RANDWICK CAMPUS REDEVELOPMENT

CONSTRUCTION AND ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

STRICTLY CONFIDENTIAL

MAY 2019

NSW GOVERNMENT Planning & Environment

NSW GOVERNMENT Health Infrastructure

Randwick City Council
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CONSTRUCTION AND ENVIRONMENTAL MANAGEMENT PLAN

CONSTRUCTION CERTIFICATE ONE WORKS

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1.0 INTRODUCTION

The Randwick Campus Redevelopment Acute Service Building (RCR-ASB) is a highly complex project with critical early milestone components that must be delivered on time. The objective of this Construction and Environmental Management Plan (CEMP) is to ensure that demolition and site clearance activities associated with the RCR are safely delivered using a robust set of methodologies and zero unplanned disruption to hospital services.

The Lendlease construction management processes will provide:

- Seamless performance and accountability from a single responsible entity;
- The works will be managed by a single proven responsible entity; and
- Reduced risk of delivery.

Lendlease has produced this CEMP as the contractor responsible for delivery of piling and bulk excavation under the Early Enabling Works Package. It is envisaged that this CEMP will evolve during the course of the project as the design develops in conjunction with the design consultant team, project stakeholders; HI, SESLHD and PWC.

In the following sections, we have set out how we intend on managing the demolition and site clearance activities associated with the RCR.

The CEMP also defines the impacts of the proposed construction activities on areas within the RCR site and hospital campus. This plan will outline the proposed mitigation strategies to be implemented during the relevant construction activities and outlines contingency measures that will be enacted to eradicate any potential risk to HI, SESLHD its community partners and stakeholders.

Our proactive and collaborative approach is underpinned by the following overriding and non-negotiable objectives:

- Maintain business continuity of the hospital and adjoining facilities and properties;
- To deliver a world class facility for our client on time to the highest safety and quality standards;
- Safe and timely delivery of demolition and site clearance works enabling construction of the Randwick Campus Redevelopment;
- Communicate in a timely fashion with all relevant stakeholders what, when and how we are planning to undertake interface works;
- Present a positive public perception of the project during the construction works;
- Use experienced and competent subcontractors with appropriate resources to deliver their works in the manner we prescribe; and
- Hands on control of subcontractors from experienced Lendlease site supervision.

Health Infrastructure will have four key outcomes from the Lendlease CEMP:

CERTAINTY

- Robust management processes across all areas of the business
- Demonstrated and strong delivery experience

PARTNERSHIP

- Transparency of management processes
- Shared responsibilities applied to the project team
- Collaboration with Client and contractor market

CAPABILITY

- Extensive industry experience of the project leadership in delivery

COMPLIANCE

- Processes that meet Health Infrastructure, industry and company certification requirements
- Superior QA performance

2.0 STAGING AND BUSINESS CONTINUITY

2.1 RANDWICK HOSPITALS' CAMPUS HEALTH SERVICE CONTINUITY

Proposed methodology for working within an operational hospital environment and maintaining pedestrian traffic and vehicular traffic to entries;

2.1.1 Working Within the Operational Hospital Environment

The Lendlease project team understands the challenging nature of the RCR and the constraints of managing major construction works adjacent and within an operational hospital environment and the non-negotiable requirement of no disruptions to hospital 'business continuity'.

Works Areas

The first strategic approach from the site team in addressing live environment works is elimination. This means isolating work areas from operational hospital areas prior to any works being commenced and eliminating a works/hospital operations interface.

This will be the case for the major works to the following areas;

- The residential demolition area will be enclosed by A Class hoardings and will be secured to ensure no unauthorised access. The A Class hoarding will be maintained for the construction of the new ASB.

When elimination is not feasible, the second approach is to fully isolate the work area through secure hoardings prior to commencing any works and to provide controlled work access through the operational environment. This will be applicable to:

- Services connections to existing infrastructure that are required.

Along with significant works interfaces noted above there will also be planned investigative works, access to plant rooms, minor temporary works and installation of protective measures which will require process and controls to ensure full visibility of all subcontractors for these types of activities. Lendlease will impose a strict regime of consultation on all works outside the site perimeters, regardless of the nature of the intended works.

The Disruption Works Notice process will be followed here. This includes all workers to firstly complete the required hospital worker induction and secondly, Lendlease will institute a 'Permit to Work' process for all works outside of the secured site areas.

