston tracks cross over each other east of the new platforms, which involves widening the rail reserve beyond Chapel Street.

MMRA option B is designed to make transfers between trains easier and more attractive to users. However, no information is provided on the amount and direction of transfers likely to be needed between trains; this information would assist considerably in refining the designs. Transfers are discussed further below.

5.2 Transferring passengers

An important consideration for station designs is to accommodate passengers transferring between trains as well as those entering and leaving the station from the street.

5.2.1 Present situation

At present it is thought that there are about 7,000 passengers transferring between train services at South Yarra station every day (this is supported by PTV data for 2015).

I expect that a significant proportion of these are thought to occur on the evening peak as people transfer between Dandenong trains (which have come out of the city via the Loop) and Frankston or Sandringham trains (which have mostly come direct from Flinders Street). Although this can also be done at Richmond station, South Yarra may be seen as a better alternative by many people. Data very recently provided by PTV, discussed earlier, may throw more light on this.

5.2.2 With Melbourne Metro (current scope)

The February 2016 Business Case indicates that passengers transferring between train services at South Yarra will reduce considerably (by about 50%[2]) when Melbourne Metro is completed. This is not surprising since the Dandenong line trains will no longer stop there. However, Sandringham trains will travel direct from Flinders Street whilst Frankston trains will travel around the Loop, so Frankston line passengers wishing to go to/from Flinders Street may take Sandringham trains to/from South Yarra to save time. This would likely increase the transfers between Frankston and Sandringham line trains, which currently both (mostly) travel to and from Flinders Street. The presence of the South Yarra 'short starters'

[2] Melbourne Metro Business Case Appendix 5 (Customer Demand Forecasts), Figure 28

will probably increase the attractiveness of this further, because these trains will be much less crowded.

5.3 Benefits

5.3.1 Passenger effects

The Business Case quantifies the passenger effects by trading off winners and losers as summarised in Table 5-1.

Table 5-1 MMRA summation of passenger benefits

Movement	Passengers/day		Minutes saved		Passenger-minutes/day		
	From	To	From	To	From	To	Average
South Yarra to CBD	6,700	7,400	0.4	0.6	2,568	4,193	3,349
South Yarra to Domain	200	250	5	8	1,000	2,000	1,463
South Yarra to Parkville	600	700	5	8	3,000	5,600	4,225
The west to South Yarra	800	900	5	5	4,000	4,500	4,250
Dandenong line to South Yarra	1,700	1,900	5	5	8,500	9,500	9,000
Sand/Frank lines to Domain	8,000	8,800	0	8	0	70,400	33,600
Sandringham to Dandenong lines	1,200	300	0	10	0	3,000	3,750
Dandenong line passengers	93,000	102,000	-1	-1	-93,000	-102,000	-97,500
Frankston line Caulfield transferers	8,400	9,200	-1	-1	-8,400	-9,200	-8,800
Net change in passenger-mins/day					**-82,332**	**-12,007**	**-46,664**

These figures fail to account for the loss of rail patronage the Project would cause at South Yarra, nor the increase likely to arise if the network connectivity was retained.

There is a large range of net change in passenger-minutes (-82,000 to -12,000) depending on the assumptions. The average change is -47,000 minutes (-778 hours) per weekday. On an annual basis this adds up to about 200,000 passenger hours lost. This would be valued at about $17/hour (an estimate of the value of commuter travel time used in economic appraisal) in 2031, giving $3.4 million, which is not a huge disbenefit in the context of such a large project.

Note that the large disbenefit to stopping trains is estimated by allocating a 1-minute time loss to all of the Dandenong line passengers who would stop at South Yarra. This depends on the time lost by trains stopping at South Yarra, which in turn depends on the speed from which they decelerate and accelerate, and the dwell time at the station. If the lost time is calculated assuming an 80km/h train speed and a 30-second dwell time, the result is 52 seconds instead of 1 minute. This reduces the average lost time to -33,000 minutes, equivalent to only $2.4 million a year. Clearly the result is sensitive to assumptions.

