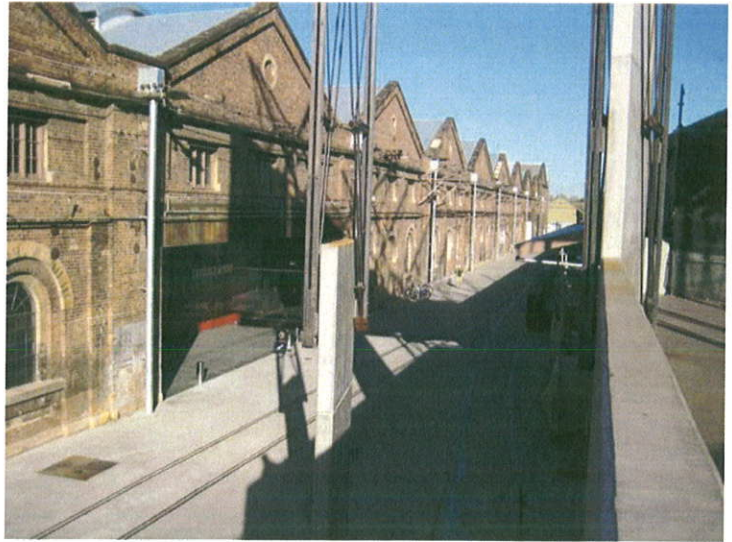


North Eveleigh Development



TRAFFIC AND TRANSPORT REVIEW

- Final
- November 2008



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1. Background

SKM was engaged by the Department of Planning to review the traffic and transport assessment of the North Eveleigh redevelopment. The traffic and transport assessment was carried out by Parsons Brinkerhoff (PB), who reported in April 2008. PB is a consultant to the Redfern - Waterloo Authority (RWA), the proponent of the development.

The basis of our review was the Traffic and Transport Impact Assessment report, prepared by PB, and included as Appendix H of the North Eveleigh Concept Plan, submitted by the Redfern - Waterloo Authority to the Department of Planning for consideration. It should be noted that a detailed review of the traffic modelling analysis completed by PB was not undertaken, as the models were not made available to evaluate.



2. Initial Review

Our initial review of the Traffic and Transport Impact Assessment report identified a number of issues of potential concern with the assessment and also areas where additional information was needed in order to allow a full assessment to be made. At this stage, no firm conclusion could be reached without receipt and consideration of responses from the RWA to the initial review.

The following 3 issues were highlighted to the RWA (via the Department of Planning) for particular attention, in addition to a detailed list of questions and concerns, outlined in **Table 2-1**:

- 1) There was a concern that the nominated trip generation rates potentially underestimate traffic generation from the proposed development. This concern was based on an understanding that trip generation rates published by the RTA are for vehicle trips, and include some allowance for such factors as vehicle occupancy and non-car mode use. Thus the approach taken by PB to further discount the traffic generation for mode share and vehicle occupancy required justification that was not provided in the Traffic and Transport Impact Assessment report;
- 2) SKM observations suggested that the nominated heavy vehicle access routes are not of suitable standard to safely cater for heavy vehicle traffic, in particular articulated trucks, and are likely to impact significantly on amenity in the predominantly residential Golden Grove and Wilson Streets. The Traffic and Transport Impact Assessment did not address this issue satisfactorily, and it was our concern that an increase in heavy vehicle activity would have a negative impact on safety and amenity in the area. Justification of the use of these streets for heavy vehicle access is required;
- 3) The development proposes rates of parking provision above the current DCP requirements, and creates an increase in on-street parking availability. There is an inconsistency between this approach and the stated objectives of reducing private car use. On one hand, the parking supply is “intended to manage growth in car travel”, while on the other hand the amount of parking to be provided is in excess of Council guidelines. The implications of the parking supply on achieving the mode share targets of the project were not discussed in the assessment.

