

Macquarie University

**Australian Hearing Hub
(MP 10_0032)**

Transport and
Accessibility Impacts
Report

ARUP

Macquarie University

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(MP 10_0032)**

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Accessibility Impacts
Report**

June 2010

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Job number 220034-02

Job title	Australian Hearing Hub (MP 10_0032)	Job number
		220034-02

Document title	Transport and Accessibility Impacts Report	File reference
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Document ref

Revision	Date	Filename	0003Hearing Hub Report.docx		
Issue	16/06/10	Description	Issue to Department of Planning		
			Prepared by	Checked by	Approved by
		Name	John Hanlon	Colin Henson	Colin Henson
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			

Issue Document Verification with Document



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1 INTRODUCTION

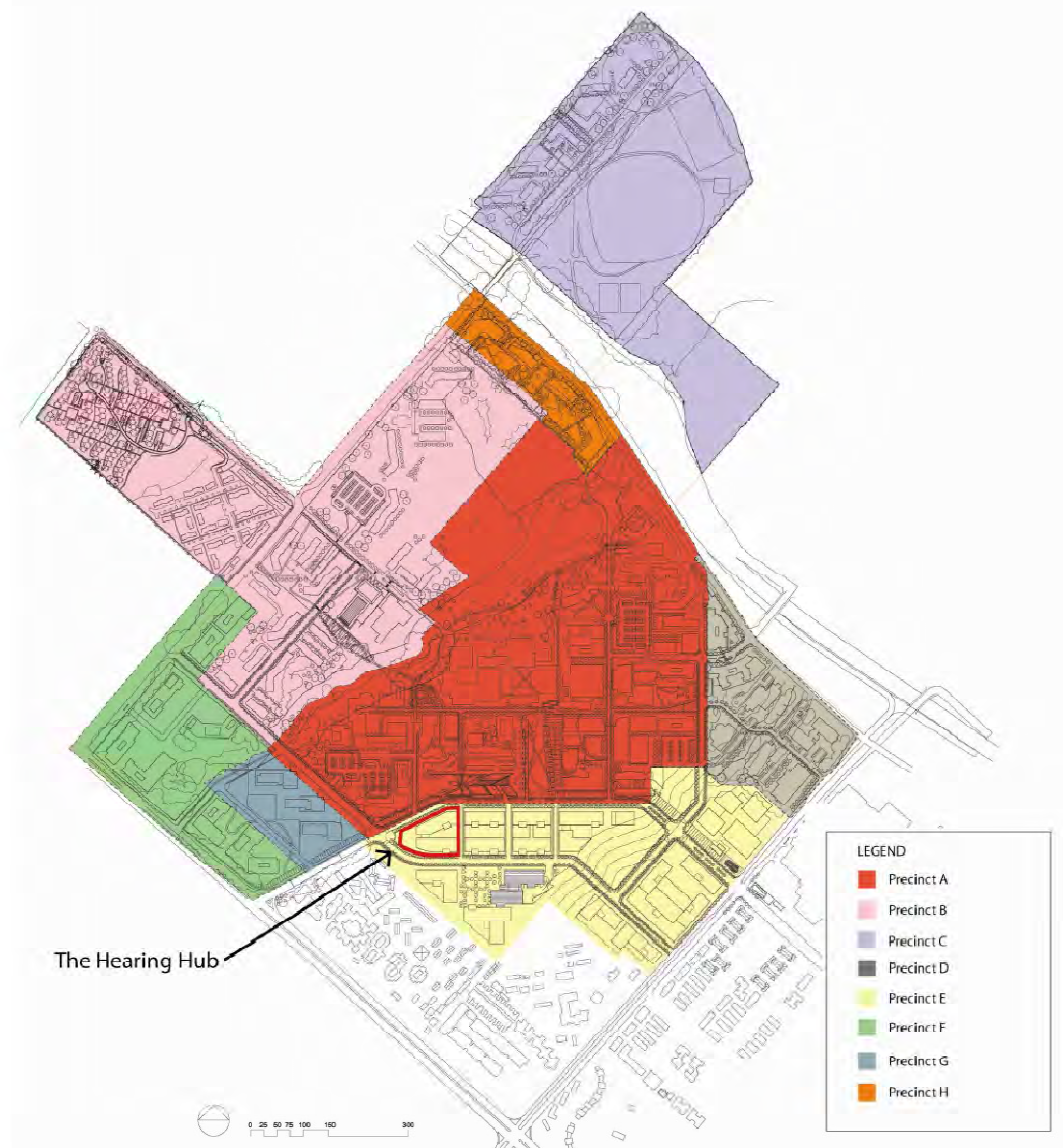
Arup was commissioned by Macquarie University to undertake a Transport and Accessibility Impact Assessment for the proposed Australian Hearing Hub development within the Macquarie University campus.

The Australian Hearing Hub will be a purpose-built facility to accommodate research, training, teaching and learning facility in hearing, hearing-related speech, language and reading disorders.

The project application will be assessed as a Major Project by the Director-General of the NSW Department of Planning under Part 3A of the Environmental Planning and Assessment Act. DGRs were issued on 1 April 2010 (MP 10_0032). A Transport and Accessibility Impacts report is required as part of this application.

The development will be located on the southern side of Macquarie Drive as shown on Figure 1 and is within Precinct E of the university.

Figure 1 Site Location



1.1 Project Director-General's Requirements

This report responds to the project DGRs and Section 5 in particular - *Transport & Accessibility Impacts (Construction and Operational)* as reproduced below. The relevant section of this report that responds to each DGR is also indicated in Table 1.

Table 1 Project DGRs – Section 5: Transport and Accessibility Impacts

The EA shall provide a Transport & Accessibility Impact Assessment prepared in accordance with the RTA's *Guide to Traffic Generating Developments* and utilising City of Ryde Council's *Macquarie Park 2007 Base Paramics Model* whilst making reference to the NSW *Planning Guidelines for Walking and Cycling* and the *Integrated Land Use and Transport Policy*, considering the following issues:

DGR No.	Description	Relevant Section of Report
5.1	Traffic generation including daily and peak traffic movements likely to be generated by the proposed development, the impact on nearby intersections (internal and external to the Macquarie University campus) and the need for funding or upgrading or road improvement works (if required)	Section 4.1 & 4.2
5.2	Car parking arrangements, having regard to the Concept Plan approval (MP06_0016), local planning controls and RTA guidelines whilst also considering accessibility of the site to public transport and campus wide parking provisions	Section 4.3
5.3	Measures to promote sustainable means of transport including public transport usage, car sharing, car pooling and pedestrian and bicycle linkages in addition to addressing the potential for implementing a Workplace Travel Plan or a location specific sustainable travel plan	Section 4.4
5.4	Detail the provision of facilities to increase the non car mode share for travel to and from the site as per the 40% non-car mode share target specified in Condition B2(1) of the Concept Plan approval (MP 06_0016)	Section 4.5
5.5	Demonstrate how users of the development will be able to make travel choices that support the achievement of relevant State Plan targets	
5.6	Detail the existing pedestrian and cycle movements within the vicinity of the site and determine the adequacy of the proposal to meet the likely future demand for increased public transport and pedestrian and cycle access with consideration to the Ryde Bicycle Strategy and Master Plan 2007	
5.7	Identify measures to mitigate potential impacts for pedestrians and cyclists during the construction stage of the project	Section 4.6

DGR No.	Description	Relevant Section of Report
5.8	Details of proposed accesses and parking provisions including compliance with the relevant Australian Standards	Section 4.7
5.9	Details of service vehicle movements	Section 4.8

1.2 Macquarie University Concept Plan

1.2.1 Description

In mid-2004, the University Council adopted the *Macquarie University Campus Development Plan 2004* (CDP) as a guiding document for the future development of the University. The CDP was developed to outline the likely directions and to identify opportunities to guide the physical growth of the University Campus over the next 40 years. One of the key aspects of the CDP was the relocation and redevelopment of on-campus parking facilities, to facilitate improved land use outcomes.

In December 2005 the Minister for Planning agreed to consider Macquarie University as a potential State Significant Site (SSS). The Minister for Planning formed the opinion that the project was a Major Project under Part 3A of the Environmental Planning and Assessment Act 1979. Macquarie University subsequently developed the Macquarie University Concept Plan. This was submitted to the Department of Planning in December 2007 and approved by the Minister for Planning in August 2009.

1.2.2 Macquarie University Concept Plan TMAP

The Macquarie University Transport Management and Accessibility Plan (Cardno, March 2009) was developed in conjunction with the Concept Plan. The TMAP outlines transport and access considerations for Macquarie University in relation to:

- mode share targets
- public transport
- pedestrians and cycling
- internal and external road network
- parking

It includes a package of recommended measures covering the following issues:

- road network improvements both internal and external to the university
- pedestrian and cyclists measures
- public transport improvements
- transport policy
- travel demand management

Some of these measures, such as the need for external intersection upgrades, are to be further investigated as development of the campus occurs over time.

1.2.3 Approval Conditions

The Concept Plan approval conditions included the following related to transport and parking:

B1 Car Parking

- (2) Car parking for commercial uses shall not exceed a maximum rate of 1 space per 80m² of gross floor area across Precincts E and F.

Note: Variations to the car parking rates could be considered only where it can be demonstrated with certainty that upon completion of the full developments of Precincts E and F in accordance with the approved Concept Plan, compliance is achieved with the maximum prescribed car parking rate.

- (1) The maximum car parking across the campus is 10,800 spaces and is distributed for each precinct as follows:
 - (d) Precinct E and F (total) – 5,000 spaces
- (2) New car parking for commercial buildings within Precincts D, E and F shall be located within basements (which may be above ground on sloping sites) and generally contained within the footprint of the building above. The design of any above ground car parking shall include architectural treatment of the elevations to reduce their visual impact and dominance.

B2 Transport and Pedestrian Management

- (1) A 40% non-car mode share target shall be adopted for the academic and commercial uses on the site.

B3 Road works

- (1) The Concept Plan approval includes the following road intersection upgrades identified within Section 4.4 of the “Macquarie University Concept Plan TMAP” dated March 2009 and prepared by Cardno Eppell Olsen:
 - a) Epping Road / Balaclava Road intersection – additional through lane on Balaclava Road (south) and additional right turn lane on Balaclava Road (north)
 - b) Epping Road / Herring Road intersection – additional through lane on Herring Road (south), additional right turn lane on Epping Road (east), two through lanes and two right turn lanes on Herring Road (north) and adjusted signal phasing.
 - c) Waterloo Road / Herring Road intersection – left/through lane on Waterloo Road (east) and adjusted signal phasing.
 - d) Waterloo Road / Culloden Road intersection – realign Gymnasium Road to make fourth leg at roundabout and provide two lane circulating roundabout.
 - e) Talavera Road / Christie Road intersection – additional left turn slip lane, though lane/right turn lane on Talavera Road (east), departure lane becomes full traffic lane on Talavera Road (west) and adjusted signal phasing.
 - f) Talavera Road / Herring Road intersection – adjusted signal phasing.
- (2) Within 3 months of the date of this approval, or as otherwise agreed to by the Department, indicative timing and staging plans of the above intersection works shall be submitted to the Department. As part of any application that generates the need to undertake the above intersection works, detailed design plans for the relevant intersection upgrade(s) and a commitment to enter into a Works Authorisation Deed (or similar type of agreement), with the RTA, shall be submitted.

C10 Access, Traffic, Transport and Parking

- (2) The detailed micro-simulation model referred to at page 2 of the Statement of Commitments is to be prepared in liaison with Council, the RTA and the Ministry of Transport and submitted to the Department of Planning for approval prior to or with the submission of the first application for new commercial floor space on the site.

