Flemington Hill and Epsom Road Advisory Committee

Independent Peer Review- Traffic, Access and Parking

CG180072

Prepared for
Minter Ellison

23 February 2016
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1 Introduction

My name is Stephen Hunt and I am a Group Manager and Consultant Traffic Engineer employed by Cardno Victoria Pty Ltd.

I have practiced as a Traffic Engineer for over 40 years, including 13 years in local government and 28 years in consulting at Cardno and Grogan Richards, where I was a director between 1989 and 2006. My qualifications and experience is attached in Appendix A.

The Flemington Hill and Epsom Road Advisory Committee was appointed in September 2015 by the Minister of Planning to consider rezoning of two parcels of land at Flemington Racecourse surplus to racing requirements to Comprehensive Development Zone to facilitate the development of residential buildings and to comment on two draft planning scheme amendments which seek to facilitate these developments.

I have been requested by Minter Ellison to prepare an independent peer review of traffic, access and parking issues for consideration by Committee, in response to Recommendation 5 of the Committee’s Stage 1 report.

In instructions received on the 16th February 2016, I was specifically requested to considered the Terms of Reference of the Advisory Committee and the Stage 1 Report and prepare a peer review on the traffic, access and parking components for each of the two identified precincts considering:

- The adequacy of the traffic modelling and assumptions undertaken by GTA;
- The appropriateness of the identified traffic mitigation works;
- The appropriate triggers for delivery of any identified mitigation works;
- The appropriate controls parking rates and decision guideline’s for assessment of planning permit applications for uses and development under the draft exhibited schedules to the Comprehensive Development Zone to each precinct.

As a peer review exercise, I have assessed the material filed with the Advisory Committee in relation to traffic parking and traffic and tested assumptions and issues set out in the following documents:

1. The Flemington Hill and Epsom Road Advisory Committee Stage 1 Report – 17th December 2015; including commentary and traffic, access and parking,
2. “Flemington Life” Development Integrated Transport and Access Plan” – 26th June 2014 – prepared by GTA Consultants on behalf of the Greenland Group (as consider by the Advisory Committee in the Stage 1 Report prior to exhibition) incorporating at Annex 2 “Flemington Life Transport Impact Assessment” – June 26th 2014,

I have also noted that the analysis undertaken by GTA has been based on the Flemington Life Development Plans exhibited with the amendments which show indicative development representing a high yield outcome.

In preparing this report, I have investigated previous involvement by Cardno in providing traffic advice and assessment of proposals in the precinct of the proposed amendments, with a summary contained in Appendix B.

I have had no previous involvement with the matter before the Advisory Committee. This review of the methodology adopted by GTA, the assumptions adopted in analysis, the traffic modelling undertaken and the mitigating works identified has been undertaken independently.

My opinions with respect to the adequacy of the material filed in association with the proposed amendments are as follows.
2 Advisory Committee Stage 1 Report

The Advisory Committee Stage 1 Report was issued on 17th December 2015 which, in line with the terms of reference, reviews of the proposal and supporting documentation to determine whether there is sufficient information to enable the Amendments to be exhibited.

The report recommended that subject to the VRC accepting recommendations to the amendment document as outlined in the Stage 1 Report, exhibition should proceed.

The Committee recommended as follows with respect to traffic access and parking issues.

4. Provide the following information in support of the Project to the Committee by close of business on 23 February 2016:
   a) In relation to the GTA traffic report:
      • update traffic volume diagrams to ensure clarity and readability.
      • undertake a sensitivity analysis at the relevant intersections adopting a Thursday pm peak hour generation rate of 0.35 movements per dwelling for the Epsom Road site.
      • comment on the traffic generation rate for the Flemington Green site, bearing in mind that the PTV response and the earlier work by GTA indicates no change in bus patronage, as a percentage of journey to work trips, in Flemington, Ascot Vale or Maribyrnong between 2001 and 2011.
      • provide further information in relation to individual traffic movements at critical intersections.
   b) In relation to VicRoads:
      • provide advice regarding acceptance of the GTA modelling or any comment regarding the proposed mitigating works, including a written response outlining acceptance or otherwise of the mitigating works proposed, particularly the Epsom Road roundabout and pedestrian treatment.
   c) In relation to PTV:
      • provide information on current bus and tram peak hour occupancy rates on routes adjacent to the site.
      • provide an indication on what measures are proposed to cater for the potential increase in demand for public transport services.

5. An independent peer review report on the traffic, access and parking components of the Project.

GTA Consulting, in accordance with the Committee request, issued an updated report on the 23rd December 2015 entitled “Flemington Life Transport Impact Assessment”, updating an earlier TIA dated July 2014 submitted with the amendment application.

I understand that, in part, the revised TIA sort to address the issues raised under Item 4 a) of the Committee recommendations.

It is further understood that VicRoads and PTV will address items in Items 4 b) and 4 c).

This report provides the independent peer review report sought in Item 5.

Section 4 of the Stage 1 report discusses the committee’s initial assessment of traffic, parking and traffic, identifying that the following issues need to be addressed:

1. The traffic impact upon the arterial and local road network,
2. The ability of the public transport infrastructure to cater for the increased demand,
3. Pedestrian safety and connectivity within the sites and to the public transport network,
4. Adequacy of car parking supply,
5. Impact on RASV activities, and
6. The impact of additional traffic upon the major event precinct.

Within the discussion section the following specific comments are noted by the Committee:

- Sidra analysis undertaken by GTA does not provide details of output parameters for individual movements at intersections,
- The ability for the public transport network to service the future population is not addressed,
- Traffic generation and public transport patronage levels should be reviewed in light of the clear advice to the Committee from PTV that upgrading of the spur line to Flemington Station is not an option under consideration.
3 Review of Traffic Impact Assessment Methodology

3.1 Overview

I have reviewed the traffic impact assessment methodology adopted by GTA Consulting and assessed the steps taken against industry standards for analysis of this type, having regard to the site specific issues which relate to the proposed development sites which are the subject of the proposed amendments.

