Prince of Wales Medical Research Institute Neuroscience Precinct

February 2009

Traffic Study and TMAP

Parsons Brinckerhoff Australia Pty Limited ABN 80 078 004 798

Ernst & Young Centre,
Level 27, 680 George Street
Sydney NSW 2000
GPO Box 5394
Sydney NSW 2001
Australia
Telephone +61 2 9272 5100
Facsimile +61 2 9272 5101
Email sydney@pb.com.au

NCSI Certified Quality System ISO 9001

2112699A PR_2153 RevD

Author: Tom van Drempt.....

Signed: .....

Reviewer: John Gill.....

Signed: .....

Approved by: Wendy Adam.....

Signed: .....

Date: .....

Distribution: .....

Contents

Contents (continued)

Page Number

Contents (continued)

Page Number

List of tables

List of figures

List of appendices

Executive summary

This report contains the traffic and transport assessment of the Concept Plan and Project Application for the Director General's Environmental Assessment Report, prepared pursuant to Part 3A of the Environmental Planning and Assessment Act (1979, as amended) for the expansion of the Prince of Wales Medical Research Institute facility at Randwick.

The proposed development will occur in three basic stages.

- Stage 1 – additions to the POWMRI facility already approved by Randwick City Council (currently under construction)
- Stage 2 – the Project Application, involves the reconstruction of the POWMRI facility with buildings up to six storeys (includes the ambulance station, excludes the Black Dog Institute)
- Stage 3 – Full realisation of the Concept Plan, for the development area which contains some buildings up to 12 storeys, and incorporates the Black Dog Institute.

Concept Plan

Stage 3 would increase the gross floor area (GFA) to 61,000m^2 in the SW development precinct which is expected to accommodate up to 1,500 employees and research students.

The additional traffic forecast to be generated by the expanded facility can be accommodated within the surrounding road system. Intersection modelling has identified two potential upgrades to reduce delays at two junctions. These would required once the full development was occupied, at the end of Stage 3.

1. Introduction of *No Stopping* on the eastern side of Avoca Street between St Pauls Road and Barker Street from 7:00am to 9:00am
2. Conversion of the intersection of Botany Street and Barker Street to traffic signal control from roundabout operation.

A total of 365 parking spaces would be provided in two basement levels. Access to the internal car park would be via Hospital Road. The basement car park has been checked for compliance with the Australian Standard 2890.1 – 2004 and an AutoTrack swept path analysis has been carried out for parking and service vehicles. 13 reserved spaces would remain on Hospital Road. A loading dock with two docks suitable to accommodate large rigid trucks would be provided, along with four spaces for vans.

Visitors to the Research Centre would be dropped off at the front of the facility, via a porte cochere on Barker Street. The porte cochere would be wide enough to allow a vehicle to pass a stopped vehicle. Family and friends assisting the participants could then turn left into Easy Street and park in the Hospital's public car park. The bus stop in front of the site could be accommodated between the entry and exit of the porte cochere.

A detailed construction management plan will be completed and submitted when a construction contractor has been appointed and more information on the method of construction and spoil disposal site is known. A Travel Smart process would be applied to construction workers to make them aware of their non-car travel choices to the site.

A TMAP assessment of the site has been made. The TMAP's objectives were to achieve the mode share change shown below.

Mode	before	target	change
car (driver)	48%	42%	-12%
car (passenger)	4%	4%	0%
motorcycle	2%	2%	0%
cycling	8%	10%	25%
bus and train	22%	24%	10%
walking	16%	18%	10%

This would be achieved through a package including:

- TravelSmart program including the production of a site Travel Plan at the completion of Stage 2A and repeated at the completion of Stages 2B, 2D and 3

- Bicycle facilities from Stage 2B including parking spaces, lockers, showers and change rooms with sufficient capacity to support the 25% increase in bicycle usage.

The impacts of the TravelSmart scheme would be evaluated six months after being implemented or reviewed at Stages 2A, 2C, 2D and 3 to ensure that the target mode splits are being achieved. If the reduction in car usage is lagging behind the target the subsidy of bus fares for staff should be considered. Local experiences with travel interventions such as the active management program at the University of New South Wales' staff and students have demonstrated that these initiatives can change travel outcomes. Consultation has been undertaken with the RTA, Randwick Council and the MoT/State Transit.

Project Application

Stage 2 (Project Application) will increase the GFA to about 25,470sqm, accommodating approximately 650 employees (excluding Black Dog employees). This stage is divided into four sub-stages:

- Stage 2A – including main entry, participant assessment rooms, café, magnetic resonance machines
- Stage 2B – incorporating the ambulance station, additional laboratory space and basement parking
- Stage 2C – new auditorium with 300 seat capacity
- Stage 2D – additional laboratory space, loading dock and basement car park.

The additional traffic generated by the Project Application Stage can be satisfactorily accommodated within the existing road and transport networks.

176 parking spaces would be provided in the Stage 2 development basement car park and 50 spaces would be provided on the surface within the site. Ten reserved spaces on the western side of Hospital Road would be retained for the use of POWMRI staff and visitors. The car park would be accessed via a single access off Hospital Road.

A construction Work Zone for material delivery and waste removal will be sought on the northern side of Barker Street, in front of the site during Stage 2A. This would necessitate the temporary relocation of the bus stop to east of Easy Street.

1. Introduction

The Prince of Wales Medical Research Institute is seeking approval for the redevelopment of its current facility on the corner of Barker Street and Easy Street, Randwick. An application for Concept Plan approval under Part 3A of the Environmental Planning and Assessment Act, 1979 is being sought for the development of the POWMRI site at Barker Street, Randwick. The redevelopment will include consolidation and expansion of the existing clinical and laboratory neuroscience research space over progressive development phases. The development includes the Prince of Wales Medical Research Institute and the Black Dog Institute, but excludes the Kiloh Centre and the memorial garden to the south of the Kiloh Centre (see Figure 3-1 for an aerial view of the site).

Concurrently, a Project Application approval is being sought for Stage 2 (being Stages 2A to 2D) of the Concept Plan proposal, and including associated infrastructure works. The Concept Plan contains these works as well as a Stage 3.

Stage 1 of the overall project has already been approved by Randwick Council (DA/468/2007) for 'proposed additions to Prince of Wales Medical Research Institute, comprising additional open office spaces located to the northeast and southwest corners of the building envelope, additional stairs and rooftop plant room located above the north-eastern addition', by agreeing that no further environmental assessment is required pursuant to Section 75P(1)(c) of the Act for works associated with that development consent.

This report contains the traffic and transport assessment of the Concept Plan for Stages 2 and 3 and Project Application for Stage 2 to the Director General's Environmental Assessment Report, prepared pursuant to Part 3A of the Environmental Planning and Assessment Act (1979, as amended).

1.1 Background

The Prince of Wales Medical Research Institute (POWMRI) undertakes critical research into understanding the integrative actions of the brain and nervous system in health and disease. The work at POWMRI is concentrated on understanding in detail the human nervous system. The research also seeks improvements in clinical practice to help diagnose and prevent disease and ultimately to look for curative therapies. Some of the areas of research are:

- Ageing and Neurodegeneration
- Falls and Balance
- Mental Health
- Injury
- Brain mapping and imaging
- Human movement.

Some of the conditions researched by the Institute include Parkinson's Disease, Dementia and Schizophrenia.

POWMRI is seeking to increase its capacity to accommodate the increasing amount of research being undertaken in this field. POWMRI facilitates the research activities of students and works closely with other institutions, such as the University of New South Wales. One of the objectives of the expansion is to provide a world-class facility which can be used by researchers from outside the organisation, and therefore provide a world ranked centre for excellence in neurological research.

The purpose of the expansion is to provide increased space for the following activities:

- Reception, Administration and Executive Offices
- Research Project Groups
- Magnetic Resonance Imaging Centre
- Specialised Research facilities and scientific support
- Clinical, wet and dry lab, and special facilities for research.

The Black Dog Institute also occupies the site. The Black Dog Institute is an educational, research, clinical and community-oriented facility offering specialist expertise in mood disorders - a range of disorders that include depression and Bipolar Disorder (formerly called 'manic depression'). The Institute is attached to the Prince of Wales Hospital and affiliated with the University of New South Wales.

The Black Dog Institute would be incorporated into the new facility in Stage 3 of the Concept Plan. The future space would be used for:

- Depression Clinic
- consultancy services to health professionals
- research activities, including University of NSW School of Psychiatry
- medical student education.

1.2 Guide to Director General Requirements

The Minister for Planning has accepted the proposed development for assessment within the requirements of Part 3A of the Environmental Planning and Assessment Act 1979 as amended.

The Director General's Requirements (DGRs) for the Concept Plan's assessment were issued by the NSW Department of Planning on 13th August 2008, and for the Project Application on 11th September 2008. This report addresses the traffic and transport related conditions for both the Concept Plan and Project Application Stages.

The specific DGRs addressed in this report are included below, along with a reference to the relevant section of this report. Table 1-1 covers the DGRs for the Concept Plan and Table 1-2 covers the DGRs for the Project Application. The DGRs make reference to comments from the Roads and Traffic Authority of NSW (RTA). Table 2-1 contains the list of issues and a reference to the relevant section of this report where they are addressed.

Table 1-1 Director General's Requirements for Concept Plan

Key Assessment Requirements			Location in Report
Car Parking and Traffic	A Traffic Study in accordance with the Road and Traffic Authority's *Guide to Traffic Generating Development*, with particular regard to:	Existing road capacity, traffic conditions, expected impacts and any upgrade requirements	Section 3.3 Chapter 5 Section 10.1
		Internal road layout and access arrangements	Sections 4.1.2, 6.2, and 6.3
		Car parking arrangement for staff and visitors	Sections 4.1.1 and 6.1
		Delivery, servicing and loading arrangements	Sections 4.1.3 and 6.4
		Pedestrian and bicycle linkages within the site and wider hospital area	Sections 5.4, 5.5 and Chapter 9
	Transport Management and Accessibility Plan (TMAP) for the site, in accordance with the Ministry of Transport's *Interim TMAP Guidelines*, including:	Staging/Sequencing plan	Chapter 4
		Construction Management Plan	Section 4.1.4
	Measures to promote public transport usage and reduce car usage		Chapter 9
	Determine the adequacy of the proposal to meet likely future demand for increased pedestrian and cycle access in the vicinity of the site		Sections 5.4, 5.5 and Chapter 9
	Identify measures to mitigate potential impacts for pedestrians and cyclists during the construction of the project		Section 4.1.4
	Proposed car parking arrangements, including car parking allocation and parking for construction workers		Sections 4.1.1, 4.1.4 and Section 6.1
Construction and operational impacts	Prepare a construction management plan to mitigate against the impacts associated with demolition and construction of the new work		Section 4.1.4
Consultation	During the preparation of the Environmental Assessment, you should undertake an appropriate level of consultation with the relevant Local or State government authorities, service providers, existing staff at POWMRI and Black Dog, community groups and other stakeholders. In addition the EA is to include written evidence of consultation with the following:	Randwick City Council	Section 2.2.2
		NSW Roads and Traffic Authority	Section 2.2.1
		NSW Ministry of Transport	Section 2.2.3

Table 1-2 Director General's Requirements for Stage 2 Development

Key Assessment Requirements			Location in Report
Car Parking and Traffic	A Traffic Study in accordance with the Road and Traffic Authority's *Guide to Traffic Generating Development*, with particular regard to:	Existing road capacity, traffic conditions, expected impacts and any upgrade requirements	Section 3.3 Chapter 7 Section 10.2
		Daily and Peak traffic movements and impacts on intersections	Section 7.1 Section 7.2
		Internal road layout and access arrangements	Sections 4.2.2, 8.2, and 8.3
		Pedestrian and bicycle circulation patterns and linkages	Sections 5.4, 5.5 and Chapter 7
	Transport Management and Accessibility Plan (TMAP) for the site, in accordance with the Ministry of Transport's *Interim TMAP Guidelines*, including:	Cumulative regional traffic impacts	Section 7.2
		Staging/Sequencing plan	Section 4.2
		Construction Management Plan	Section 4.2.4
	Measures to minimise car parking provision and promotion of public transport and bicycle usage		Section 9.2
	Proposed car parking arrangements, including car parking allocation and parking for construction workers		Sections 4.2.1, 4.2.4 and Section 8.1
Construction and operational impacts	Prepare a construction management plan to mitigate against the impacts associated with demolition and construction of the new work		Section 4.2.4
Consultation	During the preparation of the Environmental Assessment, you should undertake an appropriate level of consultation with the relevant Local or State government authorities, service providers, existing staff at POWMRI and Black Dog, community groups and other stakeholders. In particular, you should consult with	Randwick City Council	Section 2.2.2
		NSW Roads and Traffic Authority	Section 2.2.1
		NSW Ministry of Transport	Section 2.2.3

1.3 Scope of this report

The Prince of Wales precinct has been identified as a specialised centre for medicine. There are a number of strategic planning documents which apply to the site. These are discussed in **Section 2** along with the results of our consultation with state and local government agencies.

The current transport conditions are documented in **Section 3**.

This project has two distinct stages – the Concept Plan (the full development scenario) and the Project Application. Both are described in **Section 4**.

The impacts on the transport system and an assessment of the parking and access impacts of the Concept Plan are contained in **Sections 5 and 6** respectively.

Similarly, the transport impacts and parking and access assessment for the Project Application are discussed in **Sections 7 and 8** respectively.

The TMAP assessment is included in **Section 9** along with the proposed mitigation measures and an evaluation of timing.

The recommendations of the study with respect to both the Concept Plan and Project Application are summarised in **Section10**.

2. Strategic context and consultation

The Prince of Wales Hospital Medical Research Institute undertakes important research, providing the prospect of medical breakthroughs for the community. Its importance has been recognised in a number of planning documents. The transport options of the area are influenced not only by the medical precinct, but also the significant education institutions in vicinity, the local community and a number of other stakeholders. This section discusses the strategic planning framework, as well as local planning controls.

Several government agencies have been consulted for their views on the important issues and to ensure that these are addressed in the assessment.

2.1 Planning

NSW Metropolitan Strategy

The NSW Metropolitan Strategy was released in December 2005. It supports continuing economic growth while balancing social and environmental impacts. The Strategy plans for an additional 1.1 million people living in Sydney.

The Randwick area is identified as being close to the economic corridor from the City to the Airport and Port Botany. The Randwick Education and Health precinct is listed as a 'Specialised Centre' (places such as hospitals, universities and major research and business centres that perform vital economic and employment roles across Sydney). The site is therefore able to combine this strategic geographical position with its nationally significant research and employment potential. The projection for the eastern area (Randwick, Botany Bay, Woollahra and Waverley) in the Metropolitan Strategy is an additional 20,000 dwellings and 17,500 jobs.

For transport, the vision for Sydney is that Sydney's neighbourhoods would have improved local transport, with walking and cycling facilities for internal travel and bus services to reach nearby major centres. One of its objectives is to influence travel choices towards more sustainable travel such as walking, cycling and public transport.

One of the aims of the upgrades to the transport system would be to improve access to jobs. A network of fast, frequent, direct and convenient bus services on 'strategic' bus corridors which connect centres across Sydney (as identified by the 2004 *Review of Bus Services in New South Wales* – the 'Unsworth Report') would be implemented.

Following on from draft State Environmental Planning Policy No. 66 – Integration of Land Use and Transport, the Metropolitan Strategy seeks to develop mixed use centres and 'high trip generating' land uses on major transport routes in an effort to reduce vehicle movements and promote efficient use of the transport network. Randwick, The Spot, Kensington and Kingsford are vibrant and densely settled communities within walking and cycling distances of the site.

The POWMRI site is located close to three strategic bus corridors: 19 – between Randwick and the CBD, 29 – between Bondi Junction and Burwood and 30 – between Bondi Junction and Hurstville. This is a rich combination of origin choices for work trips with radial and cross-regional routes connecting directly to a number of suburbs and a number of rail lines. This places it in a location where the new jobs it creates would be supported by a frequent public transport service. Therefore, the development supports the overall policy of integrating land use and transport by focusing activities in centres and near corridors. This strategy is seen as the best way to influence people's choices about where they live, work and travel to services and activities.

One initiative is to introduce a parking policy to encourage the use of public transport. Another is to implement TravelSmart voluntary travel behaviour change programs targeted at locations which generate travel. TravelSmart targets information about alternatives to car travel specific to the location so it successfully addresses its intended audience. TravelSmart would be implemented during both construction and operation stages.

East Subregional Strategy

The East Subregional Strategy is a component of the Department of Planning's Metropolitan Strategy. Its main initiatives relating to transport are the implementation of the strategic bus corridors and improvements to walking and cycling. It recognises that the region already has strong public transport corridors into the city, but east-west corridors could be enhanced. Projects near to the development precinct include cycleway provision in Randwick (shared use path along Wansey Road, from Alison Road to High Street, Randwick) and the reconstruction of the road pavement of Rainbow Street.

A metropolitan–wide parking policy is to be developed by the Department of Planning in consultation with other transport agencies. The parking policy would guide the supply and management of parking to support the use of sustainable transport to strategic centres, including the Randwick Education and Health Centre. Another initiative is the development and implementation of TravelSmart Centres voluntary travel behaviour change programs for the Randwick Education and Health Specialised Centre.

NSW State Plan

The transport component of the NSW State Plan seeks an increasing share of peak hour journeys on a safe and reliable public transport system. The Plan contains the specific targets of an increase in the journeys to work in the Sydney metropolitan region by public transport to 25% by 2016. As discussed in Section 3.7, the current mode share for public transport for existing employees is close to this level.

Urban Transport Statement

The Urban Transport Statement, released in November 2006, reiterates the commitment to the 43 Strategic Bus Corridors and the focussing of bus priority in these locations. Road upgrades will also be focussed on network pinch points.

A metro rail line to Port Botany was discussed. However, its indicative location was along the Anzac Parade corridor, which is 1.1 km from the POWMRI site. It may be reasonable to assume that bus-based public transport, linked into the metropolitan rail network, will continue to be the predominant public transport in the area in the foreseeable future.

Randwick City Plan

The Randwick City Plan is a 20 year plan (2006 – 2026). One of the outcomes it seeks is integrated and accessible transport to support economic growth. The key direction for transport with Council will be to 'focus on promoting public transport, walking and cycling as ways to access our town centres and key destinations, and to improve the links between the locations'. Randwick Council has undertaken to define walking and cycling catchments, and to create high quality pedestrian and cycle links to key destinations, such as the Hospital precinct.

Council's *Moving Around* document, which supports the City Plan, focussed on:

- sustainable transport options
- integrated transport and land uses
- pedestrian accessibility and quality local infrastructure
- car parking provision and management
- improved pedestrian access throughout our City.

Similar to the TravelSmart initiatives in the Metropolitan Strategy, Council will provide information and education about sustainable transport opportunities to its residents. It also plans to coordinate planning for transport improvements by entering into discussions with organisations that are major trip generating destinations.

The management of car parking is seen as balancing the needs of a variety of parking demands with reducing car reliance. The aim is to provide appropriate provisions for public and private parking.

The City Wide On Street Parking Policy

This policy guides future 'on street parking' priorities, including maximum use and parking turnover through the Residents Parking Scheme, and parking period time restrictions and effective enforcement.

The area based resident parking schemes are to be implemented in five locations: areas around the University of New South Wales; the Randwick Hospitals Complex; and areas located adjacent to Coogee, Maroubra and Clovelly beaches.

Randwick Bicycle Plan 2008

The 2008 version of the Randwick Bicycle Plan identifies a number of proposed bicycle routes within Randwick City and a staged implementation process. Several planned routes pass in front of, or nearby, the proposed development, including along Barker Street, Botany Street, Magill Street, Francis Martin Drive, St Pauls Road, High Street and Avoca Street. A priority ranking of the cycleways is also included. The plan is discussed in more detail in Section 3.6.

Action for Bikes – Bike Plan 2010

A masterplan for the bicycle network in Sydney was set in this document. It includes regional bicycle links to employment, retail, education, recreation and public transport nodes. There are three regional bicycle links identified to areas within Randwick City along with an anticipated timing:

- University of Sydney to the University of New South Wales 2006 (partially complete)

- Eastgardens to the University of New South Wales by 2006 (partially complete)
- Bondi Junction to the University of New South Wales by 2010.

DCP Parking

Randwick Council's Development Control Plan for parking includes parking rates for different types of land uses. While the POWMRI site is located within the Prince of Wales Hospital precinct, it is a research facility and therefore subject to different activities than would be experienced in a hospital or medical consulting rooms.

The POWMRI research facility has different traffic and parking characteristics compared to a hospital, medical consulting rooms or medical centres. There are a high proportion of students and part-time staff, creating travel at different times of the day. A small number of participants in the research are dropped at the facility, stay for an assessment and then leave, as opposed to a quick medical examination or an extended hospital stay.

As the DCP Parking does not have rates which are applicable to a medical research facility, the results of a staff survey will be used instead aas the benchmark to forecast the future impacts of expansion of the site. The DCP also contains design guidelines for parking facilities.

2.2 Consultation

In addition to the Director General's Requirements and the RTA's letter containing a list of issues, the RTA, Randwick City Council, Ministry of Transport and the State Transit Authority were consulted regarding the development to ensure that all the relevant issues could be covered in this assessment. Notations on this consultation are included in Appendix B.

2.2.1 Roads and Traffic Authority

The RTA provided a list of issues to be covered in the Environmental Assessment to the Department of Planning which were incorporated into the Director General's Requirements for the development. A copy of the issues raised is included in Table 2-1 along with a reference to the section in this report where the issues raised are discussed.

In addition, the RTA regional engineer was contacted to confirm that the list of issues was comprehensive. During these discussions, the RTA clarified that the intersection modelling mentioned in issue 2 should be completed using the SCATES coordinated intersection analysis software, while the modelling for non-signalised and isolated intersections could be completed using the SIDRA intersection analysis program.

Table 2-1 RTA Issues for Stage 2

RTA Issue	Location in Report
1. It is noted that the Metropolitan Strategy has designated City of Sydney as a Global City and a major focal point for world class business, tourism, cultural, health, education and entertainment activities. It is important that the development of The Prince of Wales Medical Research Institute's proposed Neuroscience Research Precinct Stage 2, takes into consideration, and contributes to the achievement of, transport objectives contained in this and other high-level NSW Government strategies. These strategies include the NSW State Plan, Urban Transport Statement and the Sydney City Subregional Strategy. These policies share the aims of increasing the use of walking, cycling and public transport; appropriately co-locating new urban development with existing and improved transport services; and improving the efficiency of the road network. By addressing both the supply of transport services and measures to manage demand for car use, the EA report should demonstrate how users of The Prince of Wales Medical Research Institute's proposed Neuroscience Research Precinct Stage 2, will be able to make travel choices that support the achievement of relevant State Plan targets.	Section 2.1
2. Daily and peak traffic movements likely to be generated by the proposed development including the impact on nearby intersections and the need / associated funding for upgrading or road improvement works (if required). The key intersections to be examined / modelled include: ▪ Avoca Street and High Street/Belmore Road ▪ Avoca Street and Cuthill Street ▪ Avoca Street and St Pauls Street ▪ Avoca Street and Barker Street.	Section 5.2, Section 7.2
3. Details of the proposed accesses and the parking provisions associated with the proposed development including compliance with the requirements of the relevant Australian Standards (ie: turn paths, sight distance requirements, aisle widths, etc).	Sections 6.2, 6.3, 8.2 and 8.3
4. Proposed number of car parking spaces and compliance with the appropriate parking codes.	Section6.1, Section 8.1
5. Details of service vehicle movements (including vehicle type and likely arrival and departure times).	Section 6.4, Section 8.4
6. The RTA requires the EA report to assess the implications of the proposed development for non-car travel modes (including public transport use, walking and cycling); the potential for implementing a location-specific sustainable travel plan (eg Travelsmart' or other travel behaviour change initiative); and the provision of facilities to increase the non-car mode share for travel to and from the site. This will entail an assessment of the accessibility of the development site by public transport.	Sections 5.3, 5.4, 5.5, 7.3, 7.4, 7.5 and 9.1

RTA Issue	Location in Report
7. To ensure that the above requirements are fully addressed, the RTA requests that a Traffic Management and Accessibility Plan (TMAP) be undertaken for The Prince of Wales Medical Research Institute's proposed Neuroscience Research Precinct Stage 2 site to properly ascertain the cumulative regional traffic impacts associated with the development. The TMAP process provides an opportunity to identify a package of traffic and transport infrastructure measures required to support future development. Regional and local intersection and road improvements, vehicular access options for adjoining sites, public transport needs, the timing and cost of infrastructure works and the identification of funding responsibilities associated with the development should be identified.	Chapter 9
8. The RTA will require in due course the provision of a traffic management plan for all demolition / construction activities, detailing vehicle routes, number of trucks, hours of operation, access arrangements and traffic control measures.	Section 4.1.4, Section 4.2.4

2.2.2 Randwick City Council

A meeting with traffic representatives from Randwick City Council was held on 21st November 2008. The proposed assessment methodology was discussed along with details of the project. Points of discussion included:

- the temporary relocation of the bus stop during construction of Stage 2A
- no planned road network changes, other developments
- no nett increase in on-street parking
- survey of staff travel patterns - extension for future development
- intersection modelling methodology and stages to be modelled.

The issues raised by Council for attention in the assessment were:

- Design of porte cochere – Council expressed concern regarding pedestrian safety at the entrance and exit of the porte cochere for participant drop off. The design of the porte cochere has been amended to: increase driver angle when exiting the facility; widen the facility to allow a vehicle to pass another unloading a passenger; prevent right-turn movements out of the facility; and increase driver exit sight distance by moving the bus stop westwards. A plan of management should be included for the situation where the facility is not used as intended (see Section 6.2).
- Bicycle facilities to be designed to the NSW Bicycle Guidelines (RTA, 2005).

2.2.3 Ministry of Transport

The Ministry of Transport advised that consultation regarding the nearby bus services and the bus stop on Barker Street should be undertaken directly with the State Transit Authority.

2.2.4 State Transit Authority

State Transit were consulted to determine future plans for the bus services near the development and also regarding potential impacts to its services from proposed changes to the bus stop on the Barker Street frontage of the site.

State Transit advised that there are plans currently being considered to replace route 359 with route 357 on the section of Barker Street between Avoca Street and Botany Street. The service frequency would then be 30 minutes and higher during the morning and afternoon peak.

Patronage on the Coogee Bay Road/Perouse Road corridor (routes 373 and 377) is growing. If patronage growth continues, additional capacity in the form of additional services or higher capacity buses (e.g. articulated buses) could be considered by the operator.

A meeting regarding the future plans for the bus stop in front of the development and the future of the bus service was held with State Transit representatives on 18th November 2008. At this meeting, it was agreed that the bus stop would be retained in approximately its current location, between the entry and exit of the porte cochere. During construction, there would be a temporary relocation of the bus stop to east of Easy Street to allow for a construction work zone for the unloading and loading of building materials.

3. Existing Situation

3.1 Site location and existing development

The Prince of Wales Medical Research Institute site is located on Barker Street between Hospital Road and Easy Street. The site contains the current POWMRI facility, the ambulance station and the Black Dog Institute. The Kiloh Centre and a memorial garden are location on the north-east corner of the block. They are not included in the development, hence their transport impact would remain unchanged.

The precinct site area is approximately 14,055 sq.m, with the Institute's existing development footprint at about 6,426m^2. The Gross Floor Area (GFA) of the POWMRI site is 4,460m^2. The current staff numbers are 225, although not all are present at one time. There are currently 116 full-time staff, 52 part-time staff, 49 students and 8 honorary/visiting researchers, i.e. approximately half of the staff are full-time. The Black Dog Institute has approximately 80 staff.

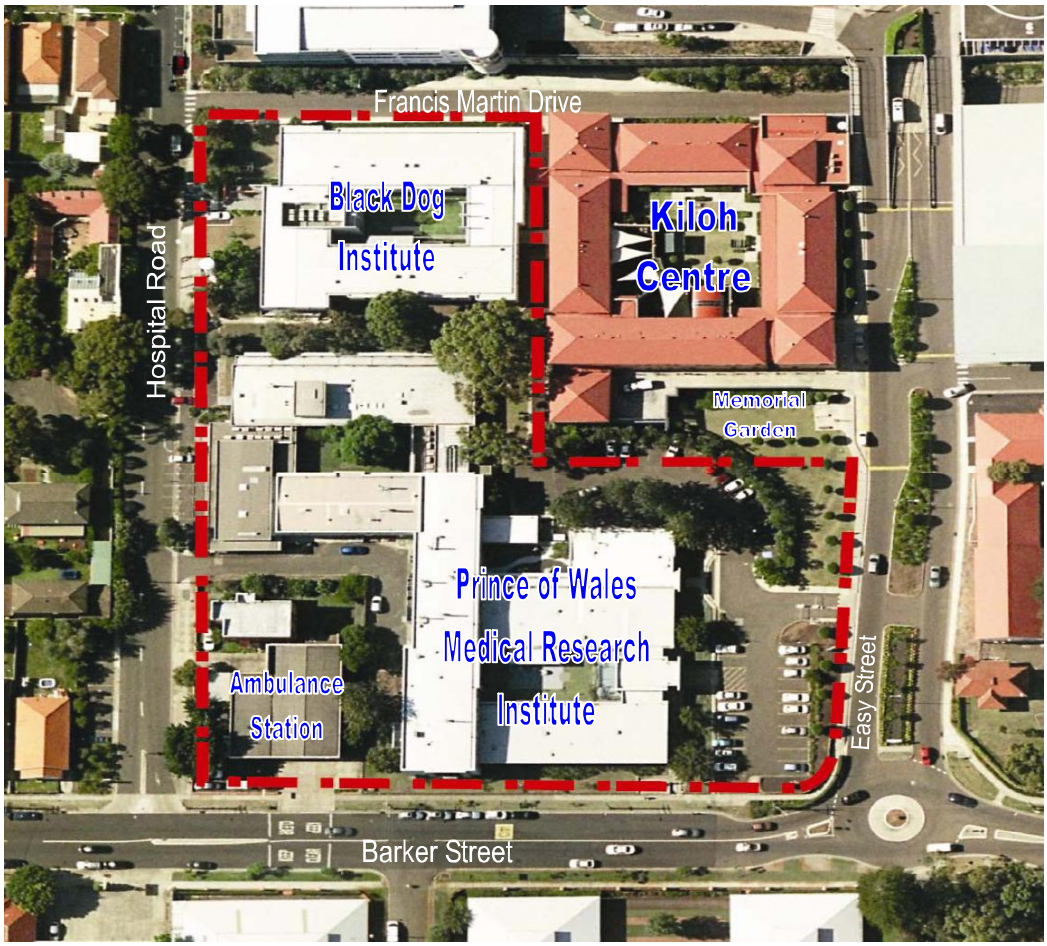


Figure 3-1 Aerial view showing site boundary

The area surrounding the POWMRI site includes some land uses with high importance for the community. The POWMRI site and some of the larger land uses are shown in and are discussed below.

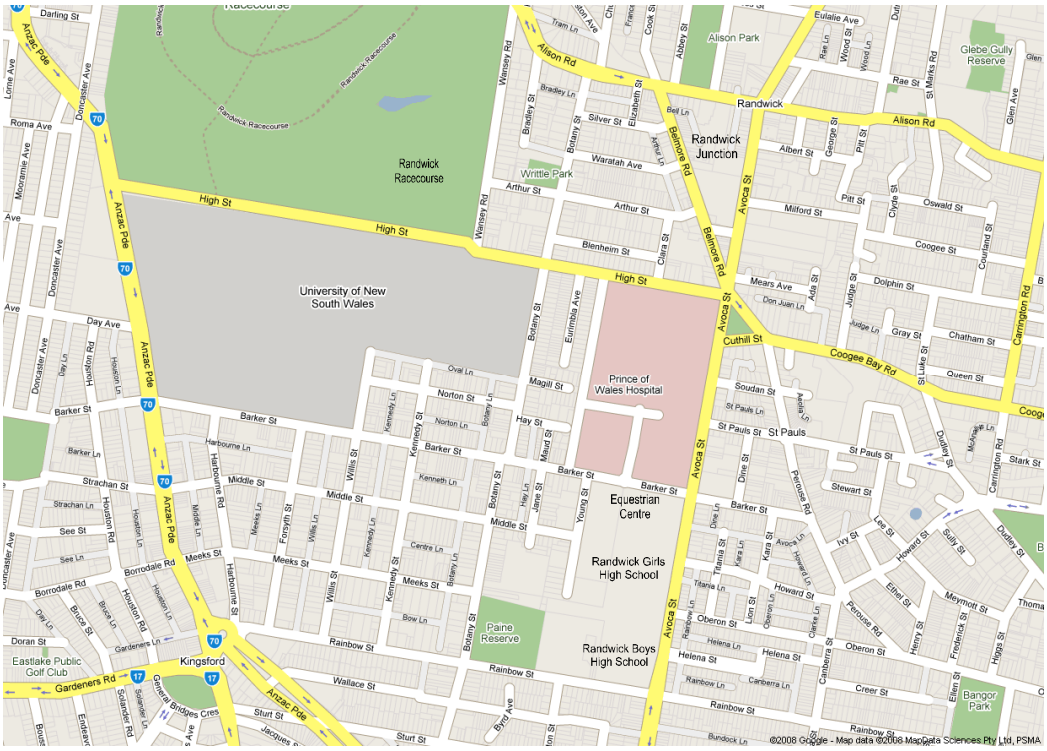


Figure 3-2 Site location and surrounding land uses

The Prince of Wales Hospital is located immediately to the north and east. It includes The Prince of Wales Private Hospital, the Royal Hospital for Women and Sydney Children's Hospital. The Public Hospital has 440 beds and almost 3,000 staff. Access to these facilities is gained from High Street, Avoca Street and Hospital Road. Access to the public car park for the Hospital is via Easy Street, off Barker Street.

The University of New South Wales is located to the west of the site. The University has close to 40,000 students and 6,000 staff. Access is gained from Anzac Parade, High Street, Barker Street and Botany Road. UNSW has limited permit and paid parking on site. It is served by dedicated buses to Central and Circular Quay, as well as regular bus routes on Anzac Parade, High Street, Barker Street and Botany Road.

The Randwick Equestrian Centre is located on the southern side of Barker Street, directly opposite the existing POWMRI site. It has access off Young Street

Randwick Girls High School is located south of Barker Street and is also bounded by Avoca Street. School bus services depart from Avoca Street. The staff car park and student drop-off are located on Barker Street to the east of the site.

Randwick Junction is within 900 metres (approximately an 11 minutes walk) of the site. It is the major retail area for the locality and a focal point for transport services.

3.2 Road system

The POWMRI site is located on Barker Street between the privately owned Hospital Road and Easy Street. The closest sub-arterial road is Avoca Street. Anzac Parade is an arterial road located about 1.1km to the west. High Street and Botany Street are regional collectors which also provide access to the Prince of Wales Hospital and the University of New South Wales.

Avoca Street

Avoca Street is State Road, located to the east of the Prince of Wales Medical Research Institute. Avoca Street runs from York Road/Darley Road at Queens Park in the north to Anzac Parade at Maroubra Junction in the south. The road has two-lanes in each direction. On street parking is provided in both directions. On street parking in the southbound direction is generally unrestricted. In the northbound direction, parking is not permitted during 7:00-9:00am and 4:00-6:00pm on weekdays.

A 60 km/h speed limit is the general speed limit. A school zone exists near Randwick Girls and Boys high schools. There are some entrances to the hospital grounds along Avoca Street. Pedestrian crossings are provided at the signalised intersections.

Barker Street

Barker Street is a collector road, located on the southern boundary of the POWMRI site. Barker Street runs parallel to High Street and connects Anzac Parade with Perouse Road, crossing Botany Street and Avoca Street on the way. Barker Street generally has one traffic lane in each direction with parking on the side. Near Avoca Street the following restrictions apply:

- *No Parking* 8:00-9:30am and 2:30-4:00pm on schooldays westbound lane to the west of the intersection
- *No Parking* 3:00-6:30pm on weekdays eastbound lane to the west of the intersection.

There are roundabouts at the intersections with Easy Street and Botany Street. The main public vehicle entry to the Prince of Wales Hospital, Easy Street, is accessible via Barker Street. A 50 km/h speed limit applies to Barker Street, apart from school times when a 40 km/h school zone applies to the frontage of Randwick Girls High School. Pedestrian crossings are provided at the signalised intersections and pedestrian refuges in the splitter islands are provided at the Easy Street roundabout.

High Street

High Street is a collector road, located to the north of the Prince of Wales Hospital. The road connects Anzac Parade and Avoca Street. The road is one traffic lane in each direction, with parking lanes. Two lanes are provided on the approach to signalised intersections, but lane markings do not formalise the arrangement. A bus zone outside Gate 9 of the University of New South Wales exists during 3:00pm and 6:00pm on weekdays.

The speed limit applied to this road is 50 km/h. Pedestrian crossings are provided at the signalised intersections and a zebra crossing is also provided on High Street, between Hospital Road and Avoca Street.

Botany Street

Botany Street is a collector road running parallel to Avoca Street, running north-south between Bunnerong Road in Pagewood to Alison Road in Randwick, passing alongside the University of New South Wales. The road has one traffic lane in each direction with parking. A northbound, weekday afternoon peak (3:00pm – 6:00pm) restriction exists on the approach to the signalised intersection with High Street.

The speed limit on Botany Street is 50 km/h. Botany Road provides access to the main car park in the eastern campus of UNSW. Pedestrian crossings are provided at the signalised intersections and pedestrian refuges exist in the splitter islands at the Botany/Barker Street roundabout.

Hospital Road

Hospital Road runs between High Street and Barker Street. It is owned by the Hospital and provides access to the hospital grounds and the car parks of different buildings. Some reserved on-street parking exists for disabled and emergency parking near High Street and Black Dog and POWMRI near Barker Street. Hospital Road has a 20 km/h low speed environment. Hospital Road forms the western boundary of the POWMRI site. It provides access to Francis Martin Drive which forms the northern boundary of the site.

Easy Street

As mentioned before, Easy Street provides access to the public section of the Hospital car park. It has a divided carriageway near Barker Street with one lane in each direction and no kerbside parking. The on-site parking for the current POWMRI site is accessed via Easy Street. Easy Street rises and is grade separated from Francis Martin Drive. It forms the eastern boundary of the site.

3.3 Traffic operation

As with many streets in the Eastern Suburbs, the roads mentioned can be congested but flowing during peak periods, with localised points of delay. Roads around Randwick Junction can become congested with the competing flows of traffic and side friction from parallel parking manoeuvres and pedestrian crossings. Turning movements at intersections can cause delays for all traffic if combined with pedestrian movements and short lanes created by parking.

3.3.1 Traffic volume

Traffic surveys were undertaken at several intersections for the project. The following intersections were surveyed on 6th August 2008 for the hours 6.30-9.30am and 3.30-6.30pm:

- Barker Street and Hospital Road
- Barker Street and East Street
- Barker Street and Young Street.

The following intersections were surveyed on October 2008, again for the hours of 6.30-9.30am and 3.30-6.30pm:

- Avoca Street, High Street & Belmore Road
- Avoca Street and Cuthill Street
- Avoca Street and St Pauls Road
- Avoca Street and Barker Street
- Barker Street and Botany Road
- Hospital Road and High Street
- High Street and Botany Road.