■ **Table 2-1 Detailed Questions and Concerns**

Section / Paragraph	Topic	Specific Concern
2.5.2, page 17	Bus Services	This section highlights problems with current bus services – how would these problems be addressed to make PT use more attractive?
Table 2-3	RTA Volumes	2005 Data is available and should also be reviewed.
3.2.5	Justification for modelling AM peak only	<p>The highest uni-directional volume may be in the AM peak, but in terms of 2-way volumes the AM and PM peaks are similar.</p> <p>The analysis, and therefore any recommended improvements to intersections etc would be biased towards the AM peak, and would not consider the impact in the PM peak, when different traffic patterns are evident.</p> <p>How would key intersections operate in the PM peak period?</p>



Section / Paragraph	Topic	Specific Concern
3.5	Date of Site Visit and traffic counts	11 April 2006 was in the week before Easter, when traffic volumes may be lower than normal. How was the representativeness of these traffic counts assured? The PB site visit and traffic counts were undertaken in February, before the start of the University semester. How was the seasonal effect on traffic volumes taken into account?
3.6.2	Demand Profile	Might the "dip" in demand 7:45-8:00am reflect the impact of congested conditions on SCATS' ability to count all vehicles, rather than an actual drop in demand during that time? Do the volumes fed into the model reflect actual demand (including latent demand) during the study period?
3.7.5	Model Calibration	The ARRB in its report <i>"The use and application of microsimulation traffic models"</i> recommends that turn movements should be calibrated to minimum GEH measures. How do turn movements in the model compare against GEH criteria?
3.7.5	Model Validation	How was the model validated against independent data such as travel times or queue lengths?
4	Intersection Upgrades	On what basis were these intersections identified for upgrade, and how were the proposed upgrades chosen? Given the co-ordinated nature of signals under SCATS control, is extending cycle times a realistic proposal?
4.2.1	RTA reference document	What is the RTA <i>"Guidelines for Re-development Traffic Generation"</i> ? How does this document relate to the RTA <i>"Guide to Traffic Generating Developments"</i> ?
4.2.1	Conversion to AM Peak period	What was the basis for using 0.18 to convert from daily to AM peak 2 hours?
Table 4-3	Dwelling trip generation rate	What was the justification for adopting 6.5 trips / day for residential dwellings in the development?
Table 4-3	Trip generation rates	What is the source of the Commercial and Retail trip generation rates?
Table 4-3	Footnotes	The footnotes under "Estimated Quantity" were not provided.
Table 4-4	Mode splits	Should different mode split assumptions be made for the different land uses? Eg residential vs commercial
4.2.1	Discounts for multi-occupant car users	The RTA trip generation rates are for vehicle trips generated by each dwelling, not for trips made by individuals. Please justify the discounting of these rates for mode split and multi-occupant vehicle trips.
Table 4-5	Distribution	The in/out proportions in this table are inconsistent with each other and the text above it.
Table 4-6	Trip generation rates	What was the justification for rejecting the RTA guide rates for childcare centres? What is the source of the rates used in this table?



Section / Paragraph	Topic	Specific Concern
4.2.2	Discounts for multi-occupant car users	The RTA trip generation rates are for vehicle trips generated by each dwelling, not for trips made by individuals. Please justify the discounting of these rates for mode split and multi-occupant vehicle trips. What is the basis of assuming 52% of car users sharing their trip?
Table 4-9	Additional traffic in the model	Please explain why the difference in the number of trips in the future model and in the future base model (1881) does not match the number of trips to be generated by the North Eveleigh and Abercrombie Precinct developments (1601 + 152).
4.2	Traffic distribution	How was the distribution of development traffic determined?
4.3	Intersection Performance	How was the intersection Level of Service and Average Delay determined? What modelling tool was used?
Table 4-11	Intersection Level of Service	SIDRA modelling of key intersections using the volumes in Appendix B suggests that the quoted results significantly underestimate delays at these intersections. Please provide details of the intersection assessment.
4.3	Cycle Times	What is the basis for adopting these cycle times? Site observation suggests cycle times are longer than stated.
Table 4-11	Intersection improvements	What would the LoS be if no intersection improvements were made?
Table 4-11	Site Access intersections	What Level of Service would be achieved at the two site access intersections with Wilson Street?
Appendix B	Forecast Turning Movements	Appendix B appears to contain the base SCATS counts, rather than forecast turning movements. Please confirm.
Table 4-12	Contributions	Why was this analysis only done for the Abercrombie Street / Shepherd Street intersection? Please provide details of the mix at the other intersections nominated for upgrade.
5.2.3	On-street parking	What measures would be in place to ensure that the existing on-street parking spaces were not used by residents or employees of the development? Would this affect the assessment and subsequent conclusions?
5.3.2	Impact of trucks	Please explain why the increase in truck activity would not be a nuisance?
5.3.2	Truck traffic	What is the current level of truck activity on Shepherd, Golden Grove and Wilson Streets? Are they currently used by articulated vehicles?
5.3.5	Local Access	The text states that the site would have a "permeable road system that will allow vehicles to enter and exit by either access". This statement is not reflected in the plan in Appendix A7 of the North Eveleigh Concept Plan, showing "roads to be dedicated".
5.3.6; 5.4.3	Heavy vehicle routes	The nominated routes were not clear. Can these routes be shown on a map for clarity?
5.4.3	Heavy vehicle routes	Have these routes been assessed for physical suitability for articulated trucks eg swept path analysis of roundabouts, corners, overhead clearances etc?
6.2.2	Redfern Station	How reliant are the proposed mode split targets on Redfern Station being upgraded? When is any upgrade likely to begin?