The permit system puts hold-points in place, which have to be signed-off prior to permit issue. If workers are found to be working without permits, they will be removed from the project. The hold points for the 'Permit to Work in the Hospital Area' will be the same as those for the Disruption Works Notice, to ensure a consistent level of compliance from the subcontractors.

Lendlease have identified a 4 step process that we will undertake to ensure that the design and construction methodology mitigates the construction risks inherent in conducting site works within a live Health Campus (refer Figure 1). The planning for health service continuity and risk management 4 step process will underpin all stages of the RCR-ASB project and will be used as the guiding principal for how construction will be undertaken around the campus.

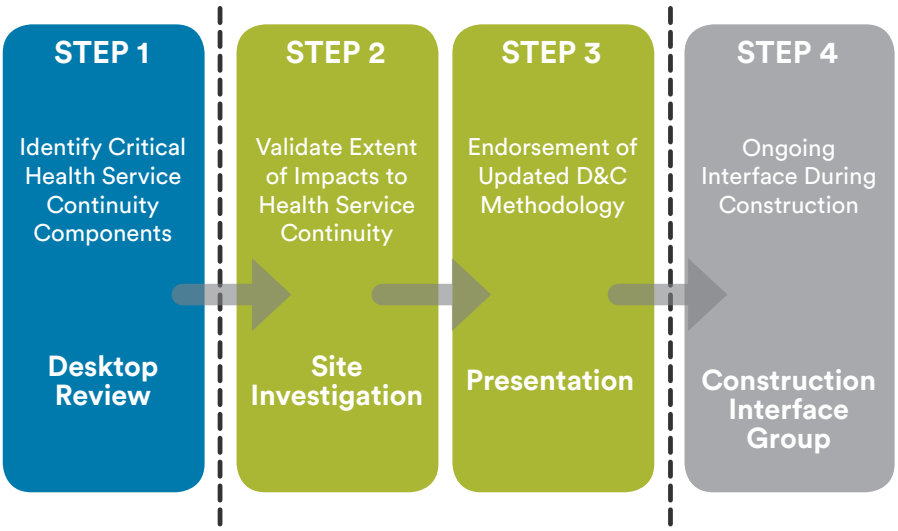


Figure 1: Four step business continuity process

Step 1 has been undertaken during the planning phase by Lendlease and will heavily influence initial construction methodology planning. Examples include but not limited to the following:

Program and Staging:

- Analysis of disruptive works staging in the most efficient manner to minimise disruption to the Campus stakeholders.
- Sequencing construction to ensure handover of completed spaces to the Randwick Campus Redevelopment at the best and earliest opportunity.

Site Establishment:

- Efficient use of existing redundant facilities and space available for site establishment to minimise space taken by the construction site.
- Off Campus solutions to construction car parking to ensure no disruption to car parking within the precinct.
- Planning for construction access in controlled zones.

Construction Interfaces:

- Strictly controlling where construction will interface with the Hospital nearby residential dwellings or public
- Implementing airtight, acoustically treated hoardings for all existing building connections to minimise Infection Control risks and reduce construction noise impacts to nearby existing buildings.
- Ensuring sight lines from the construction site are managed so that patient and residential privacy in adjacent buildings are maintained.
- Developing a web based Disruptive Works Notice (LiveOps) system to identify, document and communicate disruptions to stakeholders in a timely, interactive and transparent manner.
- Separation of the construction workers from staff, public and patients by providing discrete site accommodation and amenities within the construction boundaries.
- Using low impact construction methods to ensure noise and vibration doesn't impact the daily operations of the Hospital and nearby residential properties.

Lendlease will follow steps 2 and 3 to validate these assumptions and further develop them ready for the construction phase.

Step 4 implements ongoing risk assessment, mitigations and controls that have been established through Steps 1-3 and the continual monitoring of changing conditions that may affect our design and construction methodology. Strategies to support Randwick business continuity include but not limited to:

- Regular construction risk assessment using the Interface Strategy principles to identify areas of and manage potential interface risks that may affect the Randwick Hospital Campus business continuity.
- Utilising the Disruptive Works Notification (LiveOps) process to identify, manage, communicate and collaborate on works that affect the existing Hospital facility in a clear and transparent way.
- Undertake a holistic integrated system testing and commissioning process.
- Undertaking an efficient, transparent Completion and Validation processes in collaboration with the South East Sydney Local Health District and principal representatives to ensure that the completed product is seamlessly transitioned into a live hospital environment.
- Community notices/ updates.