Statement of Commitments:

A detailed micro-simulation transport model of the University internal road network and surrounding “area of influence” will be developed. The model will be used to assess in detail proposed changes to the internal road network and review internal intersection

performance. The model will be utilised for assessment of project applications and to determine staging of works. The timing of the model would be based on full operation of the Epping-Chatswood rail link being realised and any major redevelopment of the Station South portion of Precinct E.

- (3) The micro simulation modelling is to be prepared on the basis that there will be no additional access to the M2 Hills Motorway.
- (4) The micro simulation modelling is to form the basis for discussion in respect of the agreement between the RTA and the Proponent referred to at C15 below.

C15 Agency and Council Agreements

- (1) An agreement is to be made with the RTA for relevant road and intersection works prior to or with the first application for new commercial floor space on the site.

1.3 Reference Documents

The following documents have been used as reference material for this assessment:

Macquarie University

- Macquarie University Temporary Car Park - Traffic & Parking Assessment (Cardno, March 2010)
- Macquarie University Concept Plan – Transport Management and Accessibility Plan (TMAP) (Cardno, March 2009)
- Macquarie University Sustainable Transport Plan (GTA, December 2008)
- Macquarie University Concept Plan (Macquarie University, April 2008)
- Macquarie University Bicycle Network Masterplan (GTA, July 2006)

Other

- NSW State Plan 2010 (NSW Government, 2010)
- Macquarie Park Traffic Study (City of Ryde, July 2008)
- Ryde Bicycle Strategy and Masterplan 2007 (City of Ryde, October 2007)
- Planning Guidelines for Walking and Cycling (NSW Government, 2004)
- Guide to Traffic Generating Developments (RTA, 2002)
- AS 2890 Parking Facilities

1.4 Structure of Report

This Transport and Accessibility Impact Report is structured as follows:

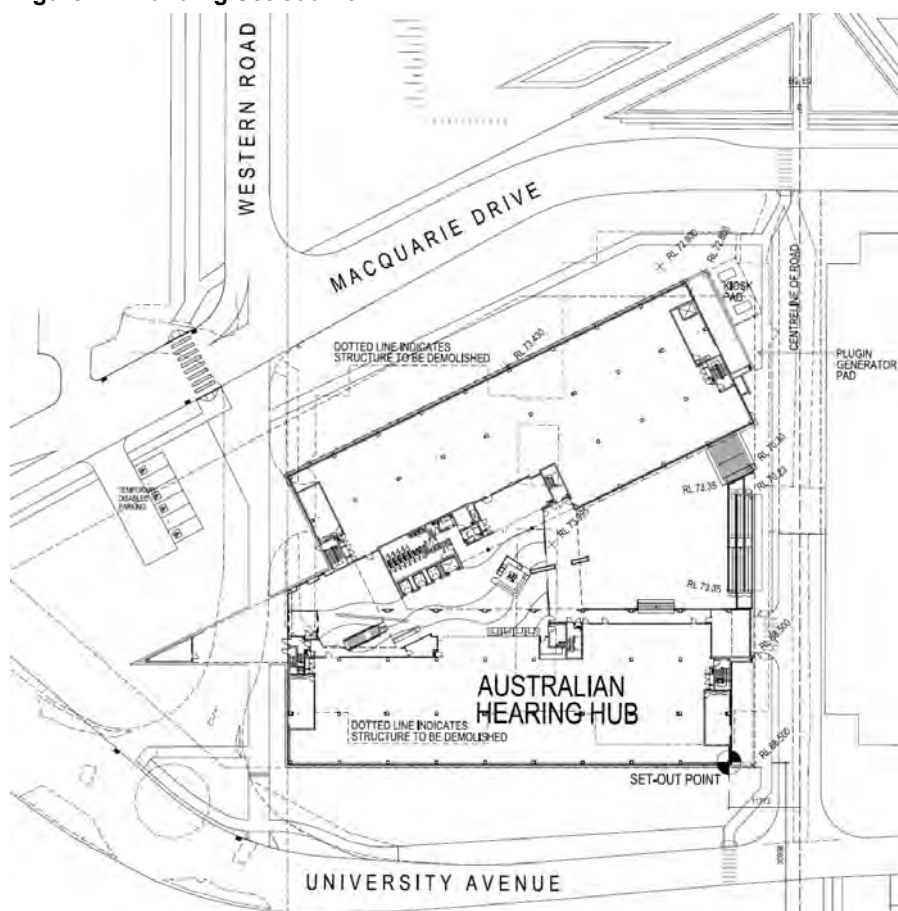
- Section 1 Introduction and objectives
- Section 2 Description of proposed development
- Section 3 Existing transport and accessibility situation
- Section 4 Transport and accessibility impacts assessment based on the relevant DGRs
- Section 5 Summary and conclusions
- Appendices

2 DESCRIPTION OF PROPOSED DEVELOPMENT

The development will be a unique, world-class facility designed to understand hearing and related speech and language disorders. It will bring together the University's internationally leading research teams, clinical research/professional training teams, government research organisations, hearing research companies and major not for profit organisations offering clinical and related social services for hearing disorders.

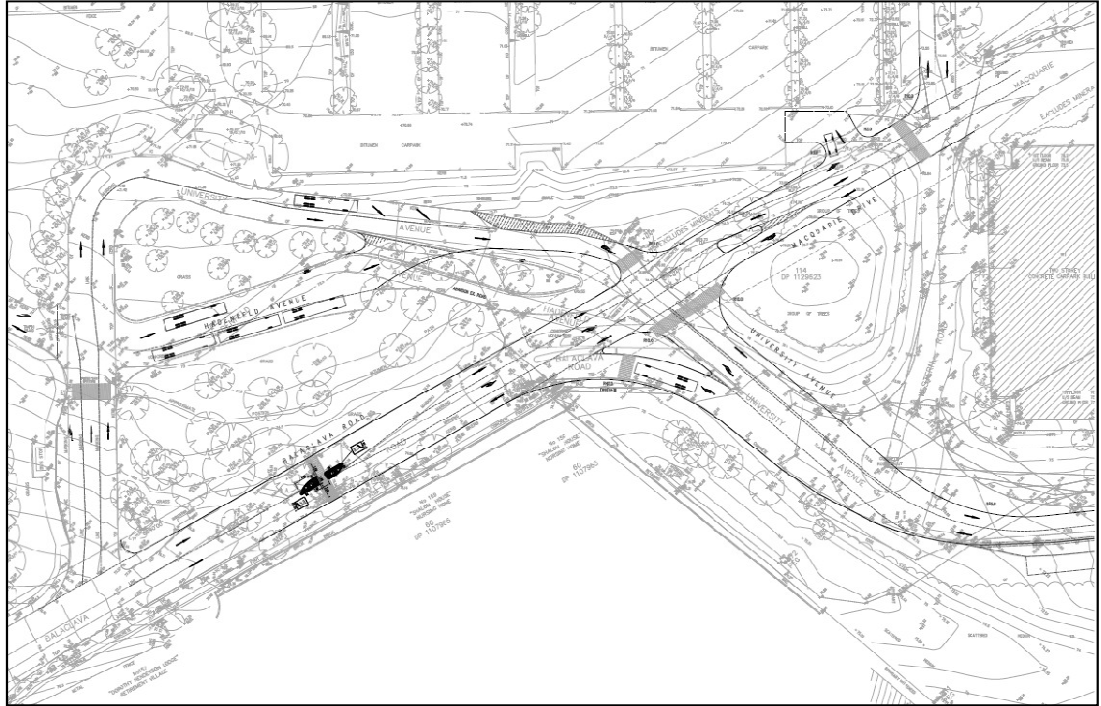
The development involves construction of a five storey building with two levels of basement car parking. A number of architectural concept design drawings are included as Appendix A (Source: Perumal Pedavoli Architects). The building set-out is shown in Figure 2.

Figure 2 Building Set-out Plan



A new north-south access road from University Ave will provide access to the car park driveway. The development will also require the realignment of Macquarie Drive between Western Road and Balaclava Road as shown on Figure 3. A new priority controlled four – way intersection will be formed at Balaclava Road / Macquarie Drive / University Ave. In the short term the one-way eastbound direction of vehicular flow on Macquarie Drive, east of Western Road, would be maintained.

Figure 3 Proposed Macquarie Drive Realignment



Source: TTW, March 2010

The facility would operate according to normal office hours, i.e. 8:30am to 5:30pm on weekdays. The majority of visitor movements would occur between 10am - 4pm. It is expected that up to 1000 people may work at the facility when it opens in late 2012.

To facilitate the Hearing Hub development, the demolition of three existing car parks (W1, W2 and C1) will be undertaken by way of a separate Review of Environmental Factors (REF) process prior to the commencement of excavation works on the site. These existing car parks contain a total of 955 parking spaces. This loss of campus parking will be offset by a temporary car park to be constructed adjacent to Culloden Road. The aim of this car park is to maintain the total number of on-site parking spaces during the construction periods of various developments at the university, including the Hearing Hub. The car park will be constructed in up to four stages as required with a total capacity of 1500 spaces. Sections A, B and part of C would be constructed in conjunction with the Hearing Hub – a total of 795 spaces.

3 EXISTING TRANSPORT AND ACCESSIBILITY SITUATION

The following is a summary of the existing transport infrastructure and services in the vicinity of the Australian Hearing Hub site both within the Macquarie University campus and in the surrounding areas. The Transport and Accessibility Impacts described in Section 4 contain references to the existing situation.

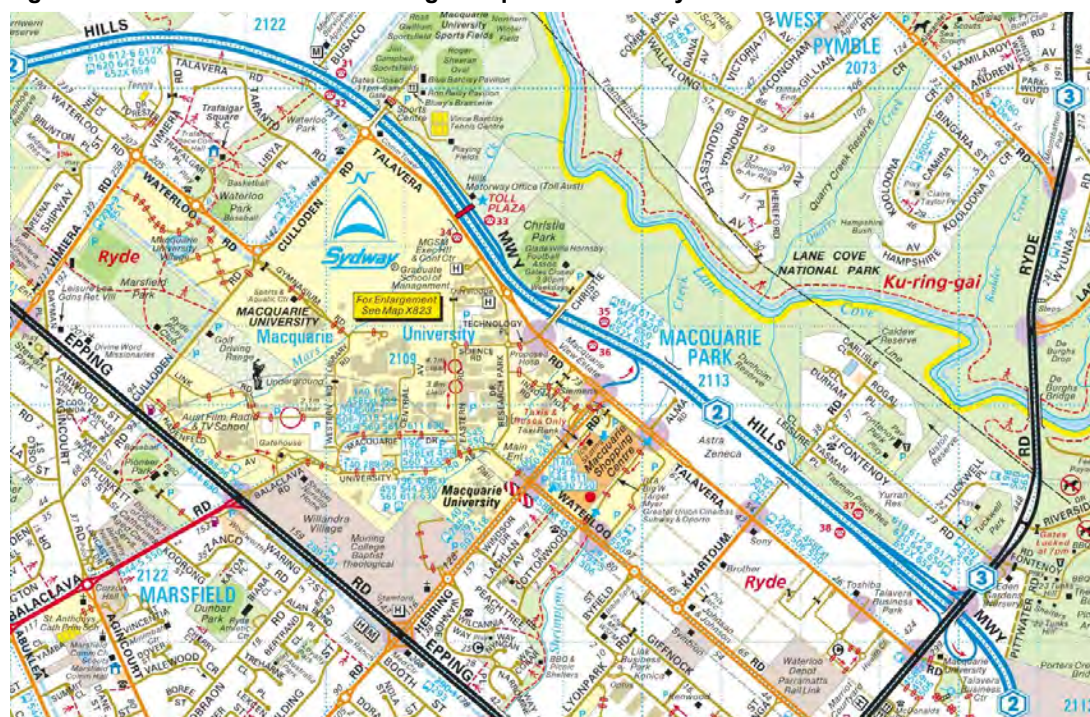
3.1 Road Network and Parking

3.1.1 Major Roads

Macquarie University is surrounded by a number of major roads which carry significant traffic volumes (refer to Figure 4). These roads, including the administrative classification, are:

- Epping Road (State road)
- M2 Motorway (State road)
- Herring Road (Regional road between Epping Road and Talavera Road)
- Talavera Road (Regional road between Lane Cove Road and Talavera Road)
- Waterloo Road (Local road)
- Balaclava Road (Local road)
- Culloden Road (Local road)

Figure 4 Road Network Surrounding Macquarie University



Within the campus, key roads in the vicinity of the Hearing Hub site are University Ave and Macquarie Drive.