I note that the methodology adopted in both the initial TIAR prepared in July 2014 and the updated report issued in December 2015 is essentially the same, with the updated report providing additional detail as to assumptions and analysis undertaken. The principle inclusion in the 2015 report is Mesoscopic Modelling analysis utilising the Aimsun software package which was undertaken following initial consideration of the 2014 report and feedback from the Transport Working Group.

The methodology for assessment has been undertaken in accordance with “Vic Roads Guidelines for Transport Impact Assessment Reports for major land use and development proposals” developed by Vic Roads initially developed by Vic Roads in 2006. The Guidelines are accepted as the “industry standard” for the preparation of transport impact assessments in association with major developments.

With respect to traffic impact and required mitigating works, the TIAR Guidelines set out the following methodology for analysis:

1. Assessment of existing traffic conditions on the surrounding road network utilising actual peak hour counts.
2. Review of proposed direct vehicular access arrangements including assessment of capacity allowing for 10 years traffic growth on the road network.
3. Assessment of traffic generation for land use components during peak hours including the likely distribution of traffic taking into account all travel modes likely to be utilised.
4. Assessment of a base case scenario without the development proposal occurring based on existing traffic volumes and an estimate of traffic growth expected to occur up to “key point in time” related to the development timing and staging. It is noted that the base case scenario is not required to consider background traffic growth beyond the expected completion time of the project.
5. Assessment of post development traffic conditions, effectively by superimposing development traffic projections onto “base case” network traffic volumes. The extent of the road network analysed is not confined to the immediate area only but should consider all intersections and mid-block locations where any traffic movement is increased by an amount of 10% or greater as a result of traffic generated (beyond the base case condition).
6. Assessment of mitigating treatments to restore traffic safety and operational efficiency to levels that would have existed without the development occurring.

In my opinion, the methodology adopted by GTA in the TIAR is in accordance with the Vic Roads TIAR Guidelines and in accordance with industry best practice.

In particular, the fact that the analysis has considered the combined impacts of the two development sites, despite the sites being a considerable distance apart and accessed from different parts of the road network, has resulted in a study area which is far wider than what would normally be reviewed.

The only aspect of the assessment which is not detailed in the exhibited reports is the performance of access point of the proposed development sites to the road network and the suitability of access to cater for 10 years of traffic growth.

In my view, this analysis can (and should) be undertaken at the planning permit stage, and is not required in consideration of the current amendments.
3.2 Transport Working Group

A Transport Working Group was established in March 2014, which sought to provide a forum where transport issues related to the project could be discussed with relevant stakeholders and transport agencies.

The meetings were attended at various times by representatives of:

- VicRoads,
- Public Transport Victoria,
- DELWP,
- DEDJTR (formally DTPLI),
- Melbourne City Council, and
- Moonee Valley City Council

It is understood that the meetings, and ongoing dialogue with the relevant agencies, provided a forum for agreement of the methodology used in assessing transport issues, as well as on technical elements including assessment peak hours, adopted traffic generation rates and distribution and calibration and validation of the mesoscopic simulation model.

This is confirmed in letters to the Advisory Committee Chair from VicRoads, dated 18th December 2015 and PTV dated 21/2/15 attached in Appendix A of the exhibited TIAR.

VicRoads confirm in their letter that, as a party to the Working Group they have accepted the transport modelling inputs including:

- Assessment periods,
- Traffic generation rates,
- Traffic distribution,
- Design year, and
- Growth rates

VicRoads have however advised that they have not as yet finalised there assessment of required mitigating works.

PTV also advise that as a member if the Working Group, they have provided input into modelling inputs including traffic generation and distribution and accept the adopted input. They also however have not finalised their assessment of proposed mitigating works, which requires further with other transport stakeholders.

Based on this advice, I accept that the VicRoads and PTV have accepted the inputs into the modelling, both SIDRA and Aimsun, undertaken by GTA and that the remaining issue for both agencies relates to interpretation of the model outputs and agreement on appropriate mitigating works.

Despite the agreement of VicRoads and PTV to the modelling inputs, in accordance with my instructions I have independently assessed the adequacy of the modelling inputs as adopted.
4 Adequacy of Traffic Modelling and Assumptions

4.1 Assumptions

4.1.1 Assessment Periods and Existing Conditions Surveys

Existing conditions traffic data which forms the basis of the TIAR assessment was collected over three days between Thursday 27th February to Saturday 1st March 2014, with weekday commuter peaks identified on the two weekdays and the midday peak on the Saturday.

The survey days were chosen to represent a variety of existing conditions in the area:

- Thursday – typical weekday with no events held at either Flemington Racecourse or the Showgrounds;
- Friday – weekday when a music event was held at Flemington Racecourse in the evening attended by 55,000 people.
- Saturday – race meeting at Flemington attended by 15,000 people, understood to be the largest race day event outside the Spring Carnival and the largest without external traffic management controls.

Analysis undertaken has adopted the Thursday morning and afternoon peak hours and the Saturday lunchtime peak as the modelling base. It is understood that there were no events held at the Royal Melbourne Showgrounds on any of the three survey days.

It is noted that the Friday surveys have not been utilised for analysis, although volumes during the Friday morning peak were higher than the Thursday peak. The Friday data was not utilised as the music festival was observed to influence traffic conditions and "site observations indicted that more congestion was actually observed to be in the network on the Thursday, resulting in slower travel times and poor operating conditions".

