Memorandum

Date	18 May 2012
File No.	DA 531/2011/1
To	Nick Tomkins
CC	
From	Cathy Edwards-Davis
Subject	KIAORA LANDS REDEVELOPMENT, DOUBLE BAY – TRAFFIC & PARKING

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I refer to the following documents:

- Traffic Report prepared by Halcrow dated 19 October 2011
- Letter to RMS prepared by Halcrow dated 23 December 2011
- Letter to the Caverstock Group by Halcrow dated 10 February 2012
- Letter from RMS dated 15 February 2012
- Letter to RMS prepared by Halcrow dated 4 May 2012
- Letter to RMS prepared by Halcrow dated 11 May 2012
- Letter from RMS dated 16 May 2012

Existing Development

The existing development comprises the following:

- The existing Woolworths supermarket on New South Head Road
- The existing Kiaora Lane and Anderson Street public car parks
- A former telephone exchange at the corner of Kiaora Lane and Patterson Street
- Seven residential properties along Kiaora Road, south of Kiaora Lane
- Four residential properties at or near the intersection of Patterson Street and Anderson Street

Previous Development Approval

The previously approved development comprised the following:

- A new Woolworths supermarket with 4,300 m² GFA
- A specialty retail area with approximately 1,400 m² GFA
- A commercial area with approximately 3,870 m² GFA
- A library with approximately 2,000 m² GFA
- 134 residential apartments (31 x one-bedroom, 36 x two-bedroom, 59 x three-bedroom, 7 x four-bedroom)

- Expansion of the Golden Sheaf Hotel including an additional 29 hotel rooms and a new function area
- 725 parking spaces over two basement levels, with separate private and public parking areas

Vehicular access was proposed from Kiaora Lane, Kiaora Road and Patterson Street.

The loading area was proposed to be located adjacent to Kiaora Road with the service access directly off Kiaora Road.

Proposed Development

The current proposed development comprises the following:

- A new Woolworths supermarket with approximately 5,027 m² GFA
- A Dan Murphy's liquor store with approximately 1,309 m² GFA
- A Thomas Dux grocer with approximately 1,249 m² GFA
- A specialty retail area with approximately 2,164 m² GFA
- A commercial/ office area with approximately 3,249 m² GFA
- A library with approximately 2,234 m² GFA
- 446 parking spaces over two levels

There is a proposed net increase of 7,159 m² GFA of retail space (compared with the existing) and there is a proposed net increase of 2,789 m² GFA of commercial space.

Vehicular access is proposed from Kiaora Road, Patterson Street and Anderson Street.

Parking

The parking is calculated as follows:

Development Component	DCP Parking Rate	Number Spaces Required by DCP	Number Spaces Proposed
Additional Retail (7,159 m²)	3.5 per 100 m²	250.6	230
Additional Commercial (2,789 m²)	2.0 per 100 m²	55.8	55
Library (2,234 m²)	2.0 per 100 m² **	44.7	16
Existing car parking		145	145
Total		496	446

** The DCP does not outline a specific parking rate for libraries. It would generally seem to fall into the category of a Community Facility which has a requirement for 2 spaces per 100 m².

The DCP requires a total of 496 parking spaces. The proposed development includes 446 parking spaces. There is a shortfall in the proposed parking. There are likely to be different peak periods for the various development components. Therefore, I generally concur with the applicant that the proposed parking is satisfactory.

It should be noted that the original plans had 459 parking spaces. The latest set of plans have 446 parking spaces. The revised plans did not specify how the parking would be allocated to the different development components. For the sake of the traffic generation analysis below, it has been assumed that the shortfall in parking spaces will be removed from the retail component of the development.

Traffic Generation

The applicant has utilised the following peak period turnover rates:

- Long stay – 0.6 vehicles per space per peak hour
- Short stay – 1.9 vehicles per space per peak hour

The rate for short stay vehicles was based on a survey undertaken at the site on the 10 December 2009. The applicant's survey figures show that the peak turnover rate was slightly higher at 2.0 vehicles per space per peak hour. For the sake of analysis, this more conservative figure will therefore be utilised. I note that in Bluestone Property v North Sydney Council [2006] NSWLEC 449 (20 July 2006) Senior Commissioner Roseth found that 2.0 vehicles per space per peak hour was an appropriate figure for the non-residential component [supermarket, fruit market and specialty stores] of the development.

The RMS' Guide to Traffic Generating Developments outlines a traffic generation rate of 0.8 vehicles per space per peak hour. The applicant has stated that this figure is no longer appropriate as it is based on surveys conducted in the late 1970s. Since then commuters' travel behaviours have altered due to the change in work patterns eg flexible hours and working from home leading to less traffic generated during the peak hour, but with a slightly longer peak period resulting in a phenomenon known as peak spreading. The applicant goes on to state that in more recent work conducted in 2010 by RMS, it was found that office blocks have an average peak trip generation rate of 1.15 trips per 100m² in the evening peak. This new survey data is consistent with the peak spreading behaviour indicated by the applicant. Again, for the sake of conservative analysis, the figure of 0.8 will be utilised.

The long stay vehicles have a lower turnover and therefore, the higher the percentage of long stay vehicles, the lower the traffic generation associated with the site. I note that the DCP outlines that for retail parking, 60% is to be allocated to short stay and 40% is to be allocated to long stay. For commercial parking, 15% is to be allocated to short stay and 85% to long stay. The applicant has not outlined how it is intended that this parking will be managed to ensure that the ratio of short stay and long stay parking occurs in reality.