3.1.2 Key Intersections

The operation of the Macquarie Park road network is primarily a function of the performance of key intersections including:

- **Waterloo Road / Herring Road:** Directly adjacent to Macquarie University and Macquarie Shopping Centre, this intersection is signalised with pedestrian crossing facilities on all approaches. The northern leg of this intersection provides direct access to the university.
- **Epping Road / Balaclava Road:** Controlled by traffic signals with pedestrian crossing facilities on all approaches. Left turn slip lanes are provided on the north, south and west approaches. Bus priority lanes exist on Epping Road.
- **Epping Road / Herring Road:** Controlled by traffic signals with pedestrian crossing facilities on all approaches. Bus priority lanes exist on Epping Road.
- **Herring Road / Talavera Road:** The eastern leg of this signalised intersection provides vehicular access to the westbound on-ramp of the M2 Motorway. Pedestrian crossing facilities are provided on the eastern and northern legs. Right turn movements from Talavera Road into Herring Road are for buses only.
- **Talavera Road / Technology Place / Christie Road:** This intersection is controlled by traffic signals, with pedestrian crossing facilities on all four legs. The Christie Street leg of the intersection is an extension of the eastbound off-ramp of the M2 Motorway.

3.1.3 Traffic Volumes

A weekday peak hour traffic survey was undertaken on Thursday 25 March 2010, at key intersections, to give an indication of typical weekday peak hour traffic movements. The traffic volumes from the survey are summarised in Figure 5.

The majority of vehicular traffic likely to access the Hearing Hub site would enter the university at either the Balaclava Road or Waterloo Road entrances. Peak hour traffic volumes at these locations are presented in Table 3.

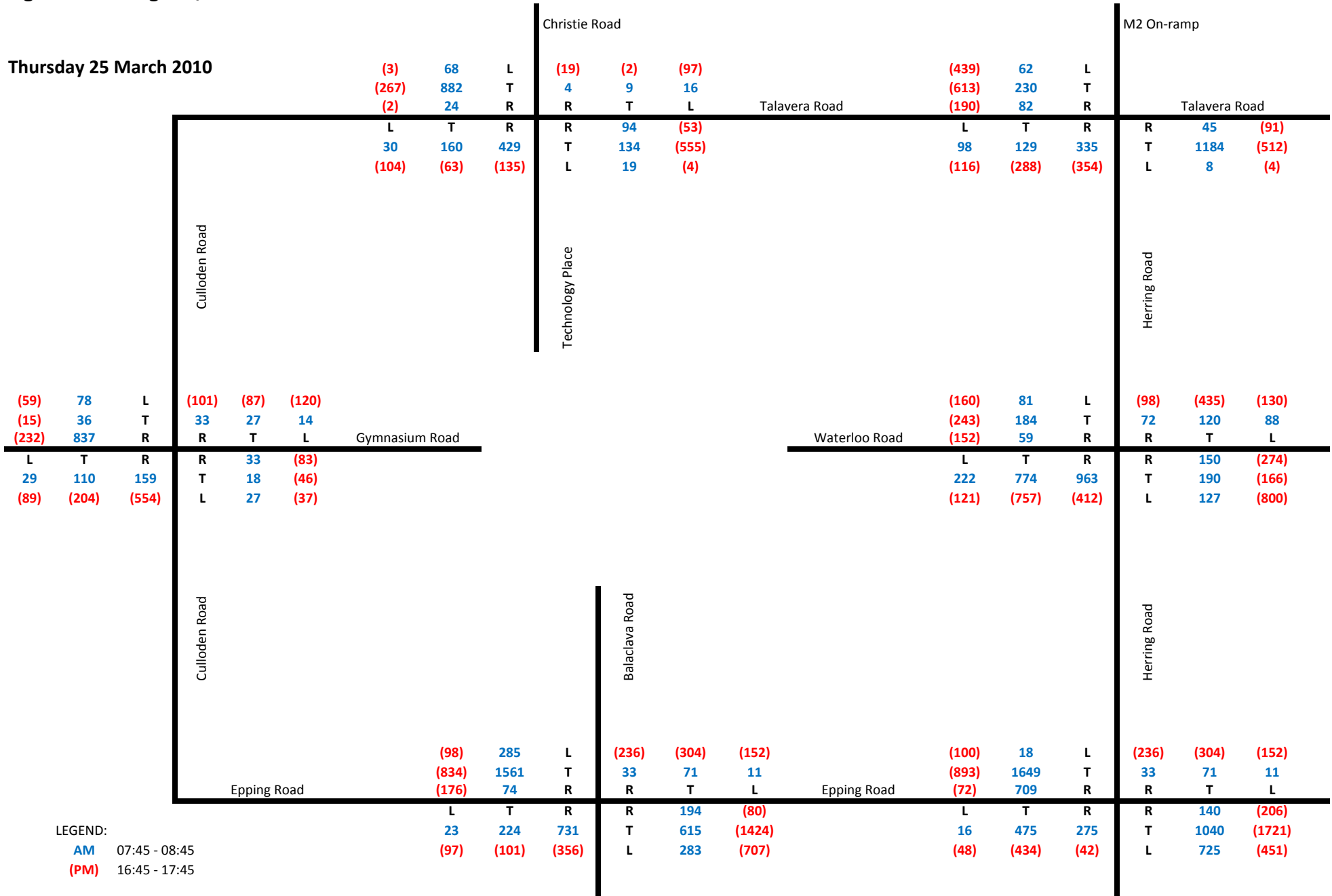
Table 3 Balaclava Road and Waterloo Road Traffic Volumes

Time Period	Traffic Volume (vehicles per hour)					
	Balaclava Road Entrance			Waterloo Road Entrance		
	Inbound	Outbound	Total	Inbound	Outbound	Total
AM Peak Hour (7.45am – 8.45am)	703	115	818	484	324	808
PM Peak Hour (4.45pm – 5.45pm)	279	692	971	385	555	940

Source: Traffic count Thursday 25 March 2010

Figure 5 Existing AM/PM Peak Hour Traffic Volumes

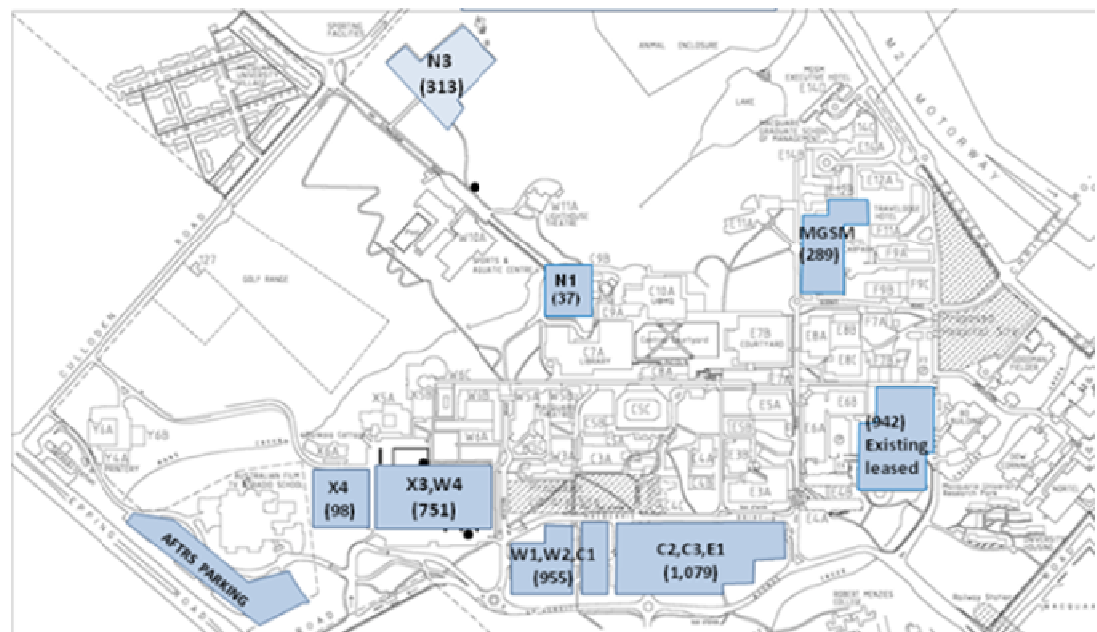
Thursday 25 March 2010



3.2 Car Parking

There are currently in the order of 5,300 on-site parking spaces across the campus in a mixture of multi-storey and at-grade car parking areas (refer to Figure 6). Approximately 70% of these spaces are available for students and staff with the remainder reserved or leased out to other tenants. The parking areas are accessed from a number of internal circulation roads. Within Precinct E there are currently in the order of 2,200 parking spaces.

Figure 6 Existing Major Off-street Parking



Source: Macquarie University, July 2009

Short term parking and annual permits are available for students and staff. Student and staff parking is available on a first come first serve basis. The maximum cost of an annual parking permit is \$220 for students and \$250 for staff. There are a limited number of premium parking areas that attract a higher annual permit fee.

Casual parking is available for visitors in a number of designated car parks (N1, N3, X3 and W4). It operates on a pay and display basis with fees up to \$18 per day. Currently there is no charge for motorcycle parking within designated motorcycle parking bays.

3.2.1 Macquarie University Road and Parking Regulations

The internal roads and parking areas within the campus are regulated by the *Macquarie University Traffic and Parking Rules* as presented in Appendix D. Key regulations include:

- vehicle speed limit of 30 km/h
- vehicle parking can only occur within marked bays
- fines, authorised by the NSW State Debt Recovery Office, can be imposed for breaches of the rules

Users of the Hearing Hub would generally be subject to these rules.