In my opinion, the critical periods which should be considered in association with the proposed amendments and the indicative (predominantly residential development) proposals are the typical week day morning and afternoon commuter peak periods and the Saturday lunchtime period.

I am satisfied that the days chosen are representative of the critical design periods and provide the base for assessing the impact of additional generated traffic onto the surrounding arterial and local road network.

The study area includes both the Racecourse and the Showgrounds and it is clear there are many events which are held at either, or both venues throughout the year of varying size which result in varying traffic conditions. In my experience, when events are held at venues such as the Showground or Flemington with significant volume of destined traffic, redistributions of traffic tends to occur with alternate routes chosen by motorists to avoid congestion around a venue. It is likely that this occurred on the Friday evening of the music event and, to some extend during the Saturday race day surveys.

Concern has been expressed by RASV that analysis has not included periods when events are held at the showgrounds and hence there is no information in relation the potential impact of additional traffic generated from development on the two sites on access to the Showgrounds and associated parking areas. As shown in Annex 2 of the ITAP, a significant number of weekday events are held at both venues, with a weekday event held at either venue on average once per week, with significant attendance levels in excess of 5,000 people occurring regularly.

It is considered that, while the Saturday surveys and subsequent analysis provide appropriate assessment of the development proposals during a weekend event, additional analysis is warranted to review the implications of development when weekday events are held at either the Showgrounds or Flemington.

In my view, this additional analysis is most appropriately undertaken at Planning Permit stage and should be centred on the local implications on access to the Showgrounds or Flemington when weekday events are held generating traffic during the commuter peak periods.
It is noted that the existing conditions data, recorded in February / March 2014 is now 2 years old. I considered, given the low (or negative) growth rates on the surrounding arterial network that the data remains representative of existing conditions.

4.1.2 Traffic Growth Rates

The Base Case analysis undertaken by GTA is designed to reflect traffic conditions in 2018, just prior to the development being completed. Volumes for the 2018 design peaks have been determined by factoring up the 2014 peak hour volumes by a compound rate of 1% per annum.

It appears likely that development will not be completed by 2018 and hence the extent of the growth period will extend. If a consistent growth rate is maintained, higher base volumes would then result.

I have reviewed traffic volume data collected by Cardno in recent years in conjunction with assessment of development proposals at 1 Ascot Vale Road which is located on the corner of Epsom Road and Ascot Vale Road.

Traffic counts were undertaken at the intersection of Epsom Road / Ascot Vale Road / Racecourse Road in July 2010 and repeated in February 2014.

Comparison of the data showed that, during the AM peak hour, total movements through the intersection increased from 2,805 to 2,816 movements or 0.4% over the 4 year period, while volumes in the PM peak reduced from 3389 to 3106 movements, a reduction of approximately 5%.

Based on this data, I am of the view that the growth rate adopted provides a conservative base case scenario, even allowing for a longer period until the development is completed.

I note that the Working Group has endorsed the growth rates adopted.

4.1.3 Traffic Generation Rates

Analysis undertaken in the TIAR has adopted the following traffic generation rates for residential development on the amendment sites.

Table 4-1 Flemington Life Adopted Traffic Generation Rates

<table>
<thead>
<tr>
<th></th>
<th>Flemington Road</th>
<th>Flemington Hill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thursday AM Peak</td>
<td>0.3 movements per dwelling per hour</td>
<td>0.4 movements per dwelling per hour</td>
</tr>
<tr>
<td>Thursday PM Peak</td>
<td>0.25 movements per dwelling per hour</td>
<td>0.35 movements per dwelling per hour</td>
</tr>
<tr>
<td>Saturday Lunchtime Peak</td>
<td>0.275 movements per dwelling per hour</td>
<td>0.375 movements per dwelling per hour</td>
</tr>
</tbody>
</table>

In addition, in Section 5.3 of the December 2015 TIAR, GTA provides a sensitivity analysis for the Epsom Road site adopting a PM peak rate of 0.35 movements per dwelling as requested by the Committee in Recommendation 4a.

The following methodology has been adopted by GTA in determining traffic residential rates for the residential components of the development proposals:

1. Person trips per apartment bedroom estimated with reference to the RMS NSW Guidelines,
2. Rates factored up by 1.6 to account for the expected proportion of 1,2 and 3 bedroom apartments
3. ABS Census journey to work data referenced to determine travel mode percentages utilising varying LGA areas to reflect the different demographics, including access to public transport options.

The rates have been derived without specific reliance on the activation of the spur rail line to Flemington Racecourse as discussed by the Committee, with the higher rates adopted for the Flemington Hill site appropriately identifying that this site will, in the foreseeable future, be not as well served as the Epsom Road site with respect to direct access to public transport.

Tables 4.3 and 4.4 of the ITAP seeks to derive AM and PM Peak modal split percentages through extrapolation of the journey to work data from the ABS Census.

In my view this data should be viewed as indicative only for the following reasons:
• It only reflects work trip data and hence does not include variations in transport mode which are likely to occur for other trip purposes,

• The data researched, particularly applying to Flemington Hill is based on a relatively wide area covering three LGA area which have varying accessibility to public transport. The predicted high levels of train travel (6%) and low bus travel (less than 1%) would be unlikely to occur at this site which is remote from train stations but adjoin a bus route.

This is recognised by GTA in the analysis of car trip generation through the adoption of higher rates for both sites, presumably having regard to these factors and a potentially higher reliance on car travel, particularly at Flemington Hill.

I have reviewed the car trip rates shown in Table 4-1 utilised by GTA against rates adopted by my firm in assessing similar types of residential development.

I provided expert evidence to VCAT in relation to development proposals at 1 Ascot Vale Road where a rate of 0.35 movements per residential apartments was adopted for analysis purposes, having regard to the "the sites location, the proposed uses and its access to surrounding development and public transport". I noted in my evidence that the rate was appropriate, if not conservatively high.

