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Life City Wollongong

Life City Wollongong Review Version 3

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Contents

1 Introduction

1.1 Introduction Status

This introduction is a revision to the previous document in order to allow the reader to understand what has changed from the previous proposals. In addition, on the request of the Department of Planning, Arup has made a further consideration of the impact of the removal of stage 4 and this is described in section 3 of this document.

1.2 Documents for Review

Arup has undertaken a peer review of studies relating to the traffic impacts for a proposed Holistic Health Care City at Warwick Street, Berkeley.

The review assessed the following documents and was issued on 22nd April 2013:

- Proposed Part 3A Application for a Holistic Health Care City at Warwick Street, Berkeley, Traffic Impact Assessment, June 2010, Traffic Impact Services Pty.Ltd. Traffic Engineering and Planning Consultants; and
- Life City Wollongong, Traffic and Transport Assessment, February 2013, GHD, Appendix 9 to Part 3A Environmental Application.

Further to the above review the following documents were provided in June 2013 as part of the Preferred Project Report and are listed below:

- Preferred Project Report TCG Planning, 31st May 2013 and associated appendices including a revision to the Traffic and Transportation Assessment by GHD dated 31st May 2013.

These documents cite a number of revisions to the proposals. Those that are relevant to the transport review are as follows:

- A reduced GFA from 61,889.54m2 to 47,059.68m2;
- Stage 8, the Healthcare Technical High School has been removed from the proposal;
- Stage 7, Residential Care Facility has been located where the Healthcare Technical High School was originally proposed;
- Stage 6, Seniors Health Care Housing will be relocated to where stage 7 was to originally be located;
- Stage 3, Hi Tech Holistic Hospital has been advanced from stage 5 to now be stage 3;
- Stage 5 will now be the ‘Medi’ Serviced Apartments;
- Nolan Street access will be stage 3 in conjunction with the Hi Tech Holistic Cancer and Medical Hospital; and
- Following completion of the Nolan Street access, the Warwick Street access will be limited to access for ambulance and for residents of the Residential Care Facility (Stage 7) and the northern car park of the stag 1 (Medical Centre and Day Surgery).

1.3 Original Key Issues and Subsequent Amendments to the Proposals

The key traffic-related issues for the proposed development are as follows. Amendments are shown in bold:

- The Wollongong Hitech Holistic Health Care City, to be constructed on vacant land to the west of Warwick Street and Nolan Street, Berkeley, will be constructed in eight stages with Nolan Street connection being made as part of stage 4. **The revised proposals will be completed within 7 stages with the Nolan Street access being constructed as part of Stage 3;**
- Warwick Street is a residential local road and will need to be protected from over use, particularly following stage 8, the construction of the selective school and the need for parking drop off and pick up arrangements. **Warwick Street continues to be a residential access and will be used upto stage 3 and then have limited use following this stage, it will need to be protected from overuse and this will be assessed within this review;**
- Proposed traffic levels on Nolan Street and Warwick Street may exceed acceptable levels of traffic for the road type. **This issue is still relevant and will be assessed within this review; and**
- Access to public transport will need to be secured to ensure that assumed public transport percentages for different users can be achieved. **This issue is still relevant and will be assessed within this review.**

Important assumptions identified in the *June 2010 Traffic Impact Statement* are as follows. Where the revised document states amendments to these assumptions, this is reported below in bold:

- Road classifications:
  - Nolan Street: Major Collector; and
  - Warwick Street: Local Road.
- Traffic Generation using RTA 2002 Traffic Generating Guidelines:
  - Stage 3: 25% of those attending holistic Course outdoor activities accessing the site via public transport and those driving have vehicle occupancy rate of 2/vehicle. **This is now stage 2 and 20% is assumed to be using public transport with 1 person assumed per vehicle;**
  - Stage 5: All health care workers living on site with no traffic generation, **this is now stage 3 but assumption remains regarding all staff living on site;**
  - **Stage 4: Reduced trip generation based upon 20 units rather than 69 units;**
  - **Stage 6: Reduced trip generation based upon 60 units rather than 86 units;**
  - Stage 7: Health care workers/students living on site, 100 quoted, others assumed to have high public transport use; **Reduced trip generation based on 139 beds rather than 170 beds;**
  - Stage 8: High levels of public transport use by students with only a small number of students driving to the site. **This stage has been removed.**
- Traffic Distribution of 40% to and from the north and 60% to and from the south. This is assumed for all stages including stage 8 the selective high school to be located near to the Warwick Street entrance to the site; **Revised distribution is as follows:**

- **80% of the development traffic would enter and exit via the Nolan Street access with 60% to and from Northcliffe Drive (Southern Freeway) and 40% to and from the Princes Highway.**
- **20% of the development traffic would enter and exit via the Warwick Street access.**

- The Nolan Street Entrance would not be constructed until Stage 4. **The Nolan Street access would be constructed as part of Stage 3;**
- Accommodation for Health care workers is stage 5 with further accommodation in stage 7. **This stage is now stage 3 and the accommodation continues to be in stage 7; and**
- It is assumed that a bus route through the site and 'high' levels of public transport use by students. **This assumption now states that there 'could' be an opportunity to extend this route through the site.**

In addition, on the request of the Department of Planning, Arup has made a further consideration of the impact of the removal of stage 4 and this is described in section 3 of this document.

2 Review

2.1 Review Status

This section is written for the revised proposals and will no longer make reference to the previous work.

2.2 Trip Generation and Distribution

The trip generation and distribution of the different components of the site are calculated from the following sources:

- RTA Guide to Traffic Generating Developments. Version 2.2 October 2002; and
- Previous preliminary report, June 2010 Traffic Impact Statement.

The stated trip generation by GHD is repeated in Table 1. Comments and potential error margins or concerns are listed with each stage. Whilst some of the preliminary assumptions are not justified in either document, errors in most would be likely to result in only small changes in the trip generation. However, for Stage 8, the school, GHD indicates that the trip generation would be 100 vehicles in the peak. This could be significantly underestimated since the school is proposed to be 350 students and the preliminary Transport Report indicates that it would be selective and hence would be more likely to have a wider catchment and lower public transport use. This is not discussed or addressed within the GHD report.

