AA CROWN HOLDINGS PTY LTD

TRAFFIC REPORT FOR PROPOSED WOLLONGONG PRIVATE HOSPITAL, 360-364 CROWN STREET, WOLLONGONG

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COLSTON BUDD HUNT & KAFES PTY LTD
ACN 002 334 296
Level 18 Tower A
Zenith Centre
821 Pacific Highway
CHATSWOOD NSW 2067

Telephone: (02) 9411 2411
Facsimile: (02) 9411 2422
Email: cbhk@cbhk.com.au

REF: 7728/1

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1. INTRODUCTION

1.1. Colston Budd Hunt & Kafes Pty Ltd has been retained by the AA Crown Holdings Pty Ltd to prepare a report on traffic aspects of a proposed private hospital at 360 to 364 Crown Street Wollongong. The site location is shown on Figure 1.

1.2. The Director Generals's Requirements (DGR's) with respect to transport and access are set out below:

Provide a traffic and transport study that addresses the following:

Transport and Accessibility

Provide a traffic and transport study that addresses the following:-

- Surrounding context and how the proposal relates with the existing Wollongong public hospital in terms of transport and traffic management;
- Estimated vehicular traffic generation from the proposed development and the cumulative impact of this with existing developments and any other known development proposals in the area;
- Intersection modelling at relevant intersections to assess any likely impacts;
- Access arrangements which consider options for access from the local road network;
- Existing public transport services in the site, including any transport services proposed to be offered by the hospital;
- Measures to encourage mode shift to public transport and reduce reliance on private vehicles and therefore on site car parking;
- Existing pedestrian and cycle movements within the vicinity of the subject site and determine the adequacy of the proposal to meet the likely future

demand for increased pedestrian and cycle access – this may include facilities for secure bicycle storage and cycle amenities; and

- Travel Demand Management (TDM) measures that will optimise the opportunity provided by the project site's proximity to public transport;
- Compliance with the RTA *Guide to Traffic Generating Developments*;
- Internal access arrangements including entry points, drop off points, traffic management and hierarchy.
- Off street car parking provision and management measures for on street parking in consideration of Council's City Centre West Parking Management Plan
- Service delivery requirements to be considered against AS2890.2;
- Emergency evacuation and public access

1.3. This report assesses the implications of the proposed development through the following chapters:

- Chapter 2 - Describing the existing situation; and
- Chapter 3 - Assessing the implications of the proposed development.

2. EXISTING CONDITIONS

Site Location

2.1. The site is located on the northern side of Crown Street, (between Staff Street and New Dapto Road) and on the western edge of Wollongong CBD. The site has frontage to Crown Street and Urunga Parade. The site location is shown on Figure 1. Surrounding land use comprises Wollongong Hospital and other medical related development to the north and east of the site. To the west of the site is residential development. To the south of the site (on the opposite side of Crown Street) is commercial and residential development.

Road Network

2.2. The road network in the vicinity of the site includes Crown Street (Princes Highway), Staff Street, New Dapto Road, Urunga Parade and Dudley Street. Crown Street forms part of the Princes Highway and is located along the southern boundary of the site. It provides an east west link from the F6 Freeway to Wollongong CBD. In the vicinity of the site, Crown Street provides a four lane undivided carriageway with clearway conditions at peak times. The RTA has advised that pedestrian access across Crown Street in the vicinity of the site is an issue as the nearest controlled crossing point is at the New Dapto Road intersection.

2.3. Staff Street is located south of the site and provides access to the commercial/residential precinct located on the southern side of Crown Street. It provides one traffic lane with kerb side parking provided clear of intersections. Staff Street connects to Crown Street at a priority controlled T-intersection (with Crown Street the major road) with all turning movements permitted.

2.4. New Dapto Road is located east of the site. It generally provides one traffic lane in each direction with an additional lane on the approach to Crown Street and a central median opposite the intersection with Urunga Parade. The intersection of New Dapto Road is a traffic signal controlled T-intersection. At its northern end New Dapto Road connects to Mercury Street and Loftus Street at a single lane roundabout.