3.3 Public Transport

3.3.1 Buses

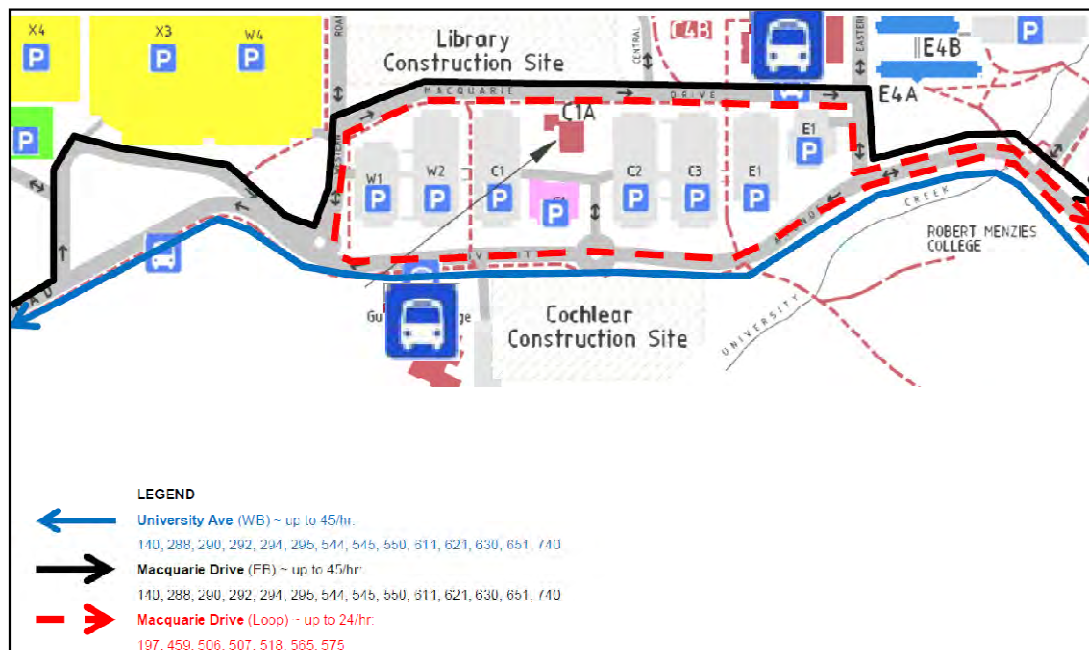
Macquarie University is served by approximately 25 different bus routes. A total of approximately 800 bus services operate on weekdays and 400 per day on weekends (refer to Table 4).

Bus stops are located on Macquarie Drive and University Avenue as shown on Figure 7 with a major interchange nearby on Herring Road adjacent to Macquarie Shopping Centre. The existing bus stops are therefore very close to the Hearing Hub site.

Bus services run at high frequencies in both the morning and evening peak periods (over 60 services in the peak hour) with lower frequencies at off-peak times.

Table 4 Macquarie University Bus Services

Route No.	Operator	Route	Weekday Services			Saturday Services		Sunday Services	
			AM Peak	PM Peak	Off-Peak	AM Peak	PM Peak	AM Peak	PM Peak
140	Sydney Buses	Epping to Manly	1	0	0	No service			
197	Forest Coach Lines	MU to Mona Vale	7	8	4	1	1	1	1
288	Sydney Buses	Epping to City	4	6	6	3	3	1	2
290	Sydney Buses	Epping to City	5	4	3	1	1	1	1
292	Sydney Buses	Marsfield to City	4	5	4	0	1	1	1
294	Sydney Buses	MU to City	0	1	0	No service			
295	Sydney Buses	Nth Epping to Macq Centre	2	3	1	1	1	0	1
458	Sydney Buses	MU to Burwood	1	0	0	2	2	1	1
459	Sydney Buses	MU to Burwood	3	2	2	No service			
506	Sydney Buses	MU to Circular Quay	3	3	4	2	2	1	2
507	Sydney Buses	MU to Circular Quay	2	2	1	2	1	1	1
518	Sydney Buses	MU to Circular Quay	3	2	2	3	2	1	1
544	Sydney Buses	Auburn to Macq Centre	3	3	2	1	1	No service	
545	Sydney Buses	Parramatta to Chatswood	9	11	8	3	2	1	2
550	Sydney Buses	Parramatta to Chatswood	0	0	1	No service			
565	Shorelink Buses	MU to Chatswood	1	3	2	No service			
575	Shorelink Buses	Hornsby to MU	4	4	4	0	1	0	1
611	Hillsbus	Blacktown to Macq Centre	4	3	2	No service			
621	Hillsbus	Castle Hill to City	2	2	1	0	1	0	1
630	Hillsbus	Blacktown to Macq Centre	3	4	2	No service			
651	Hillsbus	Castle Hill to City	2	2	1	1	1	1	1
740	Busways	Plumpton to Macq Park	1	1	0	1	1	1	1
TOTAL			64	69	50	32	38	11	17

Figure 7 Bus Routes Within Macquarie University**3.3.2 Trains**

Macquarie University Station is located on the Epping to Chatswood rail link. The station is located approximately 600m from the Hearing Hub site and therefore within a typical walking catchment (refer to Figure 8). Since the integration of the station with the CityRail network in October 2009, eight train services every hour (four in either direction at 15 minute intervals) service the station between 5am and 11pm as shown in Table 5. Although NSWTI was unable to provide patronage data, the station appears to be well-utilised by passengers.

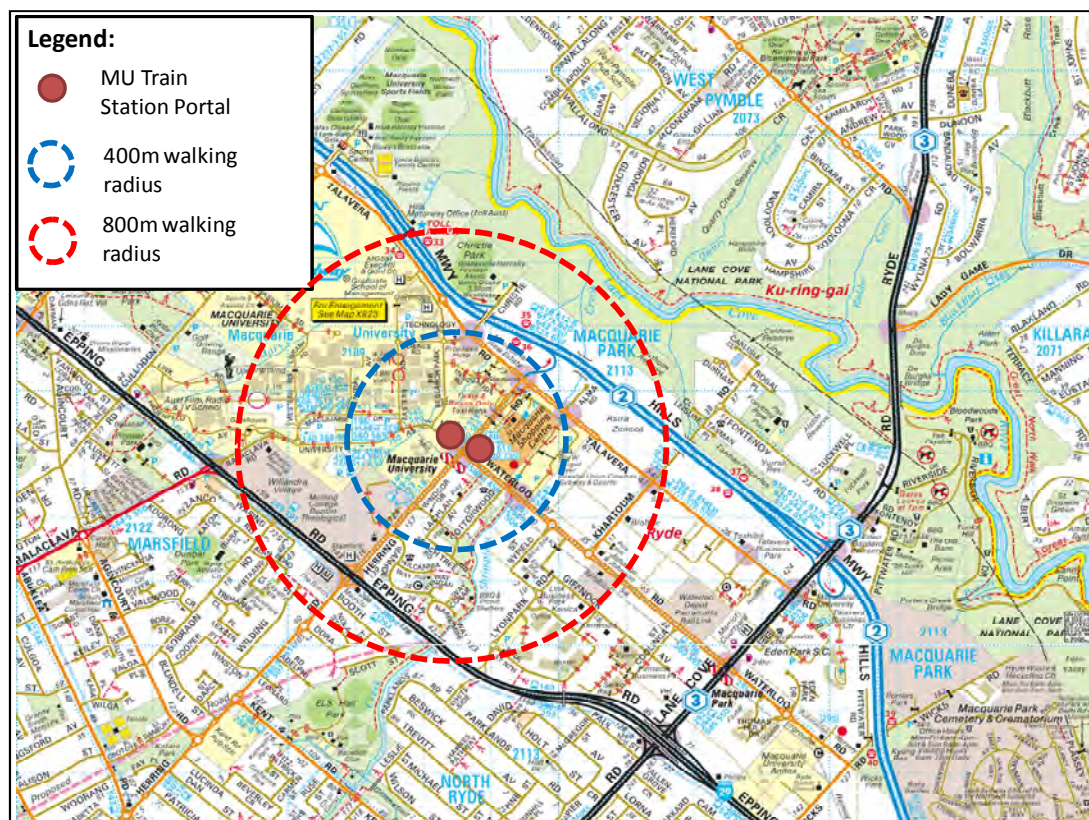
Figure 8 Walking Catchment from Macquarie University Railway Station

Table 5 Existing Train Services to Macquarie University Station

Direction	Weekday Services			Saturday Services		Sunday Services	
	AM Peak	PM Peak	Off-Peak	AM Peak	PM Peak	AM Peak	PM Peak
Chatswood to Epping	4	4	4	4	4	4	4
Epping to Chatswood	4	4	4	4	4	4	4
TOTAL	8	8	8	8	8	8	8

3.4 Walking and Cycling

3.4.1 Walking Facilities

The Macquarie University campus is built around the notion that walking is an expected and in fact the primary mode of transport within the campus. Universities are also unique in the sense that they concentrate a variety of functions within reach of pedestrians and are considered as self contained neighbourhoods where classrooms, offices, commercial developments, apartments, student centres, child care facilities, performance halls, art galleries, gymnasiums, swimming pools, sports arenas, shopping places etc are all in close proximity.

The campus has a network of well-defined paths with a particular focus on the Academic Core and links to transport nodes such as bus stops, train station and car parks. Pedestrians are given priority at most roads via pedestrian crossings. However, in some areas, including near the Hearing Hub site, these paths are often discontinuous, e.g. University Ave, and students and staff walk are forced to walk on the roadway where space is not available.

As commercial development within Precinct E occurs this part of the university will accommodate higher pedestrian movements. This development will allow for a considerable improvement in pedestrian facilities in the vicinity of the Hearing Hub. The Cochlear development will also lead to an improvement in pedestrian facilities along University Ave.

3.4.2 Cycling Facilities

There are presently few dedicated cycling facilities (i.e. on road bike lanes, shared paths) within the campus. Some end of trip facilities are provided, such as parking, showers and lockers. Two new bike hubs have recently been constructed on campus, adjacent to both Eastern Road near the Central Courtyard and Western Road near the W4 car park. Each of these hubs include capacity to store 26 bikes in a secure cage, 2 solar powered showers and 28 lockers.

The NSW BikePlan (May 2009) is a state government plan to transform cycling and to encourage people to ride more often and more safely in NSW. It includes a North Ryde to Macquarie University link to be completed as part of the Metro Sydney Bike Network.

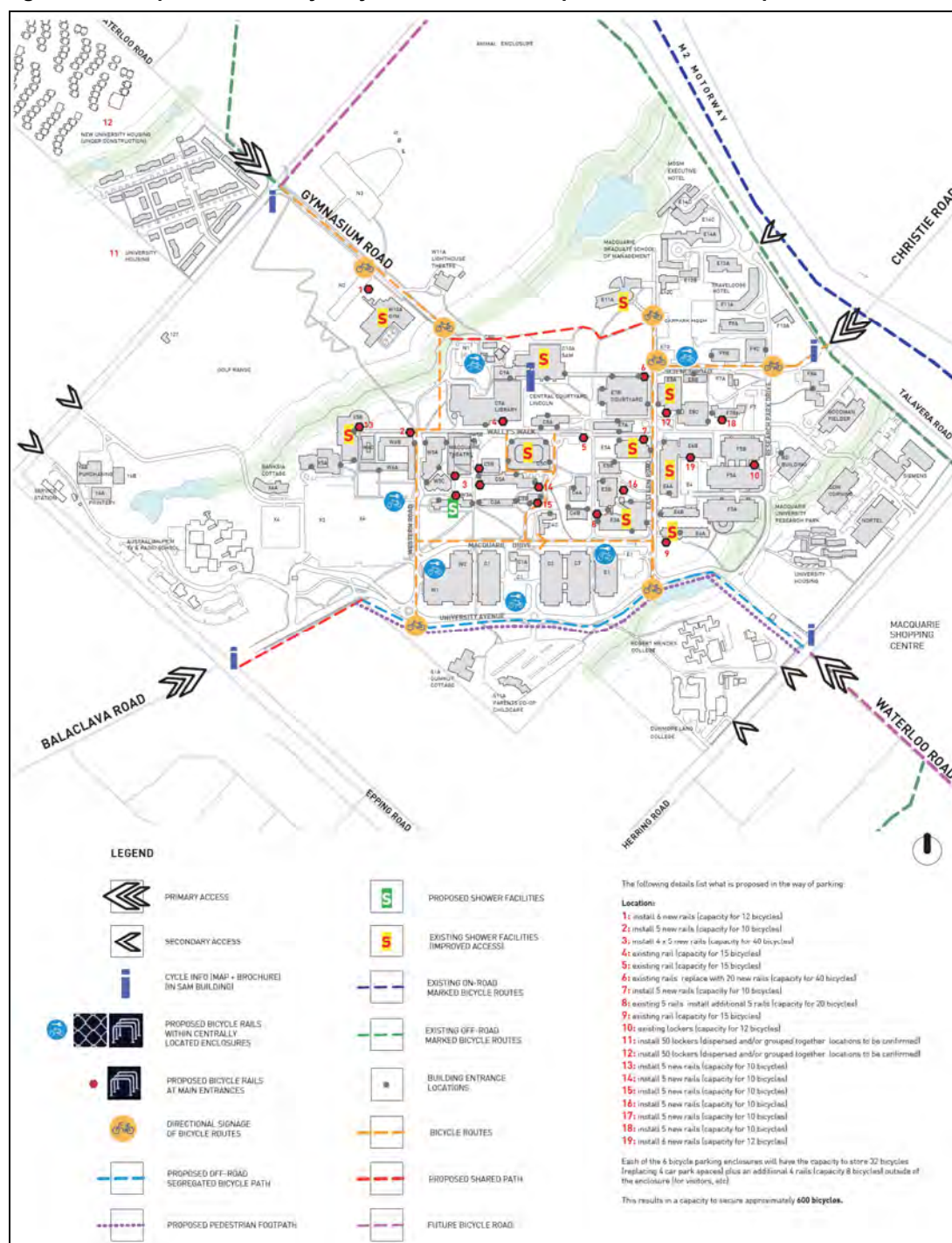
The university estimates that only 1.5% of students and staff currently cycle to campus. However there are two related cycling masterplans that provide the basis for improving cycling facilities and hence increasing cycling levels in the future.