The assessment undertaken assumes that all uses on the site provide a cumulative impact at peak times. A better understanding of the interaction between uses on the site as well as the likely profile of activity for each use over a typical day and a typical week would assist with understanding the total impact of the development, and may indicate a reduced overall impact.

2.3 Staging of the Development

The development proposals were identified as 8 individual stages. In the preliminary transport assessment undertaken, the Nolan Street entrance was proposed after stage 4 where the cumulative peak hour traffic is greater than 147 vehicles per hour. This level of traffic would be achieved following stage 2 with the updated 7 stages defined within the GHD Traffic and Transport Assessment.

Whilst there are doubts over some of the assumptions made within the trip generation calculations, for the purpose of understanding the impact on Warwick Street and Nolan Street, the GHD trip generation numbers have been used.

Table 1 GHD Trip Generation and Review Comments

Stage	Component	Beds/Rooms /Persons	Peak Hour Traffic Generation Rate	Peak Hour Trips	Cum-ulative	Comment	Potential Maximum Error Margin
1	Medical Centre, Day surgery and Respite Care Centre	30 Consulting rooms (19 specialists)	19x4 = 76	76	76	There is no justification for the consulting room rate and the 0.7 trips per child is for the evening peak. The range could be between 0.2 and 1.4 trips per child dependent upon the child age and likely timing of care	Cannot be determined without further data
		10 Beds	10x1	10	86		
	Childcare Centre	70 Children	0.7 trips per child	49	135		
2	Holistic Healthcare Course	Outdoors	*Assumption from preliminary assessment: 30 persons at any time 24 @ 1 per vehicle and 6 public transport	24	159	PT could be high but conservative assumption for car occupancy hence n change suggested	No change
3	Hi-Tech Holistic Cancer and Medical Hospital	320 beds	*Assumption from Preliminary assessment: 0.97 per bed reduced by 35 as staff accommodation on site	275	434	For this assumption to be retained, stages 4 and 5 accommodation must be used by staff, this has not been confirmed	Cannot be determined without further data
4	Ancillary accommodation and research, library, lecture theatre, auditorium	No details provided	*Assumption from Preliminary assessment: 100 trips – assumes high public transport usage	100	534	No justification for PT use or trip generation. The use, operation and interaction of this landuse with other stages of construction is not made clear.	Cannot be determined without further data
5	Serviced Apartments (Medium Density)	8x2 bedrooms 12x3 bedrooms	0.4-0.5/dwelling (RMS Medium density)	10	544	3 bedroom medium density rate should be 0.5-0.65/ dwellings. Appears to have been used	No change
6	Self-Care Seniors housing	60 units 20x1 bedroom 20x2 bedrooms 20x3 bedrooms	0.4-0.5/dwelling (RMS Medium density)	30	574	3 bedroom medium density rate should be 0.5-0.65/ dwellings. Appears to have been used	No change

Stage	Component	Beds/Rooms /Persons	Peak Hour Traffic Generation Rate	Peak Hour Trips	Cum-ulative	Comment	Potential Maximum Error Margin
7	Residential Care Facility and Hostel	139 beds	0.1-0.2/bed (RMS)	28	602		
	TOTAL				602		

2.4 Road Network and Site Access

The road access to the site is proposed via Warwick Street (a local road) and Nolan Street (a major collector road). It is proposed that the Nolan Street access would take approximately 80% of the development traffic and Warwick Street would take 20% in the full build out scenario.

The proposed Nolan Street access would be implemented prior to the operation of Stage 3 when the cumulative trip generation is estimated to be 159 vehicles in the peak. Following this, the Warwick Street access would only serve stage 7, the residential care facility and the northern section of Stage 1 the medical centre, 28 and 86 peak hour vehicles respectively. There would be no through access from Warwick Street to the remainder of the site except for emergency vehicles. All other vehicles including service vehicles would access the site via Nolan Street.

2.4.1 Road classifications

Roadway capacity is not solely measured in terms of vehicle throughput capacity. Traffic volume limits are necessary on minor roads as pedestrian safety is of primary concern, and noise is also an important factor. Traffic on any class of road has an impact on the amenity of an area, and the environmental capacity of local streets is an important consideration in planning for the range of uses, perceptions and attitudes to traffic impacts in a particular area.

Table 2 sets out recommended environmental capacity performance standards for streets providing access to residential properties.

Table 2 Environmental capacity performance standards on residential streets

Road Class	Road Type	Maximum Speed (km/hr)	Maximum peak hour volume (veh/hr)
Local	Accessway	25	100
	Street	40	200 environmental goal
			300 maximum
Collector	Street	50	300 environmental goal
			500 maximum

Source: RTA Guide to Traffic Generating Developments 2002 Table 4.6

In the performance standards set out in Table 2, two levels are given - one for the desirable maximum (the environmental goal), and one for the absolute maximum peak hour volume of traffic. There may be situations where alterations to these levels might be appropriate, however it is up to the developer to justify a departure from the standards.

For example, a road with a wide central-median, and with separate carriageways of approximately 5 metres width would have less impact on pedestrian safety than an undivided road of width 7 metres, and hence could accommodate a higher traffic flow for the same degree of safety.

Table 2 indicates that the functional classification of the street is important. While two streets may be similar, if one street functions as a collector street, then local access, safety and amenity are not the only issues to be considered. The movement of traffic along the street from adjoining areas also becomes a planning issue. Since it is still a residential area both traffic movement and planning issues need to be accommodated.

The RTA/RMS *Road Design Guide* further provides that within the Sydney conurbation, traffic volumes on collector roads providing access to areas including mixed uses may operate within a range of 5,000-10,000 vehicles per day.