2.5. Urunga Parade is located along the northern boundary of the site. It provides one traffic lane in each direction with kerb side parking clear of intersections. Urunga Parade connects to New Dapto Road at a priority controlled T-intersection (with New Dapto Road the major road) with only left turns permitted due to the median on New Dapto Road.

2.6. Dudley Street is located north of the site and provides one traffic lane in each direction with kerb side parking clear of intersections. Dudley Street connects to Urunga Parade at a priority controlled T-intersection (with Urunga Parade the major road) with all turning movements permitted.

Traffic Volumes

2.7. In order to establish existing traffic conditions, counts were undertaken during weekday morning and afternoon peak periods at the following intersections:-

- Crown Street/Staff Street;
- Crown Street/New Dapto Road (traffic signals);
- New Dapto Road/Urunga Parade;
- New Dapto Road/Mercury Street/Loftus Street (roundabout); and
- Urunga Parade/Dudley Street.

2.8. The surveyed peak flows are set out on Figures 2 and 3 and summarised in Table 2.1.

Table 2.1 : Existing Two Way Peak Hour Traffic Flows		
	Vehicles Per Hour (Two-Way)	
Location	Morning	Afternoon
Crown Street		
- east of New Dapto Road	1375	1415
- east of Staff Street	2040	2055
- west of Staff Street	2085	2135
New Dapto Road		
- north of Crown Street	1015	1000
- north of Urunga Parade	1040	1130
- north of Loftus Street	480	380
Urunga Parade		
- west of New Dapto Road	115	180
- west of Dudley Street	95	120
Staff Street		
- south of Crown Street	115	150
Dudley Street		
- north of Urunga Parade	75	70

2.9. The results in Table 2.1 reveal that:-

- Crown Street carried some 1,375 to 2,135 vehicles per hour (two-way) during the morning and afternoon peak period. Traffic flows were higher west of New Dapto Road;

- New Dapto Road carried some 380 to 1,130 vehicles per hour (two-way) during the morning and afternoon peak periods. Traffic flows in both periods were highest south of Loftus Street;

- Urunga Parade carried some 95 to 180 vehicles per hour (two-way) during the morning and afternoon peak periods;

- Staff Street carried some 115 to 150 vehicles per hour (two-way) during the morning and afternoon peak periods; and

- Dudley Street carried some 70 to 75 vehicles per hour (two-way) during the peak periods.

Residential Amenity

2.10. The definition of the impact on residential 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.

2.11. The Roads and Traffic Authority has undertaken considerable research into appropriate environmental capacity performance standards on residential streets. Their "Guide to Traffic Generating Developments" defines the following environmental capacity performance standards for local residential streets and collector roads:-

- Local Roads
  - Maximum flow - 300 vehicles per hour in the peak hour.
- Collector Roads
  - Maximum flow - 500 vehicles per hour in the peak hour.

2.12. Table 2.1 shows that Urunga Parade, Staff Street and Loftus Street are carrying traffic volumes less than the maximum flow for local roads.

Intersection Operations

2.13. The capacity of the road network is generally determined by the ability of its intersections to cater for peak period traffic flows. The surveyed intersections have been analysed using SIDRA. SIDRA produces a number of measures of intersection operations. The most useful measure provided is average delay per vehicle expressed in seconds per vehicle.

