

Hassell

**Kareena Private
Hospital**

Traffic Impact
Assessment

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Existing 2008 Kareena Private Hospital Data

1 Introduction

1.1 Project Background

Arup has been engaged by Hassell on behalf of Ramsay Health Care to prepare a traffic assessment for the proposed development of Kareena Private Hospital (KPH). The hospital, located in Sydney's Sutherland Shire, comprises of 109 inpatient beds and provides care for a range of patients. The \$24.7 million development proposes to increase the number of hospital inpatient beds by a total of 67, and increase the availability of on-site parking to 127 bays. This assessment will examine the impacts of the proposed development in relation to traffic, parking and access arrangements to the site.

1.2 Scope

The scope of the report is to primarily address the following issues:

- Assessment of existing transport conditions and arrangements
- Evaluation of vehicle volumes and parking demand generated by KPH
- Calculation of the number and distribution of trips likely to be generated by the proposed development of KPH during the critical peak hour period/s
- Analysis of the impacts of the proposed development on the surrounding road network and public transport networks during the critical peak period/s
- Review of internal vehicle circulation
- Identification of travel demand management measures

2 Existing Conditions

2.1 Site Description and Location

Kareena Private Hospital is located on the corner of Kareena Road and The Kingsway, Caringbah (refer to Figure 1). There are presently 109 hospital beds which cater for general surgical, maternity and coronal patients, as well as 19 trolleys for day surgery/care patients. An emergency department is also integrated within the hospital, with radiology and pathology services also available on site.

The land use in the immediate vicinity of KPH is mostly of a low to medium residential nature. Sutherland Public Hospital is located directly adjacent to the site on the southern side of The Kingsway.

Figure 1 Site Location

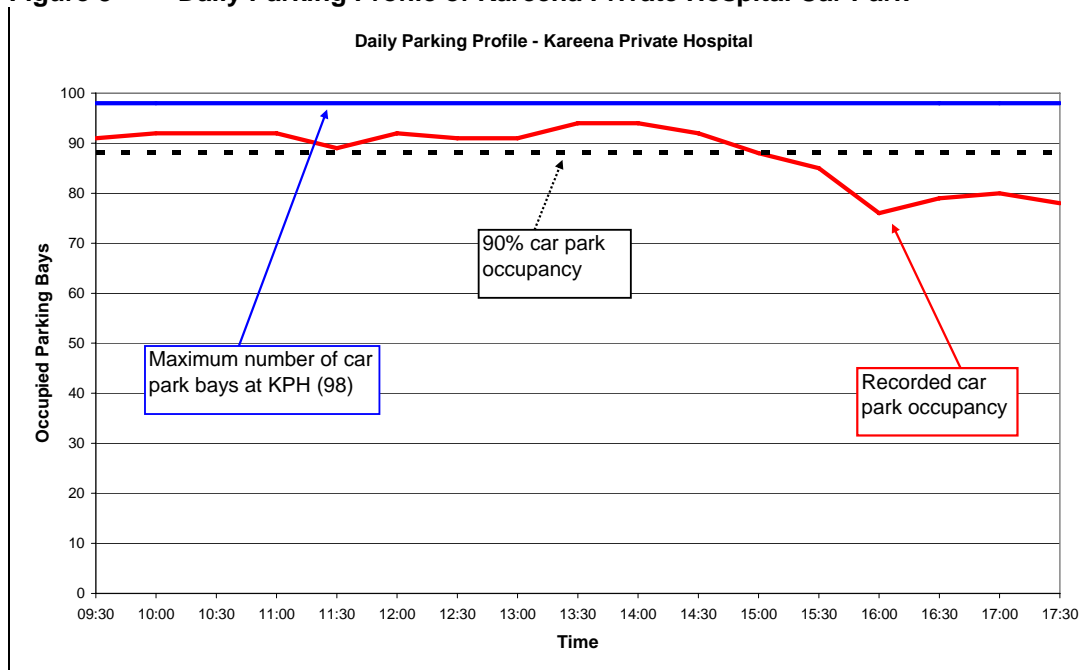


2.2 Parking Arrangements

There are presently 98 on-site parking spaces for KPH staff and visitors. These parking bays are located on the southern and north-western areas of the site. Motorists enter and exit the site via Kareena Road towards the northern end of the site, and then proceed to the parking areas from there. Visitor parking is provided free of charge, with no time restrictions. The access to the car park entrance viewed from Kareena Road is presented in Figure 2.