Using traffic volumes collected by GHD as part of the May 2013 Traffic and Transport Assessment, and included in Appendix A of their report, Warwick Street and Nolan Street already carry two-way peak hour traffic volumes as indicated below:

- Warwick Street – 67 veh/hr AM and 84 veh/hr PM and counted in 2012 at its junction with Nolan Street (Translating to 840 veh/day assuming 10 times the greatest peak volume);
- Nolan Street –532 veh/hr AM and 628 veh/hr PM and counted in 2012 north of its junction with Warwick Street (Translating to 6,280 veh/day assuming 10 times the greatest peak volume);
- Nolan Street –547 veh/hr AM and 602 veh/hr PM and counted in 2012 south of its junction with Warwick Street (Translating to 6,020 veh/day assuming 10 times the greatest peak volume); and
- Nolan Street –853 veh/hr AM and 812 veh/hr PM and counted in 2012 east of its junction with Princess Highway (Translating to 8,530 veh/day assuming 10 times the greatest peak volume).

These numbers do not accord with those quoted in Table 2 of the GHD report or used in the base junction assessments.

Warwick Street and Nolan Street are both key routes providing access to the proposed development. Additional traffic volumes on these streets as a result of the development have the potential to impact on the safety and amenity of local residents.

It should be noted that the existing traffic volumes on Nolan Street are already in excess of the environmental and maximum peak hour capacities and from a daily perspective in the upper end of the RMS 5000-10000 daily capacity for a collector road. Nolan Street is already providing an important function in this area.

2.4.2 Warwick Street Access

With the addition of stages 1 and 2 traffic, an additional 159 peak hour or 1,590 daily vehicles will travel along Warwick Street resulting in a total peak hour two way traffic level that is just greater than the environmental goal for a local street if all traffic uses Warwick Street for access to the development. Beyond Stage 2, Stage 3 could be accommodated within the recommended maximum of 300 vehicles since access would be restricted to only stage 1 traffic of 86 peak hour vehicles until stage 7 where an additional 28 vehicles in a peak hour would use Warwick Street access.

This full development would equate to 114 peak hour vehicles and hence would be within acceptable parameters. The physical restriction of access to the remainder of the site via Warwick

Street would prevent greater volumes of traffic from using this access. This is summarised in Table 3.

Table 3 Warwick Street Assessment of Environmental Capacity

	AM (Veh 2 way)	PM (Veh 2 way)	Environmental Goal and Maximum	Comment
Existing Traffic flow	67	84	200-300	
Development Traffic flow prior to Nolan Street entrance construction	156	156		Total traffic equates to 223 and 240 vehicles in the AM and PM peaks respectively and is within the Maximum (300) for the street but exceeding the environmental capacity (200) for the street during this phase of construction. This does not take into consideration the construction traffic that may use this street.
Development Traffic flow after Nolan Street entrance constructed	114	114		Total traffic equates to 181 and 198* vehicles in the AM and PM peaks respectively and is within the Environmental Capacity of the street

*It should be noted that the total of 602 peak hour vehicles minus 482 vehicles using the Nolan Street access (see below) equates to 120 vehicles which would add an additional 6 vehicles to the above calculation and take the PM peak number of vehicles 4 vehicles over the environmental capacity goal in the stage 7 scenario.

2.4.3 Nolan Street Access

The Nolan Street access is proposed to carry 80% of the traffic generated by the development. In Stage 7 this equates to (602 x 80%) 482 vehicles in the peak of which 60% or 252 vehicles in the peak are stated to travel to and from the south and 40% or 169 vehicles in the peak are stated to travel to and from the north. This equates to 2,520 veh/day south and 1,690 veh/day north on Nolan Street. When combined with the existing levels of traffic this results in the following:

- 7,710 (6,020 +1,690) veh/day on the northern section of Nolan Street or 771 veh/hr in the peak; and
- 11,050 (8,530 + 2,520) veh/day on the southern section of Nolan Street or 1,105 vehicles per hour.

Appropriate demand for available capacity has been assessed for the peak hour (environmental and maximum capacity of 300-500 peak hour vehicles) and for daily capacity (10,000 vehicles per day).

For the northern and southern sections of Nolan Street, the existing traffic levels exceed the maximum and environmental capacity for Nolan Street in the peak hours (ie traffic levels exceed 300-500 peak hour vehicles).

The northern section of Nolan Street is within the RMS maximum of 10,000 veh/day but the southern section of Nolan Street would exceed the RMS maximum levels of daily traffic for a collector road of 10,000 veh/day. This is summarised in Table 4.

Table 4 Nolan Street Assessment of Environmental Capacity

	AM (Veh 2 way)	PM (Veh 2 way)	Environmental Goal and Maximum	Comment
Northern Section of Nolan Street				
Existing Traffic flow	547	602	300-500	Total traffic equates to 716 and 771 vehicles in the AM and PM peaks respectively. This is beyond the environmental and maximum capacity of the street during the peak hour, however, the daily capacity would be under 10,000 vehicles per day and hence is within acceptable RMS limits for a Collector road.
Development Traffic flow after the Nolan Street entrance construction	169	169		
Southern Section of Nolan Street				
Existing Traffic flow	853	812	300-500	Total traffic equates to 1105 and 1064 vehicles in the AM and PM peaks respectively. This is beyond the environmental and maximum capacity of the street during the peak hour, and the daily capacity would exceed 10,000 vehicles per day and hence is greater than the acceptable RMS limit for a Collector Road.
Development Traffic flow after the Nolan Street entrance construction	252	252		

2.5 Trip Distribution and Assignment

The trip distribution assumed by GHD states 40% to and from the north and 60% to and from the south. This is opposite to the distribution that is identified within the preliminary Traffic Impact Assessment report. No explanation is provided for this change in distribution. Whilst it is not considered that this assumption will have a significant impact upon the results of the analysis, an explanation of the derivation of the distribution should be provided.

The generated traffic for the morning and evening has been assumed to be the same for each peak and the split of generated traffic entering and exiting the site has been assumed to be 50/50 for all land uses. Neither of these assumptions has been justified and they are unlikely to be the case for many of these land uses. Traffic levels on specific movements where arrival flows are larger during the morning or departure flows are larger during the evening will be underestimated. However, the LOS on most junctions is within acceptable parameters and is unlikely to be impacted significantly by changes to these assumptions.