Table 3-1 Morning Peak Hour (8am - 9am) Traffic Volumes

Location	Northbound/Eastbound				Southbound/Westbound			
	Light	Heavy	Motorbike	Bicycle	Light	Heavy	Motorbike	Bicycle
High Street, west of Avoca Street	326	24	0	0	323	9	9	5
Belmore Road, north of High Street	453	80	9	5	246	32	0	0
Avoca Street, north of High Street	995	28	3	5	812	30	5	5
Perouse Road, east of Avoca Street	529	53	2	0				4
Cuthill Street, east of Avoca Street					749	83	18	15
Avoca Street, south of Cuthill Street	914	31	4	2	782	36	3	6
St Pauls Road, east of Avoca Street	1	0	0	1	104	3	0	0
Avoca Street, north of Barker Street	997	20	4	2	0	35	2	5
Barker Street, east of Avoca Street	594	1	5	4	198	4	1	0
Avoca Street, south of Barker Street	1069	28	11	2	636	37	1	5
Barker Street, west of Avoca Street	385	10	1	0	1001	13	13	4
Easy Street, north of Barker Street	378	0	-	-	296	0	-	-
Barker Street, west of Easy Street	415	8	-	-	535	6	-	-
Young Street, south of Barker Street	13	0	-	-	16	0	-	-
Hospital Road, north of Barker Street	102	0	-	-	21	0	-	-
Barker Street, east of Botany Street	649	10	3	0	807	12	8	8
Botany Street, south of Barker Street	271	6	4	2	239	5	0	1
Barker Street, west of Botany Street	544	7	1	1	525	9	5	0
Botany Street, north of Barker Street	687	15	7	10	448	15	2	1
High Street, west of Botany Street	516	59	5	3	462	30	12	14
Botany Street, north of High Street	590	20	6	3	717	12	4	2
High Street, east of Botany Street	541	46	2	3	362	27	10	13
Hospital Road, south of High Street	39	2	0	0	214	3	0	0

Table 3-2 Afternoon Peak Hour (4:45pm – 5:45pm) Traffic Volumes

Location	Northbound/Eastbound				Southbound/Westbound			
	Light	Heavy	Motorbike	Bicycle	Light	Heavy	Motorbike	Bicycle
High Street, west of Avoca Street	549	11	7	4	238	9	1	2
Belmore Road, north of High Street	342	28	8	1	273	34	3	8
Avoca Street, north of High Street	822	8	4	6	793	10	4	5
Perouse Road, east of Avoca Street	617	43	7	12				
Cuthill Street, east of Avoca Street					534	36	3	3
Avoca Street, south of Cuthill Street	744	7	7	4	859	9	3	6
St Pauls Road, east of Avoca Street	0	0	0	0	70	0	0	0
Avoca Street, north of Barker Street	752	7	6	3	849	11	3	7
Barker Street, east of Avoca Street	257	2	3	1	359	2	6	4
Avoca Street, south of Barker Street	668	13	5	3	896	13	4	9
Barker Street, west of Avoca Street	706	5	10	5	473	9	5	0
Easy Street, north of Barker Street	217	0	-	-	400	0	-	-
Barker Street, west of Easy Street	559	5	-	-	625	8	-	-
Young Street, south of Barker Street	20	0	-	-	23	0	-	-
Hospital Road, north of Barker Street	13	0	-	-	119	0	-	-
Barker Street, east of Botany Street	585	5	8	0	525	11	7	0
Botany Street, south of Barker Street	158	1	3	2	316	5	3	0
Barker Street, west of Botany Street	455	0	4	0	463	4	5	1
Botany Street, north of Barker Street	452	11	5	2	665	9	6	2
High Street, west of Botany Street	584	23	5	4	527	31	6	5
Botany Street, north of High Street	687	5	5	5	571	8	2	4
High Street, east of Botany Street	520	24	5	7	420	27	3	5
Hospital Road, south of High Street	185	0	1	0	25	2	0	0

3.3.2 Intersection analysis

The performance of the intersections was simulated using the SIDRA intersection analysis computer program. The analysis is preliminary and used assumptions to determine the sensitivity of the scheme. SIDRA calculates intersection performance using measures such as:

- level of service (LoS)
- degree of saturation (DoS)
- average intersection delay
- queue length.

Level of service

Level of service (LoS) is one of the basic performance parameters used to describe the operation of an intersection. The levels of service range from A (indicating good intersection operation) to F (indicating over saturated conditions with long delays and queues). At signalised and roundabout intersections, the LoS criteria are related to average intersection delay (seconds per vehicle). At priority controlled intersections, the LoS is based on the average delay (seconds per vehicle) for the worst movement.

SIDRA and SCATES provide analysis of the operating conditions which can be compared to performance criteria set out in Table 3-3.

Table 3-3 Level of Service Criteria for Intersections

Level of Service	Average Delay (seconds per vehicle)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity. At signals, incidents will cause excessive delays. Roundabouts require other control mode	At capacity; requires other control mode
F	Greater than 71	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing; requires other control mode

Source: RTA Guide to Traffic Generating Developments

Degree of saturation

Degree of saturation (DoS) is defined as the ratio of demand flow to capacity, and therefore has no unit. As it approaches 1.0, extensive queues and delays could be expected. For a satisfactory situation, DoS should be less than the nominated practical degree of saturation, usually 0.9. The intersection DoS is based on the movement with the highest ratio for all types of intersection.

Delay

Delay is the difference between interrupted and uninterrupted travel times through the intersection and is measured in seconds per vehicle. The delays include queued vehicles decelerating and accelerating to and/or from stop, as well as delays experienced by all vehicles negotiating the intersection. At signalised and roundabout intersections, the average intersection delay is usually reported and is taken as the weighted average delay by summing the product of the individual movement traffic volume and its corresponding calculated delays and dividing by the total traffic volume at the intersection. At priority controlled intersections, the average delay for the worse movement is usually reported.

Queue length

Queue length is the number of vehicles waiting at the stop line and is usually quoted as the 95th percentile back of queue, which is the value below which 95% of all observed queue lengths fall. It is measured as the number of vehicles per traffic lane at the start of the green period, when traffic starts moving again after a red signal. The intersection queue length is usually taken from the movement with the longest queue length.

The operation of key regional intersections and intersections with significance for the site has been simulated using intersection modelling software to determine their current level of performance. The following intersections were listed by the RTA for analysis. They have been modelled using the SCATES program due to its ability to assess a series of signalised intersections with coordinated signal phasing:

- Avoca Street, High Street & Belmore Road
- Avoca Street and Cuthill Street
- Avoca Street and St Pauls Road
- Avoca Street and Barker Street.

The remaining intersections have been modelled using the SIDRA program as they are either traffic signals which operate on their own, or because they have roundabout, stop or give way sign control.

- Barker Street and Botany Road
- Barker Street and Hospital Road
- Barker Street and Young Street
- Barker Street and East Street
- Hospital Road and High Street
- High Street and Botany Road.

The results of the SCATES and SIDRA intersection modelling is shown in Table 3-4 below. They indicate that the intersection of High Street and Botany Road is currently facing peak demands above its capacity. This is due to a combination of high number of right turning vehicles, pedestrians delaying left turns (thus blocking both lanes), and queues extending back beyond the parking on the approach to the intersection.

The junction of High Street, Belmore Road and Avoca Street was assessed as experiencing a high degree of saturation, but overall its performance is satisfactory. This is due to one movement from Avoca Street northbound to Belmore Street which does not get sufficient capacity from the one lane it is allocated. This movement also includes a number of buses.

Table 3-4 Existing Intersection Modelling Results

Intersection	Intersection Control	AM Peak				PM Peak			
		DoS	Ave. Delay (s/veh)	LoS	95% Back of Queue (m)	DoS	Ave. Delay (s/veh)	LoS	95% Back of Queue (m)
Avoca Street, High Street & Belmore Rd	Signals	1.09	39.6	C	258	0.86	29.9	C	72
Avoca Street and Cuthill Street	Signals	0.53	22.0	B	54	0.38	14.7	A	30
Avoca Street and St Pauls Road	Signals	0.70	7.8	A	54	0.66	8.2	A	42
Avoca Street and Barker Street	Signals	0.93	49.0	D	126	0.80	27.8	B	90
Barker Street and Easy Street	Roundabout	0.69	7.9	A	66	0.58	10.1	A	46
Barker Street and Young Street	Priority	0.38	25.2	B	39	0.34	19.0	B	39
Barker Street and Hospital Road	Priority	0.42	13.8	A	53	0.33	13.1	A	39
Barker Street and Botany Road	Roundabout	1.00	18.0	B	145	0.68	10.3	A	59
High Street and Botany Road	Signals	1.21	95.6	F	393	1.11	93.7	F	308
Hospital Road and High Street	Priority	0.39	17.5	B	36	0.31	15.6	B	23

Note: Average delay for priority sign controlled intersections is for the worst movement. For traffic signal and roundabout intersections, this is the average delay for the entire intersection.

3.4 Parking

A survey of staff in June & July 2008 (see Section 3.7.1 for more details) indicated the following parking locations.

Table 3-5 Existing POWMRI Staff Parking

Location	Number
On Site	19
On Street	44
UNSW	7
POWH	5
Total	75

The situation regarding parking has changed recently, with construction and the reallocation of parking between land users in the Hospital precinct.

Before recent construction, the POWMRI site had internal space for 37 spaces with access off Easy Street. Of these 10 were used by the Prince of Wales Hospital, 16 by POWMRI and 11 by the Magnetic Resonance Imaging Centre. In addition, it has 3 reserved spaces on the eastern of Hospital Road, as well as four unused.

The Black Dog Institute has 12 reserved spaces allocated on the eastern side of Hospital Road, in front of their development and north of Francis Martin Drive. Assuming the same proportions of car driver, it is estimated that there are an additional 15 Black Dog cars parked on-street.

Recently, POWMRI acquired 10 additional parking spaces on the western side of Hospital Road. These were not available at the time of the staff survey.

Table 3-6 Parking Situation Pre-Construction

Location	Used By	Spaces
On Site	Hospital	10
	POWMRI	16
	Magnetic Resonance Imaging Centre	11
Reserved on Hospital Road	POWMRI	3
	Unused	4
	Black Dog	12
	Recently Acquired	10
On Street	POWMRI	44
	Black Dog	15
UNSW	POWMRI	7
POWH	POWMRI	5
Total		137

The Prince of Wales Hospital public car park is accessed off Easy Street. It has a capacity of 2,240 spaces for use by staff and visitors. Operators report there is parking available in the paid section of the car park. Occupancy varies during the day in response to patient visiting hours.

There are six unrestricted parking spaces on Barker Street in front of the development. There is also unrestricted parking on the southern side of Barker Street. Unrestricted parking is provided on some streets near the site. Some streets have had resident parking schemes introduced – where residents with parking permits issues by Randwick City Council can park unrestricted, but vehicles without permits are restricted to timed parking.

3.5 Public transport

Bus services are provided by Sydney Buses (State Transit Authority of NSW) eastern region. The area is relatively well served by public transport, with bus corridors operating at good frequencies on streets near the site.

Belmore Road

Bus routes 314, 316, 317, 357, 359, 371, 372, 373, 376, 377, X73, X77, 400 and 410 currently operate on Belmore Road.

The closest bus stop on Belmore Road is situated at the corner of Arthur Street and Belmore Road (towards the City), about 800m from the POWMRI site. Heading away from the City, the nearest bus stop is between Short Street and Avoca Street. Bus services on the both directions run every minute to this area during the peak hour, as well as frequent services during the middle of the day. Buses on Belmore Road remain frequent during the evening and at night, providing services for staff working shifts. Buses arrivals on the weekend fall to a frequency of one every 2 minutes, which is still regarded as a frequent service.

Some of bus routes provide more services on Thursday and Friday evenings. During school days, additional buses run during peak hours. In addition, buses run extended hours during day light saving period.

Barker Street

Bus services; 357 and 359 currently operate on Barker Street. Route 359 currently operates between Botany Street and Avoca Street, while route 357 operates between Botany Street and Kennedy Street.

The bus stop on Barker Street, provides local bus access to the Hospital for staff and patients and visitors of the Hospital. This bus stop is also used by students of the nearby high schools.

During peak hour, both bus services combine to provide a service approximately every 15 minutes. During the middle of the day, buses run every 30 minutes. On the weekend, the frequency of bus services reduces to approximately every 40 minutes.

High Street

The cross-regional bus routes 370, 400 and 410 operate along High Street. Route 400 has been designated as one of the Ministry of Transport's Strategic Bus Corridors, earmarking it for bus priority. The RTA has been trialling electronic bus priority on Route 400 buses as part of the implementation plan of the system across the wider Sydney area.

These buses on High Street provide good access to the Prince of Wales Hospital and University of New South Wales. Routes 400 and 410 provide frequent connections to the area from Bondi Junction, Eastgardens, Sydney Airport, Rockdale and Burwood. Route 370 provides access to Coogee Beach in the east and the University of Sydney and Leichhardt in the west.

Buses on High Street run every 5 minutes during the peak hour and 7/8 minutes in the middle of the day. During the weekend, bus services are operated with a frequency of 4 minutes.

Perouse Road

Bus services 316, 317, 376, 377 and X77 are currently operated on Perouse Road. Perouse Road is located to the east of the site. During the peak hour, buses run every 4-5 minutes. The frequency is reduced to 7/8 minutes in the middle of the day. The closest stop on Perouse Road is on the corner of Perouse Street and St. Pauls Street, about 1.2km from the

site. During the weekend, buses run every 4 and 5 minutes on Saturday and Sunday respectively, which still provides good service to public.

3.6 Pedestrian and bicycle facilities

Most bicycle riders who use the site ride on-street as a regular road user. The nearest designated bicycle facilities are alongside Randwick Racecourse, starting at High Street.

The Randwick Bicycle Plan 2008 includes several planned routes which pass in front of, or nearby, the proposed development:

- north-south route on Botany Street which connects to Darley Road (and Centennial Park) in the north and Maroubra Junction before continuing to La Perouse in the south (priority 2 route)
- east-west route passing through UNSW and the Hospital (along Francis Martin Drive), starting on Day Street west of Anzac Parade and continuing east to Coogee (priority 4 route)
- side loop to Botany Street route using Barker Street, Avoca Street (in front of high schools) and Rainbow Street (future route)
- east-west route running on High Street, starting on Todman Avenue Kensington, High Street then splitting via Peroure Road and Coogee Bay Road and Dolphin Street to Coogee.

The closest RTA regional cycle route is on Doncaster Avenue.

The existing POWMRI building has 2 bike racks located in a courtyard. There are two bathrooms which contain a shower cubicle and hand basin and a separate toilet cubicle. A disabled toilet also has a shower in it. All three are regularly used by the cyclists.

For pedestrians, footpaths are usually provided on both sides of streets. Crossing locations exist at signalised intersections, with a marked zebra crossing on High Street, in front of the Hospital. At the roundabouts of Barker Street with Botany Street and Easy Street, pedestrian refuges have been incorporated in the splitter islands.

The surveys mentioned in Section 3.3.1 included a count of bicycles and pedestrians. Some useful statistics from these surveys are:

Pedestrians

- there was a relatively small volume of pedestrians crossing Barker Street in front of the site – 6 people during each of the peak hours
- the volume crossing Easy Street was also relatively low. There were more pedestrians crossing Hospital Road – 17 in the morning peak and 15 in the afternoon
- as expected, there were high pedestrian volumes recorded at the junction of Belmore Road, Avoca Street and High Street – approximately 500 in total during the morning peak and over 600 during the afternoon peak hour
- at Cuthill Street and St Pauls Road there were moderate volumes recorded crossing Avoca Street towards to and from the Hospital – 60 in the AM peak and 70 in the PM peak at Cuthill Street and 140 in the morning peak and 90 in the PM peak at St Pauls Road

- due to the presence of the High Schools, there were high pedestrian volumes recorded at the intersection of Barker Street and Avoca Street – 373 in the morning g peak. As the vehicle peak occurs after the school peak in the afternoon, this volume dropped to 125 in the afternoon vehicle peak
- about 100 pedestrians were recorded at the roundabout at Botany Street & Barker Street
- due to the proximity to the University, high pedestrian volumes were recorded crossing Hospital Road at High Street – 260 in the morning peak and 300 in the afternoon peak
- similarly, high pedestrian volumes were recorded at the intersection of High Street and Botany Street – over 500 in the AM and PM peaks.

Bicycles

- high numbers of bicycles were recorded on Avoca Street at High Street. Moderate numbers were recorded on Belmore Road and High Street
- a large number of bicycles were recorded turning from Cuthill Street into Avoca Street. It is assumed that these are coming from the Perouse Road/Coogee Bay Road area
- bicycles were recorded heading north and south along the intersections surveyed on Avoca Street
- a moderate number were recoded heading towards UNSW on Barker Street
- a higher number were recorded travelling to and from UNSW on High Street
- a moderate number were recorded travelling on Botany Street, north of High Street.

3.7 Travel behaviour

The area surrounding the Prince of Wales Medical Research Institute is relatively well served with bus-based public transport. The high proportion of students in the workforce at the facility contributes to a low level of car usage.

While there are currently 225 staff and students using the facility, due to the high proportion of part-time employees, students and visitors, only a proportion are on site at any one time. The results of four fire drills for the POWMRI site have indicated an average of 120 persons were present. It is assumed that there would also be some employees who went to work on that day, but were out of the office at the time of the drill. BAsed on the information, we have assumed that 158 out of the 225 would be present at any one time in the POWMRI building.

3.7.1 Staff Survey

A survey of the travel patterns of the staff and students working on site was undertaken by POWMRI. The results are discussed below. Of the 225 staff & students, 110 staff and 22 students completed the survey. Their responses yielded the following mode split:

- Car 52%
- Motorbike / Scooter 2%
- Bicycle 8%
- Public Transport 22%

- Walk 16%.

Of those who drove, the following locations were used for parking:

- Prince of Wales Hospital car park 7%
- POWMRI car park 25%
- On-street 59%
- UNSW 9%.

Note that at the time of the survey (June & July 2008), POWMRI only had four reserved spaces on Hospital Road and some of the internal parking area was reserved for other uses in the Hospital. The spaces for these other uses have been transferred to a different location in the Hospital area.

A question also included the direction of approach to the POWMRI site:

- High St/Avoca St 30%
- Barker St/Botany St 67%
- Avoca St/Barker St 3%.

To the question 'Which door do you usually use when you arrive?', the following response was made:

- Main door 40%
- Hospital Rd door 47%
- Link door 13% (to the other villa building).

3.7.2 TDC Journey to Work Data

The NSW Ministry of Transport's Transport Data Centre undertakes an analysis of the Census data to determine the travel patterns of respondents to their work. The TDC Journey to Work Data has additional editing and imputation in order to improve the quality of the data at the small area destination level (travel zones). The TDC Journey to Work data is included to compare with the results of the Staff survey above.

The Sydney area is divided into 'travel zones' for detailed analysis of individual trips. This allows the statistics to or from a particular area to be analysed. The travel zones relevant to the site include:

- Zone 527 including Prince of Wales Hospital (including POWMRI)
- Zone 520 including the University of New South Wales
- Zone 521 including Randwick Junction and surrounding area.

The zones cover an area greater than just these land uses. A map showing the travel zone boundaries is shown in Figure 3-3.

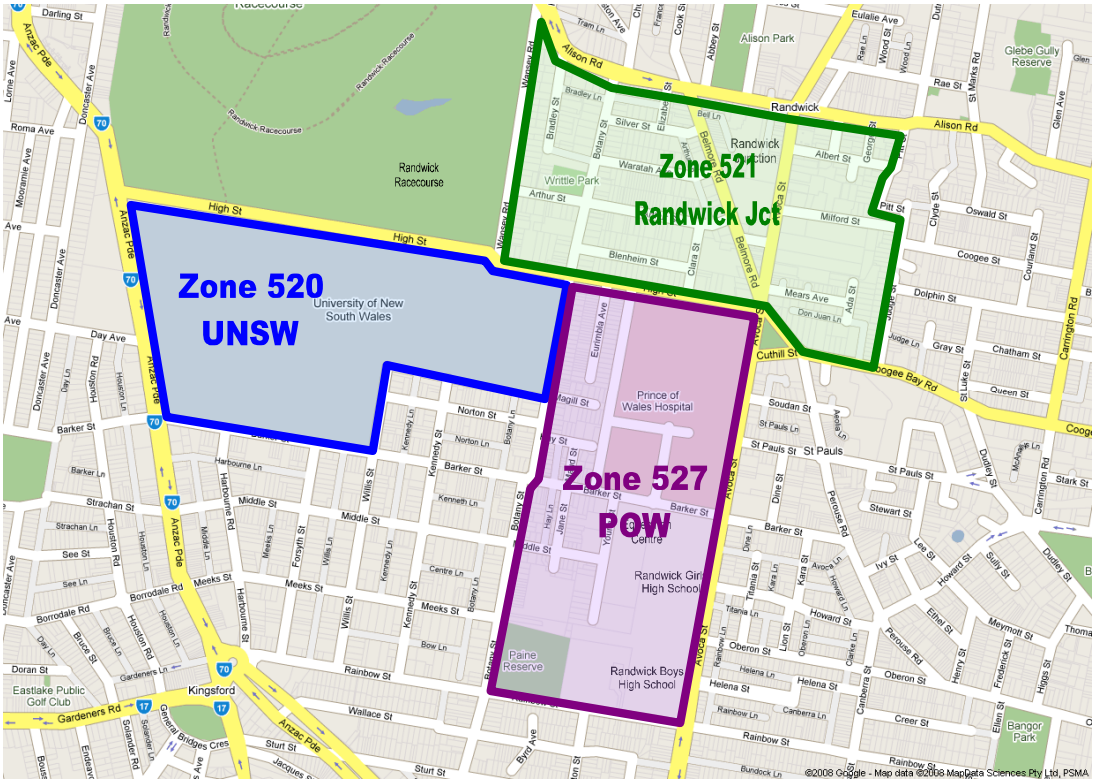


Figure 3-3 TDC Travel Zones

A summary of trips to the three zones listed above, along with the results of the Staff survey is included in Table 3-5.

Table 3-7 2006 Journey to Work Mode Share

Travel Mode	POWMRI Staff Survey*	TDC Journey To Work 2006		
		Zone 527 POW	Zone 520 UNSW	Zone 521 Randwick
Car Driver	48%	59%	53%	54%
Car Passenger	4%	6%	5%	7%
Motorcycle/scooter	2%	0%	1%	0%
Pushbike	8%	1%	2%	1%
Public Transport	22%	17%	26%	20%
Walk	16%	17%	14%	17%

Note: Car mode for Staff Surveys expanded into car driver and car passenger using relative proportions from JTW06 results for POW Zone.

The above table shows that the whole region has a level of car usage of between 50 and 60% for the journey to work. The results show that the POWMRI employees have a lower level of car usage than all three of the travel zones. They have a much higher level of bicycle usage and a mode share for public transport which is close to that of UNSW. This reflects the number of students who use the facility. Overall, the results of the staff survey and JTW are in a similar range.

3.7.3 Participants, Visitors, Deliveries and Tradespeople

A log of the research participants, visitors, deliveries and tradespeople was kept between Tuesday 24th June 2008 and Thursday 31St July 2008. It shows that on a typical working day, there are on average:

- 5 research participants (people being studied);
- 11 visitors;
- 11 deliveries; and
- 2 tradespeople.

Of the participants, 10% came by taxi, 58% came by private car, 30% walked and 3% caught public transport. 16% arrived between 8:00am and 9:00am, 15% arrived between 9:00am and 10:00am, 36% arrived between 10:00am and 12:00pm, 19% arrived between 12:00pm and 2:00pm, 13% arrived between 2:00pm and 4:00pm and 1% arrived between 4:00pm and 5:00pm.

For visitors, 3% arrived by taxi, 67% drove and 34% walked. 40% arrived between 8:00am and 9:00am, 14% arrived between 9:00am and 10:00am, 18% arrived between 10:00am and 12:00pm, 11% arrived between 12:00pm and 2:00pm, 9% arrived between 2:00pm and 4:00pm and 7% arrived between 4:00pm and 5:00pm.

4. Proposed development

The proposed development is being completed in three basic stages.

- Stage 1 covers additions to the two villas of the POWMRI facility. It has already been approved by Randwick City Council (DA/468/2007) and is currently under construction. Stage 1 would enable the decampment of areas which will undergo redevelopment in later stages. The gross floor area of the POWMRI site will increase by 454 m^2 to 4,914 m^2.
- Stage 2 – the Project Application, will involve the reconstruction of the remaining POWMRI facility. It does not include the Black Dog Institute building. The construction area would cover the frontage of Barker Street from Easy Street to Hospital Road and along Hospital Road. The gross floor area will increase to 25,470 m^2. This stage would be divided into four sub-stages, starting with the area on the corner of Barker Street and Easy Street. Stage 2 includes the Ambulance Station area.
- Stage 3 – Concept Plan, would involve the completion of the development area, predominantly covering the Black Dog Institute and the remainder of the POWMRI site left undeveloped in Stage 2.

This proposed development includes the demolition of existing buildings (Villa 1, Villa 2, Ambulance Station). It may also include the relocation of the Ambulance Station, however, this is currently unresolved. The current application includes a space for the retention of the Ambulance Station in approximately its current location.

The estimated timeframe for construction calls for completion of Stage 2D by 2018 and completion of Stage 3 by 2026. If a suitable source of funding is found, construction could be accelerated, with Stage 2D completed by 2015 and Stage 3 completed by 2018.

4.1 The Concept Plan development

The details of the full Concept Plan are discussed in this section, including Stages 1 and 2. Details of the Stage 2 Project Application works only are included in Section 4.2. Please refer to Appendix D for plans of the development.

Stage 3 includes a group of buildings up to 12 storeys in height over multiple stages dedicated to future accommodation requirements of the POWMRI for research and clinical purposes, as well as additional facilities for UNSW, the Black Dog Institute, Prince of Wales Hospital Campus, and other research partners.

The gross floor space potential at the completion of Stage 3 will be up to 61,000 m^2. It could be expected to accommodate up to 1,500 employees and research students. This space would incorporate activities for:

- Reception, Administration and Executive Offices
- Research Project Groups
- Clinical Research Imaging Centre
- Specialised Research facilities and scientific support
- Clinical, wet and dry lab, and special facilities for research
- Auditorium with approximately 300 seats
- Café and outdoor eating area.

4.1.1 Parking

Parking for the development is to be accommodated in two basement levels. A total of 365 spaces would be provided. Ten reserved spaces on the western side of Hospital Road would be retained for the use of POWMRI staff and visitors.

4.1.2 Access and circulation

Access to the basement car park would be via two driveways connecting to Hospital Road. Two-way ramps would connect the two basement levels. A traffic signal system would control traffic between the first and second basement level. Vehicles would loop through the car park in a clockwise direction.

A porte cochere on the Barker Street frontage, near Easy Street, would allow for the drop-off and collection of research participants under the shelter of the entrance awning.

Access to the Ambulance Station would be in approximately the same location, i.e. entry via Hospital Road and exit onto Barker Street near Hospital Road.

4.1.3 Servicing, deliveries and loading

The development would incorporate a loading dock with two docks accommodating large rigid vehicles and four delivery van / tradesperson spaces. Access to the loading dock would be via a separate entrance (i.e. separate from the car park) onto Hospital Road. All turns would be accommodated inside the development with vehicles entering and leaving in a forward direction.

4.1.4 Construction management

Construction would occur in several stages. At the time of writing, a construction contractor had not been appointed, so the exact methodology of construction is not yet known. A complete construction management plan will be submitted for approval before the commencement of construction, but once the required detail is known. The preliminary points discussed below would be included in the construction management plan.

During construction, as much parking as possible would be retained on site. Parking spaces on Hospital Road would also be retained where possible.

It would be the responsibility of the construction contractor to arrange parking for the construction workers. The most likely location for this parking would be in the Hospital car park. The construction contractor would undertake a TravelSmart process for the construction workers, giving them specific information on how to arrive at the site via walking, cycling and public transport.

A construction Work Zone would be sought along the Barker Street frontage. It would facilitate delivery of materials and removal of waste. During Stage 2A, this work zone would require the temporary relocation of the bus stop away from the front of the development.

The stage of construction with the highest expected generation of construction traffic is the excavation stage. Based on preliminary calculations, the peak generation of trucks would be 15 per day – approximately two per hour. During the building erection phase, it is anticipated that there would be two or three truck deliveries per day. The proposed truck routes for the development would take the quickest path onto the arterial road network. It is anticipated that spoil locations could be located to the south and west of the site.

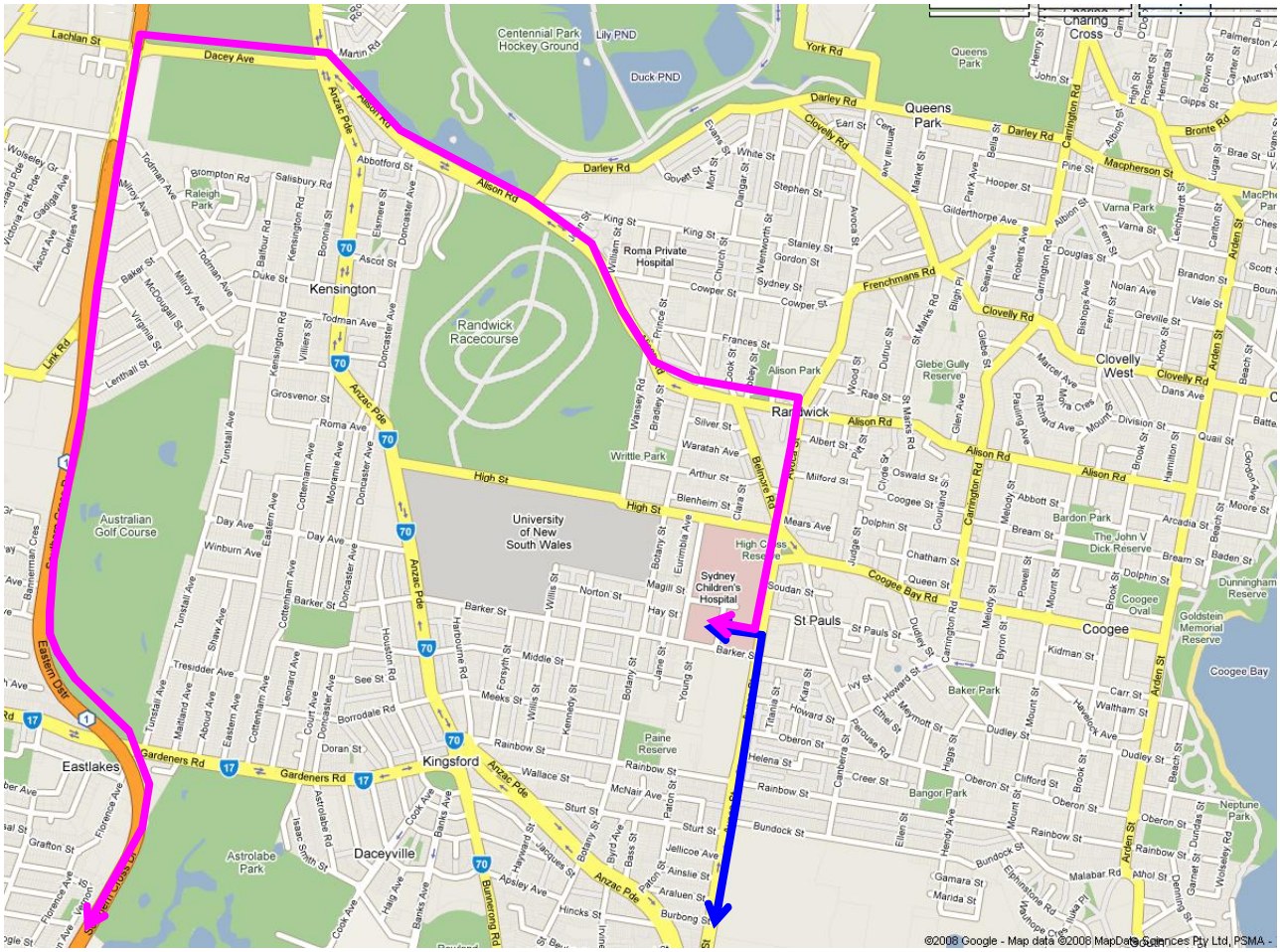


Figure 4-1 Proposed Construction Truck Routes

Pedestrians would be accommodated by hoardings, if required, to safely protect the footpath area during construction. Cyclists would continue to be able to use the public streets, unless specific situations temporarily arose where road closures affecting all traffic were required Where possible, cyclists would be allowed to continue.

There may be situations where additional temporary lane closures may be required, such as during the erection of cranes. Further details of these would be submitted to the relevant authorities with the construction management plan when further details of the construction process were known. This includes details affecting pedestrian and bicycle movements.

4.2 Project Application development

Stage 2 (Project Application) will increase the gross floor area to about 25,470 m^2 with approximately 650 employees (excluding Black Dog employees). This stage is divided into four sub-stages:

- Stage 2A – including main entry, participant assessment rooms, café, magnetic resonance machines
- Stage 2B – incorporating the ambulance station, additional laboratory space and basement parking
- Stage 2C – new auditorium with 300 seat capacity
- Stage 2D – additional laboratory space, loading dock and expansion of basement car park.

The Black Dog Institute is not included in Stage 2D.

4.2.1 Parking

Parking for Stage 2 of the development is to be accommodated in two basement levels and at-grade within the development area. 176 spaces would be provided in the Stage 2 development basement car park and 50 spaces would be provided on the surface within the site. Ten reserved spaces on the western side of Hospital Road would be retained for the use of POWMRI staff and visitors.

4.2.2 Access and circulation

Access to the basement car park would be via one driveway connecting to Hospital Road. A two-way ramp would connect the two basement levels. A traffic signal system would control traffic between the first and second basement level. Vehicles would loop through the car park in a clockwise direction.

A porte cochere on the Barker Street frontage, near Easy Street, would allow for the drop-off and collection of research participants under the shelter of the entrance awning.

Access to the Ambulance Station would be in approximately the same location, i.e. entry via Hospital Road and exit onto Barker Street near Hospital Road.

4.2.3 Servicing, deliveries and loading

The development will incorporate a loading dock with two docks accommodating large rigid vehicles and four delivery van/tradesperson spaces. Access to the loading dock would be via a separate entrance (i.e. separate from the car park) onto Hospital Road. All turns would be accommodated inside the development with vehicles entering and leaving in a forward direction. During the sub-stages, the existing loading dock will continue to function until the new facility is built.

4.2.4 Construction management

See Section 4.1.4 for details.

5. Transport impacts of the Concept Plan proposal

The future trip generation of the site has been estimated from the travel patterns of the current staff and factored up to the new staffing levels.

The Stage 3 Concept Plan could be completed between 2018 and 2026. To estimate the impacts of the development at the time of completion, the existing traffic volumes have been factored up using a historic growth rate based on traffic count data from the RTA. Traffic volumes were recorded by the SCATS traffic controller at site TCS 114 – Avoca Street, High Street and Belmore Road for the following years:

- 1993 – 33, 024 vehicles
- 1996 – 33,179 vehicles
- 1999 – 35,849 vehicles
- 2002 – 34, 384 vehicles
- 2005 – 34,254 vehicles.

Based on these results, a traffic growth rate of 0.3% per annum was derived and has been assumed as a trend to estimate future traffic volumes.

Due to the uncertainty in the changes in traffic over time, it is considered that the potential for deviation from the historic growth rate is too great beyond 10 years. Therefore, the traffic analysis completed for the Concept Plan assumes the full completion of the Concept Plan by the year 2018.

As discussed in Section 3.7, the entire number of staff and students are not all present at the one time, due to the high number of part-time staff, students and visiting researchers (about 50% of total staff). The calculation of the future trips of the development has used the assumption that the same proportion (70%) of staff are at work at any one time would continue.

The RTA has requested that a TMAP process be competed for this project, with the aim of reducing the number of car driver trips generated by the development. The NSW Metropolitan Strategy, State Plan, Urban Transport Statement and Randwick City Plan all state this aim as well. POWMRI currently has a favourable mode split to public transport, cycling and walking, demonstrating that the area already achieves a lower than average car usage. The site is within walking distance of strategic bus corridors which are likely to receive increased capacity in the future.

On this basis, a package of transport initiatives are proposed to be included in the development to reduce the current levels of car use in the future. The package includes TravelSmart and increased support for bicycle use. The package, and its impact, is discussed in more detail in Chapter 9. The future trips generated by the site for impact assessment have been generated using the current mode split. This has then been adjusted to reflect the likely impacts of the transport initiatives. The impacts have been estimated based on the results of similar programs in other locations and include:

- Car driver trips reduced by 12%, from 48% to 42%
- Public transport trips increased by 10%, from 22% to 24%
- Bicycle trips increased by 25%, from 8% to 10%
- Walking trips increased by 10%, from 16% to 18%.

Using this method, the future journey to work trips generated by the full Concept Plan development are expected to be:

Table 5-1 Concept Plan Journey to Work Trips

Mode	Base Rate	With Transport Initiatives
Car Driver	502	440
Car Pass.	47	47
Motorbike	16	16
Bicycle	88	109
Bus/Taxi	231	254
Walk	167	184
Total	1,050	1,050

5.1 Future traffic volumes

The increase in car trips from the existing situation to the completion of the Concept Plan has been assigned to the road network. To do this, the following assumptions have been made:

- proportion of staff travelling during AM peak hour 70%
- proportion of staff travelling during PM peak hour 60%.

The peak traffic estimates have assumed that 75% of staff would be at work on any given weekday and that 70% of the staff at work that day (i.e. approx. 52.5% of total staff) would arrive during the peak hour. The facility would mainly be used by researchers who usually do not follow standard travel patterns. Many have other activities during the day such as clinical or educational activities which occur off-site. Therefore, the assumptions about the proportion of staff arriving during the peak hour took a conservatively high risk management approach and in practice arrivals would be expected to spread over a greater time period. As a guide, the RTA's Guide to Traffic Generating Developments recommends that the proportion of staff leaving work for an office/commercial development is 80%, while the proportion of commuters travelling during the peak hour for a factory position is 55%. Given the nature of the staff movements described above, the proportion arriving in the peak at this location is expected to be closer to the lower level.

The split of inbound and outbound trips assumed is as follows:

	In	Out
▪ AM Peak	95%	5%
▪ PM Peak	5%	95%.

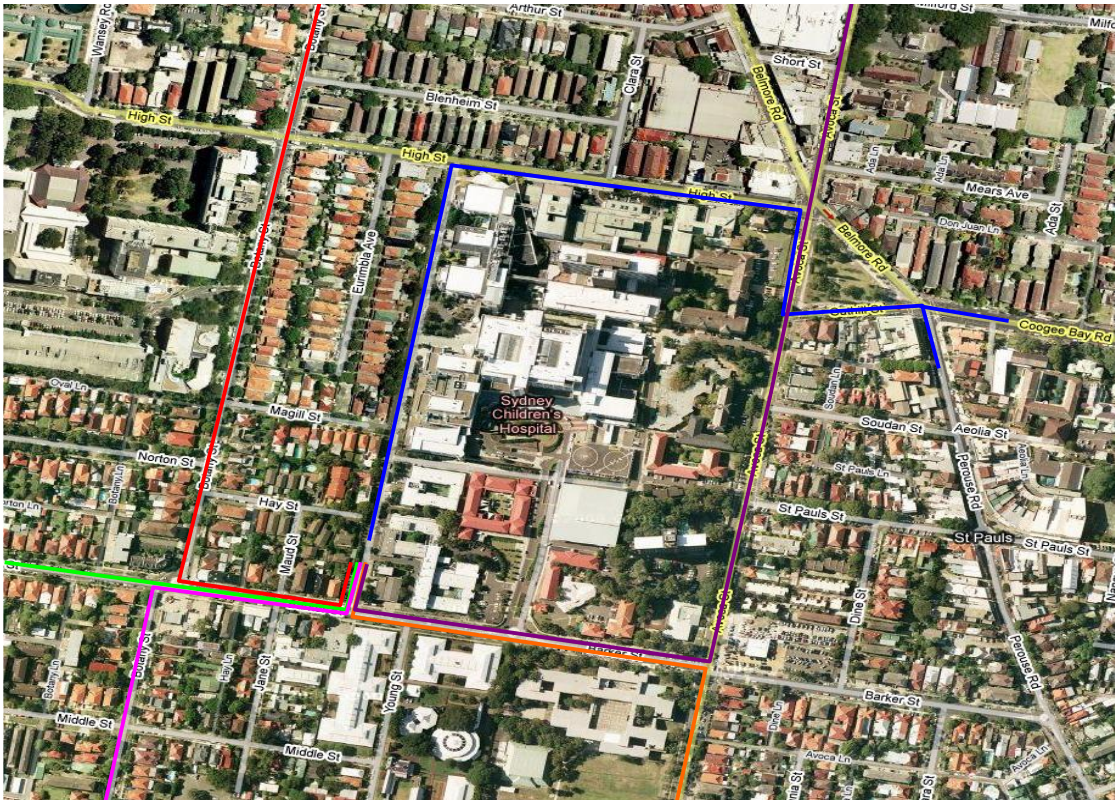


Figure 5-1 Trip Distribution

Based on the responses to the Staff Survey question on the direction of approach to the POWMRI site, the following distribution of trips onto the road network has been assumed:

Table 5-2 Assumed Trip Distribution

Survey Direction	Survey Result	Road Network Direction	Assumed Percentage
High Street/Avoca Street	**30%**	Avoca Street north	**15.0%**
		Coogee Bay Road & Perouse Road	**15.0%**
Barker Street/Botany Street	**67%**	Barker Street	**50.0%**
		Botany Street south	**7.5%**
		Botany Street north	**7.5%**
Avoca Street/Barker Street	**2%**	Avoca Street south	**5.0%**

Using the above proportions, the car driver trips were distributed and added to the forecast future traffic volumes from trend analysis. The results are shown in Table 5-3 and Table 5-4.