Analysis undertaken by Cardno in 2011 adopted peak a rate of 0.4 movements per apartment for both the Flemington Green site and the Epsom Road site for analysis purposes.

Having regard to the above, I consider that the rates adopted for the two sites, allowing for higher generation at the Flemington Green site due to the lower accessibility to public transport, are appropriate for traffic modelling and analysis purposes.

I note that the rates and hence subsequent analysis does not assume activation Flemington Station for commuter services.

I also note that the rates have been agreed by the Transport Working Group and that the analysis of higher rates for the Epsom Road site in the PM peak has been undertaken at the request of the Committee.

4.1.4 Traffic Distribution

The distribution and assignment of traffic generated by the development sites has been estimated in the TIAR to provide estimates of additional traffic through the surrounding road network for input into SIDRA analysis of future conditions.

The broad distribution matrix was determined from VITM outputs, with traffic assignment determined by surrounding arterial and local road network.

Initial analysis undertaken in the June 2014 TIAR adopted a single distribution matrix for both sites, applying to the each of AM, PM and Saturday lunchtime peaks.

Following input from the Transport Working Group, separate distribution matrices have been prepared for each development site, with inbound and outbound movements derived separately having regard to site specific considerations.

I have reviewed the distribution matrices adopted for the Sidra analysis and consider that the revised matrices utilised in the December 2015 TIAR provide an appropriate refinement for traffic assignment, reflecting reasonably the expected additional traffic movements through the road network.

4.2 Sidra Modelling Analysis

4.2.1 Extent of Analysis

Sidra Intersection has been used in the TIAR to assess the performance of intersections in the immediate vicinity as well as on the broader road network.

Intersections to be tested were identified based on the VicRoads Guidelines nominating review of intersections where any movement during the analysis periods is expected to experience volume increases of 10 percent or greater. As shown in Table 2.1 of the TIAR, a total of 19 intersections in the broader area
were reviewed of which 13 were identified as triggering the criteria. Following consultation with the Transport Working Group, a total of 9 intersections were subsequently analysed in detail using SIDRA intersection.

Variations to the criteria adopted are as follows.

**Meeting the Criteria but Not Analysed**
- Epsom Road / Flemington Drive
- Ascot Vale Road / Kent Street
- Ballarat Road / Gordon Street
- Myers Street / Farnsworth Street / Maribyrnong Boulevard

**Not Meeting the Criteria but Analysed**
- Princes Highway / Ballarat Road

It is understood that the variations were agreed by the TWG on the basis of function and significance within the surrounding road network.

Overall, in my opinion, the degree of analysis undertaken and the number and spread of intersections considered is rigorous, meeting or exceeding the level and extent of analysis normally undertaken. It is noted by comparison that the development at 1 Ascot Vale Road opposite the Epsom Road site was only required to consider the intersection of Ascot Vale Road / Racecourse Road / Epsom Road, together with the operation of the two access points.

### 4.2.2 Sidra Modelling

Modelling of each intersection has been reviewed by the TWG and was assessed by Cardno in October 2014 on behalf of the RASV.

As noted in the December 2015 TIAR, Cardno reviewed the Sidra analysis in detail and following direct consultation with GTA, minor revisions to the Sidra modelling were incorporated.

I have reviewed the modelled outputs for each intersection and scenario tested contained in Annex D of the TIAR and noted the assumptions and limitations listed in Section 2.4.5.

In my opinion the Sidra analysis undertaken provides a suitable platform for reviewing the comparative performance of each intersection resulting from development levels contemplated and identifying appropriate mitigating works.

### 4.3 Mesoscopic Analysis

In addition to the Sidra Intersection Analysis discussed in Section 4.2, GTA also undertook mesoscopic analysis using the Aimsun software package.

On behalf of the RASV, Cardno were provided with details of the validation and calibration of the model in October 2014 as contained in the report "Flemington Racecourse Development Hill Precinct Site and Flemington Epsom Road Site Calibration and Validation Report" Revised Final visions dated 29/08/14.

The report was reviewed with the following noted
- The modelling process adopted a 3-Tier Modelling approach (outlined in Figure 1.2 of the GTA report) in which VITM was used to inform an AIMSUN mesoscopic model for the study area in which pockets of microsimulation modelled were developed to assess localised traffic impacts.
- The GTA report focused on the calibration and validation of the mesoscopic model. Section 2.2 of the GTA report summaries how the mesoscopic model was developed. This process was agreed with VicRoads and considered sound.
- The development of the demand matrices outlined in Sections 6.2 and 6.3 of the GTA report is in line with common industry practise.
- The calibration/ validation process outlined in Section 7 of the GTA report is in line with common industry practise.
The calibration and validation outcomes for the mesoscopic model are reasonable.

Having regard to the above and the consultation with respect to calibration and validation of the model with the TWG, I am satisfied that the model as developed is “fit for purpose” to review the likely network effects of the proposed development levels contemplated by the amendments.

The calibrated existing conditions model for the AM peak, PM peak and the Saturday Peak was extended to review future conditions representing:

- Base case conditions (ie existing AM, PM and Saturday midday peak volumes factored up by 4% to represent growth between 2014 and 2018) and,
- Post development conditions (ie generated traffic added to the base volumes with proposed mitigating works in place).

The results are discussed in Section 4.3 of the ITAP where it is observed that, in the post development scenario, average speed across the network can be expected to marginally reduce during both the AM and PM peak periods indicating minor overall deterioration in operating conditions compared with the base case scenario. Overall increases to average speeds and hence improved conditions are expected for the Saturday lunchtime design condition.