2.6 Junction Analysis

Junction analysis indicates that the junctions will operate within acceptable limits of less than LOS E in the 2021. The 2031 scenario would require a roundabout to be constructed at the Nolan Street/Life City Entrance intersection to reduce the LOS from D to A.

2.7 Parking

A comparison of proposed parking provision against trip generation is provided. Different stages, particularly stages 2 and 5 appear to underestimated parking provision which may cause parking problems during early phases of the development. Beyond this, for full build out the total number

indicated for provision is stated by GHD to 'exceed the required 602 parking spaces required under Wollongong City Councils DCP' however, this assumes that parking is shared across the site. This is unlikely, particularly where there are elderly or mobility impaired users and residents. With the removal of the previous stage 8 of the proposals the parking is considered to be less of a problem on site with only stage 4 being ambiguous with respect to operation or actual requirements. It is recommended that more details be provided for stage 4 to confirm that the spaces provided will be adequate.

Table 5 Parking and Trip Generation Proposed

Stage	Component	Beds/Rooms/ Persons/GFA	Parking Requirements	No. Spaces (WCC DCP)	No. Spaces provided	Peak Hour Trips	Comment	Potential Maximum Error Margin
1	Medical Centre, Day surgery and Respite Care Centre	6,000 m2 GFA	4 spaces per consulting room and 1 space per 3 employees	135	140	76	Parking could accommodate the trip generation	
		10 Beds				10		
	Childcare Centre	70 children	1 per 6 children 1 per staff present 1 accessible 2 large spaces	20	20	49		
2	Holistic Healthcare Course	Outdoors	Assumption from the preliminary transport report 30 persons at any time, assume 20	20	20	24	Parking may not be enough for this land use unless other bays on site are shared	4 spaces
3	Hi-Tech Holistic Cancer and Medical Hospital	320 beds	1 space per 2 beds plus 1 space per practitioner and 1 per 2 employees	224	280	275	Parking could accommodate the trip generation	
4	Ancillary accommodation and research, library, lecture theatre, auditorium			80	70	100	The use, operation and interaction of this landuse with other stages of construction is not made clear.	Cannot be determined without further data
5	Serviced Apartments (Medium Density)	8x2 bedrooms 12x3 bedrooms	1 space/1 bedroom (<70m2) 2 spaces/2 bedroom	34	44	10		

Stage	Component	Beds/Rooms/ Persons/GFA	Parking Requirements	No. Spaces (WCC DCP)	No. Spaces provided	Peak Hour Trips	Comment	Potential Maximum Error Margin
			(+110m2) 0.2 per dwelling for visitors					
6	Self-Care Seniors housing	60 units 20x1 bedroom 20x2 bedrooms 20x3 bedrooms	Seniors housing 0.5 per bedroom	60	60	30		
7	Residential Care Facility and Hostel	170 beds	1 space per 10 beds plus 1 per 2 employees	28+1 ambulance	46	28	No staff numbers provided, however, parking could accommodate the trip generation.	Cannot be determined without further data
	TOTAL			602	680			

2.8 Public Transport

Public transport to the site is via bus route 34 which currently travels along Nolan Street at a frequency of 2-3/hour from 6am to 8.30pm Monday to Friday. This service also operates on weekends and public holidays and provides access to and from Warrawong and Wollongong. There are no further details related to diverting traffic into the development site. In order to agree that high levels of public transport can be achieved for this development, a more detailed understanding of the likely catchment of the centre would be required and considered within the context of this single route.

The sensitivity tests undertaken to test mode share where no public transport is used has been undertaken. This impacts on stages 2,3 and 4. The Nolan Street/Life City Access junction has been assessed for the roundabout layout giving a LOS A in the sensitivity test.

3 Impact of Removal of Stage 4

3.1 Overview

The Department of Planning has requested that the impact of the removal of Stage 4 be considered by Arup. This section gives as summary of the impact of this action on the proposals.

3.2 Analysis

3.2.1 Trip Generation and Distribution

The removal of Stage 4 would result in the 100 vehicles estimated to be generated by this stage being removed from the analysis. The total number of trips for all remaining 6 stages would be 502 peak hour vehicles as shown in Table 6. This will result in 100 less vehicles using the Nolan Street access during peak hours, 40 less vehicles to and from the north and 60 less vehicles to and from the south.

Table 6 Trip Generation with Stage 4 Removed

Stage	Component	Beds/Rooms /Persons	Peak Hour Traffic Generation Rate	Peak Hour Trips	Cum-ulative	Comment	Potential Maximum Error Margin
1	Medical Centre, Day surgery and Respite Care Centre	30 Consulting rooms (19 specialists)	19x4 = 76	76	76	There is no justification for the consulting room rate and the 0.7 trips per child is for the evening peak. The range could be between 0.2 and 1.4 trips per child dependent upon the child age and likely timing of care	Cannot be determined without further data
		10 Beds	10x1	10	86		
	Childcare Centre	70 Children	0.7 trips per child	49	135		
2	Holistic Healthcare Course	Outdoors	*Assumption from preliminary assessment: 30 persons at any time 24 @ 1 per vehicle and 6 public transport	24	159	PT could be high but conservative assumption for car occupancy hence n change suggested	No change
3	Hi-Tech Holistic Cancer and Medical Hospital	320 beds	*Assumption from Preliminary assessment: 0.97 per bed reduced by 35 as staff accommodation on site	275	434	For this assumption to be retained, stages 4 and 5 accommodation must be used by staff, this has not been confirmed	Cannot be determined without further data