Table 5-3 2018 Forecast AM Peak Hour Traffic Volumes

Location	Base		With Development	
	NB/EB	SB/WB	NB/EB	SB/WB
High Street, west of Avoca Street	361	356	362	390
Belmore Road, north of High Street	564	286	564	286
Avoca Street, north of High Street	1062	878	1064	912
Perouse Road, east of Avoca Street	602	4 (bicycles)	603	4 (bicycles)
Cuthill Street, east of Avoca Street	0	891	0	925
Avoca Street, south of Cuthill Street	980	852	982	886
St Pauls Road, east of Avoca Street	2	110	2	110
Avoca Street, north of Barker Street	1,054	335	1056	369
Barker Street, east of Avoca Street	622	209	622	209
Avoca Street, south of Barker Street	1,144	700	1,155	700
Barker Street, west of Avoca Street	408	1,062	410	1,107
Easy Street, north of Barker Street	389	305	389	305
Barker Street, west of Easy Street	436	557	438	602
Young Street, south of Barker Street	13	16	13	16
Hospital Road, north of Barker Street	105	22	269	30
Barker Street, east of Botany Street	682	860	828	868
Botany Street, south of Barker Street	292	252	308	253
Barker Street, west of Botany Street	570	555	682	561
Botany Street, north of Barker Street	741	480	742	497
High Street, west of Botany Street	601	534	601	534
Botany Street, north of High Street	638	757	639	774
High Street, east of Botany Street	610	424	610	424
Hospital Road, south of High Street	42	224	44	253

Table 5-4 2018 Forecast PM Peak Hour Traffic Volumes

Location	Base		With Development	
	NB/EB	SB/WB	NB/EB	SB/WB
High Street, west of Avoca Street	588	258	617	259
Belmore Road, north of High Street	390	328	390	328
Avoca Street, north of High Street	865	837	894	838
Perouse Road, east of Avoca Street	700	0	728	0
Cuthill Street, east of Avoca Street	0	593	0	595
Avoca Street, south of Cuthill Street	785	904	814	905
St Pauls Road, east of Avoca Street	0	72	0	72
Avoca Street, north of Barker Street	791	896	820	898
Barker Street, east of Avoca Street	271	382	271	382
Avoca Street, south of Barker Street	710	950	710	960
Barker Street, west of Avoca Street	748	502	787	504
Easy Street, north of Barker Street	224	412	224	412
Barker Street, west of Easy Street	581	652	620	654
Young Street, south of Barker Street	21	24	21	24
Hospital Road, north of Barker Street	13	123	21	263
Barker Street, east of Botany Street	616	559	623	685
Botany Street, south of Barker Street	169	334	170	348
Barker Street, west of Botany Street	473	487	478	584
Botany Street, north of Barker Street	484	703	499	703
High Street, west of Botany Street	635	586	635	586
Botany Street, north of High Street	723	603	738	603
High Street, east of Botany Street	573	469	573	469
Hospital Road, south of High Street	192	28	216	29

The road expected to receive the greatest impact from traffic is Hospital Road, which provides access to the full basement car park. On the rest of the road network, changes typically range between 0% and 5%. Barker Street experiences increases of around 20% in the peak direction to/from the development. Certain sections of Avoca Street experience increases of 8% - 10%.

5.1.1 Auditorium

The auditorium is proposed to hold approximately 300 seats. During the day, it would be used for lectures, briefings and information sessions for the staff and students. It would, therefore, not generate additional trips, because the staff and students would already be within the building.

During the evening, when the facility is no longer required for the daily activities of the staff and students, it could be used for special events and lectures by groups affiliated with POWMRI, the Black Dog Institute or other occupants of the building. Trips to these events would occur after the afternoon peak. Using the number of parking spaces required by the Randwick City Council DCP for Parking as a guide, the traffic generation during an event would be 58 vehicles in for the beginning of the event and out after the completion.

5.1.2 Daily Traffic Volume

The daily traffic generation rate has been based on a rate of 4.0 trips per employee per day. This was derived from the daily trip generation rate for commercial office buildings. The following daily trip and traffic volumes assume the current 48% mode split for staff & students, visitors and auditorium attendees. It assumes that participants, deliveries and tradespeople would have a 100% mode share for vehicles (private car or taxi).

Table 5-5 2018 Forecast Daily Trip and Traffic Volumes

Source	Daily Trips	Daily Traffic		
		Car	Motorbike	Bicycle
Staff & Student Trips	4,241	2,002	64	219
Visitors		62	2	15
Deliveries	147	147	0	0
Tradesmen	27	27	0	0
Participants	67	67	0	0
Auditorium*	117	49	2	12
Total	4,745	2,353	68	246

Note: * Only active during events outside peak times.

It has been assumed that there would be no change in the traffic generated by the ambulance station.

5.2 Future intersection operation

The estimated traffic volumes with, and without the development have been modelled using the SCATES and SIDRA intersection models. The results of the analysis are shown in Table 5-6 below:

Table 5-6 2018 Base Scenario Intersection Modelling Results

Intersection	Intersection Control	AM Peak				PM Peak			
		DoS	Ave. Delay (s/veh)	LoS	95% Back of Queue (m)	DoS	Ave. Delay (s/veh)	LoS	95% Back of Queue (m)
Avoca Street, High Street & Belmore Rd	Signals	1.12	43.0	D	306	0.89	31.7	C	78
Avoca Street and Cuthill Street	Signals	0.55	22.2	B	54	0.40	14.8	A	30
Avoca Street and St Pauls Road	Signals	0.72	8.0	A	54	0.68	8.4	A	42
Avoca Street and Barker Street	Signals	0.96	56.7	D	138	0.83	29.4	C	96
Barker Street and Easy Street	Roundabout	0.72	8.2	A	73	0.60	10.3	A	49
Barker Street and Young Street	Priority	0.39	26.9	B	42	0.35	20.0	B	42
Barker Street and Hospital Road	Priority	0.44	14.2	A	58	0.35	13.4	A	42
Barker Street and Botany Road	Roundabout	1.00	21.9	B	178	0.71	10.8	A	66
High Street and Botany Road	Signals	1.26	119.4	F	453	1.14	115.0	F	351
Hospital Road and High Street	Priority	0.40	18.1	B	39	0.31	16.0	B	24

Comparing the results in Table 3-4 for 2008 to those in Table 5-6 for the 2018 base scenario, there has been a forecast increase in the degree of saturation and average delay, but in general, the intersections are performing in a similar manner to the current situation. The intersection of Botany Street and High Street remains the only intersection assessed which is over capacity.

The results of the intersection modelling for the 2018 future scenario, with the additional development traffic included, is shown in Table 5-7.

Table 5-7 2018 With Concept Plan Intersection Modelling Results

Intersection	Intersection Control	AM Peak				PM Peak			
		DoS	Ave. Delay (s/veh)	LoS	95% Back of Queue (m)	DoS	Ave. Delay (s/veh)	LoS	95% Back of Queue (m)
Avoca Street, High Street & Belmore Road	Signals	1.12	43.0	D	312	0.89	32.8	C	90
Avoca Street and Cuthill Street	Signals	0.56	22.6	B	54	0.39	18.0	B	42
Avoca Street and St Pauls Road	Signals	0.72	8.1	A	54	0.62	7.0	A	48
Avoca Street and Barker Street	Signals	0.97	64.3	E	162	0.83	35.1	C	132
Barker Street and Easy Street	Roundabout	0.77	8.8	A	89	0.73	12.8	A	75
Barker Street and Young Street	Priority	0.41	29.5	C	45	0.36	21.2	B	47
Barker Street and Hospital Road	Priority	0.53	18.5	B	72	0.41	15.0	B	58
Barker Street and Botany Road	Roundabout	1.11	52.8	D	490	0.84	12.8	A	113
High Street and Botany Road	Signals	1.26	123.9	F	453	1.14	119.0	F	379
Hospital Road and High Street	Priority	0.41	18.4	B	40	0.31	16.3	B	24

With the addition of the development traffic on top of the growth in base traffic most intersections still perform at an acceptable level. The exceptions are:

- intersection of Avoca Street and Barker Street – drops to LoS E during the morning peak, with delays rising by approximately 8 seconds per vehicle
- intersection of Barker Street and Botany Street – drops from a LoS B to D. In particular, the eastbound movement on Barker Street is congested (LoS F for this movement) due to the high number of vehicles turning right from Barker Street to Botany Street northbound in front of them.

The average delays at the over-capacity intersection of Botany Street and High Street increase by 3.5 seconds per vehicle. Compared to the 23.8 second increase in delay from 2008 to 2018, the effect from the development is relatively small.

Options for addressing the two issues listed above have been tested. Measures which would address the congestion issues are:

Intersection of Avoca Street and Barker Street – the length of the southbound right-turn queue on Avoca Street extends north of the point where parking begins, resulting in both southbound lanes being blocked. If the parking on the eastern side of Avoca Street between St Pauls Road and Barker Street was restricted to No Parking 7:00am – 9:00am, the operation of this intersection would improve to a DoS of 0.93 and the average delay would reduce by 30% to 45 seconds – an acceptable LoS D (better than the existing situation).

Although the intersection of Barker Street and Botany Street still operates satisfactorily overall in 2018 with the development, with a LoS of D for the whole intersection, the delays on one approach would mean that the operation of this intersection should be reviewed in the future.

One method to distribute the delays more evenly would be to convert this intersection from a single lane roundabout to traffic signal control. This would improve its operation to a LoS B. The average delay would halve to 25.8 seconds, while the eastbound approach on Barker Street would improve to a LoS C. The LoS in the afternoon would be a satisfactory C.

5.3 Public transport

The location of the site is close to frequent public transport services. There will remain a local bus service at the front door of the development. It is within walking distance of a MoT Strategic Corridor providing cross-regional access. It is also within walking distance of Randwick Junction, with frequent services to/from the City, as well as buses to Bondi Junction.

The additional loading due to the development would also enhance the revenue from the bus services. For example, passengers for the development on services from Coogee would alight near Randwick Junction, creating space for more passengers to board these services, thus allowing two trips to be accommodated on the same service. Passengers travelling from the City during the morning peak would create back-loading, allowing more buses to operate in service for their trip back out of the City, instead of running out-of-service back to pick up their next trip in the peak direction.

The number of passengers would increase from approximately 47 to 231, based on current mode splits. With a 10% increase in public transport mode share, an additional 23 passengers would also be generated by the development. There are currently 140 bus services operating near the development between 7:00am and 9:00am. This equates to approximately 1.5 additional passengers on each service if they were evenly spread, based on existing numbers. By 2018, the major corridors in the area are likely to offer increased capacity as Sydney Buses would have responded to the patronage growth over time. Thus there should be sufficient capacity to accommodate the additional passengers generated by the development within a reasonable period of waiting.

5.4 Pedestrians

The number of people walking to the site would increase from 34 to 167 based on current rates. A 10% increase in walking mode share would mean an additional 17 walking trips out of 1,050 total trips. Footpaths on both sides exist on the majority of streets in the area.

Using the results of the staff survey, about 40% of the trips arrive via Barker Street, 47% arrive via Hospital Road and 13% arrive through the surrounding Hospital campus.

The number of UNSW students and the proximity to the University mean that walking is the most convenient mode between the two institutions. This would continue if the two organisations maintain/strengthen their current cooperative approach to research.

A pedestrian link from the Hospital Area to the new POWMRI area would be provided off Easy Street via the café and outdoor eating area. This would provide a convenient link and allow the café to be accessible from the Hospital precinct.

5.5 Bicycles

The existing POWMRI development reports a relatively high proportion of cycle trips by staff – 8%. Transport Data Centre data for travel in the Sydney Region for 2003 shows that bicycles made up only 0.6% of trips to work (*Cycling in Sydney*, Transport NSW and RTA, 2003). For the Eastern Suburbs this is higher, at 1.1%.

The number of people cycling to the development is forecast to rise from 18 to 109 assuming an increase in the mode share for bicycles from 8% to 10%.

Based on the requirements of the NSW *Planning guidelines for walking and cycling* (2004) the following bicycle facilities would be provided within the building:

- 110 bicycle parking spaces
- 37 equipment lockers
- Showers accommodating 9 male and 9 female users at a time
- Male and female changing rooms
- 15 Visitor bicycle parking facilities at surface level (based on estimated number of visitors).

The provision of bicycle spaces is one per 3.3 car spaces, which is far in excess of the ratio identified in the Randwick City Council DCP for Parking, which requires one space per 10 car spaces.

6. Parking and access impacts of the Concept Plan proposal

The parking provision of the development has been based on the objective of no nett increase in on-street parking. This protects the limited supply of parking in the area and acts to manage the generation of traffic.

6.1 Parking provision

The parking provision has been investigated for each stage of the development. The parking requirements for Stage 2 are described in Section 8.1.

The parking demand has been based on the increase in staff numbers, the existing mode share of car drivers and the forecast changes in mode share due to transport initiatives.

The current demand for parking was estimated from observations at 75 vehicles for the 158 POWMRI staff who are present at work at any one time. When the 225 total POWMRI staff & students and the 80 Black Dog Institute staff increases to 1500 with the completion of the Concept Plan (encompassing POWMRI and Black Dog Institute), this demand could rise to 502. With the 12% reduction in parking demand in response to the transport initiatives, the parking demand at completion is forecast to be 440 spaces.

The 440 spaces would be accommodated by a mixture of the new basement car park, on Hospital Road, elsewhere on the road network and at UNSW for some of the staff who work for both institutions. The following assumptions regarding the provision of future parking have been made:

- there would be a swap of parking between the Hospital car park and the POWMRI site (i.e. the 5 POWMRI staff using the Hospital car park return to the POWMRI and the 10 Hospital spaces on the POWMRI area move back to the Hospital car park)
- the UNSW parking remains
- the loss of 4 spaces in Barker Street, along the front of the development due to the construction of the porte cochere. These would be offset to some degree by the reduction in the on-street parking demand of the same number from 59 (44 plus 15) to 55, i.e. no nett loss of on-street parking
- the parking of the families/helpers of the participants in the research would be accommodated in the public car park of the Prince of Wales Hospital, while the participant is being assessed. This would provide the minimum of confusion for the visitors to the area. The public car park is also easily accessed after leaving the porte cochere and is within walking distance
- reserved parking on the eastern side of Hospital Road, between Barker Street and Francis Martin Drive, would be removed. 10 spaces on the western side and 3 spaces on the eastern side north of Francis Martin Drive remain.

The Prince of Wales Hospital public car park would receive an increase in parking of 5 spaces from the swap of allocated parking described above, the excess five spaces during the construction of Stage 2A (as described in 8.1) and approximately ten visitors at a time to

POWMRI (at the completion of the Concept Plan). The maximum increase in parking inside the Hospital public car park is 15 after the completion of the Concept Plan.

Table 6-1 Parking Situation at completion of Concept Plan

Location	Pre-Construction Spaces	Concept Plan Spaces
On Site	37	0
New Basement Car Park	0	365
Reserved on Hospital Road	29	13
On-Street	59	55
UNSW	7	7
POWH	5	0*
Total	137	440

Note: 15 spaces increase in parking in the Hospital car park but not allocated for POWMRI use.

The parking demand for the Concept Plan would be accommodated in the locations listed above with no nett increase demand for on-street parking.

Four parking spaces would be allocated to disabled drivers. These spaces would be located at the entrance to the lift lobby for ease of access to the facilities.

6.1.1 Auditorium

As discussed in Section 5.1.1, the auditorium would be used by staff and students, who are building occupants during the day, resulting in no additional trips or parking requirements. It could be used for events and lectures organised by groups affiliated with the building occupants after regular work hours. The auditorium would have 300 seats, covering a space of 350sq.m. Assuming the parking rate from Randwick City Council's Parking Development Control Plan of one space per 6 sq.m. This equates to 58 parking spaces required during evening operation.

The additional parking required by people attending these events/lectures would be accommodated by the parking spaces vacated by workers who have left for the day, resulting in no additional on-street demand. The 58 spaces represent 40% of the parking available when the auditorium becomes operational. At the end of the Project Application (Stage 2D) it would occupy 26% of the available spaces and 15% at the completion of the Concept Plan. Even if the number of people using cars was higher, this could be accommodated in the underground car park and on-site parking.

6.1.2 Ambulance Station

There is provision for the parking of nine ambulances and four staff vehicles inside the ambulance station. There would also be one wash bay. The layout of the proposed ambulance station has been shown and agreed to by the NSW Ambulance Service. During an inspection of the site, seven staff vehicles were observed parked on the ambulance station site. The remaining three vehicles would be accommodated in the on-site parking as the ambulance staff numbers are included in the projected staff numbers.

6.2 Access arrangements

Access to the basement car park levels would be via two entrances off Hospital Road. These accesses have been checked for compliance with Australian Standard AS2890.1-2004 Off-Street Parking. The width of the two-way entrances would be 7.5m. Space for four vehicles would between the controlled entry point and Hospital Road would be provided.

No changes are proposed at the intersection of Hospital Road and Barker Street.

The porte cochere would facilitate drop-off and pick-up of the participants in the research activities under the cover of the entrance awning. This is considered essential as many of the participants are suffering health issues and therefore cannot walk long distances. The entrance at the obvious front of the building is much easier for participants and their helpers to understand. It has a width of 5.4m, allowing a vehicle to pass another vehicle stopped to set down a passenger.

Currently, there is an average of 5 participants arriving per day at the facility. Assuming that the number of participants increases proportionally with the increase in staff, the forecast arrival rate would be 33 participants per day. This is approximately 4 per hour. Assuming five minutes per participant, there is still plenty of capacity in this facility even at full development.

The porte cochere accommodates vehicles that drop-off and pick-up participants. It is not intended for use by general visitors or for deliveries. To avoid unintended use, deliveries should be refused at the front reception. The entrance should be clearly signed Research Participant Drop-Off Only. Should misuse of the porte cochere affect its performance, e.g. if the queue of vehicles extends across the footpath, a kerbside supervisor in high-visability clothing should be employed to monitor correct use. The supervisor would also redirect participant vehicles to an appropriate area.

6.3 Internal layout and circulation

Copies of the development plans are included in Appendix D (basement plans shown for the Project Application).

The two basement car park levels would operate, with circulation in a clockwise direction. A traffic control system would stop vehicles descending from Level 1 to Level 2 adjacent to the south-western stairs. This would allow a vehicle travelling up from Level 2 to Level 1 to safely pass.

The parking spaces would be 2.4m wide and 5.4m deep. The aisle widths are 6.2 metres. These dimensions match the requirements of AS2890.1-2004. The parking layout was checked using the AutoTrack program. The results are shown in Appendix E. They indicate that the design car is able to travel through all areas of the internal car park.

6.4 Servicing, deliveries and loading

The development includes a loading dock area with two docks and four delivery van/tradesperson spaces. These have been checked using AutoTrack and are able to accommodate large rigid vehicles. See Appendix E for printouts of the vehicle swept paths.

Currently, an average of 11 deliveries and 2 tradespeople visits are made per day at POWMRI. Assuming that the number of deliveries and tradespeople increases

proportionally with the increase in staff, it is forecast that there would be an average of 73 deliveries and 13 tradespeople per day. Assuming that the deliveries take 5 minutes on average, and the tradespeople take 2 hours per visit, there is sufficient capacity in the four spaces, plus the two docks, to support the full development.

Access to the loading dock would be via a separate entrance (i.e. separate from the car park) onto Hospital Road. The loading dock area has been assessed using AutoTrack, which has shown that all turns can be accommodated inside the development, and that vehicles may enter and leave the site in a forward direction.

7. Transport impacts of the Project Application proposal (Stage 2)

The traffic analysis completed for the Project Application assumes the completion of Stage 2 by the year 2015 and an historic traffic growth rate of 0.3% per annum.

Using the same method as the Concept Plan, the future trip generation of the site has been estimated from the travel patterns of the current staff and factored up to the new staffing levels. It also includes the assumptions about the forecast changes in travel patterns due to the transport initiatives.

The future trips generated by the Stage 2 Project Application development are shown in Table 7-1.

Table 7-1 Project Application Trips

Mode	Project Application	
	Base Rate	With Transport Initiatives
Car Driver	245	218
Car Pass.	23	23
Motorbike	8	8
Bicycle	43	52
Bus/Taxi	112	122
Walk	81	89
Total	511	511

7.1 Future traffic volumes

The future traffic volumes for the 2015 scenario, with the project application stage fully occupied, have been made using the same process and assumptions described in Section 5.1. The forecast traffic volumes for 2015 with, and without, the development are shown in Table 7-2 and Table 7-3.

Table 7-2 2015 Forecast AM Peak Hour Traffic Volumes

Location	Base		With Development	
	NB/EB	SB/WB	NB/EB	SB/WB
High Street, west of Avoca Street	357	353	358	365
Belmore Road, north of High Street	559	284	559	284
Avoca Street, north of High Street	1053	870	1053	882
Perouse Road, east of Avoca Street	596	4 (bicycles)	597	4 (bicycles)
Cuthill Street, east of Avoca Street	0	883	0	895
Avoca Street, south of Cuthill Street	971	845	972	856
St Pauls Road, east of Avoca Street	2	109	2	109
Avoca Street, north of Barker Street	1045	332	1045	343
Barker Street, east of Avoca Street	617	207	617	207
Avoca Street, south of Barker Street	1134	693	1137	694
Barker Street, west of Avoca Street	404	1053	405	1068
Easy Street, north of Barker Street	386	302	386	302
Barker Street, west of Easy Street	432	552	433	568
Young Street, south of Barker Street	13	16	13	16
Hospital Road, north of Barker Street	104	21	160	24
Barker Street, east of Botany Street	676	853	726	855
Botany Street, south of Barker Street	289	250	295	250
Barker Street, west of Botany Street	565	550	603	552
Botany Street, north of Barker Street	734	476	735	482
High Street, west of Botany Street	595	529	595	529
Botany Street, north of High Street	632	751	632	756
High Street, east of Botany Street	605	421	605	421
Hospital Road, south of High Street	42	222	42	232

Table 7-3 2015 Forecast PM Peak Hour Traffic Volumes

Location	Base		With Development	
	NB/EB	SB/WB	NB/EB	SB/WB
Belmore Road, north of High Street	387	325	387	325
Avoca Street, north of High Street	858	829	868	830
Perouse Road, east of Avoca Street	693	0	703	0
Cuthill Street, east of Avoca Street	0	588	0	589
Avoca Street, south of Cuthill Street	778	896	788	896
St Pauls Road, east of Avoca Street	0	71	0	71
Avoca Street, north of Barker Street	784	888	794	889
Barker Street, east of Avoca Street	269	379	269	379
Avoca Street, south of Barker Street	704	942	704	945
Barker Street, west of Avoca Street	741	497	755	498
Easy Street, north of Barker Street	222	408	222	408
Barker Street, west of Easy Street	576	646	589	647
Young Street, south of Barker Street	20	23	20	23
Hospital Road, north of Barker Street	13	122	16	170
Barker Street, east of Botany Street	611	555	613	597
Botany Street, south of Barker Street	167	331	168	336
Barker Street, west of Botany Street	469	483	470	516
Botany Street, north of Barker Street	480	696	485	697
High Street, west of Botany Street	629	581	629	581
Botany Street, north of High Street	717	597	722	598
High Street, east of Botany Street	568	465	568	465
Hospital Road, south of High Street	190	28	198	28

As in the Concept Plan, Hospital Road receives the greatest impact as it provides access to the basement car park. On the rest of the road network, changes typically rage between 0% and 5%. Barker Street was estimated to experience traffic increases of around 20% in the peak direction to/from the development. Certain sections of Avoca Street are forecast to experience increases of 8% - 10%.

7.2 Future intersection operation

The estimated traffic volumes with and without the development have been modelled using the SCATES and SIDRA intersection models. The results of the analysis are shown below:

Table 7-4 2015 Base Scenario Intersection Modelling Results

Intersection	Intersection Control	AM Peak				PM Peak			
		DoS	Ave. Delay (s/veh)	LoS	95% Back of Queue (m)	DoS	Ave. Delay (s/veh)	LoS	95% Back of Queue (m)
Avoca Street, High Street & Belmore Road	Signals	1.12	42.7	C	300	0.89	32.1	C	78
Avoca Street and Cuthill Street	Signals	0.55	22.1	B	54	0.39	14.8	A	30
Avoca Street and St Pauls Road	Signals	0.71	8.0	A	54	0.67	8.3	A	42
Avoca Street and Barker Street	Signals	0.95	55.9	D	138	0.83	29.3	C	96
Barker Street and Easy Street	Roundabout	0.69	7.9	A	66	0.58	10.1	A	46
Barker Street and Young Street	Priority	0.38	25.2	B	39	0.34	19.0	B	39
Barker Street and Hospital Road	Priority	0.42	13.8	A	53	0.33	13.1	A	36
Barker Street and Botany Road	Roundabout	1.00	18.2	B	145	0.68	10.3	A	59
High Street and Botany Road	Signals	1.21	95.7	F	393	1.11	93.7	F	307
Hospital Road and High Street	Priority	0.39	17.5	B	36	0.31	15.6	B	23

Again, comparing the results in Table 3-4 for 2008 to those in Table 7-4 for the 2015 base scenario, there has been a general increase in the degree of saturation and average delay, but the intersections are performing in a similar manner to the current situation. The intersection of Botany Street and High Street remains over capacity.

The results of the intersection modelling for the 2015 future scenario, with the additional development traffic included, is shown in Table 7-5.

Table 7-5 2015 With Project Application Intersection Modelling Results

Intersection	Intersection Control	AM Peak				PM Peak			
		DoS	Ave. Delay (s/veh)	LoS	95% Back of Queue (m)	DoS	Ave. Delay (s/veh)	LoS	95% Back of Queue (m)
Avoca Street, High Street & Belmore Roadd	Signals	1.12	43.0	D	306	0.89	31.7	C	78
Avoca Street and Cuthill Street	Signals	0.55	22.2	B	54	0.40	14.8	A	30
Avoca Street and St Pauls Road	Signals	0.72	8.0	A	54	0.68	8.4	A	42
Avoca Street and Barker Street	Signals	0.96	56.7	D	138	0.83	29.4	C	96
Barker Street and Easy Street	Roundabout	0.72	8.2	A	76	0.61	10.3	A	50
Barker Street and Young Street	Priority	0.40	27.2	B	42	0.35	20.1	B	43
Barker Street and Hospital Road	Priority	0.46	15.2	B	64	0.33	13.2	A	38
Barker Street and Botany Road	Roundabout	1.00	25.5	B	208	0.73	11.1	A	75
High Street and Botany Road	Signals	1.24	110.0	F	432	1.13	109.3	F	345
Hospital Road and High Street	Priority	0.40	18.0	B	38	0.31	15.9	B	24

With the addition of the development traffic, on top of the growth in base traffic, most intersections, apart from Botany Street and High Street, still perform at an acceptable level. The delays at Botany Street and High Street are expected to increase. However, in the analysis for the Concept Plan in 2018, there is only a slight increase in overall delay.

7.3 Public transport

The proximity to public transport and opportunities for increased public transport use were discussed in Section 5.3.

The number of passengers would increase from approximately 47 to 112 based on current mode splits. With a 10% increase in public transport mode share, an additional 10 passengers would also be generated by the development. As mentioned previously, there should be sufficient capacity to accommodate the additional passengers generated by the development for the Project Application.

The temporary relocation of the bus stop during the construction of the porte cochere has been agreed in principle by Randwick City Council and State Transit. The proposed temporary location would be on the northern side of Barker Street, east of Easy Street. An application for this change would need to be included in the Construction Management Plan and submitted to the local Traffic Committee for final approval.

7.4 Pedestrians

The number of people walking to the site would increase from 34 to 81 based on current behaviour. A 10% increase in walking mode share would yield an additional 8 walking trips.

7.5 Bicycles

The number of people cycling to the development is forecast to rise from 18 to 52, assuming a increase in the mode share for bicycles from 8% to 10%.

Based on the requirements of NSW *Planning guidelines for walking and cycling* (2004) the following bicycle facilities would be provided within the building:

- 52 bicycle parking spaces
- 18 equipment lockers
- 5 male and 5 female shower
- Male and female changing rooms
- 15 Visitor bicycle parking opportunities at surface level (based on estimate of visitor numbers).

The effective provision of bicycle spaces is one per 3.2 car spaces, which far exceeds the ratio in the Randwick City Council DCP for Parking. It requires one space per 10 car spaces.

8. Parking and access impacts of the Project Application proposal

The Project Application would be completed in four sub-stages. The parking and access requirements of each stage, including construction, has been assessed.

8.1 Parking provision

The parking requirements of each sub-stage was assessed using the same method outlined in Section 6.1.

In addition to the assumptions made in this section, it is assumed that the benefits of the transport Initiatives would be available from completion of Stage 2A construction.

The temporary relocation of the bus stop during construction of the porte cochere and the consequent loss of on-street parking at the temporary bus stop location, was included in this assessment.

Table 8-1 Project Application Sub-Stage Parking

Stage	Parking Supply	Parking Demand	Excess / Deficit
Existing	137	112	25
1 Current Construction	132	111	21
2A Construction	106	111	-5
2A Operation	122	115	7
2B Construction	115	115	0
2B Operation	219	174	45
2C Construction	204	174	30
2C Operation	204	174	30
2D Construction	192	174	18
2D Operation	306	218	88

As seen above, there is a deficit of 5 spaces during the Stage 2A construction. This deficit would be made up by utilising 5 spaces in the Hospital car park.

The 88 excess spaces at the end of Stage 2D are required for the Stage 3 parking demand.

The parking supply for the sub-stages would partially be accommodated at-grade within the POWMRI area. Plans of the arrangement are included in Appendix F. The at-grade parking provisions for Stages 2A, 2B and 2C would be 35 spaces. For Stage 2D, it would increase to 50. During the construction of Stage 2A, there would be 22 spaces provided at-grade.

The remainder of the parking supply is made up of the basement parking levels as they reach completion, the reserved spaces on Hospital Road, the current UNSW spaces and the on-street spaces (with no nett increase in on-street demand).

Eight parking spaces would be accessible for disabled drivers. These spaces are located at the entrance to the lift lobby.

8.2 Access arrangements

The access arrangements for the Project Application were described in Section 6.2. The difference between the Project Application and the Concept Plan is that the Project Application has only one basement car park entrance on Hospital Road.

During the construction of Stages 2A and 2B, access to the at-grade spaces within the POWMRI site would be via a relocated entrance off Easy Street. The exit would be onto Hospital Road, connected by a one-way road. During Stages 2C and 2D the entrance and exit to the at-grade spaces would be via Hospital Road. Plans of the different Stages are included in Appendix F.

The temporary relocated access off Easy Street would no longer connect to the break in the median on Easy Street. This would not be an issue as the current two-way access would become one-way in only, with all vehicles turning left into the at-grade area from Easy Street.

8.3 Internal layout and circulation

The one-way internal road provided during the construction of Stages 2A and 2B, access to the at-grade spaces within the POWMRI site would be via a relocated entrance off Easy Street. The exit would be onto Hospital Road, connected by a one-way road. This road has been analysed using AutoTrack and it was found to provide sufficient space.

The internal layout and circulation of the basement car park is discussed in Section 6.3.

8.4 Servicing, deliveries and loading

The existing loading area will remain operational in Stages 2A – 2C. The final loading dock is completed in Stage 2D. During the construction of Stage 2D, temporary arrangements for loading, deliveries and tradespeople will be made.

The design of the final loading dock is discussed in Section 6.4.

Servicing of the facility would also occur at the loading dock.

9. POWMRI TMAP

The RTA has requested that a Transport Management and Accessibility Plan (TMAP) be completed for the development. A TMAP is a:

- comprehensive assessment of the transport impacts (both of people and goods) from a development)
- the identification of a package of appropriate transport measures to help manage the demand for travel to and from the development, in particular to reduce the demand for travel by private vehicles.

The assessment of the transport impact of the POWMRI development for the Concept plan has been provided in Chapters 5 and 6; and for the project Application in Chapters 7 and 8.

9.1 TMAP objectives and targets

The TMAP objective is to reduce the level of private car usage in favour of more sustainable modes of travel such as walking, cycling and public transport.

The targets should be an achievable change in private car usage. The existing POWMRI facility already has a higher than average mode share for sustainable modes. This indicates that the types of people employed at POWMRI are willing to use sustainable modes and that the area surrounding development is conducive to these forms of transport.

The main transport initiative proposed is the introduction of a TravelSmart scheme, with other initiatives introduced to support and facilitate the anticipated outcomes. Experience from the introduction of TravelSmart schemes in other locations was reported in '*Evaluation of Australian TravelSmart Projects in the ACT, South Australia, Queensland, Victoria and Western Australia: 2001–2005*' (Australian Greenhouse Office located in the Department of the Environment and Heritage, 2005). The average change recorded for households was:

Table 9-1 Average Household TravelSmart Mode Split Change

Mode	Benefits of TravelSmart		
	before	after	change
car (driver)	58%	53%	-10%
car (passenger)	24%	24%	1%
motorcycle	0%	0%	0%
cycling	2%	3%	50%
bus and train	5%	6%	21%
walking	11%	13%	23%

The results for workplaces were less consistent.

- car driver work trips dropped by between 6% and 40% with an average of 21%
- walking results varied widely, with some large increases, but also some reductions (possibly replaced by cycling or public transport)
- cycling also varied widely – between 0% and 600%, but were consistently above 15%. The average increase in cycling was 117%
- bus/tram usage was more consistent, increasing by from 0% up to 70%, with an average of 28%.

Given the already high starting mode share for walking cycling and public transport, if the increases suggested above were realised, the reduction in the car mode share would be a drop of between 25% and 45%. While this would be an excellent result, this impact assessment does not assume it would be achieved. The improvement achieved in the TravelSmart schemes listed above was only a 10% reduction in car trips. Therefore, a more reasonable mode share target has been set for the development at approximately half the above levels.

Table 9-2 Target Mode Split for POWMRI Development

Mode	Est. Impacts of TravelSmart		
	before	target	change
car (driver)	48%	42%	-12%
car (passenger)	4%	4%	0%
motorcycle	2%	2%	0%
cycling	8%	10%	25%
bus and train	22%	24%	10%
walking	16%	18%	10%

9.2 Proposed mitigation measures

9.2.1 TravelSmart

In the context of the development, TravelSmart would be a series of transport initiatives which encourage people to change some of their personal travel choices. TravelSmart aims to reduce people's dependency on cars and help them to know their options for sustainable travel alternatives such as cycling, walking and public transport. It involves working with individuals to promote the use of alternatives to driving where possible.

The following is taken from the TravelSmart Australia web site:

The TravelSmart program includes the development of a Travel Plan. A travel plan is a short, simple document that outlines a range of site-specific actions to encourage the use of more sustainable transport options. It focuses on the way people travel and develops a strategic approach to changing travel behaviour. It is not a one-off event to be undertaken and completed, nor is it a document to be produced and put on the shelf.

A travel plan includes going through a process of gathering information about how people travel, identifying the issues, barriers and opportunities, and coming up with actions to improve travel options. Travel plans produce many benefits. They help reduce the impact of travel on the environment but also make good business sense. They can cut traffic congestion around a local area and help people save money on travel by identifying more efficient use of the car whether for commuting or in-work travel.

A typical plan may look at:

- *walking*
- *cycling*
- *public transport*
- *incentives*
- *flexible ways of working (such as working from home or teleworking)*
- *carpooling*
- *company car fleet options (choice of vehicle, driver training, fleet operation).*

The plan incorporates analysis from a range of sources such as surveys, focus groups and workshops in order to clarify issues and identify the best approach forward. Travel plans are flexible and regularly evaluated to ensure they continue to reflect site-specific issues.

9.2.2 Improved Bicycle Facilities

Expanded facilities for bicycles will be included in the basement parking levels. Based on the requirements of the NSW *Planning guidelines for walking and cycling* (2004) the following bicycle facilities would be provided within the building:

- 110 bicycle parking spaces
- 37 equipment lockers
- 9 male and 9 female shower
- Male and female changing rooms
- 15 Visitor bicycle parking opportunities at surface level (based on estimated number of visitors).

This provision of bicycle parking spaces is sufficient to accommodate a mode share of 10%.

9.2.3 Other Initiatives

Another initiative which could be considered, after the benefits of the TravelSmart scheme have been evaluated, is a subsidy of public transport fares. This could be through the distribution of pre-paid bus tickets or payroll deductions for an annual travel pass.

9.3 Achievement of TMAP targets

The achievements of TravelSmart schemes in other locations were discussed in Section 9.1. The mode split targets selected are conservatively low, making them easier to achieve.

The mode split for bicycles is currently a healthy 8%, despite a relatively low provision of bicycle facilities. The site currently has 2 bike racks located in a courtyard, along with three older-style bathrooms with shower which are used by cyclists. Changing clothes is done in the bathrooms. If facilities are improved, there is potential to attract more people to cycling to work.

There are existing bicycle routes close to the site, with routes such as Botany Street and Francis Martin Drive listed as priority routes for bicycle infrastructure funding. Barker Street in front of the development is also listed as a future bicycle route. With increased on-street infrastructure, with more, and better quality, end-of-trip facilities to support the TravelSmart initiative, there is a high likelihood that the 25% increase in mode share for bicycles (from 8% to 10%) is achievable.

The capacity on bus routes is predicted to increase through additional services to keep pace with growth in bus patronage.

9.4 Timing and evaluation

9.4.1 Transport initiatives

The Travel Plan for the TravelSmart scheme should be developed ready for implementation to coincide with the opening of Stage 2A. It should be reviewed at the opening of Stages 2C, 2D and Stage 3.

The additional bicycle facilities should become operational at the completion of Stage 2B. For Stage 2A, the visitor bike racks should be installed to boost bicycle parking facilities and be made available to staff.

The achievement of the mode split targets should be assessed by repeating staff surveys six months after completion of stages 2A, 2C, 2D and 3. This should also be done to test the effectiveness of the TravelSmart scheme. If reductions in the car mode share have not reached the mode split targets, then perhaps subsidy of bus fares should be considered.

9.4.2 Road network upgrades

The roundabout at the intersection of Barker Street and Botany Street is expected to operate satisfactorily overall in 2018 with the development, with a LoS of D for the whole intersection. However, delays on one leg – the Barker Street western approach, are forecast to increase with a Level of Service F. After the opening of the Concept Plan (Stage 3), the operation of this intersection should be reviewed. The replacing of the roundabout with traffic signals could be considered as a possible solution to maintaining satisfactory intersection performance.

After the opening of the Concept Plan Stage, the delays at the intersection of Avoca Street and Barker Street reach 64 seconds (from an existing average delay of 49 seconds). One reason for the delay is that the length of the southbound right-turn queue on Avoca Street extends north of the point where on-street parking begins, resulting in both southbound lanes being blocked. The proposed mitigation for this might be the restriction of on-street parking on the eastern side of Avoca Street between St Pauls Road and Barker Street being restricted to *No Parking* 7:00am – 9:00am.