Section / Paragraph	Topic	Specific Concern
6.2.3	Bus routes	The western access to the site is approximately 1100m from the entrance to Redfern Station. This is in excess of the 800m nominated as an "easy walking distance". Would this affect the conclusion of the assessment?
		Can the route between Redfern Station and the developments accommodate an additional 7,000 pedestrians / cyclists (if no bus route diversion is planned)? Is the 7000 trips per day or in the 2-hour AM peak? The text is not clear
6.3.2	Footpath width	Consigning pedestrians to walk on the road (Little Eveleigh Street), no matter the traffic volume, could result in significant safety issues. How would these be managed?
6.3.2	Pedestrian access at Abercrombie / Shepherd	The proposal nominates the removal of the pedestrian scramble phase at the intersection of Abercrombie and Shepherd Streets. How is this proposal consistent with providing "improved pedestrian facilities" at this key crossing point?
6.6.1, Appendix C	Heavy Vehicle manoeuvring	How will the safety implications of reversing articulated vehicles be managed?
Appendix C	Sketch Plans	Please provide more detail on the sketch plans (eg kerb lines) to verify that articulated vehicles will be able to manoeuvre in the available space.
Appendix C	Sketch Plan 6a	This appears to be a very complex manoeuvre, with 2 individual reversals required (see Section 6.7.3, paragraph 1). Could this be simplified, and if not, how could it be managed safely?
6.7.3	Turning Heads	Please provide swept path analysis for the turning heads?
Table 6-1	Parking Rates	What was the justification for increasing the number of parking spaces for residential land uses compared to DCP 11? Do the adopted rates allow for visitor parking?
Table 6-1	Blacksmith's Shop	How has the 51 approved spaces in the Blacksmith's Shop been taken into account?
6.8.4	Loading Bays	How do the loading bays discussed in this section relate to the loading docks in Section 6.6?
7.2	Parking	How would a "significant amount of spare parking capacity" support the mode split targets adopted for the development?

2.1. Response to Review

PB, on behalf of the RWA, provided a written response to the initial SKM review. A copy is provided in **Appendix A**.

2.2. Outcome of Review

The majority of issues raised in the initial review were addressed by the PB response. A meeting was arranged between PB and SKM, to discuss any outstanding issues. This meeting was held on 9



September 2008 at the Department of Planning. The main discussion centred on the key issues of trip generation and car parking.

PB were unable to provide sufficient detail regarding the basis for traffic generation calculations, and also undertook to provide details of the proposed allocation of car parking.

A second meeting was arranged between PB and SKM specifically to discuss the calculation of traffic generation. This meeting was held on 12 September 2008, at the PB offices. At this meeting, PB supplied SKM with a printout of the traffic generation spreadsheet, which along with the discussion at the meeting, provided SKM with an understanding of the process followed by PB to estimate traffic generation from the proposed development.



3. Preferred Project Report

The Preferred Project Report (PPR) was submitted to the Department of Planning by RWA subsequent to the meetings discussed in **Section 2.2**, but prior to the finalisation of this review. The PPR documented changes made to the proposal in light of the consultation undertaken with the community and other stakeholders, and provided a response to each issue raised in that consultation process. A key change in the PPR compared to the previous proposal included a cap on off-street parking provision on the site, at 1,800 spaces. RWA also committed to the preparation of a Transport Management and Accessibility Plan (TMAP) at the Project Application Stage, addressing the following issues:

- Access and Road Works;
- Road and Public Domain Dedications;
- Traffic Management;
- Car Parking;
- Public Transport;
- Pedestrians and Cyclists; and
- Staging.