Without management of the length of stay, it would seem that parking associated with the proposed supermarket, Thomas Dux and liquor store will be short stay. In general parking associated with the specialty retail, commercial/ office area and library will be long stay. Using these assumptions, the following net traffic generation rates are calculated:

	m²	Additional m²	Parking type	Additional Parking	Additional Parking as a % of floor area	Peak Traffic Generation Short = 1.9 Long = 0.6	Peak Traffic Generation Short = 2.0 Long = 0.8
Woolworths supermarket	5,027	7,159	Short	230	119	225.3	237.2
Dan Murphy's liquor store	1,309		Short		31	58.7	61.8
Thomas Dux grocer	1,249		Short		29	56.0	58.9
Specialty retail area	2,164		Long		51	30.6	40.8
Commercial/ office area	3,249	2,789	Long	55	55	33.0	44.0
Library	2,234	2,234	Long	16	16	9.6	12.8
Total	15,232	12,182		301	301	**413.2**	**455.5**

The table demonstrates that without management of the length of stay for parking, the site is likely to generate an additional 414 to 456 vehicles per peak hour.

The applicant has calculated that the proposed development will generate an additional 412 vehicles per peak hour. The previously approved development was calculated to generate an additional 413 vehicles per peak hour.

There is a difference in net traffic generation of some 44 vehicles in the peak hour between the applicant's figures and the more conservative figures above. This represents an additional 11% of net traffic generation.

I generally concur with the applicant's assignment of traffic for future mid-block two-way peak hour flows, as shown in Table 5.1 of their report dated 19 October 2011.

Traffic Generation Impact

The impact of the additional 412 to 456 vehicles is determined in two ways:

- The impact on the surrounding intersections and their capacity to physically cater for the additional vehicle volumes
- The impact on amenity for surrounding residents

Intersection Analysis

For traffic signals, the average delay per vehicle in seconds is calculated as Delay/(All Vehicles), which is equivalent to the Level of Service as follows:

Average Delay (seconds)	LOS	Description
0-14	A	Good
15-28	B	Good with minimal delays and spare capacity
29-42	C	Satisfactory with spare capacity
43-56	D	Satisfactory but operating near capacity
57-70	E	At capacity and incidents will cause excessive delays
> 70	F	Unsatisfactory and requires additional capacity

Modelling by the applicant indicates the following delays and level of service at the key New South Head Road intersections:

Intersection	LinSig Modelling				SIDRA Modelling	
	Morning Peak		Afternoon Peak		Afternoon Peak	
	Average Delay (s)	Level of Service	Average Delay (s)	Level of Service	Average Delay (s)	Level of Service
Existing Conditions						
New South Head Road/ Kiaora Road	49	D	50	D	32	C
New South Head Road/ Knox Street	8	A	14	A	5	A
New South Head Road/ Manning Road	30	C	24	B	7	A
Future Conditions						
New South Head Road/ Kiaora Road	52	D	93	F	33	C

Intersection	LinSig Modelling				SIDRA Modelling	
	Morning Peak		Afternoon Peak		Afternoon Peak	
	Average Delay (s)	Level of Service	Average Delay (s)	Level of Service	Average Delay (s)	Level of Service
New South Head Road/ Kiaora Road (additional fourth phase/ additional alternating fourth phase)	64 / 56	E / D	53	D	38	C
New South Head Road/ Knox Street	8	A	15	B	6	A
New South Head Road/ Manning Road (existing geometry)	31	C	28	B	9	A
New South Head Road/ Manning Road (revised geometry)	-	-	-	-	12	A

New South Head Road/ Kiaora Road/ Cross Street/ Bellevue Road

The applicant has calculated that the intersection of New South Head Road/ Kiaora Road/ Cross Street/ Bellevue Road currently operates with an average delay of 32 to 50 seconds, which is a level of service C or D. The proposed development will increase the average delay at the intersection to 33 to 93 seconds, which is a level of service between C to F. The development at 33 Cross Street, which was recently approved, is likely to increase average delay by an additional six seconds. The Linsig model results indicate that the intersection would operate unsatisfactorily in the evening peak. The applicant has concluded that the Level of Service F which is calculated by the Linsig model is due to errors in the model's calculations. In comparison, SIDRA indicates that this intersection would operate with a level of service D in the future evening peak period under the three phase arrangement.

In addition to the congestion issues described above, the applicant has modelled queue lengths in association with the existing and future traffic scenarios. In general, queue lengths will be in the same order as those found under existing conditions. The exception is on the western approach at the Kiaora Road intersection in the evening peak. The existing queue length for the right turn lane at this location is about 7.9 passenger car units. The two different models provide different future queue length results, with queues of between 22.6 to 43.2 passenger car units or 165 to 315 metres. This means that the right turn lane queue will spill over into the adjacent through lane during the peak period, with queues extending beyond Knox Street.

To ameliorate the concerns regarding intersection delays and queues, the applicant has suggested the introduction of a fourth phase at these traffic signals, allowing an exclusive eastbound right turn. This would improve the average delay at the intersection to 38 to 64 seconds, which is a level of service of between C to E. This would require a reallocation of green times at this intersection. The applicant has suggested that the fourth phase could operate only every other traffic signal cycle in the critical morning peak period when westbound flows are heaviest on New South Head Road. This would further improve the average delay at the intersection to 38 to 56 seconds, which is a level of service of C or D.

The right turn bay into Kiaora Road also provides right turn access to Bellevue Road. Increased demand for the right turn into Kiaora Road may result in increased congestion and delays for right turning traffic into Bellevue Road.

It is noted that the level of service is based on average delays. RMS, who controls the phasing of the traffic signals, has an interest in maintaining through traffic movements on New South Head Road. It is therefore expected that vehicles exiting Cross Street, Bellevue Road and Kiaora Road will continue to experience delays significantly longer than the average delays above. It is noted that it is already difficult to make a right turn from Cross Street and Bellevue Road into New South Head Road, due to the lack of green phase time for these roads.