Figure 2 Entrance to Kareena Private Hospital Car Park

Parking occupancy surveys undertaken by TEF in November 2006 for the KPH car park indicate that the car park is heavily used throughout the day. For the majority of the survey period (9.30am – 5.30pm), the car park is more than 90% occupied. Results of this parking survey are presented in Figure 3.

Figure 3 Daily Parking Profile of Kareena Private Hospital Car Park

The residential areas immediately surrounding the hospital provide an opportunity for overflow off-site parking. The majority of residents in the area have private garages and

carports, and thus local streets within walking distance of KPH are often available for staff and visitor parking. On-street parking surveys were also conducted in the vicinity of KPH for the TEF study. These surveys concluded that there were between 70 to 80 vacant spaces throughout the day, located within a short walking distance of KPH. Taking a wider walking catchment of approximately 10 minutes from the site, this number of vacant parking spaces rose to anywhere between 140 and 250 throughout the day.

Much of the on and off-street parking demand is generated by staff and visitors associated with the larger Sutherland Public Hospital. Anecdotally it seems that a number of Sutherland Hospital staff and visitors utilise the KPH car park, and then simply walk across the road to access the site. This is exacerbated by the fact that Sutherland Hospital charges a fee for vehicles to park on site, which leaves its on-site parking areas significantly underutilised (TEF, 2007).

2.3 Local Road Network

Kareena Road is a local access road which provides motorists access to Kareena Private Hospital. Traffic volumes along this road and the surrounding local residential streets are low, with a peak between approximately 3pm to 4pm due to school associated traffic. Significant spare capacity exists at intersections connecting these local streets.

The Kingsway to the south of the site is a major arterial road which carries in the order of 35,000 vehicles per day. It is utilised by a significant proportion of KPH staff and visitors to access Kareena road. The intersection with Kareena road is signalised and operates efficiently. Site observations indicate no significant queuing, with vehicles able to clear in one traffic cycle in both the morning and afternoon peak periods.

2.4 Public Transport

Kareena Private Hospital is well served by a number of forms of public transport. The hospital is located within feasible walking distance of both Miranda and Caringbah railway stations on the Eastern Suburbs and Illawarra line, approximately 1.2km from the site. Train services on this line operate frequently on both weekdays and weekends, at intervals of up to five minutes during peak hours.

The hospital is also served by a number of Sydney bus routes. Service number 477 operates daily between Rockdale Station and Miranda, with frequencies of approximately 30 minutes throughout the day. Service 478 is an express service between Rockdale and Miranda, however these services only operate between 9am and 4pm, with a frequency of approximately one hour. Further, they do not operate on weekends. Service 474 operates between Ramsgate and Miranda on schooldays only, with only one bus departing Ramsgate in the morning and leaving Miranda in the afternoon. Bus stops for these services are located on the Kingsway, directly opposite to the hospital.

A summary of the various public transport options available to access Kareena Private Hospital is presented in Figure 4.

Figure 4 Public Transport Network Surrounding Kareena Private Hospital

Source: Sydney Buses (2008)

2.5 Pedestrian and Cycle Network

The site is well connected through local pedestrian footpath networks. Signalised pedestrian crossings across the Kingsway and Kareena Road provide pedestrians direct access to the site. Bus stops located on the Kingsway are only a short walk from the hospital, and are easily accessible to the public. Direct access to both Caringbah and Miranda railway stations is provided through the local footpath network. No cycling facilities are presently provided on-site for staff or visitors.

The pedestrian environment surrounding Kareena Private Hospital is presented visually in Figure 5.

Figure 5 Pedestrian Site Access

3 Proposed Development

3.1 Proposed Scheme

3.1.1 Description

The proposed development of Kareena Private Hospital is illustrated on drawings prepared by Hassell Pty Ltd. It involves the provision of 67 new hospital beds, 29 car parking bays and modification to the existing traffic circulation arrangements. Additionally, a gymnasium with a hydrotherapy pool is proposed to facilitate an expanded rehabilitation programme.

3.1.2 Hours of Operation

The proposed development would essentially be an expansion of existing hospital uses. The hours of operation would remain unchanged.