In reviewing the submissions made by various stakeholder agencies, there were shared concerns about a number of issues, including traffic generation rates, mode share and pedestrian access. The responses made in the PPR to the issues raised by stakeholder agencies were generally satisfactory, however some key issues remain a concern.



4. Conclusion of Review

This section discusses the outstanding traffic and transport issues with the proposal put forward by RWA and the accompanying traffic impact assessment, taking into account the Preferred Project Report and responses to Agency submissions. We do not believe that this site is unsuitable for development as proposed by RWA. However we consider that the preparation of a TMAP for the site is an appropriate way forward to address the following issues with the traffic and transport impact assessment:

4.1. Traffic Generation

Some of the traffic generation assumptions made by PB in their assessment are considered inappropriate for the subject development, and potentially could underestimate the traffic impacts that would be caused by the proposal. This concern relates both to the method of calculating traffic generation and the assumptions made regarding mode share.

4.1.1. Calculations

PB used rates published in the RTA *Guide to Traffic Generating Developments* as the basis for their assessment. However, an adjustment was made to the basic rates nominated by the RTA to allow for later factoring for the mode split and employee density targets set for the development. The trip rates nominated in Table 4-3 of the PB Traffic and Transport Impact Assessment Report are effectively person trips, rather than vehicle trips.

In providing average traffic generation rates for office / commercial land uses, the RTA *Guide to Traffic Generating Developments* specifies certain mode split, car driver and employee density variables that apply to those average rates. PB modified these mode split, car driver and employee density variables based on the specific North Eveleigh development, and calculated traffic generation rates that are different to those specified by the RTA. Subject to further concerns detailed below, about the actual factors used, this approach is considered to be acceptable for the commercial / office component of the development.

However, PB used a similar approach to vary the rates nominated by the RTA for residential land uses. It is our view that there is insufficient data provided by the RTA to justify this. Indeed, PB assumed the same mode split and car driver proportions nominated for the office / commercial generation rates. These factors are articulated in a completely different section of the RTA *Guide to Traffic Generating Developments*, based on separate surveys. For this reason we do not consider their application for residential traffic generation rates to be appropriate without further justification of measures to achieve the assumed mode share targets.



Comparison of the traffic generation rates specified in Section 3.3 of the *RTA Guide to Traffic Generating Developments* indicates that the rates for higher-density units and flats already allows for lower car use, and fewer trips overall, than the standard “dwelling house” rates. Whilst the actual mode splits applicable to the higher-density unit rates is unknown, it cannot be assumed from the data provided in the *RTA Guide to Traffic Generating Developments* that the office / commercial mode splits would also apply to this situation.

PB based their assessment on a rate of 6.5 trips per day per dwelling, and then applied a 40% mode share to car and a 25% discount for multi-occupant vehicles to give an effective rate of 1.95 vehicle trips per dwelling. This is less than the RTA rates for high density residential units in regional CBDs (see Section 3.3.3 of the *RTA Guide to Traffic Generating Developments*) with implied low car use. The larger trip generation potential of 3-bedroom units in the development does not appear to have been considered. The *RTA Guide to Traffic Generating Developments* suggests that such dwellings may generate up to 1.5 more trips per day than smaller units. There are 185 3-bedroom units proposed as part of this development.

4.1.2. Mode Share Assumptions

A key strategy of the traffic assessment is the achievement of a 40% maximum mode share for cars. This rate is currently achieved in centres such as Chatswood, North Sydney and Bondi Junction, but its application to North Eveleigh in its current form is questioned.

Responses to Agency submissions on this topic, supplied in the PPR, highlight the reliance of the success of the project on achieving the proposed mode share targets. The proponent assumes this mode shift would occur without significant investment in existing public transport service patterns, infrastructure or changes to travel behaviour. Whilst the relatively close proximity of Redfern and Macdonaldtown railway stations is acknowledged, along with the King Street / City Road and Botany Road / Gibbons Street bus corridors, without other intervention they alone are not sufficient to support the mode share targets.