As discussed below, the majority of heavy vehicles accessing the proposed development will need to utilise the right turn from New South Head Road into Kiaora Road.

At the moment, northbound vehicles on Kiaora Road on the approach to the traffic signals have two marked lanes. One is a marked dedicated right lane. The other is unmarked, so effectively a dedicated left turn lane. In practice, drivers sometimes create three lanes at this intersection. One becomes a left lane and two right turn lanes are created. The applicant is suggesting that this informal arrangement be formalised and three northbound lanes be marked on Kiaora Road. This is supported.

New South Head Road/ Manning Road

The applicant has calculated that the intersection of New South Head Road/ Manning Road currently operates with an average delay of 7 to 30 seconds with a level of service between A to C. The proposed development will increase the average delay to 9 to 31 seconds with a level of service between A to C.

The right turn bay for eastbound vehicles on New South Head Road into Manning Road is approximately 25 metres long, providing for a maximum of three to four vehicles. This currently results in right turning vehicles being queued into the through travel lane. There are serious concerns that the additional traffic associated with the proposed development will increase the number and regularity of vehicles being queued into the through travel lane. This will particularly impact on the capacity of the traffic network in the PM Peak. Queued vehicles may also create safety issues, with the increased risk of rear-end accidents as vehicles travel eastbound downhill along New South Head Road.

The eastbound 327 bus route turns right into Manning Road and there are a number of bus routes which travel on New South Head Road. There are concerns that further traffic congestion and delays on this section of New South Head Road will impact on the efficient operation of public transport.

To ameliorate the concerns associated with this eastbound right turn, the applicant has prepared a concept plan to extend the right turn bay to be approximately 100 metres long, providing queue length for 14 to 16 vehicles. This would require rearrangement of the existing lanes and lane markings and the removal of approximately ten parking spaces on the southern side of New South Head Road.

As above, RMS has interest in maintaining through movements on New South Head Road. Therefore it is expected that vehicles exiting Manning Road will continue to experience average delays significantly longer than the average delay of 9 to 31 seconds.

The applicant concludes in relation to traffic generation:

> In conclusion, we note that although peak traffic conditions through Double Bay are heavy in peak periods, it would be possible to satisfactorily accommodate the additional traffic that would be generated. This is particularly the case having regard to the importance of the proposal to the revitalisation of Double Bay as one of Sydney's foremost high end shopping precincts.

RMS Comments

RMS have reviewed and provided comments on the applicant's traffic modelling for New South Head Road. The applicant met with RMS and Council staff on three occasions to discuss and refine the accuracy of the modelling.

RMS have provided in principle support to the installation of a fourth phase at the signalised intersection of New South Head Road/ Kiaora Road/ Belleuve Road/ Cross Street. This is subject to a trial period of the traffic signals remaining in their existing configuration post development. They have recommended that the developer be required to prepare an updated traffic signal plan for the intersection which incorporates a fourth phase. The trial period will last for 12 months following completion of the full development. This will allow RMS to evaluate the intersection and corridor performance without the fourth phase and to determine whether it is needed.

Similarly, RMS have provided in principle support to the extension of the right turn storage bay for eastbound vehicles at the intersection of New South Head Road/ Manning Road subject to a trial period of the traffic signals remaining in their existing lane configuration post development. They have recommended that the developer be required to prepare an updated design for the intersection which incorporates the extended right turn storage bay. The trial period will last for 12 months following completion of the full development. This will allow RMS to evaluate the intersection and corridor performance without the right turn storage bay and to determine whether it is needed. RMS have also requested an independent safety audit be undertaken at this intersection.

With regard to the traffic impact on New South Head Road, a State road, Council must be largely guided by the RMS. Therefore, the above RMS comments and improvements are supported.

Residential Amenity

In the previously approved development, vehicular access was proposed from Kiaora Lane, Kiaora Road and Patterson Street.

The current proposal includes vehicular access from Kiaora Road, Patterson Street and Anderson Street. Vehicle volumes will therefore increase on the following residential streets: Anderson Street, Court Road Kiaora Road, Manning Road and Patterson Street.

Council staff raised concerns about the need for an additional car park entrance in Anderson Street. The applicant has provided the following comments:

> The future traffic volume using Anderson Street to access the car park would be relatively low – in the order of 150 vph during the busiest period. However, it would assist with the spreading of the traffic to the surrounding road network and provide flexibility for periods of extremely high peak traffic activity in the area. A particular benefit of having the Anderson Street access is that it would take pressure off the right turn exit into Kiaora Road at which exiting traffic would have to give way to traffic in both directions on Kiaora Road plus right turn entries from that road.
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> In relation to reducing impacts on Anderson Street and Court Road, the RMS (RTA) guidelines suggest a road environmental capacity of 300 vph for a local residential street. Traffic volumes exceeding this road environmental capacity would result in the local neighbourhood amenity adversely affected. In this regard, the future traffic flows on the nearby Court Street during the busiest period would be less than 300 vph. Therefore the proposed development is unlikely to create any adverse impacts to Anderson Street and Court Road.
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> In addition, it is proposed that the Anderson Street entry/ exit be closed after 9.00pm each day. Thus late night conditions on Anderson Street would be better than at present.