Aimsun has also been used to review relative levels of road congestion, public transport performance and average intersections delays through the key intersections of the Epsom Road roundabout and the Farnsworth Street/Ballarat Road intersection.

I consider that the Aimsun modelling undertaken provides a useful adjunct to the Sidra analysis, in particular ensuring that network effects are understood.

I also agree with the observations in Section 4.4 of the TIAR that the assessment presents one of the most comprehensive undertaken for a development of the scale proposed.
5 Appropriateness of Proposed Mitigation Works

5.1 Mitigating Works Package

A package of facilitating and mitigating works is detailed in Section 5.4 of the ITAP which are proposed in conjunction with development of the two sites as contemplated by the Planning Scheme Amendments.

Tables 5.1 and 5.2 detail recommended improvements for Bicycle and Pedestrian Networks and the Public Transport Network respectively. It is assumed that the package of works will be undertaken as a cost against development of the two sites.

In my opinion the proposals are comprehensive and will result in improved facilities for not only future residents of the development sites but also the broader local and regional communities.

In addition a package of mitigating road network improvements are proposed, detailed in Table 5.3 of the ITAP.

The recommended treatments to be constructed at the cost of the applicant are shown proposed at the following locations:

Table 5-1 Road Network Upgrade Proposals

<table>
<thead>
<tr>
<th>Location</th>
<th>Proposed Works</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leonard Crescent</td>
<td>Realign and widen to an 11.0 metre road pavement and potentially a future bus route</td>
</tr>
<tr>
<td>Fisher Parade / Leonard Crescent Intersection</td>
<td>Realign and upgrade unsignalised intersection to an alignment ultimately capable of future signalisation</td>
</tr>
<tr>
<td>Leonard Crescent / Langs Road / Chauvel Street Intersection</td>
<td>Modify to provide staggered T junctions and pedestrian refuge in Langs Road</td>
</tr>
<tr>
<td>Langs Road / Epsom Road Intersection</td>
<td>Modify Langs Road approach to provide double right turn into Epsom Road Modify southern Epsom Road approach</td>
</tr>
<tr>
<td>Epsom Road Roundabout</td>
<td>Restrict access to development site to Epsom Road left in left out through construction of a central median Lengthen departure lanes on northern leg Provide signalised pedestrian crossing on southern Epsom Road leg Examine signal metering of roundabout through installation of additional pedestrian crossing complementing proposed crossing on Ascot Vale Road in conjunction with 1 Ascot Vale Road development</td>
</tr>
<tr>
<td>Ballarat Road / Farnsworth Road / Droop Street Intersection</td>
<td>Provide additional lane on north approach Lengthen right turn lane on east approach</td>
</tr>
</tbody>
</table>

It is noted that VicRoads and PTV, while “signing off” on the traffic modelling assumptions have not, at this stage agreed to the extent of the mitigating works package.
5.2 Adequacy of Proposed Roadworks

The proposed roadwork package developed in the ITAP and TIAR has been determined through traffic analysis undertaken in accordance with VicRoads Guidelines for Traffic Impact Assessment Reports.

While assisted by the Aimsun mesoscopic modelling undertaken, the predominant analytical tool used to determine the extent of mitigating works required is the comparative Sidra Intersection modelling undertaken between the future base and the post development conditions.

In order to provide an overview assessment of the adequacy of the mitigating works proposed I have reviewed the intersection "degrees of saturation" modelled for each intersection and assessed the extent of mitigation resulting.

The comparative results for each intersection modelled are shown in Table 5-2, Table 5-3 and Table 5-4.

Table 5-2  Sidra Intersection Degrees of Saturation – AM Weekday Peak

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Existing</th>
<th>Base</th>
<th>Post Development</th>
<th>With Mitigation Works</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epsom Road / Langs Road</td>
<td>0.74</td>
<td>0.75</td>
<td>0.86</td>
<td>0.80</td>
</tr>
<tr>
<td>Epsom Road / Union Road</td>
<td>0.57</td>
<td>0.60</td>
<td>0.67</td>
<td>Nil</td>
</tr>
<tr>
<td>Epsom Road / Showgrounds</td>
<td>0.79</td>
<td>0.82</td>
<td>0.88</td>
<td>Nil</td>
</tr>
<tr>
<td>Epsom Road Roundabout</td>
<td>0.59</td>
<td>0.62</td>
<td>0.72</td>
<td>0.72</td>
</tr>
<tr>
<td>Smithfield Rd / Racecourse Rd</td>
<td>0.71</td>
<td>0.74</td>
<td>0.75</td>
<td>Nil</td>
</tr>
<tr>
<td>Smithfield / Epsom Rd</td>
<td>0.92</td>
<td>0.96</td>
<td>0.98</td>
<td>Nil</td>
</tr>
<tr>
<td>Ballarat Road / Geelong Road</td>
<td>0.86</td>
<td>0.89</td>
<td>0.90</td>
<td>Nil</td>
</tr>
<tr>
<td>Ballarat / Farnsworth Ave</td>
<td>0.74</td>
<td>0.76</td>
<td>0.94</td>
<td>0.78</td>
</tr>
<tr>
<td>Droop St / Farnsworth Ave</td>
<td>0.92</td>
<td>0.96</td>
<td>0.98</td>
<td>0.98</td>
</tr>
<tr>
<td>Langs Road / Leornard Cres</td>
<td>0.34</td>
<td>0.36</td>
<td>0.49</td>
<td>0.56</td>
</tr>
<tr>
<td>Fisher Pde / Leornard Cres</td>
<td>0.35</td>
<td>0.36</td>
<td>0.68</td>
<td>0.34</td>
</tr>
</tbody>
</table>