3.0 RISK AND HAZARD MANAGEMENT

3.1 IDENTIFICATION AND MANAGEMENT OF KEY PROJECT RISKS

Identify the key issues and risks for the project and provide your proposed approach to management and mitigation of these issues and risks

The Randwick Campus Redevelopment presents a number of challenges that need to be delivered through a planned and structured approach.

Prior to commencing with construction activities an extensive analysis of the project documents will be undertaken including multiple site inspections to thoroughly understand and plan the project based on our awareness of the key risks. Within this section an initial assessment of such risks and the proven construction delivery techniques adopted for the project

The key objective is to cause "zero unplanned disruptions" during delivery of the works.

To achieve this objective Lendlease propose using a risk identification strategy built around the key interface points between the construction and the operational Health Precinct. This Interface Strategy will be critical in risk identification and will be used to influence design decisions and dictate construction methodology.

The following provides an initial assessment of the key interface risks and mitigations associated with the demolition and site clearance activities associated with the Randwick Campus Redevelopment. These will be developed in meticulous detail during the planning phase to inform the design and construction methodology, eliminate or manage risks appropriately and to ensure a smooth interface with the existing Randwick Health Precinct.

Approach to Risk Management			
Risk, Major Issues and Interface Type	**Details**	**Mitigation**	**Benefit**
Maintain the public's perception of 'business as usual' for the Randwick Hospitals' Campus	Understand the implications of construction staging on the hospital's operational drivers and the potential impacts.	Review the construction staging with the hospital to ensure the full understanding and acceptance of the proposals: timing/duration, construction impacts, power tools, noise, temporary partitions and access routes etc. All workers will be made aware of their responsibilities towards understanding what constitutes disruptive works and to understand the time frames associated with preparing to carry out any such works.	Minimise impacts of disruption to the hospital's daily activities wherever possible. Separation of construction and Hospital/public. Workers to be constantly reminded of the importance of patients and users of the Hospital.

Approach to Risk Management			
Risk, Major Issues and Interface Type	**Details**	**Mitigation**	**Benefit**
Working adjacent Royal Hospital for Women (RHW)	Construction works will take place adjacent to existing RHW facilities with potential disruption to services.	Privacy screens will be erected to remove direct sightlines from the RHW into the site. Workers will be made aware of patient privacy within the RHW bedrooms. No unauthorised removal of privacy screens erected on scaffold to prevent direct sightline within wards from the site. Where there are potential disruptions, extensive planning and consultation will be undertaken prior to commencement of disruptive works.	Increased patient privacy to improve wellbeing. Separation of staff and patients from construction. Workers to be constantly reminded of the importance of patients and users of the Hospital.
Construction Workers access and egress affecting daily Hospital operations.	Construction works should cause the least amount of disruption possible for staff and patients.	Access to and from site will be defined and out of bounds areas clarified for workers. The induction will focus on the amenities planned for within the construction site boundary which include lunch facilities with a selection of food outlets designed to offer choices to workers to limit their need to exit site at meal times.	Reduced congestion of public areas through separate access routes and social areas. Workers to be constantly reminded of the importance of patients and users of the Hospital.
Working around children	With construction in close proximity to the existing Children's Hospital, workers will need to be aware of working around children.	All workers will be made aware of their responsibilities towards working adjacent to facilities with children. Any workers involved with direct works inside identified areas will be required to undergo a 'working with children check'.	Children, their parents, and the staff in the children's hospital are reassured that the increased activity will not have negative impacts on young patients, and that workers are sensitive to their responsibilities around children. Separation of staff and patients from construction. Workers to be constantly reminded of the importance of patients and users of the Hospital.
Disruption to critical life services	Disruption to critical life services for tie-in's between new and existing	Clear identification of critical building services. Any construction works which could impact these services only to proceed once full work plans and contingency plans are in place and signed off by all parties.	Zero unplanned disruptions to existing facility and critical services.
Disruption to Light Rail Operations	Work in close proximity to energised wires nand adjacent work zones	Clear communication and planing protocols to be set-up and managed to ensure a successful project outcome.	Nil disruption to Light Rail external operations and the demolition phase can stay on program.