Improvements to bus services on King Street / City Road and Botany Road / Gibbons Street require intervention by the City of Sydney and RTA respectively, and there is no discussion of when nor how these interventions would occur. This should be discussed in the TMAP. The reduction of parking on King Street in particular is likely to meet some resistance, and its effectiveness for improving bus services on City Road is also questionable. Aside from a restrictive parking supply, the Proposal has not discussed or evaluated measures to support the assumed mode share targets. It would be appropriate to investigate infrastructure-based approaches or behaviour-change programs to assist in meeting the mode share targets. Options may include employing a Travel Plan Co-ordinator for the site, improving the quality and capacity of pedestrian and cycle access routes to Redfern Station, or supporting a car-share scheme for the use of residents and commercial tenants.



4.1.3. SKM Approach

Given the characteristics of the North Eveleigh site and proposed development, without any additional measures to support reduced private car mode share, SKM calculates the following traffic generation:

4.1.3.1. Traffic Generation Rates

Typical traffic generation rates are provided by the RTA *Guide to Traffic Generating Developments*. The RTA rates applicable to this development are shown in **Table 4-1**.

■ **Table 4-1 RTA Traffic Generation Rates**

Land Use Type	Unit	Trips/day	Trips/peak hour
Residential			
Medium Density Residential Flat Building	Dwelling	4-5	0.4-0.5
Up to 2 bedrooms			
3 or more bedrooms	Dwelling	5.0-6.5	0.5-0.65
Commercial	100m ² GFA	10	2
Retail			
Average Rates			
0-10,000m ²	100m ² GLFA	121	12.5 ¹

It is not considered that the residential component of this development would have the traffic generating characteristics of “High Density Residential Flat Buildings in CBD or metropolitan sub-regional centres” as outlined in Section 3.3.3 of the RTA *Guide to Traffic Generating Developments*. As per Section 3.3.1 of the *Guide to Traffic Generating Developments*, “traffic generation in inner metropolitan areas where public transport is more accessible could be lower. However in inner metropolitan areas that are more affluent, higher car ownership rates often counter-balance better public transport accessibility”. Without adequate data, a reduction from the published RTA rates cannot be justified.

There may be some justification in reducing the commercial traffic generation rates given the employee density and stated mode split targets identified in the Concept Plan. The RTA rates for commercial developments are based on an average employee density of 4.75 employees per 100m², 62% mode split to cars, and a mean vehicle occupancy of 1.19. The 10 trips/day from **Table 4-1**

¹ AM peak hour generation is likely to be considerably less than the PM peak hour. Rate given is for PM peak hour.



implies a vehicle trip rate per car-driving employee of 4.04. On the assumption that this rate will remain constant, the impact of other factors, such as mode split, vehicle occupancy and employee density, on trip generation can be estimated.

There will be 4 employees per 100m² at the North Eveleigh development. A target of 40% mode split to cars has been set, with vehicle occupancy of 1.33. With 4.04 trips per car-driving employee, the trip generation per 100m² of GFA can be calculated as 4.85 trips/day. However, this is heavily reliant on the achievement of the 40% mode split to cars. Adjusting only for employee density and vehicle occupancy gives a rate of 7.53 trips/day. The peak hour trips can be adjusted similarly to give 1.51 trips per 100m² GFA.

4.1.3.2. Traffic Generation Calculations

Applying these rates to the proposed development gives the traffic generation outlined in **Table 4-2**.

■ **Table 4-2 North Eveleigh Traffic Generation (SKM Estimate without additional measures to support mode share targets)**

Land Use	Quantity	Daily Trip Generation	Daily Trips (2-way)	Peak Hour Trip Generation	Peak Hour Trips (2-way)
Residential					
Studio	111	4 / unit	444	0.4 / unit	44
1-bed	391	4 / unit	1,564	0.4 / unit	156
2-bed	571	4 / unit	2,284	0.4 / unit	228
3-bed	185	5 / unit	925	0.5 / unit	93
Commercial	64,400m ² GFA	7.53 / 100m ²	4,852	1.51 / 100m ²	970
Retail	4,000m ² GLFA	121 / 100m ²	4,840	12.5 (PM) / 100m ²	500
				3.13 ² (AM) / 100m ²	125
Total			14,909		1,617 (AM) 1,992 (PM)

² For AM Peak assume 0.25 of PM Peak.