10. Conclusion and recommendations

The proposed Concept Plan and Project Application for the Prince of Wales Medical Research Institute have been assessed in terms of their transport impact. The impact at the discrete sub-stages of development has also been assessed.

The site has a number of advantages which make it attractive for intensification of medical research development:

- it is in an area identified as a specialised centre for education and health
- it is located near to a strategic bus corridor and frequent city bus corridor
- the employees in the current facility display lower than average need for car travel, with high use of walking, cycling and bus
- improvements to bicycle infrastructure near the site is on a priority list
- increases in bus capacity are anticipated through additional services to meet the projected future growth in bus patronage.

Thus the site meets the requirement for the integration of transport and land use by locating new jobs near public transport corridors.

The proposed development would be completed in three stages.

- Stage 1 covers additions to the two villas of the POWMRI facility. It has already been approved by Randwick City Council (DA/468/2007) and is currently under construction
- Stage 2 – the Project Application, would involve the reconstruction of the remaining POWMRI but not including the Black Dog building. Stage 2 includes the Ambulance Station area
- Stage 3 – Concept Plan, would involve the completion of the development area, predominantly covering the Black Dog Institute and the remainder of the POWMRI site left undeveloped in Stage 2.

A TMAP process has been undertaken on the site.

10.1 Recommendations for the Concept Plan

Additional traffic impacts

The additional traffic forecast to be generated by the expanded facility can be accommodated on the surrounding road system. Intersection modelling has identified two potential upgrades to reduce delays at two junctions. These should be considered on completion of the Concept Plan.

1. Introduction of No Stopping on the eastern side of Avoca Street between St Pauls Road and Barker Street from 7:00am to 9:00am
2. Conversion of the intersection of Botany Street and Barker Street to traffic signal control.

Parking, access, visitors and servicing

Sufficient parking will be provided onsite so there will be no nett increase in on-street parking demand. The basement car park and its entrances have been checked for compliance with the Australian Standard 2890.1 – 2004 and an AutoTrack swept path analysis has been carried out.

The proposed loading dock with two docks suitable to accommodate large rigid trucks, along with four spaces for vans, provides sufficient capacity for the development.

Participants in the research would be dropped off at the front of the facility via a porte cochere on Barker Street. The porte cochere would be wide enough to allow a vehicle to pass a stopped vehicle. The bus stop in front of the site could be accommodated between the entry and exit of the porte cochere.

Bicycle and pedestrian access

The site has priority bicycle routes nearby and a future route at its doorstep. This along with suitable provision of end of trip facilities would mean that bicycling targets can be met.

The site will be connected by paved, level pedestrian links to the street network and the rest of the hospital.

Construction Management Plan

A detailed construction management plan will be completed and submitted when a construction contractor is appointed. The assessment undertaken has highlighted some aspects which should be taken into consideration in the CMP, including truck routes and the temporary relocation of the bus stop in front of the site to allow the establishment of a construction Work Zone for materials delivery.

Pedestrians on the footpath would be protected using a hoarding where required. Traffic management plans for specific construction events will take into consideration the safe passage of pedestrians and bicycles.

Parking for construction workers would be accommodated by: undertaking a TravelSmart process for construction workers; retaining parking on site and on Hospital Road where possible; and arranging sufficient remaining parking in the Hospital car park.

TMAP Transport Initiatives

The TMAP objectives are to achieve a mode share increase in cycling of 25%, public transport of 10% and walking of 10%. This shift would achieve a reduction in car driver usage of 12%.

This will be achieved through a package including:

- TravelSmart program including the production of a site Travel Plan at the completion of Stage 2A and repeated at the completion of Stages 2B, 2D and 3
- bicycle facilities from Stage 2B including parking spaces, lockers, showers and change rooms with sufficient capacity to support the 25% increase in bicycle usage.

The impacts of the TravelSmart scheme would be evaluated six months after being implemented, or reviewed at the occupation of Stages 2A, 2C, 2D and 3, to ensure that the target mode splits are being achieved. If the reduction in car usage is lagging behind the target, then the subsidy of bus fares for staff should be considered.

Consultation

Consultation has been undertaken with the RTA, Randwick Council and the MoT/State Transit. The RTA issues were included in the DGRs and have been addressed in this report

The porte cochere has been redesigned to take into consideration Randwick City Council's officers' concerns. As mentioned above, there would be sufficient on-site parking to result in no nett increase in on-street parking.

The bus stop would be retained approximately in its existing location, but would require temporary relocation during Stage 2A construction.

10.2 Recommendations for Project Application

Additional traffic impacts

The additional traffic generated by the Project Application can be satisfactorily accommodated on the existing road network.

Parking, access, visitors and servicing

Sufficient parking will be provided on-site to result in no nett increase in on-street parking.

Access to the car park would be via one entry off Hospital Road. The porte cochere would be constructed in Stage 2A for participant drop-off and pick-up. The existing loading dock would remain open until Stage 2D, where temporary arrangements would be made. The new loading dock would be completed in Stage 2D.

It has been assumed that the ambulance station would be retained in its current location within the new building, with no change in traffic generation.

Construction Management Plan

A detailed construction management plan will be completed and submitted when a construction contractor is appointed and more information on the method of construction is known. A construction Work Zone for material delivery and waste removal will be sought on the northern side of Barker Street in front of the site during Stage 2A.

TMAP Transport Initiatives

The target mode splits will be achieved through a package including:

- TravelSmart program including the production of a site Travel Plan at the completion of Stage 2A and repeated at the completion of Stages 2B and 2D
- bicycle facilities installed from Stage 2B including parking spaces, lockers, showers and change rooms with sufficient capacity to support the 25% increase in bicycle usage.

The impacts of the TravelSmart scheme would be evaluated six months after being implemented or reviewed at occupation of Stages 2A, 2C and 2D, to ensure that the target mode splits are being achieved.

Appendix A

Director General's Requirements
and RTA Comments

NSW GOVERNMENT
Department of Planning

Contact: Michelle Cramsie
Phone: 02 9228 6534
Fax: 02 9228 6570
Email: michelle.cramsie@planning.nsw.gov.au

Our ref: MP 08_0086
File: S08/00682

Oliver Klein
JBA Urban Planning Consultants
Level 7, 77 Berry Street
NORTH SYDNEY NSW 2060

Dear Mr Klein,

PRINCE OF WALES MEDICAL RESEARCH INSTITUTE
PROPOSED NEUROSCIENCE RESEARCH PRECINCT CONCEPT PLAN (MP 08_0086)

I write in relation to the above project for which you are acting on behalf of the Prince of Wales Medical Research Institute. On 10 July 2008, pursuant to Clause 6 of the *State Environmental Planning Policy (Major Projects) 2005*, the Minister for Planning formed the opinion that the proposed Neuroscience Research Precinct is a project to which Part 3A of the Act applies, and authorised the submission of a Concept Plan for the site.

The Department has reviewed the submitted plans and documentation and has consulted relevant agencies pursuant to Section 75F(4) of the *Environmental Planning and Assessment Act 1979* (the Act). The Director General's Environmental Assessment Requirements have subsequently been prepared and are attached herewith.

The Director General's Environmental Assessment Requirements have been developed from information provided with your application. You should be aware at this stage that Section 75F(3) of the Act permits subsequent modification of the Director General's Environmental Assessment Requirements and may be invoked to address hitherto unidentified environmental impacts. If these powers are used, you will be formally notified of changes to the Director General's Environmental Assessment Requirements.

Once you have lodged the Environmental Assessment, the Department (in consultation with other agencies where appropriate) will undertake a "test of adequacy" of the submitted documentation to establish whether it meets the Director General's Environmental Assessment Requirements and is satisfactory for the purposes of public exhibition. Following that review, the Environmental Assessment (together with the Director General's Environmental Assessment Requirements) will be publicly exhibited for a minimum period of 30 days.

You should keep the contact officer for this project up to date with the preparation of the Environmental Assessment and, where relevant, any emerging issues. The officer, Michelle Cramsie, is available during business hours on (02) 9228 6534 or via return email to michelle.cramsie@planning.nsw.gov.au.

Yours sincerely

Jason Perica 13/8/08
Executive Director
Strategic Sites and Urban Renewal

Part 3A – Project Application
Director-General's Requirements
Section 75F of the *Environmental Planning and Assessment Act 1979*

Application No.	MP 08_0086 (Concept Plan)
Project	**Concept Plan - Prince of Wales Hospital Medical Research Institute** The proponent is seeking concept plan approval for a new Neuroscience Research Precinct on part of the Prince of Wales Hospital, Randwick campus.
Site	Prince of Wales Medical Research Institute (on part of the Prince of Wales hospital campus) Barker Street, Randwick.
Proponent	JBA Urban Planning Consultants P/L (on behalf of the Prince of Wales Medical Research Institute).
Date of Issue	13/8/08 *(If the environmental assessment is not exhibited within 2 years after this date, the applicant must consult further with the Director-General in relation to the preparation of the environmental assessment.)*

General Requirements	The Environmental Assessment must include:
	• an executive summary;
	• a description of the proposal comprising:
	  ○ description of the site including cadastre and title details;
	  ○ design, construction, operation, maintenance, rehabilitation and staging as applicable;
	  ○ project objectives and need;
	  ○ consideration of alternatives to the proposal.
	• an assessment of the environmental impacts of the project, with particular focus on the key assessment requirements specified below; and
	• a statement on the validity of the Environmental Assessment, the qualifications of person(s) preparing the assessment and that the information contained in the Environmental Assessment is neither false nor misleading.

Key Assessment Requirements	**Relevant EPIs, Guidelines and other requirements to be addressed** • Planning provisions applying to the site, including the permissibility and the provisions of all plans and policies including Randwick LEP 1998, relevant DCPs, SEPP (Infrastructure) 2007 and SEPP 55. • Nature and extent of non-compliance with relevant EPIs and justification for any departure. • Submission of a copy of the Development Consent DA/468/2007 issued by Randwick City Council, including copies of stamped plans. • Relationship of the proposal to the Randwick Hospitals Development Plan March 2006 (prepared by Deb Berkhoult for NSW Health) **Built Form/Urban Design** • Indicative plans, elevations and sections to detail the urban design, height, density, bulk and scale, setbacks of the proposal in relation to the surrounding development, topography, streetscape and view corridors. • Relationship of the development to the whole PoW Hospital site including entry points from Barker Street • View analysis, including artist's perspective and photomontages. • Details of the proposed landscaping and open space areas. • Consideration of safety and security issues for those using the site, and in adjoining public areas. **Environmental and Residential Amenity** • Address solar access, visual privacy, acoustic privacy, and wind impacts and achieve a high level of environmental amenity within the PoW Site and amenity for adjoining properties. The proposal must demonstrate that the proposed siting of buildings does not have unacceptable level of impacts on overshadowing, privacy and outlook of buildings within the site and on adjoining sites.

	Transport and Accessibility
	• A Traffic Study in accordance with the Roads and Traffic Authority's *Guide to Traffic Generating Development*, with particular regard to:
	  ○ Existing road capacity, traffic conditions, expected impacts and any upgrade requirements;
	  ○ Internal road layout and access arrangements;
	  ○ Car parking arrangement for staff and visitors;
	  ○ Delivery, servicing and loading arrangements; and
	  ○ Pedestrian and bicycle linkages within the site and wider hospital area.
	• Transport Management and Accessibility Plan (TMAP) for the site, in accordance with the Ministry of Transport's *Interim TMAP Guidelines*, including:
	  ○ Staging/Sequencing plan; and
	  ○ Construction Management Plan.
	• Measures to promote public transport usage and reduce car usage.
	• Determine the adequacy of the proposal to meet the likely future demand for increased pedestrian and cycle access in the vicinity of the site.
	• Identify measures to mitigate potential impacts for pedestrians and cyclists during the construction of the project.
	• Proposed car parking arrangements, including car parking allocation and parking for construction workers.
	
	Ecologically Sustainable Development (ESD)
	• Detail how the development will incorporate ESD principles in the design, construction and ongoing operation phases of the development including water sensitive urban design measures, energy efficiency, recycling and waste disposal.
	
	Heritage
	• Detail any potential Aboriginal and European archaeological heritage on the site, such as the Randwick Destitute Children's Asylum, and how it would be considered, preserved and recognised appropriately.
	
	Staging
	• Include details regarding any proposed staging of the development including impacts of existing employees, car parking etc.
	
	Ambulance Station
	• Provide details on the redesign or relocation of the ambulance station.
	
	Utilities
	• In consultation with relevant agencies, address the existing capacity and requirements of the development for the provision of utilities including staging of any infrastructure works.
	
	Drainage, Stormwater and Groundwater Management
	• Identify drainage, stormwater and groundwater management issues including topography, on site stormwater detention, water sensitive urban design and drainage infrastructure.
	
	Planning Agreements and/or Developer Contributions
	• Address Council's Section 94A Development Contributions Plan and provide the likely scope of a planning agreement and/or developer contributions between the proponent and Council for matters such as open space, community, regional and local infrastructure, public transport provisions, social infrastructure and facilities either on site or within the City of Randwick.
	
	Draft Statement of Commitments
	• Proposed mitigation and management of residual impacts.
	• A Statement of Commitments detailing measures for environmental management and mitigation measures and monitoring for the project.

Test of Adequacy	If the Director-General considers that the Environmental Assessment does not adequately address the Environmental Assessment Requirements, the Director-General may require the proponent to submit a revised Environmental Assessment to address the matters notified to the proponent. The Director-General may modify these requirements by further notice to the proponent.
Consultation Requirements	During the preparation of the Environmental Assessment, you should undertake an appropriate level of consultation with the relevant Local or State government authorities, service providers, existing staff at PoWMRI and Black Dog, community groups and other stakeholders. In addition the EA is to include written evidence of consultation with the following: **Agencies, other authorities and groups:** • South Eastern Sydney and Illawarra Area Health Service • Randwick City Council • NSW Roads and Traffic Authority • NSW Ministry of Transport • NSW Department of Conservation and Climate Change • All relevant utility providers
Deemed Refusal Period	60 days (see Clause 8E of the *Environmental Planning and Assessment Regulation 2000)*
Application Fee Information	The application fee is based on Capital Investment Value of the project as defined in the Major Projects SEPP and as set out in Clause 8H of the *Environmental Planning and Assessment Regulation 2000.* To verify the cost of works for this project you are requested to submit a **Quantity Surveyor's** report for the project.
Landowners Consent	Landowner's consent is to be provided in accordance with the *Environmental Planning and Assessment Regulation 2000.*
Documents to be submitted	Once the draft EA has been submitted and determined to be adequate by the Department the applicant should submit: • 10 hard copies of the environmental assessment report & 10 sets of the site analysis plan and architectural plans; and • 10 copies of the environmental assessment report and plans on CD-ROM (in PDF – please ensure all files are less than 2Mb in size).

NSW GOVERNMENT
Department of Planning

Contact: Michelle Cramsie
Phone: 02 9228 6534
Fax: 02 9228 6570
Email: michelle.cramsie@planning.nsw.gov.au

Our ref: MP 08_0153
File: S08/01251

Mr Oliver Klein
JBA Urban Planning Consultants
Level 7, 77 Berry Street
NORTH SYDNEY NSW 2060

Dear Mr Klein,

PRINCE OF WALES MEDICAL RESEARCH INSTITUTE
PROPOSED NEUROSCIENCE RESEARCH PRECINCT – STAGE 2 WORKS (MP 08_0153)

I write in relation to the above project for which you are acting on behalf of the Prince of Wales Medical Research Institute. On 12 August 2008, pursuant to Clause 6 of the *State Environmental Planning Policy (Major Projects) 2005*, the Minister for Planning formed the opinion that the proposed Stage 2 works as part of the Neuroscience Research Precinct, is a project to which Part 3A of the Act applies.

The Department has reviewed the submitted plans and documentation and has consulted relevant agencies pursuant to Section 75F(4) of the *Environmental Planning and Assessment Act 1979* (the Act). The Director General's Environmental Assessment Requirements (DGRs) have subsequently been prepared and are attached herewith.

The DGRs have been developed from information provided with your application. You should be aware at this stage that Section 75F(3) of the Act permits subsequent modification of the DGRs and may be invoked to address hitherto unidentified environmental impacts. If these powers are used, you will be formally notified of changes to the DGRs.

Once you have lodged the Environmental Assessment, the Department (in consultation with other agencies where appropriate) will undertake a "test of adequacy" of the submitted documentation to establish whether it meets the DGRs and is satisfactory for the purposes of public exhibition. Following that review, the Environmental Assessment (together with the DGRs) will be publicly exhibited for a minimum period of 30 days.

You should keep the contact officer for this project up to date with the preparation of the Environmental Assessment and, where relevant, any emerging issues. The officer, Michelle Cramsie, is available during business hours on (02) 9228 6534 or via return email to michelle.cramsie@planning.nsw.gov.au.

Yours sincerely

Jason Perica
Executive Director
Strategic Sites and Urban Renewal

16/9/08

Part 3A – Project Application
Director-General's Requirements
Section 75F of the *Environmental Planning and Assessment Act 1979*

Application No.	MP 08_0153
Project	Stage 2 works for the proposed Neuroscience Research Precinct on part of the Prince of Wales Hospital, Randwick campus.
Site	Prince of Wales Medical Research Institute (on part of the Prince of Wales hospital campus) Barker Street, Randwick.
Proponent	JBA Urban Planning Consultants P/L (on behalf of the Prince of Wales Medical Research Institute).
Date of Issue	11/9/08 *(If the environmental assessment is not exhibited within 2 years after this date, the applicant must consult further with the Director-General in relation to the preparation of the environmental assessment.)*

General Requirements	The Environmental Assessment must include:
	• an executive summary;
	• a description of the proposal comprising:
	  ○ description of the site including cadastre and title details;
	  ○ design, construction, operation, maintenance, rehabilitation and staging as applicable;
	  ○ project objectives and need; and
	  ○ consideration of alternatives
	• an assessment of the environmental impacts of the project, with particular focus on the key assessment requirements specified below; and
	• a statement on the validity of the Environmental Assessment, the qualifications of person(s) preparing the assessment and that the information contained in the Environmental Assessment is neither false nor misleading.

Key Assessment Requirements	**Relevant EPIs, Guidelines and other requirements to be addressed** • Planning provisions applying to the site, including the permissibility and the provisions of all plans and policies including Randwick LEP 1998, relevant DCPs, SEPP (Infrastructure) 2007 and SEPP 55; • Relationship to the proposed Concept Plan MP 08_0086 for the site; • Nature and extent of non-compliance with relevant EPIs and the Concept Plan; • Consideration of alternatives to the proposal. **Built Form/Urban Design** • Plans, elevations and sections to detail the urban design, height, setbacks, density, bulk and scale of the proposal in relation to the surrounding development, topography and streetscape; • Activation of the Barker Street and Easy Street frontages; • View analysis, including artist's perspective and photomontages; • Schedule of materials and finishes; • Details of any proposed landscaping and open space areas; • Setbacks and links to the Memorial Garden and other landscaped areas. **Environmental and Residential Amenity** • Address solar access, visual privacy, acoustic privacy, wind impacts and view corridors and achieve a high level of environmental amenity and amenity for adjoining residences. The proposal must demonstrate that the proposed building does not have unacceptable level of impacts on overshadowing, privacy and outlook of buildings within the site and on adjoining sites.

Car Parking and Traffic

- A Traffic Study in accordance with the Roads and Traffic Authority's *Guide to Traffic Generating Development*, with particular regard to:
  - Existing road capacity, traffic conditions, expected impacts and any upgrade requirements;
  - Daily and peak traffic movements and impacts on intersections;
  - Internal road layout and access arrangements; and
  - Pedestrian and bicycle circulation patterns and linkages.
- Transport Management and Accessibility Plan (TMAP) for the site, in accordance with the Ministry of Transport's *Interim TMAP Guidelines*, including:
  - Cumulative regional traffic impacts;
  - Staging/Sequencing plan; and
  - Construction Management Plan.
- Measures to minimise car parking provision and promotion of public transport and bicycle usage;
- Proposed car parking arrangements, including car parking allocation and parking for construction workers.

Ambulance Station

- Provide details on the redesign or relocation of the ambulance station.

Ecologically Sustainable Development (ESD)

- Detail how the development will incorporate ESD principles in the design, construction and ongoing operation phases of the development including water sensitive urban design measures, energy efficiency, recycling and waste disposal.

Heritage

- Detail any potential Aboriginal and European archaeological heritage on the site, such as the Randwick Destitute Children's Asylum, and how it would be considered and recognised appropriately.
- Detail consideration of the Struggletown Heritage Conservation Area.

Construction and operational impacts

The EA should address the following:

- Any likely geotechnical impacts;
- Any potential contamination on the site to address SEPP 55;
- Air pollution, soil and erosion and waste material including operation waste including biomedical infectious or other toxic wastes;
- Noise and vibration;
- Details of any cut and fill and whether any fill is proposed to be imported or exported to/from the site;
- Prepare a sediment and erosion control plan;
- Prepare a waste management plan;
- Prepare a construction management plan to mitigate against the impacts associated with demolition and construction of the new work.

Staging

Staging of demolition and construction on the site, including decanting of buildings and temporary access arrangements.

Utilities

- In consultation with relevant agencies, address the existing capacity and requirements of the development for the provision of utilities including staging of any infrastructure works.

Drainage, Stormwater and Groundwater Management

- Identify drainage, stormwater and groundwater management issues, on site stormwater detention and drainage infrastructure.

	Planning Agreements and/or Developer Contributions • Address Council's Section 94A Development Contributions Plan and provide the likely scope of a planning agreement and/or developer contributions between the proponent and Council for matters such as open space, community, regional and local infrastructure, public transport provisions, social infrastructure and facilities either on site or within the City of Randwick. **Draft Statement of Commitments** • Proposed mitigation and management of residual impacts. • A Statement of Commitments detailing measures for environmental management and mitigation measures and monitoring for the project.
Test of Adequacy	If the Director-General considers that the Environmental Assessment does not adequately address the Environmental Assessment Requirements, the Director-General may require the proponent to submit a revised Environmental Assessment to address the matters notified to the proponent. The Director-General may modify these requirements by further notice to the proponent.
Consultation Requirements	During the preparation of the Environmental Assessment, you should undertake an appropriate level of consultation with the relevant Local or State government authorities, service providers, existing staff at PoWMRI and Black Dog, community groups and other stakeholders. In particular, you should consult with: **Agencies, other authorities and groups:** • South Eastern Sydney and Illawarra Area Health Service • Randwick City Council • NSW Roads and Traffic Authority • NSW Ministry of Transport • NSW Department of Conservation and Climate Change • All relevant utility providers
Deemed Refusal Period	60 days (see Clause 8E of the *Environmental Planning and Assessment Regulation 2000)*
Application Fee Information	The application fee is based on Capital Investment Value of the project as defined in the Major Projects SEPP and as set out in Clause 8H of the *Environmental Planning and Assessment Regulation 2000.* To verify the cost of works for this project you are requested to submit a **Quantity Surveyor's** report for the project.
Landowners Consent	Landowner's consent is to be provided in accordance with the *Environmental Planning and Assessment Regulation 2000.*
Documents to be submitted	Once the draft EA has been submitted and determined to be adequate by the Department the applicant should submit: • 10 hard copies of the environmental assessment report & 10 sets of the site analysis plan and architectural plans; and • 10 copies of the environmental assessment report and plans on CD-ROM (in PDF – please ensure all files are less than 2Mb in size).

RDC 08M1188 Vol 1

Iona Cameron

The Director
Strategic Assessments
Department of Planning
GPO Box 39
Sydney NSW 2001

Attention: Michelle Cramsie

DIRECTOR GENERAL'S REQUIREMENTS: PROPOSED NEUROSCIENCE RESEARCH PRECINCT STAGE 2 WORKS AT THE ROYAL PRINCE OF WALES HOSPITAL (MAJOR PROJECT APPLICATION MP 08_0153) – CONCEPT PLAN AND STATE SIGNIFICANT SITE LISTING

Dear Sir / Madam,

I refer to your letter of 8 August 2008 (Ref: MP 08_0153) requesting the Roads and Traffic Authority (RTA) to provide details of key issues and assessment requirements regarding the abovementioned development for inclusion in the Director General's Environmental Assessment (EA) requirements.

The RTA would like the following issues to be included in the transport and traffic impact assessment of the proposed development:

1. It is noted that the Metropolitan Strategy has designated City of Sydney as a Global City and a major focal point for world class business, tourism, cultural, health, education and entertainment activities. It is important that the development of The Prince of Wales Medical Research Institute's proposed Neuroscience Research Precinct Stage 2, takes into consideration, and contributes to the achievement of, transport objectives contained in this and other high-level NSW Government strategies.

   These strategies include the NSW State Plan, Urban Transport Statement and the Sydney City Subregional Strategy. These policies share the aims of increasing the use of walking, cycling and public transport; appropriately co-locating new urban development with existing and improved transport services; and improving the efficiency of the road network.

   By addressing both the supply of transport services and measures to manage demand for car use, the EA report should demonstrate how users of The Prince of Wales Medical Research Institute's proposed Neuroscience Research Precinct Stage 2, will be able to make travel choices that support the achievement of relevant State Plan targets.

2. Daily and peak traffic movements likely to be generated by the proposed development including the impact on nearby intersections and the need / associated funding for upgrading or road improvement works (if required).

Roads and Traffic Authority
27-31 Argyle Street Parramatta NSW 2150 | PO Box 973 Parramatta CBD NSW 2124 DX 28555 Parramatta | T 13 17 82 | www.rta.nsw.gov.au

The key intersections to be examined / modelled include:

- Avoca Street and High Street/Belmore Road;
- Avoca Street and Cuthill Street;
- Avoca Street and St Pauls Street; and
- Avoca Street and Barker Street;

3. Details of the proposed accesses and the parking provisions associated with the proposed development including compliance with the requirements of the relevant Australian Standards (ie: turn paths, sight distance requirements, aisle widths, etc).

4. Proposed number of car parking spaces and compliance with the appropriate parking codes.

5. Details of service vehicle movements (including vehicle type and likely arrival and departure times).

6. The RTA requires the EA report to assess the implications of the proposed development for non-car travel modes (including public transport use, walking and cycling); the potential for implementing a location-specific sustainable travel plan (eg 'Travelsmart' or other travel behaviour change initiative); and the provision of facilities to increase the non-car mode share for travel to and from the site. This will entail an assessment of the accessibility of the development site by public transport.

7. To ensure that the above requirements are fully addressed, the RTA requests that a Traffic Management and Accessibility Plan (TMAP) be undertaken for The Prince of Wales Medical Research Institute's proposed Neuroscience Research Precinct Stage 2 site to properly ascertain the cumulative regional traffic impacts associated with the development. The TMAP process provides an opportunity to identify a package of traffic and transport infrastructure measures required to support future development. Regional and local intersection and road improvements, vehicular access options for adjoining sites, public transport needs, the timing and cost of infrastructure works and the identification of funding responsibilities associated with the development should be identified.

8. The RTA will require in due course the provision of a traffic management plan for all demolition / construction activities, detailing vehicle routes, number of trucks, hours of operation, access arrangements and traffic control measures.

Further enquiries on this matter can be directed to Stan Mack on phone 8849 2584 or facsimile (02) 8849 2918.

Yours sincerely

James Hall
A\Senior Land Use Planner
Transport Planning, Sydney Region

2 September 2008

Appendix B

Stakeholder Consultation

Prince of Wales Hospital Medical Research Institute Neuroscience Precinct Stage 2

Minutes of Meeting
10:00am 18th November 2008

Barker Street Bus Stop

Attendance:

Tony Lehmann	(TL)	Randwick City Council
Aurelio Lindaya	(AL)	Randwick City Council
Rod Winton	(RW)	Winton Associates
Michael Grave	(MG)	Cox Architects
Tom van Drempt	(TvD)	Parsons Brinckerhoff

Distribution: Tony Lehmann, Rod Winton, Michael Grave

Item no.	Description	Action
1A	TL is concerned about pedestrian safety at the porte cochere on Barker Street. A potential measure to address the concerns is to increase the exit angle.	TvD / MG to realign porte cochere
1B	There may be problems with congestion inside the porte cochere. Widen to allow a vehicle to pass a stoped vehicle.	TvD to run Autotrack
1C	Vehicles should not be able to turn right out of the porte cochere. Extend splitter median island.	TvD / MG
1D	Buses at the bus stop obstruct the siht distance of departing vehicles. Move bus stop away from exit to porte cochere. Landscape between porte cochere and footpath to define the area.	TvD / MG
1E	Include plan of management for porte cochere in case future operation is not as intended.	TvD
2	TL noted that the bushes on corner of Easy Street and Barker Street should be trimmed by three metres and replaced with fencing to improve sight distance for left-turning vehicles of pedestrians intending to cross Easy Street..	Noted
3	Temporary relocation of the bus stop during the Stage 2A construction works – no issues	
4	No plans for road upgrades in the immediate area.	
5	No other future developments to be included in the assessment.	
6	AL – preferred the use of the RTA Bicycle design guide for bicycle facilities.	Noted
7	Council is not in favour of uncontrolled right-turns from Hospital Road.	Noted
8	A resident parking scheme has already been installed in nearby streets.	
9	No nett increase in on street parking – accepted by Council	

Item no.	Description	Action
10	Base assumptions for future on existing travel patterns. – accepted by Council	
11	RTA requested that TMAP process be undertaken for development.	
12	Intersection modelling to be done with SCATES for Avoca Street intersections and SIDRA for other intersections– accepted by Council	
13	Modelling Stages 2D and 3 for future traffic impact. – accepted by Council	

Van Drempt, Tom

From: MACK Stan [Stan_MACK@rta.nsw.gov.au]
Sent: Friday, 21 November 2008 9:20 AM
To: Van Drempt, Tom
Subject: RE: Prince of Wales Medical Research Institute

Hi Tom,

The letter we sent to the DOP was in response to their request for Part 3A requirements for the Stage 2 development application. Stage 3 was not included in their request.
However, I would assume that Stage 3 requirements would be similar. In your study you should assess the impacts for stage 2 separately and the cumulative impacts for the total development.

Regards,
Stan Mack

From: Van Drempt, Tom [mailto:tvandrempt@pb.com.au]
Sent: Thursday, 20 November 2008 5:11 PM
To: MACK Stan
Subject: FW: Prince of Wales Medical Research Institute

Dear Stan,

Thank you for speaking to me yesterday regarding this project.

As discussed, we have reviewed the list of issues raised in your letter attached and will address them in our traffic and transport assessment.

Following subsequent discussions with Chris Smith at the TMC, we understand that the RTA will require the four signalised intersections along Avoca Street from Barker Street to High Street to be modelled in SCATES. We will undertake this modelling in SCATES. For other intersections to be assessed as part of this project, we will use SIDRA, as traffic signal coordination will not be an issue.

The development actually has three stages. Stage 1 has already been approved by Randwick Council and is currently under construction. The Project Application covers Stage 2 covers partial development of the site frontage along Barker Street (approximately 22,500sq.m). The Concept Plan covers Stage 3 - the whole development. Both applications for Stages 2 and 3 - the Project Application and Concept Plan were submitted to the Department of Planning. Can I assume that your comments on Stage 2 apply equally to Stage 3?

If you have any other issues or questions about the above, please let me know.

Could you please confirm the points above in a letter from the RTA so we can show that we have undertaken the required authority consultation?

Thanks

<<RTA Comments DGRs Stage 2.pdf>>

Tom van Drempt
Senior Transport Engineer
National Traffic and Transport Planning Service
PB
Level 27, Ernst & Young Centre

680 George Street
GPO Box 5394
Sydney NSW 2001
AUSTRALIA

Switch: +61(0)2 9272 5100
Direct: +61(0)2 9272 1415
Mobile: +61(0)400 407 156
Fax: +61(0)2 9272 5101
Email: tvandrempt@pb.com.au

www.pbworld.com

Van Drempt, Tom

From: Ahmed Youssef [Ahmed.Youssef@transport.nsw.gov.au]
Sent: Monday, 10 November 2008 11:38 AM
To: Van Drempt, Tom
Cc: Adrian Dessanti; John Broady
Subject: Re: Prince of Wales MRI

Hello Tom,

Happy for you to deal with Council and STA direct. Keep us in the loop though, particularly John and Adrian. They can also comment on issues if they have any, I don't.

Thanks

Ahmed Youssef
Infrastructure Officer
Ministry of Transport
(P) 02 9268 2252
(F) 02 9268 2275
(M) 0409 902 962

>>> "Van Drempt, Tom" <tvandrempt@pb.com.au> 10/11/2008 10:52 am >>>

Dear Ahmed,

PB is also working on a project at the Prince of Wales Medical Research Institute. The project is an expansion and upgrading of facilities for important medical research.

There may need to be a relocation of a bus stop on Route 359 (maybe 357 in the future) for construction and possibly full-time to allow a new porte cochere. Is the Ministry happy for PB to deal directly with STA and Randwick Council regarding this bus stop?

The other impact for public transport will be a potential increase in passengers over time, as this area has a good mode split. We understand that State Transit has identified the nearby Perouse Road corridor as an existing growth corridor. Due to its location, this development would create back-loading trips and intermediate trips - i.e. trips from the beaches to Perouse Road, allowing the seat to be re-used for passengers at Randwick Junction.

Does the Ministry have any questions / issues regarding this development?

Thanks

Tom van Drempt
Senior Transport Engineer
National Traffic and Transport Planning Service
PB
Level 27, Ernst & Young Centre
680 George Street
GPO Box 5394
Sydney NSW 2001
AUSTRALIA

Switch: +61(0)2 9272 5100
Direct: +61(0)2 9272 1415
Mobile: +61(0)400 407 156
Fax: +61(0)2 9272 5101
Email: tvandrempt@pb.com.au

www.pbworld.com

Prince of Wales Hospital Medical Research Institute Neuroscience Precinct Stage 2

Minutes of Meeting
10:00am 18th November 2008

Barker Street Bus Stop

Attendance:	Eric Graham	(EG)	State Transit
	Robert Rosadi	(RR)	State Transit
	Rod Winton	(RW)	Winton Associates
	Michael Grave	(MG)	Cox Architects
	Tom van Drempt	(TvD)	Parsons Brinckerhoff

Distribution: Eric Graham, Rod Winton, Michael Grave

Item no.	Description	Action
1	State Transit prefer to have the bus stop stay in its current location as there will continue to be a bus service along this section of Barker Street, and this bus stop provides for local access to the Hospital and the high school.	
2	A location between the entry and exit ramps of the porte cochere is the preferred option. Bus frequency should not cause a major sight distance issue (similar to bus stop in front of a service station).	
3	Plan for Eastern Network currently being considered has Route 359 being replaced by Route 357 on the section of Barker Street between Avoca Street and Botany Street. It will have approximately a 30 minute frequency, with higher during the peaks.	
4	State Transit would like to see a plan of the area. This plan should show the width of the footpath.	MG / TvD to provide plan
5	A bench seat could be provided, but a shelter would obstruct sight distance for vehicles exiting the porte cochere.	
6	The porte cochere should be driveway style entry and exit to reinforce that the vehicles using the facility give way to pedestrians. Pedestrians should be able to continue along the footpath at-grade.	
7	The ambulance station may stay at its current location. There is insufficient space remaining between the current ambulance driveway and the start of the porte cochere for the bus stop.	
8	A temporary location for the bus stop will be required during construction (Stage 2A) until the porte cochere is completed. A temporary location east of Easy Street is considered feasible. Minimum length for bus zone is 30 metres, including draw-in (can overlap No Stopping). Make up to next power pole (7.6m No Stopping draw-in and 28.9m bus zone). Width of carriageway from kerb to double barrier line (6.3m) is wide enough for a bus stop and traffic lane.	

Item no.	Description	Action
9	All these agreements are subject to the approval of the Traffic Committee and consultation with Randwick Council.	
10	Written evidence of consultation is required for Part 3A Study. PB to provide minutes from on-site meeting along with plan. State Transit to provide written comments.	TvD / EG

Appendix C

Intersection Analysis

SCATES & SIDRA Results Existing 2008

SCATES Program Version: 2004-001 Date: 28-NOV-08 Time:
Registered User Name. - PARSONS BRINCKERHOFF PTY LTD
Registered User No.   - 1014
Data File: AVOCA08
AVOCA STREET
2008 EXISTING

Avoca St / Belmore Rd / High St / Perouse Rd

	AM PEAK				PM PEAK				BUSINESS			
Ph	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL
A	36.0	36.0	119	119	38.0	38.0	92	92	41.4	39.2	84	92
B	20.8	20.8			31.1	31.1			29.4	27.7		
C	43.2	43.2			30.9	30.9			29.2	33.0		
D												
E												
F			dlay	dlay			dlay	dlay			dlay	dlay
G			7.4	7.4			7.1	7.1			3.7	4.1
Seq	CAB	dlay	38	38	CAB	dlay	25	25	CAB	dlay	15	15
		Stps	3.0	3.0		Stps	2.5	2.5		Stps	1.7	1.6
Mode	1	DS	1.09	1.09	1	DS	0.86	0.86	1	DS	0.79	0.71

File = AVOCA08

A	Bay Req	Bay Act	Slip Req	Slip Act	Type
1			10	0	L4C0
2	77	0	14	0	
3			31	77	
4					

TCS = 114

Bays if all intersections are optimised

Avoca St / Cuthill St

	AM PEAK				PM PEAK				BUSINESS			
Ph	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL
A	50.6	48.1	119	40	58.2	54.8	92	46	53.4	51.7	84	43
B	49.4	51.9			41.8	45.2			46.6	48.3		
C												
D												
E												
F			dlay	dlay			dlay	dlay			dlay	dlay
G			1.0	0.3			1.0	0.4			0.7	0.3
Seq	AB	dlay	17	7	AB	dlay	9	6	AB	dlay	7	4
		Stps	1.7	2.0		Stps	1.2	1.4		Stps	1.0	1.1
Mode	1	DS	0.53	0.66	1	DS	0.38	0.45	1	DS	0.32	0.37

File = AVOCA08

A	Bay Req	Bay Act	Slip Req	Slip Act	Type
1					T4
2					
3					
4			15	0	

TCS = 518

Bays if all intersections are optimised

Existing 2008

```
SCATES Program Version: 2004-001  Date: 28-NOV-08  Time:
Registered User Name. - PARSONS BRINCKERHOFF PTY LTD
Registered User No.   -  1014
Data File: AVOCA08
AVOCA STREET
2008 EXISTING
```

Avoca St / St Pauls St

```
              AM PEAK                    PM PEAK                    BUSINESS
 Ph   GT%  GT%       CL   CL   GT%  GT%       CL   CL   GT%  GT%       CL   CL
     CORD ISOL      CORD ISOL CORD ISOL      CORD ISOL CORD ISOL      CORD ISOL
  A  79.0 79.0       119  119 72.8 79.2        92  120 70.2 79.2        84  120
  B  21.0 21.0           0    0 27.2 20.8         0    0 29.8 20.8         0    0
  C
  D
  E
  F                 dlay dlay                  dlay dlay                  dlay dlay
  G                  0.3  0.3                   0.4  0.6                   0.2  0.2
 Seq       AB  dlay    4    4       AB  dlay    4    3       AB  dlay    3    2
              Stps  0.8  0.8           Stps  0.8  0.6           Stps  0.6  0.4
Mode    1       DS  0.70 0.70    1       DS  0.66 0.59    1       DS  0.56 0.49
File = AVOCA08                 A     Bay  Bay  Slip Slip           Type
                                     Req  Act  Req  Act
TCS =  3                       1                10    0              T4
                               2
                               3      16    0
                               4
                                    Bays if all intersections are optimised
--------------------------------------------------------------------------------
```

Avoca St / Barker St

```
              AM PEAK                    PM PEAK                    BUSINESS
 Ph   GT%  GT%       CL   CL   GT%  GT%       CL   CL   GT%  GT%       CL   CL
     CORD ISOL      CORD ISOL CORD ISOL      CORD ISOL CORD ISOL      CORD ISOL
  A  37.9 37.9       119  119 29.2 35.0        92   74 34.2 39.1        84   66
  B  40.2 40.2           0    0 41.3 40.0         0    0 39.0 39.1         0    0
  C  21.9 21.9           0    0 29.5 25.1         0    0 26.8 21.9         0    0
  D
  E
  F                 dlay dlay                  dlay dlay                  dlay dlay
  G                  5.7  5.7                   1.4  1.1                   1.1  0.8
 Seq      CAB  dlay   41   41      CAB  dlay   20   39      CAB  dlay   12   10
              Stps  2.8  2.8           Stps  2.1  2.5           Stps  1.4  1.4
Mode    1       DS  0.93 0.93    1       DS  0.80 2.32    1       DS  0.63 0.85
File = AVOCA08                 A     Bay  Bay  Slip Slip           Type
                                     Req  Act  Req  Act
TCS =  4                       1      56    0   10    0             L2C0
                               2      46    0   23    0
                               3                62    0
                               4      11    0   10    0
                                    Bays if all intersections are optimised
--------------------------------------------------------------------------------
```

Botany St./Barker St.