2.14. Based on average delay per vehicle, SIDRA estimate the following levels of service (LOS):-

- For Traffic Signals, the average delay per vehicle in seconds is calculated as delay/(all vehicles), for roundabouts the average delay per vehicle in seconds is selected for the movement with the highest average delay per vehicle, equivalent to the following LOS:-

0 to 14	=	"A"	Good
15 to 28	=	"B"	Good with minimal delays and spare capacity
29 to 42	=	"C"	Satisfactory with spare capacity
43 to 56	=	"D"	Satisfactory but operating near capacity
57 to 70	=	"E"	At capacity and incidents will cause excessive delays. Roundabouts require other control mode.
>70	=	"F"	Unsatisfactory and requires additional capacity

- For give way and stop signs, the average delay per vehicle in seconds is selected from the movement with the highest average delay per vehicle, equivalent to following LOS:-

0 to 14	=	"A"	Good
15 to 28	=	"B"	Acceptable delays and spare capacity
29 to 42	=	"C"	Satisfactory but accident study required
43 to 56	=	"D"	Near capacity and accident study required
57 to 70	=	"E"	At capacity and requires other control mode.
>70	=	"F"	Unsatisfactory and requires other control mode

2.15. It should be noted that for roundabouts, give way and stop signs, in some circumstances, simply examining the highest individual average delay can be misleading. The size of the movement with the highest average delay per vehicle should also be taken into account. Thus, for example, an intersection where all movements are operating at a level of service A, except one which is at level of service E, may not necessarily define the intersection level of service as E if that movement is very small. That is, longer delays to a small number of vehicles may not justify upgrading an intersection unless a safety issue was also involved.

2.16. The SIDRA analysis found that:-

- the intersection of Crown Street and New Dapto Road operates with average delays per vehicle of less than 25 seconds for both peak periods. This represents level of service B, a good level of intersection operation;

- the roundabout at the intersection of New Dapto Road, Loftus Street and Mercury Street operates with average delays per vehicle of less than 20 seconds for both peak periods. This represents level of service B, a satisfactory level of intersection operation;

- the intersection of New Dapto Road and Urunga Parade operates with average delays per vehicle of less than 15 seconds for both peak periods. This represents level of service A/B, a good level of intersection operation;

- the intersection of Dudley Street and Urunga Parade operates with average delays per vehicle of less than 15 seconds for both peak periods. This represents level of service A/B, a good level of intersection operation; and

- the right turn out of Staff Street into Crown Street operates at capacity in both peak periods due to the high through traffic flows on Crown Street. However, the right turn volume is low and is able to turn due to gaps provided by the traffic signals at New Dapto Road. Other turning movements at the intersection (right turn from Crown Street into Staff Street and left turn from Staff Street into Crown Street) operate with average delays per vehicle of less than 35 seconds for both peak periods. This represents level of service C, a satisfactory level of operation.

Public Transport

2.17. Public transport services are provided by bus services operating along Crown Street past the site. Premier Illawarra Buses operates 11 bus services along Crown Street past the site. These are the 23, 24, 30, 31, 32, 33, 34, 35, 36, 37 and 57. These routes provide connections between Wollongong CBD (and Wollongong Hospital) and surrounding areas. The buses generally operate hourly from morning to evening, Monday to Friday with less frequent services on weekends. Bus stops are located on both sides of Crown Street in the vicinity of the site.

2.18. In addition to the regular route services the Gong Shuttle service operates along Crown Street and New Dapto Road to the east of the site. This is a seven day a

week service operating at 10 minute intervals in peak periods and 20 minute intervals during the off peak. The shuttle service connects various parts of the CBD.

2.19. Wollongong Rail Station is located some 800 metres to the east of the site. It is located on the southern line that connects Kiama with Sydney.

2.20. In summary buses provide public transport services to the site. These bus services provide connections to from the surrounding areas to Wollongong CBD and railway station.

3. IMPLICATIONS OF PROPOSED DEVELOPMENT

The Proposed Development

3.1. The proposed development is for a private hospital (156 beds) with associated medical centre (some 5,460m^2 GFA comprising general purpose medical centre, specialist consulting rooms, diagnostic and clinical facilities and a day surgery) and commercial space (some 1,510m^2 GFA). Parking for 331 cars within three levels of basement car parking will be provided. Access is proposed from Crown Street (via a new traffic signal controlled intersection) and Urunga Parade (service access and car park entry).

3.2. This chapter examines the implications of the proposed development through the following sections:-

- public transport;
- parking provision;
- access and internal layout;
- traffic effects;
- response to Director General Requirements (DGR's); and
- summary.