Macquarie University Bicycle Network Masterplan (GTA, 2006)

The Macquarie University Bicycle Network Masterplan (Bicycle Masterplan) outlines short and long term infrastructure provisions to provide for current cycling patterns and to increase the level of cycling by students, university staff and staff of commercial developments. The short term strategy is shown in Figure 9. The long term strategy is based around the Concept Plan road network which includes changes to Macquarie Drive and University Ave.

Implementation of the bicycle masterplan has so far focused on encouragement programs and end of trip facilities such as parking and bicycle hubs. It is expected that on and off-road cycling infrastructure will be improved in the coming years.

Figure 9 Macquarie University Bicycle Network Masterplan – Short Term Option



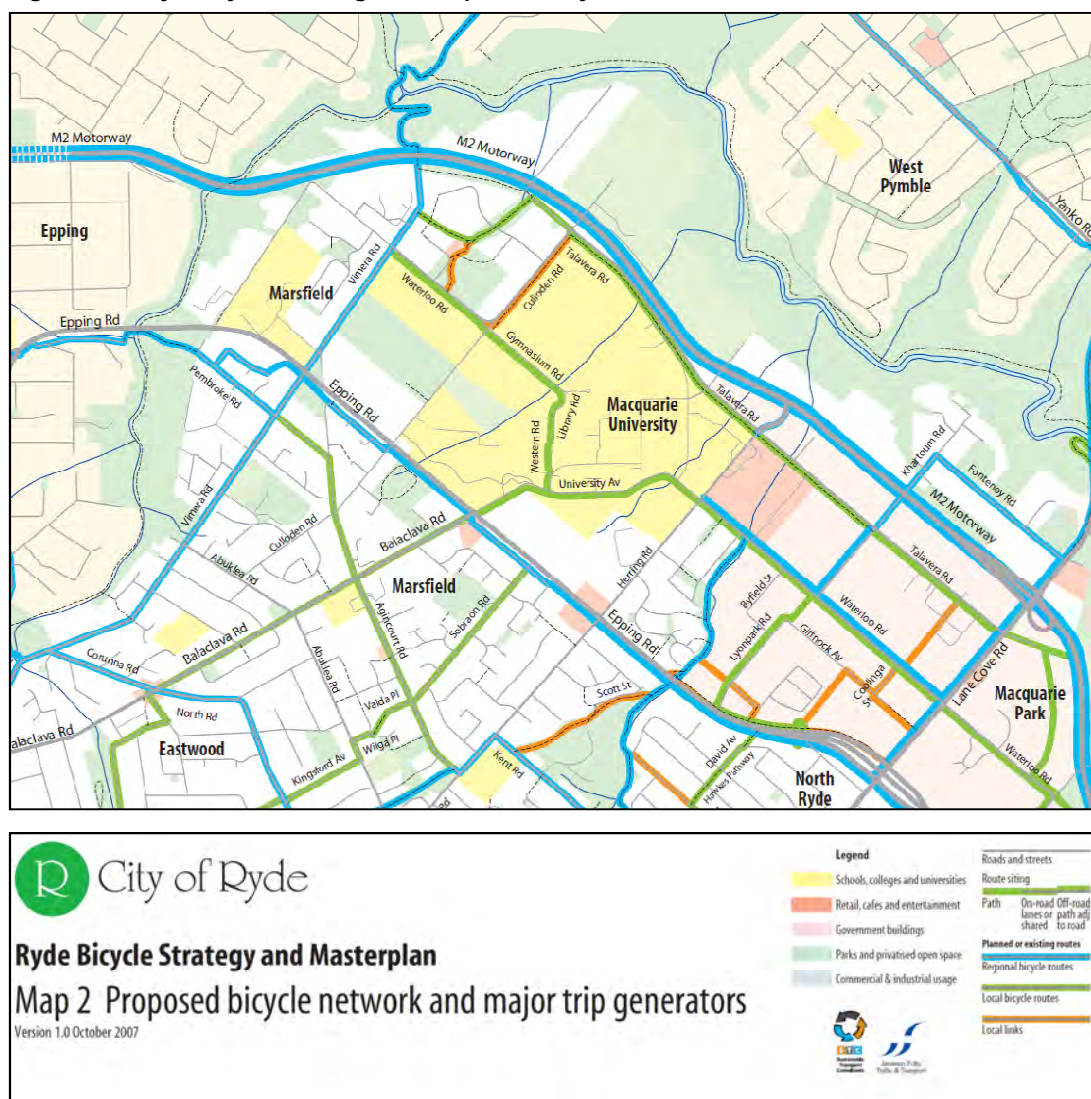
2007 Ryde Bicycle Strategy and Masterplan (City of Ryde, 2007)

The 2007 Ryde Bicycle Strategy and Masterplan (Bicycle Strategy) outlines a series of both infrastructure and non-infrastructure measures to promote cycling with the City of Ryde. Key recommendations include:

- improved signage, network mapping and way-finding
- improvements in the quality and quantity of bicycle parking, including requirements for new developments to incorporate bicycle parking
- improvements to the bicycle network surrounding public transport interchanges

The existing and proposed network of bicycle routes in the vicinity of the Hearing Hub site are presented in Figure 10. Shared paths currently exist on the western side of Waterloo Road south of Herring Road and on the western side of Talavera Road.

Figure 10 City of Ryde Existing and Proposed Bicycle Network



4 TRANSPORT AND ACCESSIBILITY IMPACTS

4.1 Traffic Generation (DGR 5.1)

DGR 5.1 - Traffic generation including daily and peak traffic movements likely to be generated by the proposed development, the impact on nearby intersections (internal and external to the Macquarie University campus) and the need for funding or upgrading or road improvement works (if required).

Daily and peak traffic generation forecasts for the development have been calculated on the basis of the RTA's *Guide to Traffic Generating Developments*. The guide states that two periods of traffic generation need to be considered:

- the peak activity time of the development itself.
- the peak activity time of the adjacent road network.

The first of these is generally used as a basis for reviewing access to the site and driveway design requirements. The second is used to assess the effect of the development on the road system. Such an assessment should identify whether any road improvements or traffic management measures are required to accommodate the increased traffic on the system.

The peak activity time of the Hearing Hub development and the peak activity time of the adjacent road network are likely to coincide due to the commercial nature of the development with a strong commuter profile. The peak periods adopted were selected to coincide with the City of Ryde Council's Macquarie Park 2007 Base Paramics Model peak periods:

- 07:45 – 08:45 AM
- 4:45 – 5:45 PM

For the purposes of this assessment it has been assumed that the development contains 23,182m² GFA of office and commercial floor space. It is noted, however, that the majority of the space will actually be used for University purposes and that commercial floor space has only been used for the determination of a traffic generation rate (refer to Table 2).

Based on the RTA's unrestrained parking trip rate for offices of 2 trips per 100m² GFA the development would generate 455 peak hour vehicle trips. Thus each of the parking spaces would generate 1.3 vehicle trips per hour. This total trip generation is unrealistic because, in practice, turnover of office parking spaces would be less than 1 vehicle trip per hour to reflect the predominantly commuter nature of the travel profile.

The RTA allows for standard traffic generation rates to be reduced where parking is less than the parking rate included in the RTA guide. Furthermore, as stated in Section 2, 60 of the 339 parking spaces will be visitor parking spaces and are unlikely to generate traffic in the nominated peak hours. The RTA guide specifies an unrestrained parking rate of 1 space per 40m² for office and commercial. The proposed parking rate for the non-visitor component of the development is 1 space per 82m². Thus a traffic generation rate of $2 \times 40/82 = 1.0$ trips per 100m² GFA is appropriate. This equates to each non-visitor parking space generating 0.82 vehicle trips per peak hour.

The RTA guide states that daily vehicle trips for office and commercial can be estimated as five times the peak hour rate, equating to 5 trips per 100m² GFA.

The forecast traffic generation used for this assessment is given in Table 6. It is likely that the actual traffic generation rates for the development would be lower due to the spread-out nature of employee arrival/departure profiles, proximity of good public transport, both bus and train, and other sustainable transport measures (refer to Section 4.5).

Table 6 Forecast Traffic Generation

Time Period	Forecast Traffic Generation (vehicle trips*)
AM Peak Hour	228
PM Peak Hour	228
Daily	1,140

*vehicle trips are two-way, i.e. in + out

4.2 Traffic Impact (DGR 5.1)

4.2.1 Modelling Approach

The forecast traffic impact of the development has been assessed on the basis of guidance contained in the following two documents:

- RTA's *Guide to Traffic Generating Developments*
- City of Ryde Council's *Macquarie Park 2007 Base Paramics Model*

The Macquarie Park 2007 Base Paramics Model was partially updated to 2010 conditions in the vicinity of Macquarie University as part of the Temporary Car Park development application. This updated model was used as the basis for traffic modelling of the impacts of the Australian Hearing Hub and was supplemented by Sidra modelling, a software package used to assess the performance of intersections.

4.2.2 Traffic Generation Scenarios

The forecast opening date of the development is 2012. A number of other university developments, currently in planning or construction phases, will be operational by 2012. It has been assumed that the proposed M2 upgrade would not be operational by 2012 and therefore any traffic impacts of the upgrade have not been included in the assessment.

The modelled scenarios were:

Base	2010 AM/PM
2012 Base	2012 AM/PM with temporary car park, Cochlear Stage 1, Library, Macquarie University Private Hospital
2012 Project Case	2012 AM/PM Base + Australian Hearing Hub

The 2012 cases include an upgraded Waterloo Road/Herring Road intersection. This intersection is required to be upgraded as a condition of consent of the Cochlear development. The works, expected to be completed by the end of 2010, include an additional lane on the Waterloo Road east approach and an additional lane on the Herring Road north approach.