The impact on the surrounding residential streets will be as follows:

Street	Type of Road	Environmental Goal	Environmental Maximum	Existing Vehicle Volumes	Proposed Vehicle Volumes	Percentage Increase Vehicle Volumes
Anderson Street	Local	200	300	74	148	100
Court Road	Local	200	300	237	291	22.8
Kiaora Road	Collector*	300	500	603	900	49.3
Manning Road	Collector*	300	500	615	736	19.7
Patterson Street	Local	200	300	67	283	322

*Given the residential nature of Kiaora Road and Manning Road they should be classified as local roads. However, given their proximity to the Double Bay retail area and New South Head Road and their location within a busy inner-metropolitan area of Sydney, they already function as through collector roads.

The definition of the impact on residential/environmental amenity by varying levels of traffic flow is extremely complex. Perceptions of impact vary greatly from person to person. Traffic flows that one person may find perfectly acceptable may be considered excessive by another. Impact is affected by the nature of the street and the area in which it is located, its width, building setbacks, grades, etc. as well as by the speed of traffic and the mix of cars and heavy vehicles.

The functional classification of the street is important when determining the impact on residential/environmental amenity. The RMS' Guide to Traffic Generating Developments states that the environmental capacity performance for a collector road is a goal of 300 vehicles per hour and a maximum of 500 vehicles per hour. The RMS' Guide to Traffic Generating Developments states that the environmental capacity performance for a local road is a goal of 200 vehicles per hour and a maximum of 300 vehicles per hour.

It is clear from the table above that Kiaora Road and Manning Road already experience vehicle volumes that exceed the environmental capacity of the roadway. The additional traffic generated as a result of this development will therefore further erode the amenity of these streets for residents.

The Anderson Street car park entry and exit is likely to provide access and egress for about 150 peak hour vehicles. The impact of this entry and exit on the residents of Anderson Street and Court Road could be removed entirely by simply removing this access point. Consideration would then need to be given to queue lengths at the other car park entries (see section below).

Anderson Street, Court Road and Patterson Street will remain below the environmental maximum goal for local roads. However, the impact on residents is likely to be significant given it is such a large and sudden increase in vehicles due to one development, rather than a gradual increase caused by a number of smaller developments over a number of years. Therefore the impact of this increase in vehicles is more likely to be "felt" by the local residents.

This significant increase in traffic volumes and subsequent impact on resident amenity is considered unacceptable, unless steps are taken to ameliorate the impact. One of the means to reduce the impact of

increasing vehicle volumes is to slow their speed. This can be done through traffic calming. It is therefore suggested that the following traffic management measures be implemented:

- Installation of a roundabout at the intersection of Manning Road and Patterson Street
- Installation of an "intersection" treatment at the new car park entrance in Kiaora Road, incorporating a right turn lane for southbound vehicles on Kiaora Road and a marked pedestrian crossing and refuge across the driveway access

Manning Road/ Patterson Street

The proposed development includes an entrance to the car park from Patterson Street. The intersection of Manning Road/ Patterson Street will therefore experience a significant increase in vehicle volumes. The existing intersection has a total of 607 peak hour vehicles, with 63 entering and exiting Patterson Street. The proposed development will result in the intersection supporting 815 peak hour vehicles, with 283 entering and exiting Patterson Street. Of particular note, there will be 29 vehicles turning right from Manning Road to Patterson Street and there will be 103 vehicles turning right from Patterson Street to Manning Road.

The installation of a roundabout at this location will assist in facilitating vehicle movements in and out of Patterson Street. It will also slow vehicle speeds in Manning Road and Patterson Street. This should assist in ameliorating the increase in vehicle volumes in these streets.

Kiaora Road/ Car Park Entrance

A significant number of vehicles will be entering and exiting the car park at the Kiaora Road entrance. This will result in southbound vehicles queuing in Kiaora Road, whilst waiting to turn right into the car park. It is therefore considered appropriate to install a right turn lane for these vehicles. The right turn lane is to be designed for use by motorists accessing the car park as well as trucks entering the loading docks. This will allow through vehicles to continue southbound on Kiaora Road. This will likely require the removal of some on-street parking.

On the plans, it shows two exit lanes from the car park. The left lane is marked as left turn only. The right lane is marked as left or right turn. A design, with appropriate linemarking, will need to be developed to accommodate these two left turning lanes.

The combined driveway entrance to the car park and loading dock on Kiaora Road is approximately 22 to 26 metres wide as measured off the plans. This creates significant potential conflict for pedestrians. The Australian Road Rules gives pedestrians right of way at all driveways. However, to reinforce this right of way, it is recommended that the driveway access be marked as a pedestrian crossing, with suitable refuges between the entrance to the car park/ exit to the car park and the exit to the car park/ entrance to the loading dock. The refuges will allow pedestrians to pause and check for vehicles, before continuing to cross the driveway.

Queuing Analysis

The Australian Standard 2890.1 outlines that at an entry point, the queuing area to be provided between the vehicular control point and the property boundary shall be sufficient to allow a free influx of traffic which will not adversely affect traffic or pedestrian flows in the frontage road. The size of the queuing area may be determined from consideration of the following:

- The number of parking spaces in the car park

- Anticipated peak entry/ exit flow
- Rate of entry/exit at control points

Australian Standard 2890.1 does not specifically address the issue of queue length percentiles. However, it does state in relation to mechanical parking installations that when determining the amount of vehicle storage required, queue lengths shall be calculated by applying conventional queuing theory to estimated mean arrival rates during normal peak periods, and mean service rates under continuous demand, determined as closely as possible from observing the operation of similar facilities. The storage area shall be designed to accommodate the 98th percentile queue under such conditions. Vehicle storage shall be provided to ensure that queues of vehicles awaiting service by the installation do not extend beyond the property boundary of the parking facility under normally foreseeable conditions.

Therefore the 98th percentile figure will be utilised.