Existing AM Peak 2008

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	13	0.0	0.565	15.0	LOS B	41	0.96	1.08	36.7
2	T	176	2.8	0.562	13.9	LOS A	41	0.96	1.07	37.5
3	R	104	1.0	0.562	18.1	LOS B	41	0.96	1.00	35.1
Approach		**293**	**2.0**	**0.561**	**15.4**	**LOS B**	**41**	**0.96**	**1.05**	**36.6**
BARKER ST (E)										
4	L	65	1.5	0.878	16.8	LOS B	145	1.00	1.11	29.8
5	T	411	1.5	0.880	15.8	LOS B	145	1.00	1.11	30.6
6	R	412	1.5	0.880	20.0	LOS B	145	1.00	1.05	28.3
Approach		**886**	**1.5**	**0.880**	**17.8**	**LOS B**	**145**	**1.00**	**1.08**	**29.4**
BOTANY ST (N)										
7	L	208	3.8	0.561	8.9	LOS A	35	0.69	0.85	40.5
8	T	179	3.9	0.561	7.7	LOS A	35	0.69	0.81	41.1
9	R	140	3.6	0.560	11.9	LOS A	35	0.69	0.84	38.4
Approach		**527**	**3.8**	**0.561**	**9.3**	**LOS A**	**35**	**0.69**	**0.83**	**40.1**
BARKER ST (W)										
10	L	181	1.7	0.862	28.3	LOS B	123	1.00	1.48	29.7
11	T	393	1.0	0.863	27.4	LOS B	123	1.00	1.48	30.1
12	R	3	0.0	1.000	31.6	LOS C	123	1.00	1.39	28.7
Approach		**576**	**1.2**	**0.864**	**27.7**	**LOS B**	**123**	**1.00**	**1.48**	**30.0**
All Vehicles		**2282**	**2.0**	**1.000**	**18.0**	**LOS B**	**145**	**0.92**	**1.12**	**32.8**

Botany St./Barker St.

Existing PM Peak 2008

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	12	0.0	0.300	8.7	LOS A	15	0.67	0.80	41.3
2	T	173	1.2	0.302	7.5	LOS A	15	0.67	0.77	41.8
3	R	59	0.0	0.303	11.8	LOS A	15	0.67	0.79	39.2
Approach		**244**	**0.8**	**0.302**	**8.6**	**LOS A**	**15**	**0.67**	**0.78**	**41.1**
BARKER ST (E)										
4	L	54	0.0	0.659	11.8	LOS A	59	0.86	0.95	33.8
5	T	301	0.3	0.659	10.8	LOS A	59	0.86	0.94	34.8
6	R	205	5.3	0.658	15.2	LOS B	59	0.86	0.91	31.7
Approach		**561**	**2.1**	**0.658**	**12.5**	**LOS A**	**59**	**0.86**	**0.93**	**33.5**
BOTANY ST (N)										
7	L	289	1.7	0.682	9.0	LOS A	50	0.68	0.83	40.4
8	T	260	0.4	0.681	7.7	LOS A	50	0.68	0.80	41.1
9	R	173	1.2	0.681	12.0	LOS A	50	0.68	0.83	38.3
Approach		**722**	**1.1**	**0.681**	**9.3**	**LOS A**	**50**	**0.68**	**0.82**	**40.1**
BARKER ST (W)										
10	L	177	0.0	0.578	10.5	LOS A	44	0.78	0.87	39.9
11	T	322	0.0	0.579	9.6	LOS A	44	0.78	0.85	40.6
12	R	13	0.0	0.591	13.9	LOS A	44	0.78	0.85	37.7
Approach		**512**	**0.0**	**0.579**	**10.0**	**LOS A**	**44**	**0.78**	**0.86**	**40.3**
All Vehicles		**2039**	**1.1**	**0.682**	**10.3**	**LOS A**	**59**	**0.75**	**0.85**	**38.8**

Botany St./High St.

Existing AM Peak 2008

Signalised - Fixed time **Cycle Time = 50 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	159	3.1	0.418	17.8	LOS B	28	0.71	0.76	35.0
2	T	537	0.9	1.076	112.5	LOS F	281	1.00	2.17	13.4
3	R	58	10.3	1.076	119.2	LOS F	281	1.00	2.17	12.9
Approach		**754**	**2.1**	**1.076**	**93.1**	**LOS F**	**281**	**0.94**	**1.87**	**15.4**
HIGH ST (E)										
4	L	60	8.3	0.238	17.8	LOS B	10	0.58	0.70	33.1
5	T	332	6.9	0.687	16.9	LOS B	71	0.86	0.78	33.4
6	R	42	0.0	0.686	23.4	LOS B	71	0.86	0.86	29.7
Approach		**433**	**6.5**	**0.687**	**17.7**	**LOS B**	**71**	**0.82**	**0.77**	**33.0**
BOTANY ST (N)										
7	L	191	2.1	0.492	16.7	LOS B	27	0.59	0.74	34.7
8	T	528	0.9	1.039	79.9	LOS F	224	1.00	1.81	16.0
9	R	55	5.5	1.040	86.5	LOS F	224	1.00	1.81	15.2
Approach		**773**	**1.6**	**1.039**	**64.9**	**LOS E**	**224**	**0.90**	**1.54**	**18.4**
HIGH ST (W)										
10	L	73	21.9	0.242	19.3	LOS B	21	0.72	0.75	40.9
11	T	375	10.1	1.208	208.4	LOS F	393	0.98	2.78	14.4
12	R	166	4.8	1.210	232.1	LOS F	393	1.00	2.98	13.4
Approach		**614**	**10.1**	**1.209**	**192.3**	**LOS F**	**393**	**0.95**	**2.59**	**15.3**
All Vehicles		**2574**	**4.6**	**1.210**	**95.6**	**LOS F**	**393**	**0.91**	**1.76**	**17.0**

Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	216	16.0	LOS B	0	0.80	0.80
P3	56	14.4	LOS B	0	0.76	0.76
P5	117	16.0	LOS B	0	0.80	0.80
P7	171	14.4	LOS B	0	0.76	0.76
All Peds	**560**	**15.4**	**LOS B**	**0**	**0.78**	**0.78**

Botany St./High St.

Existing PM Peak 2008

Signalised - Fixed time **Cycle Time = 60 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	197	2.0	0.304	18.7	LOS B	37	0.69	0.77	34.5
2	T	529	0.4	1.058	104.6	LOS F	300	1.00	1.96	14.2
3	R	95	4.2	1.058	111.1	LOS F	300	1.00	1.96	13.6
Approach		**821**	**1.2**	**1.057**	**84.7**	**LOS F**	**300**	**0.93**	**1.68**	**16.4**
HIGH ST (E)										
4	L	57	8.8	0.261	19.6	LOS B	11	0.57	0.70	32.0
5	T	338	6.8	1.042	89.0	LOS F	190	1.00	1.68	15.8
6	R	84	0.0	1.041	95.4	LOS F	190	1.00	1.68	13.2
Approach		**479**	**5.8**	**1.042**	**81.8**	**LOS F**	**190**	**0.95**	**1.57**	**16.2**
BOTANY ST (N)										
7	L	83	0.0	0.229	16.0	LOS B	13	0.48	0.70	35.2
8	T	468	0.6	1.054	95.3	LOS F	238	0.99	1.78	14.2
9	R	64	7.8	1.053	102.9	LOS F	238	1.00	1.79	13.5
Approach		**615**	**1.3**	**1.053**	**85.3**	**LOS F**	**238**	**0.93**	**1.63**	**15.3**
HIGH ST (W)										
10	L	125	2.4	0.299	21.0	LOS B	27	0.73	0.75	40.1
11	T	407	5.2	1.108	144.4	LOS F	308	1.00	2.22	18.5
12	R	116	0.0	1.108	150.9	LOS F	308	1.00	2.22	18.0
Approach		**648**	**3.7**	**1.108**	**121.8**	**LOS F**	**308**	**0.95**	**1.93**	**20.5**
All Vehicles		**2563**	**2.7**	**1.108**	**93.7**	**LOS F**	**308**	**0.94**	**1.71**	**17.6**

Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	307	17.6	LOS B	0	0.77	0.77
P3	49	14.7	LOS B	0	0.70	0.70
P5	109	17.6	LOS B	0	0.77	0.77
P7	68	14.7	LOS B	0	0.70	0.70
All Peds	**533**	**17.0**	**LOS B**	**0**	**0.75**	**0.75**

Hospital Rd. / High St.

Existing AM Peak 2008

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
HOSPITAL RD (S)										
1	L	28	7.1	0.039	11.4	LOS A	1	0.45	0.89	34.1
3	R	15	0.0	0.044	17.5	LOS B	1	0.73	1.00	31.0
Approach		**43**	**4.7**	**0.044**	**13.5**	**LOS A**	**1**	**0.55**	**0.93**	**33.0**
HIGH ST (E)										
4	L	52	0.0	0.028	5.6	LOS A	0	0.00	0.58	40.7
5	T	399	6.3	0.213	0.0	LOS A	0	0.00	0.00	50.0
Approach		**451**	**5.5**	**0.213**	**0.7**	**LOS A**		**0.00**	**0.07**	**48.8**
HIGH ST (W)										
11	T	436	10.6	0.388	3.0	LOS A	36	0.64	0.00	38.2
12	R	177	1.7	0.388	10.4	LOS A	36	0.64	0.83	26.2
Approach		**612**	**8.0**	**0.388**	**5.1**	**LOS A**	**36**	**0.64**	**0.24**	**34.4**
All Vehicles		**1106**	**6.9**	**0.388**	**3.6**	**Not Applicable**	**36**	**0.38**	**0.20**	**41.4**

Existing PM Peak 2008

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
HOSPITAL RD (S)										
1	L	158	0.0	0.189	10.6	LOS A	7	0.44	0.92	34.3
3	R	38	0.0	0.091	15.6	LOS B	3	0.67	1.00	31.9
Approach		**196**	**0.0**	**0.189**	**11.6**	**LOS A**	**7**	**0.49**	**0.94**	**33.8**
HIGH ST (E)										
4	L	13	15.4	0.008	6.0	LOS A	0	0.00	0.58	40.7
5	T	318	9.7	0.173	0.0	LOS A	0	0.00	0.00	50.0
Approach		**331**	**10.0**	**0.173**	**0.2**	**LOS A**		**0.00**	**0.02**	**49.6**
HIGH ST (W)										
11	T	557	4.3	0.306	1.7	LOS A	23	0.53	0.00	40.2
12	R	16	0.0	0.308	9.1	LOS A	23	0.53	0.71	27.5
Approach		**573**	**4.2**	**0.306**	**1.9**	**LOS A**	**23**	**0.53**	**0.02**	**39.8**
All Vehicles		**1100**	**5.2**	**0.308**	**3.1**	**Not Applicable**	**23**	**0.36**	**0.18**	**40.5**

Barker St./Hospital Rd.

Exisitng AM Peak 2008

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	679	1.0	0.423	5.4	LOS A	53	0.83	0.00	50.2
6	R	68	0.0	0.422	13.8	LOS A	53	0.83	1.05	43.4
Approach		**747**	**0.9**	**0.423**	**6.1**	**LOS A**	**53**	**0.83**	**0.10**	**49.5**
Hospital Road (N)										
7	L	29	0.0	0.040	12.6	LOS A	1	0.54	0.92	39.2
Approach		**29**	**0.0**	**0.040**	**12.6**	**LOS A**	**1**	**0.54**	**0.92**	**39.2**
Barker Street (W)										
10	L	31	0.0	0.316	8.2	LOS A	0	0.00	0.67	49.0
11	T	577	2.3	0.317	0.0	LOS A	0	0.00	0.00	60.0
Approach		**608**	**2.1**	**0.317**	**0.4**	**LOS A**		**0.00**	**0.03**	**59.3**
All Vehicles		**1384**	**1.4**	**0.423**	**3.8**	**Not Applicable**	**53**	**0.46**	**0.09**	**53.1**

Exisitng PM Peak 2008

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	627	2.2	0.333	4.6	LOS A	39	0.77	0.00	50.8
6	R	6	0.0	0.333	13.0	LOS A	39	0.77	0.98	44.1
Approach		**634**	**2.2**	**0.333**	**4.7**	**LOS A**	**39**	**0.77**	**0.01**	**50.8**
Hospital Road (N)										
7	L	94	0.0	0.135	13.1	LOS A	5	0.57	0.98	38.9
Approach		**94**	**0.0**	**0.135**	**13.1**	**LOS A**	**5**	**0.57**	**0.98**	**38.9**
Barker Street (W)										
10	L	27	0.0	0.325	8.2	LOS A	0	0.00	0.67	49.0
11	T	601	0.8	0.324	0.0	LOS A	0	0.00	0.00	60.0
Approach		**628**	**0.8**	**0.324**	**0.4**	**LOS A**		**0.00**	**0.03**	**59.4**
All Vehicles		**1356**	**1.4**	**0.333**	**3.3**	**Not Applicable**	**39**	**0.40**	**0.09**	**53.3**

Barker St./Young St.

Existing AM Peak 2008

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Young Street (S)										
1	L	6	0.0	0.107	24.9	LOS B	3	0.84	0.94	31.2
3	R	13	0.0	0.107	25.2	LOS B	3	0.84	0.94	31.0
Approach		**19**	**0.0**	**0.107**	**25.1**	**LOS B**	**3**	**0.84**	**0.94**	**31.1**
Barker Street (E)										
4	L	11	0.0	0.379	8.2	LOS A	0	0.00	0.67	49.0
5	T	722	1.1	0.379	0.0	LOS A	0	0.00	0.00	60.0
Approach		**733**	**1.1**	**0.379**	**0.1**	**LOS A**		**0.00**	**0.01**	**59.8**
Barker Street (W)										
11	T	564	2.5	0.314	5.8	LOS A	39	0.83	0.00	50.2
12	R	15	0.0	0.312	14.3	LOS A	39	0.83	1.01	43.0
Approach		**580**	**2.4**	**0.314**	**6.1**	**LOS A**	**39**	**0.83**	**0.03**	**50.0**
All Vehicles		**1332**	**1.7**	**0.379**	**3.1**	**Not Applicable**	**39**	**0.37**	**0.03**	**54.5**

Existing PM Peak 2008

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Young Street (S)										
1	L	12	0.0	0.082	18.6	LOS B	2	0.76	0.87	34.5
3	R	9	0.0	0.082	19.0	LOS B	2	0.76	0.92	34.2
Approach		**21**	**0.0**	**0.082**	**18.8**	**LOS B**	**2**	**0.76**	**0.89**	**34.4**
Barker Street (E)										
4	L	7	0.0	0.333	8.2	LOS A	0	0.00	0.67	49.0
5	T	652	1.4	0.341	0.0	LOS A	0	0.00	0.00	60.0
Approach		**658**	**1.4**	**0.341**	**0.1**	**LOS A**		**0.00**	**0.01**	**59.9**
Barker Street (W)										
11	T	615	0.8	0.331	5.0	LOS A	39	0.78	0.00	50.7
12	R	13	0.0	0.333	13.4	LOS A	39	0.78	0.99	43.7
Approach		**627**	**0.8**	**0.331**	**5.2**	**LOS A**	**39**	**0.78**	**0.02**	**50.5**
All Vehicles		**1306**	**1.1**	**0.341**	**2.8**	**Not Applicable**	**39**	**0.39**	**0.03**	**54.4**

Barker St./Easy St.

Existing AM Peak 2008

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	512	1.6	0.690	6.4	LOS A	66	0.77	0.71	35.2
6	R	224	0.0	0.689	11.9	LOS A	66	0.77	0.79	34.3
Approach		**735**	**1.1**	**0.690**	**8.1**	**LOS A**	**66**	**0.77**	**0.73**	**34.9**
Easy Street (N)										
7	L	108	0.0	0.367	7.3	LOS A	21	0.65	0.71	35.6
9	R	217	0.0	0.367	10.4	LOS A	21	0.65	0.76	34.2
Approach		**325**	**0.0**	**0.367**	**9.4**	**LOS A**	**21**	**0.65**	**0.75**	**34.6**
Barker Street (W)										
10	L	240	0.0	0.566	7.1	LOS A	43	0.66	0.66	36.2
11	T	337	4.2	0.566	6.2	LOS A	43	0.66	0.63	36.6
12	R	25	0.0	0.568	12.0	LOS A	43	0.66	0.70	34.3
Approach		**602**	**2.3**	**0.566**	**6.8**	**LOS A**	**43**	**0.66**	**0.65**	**36.3**
All Vehicles		**1662**	**1.3**	**0.690**	**7.9**	**LOS A**	**66**	**0.71**	**0.71**	**35.4**

Existing PM Peak 2008

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	366	3.8	0.508	9.0	LOS A	35	0.65	0.69	47.0
6	R	143	0.0	0.509	13.0	LOS A	35	0.65	0.75	44.2
Approach		**510**	**2.7**	**0.508**	**10.1**	**LOS A**	**35**	**0.65**	**0.71**	**46.2**
Easy Street (N)										
7	L	154	0.0	0.510	11.1	LOS A	35	0.80	0.90	39.4
9	R	239	0.0	0.511	14.1	LOS A	35	0.80	0.92	37.5
Approach		**393**	**0.0**	**0.510**	**12.9**	**LOS A**	**35**	**0.80**	**0.91**	**38.2**
Barker Street (W)										
10	L	173	1.2	0.577	8.9	LOS A	46	0.55	0.63	47.1
11	T	497	0.6	0.577	8.0	LOS A	46	0.55	0.60	47.6
12	R	24	0.0	0.571	13.7	LOS A	46	0.55	0.67	43.4
Approach		**694**	**0.7**	**0.577**	**8.4**	**LOS A**	**46**	**0.55**	**0.61**	**47.3**
All Vehicles		**1597**	**1.2**	**0.577**	**10.1**	**LOS A**	**46**	**0.65**	**0.71**	**44.4**

SCATES & SIDRA Results 2015 Base Future

SCATES Program Version: 2004-001 Date: 28-NOV-08 Time:
Registered User Name. - PARSONS BRINCKERHOFF PTY LTD
Registered User No. - 1014
Data File: AVOCA15
AVOCA STREET
2015 BASE FUTURE

Avoca St / Belmore Rd / High St / Perouse Rd

	AM PEAK				PM PEAK				BUSINESS			
Ph	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL
A	36.1	36.1	118	118	38.0	38.0	92	92	41.4	39.2	84	92
B	21.0	21.0			31.0	31.0			29.4	27.7		
C	42.9	42.9			30.9	30.9			29.2	33.0		
D												
E												
F			dlay	dlay			dlay	dlay			dlay	dlay
G			7.5	7.5			7.2	7.2			3.7	4.1
Seq	CAB	dlay	42	42	CAB	dlay	27	27	CAB	dlay	16	15
		Stps	3.3	3.3		Stps	2.6	2.6		Stps	1.7	1.6
Mode	1	DS	1.12	1.12	1	DS	0.88	0.88	1	DS	0.81	0.73

File = AVOCA15

TCS = 114

A	Bay Req	Bay Act	Slip Req	Slip Act	Type
1			10	0	L4C0
2	78	0	14	0	
3			32	77	
4					

Bays if all intersections are optimised

Avoca St / Cuthill St

	AM PEAK				PM PEAK				BUSINESS			
Ph	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL
A	50.6	48.1	118	40	58.2	54.8	92	46	53.3	51.7	84	43
B	49.4	51.9			41.8	45.2			46.7	48.3		
C												
D												
E												
F			dlay	dlay			dlay	dlay			dlay	dlay
G			1.0	0.3			1.0	0.5			0.7	0.3
Seq	AB	dlay	17	8	AB	dlay	9	6	AB	dlay	7	4
		Stps	1.8	2.0		Stps	1.3	1.4		Stps	1.0	1.1
Mode	1	DS	0.55	0.68	1	DS	0.39	0.46	1	DS	0.33	0.38

File = AVOCA15

TCS = 518

A	Bay Req	Bay Act	Slip Req	Slip Act	Type
1					T4
2					
3					
4			15	0	

Bays if all intersections are optimised

Base Future 2015

```
SCATES Program Version: 2004-001  Date: 28-NOV-08  Time:
Registered User Name. - PARSONS BRINCKERHOFF PTY LTD
Registered User No.   -  1014
Data File: AVOCA15
AVOCA STREET
2015 BASE FUTURE
```

Avoca St / St Pauls St

```
              AM PEAK                    PM PEAK                    BUSINESS
 Ph   GT%  GT%       CL   CL   GT%  GT%       CL   CL   GT%  GT%       CL   CL
     CORD ISOL      CORD ISOL CORD ISOL      CORD ISOL CORD ISOL      CORD ISOL
  A  78.9 78.9       118  118 72.8 79.2        92  120 70.2 79.2        84  120
  B  21.1 21.1                27.2 20.8                29.8 20.8
  C
  D
  E
  F                 dlay dlay                dlay dlay                dlay dlay
  G                  0.3  0.3                 0.4  0.6                 0.2  0.2
 Seq       AB  dlay    4    4       AB  dlay    4    3       AB  dlay    3    2
              Stps  0.9  0.9           Stps  0.8  0.6           Stps  0.6  0.4
Mode    1       DS  0.71 0.71    1       DS  0.67 0.61    1       DS  0.58 0.50
File = AVOCA15                A     Bay  Bay  Slip Slip           Type
                                    Req  Act  Req  Act
TCS =  3                      1               10    0              T4
                              2
                              3      16    0
                              4
                                   Bays if all intersections are optimised
--------------------------------------------------------------------------------
```

Avoca St / Barker St

```
              AM PEAK                    PM PEAK                    BUSINESS
 Ph   GT%  GT%       CL   CL   GT%  GT%       CL   CL   GT%  GT%       CL   CL
     CORD ISOL      CORD ISOL CORD ISOL      CORD ISOL CORD ISOL      CORD ISOL
  A  38.0 38.0       118  118 29.2 34.5        92   75 34.2 39.1        84   66
  B  40.3 40.3                41.3 40.2                39.0 39.1
  C  21.7 21.7                29.5 25.4                26.8 21.9
  D
  E
  F                 dlay dlay                dlay dlay                dlay dlay
  G                  5.7  5.7                 1.5  1.2                 1.1  0.8
 Seq      CAB  dlay   46   46      CAB  dlay   21   40      CAB  dlay   12   10
              Stps  3.0  3.0           Stps  2.1  2.5           Stps  1.4  1.5
Mode    1       DS  0.95 0.95    1       DS  0.82 2.32    1       DS  0.64 0.87
File = AVOCA15                A     Bay  Bay  Slip Slip           Type
                                    Req  Act  Req  Act
TCS =  4                      1      58    0   10    0             L2C0
                              2      47    0   24    0
                              3                63    0
                              4      12    0   10    0
                                   Bays if all intersections are optimised
--------------------------------------------------------------------------------
```

Botany St./Barker St.

Future AM Peak 2015

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	13	0.0	0.565	15.1	LOS B	42	0.96	1.08	36.6
2	T	179	2.8	0.566	14.0	LOS A	42	0.96	1.08	37.4
3	R	104	1.0	0.568	18.2	LOS B	42	0.96	1.00	35.1
Approach		**296**	**2.0**	**0.567**	**15.5**	**LOS B**	**42**	**0.96**	**1.05**	**36.5**
BARKER ST (E)										
4	L	65	1.5	0.878	16.8	LOS B	145	1.00	1.11	29.8
5	T	411	1.5	0.880	15.8	LOS B	145	1.00	1.11	30.6
6	R	412	1.5	0.880	20.0	LOS B	145	1.00	1.05	28.3
Approach		**886**	**1.5**	**0.880**	**17.8**	**LOS B**	**145**	**1.00**	**1.08**	**29.4**
BOTANY ST (N)										
7	L	208	3.8	0.561	8.9	LOS A	35	0.69	0.85	40.5
8	T	179	3.9	0.561	7.7	LOS A	35	0.69	0.81	41.1
9	R	140	3.6	0.560	11.9	LOS A	35	0.69	0.84	38.4
Approach		**527**	**3.8**	**0.561**	**9.3**	**LOS A**	**35**	**0.69**	**0.83**	**40.1**
BARKER ST (W)										
10	L	181	1.7	0.866	28.7	LOS C	125	1.00	1.49	29.5
11	T	393	1.0	0.865	27.8	LOS B	125	1.00	1.49	29.9
12	R	3	0.0	1.000	32.0	LOS C	125	1.00	1.40	28.6
Approach		**576**	**1.2**	**0.866**	**28.1**	**LOS B**	**125**	**1.00**	**1.49**	**29.8**
All Vehicles		**2285**	**2.0**	**1.000**	**18.2**	**LOS B**	**145**	**0.92**	**1.12**	**32.8**

Botany St./Barker St.

Future PM Peak 2015

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	12	0.0	0.300	8.7	LOS A	15	0.67	0.80	41.3
2	T	173	1.2	0.302	7.5	LOS A	15	0.67	0.77	41.8
3	R	59	0.0	0.303	11.8	LOS A	15	0.67	0.79	39.2
Approach		**244**	**0.8**	**0.302**	**8.6**	**LOS A**	**15**	**0.67**	**0.78**	**41.1**
BARKER ST (E)										
4	L	54	0.0	0.659	11.8	LOS A	59	0.86	0.95	33.8
5	T	301	0.3	0.659	10.8	LOS A	59	0.86	0.94	34.8
6	R	205	5.3	0.658	15.2	LOS B	59	0.86	0.91	31.7
Approach		**561**	**2.1**	**0.658**	**12.5**	**LOS A**	**59**	**0.86**	**0.93**	**33.5**
BOTANY ST (N)										
7	L	289	1.7	0.682	9.0	LOS A	50	0.68	0.83	40.4
8	T	260	0.4	0.681	7.7	LOS A	50	0.68	0.80	41.1
9	R	173	1.2	0.681	12.0	LOS A	50	0.68	0.83	38.3
Approach		**722**	**1.1**	**0.681**	**9.3**	**LOS A**	**50**	**0.68**	**0.82**	**40.1**
BARKER ST (W)										
10	L	177	0.0	0.578	10.5	LOS A	44	0.78	0.87	39.9
11	T	322	0.0	0.579	9.6	LOS A	44	0.78	0.85	40.6
12	R	13	0.0	0.591	13.9	LOS A	44	0.78	0.85	37.7
Approach		**512**	**0.0**	**0.579**	**10.0**	**LOS A**	**44**	**0.78**	**0.86**	**40.3**
All Vehicles		**2039**	**1.1**	**0.682**	**10.3**	**LOS A**	**59**	**0.75**	**0.85**	**38.8**

Botany St./High St.

Future AM Peak 2015

Signalised - Fixed time **Cycle Time = 50 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	159	3.1	0.418	17.8	LOS B	28	0.72	0.76	35.0
2	T	537	0.9	1.076	112.6	LOS F	281	1.00	2.17	13.4
3	R	58	10.3	1.076	119.3	LOS F	281	1.00	2.17	12.9
Approach		**754**	**2.1**	**1.076**	**93.1**	**LOS F**	**281**	**0.94**	**1.87**	**15.4**
HIGH ST (E)										
4	L	60	8.3	0.239	17.8	LOS B	10	0.58	0.70	33.0
5	T	332	6.9	0.687	16.9	LOS B	71	0.86	0.78	33.4
6	R	42	0.0	0.688	23.4	LOS B	71	0.86	0.86	29.7
Approach		**433**	**6.5**	**0.687**	**17.7**	**LOS B**	**71**	**0.82**	**0.77**	**33.0**
BOTANY ST (N)										
7	L	191	2.1	0.492	16.7	LOS B	27	0.59	0.74	34.7
8	T	528	0.9	1.040	80.2	LOS F	224	1.00	1.81	16.0
9	R	55	5.5	1.040	86.8	LOS F	224	1.00	1.81	15.2
Approach		**773**	**1.6**	**1.040**	**65.1**	**LOS E**	**224**	**0.90**	**1.54**	**18.4**
HIGH ST (W)										
10	L	73	21.9	0.242	19.3	LOS B	21	0.72	0.75	40.9
11	T	375	10.1	1.210	208.6	LOS F	393	0.98	2.79	14.4
12	R	166	4.8	1.210	232.3	LOS F	393	1.00	2.98	13.4
Approach		**614**	**10.1**	**1.209**	**192.5**	**LOS F**	**393**	**0.95**	**2.60**	**15.3**
All Vehicles		**2574**	**4.6**	**1.210**	**95.7**	**LOS F**	**393**	**0.91**	**1.76**	**17.0**

Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	232	16.0	LOS B	0	0.80	0.80
P3	60	14.4	LOS B	0	0.76	0.76
P5	125	16.0	LOS B	0	0.80	0.80
P7	183	14.4	LOS B	0	0.76	0.76
All Peds	**600**	**15.4**	**LOS B**	**0**	**0.78**	**0.78**

Botany St./High St.

Future PM Peak 2015

Signalised - Fixed time **Cycle Time = 60 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	197	2.0	0.306	18.7	LOS B	37	0.69	0.77	34.5
2	T	529	0.4	1.058	104.6	LOS F	300	1.00	1.96	14.2
3	R	95	4.2	1.058	111.2	LOS F	300	1.00	1.96	13.6
Approach		**821**	**1.2**	**1.057**	**84.7**	**LOS F**	**300**	**0.93**	**1.68**	**16.4**
HIGH ST (E)										
4	L	57	8.8	0.262	19.6	LOS B	11	0.57	0.70	31.9
5	T	338	6.8	1.042	89.1	LOS F	190	1.00	1.68	15.8
6	R	84	0.0	1.041	95.5	LOS F	190	1.00	1.68	13.2
Approach		**479**	**5.8**	**1.042**	**82.0**	**LOS F**	**190**	**0.95**	**1.57**	**16.2**
BOTANY ST (N)										
7	L	83	0.0	0.229	16.0	LOS B	13	0.48	0.70	35.2
8	T	468	0.6	1.054	95.5	LOS F	238	0.99	1.78	14.1
9	R	64	7.8	1.054	103.1	LOS F	238	1.00	1.80	13.4
Approach		**615**	**1.3**	**1.054**	**85.6**	**LOS F**	**238**	**0.93**	**1.64**	**15.3**
HIGH ST (W)										
10	L	125	2.4	0.299	21.0	LOS B	27	0.73	0.75	40.1
11	T	407	5.2	1.107	143.9	LOS F	307	1.00	2.21	18.5
12	R	116	0.0	1.106	150.3	LOS F	307	1.00	2.21	18.0
Approach		**648**	**3.7**	**1.107**	**121.3**	**LOS F**	**307**	**0.95**	**1.93**	**20.5**
All Vehicles		**2563**	**2.7**	**1.107**	**93.7**	**LOS F**	**307**	**0.94**	**1.71**	**17.6**

Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	329	17.6	LOS B	0	0.77	0.77
P3	54	14.7	LOS B	0	0.70	0.70
P5	118	17.6	LOS B	0	0.77	0.77
P7	74	14.7	LOS B	0	0.70	0.70
All Peds	**575**	**17.0**	**LOS B**	**0**	**0.75**	**0.75**

Hospital Rd. / High St.

Future AM Peak 2015

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
HOSPITAL RD (S)										
1	L	28	7.1	0.039	11.4	LOS A	1	0.45	0.89	34.1
3	R	15	0.0	0.044	17.5	LOS B	1	0.73	1.00	31.0
Approach		**43**	**4.7**	**0.044**	**13.5**	**LOS A**	**1**	**0.55**	**0.93**	**33.0**
HIGH ST (E)										
4	L	52	0.0	0.028	5.6	LOS A	0	0.00	0.58	40.7
5	T	399	6.3	0.213	0.0	LOS A	0	0.00	0.00	50.0
Approach		**451**	**5.5**	**0.213**	**0.7**	**LOS A**		**0.00**	**0.07**	**48.8**
HIGH ST (W)										
11	T	436	10.6	0.388	3.0	LOS A	36	0.64	0.00	38.2
12	R	177	1.7	0.388	10.4	LOS A	36	0.64	0.83	26.2
Approach		**612**	**8.0**	**0.388**	**5.1**	**LOS A**	**36**	**0.64**	**0.24**	**34.4**
All Vehicles		**1106**	**6.9**	**0.388**	**3.6**	**Not Applicable**	**36**	**0.38**	**0.20**	**41.4**

Future AM Peak 2015

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
HOSPITAL RD (S)										
1	L	158	0.0	0.189	10.6	LOS A	7	0.44	0.92	34.3
3	R	38	0.0	0.091	15.6	LOS B	3	0.67	1.00	31.9
Approach		**196**	**0.0**	**0.189**	**11.6**	**LOS A**	**7**	**0.49**	**0.94**	**33.8**
HIGH ST (E)										
4	L	13	15.4	0.008	6.0	LOS A	0	0.00	0.58	40.7
5	T	318	9.7	0.173	0.0	LOS A	0	0.00	0.00	50.0
Approach		**331**	**10.0**	**0.173**	**0.2**	**LOS A**		**0.00**	**0.02**	**49.6**
HIGH ST (W)										
11	T	557	4.3	0.306	1.7	LOS A	23	0.53	0.00	40.2
12	R	16	0.0	0.308	9.1	LOS A	23	0.53	0.71	27.5
Approach		**573**	**4.2**	**0.306**	**1.9**	**LOS A**	**23**	**0.53**	**0.02**	**39.8**
All Vehicles		**1100**	**5.2**	**0.308**	**3.1**	**Not Applicable**	**23**	**0.36**	**0.18**	**40.5**

Barker St./Hospital Rd.

Future AM Peak 2015

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	679	1.0	0.423	5.4	LOS A	53	0.83	0.00	50.2
6	R	68	0.0	0.422	13.8	LOS A	53	0.83	1.05	43.4
Approach		**747**	**0.9**	**0.423**	**6.1**	**LOS A**	**53**	**0.83**	**0.10**	**49.5**
Hospital Road (N)										
7	L	29	0.0	0.040	12.6	LOS A	1	0.54	0.92	39.2
Approach		**29**	**0.0**	**0.040**	**12.6**	**LOS A**	**1**	**0.54**	**0.92**	**39.2**
Barker Street (W)										
10	L	31	0.0	0.316	8.2	LOS A	0	0.00	0.67	49.0
11	T	577	2.3	0.317	0.0	LOS A	0	0.00	0.00	60.0
Approach		**608**	**2.1**	**0.317**	**0.4**	**LOS A**		**0.00**	**0.03**	**59.3**
All Vehicles		**1384**	**1.4**	**0.423**	**3.8**	**Not Applicable**	**53**	**0.46**	**0.09**	**53.1**

Future PM Peak 2015

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	606	2.3	0.323	4.5	LOS A	36	0.76	0.00	50.9
6	R	6	0.0	0.316	12.9	LOS A	36	0.76	0.97	44.2
Approach		**613**	**2.3**	**0.323**	**4.6**	**LOS A**	**36**	**0.76**	**0.01**	**50.9**
Hospital Road (N)										
7	L	94	0.0	0.135	13.1	LOS A	5	0.57	0.98	38.9
Approach		**94**	**0.0**	**0.135**	**13.1**	**LOS A**	**5**	**0.57**	**0.98**	**38.9**
Barker Street (W)										
10	L	27	0.0	0.325	8.2	LOS A	0	0.00	0.67	49.0
11	T	601	0.8	0.324	0.0	LOS A	0	0.00	0.00	60.0
Approach		**628**	**0.8**	**0.324**	**0.4**	**LOS A**		**0.00**	**0.03**	**59.4**
All Vehicles		**1335**	**1.4**	**0.325**	**3.2**	**Not Applicable**	**36**	**0.39**	**0.09**	**53.4**

Barker St. / Young St.

Future AM Peak 2015

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Young Street (S)										
1	L	6	0.0	0.107	24.9	LOS B	3	0.84	0.94	31.2
3	R	13	0.0	0.107	25.2	LOS B	3	0.84	0.94	31.0
Approach		**19**	**0.0**	**0.107**	**25.1**	**LOS B**	**3**	**0.84**	**0.94**	**31.1**
Barker Street (E)										
4	L	11	0.0	0.379	8.2	LOS A	0	0.00	0.67	49.0
5	T	722	1.1	0.379	0.0	LOS A	0	0.00	0.00	60.0
Approach		**733**	**1.1**	**0.379**	**0.1**	**LOS A**		**0.00**	**0.01**	**59.8**
Barker Street (W)										
11	T	564	2.5	0.314	5.8	LOS A	39	0.83	0.00	50.2
12	R	15	0.0	0.312	14.3	LOS A	39	0.83	1.01	43.0
Approach		**580**	**2.4**	**0.314**	**6.1**	**LOS A**	**39**	**0.83**	**0.03**	**50.0**
All Vehicles		**1332**	**1.7**	**0.379**	**3.1**	**Not Applicable**	**39**	**0.37**	**0.03**	**54.5**

Future PM Peak 2015

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Young Street (S)										
1	L	12	0.0	0.082	18.6	LOS B	2	0.76	0.87	34.5
3	R	9	0.0	0.082	19.0	LOS B	2	0.76	0.92	34.2
Approach		**21**	**0.0**	**0.082**	**18.8**	**LOS B**	**2**	**0.76**	**0.89**	**34.4**
Barker Street (E)										
4	L	7	0.0	0.333	8.2	LOS A	0	0.00	0.67	49.0
5	T	652	1.4	0.341	0.0	LOS A	0	0.00	0.00	60.0
Approach		**658**	**1.4**	**0.341**	**0.1**	**LOS A**		**0.00**	**0.01**	**59.9**
Barker Street (W)										
11	T	615	0.8	0.331	5.0	LOS A	39	0.78	0.00	50.7
12	R	13	0.0	0.333	13.4	LOS A	39	0.78	0.99	43.7
Approach		**627**	**0.8**	**0.331**	**5.2**	**LOS A**	**39**	**0.78**	**0.02**	**50.5**
All Vehicles		**1306**	**1.1**	**0.341**	**2.8**	**Not Applicable**	**39**	**0.39**	**0.03**	**54.4**

Barker St./Easy St.