Table 5-3  Sidra Intersection Degrees of Saturation – PM Weekday Peak

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Existing</th>
<th>Base</th>
<th>Post Development</th>
<th>With Mitigation Works</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epsom Road / Langs Road</td>
<td>0.72</td>
<td>0.75</td>
<td>0.81</td>
<td>0.79</td>
</tr>
<tr>
<td>Epsom Road / Union Road</td>
<td>0.77</td>
<td>0.80</td>
<td>0.87</td>
<td>Nil</td>
</tr>
<tr>
<td>Epsom Road / Showgrounds</td>
<td>0.77</td>
<td>0.81</td>
<td>0.81</td>
<td>Nil</td>
</tr>
<tr>
<td>Epsom Road Roundabout</td>
<td>0.72</td>
<td>0.76</td>
<td>0.84</td>
<td>0.81</td>
</tr>
<tr>
<td>Smithfield Rd / Racecourse Rd</td>
<td>0.77</td>
<td>0.80</td>
<td>0.80</td>
<td>Nil</td>
</tr>
<tr>
<td>Smithfield / Epsom Rd</td>
<td>0.90</td>
<td>0.93</td>
<td>0.94</td>
<td>Nil</td>
</tr>
<tr>
<td>Ballarat Road / Geelong Road</td>
<td>0.60</td>
<td>0.63</td>
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</tr>
<tr>
<td>Ballarat / Farnsworth Ave</td>
<td>1.00</td>
<td>1.00</td>
<td>1.03</td>
<td>0.93</td>
</tr>
<tr>
<td>Droop St / Farnsworth Ave</td>
<td>0.78</td>
<td>0.88</td>
<td>0.86</td>
<td>0.90</td>
</tr>
<tr>
<td>Langs Road / Leornard Cres</td>
<td>0.35</td>
<td>0.36</td>
<td>0.61</td>
<td>0.69</td>
</tr>
<tr>
<td>Fisher Pde / Leornard Cres</td>
<td>0.37</td>
<td>0.39</td>
<td>0.71</td>
<td>0.36</td>
</tr>
</tbody>
</table>
Table 5-4  Sidra Intersection Degrees of Saturation – Saturday Midday Peak

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Existing</th>
<th>Base</th>
<th>Post Development</th>
<th>With Mitigation Works</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epsom Road / Langs Road</td>
<td>0.78</td>
<td>0.81</td>
<td>0.88</td>
<td>0.80</td>
</tr>
<tr>
<td>Epsom Road / Union Road</td>
<td>0.57</td>
<td>0.59</td>
<td>0.66</td>
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</tr>
<tr>
<td>Epsom Road / Showgrounds</td>
<td>0.77</td>
<td>0.81</td>
<td>0.81</td>
<td>Nil</td>
</tr>
<tr>
<td>Epsom Road Roundabout</td>
<td>0.72</td>
<td>0.78</td>
<td>0.85</td>
<td>0.86</td>
</tr>
<tr>
<td>Smithfield Rd / Racecourse Rd</td>
<td>0.80</td>
<td>0.83</td>
<td>0.88</td>
<td>Nil</td>
</tr>
<tr>
<td>Smithfield / Epsom Rd</td>
<td>0.95</td>
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<td>0.96</td>
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<tr>
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<tr>
<td>Ballarat Road / Farnsworth Ave</td>
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<td>1.00</td>
<td>1.11</td>
<td>0.95</td>
</tr>
<tr>
<td>Droop St / Farnsworth Ave</td>
<td>0.82</td>
<td>0.88</td>
<td>0.95</td>
<td>0.98</td>
</tr>
<tr>
<td>Langs Road / Leonard Cres</td>
<td>0.33</td>
<td>0.35</td>
<td>0.71</td>
<td>0.77</td>
</tr>
<tr>
<td>Fisher Pde / Leonard Cres</td>
<td>0.35</td>
<td>0.37</td>
<td>0.68</td>
<td>0.34</td>
</tr>
</tbody>
</table>

Based on the comparison of the broad intersection performance parameter, it is considered that the package of works proposed provides for appropriate levels of mitigation of the development yields considered and in some cases results in improvement to the performance of individual intersections at key times.

The works specifically target areas where traffic increases (and impacts) will be greatest being at the junctions of the Langs Road / Fischer Parade corridor with the surrounding arterial network (serving the Flemington Green site, and at the Epsom Road roundabout (serving the Epsom Road site).

It is noted that the analysis undertaken based on the Flemington Life Concept Plans and indicative land use and access proposals shown in the plans.

The proposed amendments to the Melbourne and Moonee Valley Planning Schemes seek to incorporate Comprehensive Development Plans for the Flemington Green site and the 550 Epsom Road site in to the Planning Schemes.

Both Plans detail the principles and objectives for development on the two sites including building envelopes and principles related to access and movement. It is understood that the Flemington Life Development Plans exhibited with the Amendments shows indicative development which is seen as being consistent with the Comprehensive Development Plans, corresponding closely to the maximum levels of development achievable under the building envelopes prescribed.

It is possible that at planning permit application stage, variations in the development schedule and mix may occur such that traffic characteristics and impact may change.

Traffic Management Plans are required to be prepared and approved in association with a permit application for Buildings and Works and details of traffic mitigating works required will be identified and approved at this stage, generally in accordance with the mitigating works package detailed in the December 2015 TIAR.

Having reviewed the analysis undertaken, it is considered that the package of works identified in the TIAR provides sufficient increases to capacity within the network to reasonably accommodate variations in generated traffic beyond the indicative concept plans considered in the TIAR analysis, noting that the concept plans represent a high yield outcome.