Stage	Component	Beds/Rooms /Persons	Peak Hour Traffic Generation Rate	Peak Hour Trips	Cum-ulative	Comment	Potential Maximum Error Margin
4	STAGE 4 REMOVED						
5	Serviced Apartments (Medium Density)	8x2 bedrooms 12x3 bedrooms	0.4-0.5/dwelling (RMS Medium density)	10	444	3 bedroom medium density rate should be 0.5-0.65/ dwellings. Appears to have been used	No change
6	Self-Care Seniors housing	60 units 20x1 bedroom 20x2 bedrooms 20x3 bedrooms	0.4-0.5/dwelling (RMS Medium density)	30	474	3 bedroom medium density rate should be 0.5-0.65/ dwellings. Appears to have been used	No change
7	Residential Care Facility and Hostel	139 beds	0.1-0.2/bed (RMS)	28	502		
	TOTAL				502		

3.3 Nolan Street Road Network Assessment

The resultant flows on Warwick Street are not impacted, but the flows on Nolan Street would be reduced as shown in Table 7. The conclusions are not changed but the daily number of vehicles is reduced to a level that is only marginally above the RMS daily maximum for a collector Road on the southern section. It should be noted that stage 4 is the element of the proposals with the greatest level of uncertainty on likely trip generation and operation and hence, its removal allows us to be more certain of the likely conclusions identified in this review.

Table 7 Nolan Street Resultant Flows with Stage 4 Removed

	AM (Veh 2 way)	**PM (Veh 2 way)**	**Environmental Goal and Maximum**	**Comment**
Northern Section of Nolan Street (Reduction of 40 peak hour trips)				
Existing Traffic flow	547	602	300-500	Total traffic equates to 676 and 731 vehicles in the AM and PM peaks respectively. This is beyond the environmental and maximum capacity of the street during the peak hour, however, the daily capacity would be under 10,000 vehicles per day and hence is within acceptable RMS limits for a Collector road.
Development Traffic flow after the Nolan Street entrance construction	129	129		
Southern Section of Nolan Street (Reduction of 60 peak hour trips)				
Existing Traffic flow	853	812	300-500	Total traffic equates to 1045 and 1004 vehicles in the AM and PM peaks respectively. This is beyond the environmental and maximum capacity of the street during the peak hour, however, the daily capacity would be only marginally greater than the RMS maximum of 10,000 vehicles per day for a Collector road.
Development Traffic flow after the Nolan Street entrance construction	192	192		

4 Agency and Community Submissions

The following table represents the comments made by Public Agencies and the Community with respect to Transport only. The Arup response to these comments has been included below.

Issue	Summary of Issue Raised	Proponent Response	Arup Conclusion
Department of Planning and Infrastructure			
a) Scale of the development in the context of the surrounding locality / overdevelopment of:	Traffic volumes of the completed development do not exceed the environmental capacity of the surrounding residential streets, including Warwick Street and Nolan Street.	Changes to the Warwick Street access arrangements will restrict access to ambulances; staff/residents of the residential care facility; and the northern medical centre carpark only. This will occur once access from Nolan Street has been constructed at Stage 3 and will therefore restrict traffic flow through Warwick Street and Hopman Crescent.	**Warwick Street - Development Traffic flow prior to Nolan Street entrance construction** Total traffic equates to 223 and 240 vehicles in the AM and PM peaks respectively and is within the Maximum for the street but exceeding the environmental capacity for the street during this phase of construction. This does not take into consideration the construction traffic that may use this street. **Warwick Street - Development Traffic flow after Nolan Street entrance constructed** Total traffic equates to 181 and 198 (It should be noted that the total of 602 peak hour vehicles minus 482 vehicles using the Nolan Street equates to 120 vehicles which would add an additional 6 vehicles to the above calculation and take the PM peak number of vehicles 4 vehicles over the environmental capacity goal in the stage 7 scenario.) Using the trip generation numbers, vehicles in the AM and PM peaks respectively and is within the Environmental Capacity of the street
d) Landslip and geotechnical issues	The proposed cut and fill is excessive and has implications for slope stability. In addition to landslip and geotechnical concerns, the excessive cut and fill would also give rise to excessive truck movements and excessive noise and dust during the	"Coffey agrees that the proposed development at the site will involve significant earthworks, including significant cutting (approximately 121,000m3 of cut) and some filling (approximately 8,000m3 of fill). There will be a net cut volume of about 113,000m3 that we understand will be removed offsite as part of the development	It is considered that 113,000m2 of excavation is likely to result in a significant number of truck vehicle movements to and from the site over the excavation stage of construction. The effect of construction vehicles on the surrounding road network should be minimised. A Construction Traffic Management Plan and Traffic

Issue	Summary of Issue Raised	Proponent Response	Arup Conclusion
	construction phase, which would have an unnecessary and unreasonable impact on the residential amenity of the surrounding locality.	proposal.	Control Plan should be submitted, detailing the construction traffic timings, volumes, access locations and routes. Mitigation measures to ensure safety should be provided for the site and surrounding road network where required.
f) Traffic and access	The Department engaged ARUP to peer review the Traffic and Transport Assessment (GHD 2013) which accompanied the Environmental Assessment, together with the earlier Traffic Impact Assessment (Traffic Impact Services 2010). The review indicates: That the trip generation in relation to the Stage 8 school are likely to be significantly underestimated since the 350 student school will be selective and is likely to have a wider student catchment greater private car dependency and lower public transport use. The environmental capacity of Warwick Street would be exceeded by Stage 2 of the Development, and that Stage 3 could be accommodated within the recommended maximum of 300 vehicles. However, substantial amenity impacts would occur beyond Stage 3 without the introduction of the Nolan Street entrance. No traffic management measures are proposed in order to achieve the 20% and 80% distribution of total traffic generated	The Stage 8 School is no longer proposed as part of the amended concept plan. Construction of the Nolan Street access is proposed to be brought forward to Stage 3. Therefore only Stage 1 and 2 will utilise the Warwick Street access before this time. Once Nolan Street access is operational at Stage 3, all vehicles will access the site from Nolan Street, with the exception of ambulances; residents/staff of the Residential Care Facility and the northern carpark of the Medical Centre only. The revised Traffic and Transport Report prepared by GHD in May 2013 confirms that the road network surrounding the Life City development would operate satisfactorily under forecast 2021 and 2031 traffic flows including background traffic growth and traffic generated by the development in both the AM and PM peaks. The recommended peak hour volume of Warwick Street (local road) is up to 200. This will not be exceeded by the current maximum peak hour (PM) volume of 65 vehicles on Warwick Street, together with the anticipated evening peak hour vehicles of 68 accessing the Stage 1 Medical Centre and 12 vehicles accessing the Stage 2 Holistic Health Course. Further, following the construction of the Nolan Street access at Stage 3 the anticipated evening peak development traffic of 60 vehicles (20%of 301) coupled with existing peak hour traffic flows (of 65) will also not exceed the recommended traffic volumes on	Accept that the school reduces traffic proposed for Warwick Street. The peak hour flows on Warwick Street and Nolan Street are as indicated below. Traffic Flows on main access roads to the site **Warwick Street - Development Traffic flow prior to Nolan Street entrance construction** Total traffic equates to 223 and 240 vehicles in the AM and PM peaks respectively and is within the Maximum for the street but exceeding the environmental capacity for the street during this phase of construction. This does not take into consideration the construction traffic that may use this street. **Warwick Street - Development Traffic flow after Nolan Street entrance constructed** Total traffic equates to 181 and 198 (It should be noted that the total of 602 peak hour vehicles minus 482 vehicles using the Nolan Street equates to 120 vehicles which would add an additional 6 vehicles to the above calculation and take the PM peak number of vehicles 4 vehicles over the environmental capacity goal in the stage 7 scenario.) Using the trp generation numbers, vehicles in the AM and PM peaks respectively and is within the Environmental Capacity of the street **Northern Section of Nolan Street**