Halcrow have undertaken a queuing analysis of the three proposed entries and exits. They have calculated that the service rate for entries is 9 seconds. The properties for the various entrances are as follows:

	Patterson Street	Kiaora Road	Anderson Street
Number of boom gates	2	1	1
Queue length (number of vehicles)	2	6	1
Number of vehicles per peak hour	131	242	44

Utilising Halcrow's figures, reveals the following:

- There is a 0.45% probability that there will be 3 or more vehicles queued at Patterson Street
- There is a 2.97% probability that there will be 7 or more vehicles queued at Kiaora Road
- There is a 1.21% probability that there will be 2 or more vehicles at Anderson Street

Sensitivity Analysis

Based on the above figures, it is clear that the Kiaora Road entrance is already failing the 98th percentile queue length, albeit slightly. Given the significance of the proposed development and its likely impact on the surrounding local road network, a sensitivity analysis was undertaken, which reveals the following:

Patterson Street:

Probability (%) of 3 or more vehicles queued		
Service Rate (seconds)	131 vph	157 vph (20% more)
9	0.45	0.76
12	1.06	1.79
15	**2.08**	**3.50**

Kiaora Road:

Probability (%) of 7 or more vehicles queued		
Service Rate (seconds)	242 vph	290 vph (20% more)
9	**2.97**	**10.53**
12	**22.23**	**78.87**
15	**Failure**	**Failure**

Anderson Street:

Probability (%) of 2 or more vehicles queued		
Service Rate (seconds)	44 vph	53 vph (20% more)
9	1.21	1.76
12	**2.15**	**3.12**
15	**3.36**	**4.88**

The figures above demonstrate that if the service rate increases to 15 seconds, the Patterson Street entrance will experience some queuing beyond the 98th percentile. If the service rate increases to 12 seconds, the Anderson Street entrance will experience some queuing beyond the 98th percentile. However, it is felt that the access arrangements in Patterson Street and Anderson Street are generally appropriate to cater to the anticipated vehicle volumes.

The entrance that raises concerns is the Kiaora Road entrance. If the applicant's figures are correct, the queuing will only slightly exceed the 98th percentile. However, if the volume of vehicles is just 20% greater then there is a 10.5% probability that there will be vehicles queued in Kiaora Road. Given that the number of motorists who will choose to utilise the different car park entrances is unknown and is based on estimates, it is entirely possible that additional motorists will choose to utilise the Kiaora Road entrance.

Further, the service rate for vehicles entering the car park is highly reliant on human behaviour. It relies on motorists pulling in close to the ticket dispenser and efficiently collecting the ticket and moving on. If some of these motorists are slightly slower in collecting their ticket, then the service rate will increase. If the service rate increases to 12 seconds, then there is a 22.2 to 78.9% probability that there will be vehicles queued in Kiaora Road. If the service rate increases to 15 seconds, then the ticket machine simply cannot cater for the proposed volume of vehicles.

Queued vehicles on the footpath, waiting to enter the proposed car park, are undesirable because it creates a significant hazard for the numerous pedestrians who will be walking in this busy retail area. Further, if it becomes known that the Kiaora Road entrance experiences delays, this may result in motorists utilising other entrances which will have unknown traffic impacts on the surrounding streets.

Based on the above analysis, it is felt that the Kiaora Road entrance is inadequate to cater to the volume of vehicles which are anticipated to utilise this entrance. Modifications to this entrance should be made such that there are two boom gate entrances. It is proposed that there would still be one vehicular entrance to the car park off Kiaora Road; however it would split into two lanes within the site, with two boom gates. This will likely result in the loss of a small number of parking spaces.

Loading Dock & Heavy Vehicles

In the previously approved development, the loading area was proposed to be located adjacent to Kiaora Road with the service access directly off Kiaora Road.

The current proposal has two loading areas.

The main loading area will be located adjacent to Kiaora Road and will be accessed via Kiaora Road. This loading dock can accommodate one 19m articulated truck and two 12.5m heavy rigid trucks. This loading dock is proposed to service the Woolworths supermarket, the Thomas Dux and the retail tenancies in the arcade area adjacent to New South Head Road.

The applicant has advised that the main loading dock is expected to have up to eight 19m semi-trailers per day to the site. It is also anticipated that there will be approximately 35 deliveries per day by 12.5m rigid vehicles and vans.

A smaller loading dock is proposed to the east of the car park. Access is proposed from Kiaora Lane and egress is proposed to Patterson Street. This would have one loading bay for trucks up to an 8.8m medium rigid truck. This loading dock is expected to receive two to four deliveries per week day and one delivery on Saturdays.

The applicant has advised that all entry and exit movements to the loading areas will be by way of forward movements and all manoeuvring by service vehicles will take place entirely within the loading areas.

The applicant has stated that the heavy vehicles "are expected to access the site from either Manning road (then on to Kiaora Lane/ Patterson Street) or Kiaora Road via New South Head Road. Delivery vehicles are not expected to enter local residential streets to access the loading dock areas."

Access to the Smaller Loading Dock

Access to the smaller loading dock is proposed from Kiaora Lane and egress is proposed to Patterson Street. If a turntable were installed in the smaller loading dock, this would allow heavy vehicle access and egress from Patterson Street. This would then allow streetscape improvements at the western end of Kiaora Lane.