Approach to Risk Management			
Risk, Major Issues and Interface Type	**Details**	**Mitigation**	**Benefit**
Disruption of the existing hospital pedestrian and vehicle access	Entry/exit to site will be manned and managed by Lendlease Traffic controllers to mitigate disruption to pedestrian and vehicle access.	The project works will be programmed with a full temporary traffic management system to be established and coordinated with the hospital stakeholders prior to the commencement of construction. Traffic controller management of the entry and exit to existing Hospital Loading Dock. Traffic flow will be assisted and priority given to key hospital deliveries. In consultation with the Principal and Local Council, identify proposed construction vehicular traffic movements and routes. Prepare and agree a detailed traffic management plan that will be implemented on the project.	Pedestrian safety with logical wayfinding routes Controlled traffic management Minimises interface between construction and the Health precinct.
Vehicle parking	The commencement of the construction works for the early and main works contracts will see an influx of subcontractor workforce to the Precinct.	We will actively encourage the construction workers to use public transport to commute to and from the site, we do expect that some additional vehicles will be attempting to park near site. We will review opportunity for supplementary offsite parking to alleviate existing parking pressures onsite.	Minimises interface between construction and the Health precinct. Maintains existing carpark numbers for staff, patients and public
Impact on hospital operations	Minimising loss of amenity for patients and staff during construction, in particular the interface works at the existing facades and refurbishment works adjacent to occupied areas.	Throughout the interface works we expect there will be a need for impact drilling for structural connections and the like. Lendlease will plan and sequence these works to occur at specific agreed times to allow as much respite time as possible, in addition the utilisation of low frequency low impact tools and equipment will be implemented where possible. Core drilling will be utilised as an alternative where practical.	Continuation of regular hospital activities with minimal disruption to staff and patients. Minimises noise, dust and vibration effect on the operational Hospital.
Disruption to nearby residential and business properties	Minimising loss of amenity for nearby residential and business properties during construction, in particular the interface works at the existing facades and refurbishment works adjacent to occupied areas.	Noise, dust and vibration monitoring proactive notification of disruptive works selection of low impact equipment where possible maintenance of public safety.	Minimise noise, dust and vibration impacts on nearby dwellings.

Approach to Risk Management			
Risk, Major Issues and Interface Type	**Details**	**Mitigation**	**Benefit**
Infection control	A major issue whilst undertaking construction work on an operational campus.	Provision of acoustic and dust proof hoardings providing construction containment, the provision of localised dust monitoring, maintenance of negative pressure areas plus the use of air pressure sampling to ensure our construction containment regimes are working. The project specific Infection Control Plan is developed prior to commencing the construction works. In preparing this plan Lendlease will make reference to the 'Infection Control Principles for the Management of Construction, Renovation, Repairs and Maintenance within Healthcare Facilities. The plan will identify the different types and locations of works planned on the Randwick Campus Redevelopment and specify the level of infection control required for each type of activity. Identification of existing hospital air intakes and review to determine if additional filtration is required.	Elimination of negative impacts on staff and patients' health and wellbeing. Preventing dust from entering a clean Hospital environment with ongoing monitoring to ensure adherence to this policy. Minimises noise and vibration effect on the operational Hospital
Environmental Conditions	The site area will require careful management of site run-off.	Early Works Perimeter protections to be investigated during the ECI Planning period.	Minimises negative impact of construction to surrounding precinct and green zones.
Removal of potentially hazardous materials	Removal and disposal of potentially hazardous or contaminated materials and substances	Clearly communicate our methodologies to the hospital and liaise with all stakeholders to ensure visibility and understanding of the processes.	Containment of potentially hazardous materials in a controlled manner.
Damage to existing building facades	During construction of link bridges there is potential for damage to the existing building façade.	Temporary hoarding of glazed facades will be installed to enable continued operation of spaces adjacent to the affected areas.	Limit potential impact of construction to the existing facilities. Continuation of regular hospital activities with minimal disruption to staff and patients.
Continued compliance of existing fire zones	Fire zones and egress paths are to be maintained.	Maintain all required egress paths in coordination with the authorities. Maintain smoke extraction and relief air supply through the main entry doors. Undertake works in consultation with the Fire Engineer, Principal Certifying Authority and HI NSW.	Clear communication of emergency egress for public and Hospital users.
Unauthorised access to the Construction Site	Prevent public/patients from climbing the perimeter fence.	A solid 2.4m "A" class hoarding wall to be installed.	Provision of a safe site environment

A detailed risk analysis and refinement of the associated mitigation strategies will be further progressed during the design phase.