The time savings allocated to different groups can be questioned further – many of them will depend on the transfer times at South Yarra, which will in turn be influenced by the station design. Two obvious ones are the 'Sandringham/Frankston lines to Domain' and the 'Sandringham to Dandenong line' transfers which are given a wide range of time savings depending on the station option chosen.

The allocation of benefits to different user groups in this way presents a misleading overall picture, and in any case the annual effects appear to be quite small in the scheme of things.

For an investment the size of maintaining the network connectivity at South Yarra, it would be much better to do full transport modelling and economic appraisal of the option for comparison with the Project as it stands. This would take proper account of the full redistribution of trips throughout the network, and the added attraction of South Yarra station to passengers displaced under the current Melbourne Metro project. Overall, such an assessment would provide a much more reliable result than the simplified trade-offs presented in the Business Case.

5.3.2 Additional passenger benefits

Other benefits of incorporating a stop at South Yarra for Melbourne Metro trains include the following, not included in the MMRA assessment above. These would be properly accounted for if full modelling and economic appraisal was undertaken.

Increased train services at South Yarra

There would be 16 more trains per peak hour on completion of Melbourne Metro – this would attract additional on-off patronage at South Yarra not only because of the additional services but also the different destinations offered, which would include direct access to:

- Dandenong line trains (no need to transfer at Caulfield)
- CBD and Parkville tertiary/medical precinct
- Sunbury and Melton lines
- Airport rail link, when this is built (subject to train service design – this is not included in the Melbourne Metro business case)

The MMRA document suggests that, with the Melbourne Metro platforms, there may be an additional 11,000 passengers boarding and alighting trains at South Yarra per day. Of this, I estimate an extra 1,300 passengers would board trains at South Yarra in the morning peak (using observed proportions of passenger activity through the day from City of Stonnington pedestrian counts).

No indication is given, however, of the projected patronage that would be 'lost' by not having the Dandenong line trains stopping there. As discussed earlier in this report, I estimate that, given the projected growth in dwellings and jobs in the station catchment, 2031 station entries and exits could grow to 41,000 per weekday (from about 27,000 today). PTV figures show that this would be reduced to about 33,000 if the Dandenong trains no longer stop there (i.e. under the 'base' Melbourne Metro scenario).

Adding the MMRA-predicted 11,000 (which is subject to sense-checking) means that South Yarra station (with Melbourne Metro platforms) could be catering for about 46,000 movements a day in 2031, plus (say) 7,000 transfers.

5.3.3 Unquantified benefits

Other significant, non-quantified benefits of Melbourne Metro platforms at South Yarra include:

- **Direct rail access to the Airport** – this depends on service design at the time (whether Airport trains will run only to/from CBD stations, or run through to the Dandenong line, as indicated in PTV's Rail Network Development Plan). Without a stop, South Yarra passengers would need to travel to Flinders Street or Melbourne Central to interchange with airport trains at the Melbourne Metro stations (CBD South and CBD North). This could add about 10 minutes to an airport journey from South Yarra.
- **Better accommodating future growth** – more and better train services at South Yarra will enable future growth to be better accommodated. Future development could increase in and around Forrest Hill/South Yarra.
- **Greater relief to road traffic** – accommodating an additional 11,000 passengers a day at South Yarra would relieve road traffic demand (some of the total would be mode shifts from car). The consequences of this for local traffic management, parking and the need for road improvements requires further thought.
- **Relief to trams** – The Toorak Road tram service is already overcrowded in the peaks and demand would increase further with Melbourne Metro (passengers wishing to get to Domain to catch Melbourne Metro trains there).

5.4 Potential refinements

Detailed design could generally improve or refine the alignments and property requirements of both South Yarra platform options. Some significant opportunities appear worth investigating, as outlined below.

5.4.1 Dandenong and Frankston lines crossover

Crossover option 1 – at South Yarra

With the existing Melbourne Metro proposal and both station options, the grade-separated crossing over of Dandenong line and Frankston line just east of the Melbourne Metro portal involves significant extra costs and land requirements along the rail alignment, especially with MMRA option B.