4.2.3 Traffic Generation and Distribution

4.2.3.1 Removal of Existing Car Park and Temporary Car Park

As described in Section 2, to facilitate the Hearing Hub development, the demolition of three existing car parks (W1, W2 and C1) will be undertaken by way of a separate Review of Environmental Factors (REF) process prior to the commencement of excavation works on the site. These existing car parks contain a total of 955 parking spaces. This loss of campus parking will be offset by a temporary car park to be constructed adjacent to Culloden Road (total 795 spaces). It has been assumed that the temporary car park would generate traffic at the same rate per space as the demolished car park resulting in a slight net reduction in traffic. The assumed magnitude of this reduction is based on the traffic generation rates adopted for the temporary car park traffic impact assessment (Cardno, March 2010).

4.2.3.2 Cochlear

The Cochlear Stage 1 development, currently under construction, is located to the south of University Avenue and has a target completion date of late 2010. The seven storey development involves 24,343m² GFA, 528 parking spaces, and will accommodate a mix of research and office function.

The Cochlear development is similar in nature to the Australian Hearing Hub and forecast peak traffic generation has been calculated at the same rate on the basis of non-visitor parking supply – refer to Table 7.

4.2.3.3 Library

The Library development (within the Academic Core) is due for completion in late 2010. It does not include any additional parking and is not expected to increase traffic generation to the campus.

4.2.3.4 Macquarie University Private Hospital

The Macquarie University Private Hospital is located in the north-eastern corner of the campus adjacent to Talavera Road. It is currently under construction, with a scheduled opening date of mid-2010 and includes 218 parking spaces. Forecast traffic generation has been obtained from the original traffic impact assessment (TEF Consulting, 2006) as listed in Table 7.

4.2.3.5 Summary

The forecast traffic generation for the 2012 Base and Project Cases are summarised in Table 7.

Table 7 Traffic Generation Summary

Development	Traffic Generation (vehicles per hour)					
	AM Peak (7:45-8:45 AM)			PM Peak (4:45-5:45 PM)		
	In	Out	Total	In	Out	Total
2012 Base						
Demolished Car Park + Temporary Car Park (net change)*	-33	-9	-42	-10	-26	-36
Cochlear Stage 1	244	61	305	61	244	305
Private Hospital	135	40	175	50	170	220
2012 Project Case						
Australian Hearing Hub	182	46	228	46	182	228

*Involves replacing 955 spaces with 795 spaces and therefore a net reduction in traffic

4.2.4 Traffic Distribution

Traffic data suggests that approximately 70% and 80% of vehicular trips to/from Macquarie University use the Waterloo Road/Herring Road and Epping Road/Balaclava Road access points, with a relatively even split between these two intersections.

This traffic impact assessment is therefore focused on these two key intersections because traffic impacts at other intersections would be relatively minor. It has been assumed that the additional traffic included in the 2012 base and project cases is equally distributed between the two key intersections. At each of these intersections, the turning movement distribution has been based on existing turning movement patterns.

The assumed directional splits for each of the developments is 80% in/20% out in the AM peak and 20% in/80% out in the PM peak.

4.2.5 Background Traffic Growth

Traffic count data from counts undertaken in 2007 and then replicated in 2010 at the same eight intersections in the Macquarie Park area were compared. The results showed that traffic volumes were generally lower in 2010 than in 2007. The 2012 base and project cases therefore assumed no growth in background traffic from 2010 values.

4.2.6 Intersection Operation

The capacity of a road network in an urban area is determined by the capacity of key intersections. The current weekday peak hour performance of the two key intersections has been assessed in Sidra using count data from Thursday 25 March 2010 (refer to Figure 5).

Results of the Sidra intersection analysis are presented in terms of Level of Service (LOS), which is an index of the operational performance of traffic at an intersection and is based on the average delay per vehicle. LOS ranges from A – very good to F – highly congested conditions. The LOS criteria used by the RTA in NSW is presented in Table 8.

Table 8 Level of Service Definitions for Vehicles

Level of Service	Average Vehicle Delay (seconds)	Summary
A	$d \leq 14.5$	Good performance
B	$14.5 \leq 28.5$	
C	$28.5 \leq 42.5$	Satisfactory
D	$42.5 \leq 56.5$	Operating near capacity
E	$56.5 \leq 70.5$	At capacity and may require other control mode
F	$70.5 < d$	

Note: RTA Level of Service method

The results of the Sidra intersection analysis for the Base, 2012 Base and 2012 Project Case is summarised in Table 9 and detailed outputs are presented in Appendix C.

Table 9 Results of Intersection Analysis

Intersection / Scenario	AM Peak			PM Peak		
	DoS	Delay	LoS	DoS	Delay	LoS
	0.74	36.6	C	0.79	44.4	D
Waterloo Road / Herring Road						
2010 Existing	0.74	36.6	C	0.79	44.4	D
2012 Base*	0.74	39.0	C	0.79	34.0	C
2012 Project Case*	0.78	38.3	C	0.84	33.8	C
Epping Road / Balaclava Road						
2010 Existing	0.90	49.3	D	0.93	41.5	C
2012 Base	0.91	52.9	D	0.95	46.2	D
2012 Project Case	0.93	54.0	D	0.99	52.3	D

*Upgraded Waterloo Road / Herring Road intersection geometry

The results of the intersection analysis show that, as a result of the development, the key external intersections will perform at an acceptable level of service. This assumes that the Waterloo Road / Herring Road intersection improvement will have occurred by the time the development is operational. The most critical aspect of the analysis is that the difference in performance between the 2012 Project Case and 2012 Base Case is relatively small.

The CoR's Macquarie Park 2007 Base Paramics Model was used to assess the performance of intersections internal to the Macquarie University campus. The modelling involved the following:

- use of the Cardno temporary car park model partially updated to 2010 in the vicinity of Culloden Road.
- addition of right-turn lane extension on Epping Road westbound at Epping Road / Herring Road intersection to reflect current conditions
- update of Balaclava Road, Macquarie Drive and University Ave to reflect current traffic flow arrangements, and including the realignment of Macquarie Drive between Western Road and Balaclava Road (refer to Figure 3) for the 2012 cases
- adjustment of the access point to model zone 13 (BCS Marsfield) by changing the access point from University Avenue to Balaclava Road
- addition of a number of new university zones to reflect Cochlear, Private Hospital and Hearing Hub
- adjustment of the trip distribution for the disaggregated university model zones
- addition of future traffic generation as per the forecasts described in Section 4.2.3.

A number of model outputs from the 2012 Project Case are presented in Figure 11 to Figure 14. The standard RTA Paramics Model Checklist for the modelling is included as Appendix E.

Figure 11 University Ave/Macquarie Drive Intersection, AM – 2012 Project Case

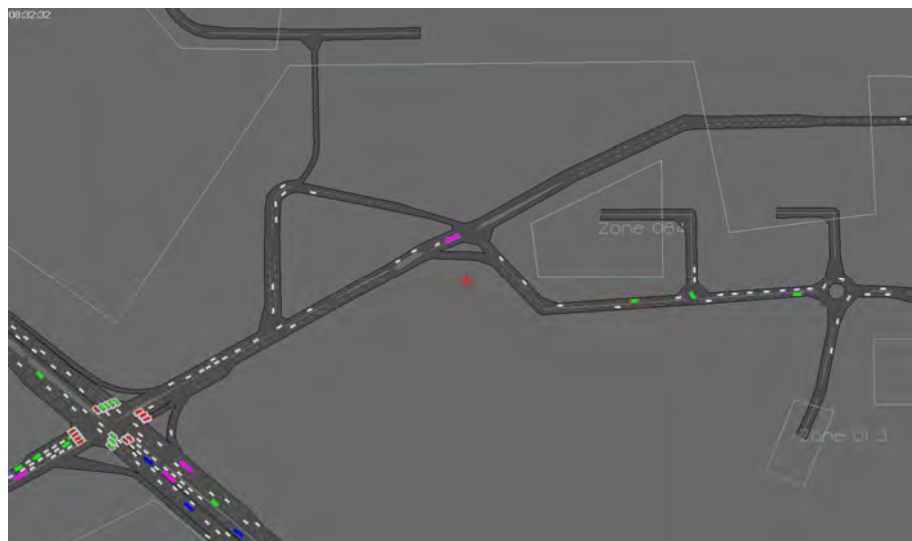
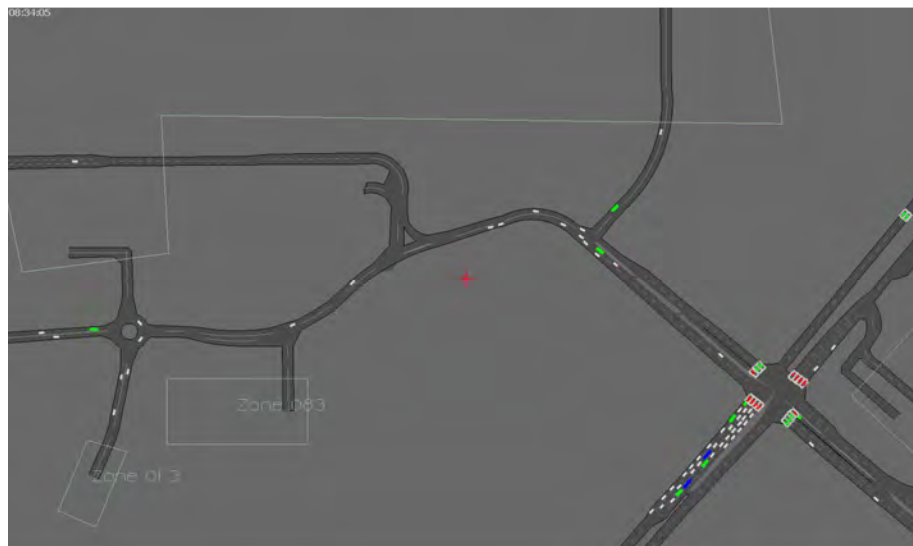


Figure 12 University Ave/Macquarie Drive Intersection, PM – 2012 Project Case**Figure 13 Waterloo Road/Research Park Drive Intersection, AM – 2012 Project Case****Figure 14 Waterloo Road/Research Park Drive Intersection, PM – 2012 Project Case**

The modelling demonstrates that the internal Macquarie University campus road network would perform at an acceptable level of service with the proposed Hearing Hub development and also the other university developments that will be operational by 2012.

4.2.7 Required Road Improvement Works

The results of the intersection analysis demonstrate that no road improvement works are required as part of the development, apart from the proposed Macquarie Drive realignment shown on Figure 3.

4.2.8 Summary of Consultation with Authorities

In preparing this assessment a meeting was held with the City of Ryde's traffic engineers on 11 May 2010. Key outcomes of the meeting were:

- use of the Macquarie Park 2007 Base Paramics Model, partially updated to 2010 conditions by Cardno for the temporary car park assessment, was appropriate
- the adopted 2012 base and development scenarios were appropriate
- there were no other major road network changes or major developments to be included in the modelling process

4.3 Car Parking Arrangements (DGR 5.2)

DGR 5.2 - Car parking arrangements, having regard to the Concept Plan approval (MP06_0016), local planning controls and RTA guidelines whilst also considering accessibility of the site to public transport and campus wide parking provisions.

4.3.1 Description

The development includes 339 car parking spaces in two basement parking levels – 150 in basement 1, 185 in basement 2 and 4 on-grade on Macquarie Drive. A single priority-controlled access driveway is proposed on the new north-south connector road to the east of the site. 62 of the parking spaces will be for visitor parking with the remainder allocated to the various tenants of the building. The car park will not form part of the wider campus public parking supply.

A total of 12 disabled parking spaces are proposed - 8 inside the car park and 4 temporary on-grade on Macquarie Drive. 8 disabled parking spaces is acceptable to the BCA requirement of 1 space for every 100 normal spaces (assuming building class 5). Note that AS 2890.6 *Parking Facilities, Part 6: Off-street Parking for People with Disabilities* does not give guidance on the number of disabled parking spaces to be provided.