Public Transport

3.3. As noted in Chapter 2, buses operating along Crown Street service the site. These provide connections to Wollongong CBD and rail station to/from the surrounding areas. The site is therefore well located to provide opportunities for staff, visitors and patients with a choice of modes for travel to the site.

3.4. The provision of increased population (staff, visitors and patients) in the area will strengthen demand for existing public transport services. It is consistent with planning principles of:

- improving accessibility to employment and services by walking, cycling, and public transport;
- improving the choice of transport and reducing dependence solely on cars for travel purposes;
- moderating growth in the demand for travel and the distances travelled, especially by car; and
- supporting the efficient and viable operation of public transport services.

3.5. It is government policy and good transport planning practice to co-locate complementary land uses. By co-locating complementary developments there is a reduction in travel between them and the ability to share facilities. The provision of the private hospital near to the existing hospital is a good example of co-location as patients and staff can share facilities without the need to travel long distances between them. Therefore the location of the proposed development is in accordance with government policy.

3.6. To encourage travel modes other than private vehicle, it is proposed to adopt a travel demand management approach, through a work place travel plan to meet the specific needs of staff, patients and visitors. The specific requirements and needs of staff, patients and visitors, including number of employees, hours of work, shift times, etc., will be incorporated in the work place travel plan to support the objectives of encouraging the use of public transport.

3.7. The principles of the work place travel plan, to be developed by the future tenants in consultation with Council, RTA and other stakeholders, will include the following:

- encourage the use of public transport to travel to and from the hospital;
- work with public transport providers to improve services;
- encourage public transport by employees through the provision of information, maps and timetables;
- provide appropriate pedestrian facilities which improve accessibility to the adjacent hospital, surrounding uses and public transport services;
- raise awareness of health benefits of walking (including maps showing safe walking routes);
- encourage cycling by providing safe and secure bicycle parking, including the provision of lockers and change facilities;
- provide appropriate on-site parking provision.

3.8. The work place travel plan will assist in delivering sustainable transport objectives by considering the means available for reducing dependence solely on cars for travel purposes, encouraging the use of public transport and supporting the efficient and viable operation of public transport services.

Parking Provision

3.9. Wollongong City Council DCP 2009 sets out the following parking requirements for hospitals, medical centres and commercial development within the CBD:

- Hospitals - 1 space per medical practitioner plus 1 space per 2 employees plus 1 space per 2 beds;
- Medical centres – 4 spaces per consulting room plus 1 space per 3 employees; and
- Commercial - 1 space per 50 m^2 GFA.

3.10. Application of the medical centre rate in DCP 2009 is considered inappropriate for the proposed development as it is a large medical centre with consulting rooms, diagnostic and clinical facilities and a day surgery. The rate in DCP 2009 is appropriate for small medical centres such as general practices. A more appropriate way to estimate parking requirements is based on surveys of other similar developments. A review of peak parking demand at a number of medical centres in Sydney has been undertaken. The medical centres surveyed included general practitioners, specialists, day surgery and radiology/pathology services. These are the types of services in the proposed medical centre. The surveys found an average peak parking demand of 2.6 spaces per 100m^2 GFA. Application of this rate (with the proposed medical centre having some 5,460m^2 GFA) results in a requirement of some 142 parking spaces.

3.11. For the hospital component the number of staff is unknown, and hence it is not possible to use the DCP 2009 rate. However, RTA Guidelines suggest the following formula for estimating parking requirements for private hospitals:

Peak Parking Accumulation (PPA) = -26.52 + 1.18B (where B is number of beds).

3.12. Application of this formula results in a peak parking accumulation of 158 spaces for the hospital.

3.13. For the commercial component (some 1,510m^2 GFA) some 30 spaces would be required under DCP 2009. Thus the total parking requirement would be some 330 spaces.