It is also noted that the package of works identified contemplates development of both sites in accordance with concept plans. Should development of either site occur independently, then staging of works could be considered having regard to the location and development staging proposed.
6 Proposed Planning Controls and Triggers for Mitigating Works

6.1 Review of Proposed Planning Controls

From the perspective of my expertise, I have reviewed Draft Amendment GC 40 to the Melbourne and Moonee Valley Planning Schemes and Draft Amendment C290 to the Melbourne Planning Scheme which are being considered by the Advisory Committee and the proposed planning controls under the Comprehensive Development Zones which are related to:

- The extent of development which could be considered
- Additional traffic and transport assessments required
- Triggers for provision of mitigating works
- Car parking provision

The Amendments propose to incorporate the Flemington Green Comprehensive Development Plan into the Melbourne and Moonee Valley Planning Scheme and the 550 Epsom Road Comprehensive Development Plan into the Melbourne Planning Scheme.

The various schedules to the CDZ require an application for use of the land to be generally in accordance with the Comprehensive Development Plan. Before deciding on an application the Responsible Authority must consider as appropriate,

- The effect of the use on the amenity of the area and the means of addressing unreasonable impacts
- The adequacy of car parking provision associated with the use
- Safety and efficiency of vehicle access arrangements and pedestrian movements.

The controls propose that a permit will be required for buildings and works with an application including, as appropriate details of the proposal including

"A Traffic Management Plan which includes but is not limited to:
- Estimated traffic generation (based on the indicative built form and land use mix) and the impact on the existing road network;
- Car Parking assessment
- Preferred location for vehicle egress and ingress; and
- A strategy to encourage walking, cycling and public transport use to guide the preparation of a Green Travel Plan."

In addition Clause 6.0 of each of the Comprehensive Development Zones requires an Integrated Transport and Access Plan as follows:

"A permit cannot be granted for use, development and/or subdivision of the whole or any part of the Comprehensive Development Area until an Integrated Transport and Access Plan is prepared to the satisfaction of the responsible authority in consultation with the Cities of Moonee Valley and Melbourne, VicRoads and Public Transport Victoria.

The Integrated Transport and Access Plan must be general in accordance with the Flemington Racecourse Development Hill Precinct and Epsom Road Site Integrated Transport and Access Plan, November 2015 prepared by GTA Consultants.

Any permit granted must be generally in accordance with the integrated transport and Access Plan."
6.2 Trigger for Implementation of Mitigating Works

The proposed planning controls require an updated ITAP to be prepared and approved in conjunction with a permit application for use, development and / or subdivision. This will provide a mechanism at planning permit stage for the overall ITAP and TIAR to be refined to reflect the requirements of detailed development proposals consistent with the Comprehensive Development Zone, but not necessarily specifically in accordance with the indicative plans analysed in the November 2015 ITAP.

The mechanism requires the ITAP to be updated and approved as required prior to a subsequent planning permit application should changes to development levels be sought beyond levels considered in the endorsed plan.

In addition a permit for buildings and works, will require approval of a Traffic Management Plan which is likely to include identification of triggers for mitigating works generate by that proposal. In my view this is the appropriate mechanism, ensuring that mitigating works are identified and included as conditions on planning permits.

It is expected that, in effect the trigger for works at the Epsom Road roundabout will occur in conjunction with a permit to develop 550 Epsom Road, while works at Langs Road / Epsom Road, Farnsworth Road / Ballarat Road and Leonard Crescent intersections will be triggered by permits for Flemington Green, with timing dependent on staging of development of that site.

6.3 Car Parking Provision

The proposed planning controls, do not prescribe car parking provision rates for land uses permitted within the zones, requiring a car parking assessment to be undertaken as part of the Traffic Management Plan in association with applications for building sand works.

In effect, decisions on car parking provision and design will be undertaken having regard to the provisions of Clause 52.06 of the Victorian Planning Provisions.

It is considered that the rates specified under Clause 52.06-6 for land uses provide an appropriate starting point for assessing the maximum parking requirements for likely land uses. Decision guidelines within the Clause enable appropriate flexibility to allow appropriate reductions in parking provision to be considered.
7 Conclusions

Based on my review of the material filed with the Advisory Committee I have concluded as follows.

1. The analysis undertaken in the December 2015 TIAR is generally in accordance with the VicRoads TIAR Guidelines and industry best practice, considering the combined impacts of the two development sites.

2. Traffic modelling assumptions in relation to:
   a. design periods considered,
   b. traffic growth,
   c. traffic generation rates, and
   d. traffic distribution

are considered to be reasonable and appropriate for traffic modelling purposes.

3. The Sidra analysis undertaken provides a suitable platform for reviewing the comparative performance of each intersection considered as a result of development levels contemplated in the indicative concept plans, and the subsequent identification of appropriate mitigating works.

4. The Aimsun mesoscopic model as developed is "fit for purpose" to review the likely network effects of possible development levels contemplated by the amendments and provides a useful adjunct to the Sidra analysis.

5. Having reviewed the analysis undertaken, it is considered that the package of works identified in the TIAR provides sufficient increases to capacity within the network to reasonably accommodate variations in generated traffic beyond the indicative concept plans considered in the TIAR analysis, noting that the concept plans represent a high yield outcome.

6. The proposed planning controls require an updated ITAP to be prepared and approved in conjunction with a permit application for use, development and / or subdivision. This will provide a mechanism at planning permit stage for the overall ITAP and TIAR to be refined to reflect the requirements of detailed development proposals consistent with the Comprehensive Development Zone, but not necessarily specifically in accordance with the indicative plans analysed in the November 2015 ITAP.

7. A permit for buildings and works will require approval of a Traffic Management Plan which is likely to include identification of triggers for mitigating works generate by that proposal. This is considered an appropriate mechanism, ensuring that mitigating works are identified and included as conditions on planning permits.