3.2 MANAGING RISKS WITHIN AN OPERATIONAL HOSPITAL ENVIRONMENT

Proposed methodology for managing risks within a live hospital environment

Lendlease is aware of the challenging nature of the RCR works being located in close proximity to the existing Hospital buildings. The project has critical construction and services interfaces and non-negotiable stakeholder requirements to ensure operational continuity is maintained.

During the design stage Lendlease will work in a collaborative manner with PWC to develop our stakeholder communication structure and to address all stakeholder requirements and concerns.

Through this open partnership collaboration process we will develop solutions that have stakeholder buy-in and document an agreed plan to manage construction delivery through to the completion of the works.

The activities below have the potential to significantly impact on the operation of the hospital, the wider Precinct and neighbour, if not managed effectively and communicated proactively with stakeholders:

- Access and traffic management;
- Planning and management of any major shutdowns;
- Minimising and controlling disruptions;
- Protection of existing hospital assets;
- Maintenance of existing patient and staff privacy and security;
- Emergency after-hours call-out;
- Hazardous material identification and removal;
- Noise, dust and vibration control; and
- Out of hours work.

Lendlease will prepare the following Management Plans to develop clear and concise communication channels for each area of interface works and support the ongoing operation of the hospital:

- Stakeholder Management Plan;
- Risk Management Plan;
- Helicopter Management Plan;
- Disruptive Works Notification Procedure; and
- Environmental, Health and Safety (EH&S) Management Plan.

Our integrated Environmental, Health and Safety Management Plan will identify all EH&S risks associated with stakeholders including and not limited to members of the public, hospital staff, hospital clients, and workers on site. The sub plans below will be developed with the collaboration of the relevant stakeholders during the pre-construction phase:

- Traffic and Pedestrian Management Plan;
- Noise and Vibration Management Plan;
- Dust Management Plan;
- Stormwater Management Plan;
- Waste Management Plan;
- Incident Management Plan;
- Emergency Response Plan;
- Crisis Management Plan;
- Hazardous Materials Management Plan; and
- Workplace Relations Management Plan.

3.3 KEY RANDWICK CAMPUS REDEVELOPMENT CONSTRUCTION INTERFACE OVERVIEW

Lendlease has reviewed the construction interfaces and have identified several requiring a detailed construction methodology to ensure Randwick Hospital business continuity is maintained at all times during the construction of the below areas:

3.4 HAZARDOUS MATERIAL

Proposed methodology for removal of hazardous materials (if encountered)

When developing a general approach to managing hazardous and unexpected finds, the starting point for Lendlease will be the existing Preliminary Site Investigation for Contamination (Douglas Partners, 2018).

Ongoing investigations will inform Lendlease's executive safety team and a draft Remediation Action Plan (RAP) which will be further developed through the stages of the Randwick Campus Redevelopment.

The primary areas and types of hazardous materials likely to be encountered include but are not limited to:

- ACM (Asbestos Containing Material) material encountered in the demolition of the existing buildings (e.g residential houses) and in-ground services (insulation);
- Contaminated fill material within early and enabling works foot print;
- Lead paint that may have been used on some of the existing residential buildings; and
- Potential biological hazards to the sewers and drainage of the existing buildings which have housed clinical service departments presently or historically (e.g pathology).

Lendlease is well equipped to co-ordinate and manage the safe removal of hazardous materials and understand how to appropriately manage risk associated with transporting hazardous materials within a live operational hospital campus and adjacent residential properties. Accordingly, Lendlease has developed a site-specific methodology for removal of hazardous waste to ensure that waste is disposed of correctly and efficiently including:

- Review and revision of the Asbestos Management Plan and Register, the Remedial Work Plan (RWP) and continual validation of the material data that has been captured to date;
- Ensure the Asbestos Remediation Contractor is appropriately licensed and the chain of custody is documented with the landfill facility to ensure the asbestos is appropriately and lawfully disposed of;
- Review all site occupational and environmental management and monitoring programmes;
- Review and revision of communications and Industrial Relations strategies; and
- RAP Validation process to be implemented throughout the works.

Of major importance in managing the removal of hazardous materials is communicating the works activity to the stakeholders.

This is compounded for projects located adjacent public health facilities due to perceived potential public health risks. To this end appropriate and responsive communication protocols will be addressed in the Stakeholder Communication Plan which will be activated immediately upon any unexpected finds are encountered.