3.14. The proposed provision of some 331 spaces satisfies this requirement. It is noted that parking requirements may be slightly lower for the following reasons:

- The site is located close to existing public transport services (buses along Crown Street and within 800 metres of the rail station);
- The site provides a number of complementary facilities and hence there is likely to be some linked trips that would reduce parking demand;
- Implementation of a travel plan to encourage travel to the site by means other the private car and hence reduce parking demand; and
- It is proposed to operate a courtesy bus that would link the hospital with the station and CBD which would reduce parking demand.

3.15. Motorcycle, bicycle and disabled parking will be provided in accordance with the requirements of DCP 2009.

Access and Internal Layout

3.16. Access is proposed from Crown Street (via a new traffic signal controlled intersection) and Urunga Parade (service access and car park entry). It is noted that in their response to the request for comments for inclusion in the Director General's Environmental Assessment Requirements, both Council and RTA have suggested that access to the site be provided from Urunga Parade. In particular the RTA noted that:

"The RTA has reviewed the submitted information and notes that the subject application is seeking direct vehicular access to Crown Street. Crown Street at this

location is a State Classified Road and provides direct vehicular access to and from the Central Business District of Wollongong. Crown Street in the immediate vicinity of the development site also facilities access to Wollongong Hospital and a number of other commercial businesses and as such experiences significant traffic volumes and delays, particularly in the AM and PM peak periods. Given this, and the strategic importance of Crown Street in the overall management of the State Network, including provision of public transport services, the RTA does not support access to the site via Crown Street.

As such, the RTA requests that the Director General's requirements state that any potential vehicular access to the site should occur via the local road network, in this instance Urunga Parade. This is consistent with Clause 101 of State Environmental Planning Policy (Infrastructure) 2007 and is considered appropriate as additional turning movements along Crown Street would compromise traffic efficiency and have the potential to significantly impact on road safety. In addition, vehicular access at this location would comprise vehicular amenity and expose pedestrians to greater risk of collision with vehicles turning to enter or exit the site."

3.17. These points were repeated at a meeting with RTA and Council officers in February 2010. In addition the RTA/Council advised that:

- there are existing safety concerns with pedestrians crossing Crown Street in the vicinity of the site. The nearest controlled pedestrian crossing points are at the traffic signals at New Dapto Road (some 150 metres to the east) and Mangerton Road (some 210 metres to the west);
- the RTA is considering banning the right turn from Crown Street into Staff Street due to safety concerns and delays created to through traffic on Crown Street (eastbound); and
- there can be significant queuing on the New Dapto Road approach to the Crown Street intersection in the PM peak period (as far back as the Loftus Street roundabout).

3.18. A number of access options have been investigated. To provide appropriate access to the site and to address the matters raised by the RTA and Council, it is proposed to provide the main access to the site from Crown Street via provision of traffic signals at the intersection of Staff Street and Crown Street. The access would form the fourth leg of the intersection. A concept sketch of the proposed traffic signal controlled site access with Crown Street and Staff Street is shown in Figure 4.

3.19. Access via traffic signals at this intersection would provide the following benefits:

- improved pedestrian access across Crown Street (in an area where Council and RTA have indicated there is an existing problem);
- provide safe and efficient access to a major new development;
- not add additional traffic to New Dapto Road (southbound) where the Council and RTA have identified there is significant queuing in the PM peak;
- provide improved access from Staff Street onto Crown Street (where the existing right turn experiences lengthy delays in the peak periods);
- reduce distances travelled to and from the site compared to access only from Urunga Parade; and
- minimise traffic in local roads (such as Urunga Parade and Dudley Street) by providing access directly to the arterial road network.

3.20. The new traffic signals would be fully funded by the proposed development.

3.21. An assessment of the proposed traffic signals is set out in the section on traffic effects. In summary the assessment has found that the new traffic signals will operate at a good level of service in the AM and PM peak periods. To minimise the impact on traffic flows along Crown Street, the right turn into the hospital

would be banned during the AM and PM peak periods. A concept sketch of the proposed intersection layout is shown in Figure 4.