The reason for the crossover is so that the Dandenong line trains, which are north of the Frankston line tracks on the current alignment, can enter the Metro tunnel while the Frankston line tracks continue northwards through South Yarra station.

As well as crossing the Frankston and Dandenong tracks over, a connection could be considered between the tracks so that V/Line and freight trains to/from the Dandenong line could cross onto the Frankston line tracks between Caulfield and South Yarra. This would avoid the need to preserve separate tracks for V/Line and freight trains through South Yarra station, and could also improve operational flexibility since the V/Line and freight trains would then be coordinated with Frankston trains instead of Dandenong trains, which are (and will continue to be) more frequent.

Potential savings by relocating the crossover

If it were possible to cross the tracks over elsewhere, substantial property and cost savings would result at South Yarra. With MMRA option B, assuming the existing rail reserve would remain unchanged east of Chapel Street, the following works could be avoided:

- acquisition and removal of about 25 individual properties;
- widening of the rail reserve and construction of about 500 metres of double track; and
- two road overbridges (Chapel Street and Surrey Road) replaced with longer structures.

I expect that this might save of the order of $2-300 million (subject to engineering assessment and costing), excluding the cost of establishing the crossover elsewhere.

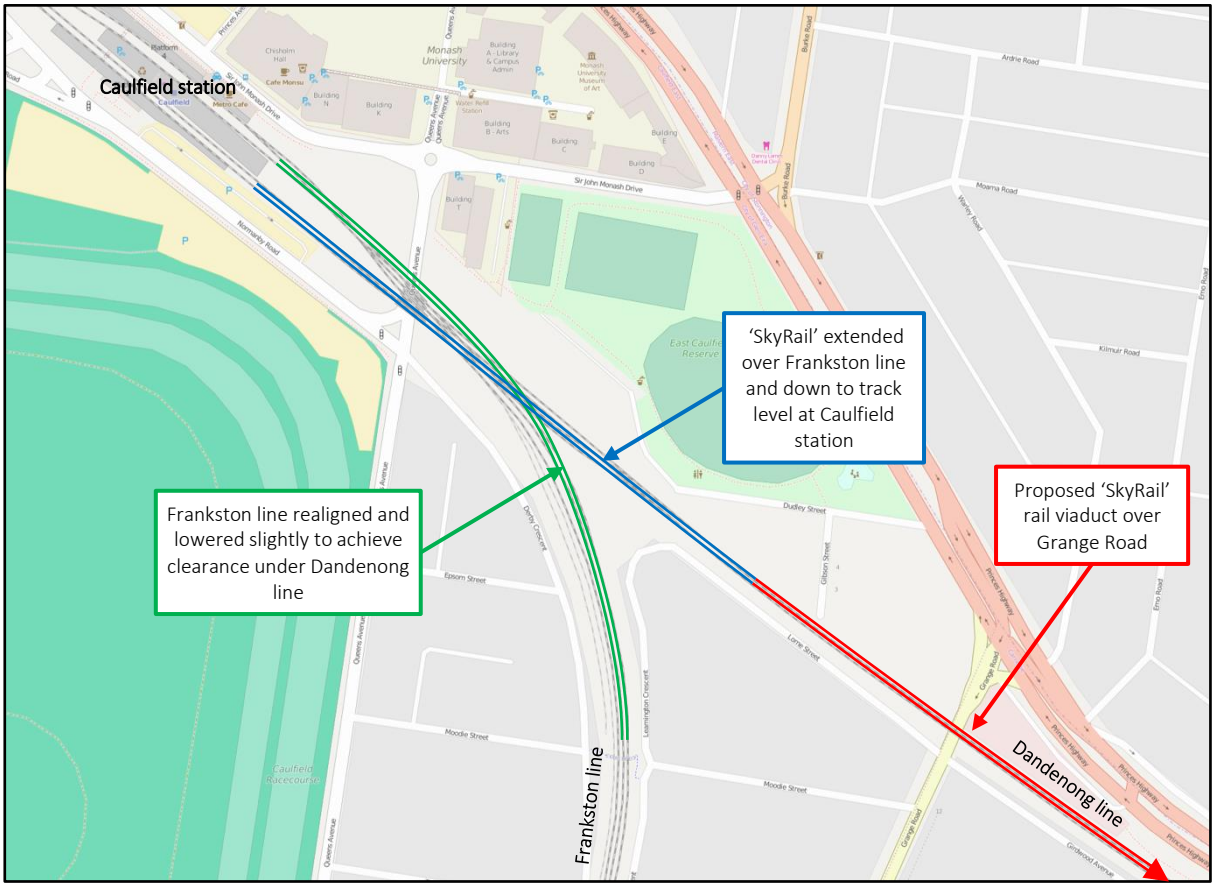
Crossover option 2 – east of Caulfield station