Future AM Peak 2015

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	512	1.6	0.690	6.4	LOS A	66	0.77	0.71	35.2
6	R	224	0.0	0.689	11.9	LOS A	66	0.77	0.79	34.3
Approach		**735**	**1.1**	**0.690**	**8.1**	**LOS A**	**66**	**0.77**	**0.73**	**34.9**
Easy Street (N)										
7	L	108	0.0	0.367	7.3	LOS A	21	0.65	0.71	35.6
9	R	217	0.0	0.367	10.4	LOS A	21	0.65	0.76	34.2
Approach		**325**	**0.0**	**0.367**	**9.4**	**LOS A**	**21**	**0.65**	**0.75**	**34.6**
Barker Street (W)										
10	L	240	0.0	0.566	7.1	LOS A	43	0.66	0.66	36.2
11	T	337	4.2	0.566	6.2	LOS A	43	0.66	0.63	36.6
12	R	25	0.0	0.568	12.0	LOS A	43	0.66	0.70	34.3
Approach		**602**	**2.3**	**0.566**	**6.8**	**LOS A**	**43**	**0.66**	**0.65**	**36.3**
All Vehicles		**1662**	**1.3**	**0.690**	**7.9**	**LOS A**	**66**	**0.71**	**0.71**	**35.4**

Future PM Peak 2015

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	366	3.8	0.508	9.0	LOS A	35	0.65	0.69	47.0
6	R	143	0.0	0.509	13.0	LOS A	35	0.65	0.75	44.2
Approach		**510**	**2.7**	**0.508**	**10.1**	**LOS A**	**35**	**0.65**	**0.71**	**46.2**
Easy Street (N)										
7	L	154	0.0	0.510	11.1	LOS A	35	0.80	0.90	39.4
9	R	239	0.0	0.511	14.1	LOS A	35	0.80	0.92	37.5
Approach		**393**	**0.0**	**0.510**	**12.9**	**LOS A**	**35**	**0.80**	**0.91**	**38.2**
Barker Street (W)										
10	L	173	1.2	0.577	8.9	LOS A	46	0.55	0.63	47.1
11	T	497	0.6	0.577	8.0	LOS A	46	0.55	0.60	47.6
12	R	24	0.0	0.571	13.7	LOS A	46	0.55	0.67	43.4
Approach		**694**	**0.7**	**0.577**	**8.4**	**LOS A**	**46**	**0.55**	**0.61**	**47.3**
All Vehicles		**1597**	**1.2**	**0.577**	**10.1**	**LOS A**	**46**	**0.65**	**0.71**	**44.4**

SCATES & SIDRA Results 2015 Future With Development

```
SCATES Program Version: 2004-001  Date: 28-NOV-08  Time:
Registered User Name. - PARSONS BRINCKERHOFF PTY LTD
Registered User No.   -  1014
Data File: AVOCA15D
AVOCA STREET
2015 WITH DEVELOPMENT
```

Avoca St / Belmore Rd / High St / Perouse Rd

```
              AM PEAK                    PM PEAK                    BUSINESS
 Ph   GT%  GT%       CL   CL   GT%  GT%       CL   CL   GT%  GT%       CL   CL
     CORD ISOL      CORD ISOL CORD ISOL      CORD ISOL CORD ISOL      CORD ISOL
  A  36.1 36.1       118  118 38.0 36.6        92   99 41.4 39.2        84   92
  B  20.9 20.9                31.2 31.8                29.4 27.7
  C  42.9 42.9                30.7 31.6                29.2 33.0
  D
  E
  F                 dlay dlay                dlay dlay                dlay dlay
  G                  7.5  7.5                 7.2  7.8                 3.7  4.1
 Seq      CAB  dlay   42   42      CAB  dlay   28   27      CAB  dlay   16   15
               Stps  3.3  3.3           Stps  2.6  2.5           Stps  1.8  1.6
Mode    1       DS  1.12 1.12    1       DS  0.89 0.89    1       DS  0.81 0.73
File = AVOCA15D               A     Bay  Bay  Slip Slip           Type
                                    Req  Act  Req  Act
TCS =  114                    1                10    0            L4C0
                              2      80    0   14    0
                              3                33   77
                              4
                                   Bays if all intersections are optimised
--------------------------------------------------------------------------------
```

Avoca St / Cuthill St

```
              AM PEAK                    PM PEAK                    BUSINESS
 Ph   GT%  GT%       CL   CL   GT%  GT%       CL   CL   GT%  GT%       CL   CL
     CORD ISOL      CORD ISOL CORD ISOL      CORD ISOL CORD ISOL      CORD ISOL
  A  50.4 48.1       118   40 58.2 54.8        92   46 53.3 51.7        84   43
  B  49.6 51.9                41.8 45.2                46.7 48.3
  C
  D
  E
  F                 dlay dlay                dlay dlay                dlay dlay
  G                  1.0  0.3                 1.0  0.5                 0.7  0.3
 Seq       AB  dlay   17    8       AB  dlay    9    6       AB  dlay    7    4
               Stps  1.8  2.0           Stps  1.3  1.4           Stps  1.0  1.1
Mode    1       DS  0.55 0.68    1       DS  0.39 0.46    1       DS  0.33 0.38
File = AVOCA15D               A     Bay  Bay  Slip Slip           Type
                                    Req  Act  Req  Act
TCS =  518                    1                                      T4
                              2
                              3
                              4                15    0
                                   Bays if all intersections are optimised
--------------------------------------------------------------------------------
```

Future With Development 2015

```
SCATES Program Version: 2004-001  Date: 28-NOV-08  Time:
Registered User Name. - PARSONS BRINCKERHOFF PTY LTD
Registered User No.   -  1014
Data File: AVOCA15D
AVOCA STREET
2015 WITH DEVELOPMENT
```

Avoca St / St Pauls St

	AM PEAK				PM PEAK				BUSINESS			
Ph	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL
A	78.9	78.9	118	118	72.8	79.2	92	120	70.2	79.2	84	120
B	21.1	21.1			27.2	20.8			29.8	20.8		
C												
D												
E												
F			dlay	dlay			dlay	dlay			dlay	dlay
G			0.3	0.3			0.4	0.6			0.2	0.2
Seq		AB	dlay	5	5	AB	dlay	4	3	AB	dlay	3	2
			Stps	0.9	0.9		Stps	0.8	0.6		Stps	0.6	0.4
Mode	1		DS	0.71	0.71	1		DS	0.67	0.61	1	DS	0.58	0.50

File = AVOCA15D

TCS = 3

A	Bay Req	Bay Act	Slip Req	Slip Act	Type
1			10	0	T4
2					
3	16	0			
4					

Bays if all intersections are optimised

Avoca St / Barker St

	AM PEAK				PM PEAK				BUSINESS			
Ph	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL
A	37.9	37.9	118	118	29.0	34.1	92	76	34.2	39.1	84	66
B	40.1	40.1			41.6	40.7			38.9	39.1		
C	22.1	22.1			29.4	25.3			26.9	21.9		
D												
E												
F			dlay	dlay			dlay	dlay			dlay	dlay
G			5.7	5.7			1.5	1.2			1.1	0.8
Seq		CAB	dlay	48	48	CAB	dlay	22	20	CAB	dlay	12	11
			Stps	3.1	3.1		Stps	2.2	2.2		Stps	1.4	1.5
Mode	1		DS	0.95	0.95	1		DS	0.83	0.99	1	DS	0.64	0.87

File = AVOCA15D

TCS = 4

A	Bay Req	Bay Act	Slip Req	Slip Act	Type
1	60	0	10	0	L2C0
2	48	0	24	0	
3			64	0	
4	12	0	10	0	

Bays if all intersections are optimised

Botany St./Barker St.

Future AM Peak 2015 ST2D

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	13	0.0	0.619	16.6	LOS B	47	0.98	1.12	35.7
2	T	179	2.8	0.605	15.5	LOS B	47	0.98	1.11	36.4
3	R	113	0.9	0.604	19.7	LOS B	47	0.98	1.03	34.2
Approach		**305**	**2.0**	**0.605**	**17.1**	**LOS B**	**47**	**0.98**	**1.08**	**35.5**
BARKER ST (E)										
4	L	66	1.5	0.917	19.8	LOS B	172	1.00	1.21	27.8
5	T	421	1.4	0.911	18.8	LOS B	172	1.00	1.21	28.5
6	R	420	1.4	0.911	23.0	LOS B	172	1.00	1.15	26.6
Approach		**907**	**1.4**	**0.911**	**20.8**	**LOS B**	**172**	**1.00**	**1.18**	**27.5**
BOTANY ST (N)										
7	L	219	3.7	0.608	9.8	LOS A	42	0.75	0.92	39.7
8	T	182	3.8	0.609	8.6	LOS A	42	0.75	0.89	40.8
9	R	143	3.5	0.609	12.8	LOS A	42	0.75	0.89	37.7
Approach		**544**	**3.7**	**0.608**	**10.2**	**LOS A**	**42**	**0.75**	**0.90**	**39.5**
BARKER ST (W)										
10	L	185	1.6	0.964	50.3	LOS D	208	1.00	1.99	22.5
11	T	441	0.9	0.963	49.4	LOS D	208	1.00	1.99	22.8
12	R	3	0.0	1.000	53.6	LOS D	208	1.00	1.92	22.2
Approach		**629**	**1.1**	**0.964**	**49.7**	**LOS D**	**208**	**1.00**	**1.99**	**22.7**
All Vehicles		**2385**	**1.9**	**1.000**	**25.5**	**LOS B**	**208**	**0.94**	**1.32**	**28.8**

Botany St./Barker St.

Future PM Peak 2015 ST2D

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	12	0.0	0.333	9.1	LOS A	17	0.72	0.84	41.0
2	T	176	1.1	0.330	8.0	LOS A	17	0.72	0.81	41.6
3	R	60	0.0	0.330	12.2	LOS A	17	0.72	0.81	38.9
Approach		**248**	**0.8**	**0.329**	**9.0**	**LOS A**	**17**	**0.72**	**0.81**	**40.9**
BARKER ST (E)										
4	L	60	0.0	0.732	13.5	LOS A	75	0.92	1.03	32.3
5	T	342	0.3	0.729	12.5	LOS A	75	0.92	1.03	33.2
6	R	215	5.1	0.729	16.9	LOS B	75	0.92	0.98	30.5
Approach		**617**	**1.9**	**0.729**	**14.1**	**LOS A**	**75**	**0.92**	**1.01**	**32.1**
BOTANY ST (N)										
7	L	296	1.7	0.701	9.3	LOS A	54	0.71	0.86	40.1
8	T	265	0.4	0.701	8.0	LOS A	54	0.71	0.82	41.0
9	R	176	1.1	0.701	12.3	LOS A	54	0.71	0.85	38.1
Approach		**737**	**1.1**	**0.702**	**9.6**	**LOS A**	**54**	**0.71**	**0.84**	**39.9**
BARKER ST (W)										
10	L	181	0.0	0.603	11.1	LOS A	48	0.81	0.90	39.4
11	T	331	0.0	0.603	10.2	LOS A	48	0.81	0.89	40.1
12	R	13	0.0	0.591	14.4	LOS A	48	0.81	0.87	37.4
Approach		**525**	**0.0**	**0.603**	**10.6**	**LOS A**	**48**	**0.81**	**0.89**	**39.8**
All Vehicles		**2127**	**1.0**	**0.732**	**11.1**	**LOS A**	**75**	**0.80**	**0.90**	**38.1**

Botany St./High St.

Future AM Peak 2015 ST2D

Signalised - Fixed time **Cycle Time = 50 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	162	3.1	0.426	17.9	LOS B	28	0.72	0.76	35.0
2	T	548	0.9	1.098	129.9	LOS F	312	1.00	2.33	12.1
3	R	59	10.2	1.099	136.6	LOS F	312	1.00	2.33	11.7
Approach		**769**	**2.1**	**1.098**	**106.8**	**LOS F**	**312**	**0.94**	**2.00**	**14.0**
HIGH ST (E)										
4	L	61	8.2	0.243	17.8	LOS B	10	0.58	0.70	33.0
5	T	338	6.8	0.702	17.2	LOS B	73	0.87	0.79	33.2
6	R	43	0.0	0.703	23.7	LOS B	73	0.87	0.87	29.6
Approach		**442**	**6.3**	**0.702**	**18.0**	**LOS B**	**73**	**0.83**	**0.79**	**32.8**
BOTANY ST (N)										
7	L	195	2.1	0.506	16.8	LOS B	28	0.60	0.74	34.7
8	T	545	0.9	1.069	101.5	LOS F	263	1.00	2.02	13.5
9	R	56	5.4	1.069	108.1	LOS F	263	1.00	2.02	13.0
Approach		**796**	**1.5**	**1.069**	**81.2**	**LOS F**	**263**	**0.90**	**1.71**	**15.9**
HIGH ST (W)										
10	L	74	21.6	0.248	19.3	LOS B	22	0.73	0.75	40.9
11	T	383	10.2	1.241	233.6	LOS F	432	0.98	2.95	13.3
12	R	169	4.7	1.241	260.5	LOS F	432	1.00	3.17	12.3
Approach		**626**	**10.1**	**1.241**	**215.5**	**LOS F**	**432**	**0.95**	**2.75**	**14.1**
All Vehicles		**2633**	**4.5**	**1.241**	**110.0**	**LOS F**	**432**	**0.91**	**1.89**	**15.5**

Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	232	16.0	LOS B	0	0.80	0.80
P3	60	14.4	LOS B	0	0.76	0.76
P5	125	16.0	LOS B	0	0.80	0.80
P7	183	14.4	LOS B	0	0.76	0.76
All Peds	**600**	**15.4**	**LOS B**	**0**	**0.78**	**0.78**

Botany St./High St.

Future PM Peak 2015 ST2D

Signalised - Fixed time **Cycle Time = 60 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	201	2.0	0.312	18.7	LOS B	38	0.69	0.77	34.5
2	T	546	0.4	1.087	127.3	LOS F	345	1.00	2.17	12.2
3	R	97	4.1	1.087	133.9	LOS F	345	1.00	2.17	11.8
Approach		**844**	**1.2**	**1.087**	**102.2**	**LOS F**	**345**	**0.93**	**1.83**	**14.4**
HIGH ST (E)										
4	L	58	8.6	0.267	19.6	LOS B	11	0.57	0.70	31.9
5	T	344	6.7	1.066	106.8	LOS F	213	1.00	1.82	13.9
6	R	86	0.0	1.066	113.3	LOS F	213	1.00	1.82	11.6
Approach		**488**	**5.7**	**1.066**	**97.6**	**LOS F**	**213**	**0.95**	**1.69**	**14.3**
BOTANY ST (N)										
7	L	85	0.0	0.234	16.0	LOS B	13	0.48	0.70	35.2
8	T	478	0.6	1.076	112.4	LOS F	266	0.99	1.92	12.6
9	R	65	7.7	1.076	120.1	LOS F	266	1.00	1.94	12.0
Approach		**628**	**1.3**	**1.076**	**100.1**	**LOS F**	**266**	**0.93**	**1.76**	**13.7**
HIGH ST (W)										
10	L	127	2.4	0.304	21.1	LOS B	27	0.73	0.76	40.1
11	T	416	5.0	1.129	161.6	LOS F	336	1.00	2.35	17.2
12	R	118	0.0	1.129	168.0	LOS F	336	1.00	2.35	16.8
Approach		**661**	**3.6**	**1.129**	**135.7**	**LOS F**	**336**	**0.95**	**2.04**	**19.2**
All Vehicles		**2621**	**2.7**	**1.129**	**109.3**	**LOS F**	**345**	**0.94**	**1.84**	**15.9**

Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	329	17.6	LOS B	0	0.77	0.77
P3	54	14.7	LOS B	0	0.70	0.70
P5	118	17.6	LOS B	0	0.77	0.77
P7	74	14.7	LOS B	0	0.70	0.70
All Peds	**575**	**17.0**	**LOS B**	**0**	**0.75**	**0.75**

Hospital Rd. / High St.

Future AM Peak 2015 ST2D

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
HOSPITAL RD (S)										
1	L	29	6.9	0.041	11.5	LOS A	1	0.46	0.90	34.0
3	R	16	0.0	0.049	18.0	LOS B	1	0.74	1.00	30.8
Approach		**45**	**4.4**	**0.049**	**13.8**	**LOS A**	**1**	**0.56**	**0.93**	**32.8**
HIGH ST (E)										
4	L	65	0.0	0.035	5.6	LOS A	0	0.00	0.58	40.7
5	T	407	6.4	0.217	0.0	LOS A	0	0.00	0.00	50.0
Approach		**472**	**5.5**	**0.217**	**0.8**	**LOS A**		**0.00**	**0.08**	**48.5**
HIGH ST (W)										
11	T	445	10.6	0.399	3.2	LOS A	38	0.66	0.00	37.8
12	R	180	1.7	0.400	10.6	LOS A	38	0.66	0.86	25.8
Approach		**625**	**8.0**	**0.400**	**5.4**	**LOS A**	**38**	**0.66**	**0.25**	**34.1**
All Vehicles		**1142**	**6.8**	**0.400**	**3.8**	**Not Applicable**	**38**	**0.38**	**0.21**	**41.2**

Future PM Peak 2015 ST2D

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
HOSPITAL RD (S)										
1	L	161	0.0	0.194	10.7	LOS A	7	0.44	0.92	34.3
3	R	49	0.0	0.119	15.9	LOS B	4	0.69	1.00	31.8
Approach		**210**	**0.0**	**0.193**	**11.9**	**LOS A**	**7**	**0.50**	**0.94**	**33.7**
HIGH ST (E)										
4	L	14	14.3	0.008	5.9	LOS A	0	0.00	0.58	40.7
5	T	319	10.0	0.174	0.0	LOS A	0	0.00	0.00	50.0
Approach		**333**	**10.2**	**0.174**	**0.2**	**LOS A**		**0.00**	**0.02**	**49.5**
HIGH ST (W)										
11	T	568	4.2	0.311	1.7	LOS A	24	0.54	0.00	40.1
12	R	16	0.0	0.314	9.1	LOS A	24	0.54	0.71	27.4
Approach		**584**	**4.1**	**0.311**	**1.9**	**LOS A**	**24**	**0.54**	**0.02**	**39.7**
All Vehicles		**1127**	**5.1**	**0.314**	**3.3**	**Not Applicable**	**24**	**0.37**	**0.19**	**40.3**

Barker St./Hospital Rd.

Future AM Peak 2015 ST2D

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	696	1.0	0.459	6.8	LOS A	64	0.97	0.00	48.9
6	R	86	0.0	0.460	15.2	LOS B	64	0.97	1.12	42.2
Approach		**781**	**0.9**	**0.459**	**7.7**	**LOS A**	**64**	**0.97**	**0.12**	**48.0**
Hospital Road (N)										
7	L	34	0.0	0.050	13.0	LOS A	2	0.56	0.94	38.9
Approach		**34**	**0.0**	**0.050**	**13.0**	**LOS A**	**2**	**0.56**	**0.94**	**38.9**
Barker Street (W)										
10	L	84	0.0	0.351	8.2	LOS A	0	0.00	0.67	49.0
11	T	588	2.2	0.352	0.0	LOS A	0	0.00	0.00	60.0
Approach		**673**	**1.9**	**0.352**	**1.0**	**LOS A**		**0.00**	**0.08**	**58.4**
All Vehicles		**1488**	**1.3**	**0.460**	**4.8**	**Not Applicable**	**64**	**0.52**	**0.12**	**51.9**

Future PM Peak 2015 ST2D

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	616	2.3	0.328	4.8	LOS A	38	0.77	0.00	50.8
6	R	7	0.0	0.333	13.2	LOS A	38	0.77	0.98	44.0
Approach		**623**	**2.2**	**0.328**	**4.9**	**LOS A**	**38**	**0.77**	**0.01**	**50.7**
Hospital Road (N)										
7	L	84	0.0	0.124	13.2	LOS A	4	0.57	0.99	38.8
Approach		**84**	**0.0**	**0.124**	**13.2**	**LOS A**	**4**	**0.57**	**0.99**	**38.8**
Barker Street (W)										
10	L	31	0.0	0.333	8.2	LOS A	0	0.00	0.67	49.0
11	T	614	0.8	0.333	0.0	LOS A	0	0.00	0.00	60.0
Approach		**644**	**0.8**	**0.333**	**0.4**	**LOS A**		**0.00**	**0.03**	**59.4**
All Vehicles		**1351**	**1.4**	**0.333**	**3.3**	**Not Applicable**	**38**	**0.39**	**0.08**	**53.5**

Barker St. / Young St.

Future AM Peak 2015 ST2D

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Young Street (S)										
1	L	6	0.0	0.118	26.9	LOS B	3	0.86	0.94	30.3
3	R	13	0.0	0.118	27.2	LOS B	3	0.86	0.95	30.1
Approach		**19**	**0.0**	**0.118**	**27.1**	**LOS B**	**3**	**0.86**	**0.95**	**30.2**
Barker Street (E)										
4	L	11	0.0	0.393	8.2	LOS A	0	0.00	0.67	49.0
5	T	754	1.1	0.395	0.0	LOS A	0	0.00	0.00	60.0
Approach		**764**	**1.0**	**0.395**	**0.1**	**LOS A**		**0.00**	**0.01**	**59.8**
Barker Street (W)										
11	T	577	2.4	0.321	6.4	LOS A	42	0.87	0.00	49.8
12	R	15	0.0	0.319	14.9	LOS B	42	0.87	1.03	42.5
Approach		**592**	**2.4**	**0.321**	**6.6**	**LOS A**	**42**	**0.87**	**0.03**	**49.6**
All Vehicles		**1375**	**1.6**	**0.395**	**3.3**	**Not Applicable**	**42**	**0.38**	**0.03**	**54.3**

Future PM Peak 2015 ST2D

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Young Street (S)										
1	L	12	0.0	0.088	19.8	LOS B	2	0.78	0.89	33.9
3	R	9	0.0	0.088	20.1	LOS B	2	0.78	0.92	33.6
Approach		**21**	**0.0**	**0.088**	**19.9**	**LOS B**	**2**	**0.78**	**0.90**	**33.7**
Barker Street (E)										
4	L	7	0.0	0.350	8.2	LOS A	0	0.00	0.67	49.0
5	T	666	1.4	0.348	0.0	LOS A	0	0.00	0.00	60.0
Approach		**673**	**1.3**	**0.348**	**0.1**	**LOS A**		**0.00**	**0.01**	**59.9**
Barker Street (W)										
11	T	641	0.8	0.346	5.4	LOS A	43	0.80	0.00	50.5
12	R	13	0.0	0.342	13.8	LOS A	43	0.80	1.01	43.4
Approach		**654**	**0.8**	**0.346**	**5.5**	**LOS A**	**43**	**0.80**	**0.02**	**50.3**
All Vehicles		**1348**	**1.0**	**0.350**	**3.0**	**Not Applicable**	**43**	**0.40**	**0.03**	**54.2**

Barker St./Easy St.

Future AM Peak 2015 ST2D

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	539	1.5	0.724	7.1	LOS A	76	0.81	0.76	35.0
6	R	228	0.0	0.724	12.7	LOS A	76	0.81	0.82	34.0
Approach		**767**	**1.0**	**0.725**	**8.8**	**LOS A**	**76**	**0.81**	**0.78**	**34.6**
Easy Street (N)										
7	L	111	0.0	0.379	7.4	LOS A	22	0.66	0.72	35.6
9	R	221	0.0	0.379	10.5	LOS A	22	0.66	0.77	34.1
Approach		**332**	**0.0**	**0.379**	**9.5**	**LOS A**	**22**	**0.66**	**0.76**	**34.6**
Barker Street (W)										
10	L	245	0.0	0.585	7.2	LOS A	45	0.68	0.67	36.2
11	T	344	4.1	0.585	6.3	LOS A	45	0.68	0.64	36.5
12	R	28	0.0	0.583	12.1	LOS A	45	0.68	0.70	34.3
Approach		**618**	**2.3**	**0.585**	**6.9**	**LOS A**	**45**	**0.68**	**0.66**	**36.2**
All Vehicles		**1717**	**1.3**	**0.724**	**8.2**	**LOS A**	**76**	**0.74**	**0.73**	**35.2**

Future PM Peak 2015 ST2D

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	375	3.7	0.525	9.1	LOS A	37	0.68	0.70	46.9
6	R	146	0.0	0.525	13.1	LOS A	37	0.68	0.76	44.2
Approach		**521**	**2.7**	**0.525**	**10.2**	**LOS A**	**37**	**0.68**	**0.72**	**46.1**
Easy Street (N)										
7	L	157	0.0	0.538	11.9	LOS A	39	0.83	0.94	38.8
9	R	244	0.0	0.537	14.9	LOS B	39	0.83	0.96	37.0
Approach		**401**	**0.0**	**0.538**	**13.7**	**LOS A**	**39**	**0.83**	**0.95**	**37.7**
Barker Street (W)										
10	L	176	1.1	0.605	9.0	LOS A	50	0.58	0.63	46.9
11	T	521	0.6	0.604	8.1	LOS A	50	0.58	0.60	47.4
12	R	28	0.0	0.609	13.8	LOS A	50	0.58	0.67	43.3
Approach		**725**	**0.7**	**0.604**	**8.5**	**LOS A**	**50**	**0.58**	**0.61**	**47.1**
All Vehicles		**1647**	**1.2**	**0.609**	**10.3**	**LOS A**	**50**	**0.67**	**0.73**	**44.2**

SCATES & SIDRA Results 2018 Base Future

SCATES Program Version: 2004-001 Date: 28-NOV-08 Time:
Registered User Name. - PARSONS BRINCKERHOFF PTY LTD
Registered User No. - 1014
Data File: AVOCA18
AVOCA STREET
2018 BASE FUTURE

Avoca St / Belmore Rd / High St / Perouse Rd

	AM PEAK				PM PEAK				BUSINESS			
Ph	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL
A	35.9	35.9	119	119	38.0	38.0	92	92	41.4	39.2	84	92
B	20.8	20.8			31.1	31.1			29.4	27.7		
C	43.3	43.3			30.9	30.9			29.2	33.0		
D												
E												
F			dlay	dlay			dlay	dlay			dlay	dlay
G			7.6	7.6			7.3	7.3			3.7	4.1
Seq	CAB	dlay	43	43	CAB	dlay	28	28	CAB	dlay	16	15
		Stps	3.3	3.3		Stps	2.6	2.6		Stps	1.8	1.6
Mode	1	DS	1.12	1.12	1	DS	0.89	0.89	1	DS	0.81	0.73

File = AVOCA18

TCS = 114

A	Bay Req	Bay Act	Slip Req	Slip Act	Type
1			10	0	L4C0
2	79	0	14	0	
3			32	77	
4					

Bays if all intersections are optimised

Avoca St / Cuthill St

	AM PEAK				PM PEAK				BUSINESS			
Ph	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL
A	50.6	48.1	119	40	58.2	54.8	92	46	53.3	51.7	84	43
B	49.4	51.9			41.8	45.2			46.7	48.3		
C												
D												
E												
F			dlay	dlay			dlay	dlay			dlay	dlay
G			1.0	0.3			1.0	0.5			0.7	0.3
Seq	AB	dlay	18	8	AB	dlay	9	6	AB	dlay	7	4
		Stps	1.8	2.0		Stps	1.3	1.4		Stps	1.0	1.1
Mode	1	DS	0.55	0.68	1	DS	0.40	0.46	1	DS	0.33	0.38

File = AVOCA18

TCS = 518

A	Bay Req	Bay Act	Slip Req	Slip Act	Type
1					T4
2					
3					
4			15	0	

Bays if all intersections are optimised

Future Base 2018

SCATES Program Version: 2004-001 Date: 28-NOV-08 Time:
Registered User Name. - PARSONS BRINCKERHOFF PTY LTD
Registered User No.   - 1014
Data File: AVOCA18
AVOCA STREET
2018 BASE FUTURE

Avoca St / St Pauls St

	AM PEAK				PM PEAK				BUSINESS			
Ph	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL
A	79.0	79.0	119	119	72.8	79.2	92	120	70.2	79.2	84	120
B	21.0	21.0			27.2	20.8			29.8	20.8		
C												
D												
E												
F			dlay	dlay			dlay	dlay			dlay	dlay
G			0.3	0.3			0.4	0.6			0.2	0.2
Seq		AB	dlay	5	5	AB	dlay	4	3	AB	dlay	3	2
			Stps	0.9	0.9		Stps	0.8	0.6		Stps	0.6	0.4
Mode	1		DS	0.72	0.72	1		DS	0.68	0.61	1	DS	0.58	0.50

File = AVOCA18

A	Bay Req	Bay Act	Slip Req	Slip Act	Type
1			10	0	T4
2					
3	16	0			
4					

TCS = 3

Bays if all intersections are optimised

Avoca St / Barker St

	AM PEAK				PM PEAK				BUSINESS			
Ph	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL
A	37.9	37.9	119	119	29.2	34.5	92	75	34.2	39.1	84	66
B	40.2	40.2			41.3	40.2			39.0	39.1		
C	21.9	21.9			29.5	25.3			26.8	21.9		
D												
E												
F			dlay	dlay			dlay	dlay			dlay	dlay
G			5.8	5.8			1.5	1.2			1.1	0.8
Seq		CAB	dlay	49	49	CAB	dlay	22	41	CAB	dlay	12	11
			Stps	3.1	3.1		Stps	2.2	2.6		Stps	1.4	1.5
Mode	1		DS	0.96	0.96	1		DS	0.83	2.34	1	DS	0.65	0.88

File = AVOCA18

A	Bay Req	Bay Act	Slip Req	Slip Act	Type
1	58	0	10	0	L2C0
2	48	0	24	0	
3			64	0	
4	12	0	10	0	

TCS = 4

Bays if all intersections are optimised

Botany St./Barker St.

Future AM Peak 2018

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	13	0.0	0.591	16.8	LOS B	47	0.98	1.12	35.6
2	T	181	2.8	0.603	15.7	LOS B	47	0.98	1.11	36.3
3	R	107	0.9	0.605	19.9	LOS B	47	0.98	1.04	34.1
Approach		**301**	**2.0**	**0.604**	**17.2**	**LOS B**	**47**	**0.98**	**1.09**	**35.5**
BARKER ST (E)										
4	L	67	1.5	0.918	20.7	LOS B	178	1.00	1.24	27.2
5	T	423	1.4	0.918	19.7	LOS B	178	1.00	1.24	27.9
6	R	424	1.4	0.918	23.9	LOS B	178	1.00	1.18	26.1
Approach		**914**	**1.4**	**0.918**	**21.7**	**LOS B**	**178**	**1.00**	**1.21**	**27.0**
BOTANY ST (N)										
7	L	215	3.7	0.583	9.3	LOS A	38	0.71	0.87	40.2
8	T	184	3.8	0.584	8.0	LOS A	38	0.71	0.84	41.0
9	R	144	3.5	0.583	12.2	LOS A	38	0.71	0.86	38.2
Approach		**542**	**3.7**	**0.583**	**9.6**	**LOS A**	**38**	**0.71**	**0.86**	**39.9**
BARKER ST (W)										
10	L	186	1.6	0.912	36.4	LOS C	154	1.00	1.67	26.6
11	T	404	1.0	0.910	35.5	LOS C	154	1.00	1.67	26.9
12	R	3	0.0	1.000	39.7	LOS C	154	1.00	1.59	25.9
Approach		**593**	**1.2**	**0.911**	**35.8**	**LOS C**	**154**	**1.00**	**1.67**	**26.8**
All Vehicles		**2350**	**2.0**	**1.000**	**21.9**	**LOS B**	**178**	**0.93**	**1.23**	**30.6**

Botany St./Barker St.

Future PM Peak 2018

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	12	0.0	0.316	8.9	LOS A	16	0.69	0.82	41.2
2	T	178	1.1	0.319	7.7	LOS A	16	0.69	0.78	41.7
3	R	61	0.0	0.319	12.0	LOS A	16	0.69	0.80	39.1
Approach		**251**	**0.8**	**0.319**	**8.8**	**LOS A**	**16**	**0.69**	**0.79**	**41.0**
BARKER ST (E)										
4	L	56	0.0	0.691	12.6	LOS A	66	0.89	0.99	33.1
5	T	311	0.3	0.689	11.6	LOS A	66	0.89	0.98	34.0
6	R	212	5.2	0.688	16.0	LOS B	66	0.89	0.94	31.1
Approach		**578**	**2.1**	**0.689**	**13.3**	**LOS A**	**66**	**0.89**	**0.97**	**32.8**
BOTANY ST (N)										
7	L	298	1.7	0.708	9.4	LOS A	55	0.72	0.86	40.0
8	T	267	0.4	0.708	8.1	LOS A	55	0.72	0.83	40.9
9	R	178	1.1	0.709	12.4	LOS A	55	0.72	0.86	38.0
Approach		**743**	**1.1**	**0.708**	**9.7**	**LOS A**	**55**	**0.72**	**0.85**	**39.8**
BARKER ST (W)										
10	L	182	0.0	0.605	11.1	LOS A	48	0.81	0.90	39.4
11	T	332	0.0	0.604	10.2	LOS A	48	0.81	0.89	40.1
12	R	13	0.0	0.591	14.4	LOS A	48	0.81	0.87	37.4
Approach		**527**	**0.0**	**0.604**	**10.6**	**LOS A**	**48**	**0.81**	**0.89**	**39.8**
All Vehicles		**2099**	**1.0**	**0.709**	**10.8**	**LOS A**	**66**	**0.78**	**0.89**	**38.4**

Botany St./High St.

Future AM Peak 2018

Signalised - Fixed time **Cycle Time = 50 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	163	3.1	0.429	17.9	LOS B	29	0.72	0.76	35.0
2	T	553	0.9	1.103	134.1	LOS F	321	1.00	2.37	11.8
3	R	59	10.2	1.103	140.8	LOS F	321	1.00	2.37	11.4
Approach		**774**	**2.1**	**1.103**	**110.2**	**LOS F**	**321**	**0.94**	**2.03**	**13.6**
HIGH ST (E)										
4	L	62	8.1	0.247	17.8	LOS B	10	0.58	0.70	33.0
5	T	342	7.0	0.709	17.4	LOS B	75	0.87	0.80	33.1
6	R	43	0.0	0.709	23.8	LOS B	75	0.87	0.88	29.5
Approach		**447**	**6.5**	**0.709**	**18.1**	**LOS B**	**75**	**0.83**	**0.79**	**32.7**
BOTANY ST (N)										
7	L	196	2.0	0.509	16.8	LOS B	28	0.60	0.74	34.7
8	T	544	0.9	1.097	124.2	LOS F	297	1.00	2.23	11.6
9	R	56	5.4	1.097	130.8	LOS F	297	1.00	2.23	11.2
Approach		**796**	**1.5**	**1.097**	**98.2**	**LOS F**	**297**	**0.90**	**1.86**	**13.9**
HIGH ST (W)										
10	L	75	21.3	0.252	19.3	LOS B	22	0.73	0.75	40.9
11	T	386	10.1	1.260	248.7	LOS F	453	0.98	3.05	12.7
12	R	172	4.7	1.261	277.3	LOS F	453	1.00	3.28	11.7
Approach		**632**	**10.0**	**1.260**	**229.2**	**LOS F**	**453**	**0.95**	**2.84**	**13.5**
All Vehicles		**2649**	**4.5**	**1.261**	**119.4**	**LOS F**	**453**	**0.91**	**1.96**	**14.6**

Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	238	16.0	LOS B	0	0.80	0.80
P3	62	14.4	LOS B	0	0.76	0.76
P5	129	16.0	LOS B	0	0.80	0.80
P7	188	14.4	LOS B	0	0.76	0.76
All Peds	**617**	**15.4**	**LOS B**	**0**	**0.78**	**0.78**

Botany St./High St.

Future PM Peak 2018

Signalised - Fixed time **Cycle Time = 60 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	203	2.0	0.315	18.7	LOS B	38	0.70	0.77	34.5
2	T	545	0.4	1.091	130.0	LOS F	349	1.00	2.19	12.1
3	R	98	4.1	1.091	136.5	LOS F	349	1.00	2.19	11.7
Approach		**846**	**1.2**	**1.091**	**104.0**	**LOS F**	**349**	**0.93**	**1.85**	**14.2**
HIGH ST (E)										
4	L	58	8.6	0.267	19.6	LOS B	11	0.57	0.70	31.9
5	T	348	6.9	1.075	113.6	LOS F	222	1.00	1.87	13.3
6	R	86	0.0	1.075	120.1	LOS F	222	1.00	1.87	11.1
Approach		**492**	**5.9**	**1.075**	**103.7**	**LOS F**	**222**	**0.95**	**1.74**	**13.7**
BOTANY ST (N)										
7	L	85	0.0	0.237	16.0	LOS B	13	0.48	0.70	35.2
8	T	482	0.6	1.088	121.8	LOS F	281	0.99	2.00	11.8
9	R	66	7.6	1.089	129.8	LOS F	281	1.00	2.02	11.3
Approach		**633**	**1.3**	**1.088**	**108.4**	**LOS F**	**281**	**0.93**	**1.83**	**12.9**
HIGH ST (W)										
10	L	129	2.3	0.309	21.1	LOS B	27	0.73	0.76	40.1
11	T	420	5.2	1.140	171.3	LOS F	351	1.00	2.42	16.5
12	R	119	0.0	1.141	177.8	LOS F	351	1.00	2.42	16.1
Approach		**668**	**3.7**	**1.140**	**143.5**	**LOS F**	**351**	**0.95**	**2.10**	**18.5**
All Vehicles		**2639**	**2.7**	**1.141**	**115.0**	**LOS F**	**351**	**0.94**	**1.89**	**15.4**

Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	339	17.6	LOS B	0	0.77	0.77
P3	55	14.7	LOS B	0	0.70	0.70
P5	121	17.6	LOS B	0	0.77	0.77
P7	76	14.7	LOS B	0	0.70	0.70
All Peds	**591**	**17.0**	**LOS B**	**0**	**0.75**	**0.75**

Hospital Rd. / High St.

Future AM Peak 2018

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
HOSPITAL RD (S)										
1	L	29	6.9	0.040	11.5	LOS A	1	0.46	0.90	34.0
3	R	15	0.0	0.046	18.1	LOS B	1	0.74	1.00	30.8
Approach		**44**	**4.5**	**0.046**	**13.7**	**LOS A**	**1**	**0.56**	**0.93**	**32.9**
HIGH ST (E)										
4	L	53	0.0	0.029	5.6	LOS A	0	0.00	0.58	40.7
5	T	412	6.3	0.219	0.0	LOS A	0	0.00	0.00	50.0
Approach		**464**	**5.6**	**0.219**	**0.6**	**LOS A**		**0.00**	**0.07**	**48.8**
HIGH ST (W)										
11	T	448	10.5	0.401	3.2	LOS A	39	0.66	0.00	37.9
12	R	182	1.6	0.402	10.6	LOS A	39	0.66	0.85	25.9
Approach		**630**	**7.9**	**0.402**	**5.3**	**LOS A**	**39**	**0.66**	**0.25**	**34.1**
All Vehicles		**1138**	**6.9**	**0.402**	**3.7**	**Not Applicable**	**39**	**0.39**	**0.20**	**41.2**

Future PM Peak 2018

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
HOSPITAL RD (S)										
1	L	163	0.0	0.198	10.7	LOS A	7	0.45	0.93	34.3
3	R	39	0.0	0.097	16.0	LOS B	3	0.69	1.00	31.7
Approach		**202**	**0.0**	**0.198**	**11.8**	**LOS A**	**7**	**0.50**	**0.94**	**33.7**
HIGH ST (E)										
4	L	13	15.4	0.008	6.0	LOS A	0	0.00	0.58	40.7
5	T	327	9.8	0.179	0.0	LOS A	0	0.00	0.00	50.0
Approach		**341**	**10.0**	**0.179**	**0.2**	**LOS A**		**0.00**	**0.02**	**49.6**
HIGH ST (W)										
11	T	574	4.4	0.314	1.8	LOS A	24	0.55	0.00	39.9
12	R	16	0.0	0.314	9.1	LOS A	24	0.55	0.71	27.4
Approach		**589**	**4.2**	**0.314**	**2.0**	**LOS A**	**24**	**0.55**	**0.02**	**39.5**
All Vehicles		**1132**	**5.2**	**0.314**	**3.2**	**Not Applicable**	**24**	**0.37**	**0.18**	**40.4**

Barker St./Hospital Rd.