3.22. As Crown Street is a Classified Road (as noted by the RTA), Council and the RTA are required to give attention to Clauses 101 2(a) and 2(b) of State Environmental Planning Policy (Infrastructure) 2007 which reads as follows:-

The consent authority must not grant consent to the development on land that has frontage to a classified road unless it is satisfied that:

(a). where practicable, vehicular access to the land is provided by a road other than the classified road,

(b). the safety, efficiency and ongoing operation of the classified road will not be adversely affected by the development as a result of:

i. the design of the vehicular access to the land; or
ii. the emission of smoke or dust from the development; or

3.23. The proposed development satisfies Clause 101 2(a) by having access to Urunga Parade.

3.24. The proposed development also satisfies Clause 101 2(b) as access to the Crown Street would be via a traffic signal controlled intersection which provides for safe and efficient access to and from the site. As noted above the new intersection would operate at good level of service in the AM and PM peak periods. Furthermore the provision of direct access to Crown Street would result in less traffic through the Crown Street/Old Dapto Road intersection, better performance of this intersection and no increase in queues on Old Dapto Road.

3.25. Secondary access to the site is proposed from Urunga Parade (car park entry only) and service access.

3.26. Access from Crown Street would provide access to the basement car park and to a set down and pick up area. This area would have a small number of short term parking spaces, provide for the courtesy bus set down/pick up and ambulance set down/pick up. Should vehicles wish to access the basement car park after dropping off, then the vehicles would need to exit the site and travel around the block and access the car park via Urunga Parade.

3.27. The parking layouts on all levels are set out in a simple and clear manner. Parking spaces, aisles, ramps etc. will be designed in accordance with AS2890.1-2004.

3.28. Parking within the basement car park will be controlled, with boom gates located on the entry and exit points on basement level 1. AS2890.1-2004 suggests that for a car park of between 300 and 400 spaces queuing for 7 cars is required prior to the entry boom gates. Queuing for 9 cars is provided on entry (7 cars at the Crown Street access and 2 cars at the Urunga Parade access). This provision complies with the requirements of AS2890.1-2004.

3.29. The loading docks are located on the north eastern part of the site with separate access to and from Urunga Parade. There is space for three trucks to park in the dock area (One large rigid truck and two smaller trucks). Trucks would enter and depart the site in a forward direction.

Traffic Effects

3.30. Traffic generated by the proposed development will have its largest effects during the weekday morning and afternoon peak periods when it combines with commuter traffic.

3.31. Estimates of traffic generated by the proposed development have been based on RTA Guidelines (for the private hospital and commercial components) and surveys

of other large medical centres that provide a range of similar services (for the medical centre component). The RTA Guide to Traffic Generating Developments suggests that traffic generation estimates should be based on similar sites.

3.32. For the private hospital component RTA Guidelines suggest the following generation rates:

Morning Vehicle Trips, 8am -9am = -12.41 + 0.57B where B is number of beds;
Afternoon Vehicle Trips, 5pm -6pm = -11.96 + 0.69B where B is number of beds;
Peak Vehicle Trips, 3pm -4pm = -22.07 + 1.04B where B is number of beds;

3.33. For the commercial component RTA Guidelines suggest a generation rate of 2 trips per 100m^2 GFA in the morning and afternoon peak periods.

3.34. Surveys of traffic generation at a number of large medical centres have been reviewed. These included general practitioners, specialists, day surgery and radiology/pathology services, similar to that proposed at the Wollongong Private Hospital. The surveys found the centres generated 1 trip per 70m^2 GFA in the morning peak period and 1 trip per 25m^2 GFA in the afternoon peak period.

3.35. Using the above rates, estimates of the traffic generation for the proposed development are set out in Table 3.1 below.