At present the Frankston line joins the Dandenong line just east of Caulfield station. There appears to be space available to grade separate this junction, with the Dandenong line crossing over the Frankston line, by extending the proposed Grange Road 'SkyRail' grade separation (Figure 5-3).

The announcement of SkyRail (i.e. a rail-over-road solution for Grange Road) makes it possible to consider this option. Subject to engineering feasibility, it could be significantly less costly (both for land and construction) to do the crossover here than at South Yarra; overall, about $100 million could potentially be saved.

The raised crossover would have added visual and noise impacts at this location, although these would be limited to relatively small areas in addition to those affected in any case, by the SkyRail proposal.

Figure 5-3 Crossover option 2 at Caulfield



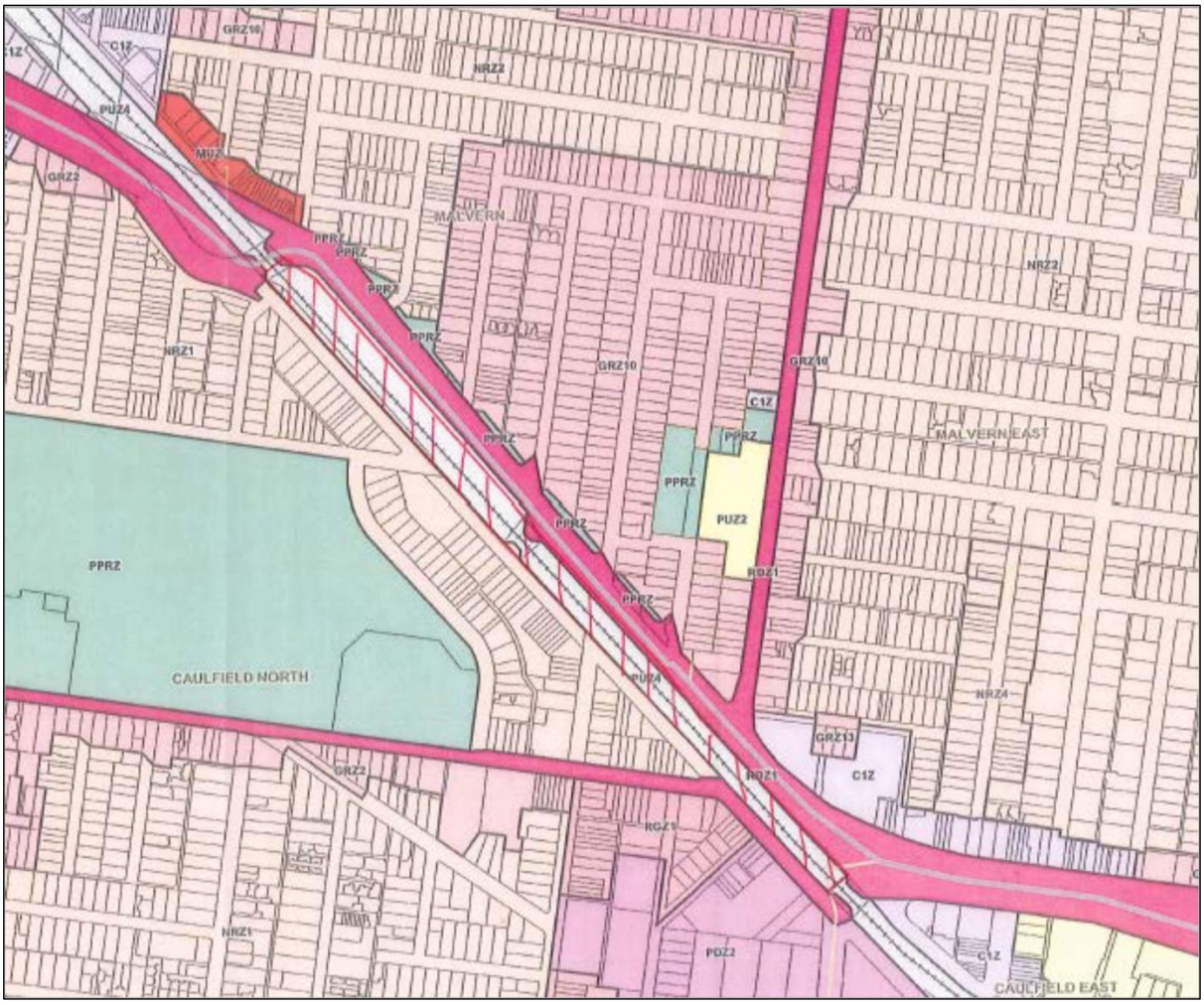
Map source: Openstreetmap
Note: This option could be refined to include a connection between the Dandenong and Frankston tracks for V/Line and freight trains to/from the Dandenong line to swap onto the Frankston line tracks from Caulfield to South Yarra. This would avoid the need to preserve separate tracks for V/Line and freight trains through South Yarra station.