There will be parking for up to 16 motorcycles and 159 bicycles. The latter exceeds the minimum requirement specified in the *Planning Guidelines for Walking and Cycling* (bicycle parking for up to 5% of staff and up to 10% of visitors).

The car park will be subject to access control to prevent access by non-Hearing Hub users. Access by visitors will be subject to concierge control.

The car park will operate on a 24 hour basis with general building hours between 8:30am – 5:30pm on weekdays. The majority of visitor movements would occur between 10am – 4pm and would not conflict with peak commuter times.

The design of the car park is addressed in Section 4.6.

4.3.2 Concept Plan Conditions and Campus Wide Parking Provisions

The primary control relating to the total supply of parking within the development is the Concept Plan (refer to Section 1.2). The Plan stipulates that each new development within Precinct E will generally be self-sufficient in terms of parking with parking to be contained within the basement of each development.

The Concept Plan permits a maximum of 10,800 spaces across the campus including 5,000 spaces within Precinct E and F (condition B1). Parking for commercial uses within Precinct E will generally be provided at a rate of no more than 1 space per 80m² GFA. There is, however, some flexibility in the provision of parking across Precinct E, i.e. some developments could have a higher rate of parking and others a lower rate of parking, as long as the overall maximum number of spaces for the precinct is not exceeded.

The Concept Plan parking provisions have been developed with regard to accessibility of the site to public transport with good access to train and bus services.

It is noted that the only approved commercial development within the precinct, Cochlear (currently under construction), includes 528 parking spaces which equates to a rate of approximately 1 space per 46m² GFA (note that the Cochlear development approval preceded the Concept Plan approval).

Based on a GFA of 23,182m² and total parking provision of 339 spaces, parking for the development will be provided at a rate of 1 space per 68m². This rate of parking is permitted under the Concept Plan conditions and will not significantly affect the parking rate that can be adopted for subsequent developments within Precinct E.

4.3.3 Local Planning Controls

City of Ryde parking controls do not apply to the development because it falls under the conditions of the Concept Plan. However, the City of Ryde *Development Control Plan 2006* specifies a parking rate for the Macquarie Park Employment Area of not more than 1 space per 46m² of nett usable floor area. The proposed parking provision for the development does not exceed this rate.

The Draft *Ryde Local Environmental Plan 2008* includes off-street parking controls for the Macquarie Park Corridor. The objectives of the controls are to:

- recognise accessibility by foot, bicycle and public transport
- support the management and supply of parking as the primary means to influence travel behaviour of employees
- encourage greater reliance on public transport
- assist in the management of increased car usage and traffic congestion in the corridor
- effect a greater mode shift to public transport.

The Draft *Macquarie Park Corridor Parking Study* (City of Ryde, 2010) seeks to make recommendations for future improvements to the area to support Macquarie Park's transition from a car dependent, homogenous, commercial centre into a sustainable, vibrant, attractive, pedestrian and public transport orientated mixed use business centre. It recommends retention of current parking rates in the short term with a gradual reduction of rates over time.

4.3.4 RTA Guidelines

The RTA *Guide to Traffic Generating Developments* gives parking guidelines to meet peak parking demand in unrestrained situations. For a restrained situation the guide states "refer to council parking code and applicable local plans" and this is discussed in Section 4.3.3.

4.4 Pedestrian and Cycle Movements (DGR 5.6)

DGR 5.6 - Detail the existing pedestrian and cycle movements within the vicinity of the site and determine the adequacy of the proposal to meet the likely future demand for increased public transport and pedestrian and cycle access with consideration to the Ryde Bicycle Strategy and Master Plan 2007

The existing pedestrian and cycle movements within the vicinity of the site, across the University campus and within the Macquarie Park area have been described in Section 3.3.

The development includes secure bicycle parking for up to 159 bicycles in addition to showers and locker facilities. Footpaths will be provided on all streets surrounding the development. The main at-grade entrance to the building is along the eastern side of the building.

As stated in Section 4.3 the total bicycle parking provision exceeds the minimum requirement specified in the *Planning Guidelines for Walking and Cycling*.

The transport policy for the University assumes a hierarchy where priority is given to non-motorised forms of transport – walking and cycling, in addition to public transport – bus and train. The lowest priority is given to the private car and parking.

The Hearing Hub development is centrally located on the campus within a good network of walking connections and close to bus stops and the rail station. A key pedestrian route will be along Macquarie Drive to the rail station. The Precinct E masterplan includes provisions to substantially upgrade this walking route. The condition of this route and the parallel route on University Ave will also improve significantly following the completion of the Library and Cochlear developments.

The design of the Hearing Hub is in accordance with the guidance contained in the *Planning Guidelines for Walking and Cycling* regarding the integration of walking and cycling at the planning stage of a development.

Cycling conditions on campus and in surrounding areas will improve in the short to medium term as elements of the University, City of Ryde and NSW BikePlan strategies are implemented. High priority routes that will be completed include:

- continuation of the Waterloo Road shared path along Macquarie Drive through the campus to Balaclava Road
- completion of a direct connection between Waterloo Road at Herring Road and Waterloo Road at Culloden Road
- completion of a direct connection from the Academic Core to the existing shared path on Talavera Road

Completion of these key links is likely to result in a significant increase in campus cycling, including to developments such as the Hearing Hub. A recent campus survey suggested that 80% of students and staff would consider cycling to the university if cycling facilities were improved.

Macquarie University has a bicycle user group which could incorporate staff at the Hearing Hub. The purpose of the group is to promote bicycle usage by lobbying for better facilities and also providing advice to new cyclists.

4.5 Sustainable Transport Measures (DGR 5.3, 5.4, 5.5)

DGR 5.3 - Measures to promote sustainable means of transport including public transport usage, car sharing, car pooling and pedestrian and bicycle linkages in addition to addressing the potential for implementing a Workplace Travel Plan or a location specific sustainable travel plan

DGR 5.4 - Detail the provision of facilities to increase the non car mode share for travel to and from the site as per the 40% non-car mode share target specified in Condition B2(1) of the Concept Plan approval (MP 06_0016)

DGR 5.5 - Demonstrate how users of the development will be able to make travel choices that support the achievement of relevant State Plan targets

The Concept Plan sets a 40% non-car mode share target for travel to and from Macquarie University and this applies to both academic and commercial land uses. It is noted that this is a long term target to be achieved over time, well beyond the opening date of the Hearing Hub, and represents a considerable increase in the current mode share.

The NSW State Plan 2010 includes the following transport targets:

- Increase the proportion of total journeys to work by public transport in the Sydney Metropolitan Region to 28% by 2016 (2009 value 24%)
- Increase the mode share of bicycle trips made in the Greater Sydney region, at a local and district level, to 5% by 2016 (2009 value 1%)

These targets will be met by measures to promote sustainable means of transport including public transport usage, car sharing, car pooling and pedestrian and bicycle linkages as described below.

Measures to increase pedestrian and cycle travel have been described in Section 4.4. The level of cycling has the potential to increase significantly, in percentage terms, if key cycling routes are constructed. Surveys indicated a willingness of workers and staff to cycle if adequate facilities are provided.

Public transport usage will continue to increase if improved pedestrian linkages, as described in Section 4.4, are provided between the site, bus stops and rail station. In the longer term bus frequencies at off-peak times will need to increase to support higher levels of bus travel. Increased services will become more viable as the population of the campus, in terms of students, academic staff and commercial workers increases over time. The proposed new Herring Road bus interchange will also improve bus services. Measures should be taken to ensure that bus stop locations and bus routing best serve the needs of students, staff and tenants as new development occurs within Precinct E.

The University is currently reviewing its parking policy and the fee structure in particular. A significant increase in parking fees would be likely to lead to an increase in the non-car mode share level and could also lead to more car pooling. A revised parking fee structure could also be developed to provide incentives to car pooling such as priority parking for vehicles with two or more occupants. Recent University staff and student surveys have indicated a willingness for people to adopt car pooling if suitable incentives were provided.

Other measures that could be introduced to increase the non-car mode share across the campus, including the Hearing Hub, include:

- Integration of the Hearing Hub employees with the existing Macquarie University car pooling scheme. The scheme allows drivers and participants to be matched based on origin and general travel times.
- Introduction of a car share scheme by allowing convenient and dedicated car share parking spaces within the campus. A number of these schemes already operate in parts of the Sydney metropolitan area.

- Introduction of a university shuttle bus service, especially at night, with links to key transport nodes.
- Promotion of flexible working practices for the commercial developments.
- Investigation of a travel pass scheme to provide for reduced cost annual public transport tickets.
- Provision of visitors to the Hearing Hub and other developments with public transport and cycling transport information.
- Preparation of a University Transport and Access Guide.
- Incorporation of Hearing Hub representatives into the existing *University Transport Action Group*.

All of these measures could lead to the implementation of a Hearing Hub Workplace Travel Plan.

4.6 Pedestrian and Cyclist Impacts During Construction (DGR 5.7)

DGR 5.7 - Identify measures to mitigate potential impacts for pedestrians and cyclists during the construction stage of the project.

A detailed construction traffic management plan would be prepared at the construction stage of the project. A summary of measures to mitigate potential impacts for pedestrians and cyclists during the construction stage of the project is given below. The measures recognise the high volumes of pedestrians in the vicinity of the site.

Provisions will be made for pedestrians and cyclists to pass the worksite safely. A minimum footpath width of 2.0m would be maintained at all times. Suitable pedestrian road crossing points would be maintained.

At times it may be necessary to direct pedestrians and cyclists onto the road carriageway and adequate warning signs and barricades would be provided. Traffic controllers or other traffic devices to direct traffic would be provided in accordance with AS 1742.3: 1996.

The construction schedule for the development will also aim to minimise:

- disruption to traffic movements particularly at peak periods
- interference with public transport services

Adequate fencing will be installed around the perimeter of the construction site to restrict unauthorised public access.

All demolition and construction related vehicles would comply with the University's traffic and parking rules (refer to Appendix D). Vehicular access points to the construction site will be selected to avoid conflict with high volume pedestrian desire lines that exist on Macquarie Drive and University Ave.

4.7 Proposed Access and Parking Provisions (DGR 5.8)

DGR 5.8 - Details of proposed accesses and parking provisions including compliance with the relevant Australian Standards

Vehicular access is proposed via a priority-controlled access driveway on a new north-south connector road between the driveway and University Ave.

There will be 150 car spaces on basement 1 and a loading dock, and 185 spaces on basement 2 – a total of 335 spaces. 62 of the parking spaces will be for visitor parking with the remainder allocated to the various tenants of the building. An additional four parking spaces will be provided on the southern side of Macquarie Drive to the west of the building.

The car park layout will be designed in accordance with the following Australian Standards:

- AS 2890.1 Parking Facilities, Part 1: Off-street Car Parking
- AS 2890.2 Parking Facilities, Part 2: Off-street Commercial Vehicle Facilities
- AS 2890.3 Parking Facilities, Part 3: Bicycle Parking Facilities
- AS 2890.6 Parking Facilities, Part 6: Off-street Parking for People with Disabilities

Car park bays will generally be a minimum of 5.5m long and 2.5m wide. A number of the tenant parking bays will be in the form of tandem parking. The parking bays for people with disabilities are in accordance with the minimum requirements of AS 2890.6. Two-way aisles would be at least 5.9m in width.