3.1.3 Internal Circulation, Parking and Service Vehicles

The development involves an additional 29 car parking bays within the on-site parking area. This will increase the parking provision from 98 to a total of 127 bays. To allow for improved circulation within the parking area, there will be a reduction of some parking bays near the existing loading dock in the south-west corner of the site. This removal of bays will permit service vehicles to manoeuvre satisfactorily in and out of the loading dock, without compromising traffic or pedestrian safety issues. Vehicles are able to adequately pass the loading dock area to access the additional car parking bays at the eastern site boundary.

The development will not involve any new vehicular access points to the external road network.

4 Traffic Impact Assessment

4.1 Parking

4.1.1 On-Site Provision

The proposed design contains a net increase of 29 parking bays. To allow for improved traffic circulation, a number of parking bays have been removed adjacent to the loading dock at the southern end of the site. Further, some bays have also been removed to create space for the proposed gymnasium and hydrotherapy pool. To offset these losses, additional parking bays are proposed on the eastern end of the site. The net change in parking provision is summarised in Table 1.

Table 1 Change in Parking Provision

Location	Bays
Existing marked bays	98
Removal of bays near loading dock	-9
Additional bays at eastern end of site	+38
Future Parking Provision	127

4.1.2 Requirements

Parking requirements for hospitals as set out in the Sutherland Shire Development Control Plan 2006 (SSDCP) are as follows:

- 1 space per 3 hospital beds
- 1 space for every 3 employees
- 1 space for every doctor

In preparation of their September 2007 traffic report, TEF Consulting was advised by KPH management that the proposed additional hospital beds would not generate a linear increase in staff numbers. Under the initial proposal where there was to be a net increase of 55 beds, TEF forecast an increase of 13 staff. Under the November 2008 proposal, there are to be 67 additional beds. Applying a linear increase, it is reasonable to then assume there to be 16 new staff as a result of these extra beds. In addition to this, an extra two staff and two doctors are to be on site each day as a result of the new gymnasium and operating theatre.

The expected change in hospital beds and staff numbers is presented in Table 2.

Table 2 Forecast Change in Hospital Staff and Beds

Hospital Use	Hospital Beds	Nurses/Carers/Admin*	Doctors*
Existing hospital	109	108	10
Additional hospital beds	+67	+16	0
Gymnasium	0	+2	0
Operating theatre	0	0	+2
Total Provision	176	126	12

*- Refers to maximum number of staff on duty at any point throughout the day

Based on these forecast changes in hospital bed and staff numbers, and the parking requirements as set out in the SSDCP, the overall parking requirements for KPH may be calculated. Results of these calculations are presented in Table 3.

Table 3 Parking Requirements at Kareena Private Hospital based on SSDCP

Hospital Use	Forecast Number	Council Parking Rate	Parking Required
Staff	126	1/3	42
Doctors	12	1/1	12
Beds	176	1/3	59
Total Parking Required			113

Thus it can be seen that the 127 parking spaces proposed under the development plan goes over and above that required by the SSDCP.

The RTA's Traffic Generating Guidelines for private hospitals can also provide a measure of on-site parking requirements for KPH. The parking accumulation according to this method is calculated through a formula¹ based on the number of hospital beds and the average number of staff per weekday shift. This parking accumulation formula is however not appropriate to use for the case of KPH. This is because the hospitals surveyed had between 30 to 99 beds, whereas Kareena will have a total of 176. Further, the number of staff for surveyed hospitals was between 10 and 102, and KPH has close to 140.