Crossover option 3 – west of Caulfield station

Locations for crossovers between Caulfield and South Yarra are limited by the length required to raise one pair of tracks up and over the other, given the presence of existing stations and overbridges. Examining the rail corridor shows that the only place with sufficient clear length to do this (about 500 metres would be required to cross one track over the other) is just west of Caulfield station.

This option was included as part of station Option 2 in the South Yarra MM Options – Technical Options Study of September 2015 (AJM JV for MMRA). Details were scant, but the location is as illustrated in Figure 5-4.

Figure 5-4 Location of crossover option 3 (west of Caulfield station)



Source: South Yarra MM Platforms – Technical Options Study (AJM JV for MMRA), September 2015

Crossover option 3 has some significant impacts and costs. According to the AJM JV's report it added a net amount of $108 million to the cost of the station option, although whether that was all attributable to the crossover works is unclear. The crossover also results in lower train speeds due to the track curvatures needed, whereas crossover option 2 does not materially change the curvatures at the rail junction east of Caulfield station and so would not have any additional adverse effects on train speeds there.

Summary of crossover options

Table 5-2 compares the main features and differences between the three crossover options described above.

Subject to more detailed design, crossover option 2 (east of Caulfield station) is regarded as the best solution overall. It is likely to cost less than the other options, requires less property (than option 1), would also have less adverse impact on adjacent land uses, would not adversely affect train operating speeds and has the added bonus of removing an at-grade train crossing layout, which would improve timetabling flexibility on the Dandenong and Frankston lines.