Issue	Summary of Issue Raised	Proponent Response	Arup Conclusion
	by the development. Traffic management measures on Warwick Street should be included in the proposal in order to ensure that 20% of the development traffic using this access is not exceeded.	Warwick Street (of up to 200). Nolan Street is a collector road with a recommended peak hour flow of 200-1000 vehicles per hour. This will not be exceed by the 80% of the predicted 301 peak hour vehicles which will utilise this road (ie.240) and the existing PM peak hour flows of 484. In order to ensure limited traffic along the residential streets of Warwick Street and Hopman Crescent, upon completion of the Nolan Street access at Stage 3, the Warwick Street access will be designed to restrict access to ambulances, to the Residential Care Facility and to the northern carpark of the medical centre only. Such measures include the provision of a cul-de-sac head at the end of the Nolan Street access and the provision of designated paving and signage to allow only emergency vehicle access in the link section between each access road. This measure will enforce an approximate 20% restriction of traffic flow from Warwick Street.	Total traffic equates to 716 and 771 vehicles in the AM and PM peaks respectively. This is beyond the environmental and maximum capacity of the street during the peak hour, however, the daily capacity would be under 10,000 vehicles per day and hence is within acceptable RMS limits for a Collector road. **Southern Section of Nolan Street** Total traffic equates to 1105 and 1064 vehicles in the AM and PM peaks respectively. This is beyond the environmental and maximum capacity of the street during the peak hour, and the daily capacity would exceed 10,000 vehicles per day and hence is greater than the acceptable RMS limit for a Collector Road.
Wollongong City Council			
d. Issue 1E Lot Isolation	The lot is considered to be isolated by way of access to public transport and commercial facilities. The site is located approximately 1.5km from the nearest train station and at least 6km from the nearest commercial centre. These distances present a significant constraint for staff, services, visitors and residents.	The site is appropriately sited to provide the immediate medical needs of residents with the Stage 1 Medical Centre and Day Surgery. The Stage 3 (Hi-Tech Holistic Cancer and Medical Hospital) will service regional medical needs (and beyond) and is appropriately located within the broader Illawarra region to meet the needs of such residents. In order to support higher public transport usage the Traffic and transport assessment dated 23 May 2013 recommends the following elements be included in the	Arup supports the inclusion of measures to increase public transport use. A full travel plan should be prepared to ensure that these are implemented successfully as part of the development.

Issue	Summary of Issue Raised	Proponent Response	Arup Conclusion
		development: • Shuttle bus service to the from Unanderra and / or Kembla Grange railway station; • Coordinating a car sharing scheme; • Development of public transport information programs and promotions • Providing and encouraging the use of the local pedestrian environment • Providing and encouraging the use of cycle facilities • Negotiating service requirements with transport agencies; and • Developing attractive flexible working practices.	
h. Issue 2 Access & Parking	Concern over the use of the Warwick Street access, and how traffic will be discouraged from using this access to prevent loss of amenity for Warwick Street residents **Warwick Street Access** There are concerns over the proposed access with Warwick Street; being a local residential road with background traffic of just 650 vehicle trips per day. As a second access it could become a 'rat run' for drivers accessing the site from the north. Plan measurements show this route to be approximately 200 metres shorter which would make it more attractive to drivers. The Traffic and Transport Assessment states that this access is mainly for the high school (20% of the total traffic generation). However concerns remain over how the other 80% of traffic is to be discouraged to	The access road from Nolan Street will be the primary access to the site, following the construction of this access road in Stage 3, as requested by the Department of Planning and Infrastructure. Changes to the Warwick Street access arrangements which will occur at Stage 3 will restrict access from Warwick Street to ambulances; staff/residents of the Residential Care Facility; and the Stage 1 Medical centre only. Works will be undertaken at Stage 3 to prevent direct access through the site through the construction of a cul-de-sac head and delineated paving and signage, thereby eliminating the potential 'rat run'. The High School has been deleted from the project. Therefore, once operational, the only traffic utilizing the Warwick Street access will initially be the Stage 1 medical centre, which at Stage 3 will be replaced by the Stage 1 Medical centre northern carpark and Stage 7 Residential Care facility traffic.	The proposed amendments to the Warwick Street Access should provide adequate deterrent against high volumes of traffic and rat running on Warwick Street. The removal of the stage 8 school will contribute to this.

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<tr><th>Issue</th><th>Summary of Issue Raised</th><th>Proponent Response</th><th>Arup Conclusion</th></tr>
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<td></td>
<td>prevent loss of amenity for Warwick Street residents.