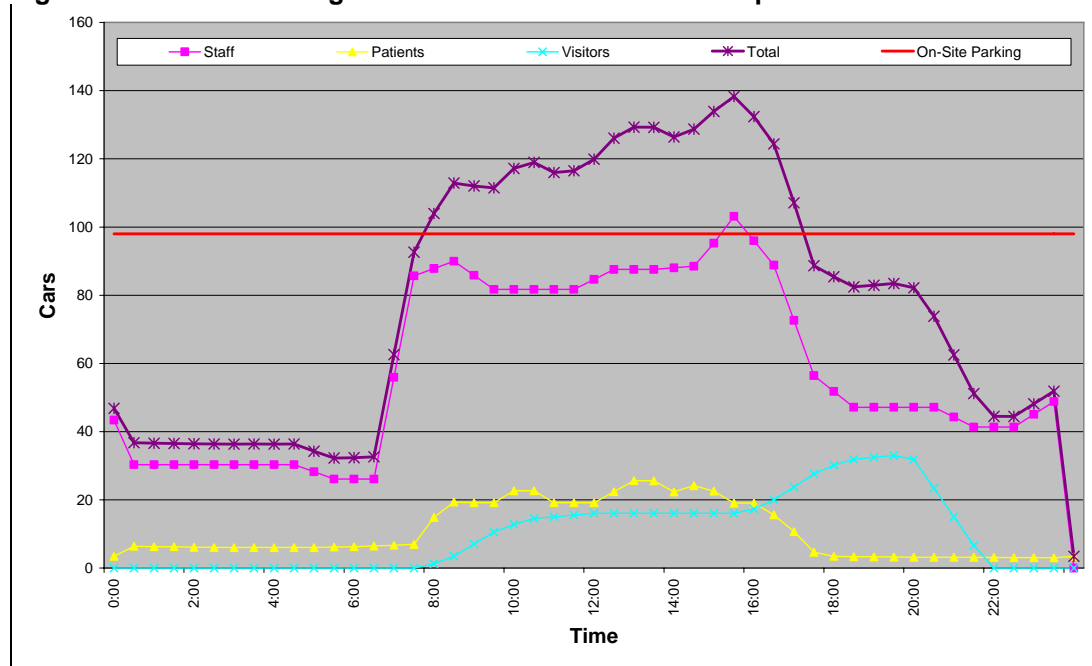
4.1.3 Demand

The future parking demand generated by Kareena Private Hospital is based on a number of factors, including:

- Number of staff on site per day
- Total number of hospital beds
- Average occupancy rate of hospital beds
- Number of hospital patients (inpatients, casualty, day only surgery) per year
- Mode split of staff and patients

Existing 2008 data relating to numbers of hospital beds, their occupancy rate, and staff and patient numbers were provided to Arup by Ramsay Health Care. This data can be found in Appendix A of this report. A parking demand model for the current hospital, which is largely consistent with that produced by TEF in September 2007, is presented in Figure 6.

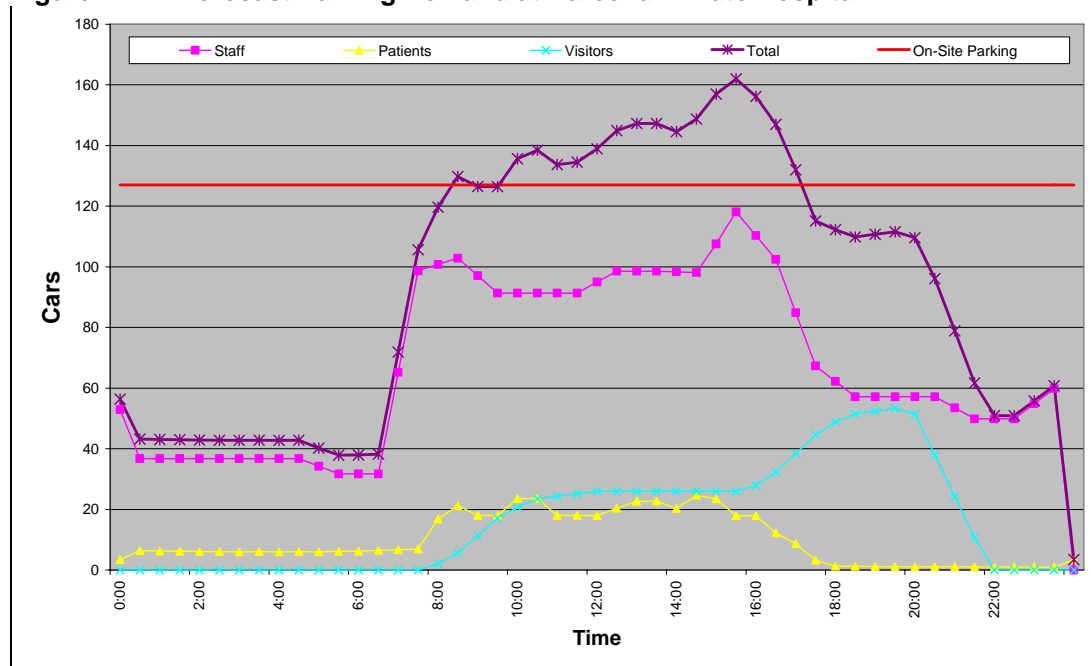
¹ Parking Accumulation = $-19.56 + 0.85 \times (\text{beds}) + 0.27 \times (\text{average staff per weekday shift})$

Figure 6 2008 Parking Demand at Kareena Private Hospital

To gain an understanding of the likely future scenario, the expected number of patients per year was increased linearly relative to the new number of hospital beds. Similarly, the number of day only surgery patients expected per year declined based on the number of trolleys falling from 19 to 14 under the proposed development.