Table 3.1 Summary of Traffic Generation

Component	Size	Rate		Traffic Generation (vehicle/hour)	
		AM	PM	AM	PM
Hospital	156 beds	-12.41+0.57B	-22.07+1.04B	77	140
Medical Centre	5460m^2	1/75m^2	1/25m^2	73	218
Commercial	1510m^2	2/100m^2	2/100m^2	30	30
Total				180	388

3.36. Table 3.1 reveals that the proposed development would generate some 180 vehicles per hour (two way) in the weekday morning peak period and some 390 vehicles per hour (two way) in the weekday afternoon peak period.

3.37. The additional traffic has been assigned to the road network with an 80%in/20%out split in the morning peak period and a 40%in/60%out split in the afternoon peak period. The resulting flows are shown on Figures 2 and 3 and summarised in Table 3.2.

Table 3.1 : Existing Plus Development Two Way Peak Hour Traffic Flows

Location	Vehicles Per Hour (Two-Way)			
	Morning		Afternoon	
	Existing	With Dev	Existing	With Dev
Crown Street				
- east of New Dapto Road	1375	+5	1415	+30
- east of Staff Street	2040	+20	2055	+90
- west of Staff Street	2085	+105	2135	+245
New Dapto Road				
- north of Crown Street	1015	+15	1000	+60
- north of Urunga Parade	1040	+10	1130	+50
- north of Loftus Street	480	+5	380	+25
Urunga Parade				
- west of New Dapto Road	115	+5	180	+10
- west of Dudley Street	95	+15	120	+20
Staff Street				
- south of Crown Street	115	+30	150	+35
Dudley Street				
- north of Urunga Parade	75	+30	70	+35

3.38. Examination of Table 3.2 reveals that:

- traffic flows on Crown Street would increase by some 5 to 105 vehicles per hour (two-way) in the morning peak period. In the afternoon peak period traffic flows would increase by 30 to 245 vehicles per hour (two-way). The greatest increases would be to the west of Staff Street;

- traffic flows would increase by some 5 to 15 vehicles per hour (two-way) on New Dapto Road in the morning peak period. In the afternoon peak period traffic flows would increase by 25 to 60 vehicles per hour (two-way); and

- traffic flows would increase by some 5 to 35 vehicles per hour (two-way) on Urunga Parade, Staff Street and Dudley Street in the morning and afternoon peak periods.

3.39. With this additional traffic, traffic flows on Urunga Parade, Staff Street and Dudley Street would remain below the maximum environmental capacity for a local street.

3.40. The intersections analysed in Chapter 2 were re-analysed, with development traffic in place, using SIDRA. The analysis found that:-

- the intersection of Crown Street and New Dapto Road would continue operates with average delays per vehicle of less than 25 seconds for both peak periods. This represents level of service B, a good level of intersection operation;

- the roundabout at the intersection of New Dapto Road, Loftus Street and Mercury Street would continue to operate with average delays per vehicle of less than 20 seconds for both peak periods. This represents level of service B, a satisfactory level of intersection operation;

- the intersection of New Dapto Road and Urunga Parade would continue to operate with average delays per vehicle of less than 15 seconds for both peak periods. This represents level of service A/B, a good level of intersection operation;

- the intersection of Dudley Street and Urunga Parade would continue to operate with average delays per vehicle of less than 15 seconds for both peak periods. This represents level of service A/B, a good level of intersection operation; and

- the new traffic signal controlled intersection of Crown Street with Staff Street and the site access would operate with average delays per vehicle of less than 20 seconds for both peak periods. This represents level of service B, a good level of intersection operation.

3.41. To assess future traffic conditions along Crown Street, existing traffic through flows along Crown Street have been increased by 25% (allowing for a 2% compound growth per year for 10 years). Using these traffic flows, the two intersections along Crown Street (Staff Street and New Dapto Road) have been reanalysed using SIDRA with development traffic in place. The analysis found that:

- the intersection of Crown Street and New Dapto Road would continue to operate with average delays per vehicle of less than 25 seconds for both peak periods. This represents level of service B, a good level of intersection operation; and

- the new traffic signal controlled intersection of Crown Street with Staff Street and the site access would operate with average delays per vehicle of less than 20 seconds for both peak periods. This represents level of service B, a good level of intersection operation.