Nolan Street Access
The proposed roundabout at Nolan Street is to be designed in accordance with Austroads. Signs and line marking are to be considered by Council’s Local Traffic Committee prior to the issue of the Construction Certificate.

Parking
The proposed car parking provision is acceptable, however the applicant will need to provide more details regarding bicycle and motorcycle provision (numbers and locations of facilities). The size of accessible car parking spaces proposed on page 18 of GHD’s Traffic and Transport Assessment do not comply with AS2890.6 (current disabled parking standard).

Cyclist Provision
Consideration should be given to providing a 2.5 metre shared path on the Nolan Street access road into the site. It should be noted that Council’s draft cross sections for new roads with traffic volumes greater than 1000 vehicles per day provide a 2.5 metre shared path on one side of the road. Bicycle parking spaces are to have adequate</td>
<td>Noted.

Details of bicycle and motorcycle parking have been included in the Traffic and Transport Assessment, dated 23 May 2013 prepared by GHD:
<table><tr><th>Stage</th><th>Bicycle</th><th>Motorcycle</th></tr><tr><td>1</td><td>9</td><td>-</td></tr><tr><td>2</td><td>-</td><td>-</td></tr><tr><td>3</td><td>45</td><td>9</td></tr><tr><td>4</td><td>10</td><td>4</td></tr><tr><td>5</td><td>8</td><td>1</td></tr><tr><td>6</td><td>-</td><td>-</td></tr><tr><td>7</td><td>-</td><td>-</td></tr></table>
A total of 72 bicycle spaces and 14 motorcycle spaces will be provided across the site. It is anticipated that the majority of persons accessing the site will utilise private vehicles and will enter the site directly to access the car parking areas. Further, it is noted that this standard applies to a public road, whilst the Nolan Street access will be retained as a private access.</td>
<td>The following requirements are deemed required by the Wollongong DCP
For the medical centre stage 1: 1 bicycle space for the centre parking spaces and 1 motorcycle space per 25 car parking spaces.
For the child care stage 1: 1 bicycle space for the 200m2 and 1 motorcycle space per 25 car parking spaces.
7 motorcycle spaces should be provided for stage 1. The GFA of the child care centre is unknown but the number of bicycle bays seems reasonable for the number of children proposed
Stage 2 – no requirement
For the hospital stage 3: 1 bicycle space per 5 parking spaces and 1 motorcycle space per 25 car parking spaces. This is correctly calculated.
For the stage 4 (assuming this functions like a function centre): 1 bicycle space per 25m2 and 1 motorcycle space per 25 car parking spaces. There is adequate provision for the motorcycle bays but the number of bicycle bays cannot be confirmed from the information provided.</td>
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Issue	Summary of Issue Raised	Proponent Response	Arup Conclusion
	weather protection, passive surveillance and lighting. Adequate security should also be provided (as required by Austroads) to ensure the viability of these spaces.		For the serviced apartments stage 5: 1 bicycle space per 3 dwellings for residents and 1 space per 12 dwellings for visitors and 1 motorcycle space per 15 dwellings. Adequate provision Stage 6 – no requirement Stage 7 – no requirement
	Proximity to the F6 Freeway The development should comply with NSW Government's 'Development Near Rail Corridors and Busy Roads – Interim Guideline'.	Noted and has been referenced in the Statement of Commitments.	
	Future Public and Active Transport Opportunities The Traffic Section supports the introduction of initiatives and plans listed under this section which will help to increase the uptake of sustainable travel.	In order to support higher public transport usage, the TIA dated 23 May 2013 recommends the following elements be included in the development: • Shuttle bus service to and from Unanderra and / or Kembla Grange railway station; • Coordinating a car sharing scheme; • Development public transport information • programs and promotions; • Providing and encouraging the use of the local • pedestrian environment; • Providing and encouraging the use of cycle • facilities; • Negotiating service requirements with transport agencies; and • Developing attractive flexible working practices.	Arup supports the inclusion of measures to increase public transport use. A full travel plan should be prepared to ensure that these are implemented successfully as part of the development.
Community Submission			
a) Traffic and Parking	A significant concern expressed throughout a number of submissions specifically related to traffic flow, site access and	**Traffic**: Stage 1 of the development will include the construction of the Warwick Street access. This first	The proposed amendments to the Warwick Street Access should provide adequate deterrent against high volumes of traffic and rat running on Warwick

Issue	Summary of Issue Raised	Proponent Response	Arup Conclusion
	parking. The concerns raised specifically related to the insufficient count of current traffic flow, lack of public transport, insufficient onsite parking provision, inappropriate weight upon the Warwick Street access point and expected higher traffic flows. One particular submission expressed concern regarding construction of the Warwick Street access and the impact upon residential amenity during construction stage. One submission did not indicate an objection to the proposal, however, provided a request for a revision of the originally proposed Warwick Street entrance. This submission raised concern that the Nolan St access would not be used as the main entrance and that it would be inappropriate for Warwick Street to be used as a main entrance with high traffic flow. Concern was expressed that the proposed arrangement was insufficient to ensure Nolan Street would be utilised as the main entrance.	stage access will therefore serve the Stage 1 Medical Centre & Day Surgery and the Stage 2 Holistic Health Care Course until the development of the Nolan Street access at Stage 3 in conjunction with the construction of the hospital. Upon construction of the Nolan Street access, alterations to the Warwick Street access will be implemented which will restrict access from Warwick Street to emergency vehicles, to residents and staff of the Residential Care Facility (Stage 7) and to the northern carpark of the Stage 1 Medical Centre & Day Care Surgery only. This traffic management outcome will be achieved through the provision of a cul-de-sac head at the end of the Nolan Street access which will prevent a direct through link to the Warwick Street access. Emergency vehicles which require access to the Stage 3 hospital will be able to access from Warwick Street if required by utilising a section of link road delineated for emergency use only through paving and signage. The proposed amendments will therefore result in a significant reduction in traffic flow through the residential streets of Warwick Street and Hopman Crescent. The revised Traffic and transport Report prepared by GHD in May 2013 confirms that the road network surrounding the Life City development would operate satisfactorily under forecast 2021 and 2031 traffic flows including background traffic growth and traffic generated by the development in both the AM and PM	Street. The removal of the stage 8 school will contribute to this. Accept that the school reduces traffic proposed for Warwick Street. The peak hour flows on Warwick Street and Nolan Street are as indicated below. Traffic Flows on main access roads to the site **Warwick Street - Development Traffic flow prior to Nolan Street entrance construction** Total traffic equates to 223 and 240 vehicles in the AM and PM peaks respectively and is within the Maximum for the street but exceeding the environmental capacity for the street during this phase of construction. This does not take into consideration the construction traffic that may use this street. **Warwick Street - Development Traffic flow after Nolan Street entrance constructed** Total traffic equates to 181 and 198 (It should be noted that the total of 602 peak hour vehicles minus 482 vehicles using the Nolan Street equates to 120 vehicles which would add an additional 6 vehicles to the above calculation and take the PM peak number of vehicles 4 vehicles over the environmental capacity goal in the stage 7 scenario.) Using the trp