The applicant has stated with regards to the suggested turntable:

- Width constraints in the loading area preclude the use of a turntable large enough to accommodate the medium rigid trucks that will service this store.
- The land is low lying and has been determined by Council as flood prone
- A design which incorporates a turntable will be subject to mechanical and electrical failure during flood events where it cannot be guaranteed that the installed equipment would need to be replaced at significant costs and time delays to operations
- The time delays to become operational again following a flood event will be similar to that which has occurred in Queensland during the flood events of January and February 2011 where Woolworths operations were affected for periods well beyond the flood levels subsiding which would not be acceptable to Woolworths
- The use of a turntable has been evaluated by Woolworths as an unacceptable Occupational Health and Safety issue for this site operations
- A better streetscape design can be delivered to Kiaora Lane with the proposal

It is noted that the smaller loading dock is only for two to four deliveries per day to the proposed Dan Murphys store. The impact of a turntable breaking down at this location would therefore be less significant than the breakdown of a turntable servicing a Woolworths supermarket, which requires many more deliveries per day.

Bicycle and Motorbike Parking

The proposed development includes 19 motorbike parking spaces and 32 bicycle parking spaces. This complies with the DCP.

Shared Zone

The proposed Shared Zone in the eastern section of Kiaora Lane is supported in principle. The applicant is responsible for obtaining RMS approval and undertaking all works required to meet the RMS' conditions of approval for a Shared Zone.

It appears from the plans that it is proposed to have on-street Loading Zones within the Shared Zone. This is not supported. The parking of heavy vehicles should not be encouraged within a highly pedestrianised area, particularly given that heavy vehicles can introduce sight distance issues.

Community Comments

Council has received a number of submissions from residents with regards to traffic and parking issues associated with the proposed development. The main concerns and comments are provided in the following table:

Community Concern	**Council Comment**
• Volume of vehicles in Manning Road and Patterson Street	• Addressed above in section on Residential Amenity
• Difficult exiting Patterson Street into Manning Road. • Increase in accidents likely to occur. • Patterson Street should be made one-way street with entry only to the car park.	• There were no reported accidents at this location from 2006 to 2010. • A roundabout has been recommended for this intersection. Roundabouts reduce the number and severity of accidents. • The Patterson Street exit will reduce queuing at other car park exits and spread the vehicle impact around the local traffic network
• Provision should be made to better manage the speed of traffic on Manning Road	• A roundabout has been recommended. • This will help slow vehicle speeds.
• Vehicles currently use the driveways at 3-15A Manning Road to do u-turns	• A roundabout has been recommended • This will allow legal u-turns
• There will be noise intrusion associated with the intersection of Patterson Street and Manning Road	• A roundabout has been recommended • This will help slow vehicle speeds, which should reduce noise impacts
• There will be head light intrusion from vehicles exiting Patterson Street at night • Patterson Street should be made one-way street with entry only to the car park.	• The Patterson Street exit will reduce queuing at other car park exits and spread the vehicle impact around the local traffic network

Community Concern	Council Comment
• Residents rely on the on-street parking in Patterson Street	• On-street parking will still be available in Patterson Street, Manning Road and other surrounding residential streets
• Increase in noise, lights and safety hazard from increased traffic in Manning Road • Ensure that appropriate traffic management measures are put in place to mitigate the detrimental impacts I have outlined	• Addressed above in section on Residential Amenity • A roundabout has been recommended for the intersection of Manning Road and Patterson Street
• The traffic study has been based on one afternoon in December 2009. This is inadequate	• Traffic surveys are undertaken to establish the approximate quantum of underlying traffic. It is agreed that traffic will fluctuate and vary throughout the day and year.
• Loss of parking during construction	• The Cross Street car park will provide some parking relief • Some parking relief would occur if Woolworths were **not** trading during construction of the new Woolworths. This is addressed separately in comments on the construction management plan
• The intersection of Kiaora Road and New South Head Road during peak hours is already slow and challenging process to negotiate	• Addressed above in section on New South Head Road/ Kiaora Road/ Cross Street/ Bellevue Road
• Additional traffic, and associated noise on Court Road • Anderson Street should only be a car park exit • Anderson Street exit should be open 7am to 7pm	• Addressed above in section on Residential Amenity
• Court Road is currently utilised as a "rat run" by those trying to avoid New South Head Road	• Not related to the proposed development
• Manning Road is already busy and difficult to negotiate	• A roundabout has been recommended. • This will help slow vehicle speeds, allow for u-turns and the management of traffic
• An over 400% increase in traffic volumes in Patterson Street, impacting on amenity in terms of noise and air pollution	• Addressed above in section on Residential Amenity
• There will be trucks utilising Patterson Street	• The proposed development has up to four trucks utilising Patterson Street per day. This represents less than 1% of the vehicles per day in Patterson Street and is therefore considered acceptable in an inner-metropolitan area of Sydney
• The location of two access driveways in Patterson Street will create conflicts between vehicles and pedestrians	• It is unclear how this will create conflict, since the proposed driveway entrances are at the end of a new dead-end street. There does not appear to be anywhere that pedestrians could be going
• A doubling of vehicle volumes in Anderson Street, impacting on amenity in terms of noise and air pollution	• Addressed above in section on Residential Amenity

Community Concern	Council Comment
• The location of the access driveway in Anderson Street will create conflicts between vehicles and pedestrians	• It is unclear how this will create conflict, since the proposed driveway entrance is at the end of a new dead-end street. There does not appear to be anywhere that pedestrians could be going
• During the construction phase there will be a huge increase in noise and traffic. • A detailed and comprehensive construction management plan has not been provided	• This is addressed separately in comments on the construction management plan • It has been recommended that a detailed construction management plan be provided prior to the issue of a construction certificate
• Request a temporary car park be created during construction	• The Cross Street car park will provide some parking relief • Some parking relief would occur if Woolworths were **not** trading during construction of the new Woolworths. This is addressed separately in comments on the construction management plan • It is not known where a temporary car park could physically be located

NSW Police

The NSW Police have provided the following comments:

> Police are concerned that future traffic flows…show that the minimum desirable long term peak period will occur at the intersection of New South Head Road and Kiaora Road. Police would therefore not consider this as a satisfactory level of traffic flow should further development occur, ie the possibility of the development of the site for residential occupancy and extension of the Golden Sheaf Hotel.