Expected staff increases are expected to be largely focused around nurses and other medical staff – with the number of clerical and administration staff to remain near current levels. The number of staff on duty at any one time is consistent with the numbers provided in Table 2. Factors such as staff/patient mode splits and average occupancy rates were forecast to remain the same as current 2008 levels.

The future forecast parking demand following the proposed development of Kareena Private Hospital is displayed in Figure 7.

Figure 7 Forecast Parking Demand at Kareena Private Hospital

4.1.4 Assessment

The 127 on-site parking bays proposed following the development of KPH goes over and above that required by the SSDCP. The Arup parking demand hospital forecast that demand for parking on-site will exceed supply between approximately 10am and 5pm on a daily basis. For the most part during this time period, this undersupply of parking will only be in the order of 15-20 spaces. During the afternoon staff handover this shortage of on-site parking rises to approximately 35 spaces. This however is only for a short period of time between 2pm and 4pm, prior to the commencement of the afternoon commuter peak.

The significant level of available on-street parking around the Miranda area will be able service these periods when parking demand exceeds supply. TEF surveys found that in the order of 70-80 parking spaces in the close vicinity of the site were vacant throughout the day. Further parking is available at the Sutherland Hospital site, which was found to be significantly underutilised during these surveys.

It can therefore be concluded that while the demand for parking on site will exceed supply during the day, available off-site parking will be sufficient to satisfy the overall parking demand generated by KPH.

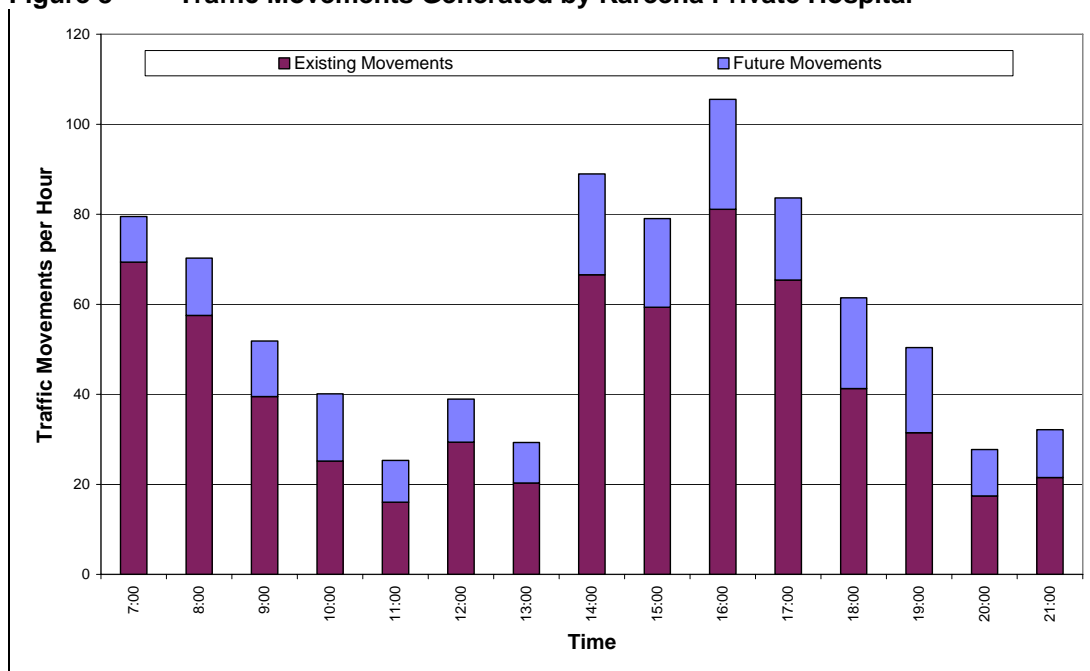
4.1.5 Car Park Movements

Car park activity within the hospital site peaks at approximately 3pm, during the afternoon staff handover. In the early evening up to 8pm, visitor demand peaks, and then drops away by around 10pm. Any vehicles arriving after 10pm will be able to find parking in the western and southern portions of the site. This will mean that the eastern region of the site adjacent to the residential properties will not need to be utilised until after 7am the next day. This is clearly indicated in Figure 7.