Future AM Peak 2018

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	700	1.0	0.439	5.8	LOS A	58	0.88	0.00	49.7
6	R	71	0.0	0.438	14.2	LOS A	58	0.88	1.08	43.0
Approach		**771**	**0.9**	**0.439**	**6.6**	**LOS A**	**58**	**0.88**	**0.10**	**49.1**
Hospital Road (N)										
7	L	31	0.0	0.044	12.7	LOS A	1	0.55	0.93	39.1
Approach		**31**	**0.0**	**0.044**	**12.7**	**LOS A**	**1**	**0.55**	**0.93**	**39.1**
Barker Street (W)										
10	L	32	0.0	0.327	8.2	LOS A	0	0.00	0.67	49.0
11	T	594	2.2	0.326	0.0	LOS A	0	0.00	0.00	60.0
Approach		**626**	**2.1**	**0.326**	**0.4**	**LOS A**		**0.00**	**0.03**	**59.3**
All Vehicles		**1428**	**1.4**	**0.439**	**4.0**	**Not Applicable**	**58**	**0.48**	**0.09**	**52.8**

Future PM Peak 2018

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	646	2.2	0.343	5.0	LOS A	42	0.79	0.00	50.6
6	R	6	0.0	0.353	13.4	LOS A	42	0.79	1.00	43.8
Approach		**653**	**2.1**	**0.343**	**5.1**	**LOS A**	**42**	**0.79**	**0.01**	**50.6**
Hospital Road (N)										
7	L	97	0.0	0.144	13.3	LOS A	5	0.58	1.00	38.7
Approach		**97**	**0.0**	**0.144**	**13.3**	**LOS A**	**5**	**0.58**	**1.00**	**38.7**
Barker Street (W)										
10	L	28	0.0	0.333	8.2	LOS A	0	0.00	0.67	49.0
11	T	619	0.8	0.334	0.0	LOS A	0	0.00	0.00	60.0
Approach		**647**	**0.8**	**0.334**	**0.4**	**LOS A**		**0.00**	**0.03**	**59.4**
All Vehicles		**1397**	**1.4**	**0.353**	**3.5**	**Not Applicable**	**42**	**0.41**	**0.09**	**53.2**

Barker St. / Young St.

Future AM Peak 2018

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Young Street (S)										
1	L	6	0.0	0.115	26.6	LOS B	3	0.85	0.94	30.5
3	R	13	0.0	0.116	26.9	LOS B	3	0.85	0.95	30.3
Approach		**19**	**0.0**	**0.116**	**26.8**	**LOS B**	**3**	**0.85**	**0.95**	**30.3**
Barker Street (E)										
4	L	11	0.0	0.393	8.2	LOS A	0	0.00	0.67	49.0
5	T	743	1.1	0.390	0.0	LOS A	0	0.00	0.00	60.0
Approach		**754**	**1.1**	**0.390**	**0.1**	**LOS A**		**0.00**	**0.01**	**59.8**
Barker Street (W)										
11	T	581	2.4	0.323	6.3	LOS A	42	0.86	0.00	49.9
12	R	15	0.0	0.319	14.7	LOS B	42	0.86	1.02	42.6
Approach		**596**	**2.3**	**0.323**	**6.5**	**LOS A**	**42**	**0.86**	**0.03**	**49.7**
All Vehicles		**1369**	**1.6**	**0.393**	**3.3**	**Not Applicable**	**42**	**0.39**	**0.03**	**54.3**

Future PM Peak 2018

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Young Street (S)										
1	L	12	0.0	0.088	19.7	LOS B	2	0.78	0.89	33.9
3	R	9	0.0	0.087	20.0	LOS B	2	0.78	0.92	33.7
Approach		**21**	**0.0**	**0.088**	**19.8**	**LOS B**	**2**	**0.78**	**0.90**	**33.8**
Barker Street (E)										
4	L	7	0.0	0.350	8.2	LOS A	0	0.00	0.67	49.0
5	T	671	1.3	0.350	0.0	LOS A	0	0.00	0.00	60.0
Approach		**677**	**1.3**	**0.350**	**0.1**	**LOS A**		**0.00**	**0.01**	**59.9**
Barker Street (W)										
11	T	633	0.8	0.341	5.4	LOS A	42	0.80	0.00	50.5
12	R	13	0.0	0.342	13.8	LOS A	42	0.80	1.01	43.4
Approach		**645**	**0.8**	**0.341**	**5.5**	**LOS A**	**42**	**0.80**	**0.02**	**50.3**
All Vehicles		**1343**	**1.0**	**0.350**	**3.0**	**Not Applicable**	**42**	**0.40**	**0.03**	**54.3**

Barker St./Easy St.

Future AM Peak 2018

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	526	1.5	0.717	7.0	LOS A	73	0.80	0.75	35.1
6	R	231	0.0	0.715	12.5	LOS A	73	0.80	0.82	34.0
Approach		**757**	**1.1**	**0.716**	**8.7**	**LOS A**	**73**	**0.80**	**0.77**	**34.7**
Easy Street (N)										
7	L	112	0.0	0.382	7.4	LOS A	23	0.67	0.72	35.6
9	R	223	0.0	0.383	10.6	LOS A	23	0.67	0.77	34.1
Approach		**335**	**0.0**	**0.383**	**9.5**	**LOS A**	**23**	**0.67**	**0.76**	**34.6**
Barker Street (W)										
10	L	247	0.0	0.588	7.2	LOS A	46	0.69	0.67	36.1
11	T	346	4.0	0.588	6.3	LOS A	46	0.69	0.65	36.5
12	R	26	0.0	0.591	12.1	LOS A	46	0.69	0.70	34.3
Approach		**620**	**2.3**	**0.588**	**6.9**	**LOS A**	**46**	**0.69**	**0.66**	**36.2**
All Vehicles		**1712**	**1.3**	**0.717**	**8.2**	**LOS A**	**73**	**0.74**	**0.73**	**35.2**

Future PM Peak 2018

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	377	3.7	0.527	9.1	LOS A	37	0.68	0.70	46.9
6	R	147	0.0	0.527	13.1	LOS A	37	0.68	0.76	44.2
Approach		**524**	**2.7**	**0.528**	**10.2**	**LOS A**	**37**	**0.68**	**0.72**	**46.1**
Easy Street (N)										
7	L	158	0.0	0.536	11.6	LOS A	39	0.82	0.93	39.0
9	R	246	0.0	0.535	14.7	LOS B	39	0.82	0.95	37.1
Approach		**404**	**0.0**	**0.535**	**13.5**	**LOS A**	**39**	**0.82**	**0.94**	**37.8**
Barker Street (W)										
10	L	178	1.1	0.597	9.0	LOS A	49	0.58	0.63	47.0
11	T	512	0.6	0.596	8.1	LOS A	49	0.58	0.60	47.4
12	R	25	0.0	0.595	13.7	LOS A	49	0.58	0.67	43.3
Approach		**714**	**0.7**	**0.596**	**8.5**	**LOS A**	**49**	**0.58**	**0.61**	**47.2**
All Vehicles		**1642**	**1.2**	**0.597**	**10.3**	**LOS A**	**49**	**0.67**	**0.73**	**44.2**

SCATES & SIDRA Results 2018 Future With Development

```
SCATES Program Version: 2004-001  Date: 28-NOV-08  Time:
Registered User Name. - PARSONS BRINCKERHOFF PTY LTD
Registered User No.   -  1014
Data File: AVOCA18D
AVOCA STREET
2018 WITH DEVELOPMENT
```

Avoca St / Belmore Rd / High St / Perouse Rd

```
              AM PEAK                    PM PEAK                    BUSINESS
 Ph   GT%  GT%       CL   CL   GT%  GT%       CL   CL   GT%  GT%       CL   CL
     CORD ISOL      CORD ISOL CORD ISOL      CORD ISOL CORD ISOL      CORD ISOL
  A  35.9 35.9       119  119 34.4 35.5       116  109 41.4 39.2        84   92
  B  20.8 20.8                30.6 30.8                29.4 27.7
  C  43.3 43.3                35.0 33.7                29.2 33.1
  D
  E
  F                 dlay dlay                dlay dlay                dlay dlay
  G                  7.6  7.6                 9.4  8.8                 3.7  4.1
 Seq      CAB  dlay   44   44      CAB  dlay   29   29      CAB  dlay   17   16
               Stps  3.4  3.4           Stps  2.4  2.5           Stps  1.8  1.7
Mode    1       DS  1.12 1.12    1       DS  0.89 0.90    1       DS  0.82 0.74
File = AVOCA18D               A     Bay  Bay  Slip Slip           Type
                                    Req  Act  Req  Act
TCS =  114                    1                10    0            L4C0
                              2      86    0   14    0
                              3                35   77
                              4
                                   Bays if all intersections are optimised
--------------------------------------------------------------------------------
```

Avoca St / Cuthill St

```
              AM PEAK                    PM PEAK                    BUSINESS
 Ph   GT%  GT%       CL   CL   GT%  GT%       CL   CL   GT%  GT%       CL   CL
     CORD ISOL      CORD ISOL CORD ISOL      CORD ISOL CORD ISOL      CORD ISOL
  A  49.8 48.1       119   40 58.3 55.8       116   47 53.2 51.7        84   43
  B  50.2 51.9                41.7 44.2                46.8 48.3
  C
  D
  E
  F                 dlay dlay                dlay dlay                dlay dlay
  G                  1.0  0.3                 1.3  0.5                 0.7  0.3
 Seq       AB  dlay   18    8       AB  dlay   11    6       AB  dlay    7    4
               Stps  1.9  2.1           Stps  1.3  1.4           Stps  1.0  1.1
Mode    1       DS  0.56 0.68    1       DS  0.39 0.45    1       DS  0.34 0.39
File = AVOCA18D               A     Bay  Bay  Slip Slip           Type
                                    Req  Act  Req  Act
TCS =  518                    1                                      T4
                              2
                              3
                              4                15    0
                                   Bays if all intersections are optimised
--------------------------------------------------------------------------------
```

Future With Development 2018

```
SCATES Program Version: 2004-001  Date: 28-NOV-08  Time:
Registered User Name. - PARSONS BRINCKERHOFF PTY LTD
Registered User No.   -  1014
Data File: AVOCA18D
AVOCA STREET
2018 WITH DEVELOPMENT
```

Avoca St / St Pauls St

	AM PEAK				PM PEAK				BUSINESS			
Ph	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL
A	79.0	79.0	119	119	78.6	78.6	116	116	70.2	79.2	84	120
B	21.0	21.0			21.4	21.4			29.8	20.8		
C												
D												
E												
F			dlay	dlay			dlay	dlay			dlay	dlay
G			0.3	0.3			0.6	0.6			0.2	0.2
Seq		AB	dlay	5	5	AB	dlay	3	3	AB	dlay	3	2
			Stps	0.9	0.9		Stps	0.7	0.7		Stps	0.6	0.5
Mode	1		DS	0.72	0.72	1		DS	0.62	0.62	1	DS	0.59	0.51

File = AVOCA18D

TCS = 3

A	Bay Req	Bay Act	Slip Req	Slip Act	Type
1			10	0	T4
2					
3	16	0			
4					

Bays if all intersections are optimised

Avoca St / Barker St

	AM PEAK				PM PEAK				BUSINESS			
Ph	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL
A	37.7	37.7	119	119	28.0	34.2	116	76	34.1	41.3	84	67
B	39.6	39.6			42.2	41.0			38.9	41.3		
C	22.7	22.7			29.8	24.8			27.0	17.3		
D												
E												
F			dlay	dlay			dlay	dlay			dlay	dlay
G			5.8	5.8			1.9	1.2			1.1	0.8
Seq		CAB	dlay	56	56	CAB	dlay	26	43	CAB	dlay	12	24
			Stps	3.4	3.4		Stps	2.2	2.6		Stps	1.5	2.0
Mode	1		DS	0.97	0.97	1		DS	0.83	2.40	1	DS	0.65	1.26

File = AVOCA18D

TCS = 4

A	Bay Req	Bay Act	Slip Req	Slip Act	Type
1	65	0	10	0	L2C0
2	50	0	24	0	
3			66	0	
4	12	0	10	0	

Bays if all intersections are optimised

Botany St./Barker St.

Future AM Peak 2018 ST3

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	13	0.0	0.650	18.3	LOS B	53	1.00	1.15	34.6
2	T	181	2.8	0.649	17.2	LOS B	53	1.00	1.15	35.4
3	R	125	0.8	0.648	21.4	LOS B	53	1.00	1.07	33.3
Approach		**319**	**1.9**	**0.648**	**18.9**	**LOS B**	**53**	**1.00**	**1.12**	**34.5**
BARKER ST (E)										
4	L	68	1.5	0.932	22.7	LOS B	195	1.00	1.30	26.1
5	T	429	1.4	0.933	21.8	LOS B	195	1.00	1.30	26.7
6	R	425	1.4	0.932	26.0	LOS B	195	1.00	1.24	25.1
Approach		**922**	**1.4**	**0.933**	**23.8**	**LOS B**	**195**	**1.00**	**1.27**	**25.9**
BOTANY ST (N)										
7	L	233	3.4	0.652	10.8	LOS A	49	0.81	0.98	38.9
8	T	184	3.8	0.650	9.5	LOS A	49	0.81	0.95	40.0
9	R	144	3.5	0.652	13.7	LOS A	49	0.81	0.94	37.1
Approach		**560**	**3.6**	**0.651**	**11.1**	**LOS A**	**49**	**0.81**	**0.96**	**38.8**
BARKER ST (W)										
10	L	186	1.6	1.114	139.3	LOS F	490	1.00	3.71	11.4
11	T	522	0.8	1.111	138.4	LOS F	490	1.00	3.71	11.5
12	R	3	0.0	1.000	142.6	LOS F	490	1.00	3.65	11.5
Approach		**711**	**1.0**	**1.112**	**138.6**	**LOS F**	**490**	**1.00**	**3.71**	**11.5**
All Vehicles		**2512**	**1.8**	**1.114**	**52.8**	**LOS D**	**490**	**0.96**	**1.87**	**19.9**

Botany St./Barker ST.

Future PM Peak 2018 ST3

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	12	0.0	0.375	9.9	LOS A	21	0.81	0.90	40.3
2	T	178	1.1	0.379	8.8	LOS A	21	0.81	0.88	41.2
3	R	62	0.0	0.378	13.0	LOS A	21	0.81	0.84	38.3
Approach		**252**	**0.8**	**0.379**	**9.9**	**LOS A**	**21**	**0.81**	**0.87**	**40.4**
BARKER ST (E)										
4	L	71	0.0	0.835	17.8	LOS B	113	1.00	1.20	29.0
5	T	412	0.2	0.836	16.8	LOS B	113	1.00	1.20	29.8
6	R	226	4.8	0.838	21.2	LOS B	113	1.00	1.13	27.7
Approach		**710**	**1.7**	**0.836**	**18.3**	**LOS B**	**113**	**1.00**	**1.18**	**29.0**
BOTANY ST (N)										
7	L	299	1.7	0.715	9.6	LOS A	57	0.73	0.87	39.9
8	T	267	0.4	0.714	8.3	LOS A	57	0.73	0.84	40.9
9	R	178	1.1	0.715	12.5	LOS A	57	0.73	0.86	37.9
Approach		**744**	**1.1**	**0.715**	**9.8**	**LOS A**	**57**	**0.73**	**0.86**	**39.7**
BARKER ST (W)										
10	L	182	0.0	0.623	11.6	LOS A	52	0.84	0.93	39.0
11	T	337	0.0	0.624	10.7	LOS A	52	0.84	0.92	39.7
12	R	13	0.0	0.619	15.0	LOS B	52	0.84	0.90	37.0
Approach		**532**	**0.0**	**0.624**	**11.1**	**LOS A**	**52**	**0.84**	**0.93**	**39.4**
All Vehicles		**2238**	**1.0**	**0.838**	**12.8**	**LOS A**	**113**	**0.85**	**0.98**	**36.6**

Botany St./High St.

Future AM Peak 2018 ST3

Signalised - Fixed time **Cycle Time = 50 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	163	3.1	0.429	17.9	LOS B	29	0.72	0.76	35.0
2	T	554	0.9	1.104	135.1	LOS F	323	1.00	2.38	11.7
3	R	59	10.2	1.105	141.8	LOS F	323	1.00	2.38	11.3
Approach		**775**	**2.1**	**1.104**	**111.0**	**LOS F**	**323**	**0.94**	**2.04**	**13.6**
HIGH ST (E)										
4	L	62	8.1	0.247	17.8	LOS B	10	0.58	0.70	33.0
5	T	342	7.0	0.709	17.4	LOS B	75	0.87	0.80	33.1
6	R	43	0.0	0.709	23.8	LOS B	75	0.87	0.88	29.5
Approach		**447**	**6.5**	**0.709**	**18.1**	**LOS B**	**75**	**0.83**	**0.79**	**32.7**
BOTANY ST (N)										
7	L	196	2.0	0.509	16.8	LOS B	28	0.60	0.74	34.7
8	T	562	0.9	1.119	142.4	LOS F	332	1.00	2.40	10.5
9	R	56	5.4	1.118	149.0	LOS F	332	1.00	2.40	10.1
Approach		**814**	**1.5**	**1.119**	**112.6**	**LOS F**	**332**	**0.90**	**2.00**	**12.6**
HIGH ST (W)										
10	L	75	21.3	0.252	19.3	LOS B	22	0.73	0.75	40.9
11	T	386	10.1	1.260	248.7	LOS F	453	0.98	3.05	12.7
12	R	172	4.7	1.261	277.3	LOS F	453	1.00	3.28	11.7
Approach		**632**	**10.0**	**1.260**	**229.2**	**LOS F**	**453**	**0.95**	**2.84**	**13.5**
All Vehicles		**2668**	**4.5**	**1.261**	**123.9**	**LOS F**	**453**	**0.91**	**2.01**	**14.2**

Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	238	16.0	LOS B	0	0.80	0.80
P3	62	14.4	LOS B	0	0.76	0.76
P5	129	16.0	LOS B	0	0.80	0.80
P7	188	14.4	LOS B	0	0.76	0.76
All Peds	**617**	**15.4**	**LOS B**	**0**	**0.78**	**0.78**

Botany St./High St.

Future PM Peak 2018 ST3

Signalised - Fixed time **Cycle Time = 60 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	203	2.0	0.315	18.7	LOS B	38	0.70	0.77	34.5
2	T	560	0.4	1.108	144.1	LOS F	379	1.00	2.31	11.1
3	R	98	4.1	1.109	150.6	LOS F	379	1.00	2.31	10.8
Approach		**861**	**1.2**	**1.108**	**115.3**	**LOS F**	**379**	**0.93**	**1.95**	**13.2**
HIGH ST (E)										
4	L	58	8.6	0.267	19.6	LOS B	11	0.57	0.70	31.9
5	T	348	6.9	1.075	113.6	LOS F	222	1.00	1.87	13.3
6	R	86	0.0	1.075	120.1	LOS F	222	1.00	1.87	11.1
Approach		**492**	**5.9**	**1.075**	**103.7**	**LOS F**	**222**	**0.95**	**1.74**	**13.7**
BOTANY ST (N)										
7	L	85	0.0	0.237	16.0	LOS B	13	0.48	0.70	35.2
8	T	483	0.6	1.091	123.8	LOS F	284	0.99	2.01	11.7
9	R	66	7.6	1.091	132.0	LOS F	284	1.00	2.03	11.2
Approach		**634**	**1.3**	**1.091**	**110.2**	**LOS F**	**284**	**0.93**	**1.84**	**12.8**
HIGH ST (W)										
10	L	129	2.3	0.309	21.1	LOS B	27	0.73	0.76	40.1
11	T	420	5.2	1.140	171.3	LOS F	351	1.00	2.42	16.5
12	R	119	0.0	1.141	177.8	LOS F	351	1.00	2.42	16.1
Approach		**668**	**3.7**	**1.140**	**143.5**	**LOS F**	**351**	**0.95**	**2.10**	**18.5**
All Vehicles		**2655**	**2.7**	**1.141**	**119.0**	**LOS F**	**379**	**0.94**	**1.92**	**15.0**

Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	339	17.6	LOS B	0	0.77	0.77
P3	55	14.7	LOS B	0	0.70	0.70
P5	121	17.6	LOS B	0	0.77	0.77
P7	76	14.7	LOS B	0	0.70	0.70
All Peds	**591**	**17.0**	**LOS B**	**0**	**0.75**	**0.75**

Hospital Rd. / High St.

Future AM Peak 2018 ST3

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
HOSPITAL RD (S)										
1	L	29	6.9	0.041	11.6	LOS A	1	0.47	0.90	34.0
3	R	17	0.0	0.054	18.4	LOS B	2	0.75	1.00	30.7
Approach		**46**	**4.3**	**0.054**	**14.1**	**LOS A**	**2**	**0.57**	**0.94**	**32.7**
HIGH ST (E)										
4	L	88	0.0	0.047	5.6	LOS A	0	0.00	0.58	40.7
5	T	412	6.3	0.219	0.0	LOS A	0	0.00	0.00	50.0
Approach		**499**	**5.2**	**0.219**	**1.0**	**LOS A**		**0.00**	**0.10**	**48.1**
HIGH ST (W)										
11	T	448	10.5	0.407	3.5	LOS A	40	0.68	0.00	37.4
12	R	182	1.6	0.407	10.9	LOS A	40	0.68	0.89	25.4
Approach		**630**	**7.9**	**0.407**	**5.7**	**LOS A**	**40**	**0.68**	**0.26**	**33.7**
All Vehicles		**1175**	**6.6**	**0.407**	**4.0**	**Not Applicable**	**40**	**0.39**	**0.22**	**41.0**

Future AM Peak 2018 ST3

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
HOSPITAL RD (S)										
1	L	163	0.0	0.198	10.7	LOS A	7	0.45	0.93	34.3
3	R	69	0.0	0.172	16.3	LOS B	5	0.71	1.00	31.6
Approach		**232**	**0.0**	**0.198**	**12.4**	**LOS A**	**7**	**0.53**	**0.95**	**33.4**
HIGH ST (E)										
4	L	15	13.3	0.009	5.9	LOS A	0	0.00	0.58	40.7
5	T	327	9.8	0.179	0.0	LOS A	0	0.00	0.00	50.0
Approach		**343**	**9.9**	**0.179**	**0.3**	**LOS A**		**0.00**	**0.03**	**49.5**
HIGH ST (W)										
11	T	574	4.4	0.314	1.8	LOS A	24	0.55	0.00	39.9
12	R	16	0.0	0.314	9.2	LOS A	24	0.55	0.72	27.4
Approach		**589**	**4.2**	**0.314**	**2.0**	**LOS A**	**24**	**0.55**	**0.02**	**39.5**
All Vehicles		**1164**	**5.1**	**0.314**	**3.6**	**Not Applicable**	**24**	**0.38**	**0.21**	**39.9**

Barker St./Hospital Rd.

Future AM Peak 2018 ST3

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	708	1.0	0.529	10.1	LOS A	72	1.00	0.00	46.9
6	R	118	0.0	0.529	18.5	LOS B	72	1.00	1.19	39.7
Approach		**826**	**0.8**	**0.529**	**11.3**	**LOS A**	**72**	**1.00**	**0.17**	**45.8**
Hospital Road (N)										
7	L	42	0.0	0.068	13.6	LOS A	2	0.59	0.97	38.5
Approach		**42**	**0.0**	**0.068**	**13.6**	**LOS A**	**2**	**0.59**	**0.97**	**38.5**
Barker Street (W)										
10	L	185	0.0	0.408	8.2	LOS A	0	0.00	0.67	49.0
11	T	594	2.2	0.409	0.0	LOS A	0	0.00	0.00	60.0
Approach		**779**	**1.7**	**0.409**	**1.9**	**LOS A**		**0.00**	**0.16**	**57.0**
All Vehicles		**1647**	**1.2**	**0.529**	**6.9**	**Not Applicable**	**72**	**0.52**	**0.18**	**50.2**

Future PM Peak 2018 ST3

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	777	1.8	0.413	5.9	LOS A	58	0.87	0.00	49.8
6	R	9	0.0	0.409	14.3	LOS A	58	0.87	1.07	42.9
Approach		**786**	**1.8**	**0.413**	**6.0**	**LOS A**	**58**	**0.87**	**0.01**	**49.7**
Hospital Road (N)										
7	L	268	0.0	0.400	15.0	LOS B	18	0.66	1.08	37.6
Approach		**268**	**0.0**	**0.400**	**15.0**	**LOS B**	**18**	**0.66**	**1.08**	**37.6**
Barker Street (W)										
10	L	36	0.0	0.340	8.2	LOS A	0	0.00	0.67	49.0
11	T	619	0.8	0.338	0.0	LOS A	0	0.00	0.00	60.0
Approach		**655**	**0.8**	**0.338**	**0.4**	**LOS A**		**0.00**	**0.04**	**59.3**
All Vehicles		**1709**	**1.1**	**0.413**	**5.3**	**Not Applicable**	**58**	**0.51**	**0.19**	**50.4**

Barker St. / Young St.

Future AM Peak 2018 ST3

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Young Street (S)										
1	L	6	0.0	0.130	29.2	LOS C	3	0.87	0.95	29.3
3	R	13	0.0	0.130	29.5	LOS C	3	0.87	0.96	29.1
Approach		**19**	**0.0**	**0.131**	**29.4**	**LOS C**	**3**	**0.87**	**0.95**	**29.2**
Barker Street (E)										
4	L	11	0.0	0.407	8.2	LOS A	0	0.00	0.67	49.0
5	T	791	1.0	0.414	0.0	LOS A	0	0.00	0.00	60.0
Approach		**801**	**1.0**	**0.414**	**0.1**	**LOS A**		**0.00**	**0.01**	**59.8**
Barker Street (W)										
11	T	584	2.4	0.326	7.1	LOS A	45	0.91	0.00	49.4
12	R	15	0.0	0.326	15.6	LOS B	45	0.91	1.05	41.9
Approach		**600**	**2.3**	**0.326**	**7.3**	**LOS A**	**45**	**0.91**	**0.03**	**49.2**
All Vehicles		**1420**	**1.5**	**0.414**	**3.6**	**Not Applicable**	**45**	**0.40**	**0.03**	**54.2**

Future PM Peak 2018 ST3

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Young Street (S)										
1	L	12	0.0	0.095	20.9	LOS B	3	0.79	0.90	33.2
3	R	9	0.0	0.095	21.2	LOS B	3	0.79	0.93	33.0
Approach		**21**	**0.0**	**0.095**	**21.1**	**LOS B**	**3**	**0.79**	**0.91**	**33.1**
Barker Street (E)										
4	L	7	0.0	0.350	8.2	LOS A	0	0.00	0.67	49.0
5	T	674	1.3	0.352	0.0	LOS A	0	0.00	0.00	60.0
Approach		**680**	**1.3**	**0.352**	**0.1**	**LOS A**		**0.00**	**0.01**	**59.9**
Barker Street (W)										
11	T	674	0.7	0.362	5.7	LOS A	47	0.83	0.00	50.2
12	R	13	0.0	0.361	14.1	LOS A	47	0.83	1.03	43.1
Approach		**686**	**0.7**	**0.362**	**5.8**	**LOS A**	**47**	**0.83**	**0.02**	**50.0**
All Vehicles		**1387**	**1.0**	**0.362**	**3.2**	**Not Applicable**	**47**	**0.42**	**0.03**	**54.0**

Barker St./Easy St.

Future AM Peak 2018 ST3

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	574	1.4	0.765	8.2	LOS A	89	0.87	0.83	34.3
6	R	231	0.0	0.765	13.7	LOS A	89	0.87	0.87	33.4
Approach		**804**	**1.0**	**0.765**	**9.8**	**LOS A**	**89**	**0.87**	**0.84**	**34.1**
Easy Street (N)										
7	L	112	0.0	0.388	7.5	LOS A	23	0.68	0.73	35.5
9	R	223	0.0	0.388	10.6	LOS A	23	0.68	0.78	34.0
Approach		**335**	**0.0**	**0.388**	**9.6**	**LOS A**	**23**	**0.68**	**0.76**	**34.5**
Barker Street (W)										
10	L	247	0.0	0.601	7.2	LOS A	48	0.70	0.68	36.1
11	T	349	4.0	0.601	6.4	LOS A	48	0.70	0.65	36.4
12	R	35	0.0	0.603	12.1	LOS A	48	0.70	0.70	34.2
Approach		**632**	**2.2**	**0.601**	**7.0**	**LOS A**	**48**	**0.70**	**0.66**	**36.2**
All Vehicles		**1771**	**1.2**	**0.765**	**8.8**	**LOS A**	**89**	**0.77**	**0.76**	**34.9**

Future PM Peak 2018 ST3

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Barker Street (E)										
5	T	380	3.7	0.610	12.0	LOS A	51	0.81	0.88	45.2
6	R	147	0.0	0.610	15.9	LOS B	51	0.81	0.91	42.0
Approach		**527**	**2.7**	**0.610**	**13.1**	**LOS A**	**51**	**0.81**	**0.88**	**44.2**
Easy Street (N)										
7	L	158	0.0	0.669	17.6	LOS B	60	0.98	1.16	35.0
9	R	246	0.0	0.670	20.7	LOS B	60	0.98	1.16	33.6
Approach		**404**	**0.0**	**0.669**	**19.5**	**LOS B**	**60**	**0.98**	**1.16**	**34.1**
Barker Street (W)										
10	L	178	1.1	0.733	9.4	LOS A	75	0.73	0.64	46.3
11	T	553	0.5	0.733	8.5	LOS A	75	0.73	0.62	46.7
12	R	156	0.0	0.732	14.1	LOS A	75	0.73	0.65	42.9
Approach		**886**	**0.6**	**0.733**	**9.6**	**LOS A**	**75**	**0.73**	**0.63**	**45.8**
All Vehicles		**1817**	**1.0**	**0.733**	**12.8**	**LOS A**	**75**	**0.81**	**0.82**	**42.3**

SCATES & SIDRA Results 2018 Future With Development – Upgraded Intersection

SCATES Program Version: 2004-001 Date: 28-NOV-08 Time:
Registered User Name. - PARSONS BRINCKERHOFF PTY LTD
Registered User No.   - 1014
Data File: AVOCA18P
AVOCA STREET
2017 DEVT + PROP

Avoca St / Barker St

	AM PEAK				PM PEAK				BUSINESS			
Ph	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL	GT% CORD	GT% ISOL	CL CORD	CL ISOL
A	39.4	39.4	116	116	28.0	34.2	116	76	34.1	41.3	84	67
B	41.4	41.4			42.2	41.0			38.9	41.3		
C	19.1	19.1			29.8	24.8			27.0	17.3		
D												
E												
F			dlay	dlay			dlay	dlay			dlay	dlay
G			5.7	5.7			1.9	1.2			1.1	0.8
Seq	CAB	dlay	40	40	CAB	dlay	26	43	CAB	dlay	12	24
		Stps	2.8	2.8		Stps	2.2	2.6		Stps	1.5	2.0
Mode	1	DS	0.93	0.93	1	DS	0.83	2.40	1	DS	0.65	1.26

File = AVOCA18P

A	Bay Req	Bay Act	Slip Req	Slip Act	Type
1	68	0	10	0	L2C0
2	50	0	25	0	
3			64	0	
4	12	0	10	0	

TCS = 4

Bays if all intersections are optimised

Botany St./Barker St.

Future AM Peak 2018 ST3 signal

Signalised - Fixed time **Cycle Time = 60 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	13	0.0	0.312	22.8	LOS B	41	0.79	0.78	32.3
2	T	181	2.8	0.313	16.4	LOS B	41	0.79	0.65	35.8
3	R	125	0.8	0.522	32.2	LOS C	35	0.95	0.79	28.1
Approach		**319**	**1.9**	**0.522**	**22.8**	**LOS B**	**41**	**0.85**	**0.71**	**32.2**
BARKER ST (E)										
4	L	68	1.5	0.755	22.9	LOS B	123	0.88	0.92	26.1
5	T	429	1.1	0.755	16.4	LOS B	123	0.88	0.85	30.0
6	R	425	2.0	1.000#	32.3	LOS C	69	1.00	0.95	21.7
Approach		**922**	**1.4**	**1.000**	**22.2**	**LOS B**	**123**	**0.92**	**0.88**	**26.4**
BOTANY ST (N)										
7	L	233	3.4	0.868	34.6	LOS C	147	0.98	1.12	26.2
8	T	184	3.8	0.868	28.1	LOS B	147	0.98	1.11	28.6
9	R	144	3.5	0.868	33.8	LOS C	142	0.94	1.11	26.5
Approach		**560**	**3.6**	**0.868**	**32.3**	**LOS C**	**147**	**0.97**	**1.11**	**27.0**
BARKER ST (W)										
10	L	186	1.6	0.754	31.7	LOS C	84	0.98	0.94	28.4
11	T	522	0.8	0.754	25.0	LOS B	89	0.98	0.93	31.1
12	R	3	0.0	0.750	31.4	LOS C	89	0.98	0.94	28.4
Approach		**711**	**1.0**	**0.754**	**26.8**	**LOS B**	**89**	**0.98**	**0.93**	**30.4**
All Vehicles		**2512**	**1.8**	**1.000**	**25.8**	**LOS B**	**147**	**0.94**	**0.93**	**28.6**

Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	42	20.8	LOS C	0	0.83	0.83
P3	35	19.2	LOS B	0	0.80	0.80
P5	39	20.8	LOS C	0	0.83	0.83
P7	2	17.6	LOS B	0	0.77	0.77
All Peds	**118**	**20.3**	**LOS B**	**0**	**0.82**	**0.82**

Botany St./Barker St.

Future PM Peak 2018 ST3 signal

Signalised - Fixed time **Cycle Time = 70 seconds**

Vehicle Movements

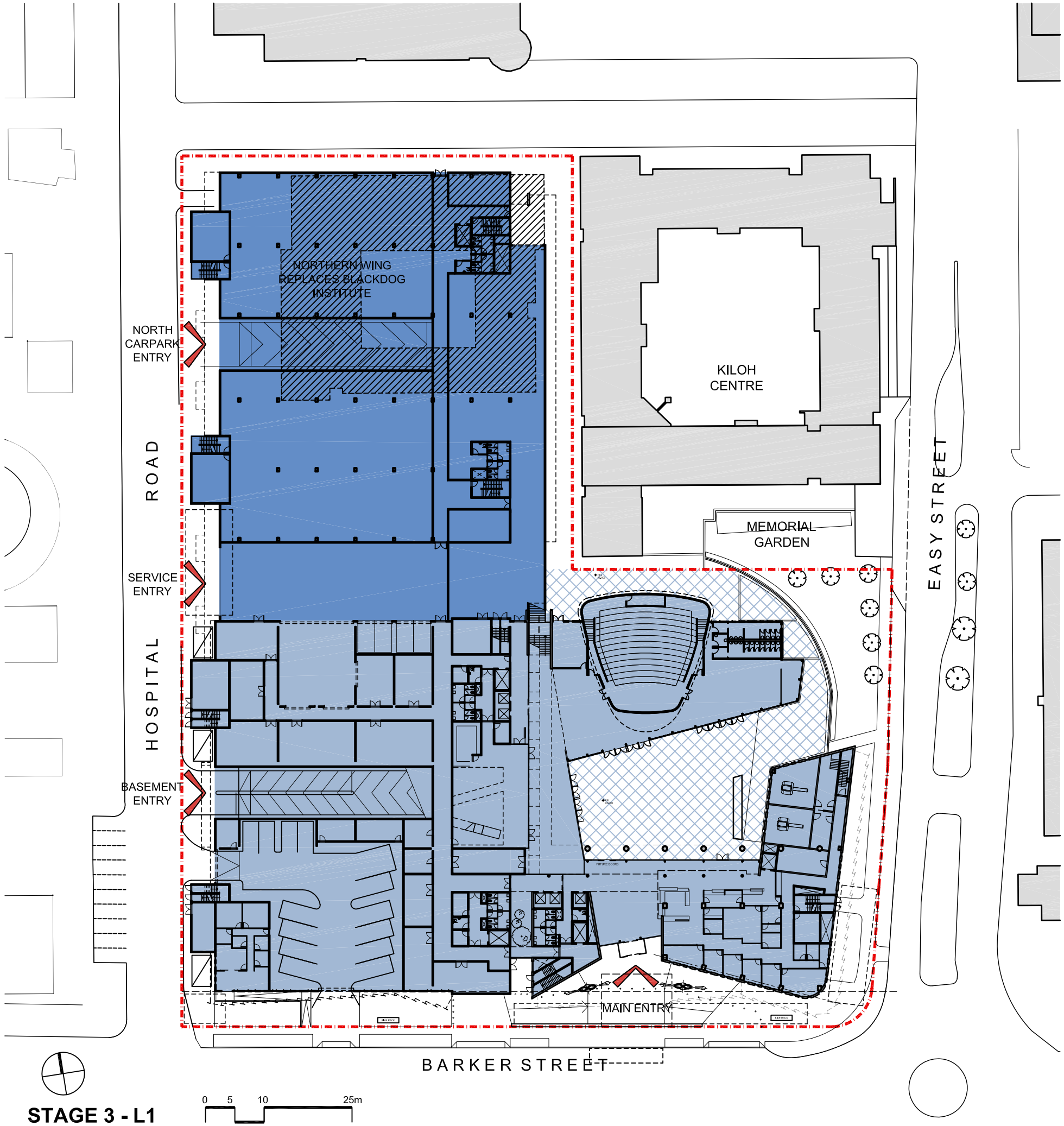
Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BOTANY ST (S)										
1	L	12	0.0	0.230	19.5	LOS B	39	0.66	0.75	34.0
2	T	178	1.1	0.229	13.0	LOS A	39	0.66	0.54	38.0
3	R	62	0.0	0.299	34.8	LOS C	20	0.90	0.76	27.2
Approach		**252**	**0.8**	**0.299**	**18.7**	**LOS B**	**39**	**0.72**	**0.61**	**34.4**
BARKER ST (E)										
4	L	72	1.4	0.778	29.9	LOS C	131	0.94	0.94	22.7
5	T	412	0.2	0.777	23.4	LOS B	131	0.94	0.91	25.7
6	R	226	6.3	1.000#	35.0	LOS C	51	0.98	0.85	20.8
Approach		**711**	**1.8**	**1.000**	**26.9**	**LOS B**	**131**	**0.95**	**0.90**	**24.0**
BOTANY ST (N)										
7	L	299	1.7	0.929	46.3	LOS D	245	1.00	1.27	22.5
8	T	267	0.4	0.928	39.9	LOS C	245	1.00	1.27	24.3
9	R	178	1.1	0.929	45.3	LOS D	236	0.95	1.25	22.8
Approach		**744**	**1.1**	**0.928**	**43.8**	**LOS D**	**245**	**0.99**	**1.26**	**23.2**
BARKER ST (W)										
10	L	185	1.6	0.816	41.7	LOS C	84	1.00	1.01	24.9
11	T	341	1.2	0.817	35.4	LOS C	84	1.00	1.00	26.9
12	R	13	0.0	0.815	42.1	LOS C	83	1.00	1.00	24.8
Approach		**539**	**1.3**	**0.816**	**37.7**	**LOS C**	**84**	**1.00**	**1.00**	**26.1**
All Vehicles		**2246**	**1.3**	**1.000**	**34.2**	**LOS C**	**245**	**0.95**	**1.01**	**25.3**