This is addressed above in the section on the New South Head Road/ Kiaora Road/ Cross Street/ Bellevue Road intersection.

BIKEast

BIKEast have provided a detailed submission. In summary they have raised the following comments and concerns:

BIKEast Concern	Council Comment
• The proposal will not satisfy existing and emerging bicycling needs or desired mobility scooter use	

BIKEast Concern	Council Comment
• Lack of ground level highly secured bicycle parking and associated locker, shower and change room facilities for workers/ staff and longer-stay visitors (eg. Library visitors)	• There is bicycle parking provided for visitors • Due to the high pedestrian activity and passive surveillance, this bicycle parking could also be utilised by employees for long term (shift) use • The internal details of the proposed development have not been finalised. Locker, shower and change facilities should be provided within the staff facilities for the library and Woolworths
• Poor location of one of the three proposed short-term low security bike parking corral areas and concern about lighting and surveillance	• It is noted that the bicycle parking near Patterson Street is less desirable than the other parking. This area can serve as an overflow area if the other areas are full
• Lack of high standard bicycle routes in and around the Kiaora Lands site, along and across key streets to make these streets suitable and attractive for riding bikes or mobility scooters	• Kiaora Lane is proposed to be a Shared Zone, which may be utilised by bicycles • Council's Technical Services division is actively working on expanding the bicycle network • A dedicated bicycle crossing on New South Head Road will require liaison between Council's Technical Services division and RMS

Recommendation

Traffic generation associated with this development will have a significant impact on the surrounding community. This impact must be ameliorated and therefore this development can only be recommended for approval if the following measures are undertaken in conjunction with the development:

- Design for a fourth phase and associated infrastructure at the intersection of New South Head Road/ Kiaora Road/ Belleuve Road/ Cross Street in accordance with RMS requirements
- Design for an extended eastbound right turn storage bay at the intersection of New South Head Road/ Manning Road in accordance with RMS requirements
- Installation of a roundabout at the intersection of Manning Road and Patterson Street
- Installation of an "intersection" treatment on Kiaora Road, at the car park and loading dock entrances
- Modifications to the Kiaora Road entry such that there are two internal boom gates

Conditions of Approval

Should this development be recommended for approval, it is recommended that the following conditions be imposed:

1. That the developer engage a suitably qualified consultant to prepare an updated traffic signal design plan for the existing signalised intersection of New South Head Road/ Kiaora Road/ Belleuve Road/ Cross Street illustrating the proposed fourth phase and associated infrastructure. The design shall include potential signal hardware and civil works necessary to allow the installation of the fourth

phase. The revised signal design plan shall be submitted and approved by RMS prior to the issuing of the occupation certificate.

2. That the signalised intersection of New South Head Road/ Kiaora Road/ Belleuve Road/ Cross Street operate in its existing configuration for a trial period of 12 months following completion of the full development. Any costs associated with the evaluation and reporting, as required by RMS, shall be at the full cost of the developer. Following trial evaluation, RMS will assess and determine whether the fourth phase is to be installed. RMS reserves the right to direct installation of the fourth phase at any point during the trial, should the need arise on safety or network performance grounds. The implementation of the proposed fourth phase shall be at full cost to the developer. A bond will be required in advance to cover the estimated cost of works.

3. That subject to design approval for the fourth phase at New South Head Road/ Kiaora Road/ Belleuve Road/ Cross Street, the proponent shall be required to install preliminary works (eg cabling), prior to the issuing of the occupation certificate. RMS will seek to maximise installation of preliminary works, in an effort to minimise the outstanding works necessary, so as to allow the rapid implementation of a fourth phase, if required at short notice.

4. That a CCTV camera be permanently installed at the signalised intersection of New South Head Road/ Kiaora Road/ Belleuve Road/ Cross Street, in accordance with RMS requirements, to allow RMS to monitor and adjust the signal operation as required, as a safeguard to support the trial. The CCTV camera must be installed prior to the issuing of the occupation certificate.

5. That the developer prepare a civil works design to extend the eastbound right turn storage bay at the New South Head Road/ Manning Road intersection. The civil works design shall be submitted and approved by RMS prior to the issuing of the occupation certificate. An independent Road Safety Audit shall be carried out and submitted to RMS as part of the design documentation.

6. That the developer prepare a Traffic Management Plan (TMP) to investigate the potential loss of parking on the southern side of New South Head Road, west of the intersection in order to support the extension of the right turn storage bay. The TMP shall include appropriate community consultation and be submitted to RMS and Council for approval prior to the issuing of the occupation certificate.

7. That the signalised intersection of New South Head Road/ Manning Road operate in its existing configuration for a trial period of 12 months following completion of the full development. Any costs associated with the evaluation and reporting, as required by RMS, shall be at the full cost of the developer. Following trial evaluation, RMS will assess and determine whether the right turn storage bay is to be extended. RMS reserves the right to direct extension of the right turn storage bay at any point during the trial, should the need arise on safety or network performance grounds. The extension of the right turn bay shall be at full cost to the developer. A bond will be required in advance to cover the estimated cost of works.

8. That the developer enter into a 'Works Authorisation Deed' with RMS for the works at the intersection of New South Head Road/ Kiaora Road/ Belleuve Road/ Cross Street and New South Head Road/ Manning Road. The amount of security for the works shall be determined and captured in the WAD. The WAD shall identify the mechanisms to be set in place to capture actual evidence of incidents / high risk situations and impacts to traffic flow on New South Head Road, to assist with trial evaluation and determination.