3.42. Thus the surrounding road network would accommodate traffic from the proposed development. The proposed new set of traffic signals at the intersection of Crown Street with Staff Street and the site access would operate at a good level of service.

Response to Director General Requirements (DGR's)

3.43. Our response to the DGR's is set out below.

Surrounding context and how the proposal relates with the existing Wollongong public hospital in terms of transport and traffic management

3.44. Existing transport conditions are described in Chapter 2 and the transport and traffic effects are described in Chapter 3.

Estimated vehicular traffic generation from the proposed development and the cumulative impact of this with existing developments and any other known development proposals in the area

3.45. Estimates of traffic generation and its effects is set out in Chapter 3 of this report.

Intersection modelling at relevant intersections to assess any likely impacts

3.46. Intersection modelling of existing and with development traffic conditions has been undertaken using SIDRA as set out in Chapters 2 and 3 of this report. The assessment has also taken into account traffic growth along Crown Street.

Access arrangements which consider options for access from the local road network

3.47. Access to the site is proposed from Crown Street (via a new traffic signal controlled intersection) and Urunga Parade. The proposed access arrangements would minimise traffic on the local road network.

Existing public transport services in the site, including any transport services proposed to be offered by the hospital

3.48. The site is well serviced by existing public transport services as described in Chapter 2. To increase travel to the site by means other the private car, the hospital will operate a courtesy bus.

Measures to encourage mode shift to public transport and reduce reliance on private vehicles and therefore on site car parking

3.49. To encourage travel to the site by means other the private car, the hospital will operate a courtesy bus, provide on site cycle facilities and prepare a work place travel plan. The preparation of a work place travel plan could be included as a condition of approval.

Existing pedestrian and cycle movements within the vicinity of the subject site and determine the adequacy of the proposal to meet the likely future demand for increased pedestrian and cycle access – this may include facilities for secure bicycle storage and cycle amenities

3.50. The proposed development will provide on site bicycle storage and cycle amenities. Pedestrian access will be provided to the site from Crown Street. The provision of traffic signals at the site access will improve pedestrian access in the area and address an existing problem identified by the RTA and Council.

Travel Demand Management (TDM) measures that will optimise the opportunity provided by the project site's proximity to public transport

3.51. A work place travel plan will be prepared to optimise travel to the site by means other the private car and maximise the sites good accessibility to existing public transport services. As discussed previously the preparation of a work place travel plan could be included as a condition of approval. In addition the proposed

development will provide on site bicycle storage and cycle amenities and operate a courtesy bus.

Compliance with the RTA Guide to Traffic Generating Developments

3.52. The transport report has been prepared in accordance with the principles set out in the *RTA Guide to Traffic Generating Developments.*

Internal access arrangements including entry points, drop off points, traffic management and hierarchy

3.53. The proposed access arrangements and internal layout have been designed to comply with AS2890.1-2004 as described in Chapter 3 and are considered appropriate. This matter could also be addressed through a condition of approval.

Off street car parking provision and management measures for on street parking in consideration of Council's City Centre West Parking Management Plan

3.54. Off street parking provision is considered appropriate as described in Chapter 3. No changes are proposed to on street parking.

Service delivery requirements to be considered against AS2890.2

3.55. The service areas will be designed to comply with the requirements of AS2890.2-2002. This matter could also be addressed through a condition of approval.

Emergency evacuation and public access

3.56. This matter has been addressed by others.

Summary

3.57. In summary, the main points relating to the proposed development are:-

(i) the proposed development will strengthen demand for existing public transport services;

(ii) the proposed development is consistent with the state government policy of co-locating complementary developments;

(iii) the proposed parking provision is considered appropriate;

(iv) access arrangements and parking layout, are appropriate;

(v) the proposed traffic signals on Crown Street at the site access would provide a number of benefits to the surrounding area;

(vi) the surrounding road network can cater for the traffic generated by the proposed development; and

(vii) the DGR's requirements have been addressed.