Pedestrian Movements

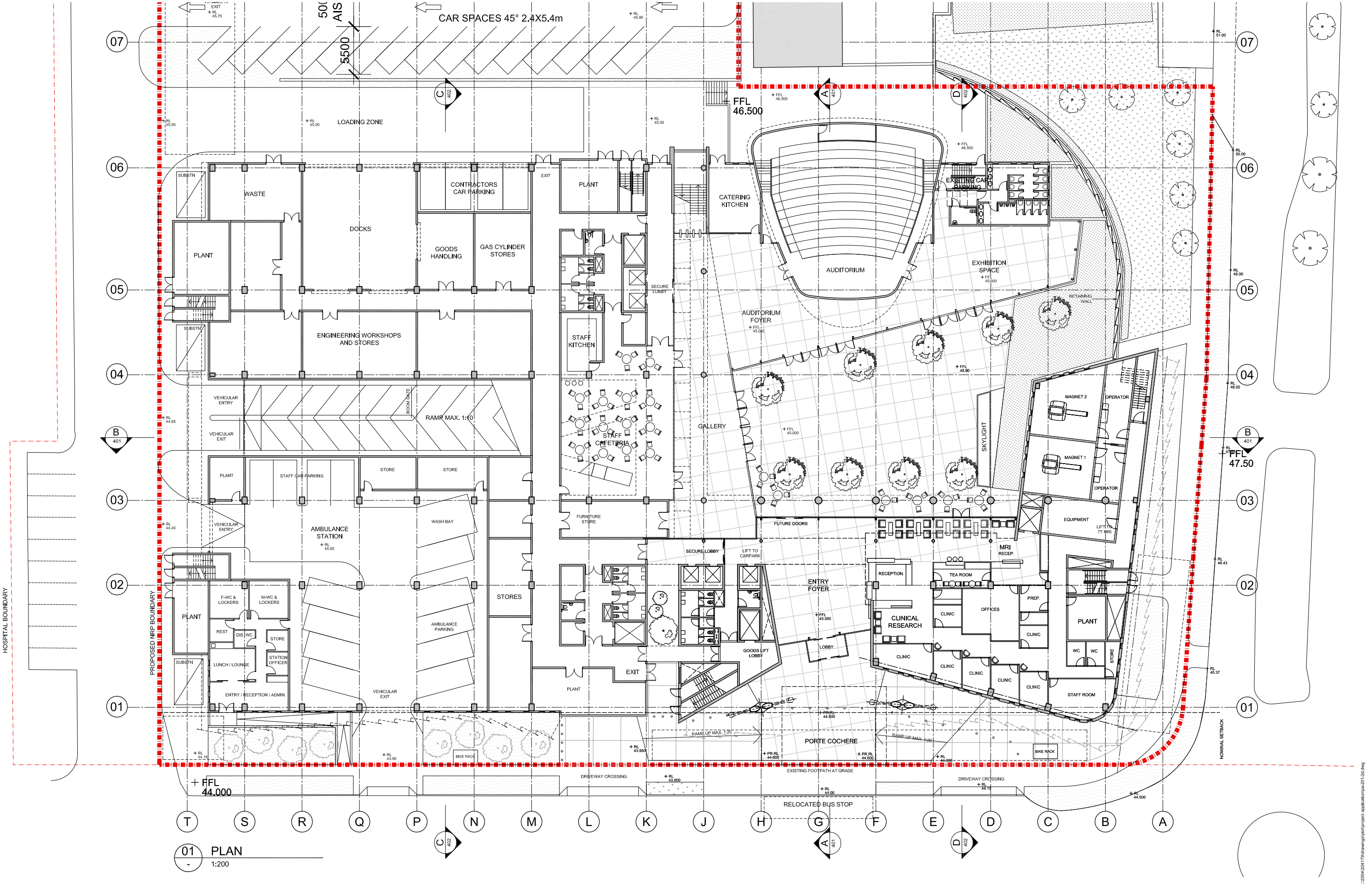
Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	16	27.5	LOS C	0	0.89	0.89
P3	25	15.8	LOS B	0	0.67	0.67
P5	23	27.5	LOS C	0	0.89	0.89
P7	41	14.5	LOS B	0	0.64	0.64
All Peds	**105**	**19.6**	**LOS B**	**0**	**0.74**	**0.74**

Appendix D

Development Plans


NORTHERN WING
REPLACES BLACKDOG
INSTITUTE
KILOH
CENTRE
MEMORIAL
GARDEN
NORTH
CARPARK
ENTRY
SERVICE
ENTRY
BASEMENT
ENTRY
MAIN ENTRY
ROAD
HOSPITAL
EASY STREET
BARKER STREET
KEY:
NEW CONSTRUCTION
DEMOLISHED
RETAINED & OCCUPIED AREAS
STAGE 1
ACCESS
INTERNAL CONNECTIONS
0 5 10 25m

STAGE 3 - L1



01 PLAN
- 1:200

Cox RIchardson

Level 2, 204 Clarence Street, Sydney 2000 Australia
Tel : 612 9267 9599 Fax : 612 9264 5844
Email : sydney@cox.com.au

Architecture Planning Urban design Interior design Health facility design

NEUROSCIENCE RESEARCH PRECINCT

BARKER STREET RANDWICK NSW

204179.30

Drawing Title
LEVEL 1 FLOOR PLAN (GROUND)

Drawing Number PA-201-2D

Rev. 07

Date
JAN 2009

k:\2004\204179\drawings\plot\proposed application\pa-201-2d.dwg

PLANT
MSB
LEVEL B1
APPROX: 80 CAR SPACES
CYCLE PARKING
AUDITORIUM
PLANT
ONE WAY
FFL 42.00
VOID TO
LEVEL B2
(MRI)
67 CYCLE
PARKING
CYCLE PARKING
AMENITIES
CAR PARKING
LOBBY
FFL 42.00
MRI PLANT
FFL 42.00
PLANT
MSB
VOID TO
LEVEL B2
GOODS
LIFT
PLANT
LINE OF BUILDING OVER
MSB
OSD WATER TANK 175SQM
OSD WATER TANK 120SQM
OSD WATER TANK
OSD WATER TANK 140SQM
C 402
A 401
D 402
B 401
07
06
05
04
03
02
01
T S R Q P N M L K J H G F E D C B A

01 PLAN
- 1:200

Cox RIchardson
Level 2, 204 Clarence Street, Sydney 2000 Australia
Tel : 612 9267 9599 Fax : 612 9264 5844
Email : sydney@cox.com.au
Architecture Planning Urban design Interior design Health facility design

NEUROSCIENCE RESEARCH PRECINCT

BARKER STREET RANDWICK NSW

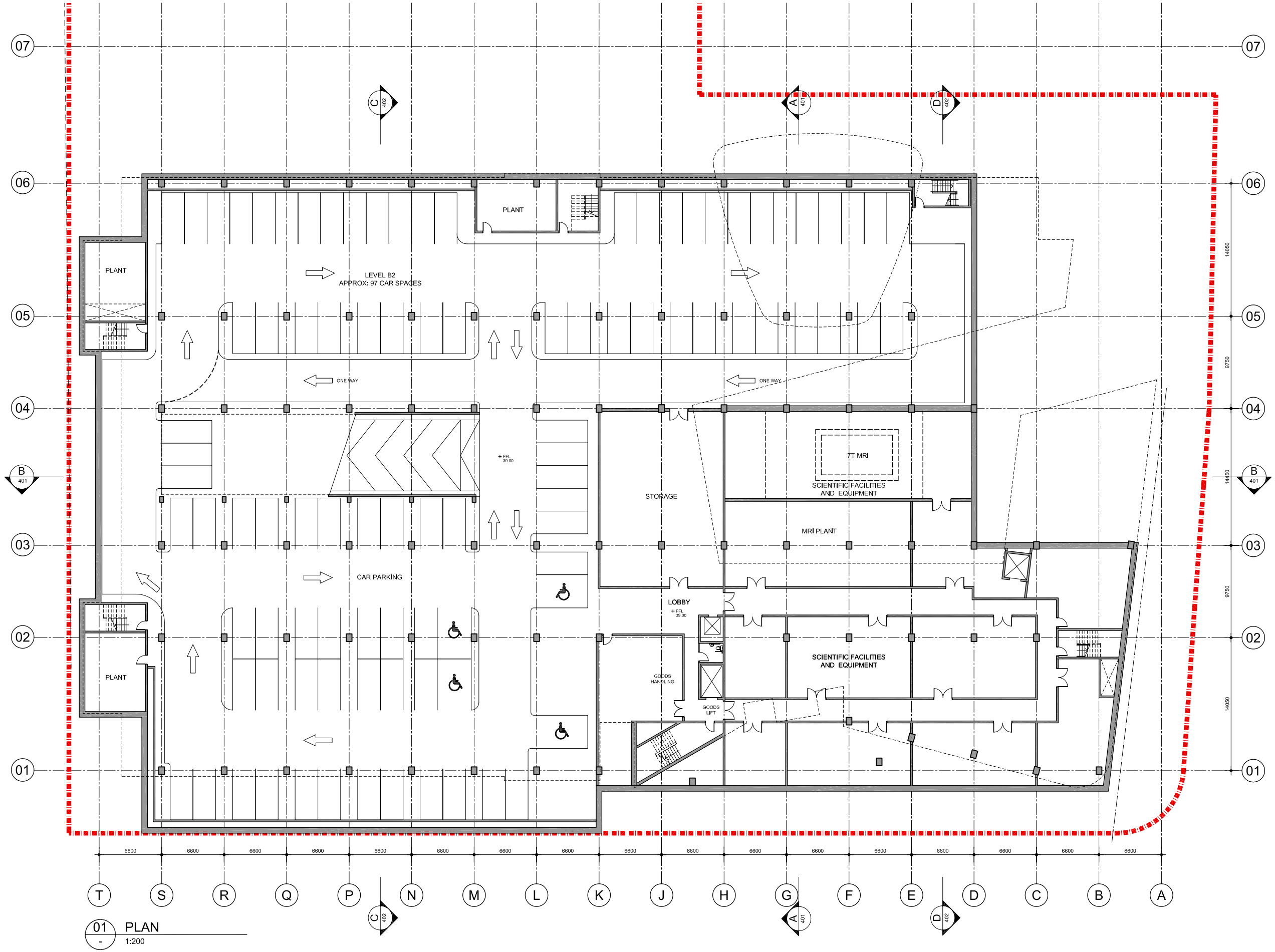
204179.30

Drawing Title
BASEMENT FLOOR PLAN LEVEL B1

Drawing Number PA-209-2D
Rev. 07

Date
DEC 2008

k:\204\204179\drawings\plot\project application\pa-209-2d.dwg



01 PLAN
- 1:200

Cox RIchardson

Level 2, 204 Clarence Street, Sydney 2000 Australia
Tel : 612 9267 9599 Fax : 612 9264 5844
Email : sydney@cox.com.au

Architecture Planning Urban design Interior design Health facility design

NEUROSCIENCE RESEARCH PRECINCT

BARKER STREET RANDWICK NSW

204179.30

Drawing Title
BASEMENT FLOOR PLAN LEVEL B2

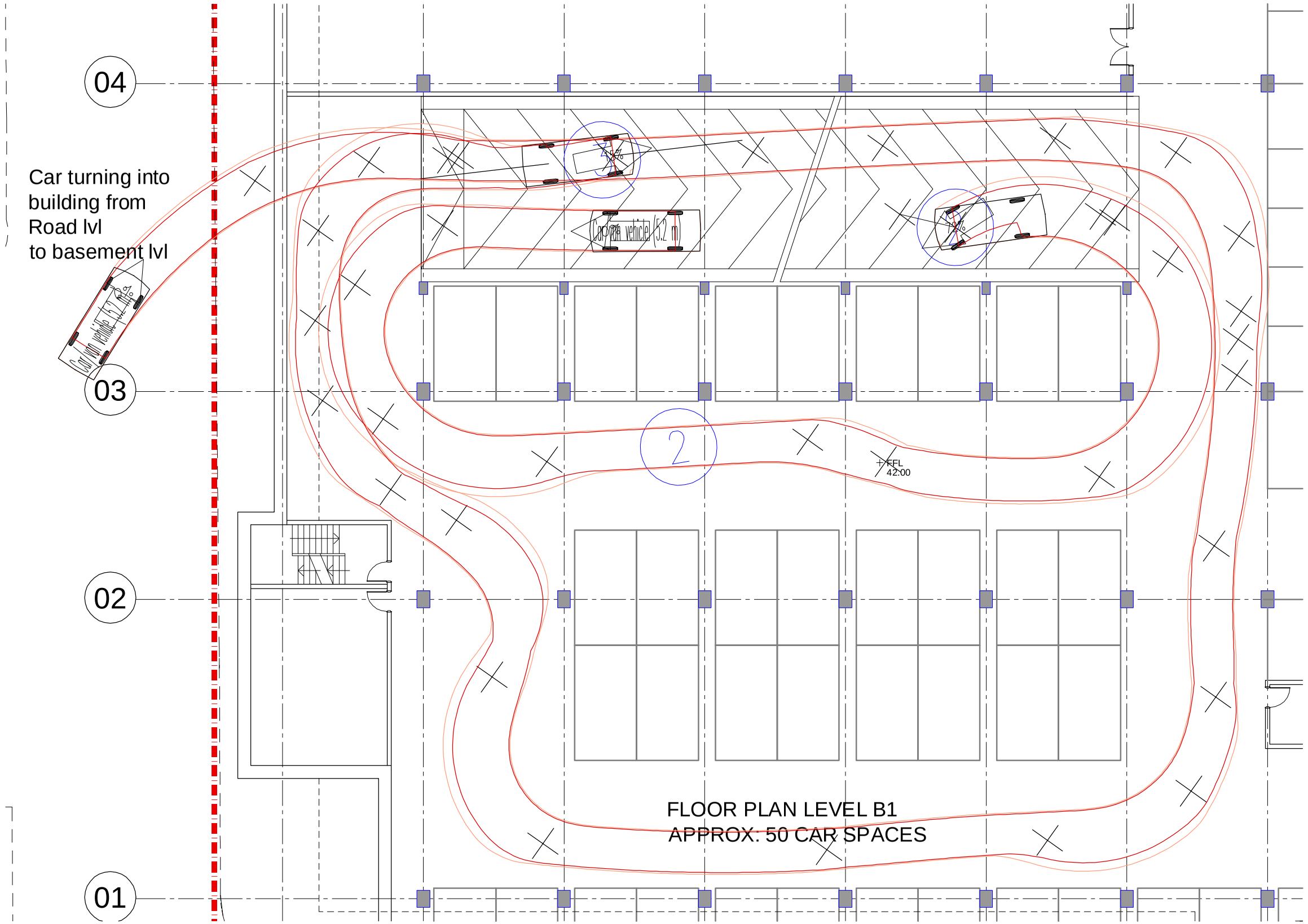
Drawing Number
PA-210-2D

Rev.
07

Date
DEC 2008

Appendix E

AutoTrack Swept Path Diagrams



FLOOR PLAN LEVEL B1
APPROX. 50 CAR SPACES

BLACK DOG INSTITUTE

KILOH CENTRE

MEMORIAL GARDEN

EASY STREET

CARPARK ENTRY

TEMPORARY PARKING AT GRADE (49 SPACES)

CARPARK EXIT

HOSPITAL ROAD

SERVICE ENTRY

TEMPORARY LOADING AREA

12.5m Rigid Vehicle

BASEMENT ENTRY

10 CAR SPACES POWMRI

ENTRY

BARKER STREET

0 5 10 25m

BLACK DOG INSTITUTE

KILOH CENTRE

CARPARK EXIT

TEMPORARY PARKING AT GRADE - 21 SPACES

MPORARY MAIN NTRY DURING NSTRUCTION

MEMORIAL GARDEN

EASY STREET

EXISTING PARKING 15 SPACES RETAINED

7 CAR SPACES POWMRI

CARPARK ENTRY

ERVICE ENTRY

EXISTING LOADING AREA

HOSPITAL ROAD

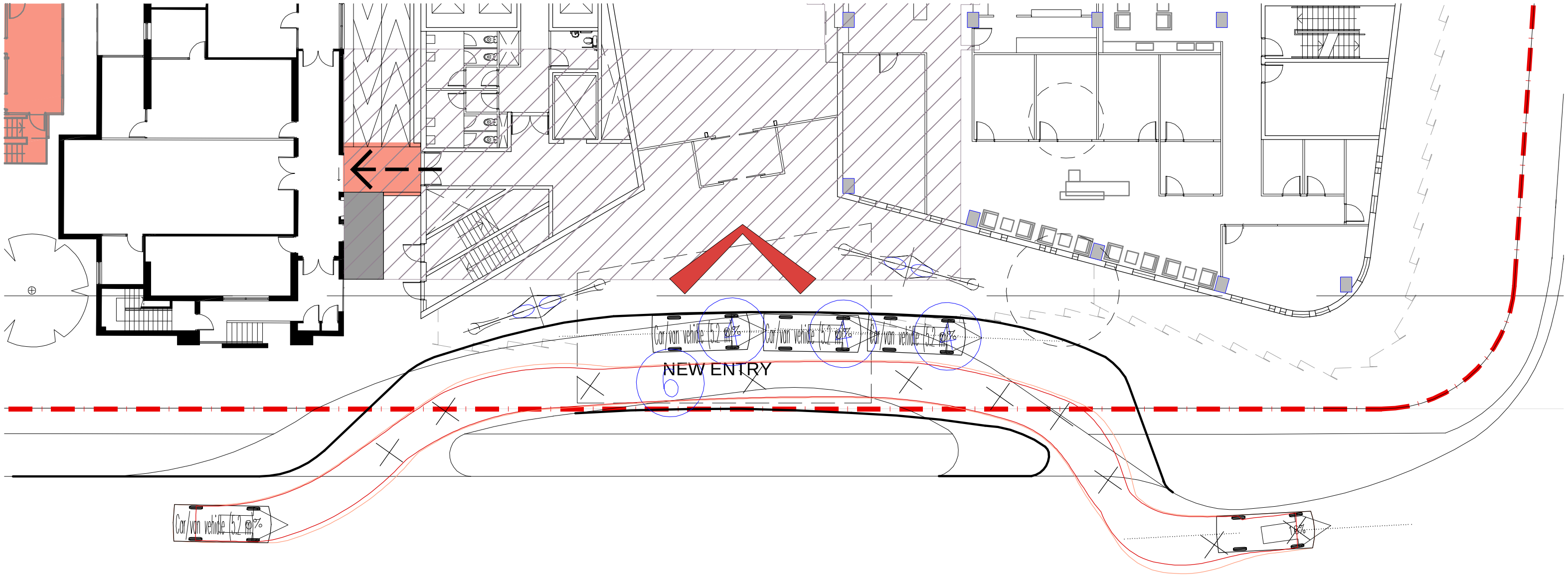
10 CAR SPACES POWMRI

AMBULANCE STATION

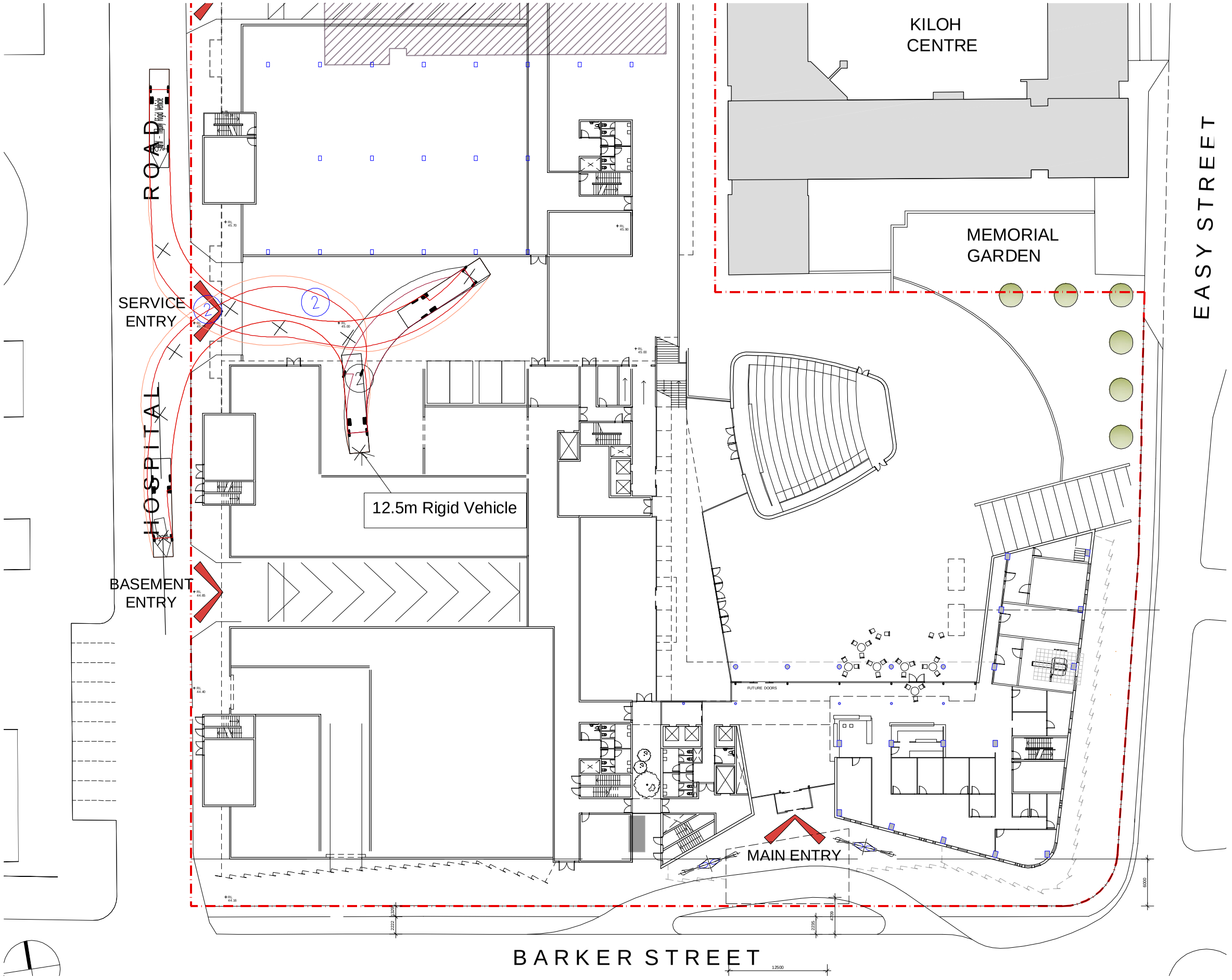
FUTURE DOORS

NEW ENTRY

BARKER STREET



BARKER STREET


KILOH
CENTRE
MEMORIAL
GARDEN
EASY STREET
ROAD
HOSPITAL
SERVICE
ENTRY
12.5m Rigid Vehicle
BASEMENT
ENTRY
MAIN ENTRY
FUTURE DOORS
BARKER STREET
12500
6000

Appendix F

Project Application Sub-Stage
Parking Diagrams

PRINCE OF
WALES HOSPITAL

BLACK DOG
INSTITUTE

KILOH
CENTRE

MEMORIAL
GARDEN

EASY STREET

HOSPITAL ROAD

EXISTING
PARKING
(17)

EXISTING
CARPARK
ENTRY / EXIT

EXISTING
ENTRANCE

EXISTING
PARKING
(20)

AMBULANCE
STATION

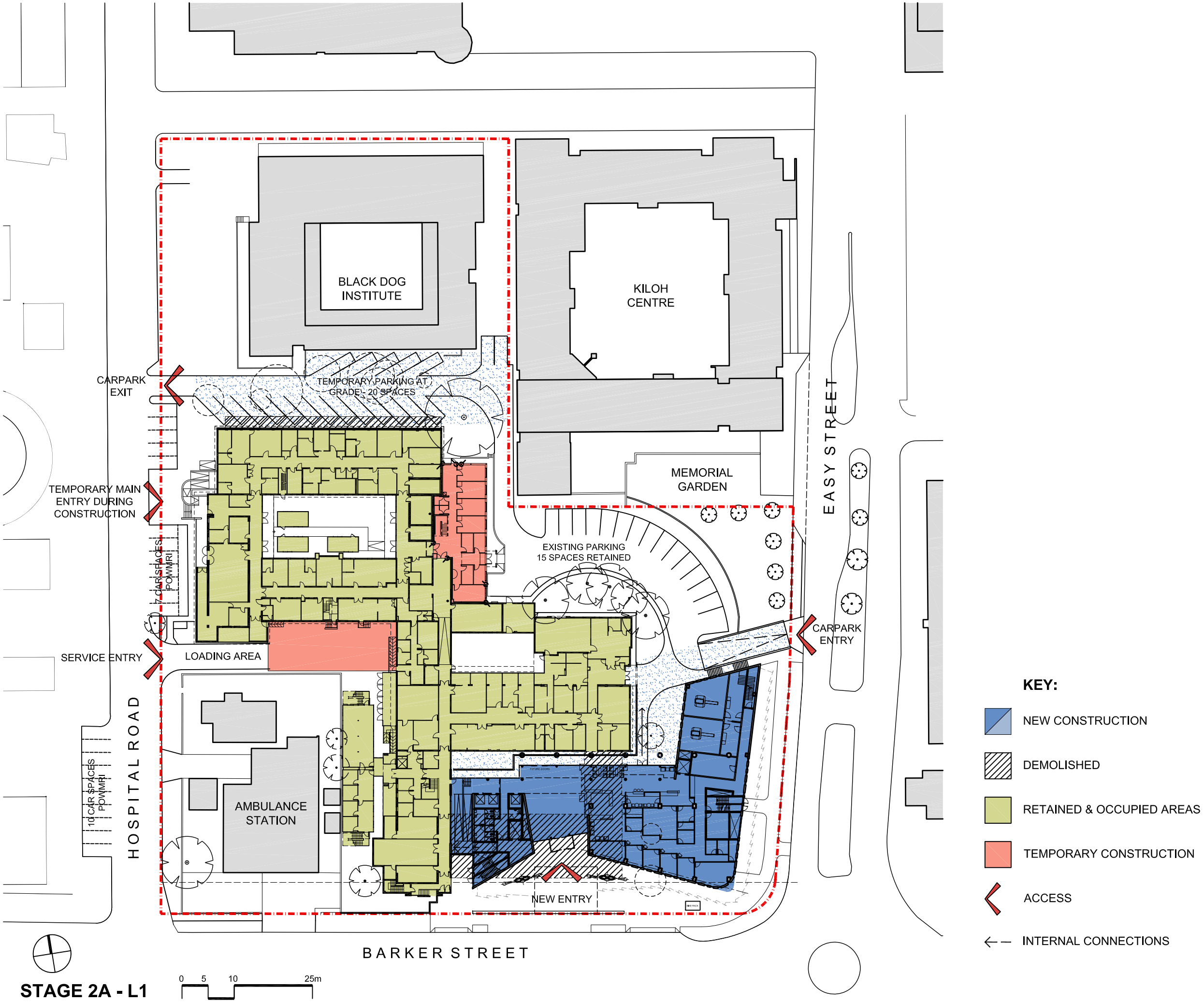
BARKER STREET

STAGE 1 - L1

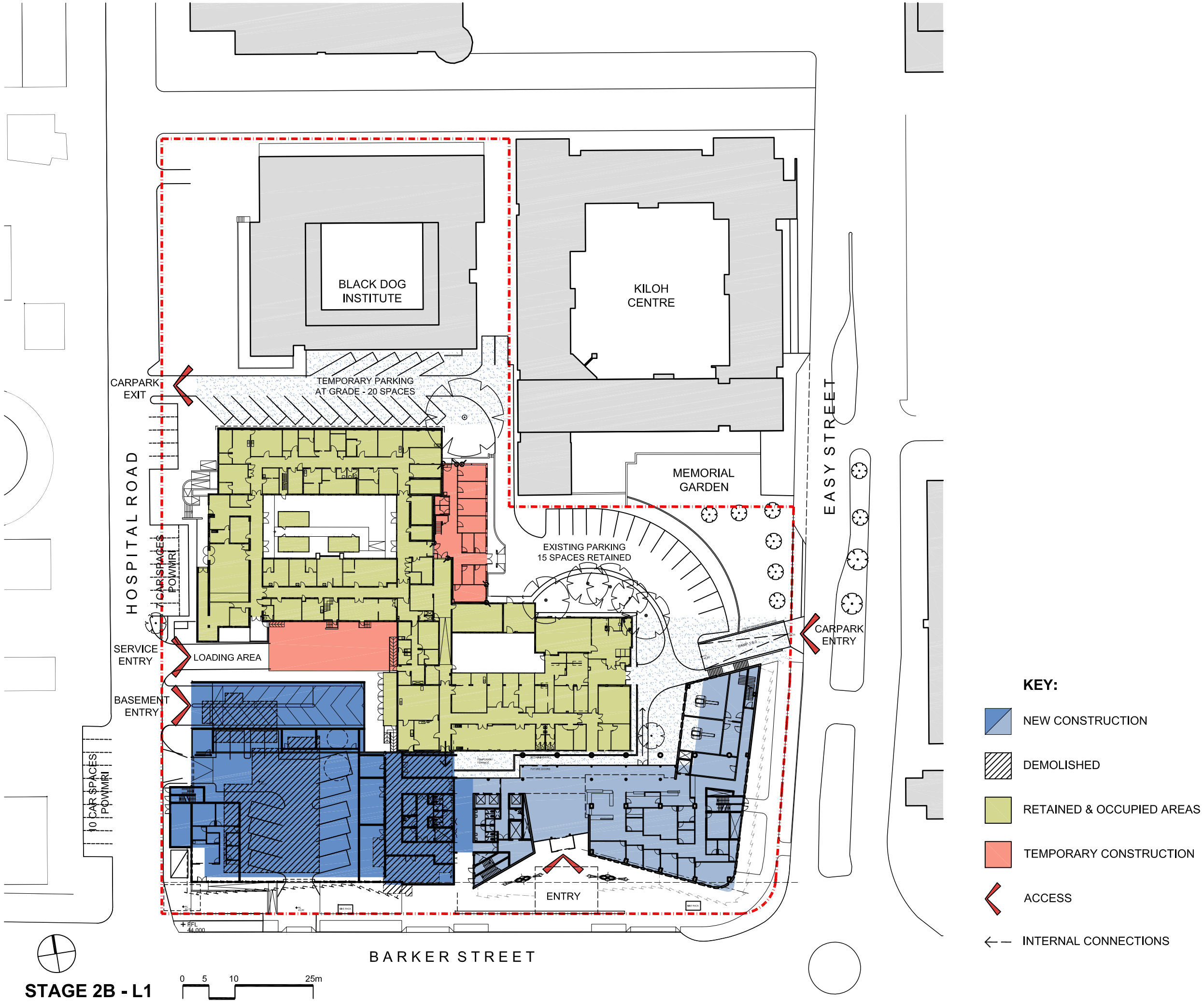
0 5 10 25m

KEY:

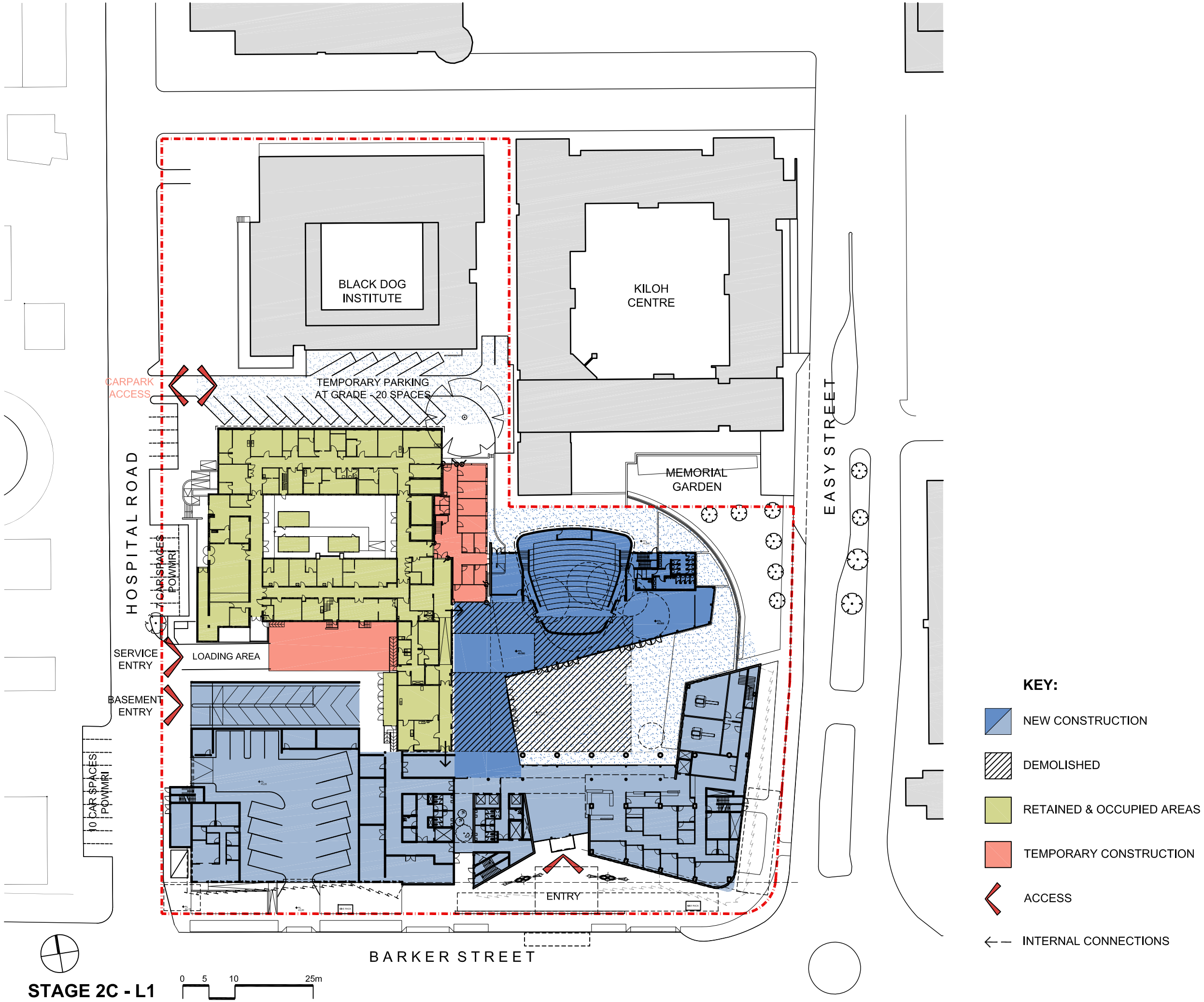
- NEW CONSTRUCTION
- DEMOLISHED
- RETAINED & OCCUPIED AREAS
- TEMPORARY CONSTRUCTION
- ACCESS
- INTERNAL CONNECTIONS


BLACK DOG INSTITUTE
KILOH CENTRE
MEMORIAL GARDEN
CARPARK EXIT
TEMPORARY PARKING AT GRADE - 20 SPACES
TEMPORARY MAIN ENTRY DURING CONSTRUCTION
7 CAR SPACES P0W/MI
EXISTING PARKING 15 SPACES RETAINED
CARPARK ENTRY
SERVICE ENTRY
LOADING AREA
10 CAR SPACES P0W/MI
AMBULANCE STATION
NEW ENTRY
HOSPITAL ROAD
EASY STREET
BARKER STREET
0 5 10 25m
KEY:
NEW CONSTRUCTION
DEMOLISHED
RETAINED & OCCUPIED AREAS
TEMPORARY CONSTRUCTION
ACCESS
INTERNAL CONNECTIONS

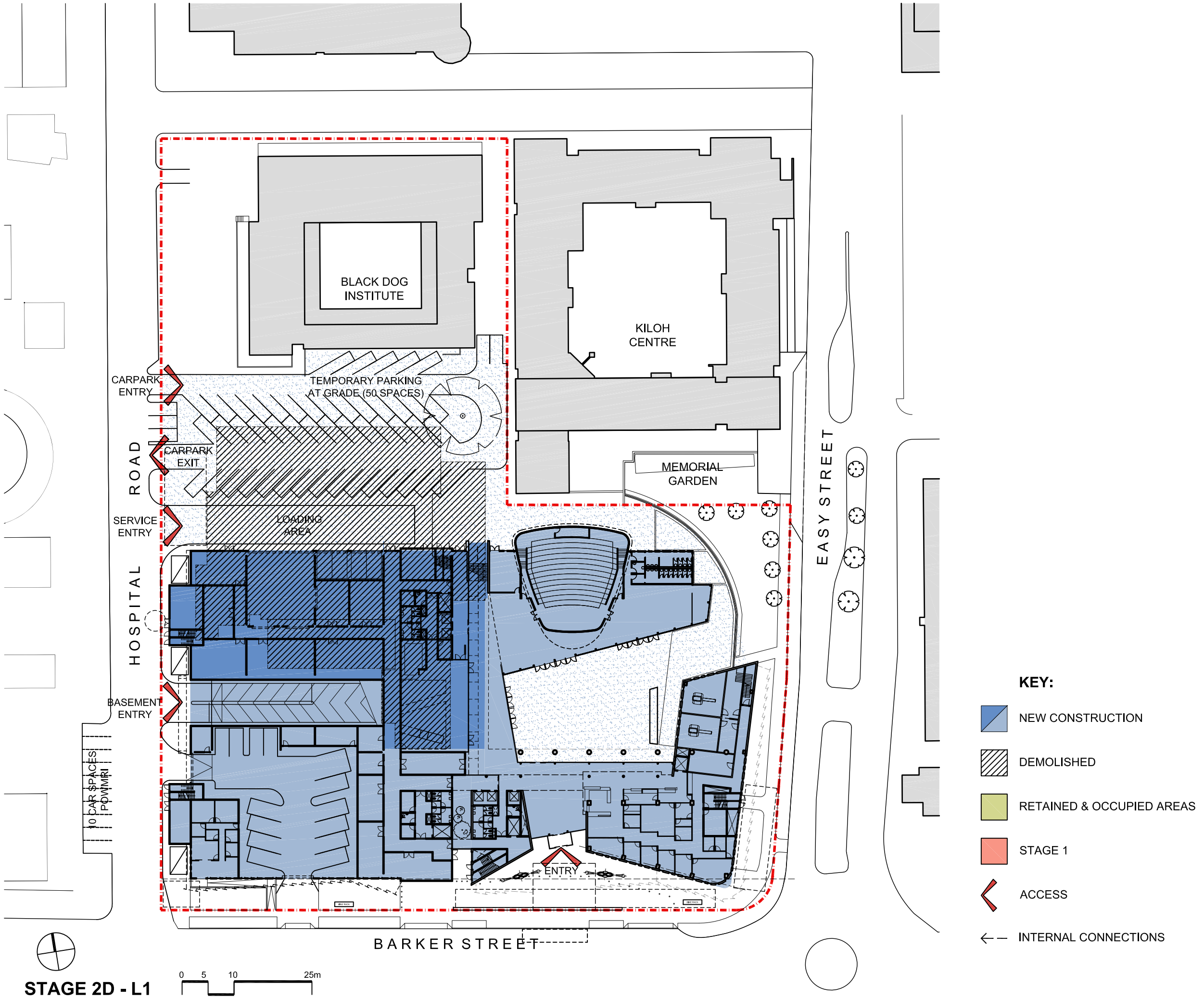
STAGE 2A - L1


BLACK DOG INSTITUTE
KILOH CENTRE
MEMORIAL GARDEN
TEMPORARY PARKING AT GRADE - 20 SPACES
CARPARK EXIT
EXISTING PARKING 15 SPACES RETAINED
CARPARK ENTRY
SERVICE ENTRY
LOADING AREA
BASEMENT ENTRY
ENTRY
HOSPITAL ROAD
EASY STREET
BARKER STREET
7 CAR SPACES POW/MRI
10 CAR SPACES POW/MRI
RAMP 1:20
TEMPORARY TERRACE
FUTURE DOORS
FFL 44.000
KEY:
NEW CONSTRUCTION
DEMOLISHED
RETAINED & OCCUPIED AREAS
TEMPORARY CONSTRUCTION
ACCESS
INTERNAL CONNECTIONS
0 5 10 25m

STAGE 2B - L1


BLACK DOG INSTITUTE
KILOH CENTRE
MEMORIAL GARDEN
TEMPORARY PARKING AT GRADE - 20 SPACES
CARPARK ACCESS
HOSPITAL ROAD
EASY STREET
BARKER STREET
2 CAR SPACES POW/MRI
SERVICE ENTRY
LOADING AREA
BASEMENT ENTRY
10 CAR SPACES POW/MRI
ENTRY
KEY:
NEW CONSTRUCTION
DEMOLISHED
RETAINED & OCCUPIED AREAS
TEMPORARY CONSTRUCTION
ACCESS
INTERNAL CONNECTIONS
0 5 10 25m

STAGE 2C - L1


BLACK DOG INSTITUTE
KILOH CENTRE
MEMORIAL GARDEN
TEMPORARY PARKING AT GRADE (50 SPACES)
CARPARK ENTRY
CARPARK EXIT
SERVICE ENTRY
LOADING AREA
BASEMENT ENTRY
ENTRY
10 CAR SPACES POWMRI
HOSPITAL ROAD
EASY STREET
BARKER STREET
KEY:
NEW CONSTRUCTION
DEMOLISHED
RETAINED & OCCUPIED AREAS
STAGE 1
ACCESS
INTERNAL CONNECTIONS
0 5 10 25m

STAGE 2D - L1