Table 5-2 Features of crossover options

Option	Option 1 At South Yarra	Option 2 E of Caulfield station	Option 3 W of Caulfield station
Description	Widened rail reserve east of Chapel Street to construct crossover prior to MM platforms at South Yarra.	Extension of proposed SkyRail over Grange Road to take Dandenong tracks over Frankston tracks just east of Caulfield Station.	Crossover in rail reserve west of Caulfield Station (where existing tracks are on embankment).
Cost	Not separately costed by MMRA.	Expected to cost of the order of $100m less than Option 1 (subject to detailed design).	$108m more than Option 1, although whether all of this is attributable to the crossover is unclear.
Property	About 25 properties additional to those needed for South Yarra platforms and MM project.	Unlikely to require additional land.	Unlikely to require additional land.
Local amenity	Widened rail reserve and crossover will impact on local area through construction, noise and visual impacts in a densely built up area.	Extended rail viaduct will impact on small residential areas south of the Dandenong line; other adjacent land uses are less sensitive to the chages.	Changes to rail embankment and local access road closure will impact on residential areas south of the rail corridor, and, to a lesser extent, land uses north of Dandenong Road.
Other considerations	Train speeds slower due to increased track curvatures through crossover location.	Train speeds largely unaffected because track curvatures will be similar to existing. Minor works required at intermediate stations where Dandenong and Frankston platforms are swapped. Removing at-grade crossing of main train lines would improve timetabling flexibility for freight trains.	Train speeds slower due to increased track curvatures through crossover location. Minor signage and other works required at intermediate stations where Dandenong and Frankston platforms are swapped.

5.4.2 Refinements to station options

MMRA Option A

The main refinement to Option A would be to add a second pedestrian entrance at the western end of the new platforms, into the Yarra Sidings area if possible. This could either replace or supplement the MMRA-proposed entrance on Toorak Road. Furthermore, a pedestrian link beneath Toorak Road to the existing station (if this was feasible structurally) could improve the interchange arrangements for transferring passengers, but this should be considered in the light of proper patronage modelling (using VITM and ClicSim); I suspect that transferring passenger demand increases may not be as large as those for entering and exiting passengers, which may change the priorities of the design solution.

Having said this, I consider Option A is not the preferred station location, because the MM platforms are further west than Option B (away from the existing station and Yarra Sidings, which is to become a plaza and open space area incorporating the station accesses).

MMRA Option B

The most significant potential refinement would be to leave the Sandringham line platforms where they are in the existing station and provide entrances to the new Metro platforms, potentially with a new pedestrian link under Toorak Road to the existing station (depending on what structural work would be required).

This could save significant costs whilst keeping the Sandringham line platforms close to the Frankston line and the South Yarra short starters, in the existing station. Subject to greater understanding of the passenger transfer demands, this could be a better outcome than separating the Frankston and Sandringham platforms, between which it is thought likely that most of the transfers would take place post-Melbourne Metro.

If crossover option 2 proves feasible, the work, cost and land required to fit the MM platforms in at South Yarra would be reduced significantly, and the current design should be reviewed to further simplify the layout and fit it in better with the surrounding existing and proposed urban fabric.

5.5 Summary

Significant opportunities exist to refine maintenance of the network connectivity at South Yarra. These are potentially (subject to engineering feasibility and demand analysis):

- Relocating the Dandenong/Frankston line crossover to the east side of Caulfield station, where it could be achieved by extending the proposed Grange Road elevated 'SkyRail' westwards. The additional costs and impacts of doing this would be substantially less than doing it at South Yarra, especially with MMRA's station Option B (which offers the best-available location for the MM platforms).
- Refining the MMRA station design by:
  - keeping the Sandringham platforms in place rather than relocating them south of Toorak Road (if merited from more detailed analysis of transferring passengers);
  - improving the overall design of the station entrances and exits in the Yarra Sidings area to integrate them with a redesigned public space; and
  - simplifying the proposed trackwork after moving the Dandenong/Frankston line crossover to Caulfield, if possible.

These concepts should ideally be taken forwards for more detailed consideration and appraisal before final decisions can be made.

The refinement ideas described in this Chapter were presented by Stonnington City Council to MMRA and PTV in May 2016. I attended a subsequent meeting to discuss them, at which MMRA provided several reasons why the refinements could not be done, and presented several drawings and layouts which showed some of these. I consider that these issues should be properly documented, the best overall solution for providing Melbourne Metro platforms at South Yarra needs to be developed, and the transport effects and economic implications need to be fully and transparently assessed.