9. That the developer prepare a civil works design to allow three northbound lanes on Kiaora Road, at New South Head Road. The civil works design shall be submitted and approved by RMS. Subject to RMS approval, the new intersection arrangements shall be installed prior to the issuing of the occupation certificate.

10. An Operational Transport Management Plan must be submitted to Council for approval by Council's Manager Engineering Services prior to the issue of the Occupation Certificate. The Plan is to address the following:
    - Describe the maximum number and types of trucks required to service the various components of the development
    - Describe the hours of operation of the loading docks and the proposed means to ensure no deliveries are received outside of the approved trading hours.
    - Describe the management strategy to ensure that at no time are heavy vehicles queued, waiting or parked in the driveway to the loading dock and/ or in surrounding streets
    - Describe the routes to be used by the heavy vehicles through the Woollahra Council area
    - Heavy vehicles associated with the site are not to utilise Manning Road (south of Patterson Street), Kiaora Road (south of Kiaora Lane), Epping Road, Court Road, Forest Road and Bellevue Road
    - Describe the means proposed to minimise the impact of heavy vehicles on the local community
    - Describe the means proposed to ensure pedestrian safety at the entry and exits from the loading docks
    - Describe the means to ensure all heavy vehicles, including delivery and garbage trucks, enter and exit the site in a forwards direction.
    - Confirm that the loading dock is to be available for moving/delivery vehicles for the commercial component of the development, as well as the retail components of the development
    - Compliance with the Operational Transport Management Plan must form part of any lease with the tenants of the development

11. The applicant is to pay all costs associated with the design and installation of a roundabout at the intersection of Manning Road and Patterson Street. The roundabout is to incorporate pedestrian access at the splitter islands on the three legs of the intersection. The design of the roundabout is to be undertaken in consultation with the community and submitted and approved by the Woollahra Local Traffic Committee and Council. The installation of the roundabout is to be completed prior to the issue of the occupation certificate.

12. The applicant is to pay all costs associated with the design and installation of an "intersection" treatment on Kiaora Road, at the proposed car park and loading dock entrances. The treatment is to include a right turn lane for southbound vehicles on Kiaora Road to allow them to turn into the car park and to allow heavy vehicles to turn into the loading dock. The treatment is to include a marked pedestrian crossing across the car park and loading zone driveway, with pedestrian refuges between the entrance to the car park/ exit to the car park and the exit to the car park/ entrance to the loading dock. Appropriate linemarking will need to be installed to accommodate the two left turning lanes from the Kiaora Road exit. The design of the intersection treatment is to be undertaken in consultation with the community and submitted and approved by the Woollahra Local Traffic Committee and Council. The installation of the intersection treatment is to be completed prior to the issue of the occupation certificate.

13. "Stop – Give Way to Pedestrians" signage is to be installed at all car park and loading dock exits.

14. "Form 1 Lane" (g9-15) signage is to be installed at the Patterson Street car park exit.

15. The Anderson Street entrance and exit to the car park is to be closed outside of the hours of 7am to 9pm Monday to Sunday.

16. The applicant is to install dynamic/ live smart signage which indicates when the car park is full. These dynamic/live smart signs are to be installed at the three proposed car park entrances and at the intersections of New South Head Road/ Kiaora Road and New South Head Road/ Manning Road.

17. The applicant is required to obtain RMS approval for the Traffic Management Plan for the proposed Shared Zone in Kiaora Lane. Once the RMS approval has been obtained, approval for the proposed Shared Zone in Kiaora Lane must be obtained from the Woollahra Local Traffic Committee and Council prior to the issue of the Occupation Certificate. Loading Zones will not be approved within any Shared Zone. The applicant is required to fund all design and installation costs for works required to meet the RMS' conditions of approval for a Shared Zone in Kiaora Lane prior to the issue of the Occupation Certificate.

18. All road works are subject to a further application and approval process under Section 138 of the Roads Act.

19. Modifications must be made to the Kiaora Road car park entrance such that there are two internal boom gates.

20. The location of the boom gates at the Patterson Street entrance must be located 12 metres within the boundary of the property, such that two queued vehicles can be contained wholly within the boundary of the property.

21. The location of the boom gates at the Anderson Street entrance must be located 6 metres within the boundary of the property, such that one queued vehicle can be contained wholly within the boundary of the property.

22. All new footpaths and kerb returns are to incorporate pram ramps which comply with Council's Specification for Roadworks, Drainage and Miscellaneous Works.

23. Lockers, showers and change facilities must be provided within the staff facilities for the library and Woolworths. Alternatively, lockers, showers and change facilities must be provided for staff elsewhere within the development.

24. A green transport access guide is to be developed to highlight to staff the available public transport, walking and cycling options for travelling to the site. The green transport access guide is to be suitable for publication on the internet and provided in brochure format for handing out to employees at the site. This is to be submitted to Council for approval by the Manager Engineering Services prior to the issue of the Occupation Certificate.

25. All aspects of the car park must comply with the Australian Standard AS2890.1.

26. All aspects of the loading dock must comply with the Australian Standard AS2890.2.

27. The applicant is to upgrade the street lighting in New South Head Road, Kioara Lane, Kiaora Road, Patterson Street and Anderson Street, adjacent to the site, to the Australian Standard. The lighting is to be upgraded prior to the issue of the occupation certificate.

28. The loading dock is to be available for moving/delivery vehicles for the commercial component of the development, as well as the retail components of the development.

Yours sincerely

Cathy Edwards-Davis
Manager Engineering Services