8. The trigger for works at the Epsom Road roundabout could be expected to occur in conjunction with a permit to develop 550 Epsom Road, while works at Langs Road / Epsom Road, Farnsworth Road / Ballarat Road and Leonard Crescent intersections would be triggered by permits for Flemington Green, with timing dependent on staging of development of that site.

9. Parking rates specified under Clause 52.06-6 of the VPP for land uses provide an appropriate starting point for assessing the maximum parking requirements for likely land uses. Decision guidelines within the Clause enable flexibility to allow appropriate reductions in parking provision to be considered.
Stephen Hunt

Summary of Experience

Stephen Hunts impressive background in local government has assisted the practices traffic discipline to evolve into a thriving, successful department. With the company since 1988, he became a Director in 1989.

Stephen started his career in 1975 as a traffic engineer. He proceeded to develop his skills on major traffic management projects with several city councils including Doncaster/Templestowe, Caulfield and Prahran before joining Cardno.

"My role entails being responsible for traffic analysis, the preparation of traffic and transport studies and the presentation of expert evidence at VCAT; all areas in which we are today considered leaders in Victoria as well as leaders in meeting our clients demands."

Stephen has designed road networks for some of Melbourne's most high profile residential developments including Roxburgh Park, Kensington Banks, Caroline Springs, Cairnlea and Mernda. All of these developments have set new standards in residential traffic infrastructure.

An ability to create innovative solutions has made Stephen a popular choice with clients. He is particularly respected for his precise assessment of parking and the traffic impacts of developmental proposals. In addition, Stephen regularly acts as a witness at the Victorian Civil and Administrative Tribunal and Panel Hearings.

A respected and diplomatic consultant, Stephen describes working with young engineers as one of the most rewarding aspects of his job. He is a gifted trainer with an eye for identifying and recruiting young talent: "Helping our younger staff to achieve their finest work and watching them develop into gifted engineers is something that makes me immensely proud."

Significant Projects

> Caroline Springs
> Valley Lake, Niddrie
> Roxburgh Park
> Mernda
> Pakenham Valley
> Various multi-unit residential developments
> Vast array of projects requiring expert evidence at VCAT
> Cabrini Hospital
Independent Peer Review - Traffic, Access and Parking

APPENDIX

B

PREVIOUS CARDNO INVOLVEMENT IN THE PRECINCT
Flemington Racecourse Master Plan 2011
Cardno was retained by Victoria Racing Club in July 2011 to prepare an opportunities and constraints assessment of proposed Master Plan for potential redevelopment of land at Flemington Racecourse surplus to racing requirements.

Development on land parcels in the Hill precinct and the Epsom Road precinct were considered corresponding to the areas under consideration in the current Planning Scheme Amendments.

Two reports prepared by Ross Hill, formerly of Cardno and reviewed by myself were issued in final draft form in September 2011 as follows:


The Epsom Road proposal contemplated a high density development comprising approximately 300 apartments.

The Hill development proposal considered, consisted of 1200 apartment dwellings, 280 hotel rooms and a tabaret and function centre with access from Fisher Parade.

As noted above, I reviewed the reports and analysis prepared by Ross Hill in 2011 and endorsed the methodology and assumptions adopted in the analysis undertaken.

I have however had no involvement with the current amendments and as far as I am aware, Cardno has not provided any advice to the VRC in relation to potential development of the two sites since 2013.

Cardno continues to provide traffic management services for the VRC during the Spring Carnival each year.

Royal Agricultural Society Victoria - Master Plan

**RASV Master Plan**

Cardno was commissioned by RASV in February 2014 to assist in the preparation of a five year Master Plan for the Melbourne Showgrounds.

The Master Plan was prepared and, as I understand it, released in July 2014.

I was not involved in any aspect of the preparation of the Master Plan and did not contribute to input from Cardno.

Cardno has provided ongoing advice to RASV in relation to the Master Plan and specific proposals within the Showgrounds site.

**Flemington Life Proposal**

In July 2014, Cardno was requested by RASV to review the Greenland Development Proposal including the GTA ITAP dated June 2014.

A commentary on the report was prepared in a letter from Peter Malley to RASV dated 28th July 2014 which included requests for additional information and areas requiring clarification from GTA.

I had no involvement with the review of the GTA report at that time or the Cardno response prepared by Peter Malley.

A response to the Cardno letter was provide in a letter from GTA dated 14th August 2014.

It is understood that following consideration of the response and the additional information received, Cardno reviewed the GTA SIDRA files and provided comments on a "few inconsistencies" which should be reviewed. These were provided to GTA in October 2014 and I understand the comments and subsequent
revised analysis was incorporated into the updated Transport Impact Assessment Report dated 23rd December 2015.

In October 2014, Cardno met with GTA with respect to the strategic road network model being developed for the Flemington Life proposal. Cardno subsequently reviewed the formal Calibration and Validation report prepared by GTA which I understand was also reviewed by the Transport Working Group. Cardno reviewed the calibration and validation of the model and endorsed the suitability of the model for the purpose of assessing traffic impacts for the time periods considered in the assessment.

Prior to the commencement of the Advisory Committee hearing on October 2015, Cardno provided a summary of the adequacy of the traffic analysis undertaken by GTA to RASV and I understand that Peter Malley and Diana DeZilwa both now no longer employed by Cardno attended the Committee hearing on the 20th October 2015.

In summary, Cardno has provided advice to RASV on the implications of the Flemington Green proposal since July 2014 and has reviewed and commented on analysis undertaken by GTA up to the commencement of the Advisory Committee hearing in October 2014. These comments are at least in part referenced in the Transport Impact Assessment Report prepared by GTA dated 23 December 2015 prepared in response to the Committees request for additional information.

I have had no involvement with any of the work undertaken by Cardno for the RASV either with respect to the RASV Master Plan or the review of the GTA analysis undertaken in support of the Flemington Life development.