6 Concluding remarks

South Yarra station is the busiest metropolitan train station outside the City Loop. At present in the morning peak, more people alight at South Yarra station than board, emphasising the significance of South Yarra as a destination as well as an origin of trips. The range of train services available at South Yarra are important for the network connectivity they provide. The station facilities are inadequate for the demand levels now occurring, and are in urgent need of improvement regardless of the impact of the Project.

The Project will result in reduced network connectivity, train service levels and effective capacities at South Yarra station. A consequence of this is that the projected demand will not be met, the existing network connectivity will be worsened, and the new connectivity provided by the Project will not be directly accessible to or from South Yarra.

MMRA has to date rejected maintaining rail network connectivity at South Yarra by enabling Melbourne Metro services (Dandenong line trains) to continue to stop there. This rejection is based on inadequate assessment of the viability of what is, in effect, a project worth of the order of $800-$900 million in capital costs. The assessment concludes that there will be more losers than winners based on a simplified set of trade-offs. Furthermore, the MMRA assessment is of a high-cost, high-impact solution. I remain convinced that there are other options that should be properly assessed, including swapping the Dandenong and Frankston tracks south-east of Caulfield station, potentially to save costs and impacts there.

A surer way of assessing the effect of Melbourne Metro platforms at South Yarra would be to run the option through the VITM and ClicSim models, thus enabling the full redistribution effects of all transport users to be taken into account in a proper and fully peer reviewed economic evaluation. Until this is done, in my opinion it is not possible to state categorically that maintaining rail network connectivity at South Yarra platforms is unviable.

The consequence of this situation is that South Yarra's public transport infrastructure and servicers will be significantly worse than they will be before Melbourne Metro is built, and also significantly worse than if the Project maintained the existing network connectivity. The reduced train services and origin/destination choices will lower the projected use of train services at South Yarra, probably putting undue additional pressure on other transport facilities (primarily Toorak Road tram services and roads for private vehicle users). South Yarra will be less directly connected to the Dandenong line (Dandenong, Cranbourne and Pakenham) Parkville (University and hospital precinct) and the western suburbs (Sunshine, Melton). In the longer term, it will also be less well-connected to Melbourne Airport, when the Airport Rail Link is built.

Subject to a proper and thorough assessment of options, these shortcomings of the Project at South Yarra are expected to be relatively easy to resolve. This will provide much better transport connectivity, both on completion of the Project and in the longer term.

In preparing this report, I have made all the enquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld from the Panel.

William McDougall, Brunswick, 10 August 2016

Attachment – William McDougall Summary CV

William McDougall

Personal details

Full name: William Roderick Tritton McDougall
Address: 15 Cooraminta Street, Brunswick, Victoria 3056, Australia
Telephone: +61 (0)457 559 260
Email: william.mcdougall@outlook.com.au
Date and place of birth: 29 September 1954, Malden, Surrey, UK
Citizenship status: Permanent Australian residency since 1985, Australian citizen (carry Australian and UK passports) since 1994

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
Past Chair, Engineers Australia Victoria Transport Branch Committee

Overview

I am a transport planner, engineer and economist with over 40 years' experience in the UK, Australasia, Asia and the Middle East. I have directed a range of studies across all modes of transport and all levels of detail, 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. I have been involved in planning public transport initiatives in most Australian cities as well as in London and the Middle East.

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 Appraisal; Report and Article Writing; Community Consultation; Presentations, Media Articles and Interviews.

Selected recent activities

Grattan Institute (2016) – I joined the Grattan Institute temporarily to work on research reports into transport policy, helping to shape the research agenda and bring my transport knowledge and experience into the organisation.
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. On completion it would not be necessary to return tram services to the same level on Swanston Street, so we also developed a post-Metro tram network which now forms 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 aviation growth trajectories and the associated landside transport task requirements, and developed a strategy to serve the demand that included road and rail elements, 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.
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
2010-2014	Principal and Practice Leader for Public Transport Planning, 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	Bachelor's 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.info 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.