4.1.3.3. Comparison with PB Approach

SKM estimated the daily volume of traffic generated by the development at 14,909 vehicles. PB estimated a daily volume of approximately 8,900 (after the application of discounts for mode split and vehicle occupancy), approximately 40% less than the SKM approach. Even if the 40% mode share to car was achieved for the commercial land uses, the PB approach results in some 4,200 less vehicle trips per day, due to the lower rates associated with the residential component.

PB assumed a 2-hour peak period, and so to draw comparisons, the SKM figures must be factored from a 1-hour peak to 2 hours. Assuming a factor of 1.8, SKM estimated 2,911 vehicle trips in the AM peak 2 hours, and 3,586 in the PM peak 2 hours. Compared to the PB approach this results in approximately 45% less AM peak period trips than the SKM approach.

4.1.4. Conclusion

Further justification of the traffic generation rates used by PB in this assessment is required and should be addressed in the TMAP, to be prepared by the proponent before development begins. The TMAP should contain:

- Detailed documentation of the traffic generation rates used, including their source, any modifications made, and the basis for those modifications;
- Measures that will be implemented to assist in the achieving of the mode share targets set for the development (and influencing the trip generation rates); and
- A sensitivity assessment of the development implications should the mode share targets not be met.

4.2. Pedestrian Network Capacity

The *Traffic and Transport Impact Assessment* forecasts significant increases in the number of pedestrians using the streets of North Eveleigh, in particular Wilson Street and the route to Redfern Station via Little Eveleigh Street. Some 7,000 people are forecast to walk to or from the development site in the AM peak 2-hour period each morning. It is unlikely that the current pedestrian facilities would be sufficient to cater for the expected levels of demand. Specifically, Little Eveleigh Street provides a very poor pedestrian environment, despite being the most direct route between the site and Redfern Station. The TMAP should identify upgrades to the capacity and quality of the pedestrian network. These may include upgrades to existing routes or provision of alternative routes such as the pedestrian bridge at the southern end of Redfern station.



4.3. Intersection Operation Assessment

There is some discrepancy between the Level of Service determined by the Paramics microsimulation model used by PB in the *Traffic and Transport Impact Assessment*, and the Level of Service indicated by the SKM SIDRA intersection modelling software. Where the Paramics model returns Level of Service B for the intersection of Cleveland Street and City Road, SIDRA indicates significant delays and Level of Service F. Similarly, the Paramics model indicates Level of Service C for the intersection of Cleveland Street and Abercrombie Street, where SIDRA suggests Level of Service F. This has potential implications for any intersection modifications that may be implemented to manage impacts of the development. Typically both SIDRA and Paramics are used in an interrelated manner to identify required improvements at intersections.

The intersection upgrades proposed in the *Traffic and Transport Impact Assessment* involve increasing cycle times and the lengths of some turn bays. No assessment is made of the appropriateness of these approaches, given constraints such as surrounding land uses and other factors. Furthermore, as the intersections are all part of the SCATS signal co-ordination system, phase times are generally set with regard to network performance and are not set for individual intersections. Verification that the proposed cycle times would be appropriate for SCATS network operation is required. The intersection modelling should be revisited as part of the TMAP process.

However, subject to the further analysis in the TMAP, the proposed upgrades are considered appropriate responses to the conditions as modelled.

4.4. Recommendation

The commitment of RWA to prepare a Transport Management and Accessibility Plan (TMAP) for the development is supported. The following should be considered for inclusion in the Condition of Approval relating to the preparation of the TMAP:

- The TMAP should identify measures in addition to those already proposed in the PPR to support the achievement of a maximum of 40% mode share to car. The measures proposed should be to the satisfaction of the Ministry of Transport, and may include enhancements to public transport and pedestrian infrastructure, policy initiatives or behaviour change programs; and
- The TMAP should include detailed modelling of critical local and regional intersections, calibrated and reviewed to the satisfaction of the RTA and Council. Trip generation and mode split assumptions and modelling methodology would also need to be agreed to the satisfaction of the RTA, Council and the Ministry of Transport. Both AM and PM peaks should be modelled to determine the impact of any proposed works on intersection operation.



Appendix A PB Response to SKM Initial Review