4.2 Traffic Impact

The additional traffic generated by the proposed development will be relatively low, in the order of 25 vehicle movements during the peak hour of 4pm and 5pm. These additional traffic movements generated by Kareena Private Hospital relative to existing flows are presented in Figure 8.

Figure 8 Traffic Movements Generated by Kareena Private Hospital



As previously discussed, Kareena Road near the site entrance presently carries a low amount of traffic. It will not be adversely affected by these slightly increased vehicle movements.

With these 25 additional movements to be spread over an hour long period, equating to approximately 1 vehicle every 2 minutes, queuing at the intersection of Kareena Road and The Kingsway is not expected to deteriorate significantly. Vehicles are likely to continue to clear the intersection in one traffic cycle as is presently the case.

It can therefore be concluded that the traffic impact of the proposed development will be low.

4.3 Site Circulation

The loading dock area has been reconfigured under the proposed design to allow for improved traffic circulation. This has been achieved through the removal of nine existing parking bays adjacent to the south western boundary of the site. An 8.8m medium rigid vehicle may safely reverse into the dock in two manoeuvres, and then exit in a forwards motion (see Figure 9 and Figure 10 respectively).

The loading area has the capacity for three service vehicles to park at the one time, with adequate space for other vehicles to pass by to access the new parking bays at the eastern end of the site.

Figure 9 **Entry Path of Medium Rigid Vehicle into Loading Dock Area**



Figure 10 Exit Path of Medium Rigid Vehicle out of Loading Dock Area



4.4 Management Measures

Kareena Private Hospital is conveniently located near two forms of public transport. While many people attending the hospital may not be in a physical condition to take public transport, it should be encouraged wherever possible.

Currently on the hospital's website, there is no indication to readers of the presence of either Miranda or Caringbah stations being within walking distance of the site. Walking directions from both stations to the site would be beneficial in informing people of this option of transport. Information regarding the bus services available, providing links to maps and timetables, would also be advisable in encouraging public transport usage.

There is presently no bicycle parking facilities for staff on site. Providing bicycle parking racks at KPH would be a relatively low cost exercise that would encourage non-car travel to the site.

Anecdotal it is evident that a number of parking spaces on site at Kareena are currently occupied by patients and staff of Sutherland Public Hospital. Future consideration may be given to the following car parking measures to prevent this:

- Time based restrictions on short term visitor parking bays
- Issuing staff parking permits
- Boom gate control at the car park entrance off Kareena Road
- Enforcement through parking officers/security staff

5 Conclusions

This report describes the existing situation, development proposal, efficiency of internal road layout, forecast traffic generation and transport impact assessment for the proposed expansion of Kareena Private Hospital. The expansion will involve approximately 67 beds, a new gymnasium and operating theatre, as well as an additional 29 car parking bays.

Kareena Private Hospital is well served by public transport in the form of the local bus services and Miranda and Caringbah railway stations, some 1200m from the site. A significant number of on-street parking spaces also exist within close walking distance of the site.

The demand for parking on busy weekdays will continue to equal or exceed on-site supply. The provision of 127 on-site parking spaces however exceeds that required by the Sutherland Shire DCP (2006). The shortfall in parking spaces during the day will be made up through on-street parking in the local area, as well as on-site parking at the adjacent Sutherland Public Hospital.

The loading area has been reconfigured to reduce any potential conflict between passing cars and service vehicles. This has been achieved through the removal of nine parking spaces adjacent to the south western boundary of the site.

The development does not involve any new vehicular access points. The net increase in vehicular traffic generated by the development is forecast to be in the order of no more than 25 vehicles in the peak hours. This is unlikely to cause any noticeable change in traffic congestion levels throughout the day.

Appendix A

**Existing 2008 Kareena
Private Hospital Data**

Table 4 Current Staff and Bed Numbers at Kareena Private Hospital

1. Staff Arrival and Departures	
	People/Weekday
Nurses	125
Clerical/Misc	90
Medical – other	30
TOTAL Arrivals	245
2. Staff Vehicle Trips	
	Mode Split
07:00 – 23:00 (Day)	91%
23:00 – 07:00 (Night)	98%
3. Visitor & Patient Arrivals/Departures	
	Patients per annum
Outpatients	0
Inpatients (non-casualty)	14,654
Casualty	5,166
Day only surgery	6,935
4. Bed Numbers/Occupancy	
Beds - Inpatient	109
Day Surgery Trolleys	19
Occupancy Rate	89%

Source: Ramsay Health Care, 2008