The car park will be controlled by boom gates although they may be left open during typical work hours with vehicular access monitored by security. At peak periods some queuing for entering traffic may occur on the north-south road although this would be acceptable due to the non-through traffic nature of this road. A boom gate controlled exit can accommodate up to 300 vehicles/hour/lane and therefore the single lane exit would be acceptable assuming maximum flows of 180 vehicles/hour.

4.8 Details of Service Vehicle Movements (DGR 5.9)

DGR 5.9 - Details of service vehicle movements.

The design of the building includes a delivery area within the car park on basement 1. The area will be accessed by the car park driveway and involves a straight path between the driveway and delivery area. The delivery area location and the single space provided is convenient for the type of delivery service vehicles likely to be accessing this type of development.

The development is commercial in nature and most of the service vehicle movements will relate to waste, small deliveries and general maintenance of the building. Tenant deliveries and service vehicle access for maintenance would generally occur within working hours using small vans or small rigid vehicles. Service vehicle movements for waste would involve vehicles up to the size of a 10.8m extended medium rigid vehicle. These movements, likely to be no more than one or two per day, would be scheduled on a regular basis and would generally occur outside normal working hours.

The adequacy of the service vehicle manoeuvring area is demonstrated by a swept path drawing for a 10.8m vehicle as presented in Appendix B. Security will manage the movement of all service vehicles to the facility. Although the movement of service vehicles is not separated from the car park, the small number of movements, small commercial vehicles involved and the timing of movements will not significantly impact on the safe and efficient operation of the car park.

5 SUMMARY AND CONCLUSIONS

This report describes the existing situation, development proposal, forecast traffic generation, traffic impacts, car parking arrangements, sustainable transport measures and details of service vehicle movements of the proposed Australian Hearing Hub development.

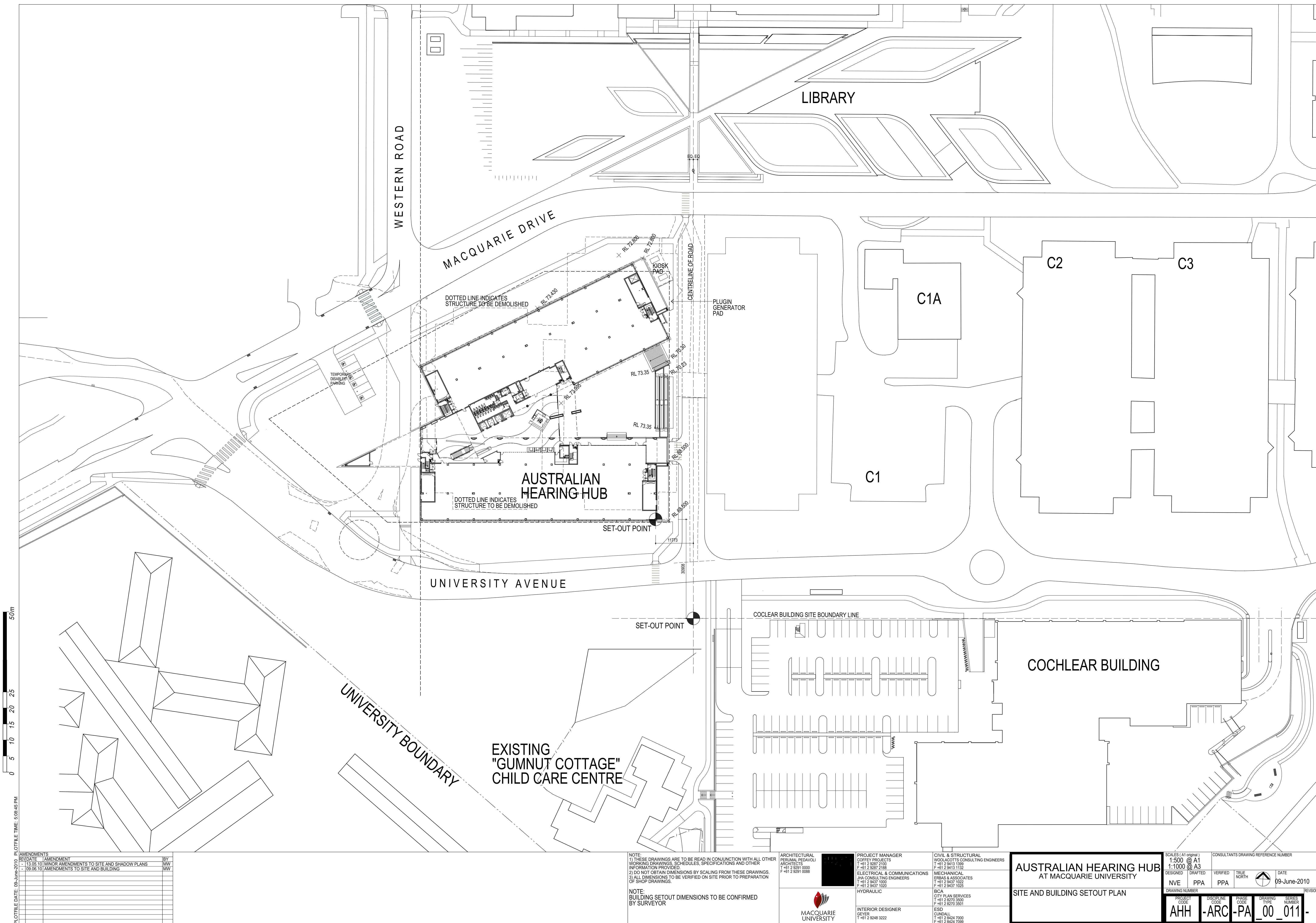
The 23,182m² GFA development will be a purpose-built facility to accommodate research, training, teaching and learning facility in hearing, hearing-related speech, language and reading disorders. It is located on the southern side of Macquarie Drive within Precinct E of Macquarie University. The development will include two levels of basement parking.

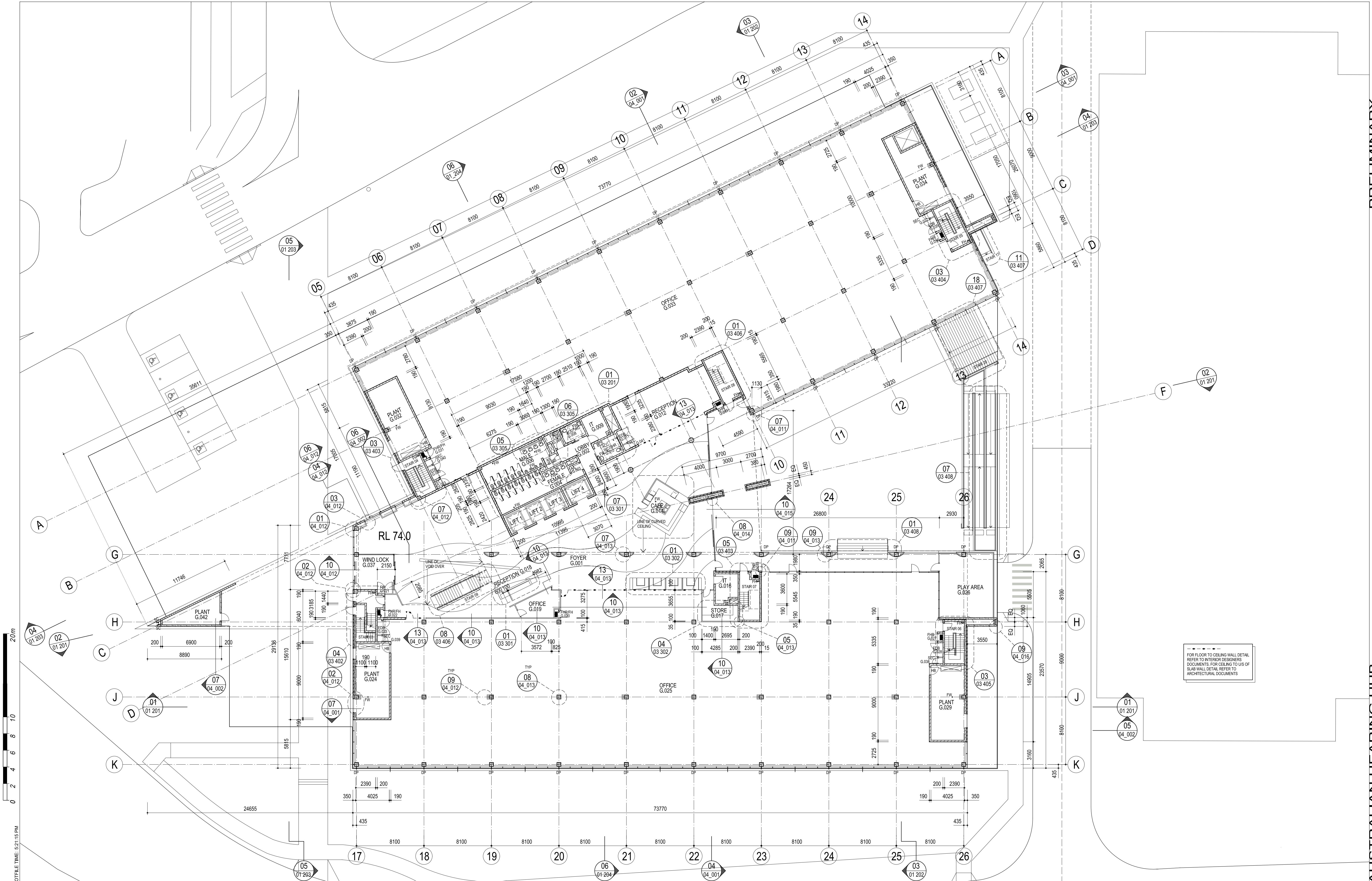
Key findings of this assessment are:

- The development is forecast to generate up to 228 vehicle trips in the weekday peak hours and 1100 vehicle trips per weekday.
- Traffic modelling demonstrates that no external road improvement works are required as part of the development. The results also demonstrate that no internal campus road network improvements are required, apart from the proposed Macquarie Drive realignment that is required to accommodate the building footprint.
- The development includes 339 car parking spaces including 12 for people with disabilities. This rate of parking is in accordance with the conditions of the Macquarie University Concept Plan. The car park will be designed in accordance with relevant Australian Standards.
- The development will be well-served by public transport, both bus and train, allowing for high levels of non-car travel to the site.
- The development includes measures to allow for significant levels of pedestrian and bicycle travel. It includes secure bicycle parking for up to 159 bicycles in addition to showers and locker facilities. Once operational, the facility will be incorporated into the University's sustainable travel planning.
- The car park loading bay has been designed to accommodate a 10.8m extended medium rigid vehicle, the largest service vehicle likely to be accessing the facility.

Appendix A

**Concept Design
Drawings**





AMENDMENTS	
REV	DATE
1	13.05.10
2	09.06.10
3	09.06.10
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AMENDMENTS	
REV	DATE
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NOTE:
1) THESE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL OTHER WORKING DRAWINGS, SCHEDULES, SPECIFICATIONS AND OTHER INFORMATION PROVIDED.
2) DO NOT OBTAIN DIMENSIONS BY SCALING FROM THESE DRAWINGS.
3) ALL DIMENSIONS TO BE VERIFIED ON SITE PRIOR TO PREPARATION OF SHOP DRAWINGS.

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F +61 2 9424 7099

AUSTRALIAN HEARING HUB
AT MACQUARIE UNIVERSITY

GROUND FLOOR PLAN

SCALES (A1 @ 10mm)		CONSULTANTS DRAWING REFERENCE NUMBER	
1:200 @ A1	1:400 @ A3	DESIGNED	VERIFIED
NVE	PPA	TRUE	NORTH
DRAWING NUMBER	PROJECT CODE	DISCIPLINE CODE	PHASE CODE
AHH	-ARC	-PA	01_003