Issue	Summary of Issue Raised	Proponent Response	Arup Conclusion
		peaks. The recommended peak hour volume of Warwick Street (local road) is up to 200. This will not be exceeded by the current maximum peak hour (PM) volume of 65 vehicles on Warwick Street, together with the anticipated evening peak hour vehicles of 68 accessing the Stage 1 Medical Centre and 12 vehicles accessing the Stage 2 Holistic Health Course. Further, following the construction of the Nolan Street access at Stage 3 the anticipated evening peak development traffic of 60 vehicles (20%of 301) coupled with existing peak hour traffic flows (of 65) will also not exceed the recommended traffic volumes on Warwick Street (of up to 200). Nolan Street is a collector road with a recommended peak hour flow of 200-1000 vehicles per hour. This will not be exceed by the 80% of the predicted 301 peak hour vehicles which will utilise this road (ie.240) and the existing PM peak hour flows of 484. **Public transport:** Public transport is available via Route 34 provided by Premier Illawarra and future discussion and investigations will be undertaken to determine the feasibility of an extension of this route through/to the property. Premier Illawarra has advised in correspondence dated 4 March 2010 (which accompanied the EA) that deviation of this route to accommodate the development is a matter which it would be interested in. Residential amenity during construction : Noted.	generation numbers, vehicles in the AM and PM peaks respectively and is within the Environmental Capacity of the street **Northern Section of Nolan Street** Total traffic equates to 716 and 771 vehicles in the AM and PM peaks respectively. This is beyond the environmental and maximum capacity of the street during the peak hour, however, the daily capacity would be under 10,000 vehicles per day and hence is within acceptable RMS limits for a Collector road. **Southern Section of Nolan Street** Total traffic equates to 1105 and 1064 vehicles in the AM and PM peaks respectively. This is beyond the environmental and maximum capacity of the street during the peak hour, and the daily capacity would exceed 10,000 vehicles per day and hence is greater than the acceptable RMS limit for a Collector Road. Arup supports the inclusion of measures to increase public transport use. A full travel plan should be prepared to ensure that these are implemented successfully as part of the development. Consideration of the extension of public transport routes should be included within the preparation of a travel plan.

Issue	Summary of Issue Raised	Proponent Response	Arup Conclusion
		The revised Statement of Commitments confirms that an EMP, Construction Noise and Environmental Management Plan and a Community Consultation Plan will be prepared prior to construction.	A Construction Traffic Management Plan and Traffic Control Plan should be submitted, detailing the construction traffic timings, volumes, access locations and routes. Mitigation measures to ensure safety should be provided for the site and surrounding road network where required.

5 Conclusions

In summary, on the basis of our review of available traffic-related documentation and analysis for the proposal:

- Warwick Street can accommodate stages 1-2 within acceptable levels of capacity performance. Stage 3 will use the Nolan Street entrance;
- The internal layout of the development is proposed to and must restrict/prevent access from Warwick Street to stages 3 to 7;
- Only stage 4 remains ambiguous in terms of its operation and likely trip generation and parking requirements. It is recommended that further details of the components of this stage be requested in order to confirm the trip generation and distribution of this element of the proposals, however, this is a minor issue that relates mainly to the parking provision only. There may be some adjustment of the trip generation, however, the LOS at surrounding junctions is good and hence could accommodate small increases in traffic levels;
- The predicted traffic levels on Nolan Street for full development exceed by approximately 1000 vehicles, the 10,000 daily vehicles cited as a maximum for a collector road for the southern section of Nolan Street;
- The generated traffic for the morning and evening has been assumed to be the same for each peak and the split of generated traffic entering and exiting the site has been assumed to be 50/50 for all land uses. This is unlikely to be the case for many of these land uses and may be underestimating traffic levels on specific movements, however, junction assessments indicate a LOS of A or B and hence there is spare capacity to accommodate this impact;
- The Nolan Street entrance should be constructed as a roundabout layout for the full buildout of the development in order to maintain a good LOS;
- Full development parking provision is stated to exceed the Wollongong City Council DCP parking requirements, however, this assumes that the parking on site is shared for stage 4. In practice, there may be localised parking problems around the development at buildings where the parking has been underestimated. With the removal of the school, this is now a minor issue. Additional motorcycle bays should be provided for stage 1; and
- A Construction Traffic Management Plan and a Travel Plan should be prepared to minimise construction impact and to ensure that good public transport mode share is achieved for the development.

The Department of Planning additional request to consider the impact of removing stage 4 nhas resulted in the following additional conclusion:

- The resultant flows on Warwick Street are not impacted, but the flows on Nolan Street would be reduced. The conclusions above are not changed but the daily number of vehicles is reduced to a level that is only marginally (approximately 400 vehicles) above the RMS daily maximum for a collector road on the southern section. It should be noted that stage 4 is the element of the proposals with the greatest level of uncertainty on likely trip generation and operation and hence, its removal would allow us to be more certain of the conclusions identified in this review.