Lendlease has allowed additional provisions to provide transparency to stakeholders and additional assurance for the successful implementation of the methodology above during the process of removing contaminated waste. Remediation progress, health and environmental monitoring results are components of the stakeholder manager's communication updates to site workers and stakeholders.

4.0 DESIGN FINALISATION AND SUBCONTRACTOR ENGAGEMENT

4.1 SUBCONTRACTOR PROCUREMENT AND ENGAGEMENT

Proposed methodology for the staged engagement of subcontractors.

The technical complexity, construction challenges and quality requirements of the Randwick Campus Redevelopment project dictate that the selection of the appropriate subcontractors will be critical in meeting the demands of the project. Lendlease will ensure that there is a flexibility and redundancy in the supply chain procurement in the way in which the work activity packages are established from an overarching scope of works and risk management perspective.

Lendlease will recommend subcontractors and supply chain partners that have a proven track record on complex healthcare projects and highly complex interface projects.

Our procurement strategy and associated program is derived from lead times determined from the overall construction program.

4.1.1 Subcontractor Inductions and Pre-Commencement Meetings

Lendlease will hold multiple meetings and briefings with the supply chain for both consultants and subcontractors. This will aid in the selection of the most appropriate preferred tenderers to carry out the works. The nature of the meetings is to ensure that each contractor understands the environment in which the construction works will be carried out and the responsibilities that comes with undertaking such works.

Following award, we will carry out formal pre-commencement meetings prior to executing subcontracts. These meetings will finalise discussions on:

- Working within the live Randwick health precinct;
- Working adjacent to residential and business properties;
- Delivery certainty;
- Subcontractor executive required involvement;
- Infection control;
- Site access and delivery requirements;
- Aboriginal participation and training targets:
- Trade specific interface and coordination issues from day one; and
- Worker car parking, site access and induction detail.

4.2 INDUCTIONS

The Lendlease induction will be specifically tailored to inform workers of their obligations working within a live health environment for the Randwick Campus Redevelopment. The content of the induction will be reviewed with the Health project team to ensure the strategies imposed by Lendlease are aligned with the requirements of the precinct.

The project induction will train new workers on project specific safety and emergency procedures, however, the key focus will include interface controls, including:

- **Working in a live environment:** The construction methodology has been designed around maintaining business continuity for the Hospital. This is key to a successful project and will be the underlying theme of the induction procedure for every worker on site;
- **Infection control:** Content within the induction will focus on the importance of infection control and the risk to the existing Hospital from construction works. It will also focus on work methodologies and quality procedures to ensure the end product delivered to the client has been constructed in accordance with the documentation and without risk of infection to end users;
- **Access within Existing Hospital:** We will provide clarity regarding no access into existing Hospital areas. There will be clear 'no-go' zones identified including the travel path for all emergency vehicles to and from the Hospital;
- **Separation of Construction Works from Hospital Operations:** Access to and from site will be defined and out of bounds areas clarified for workers. The induction will focus on the amenities planned for within the construction site boundary which include lunch facilities with a selection of food outlets designed to offer choices to workers to limit their need to exit site at meal times;
- **Disruptive Works Procedure:** All workers will be made aware of their responsibilities towards understanding what constitutes disruptive works and understand the time frames associated with preparing to carry out any such works; and
- **Working around Children:** All workers will be made aware of their responsibilities towards working adjacent facilities with children particularly the interface with the Sydney Children's Hospital.

We will also focus on the unique requirements of each stakeholder within the campus to ensure that the information in the induction is up to date and relevant to the specific work areas on site. An example of the specific requirements and locations are:

- **Working Adjacent to the Existing Clinical spaces:** All workers will be made aware of the need to ensure patient privacy within the facility. No unauthorised removal of privacy screens erected on scaffold to prevent direct sightline into wards will be permitted.
- **Working Adjacent to Local Residential and Business Properties:** All workers will be made aware of the need to enure positive contractor behavior at the approach and on site, including minimising disruptions to local parking and access.

4.3 CONTRACTORS DOCUMENTS

Proposed methodology for managing the future design interface and build ability through the design process;

4.3.1 Approvals and Design Changes

The design will be submitted to the principal at the 80% and 100% Contractor Documentation milestones. A Design Change register will also accompany any further Contractor Documentation submissions to the Principal during the delivery phase. These are envisaged to occur in monthly intervals or as required.

Any changes that constitute a deviation from the project Brief must go through an approval process with Lendlease and the Principal. Proposed changes will be submitted to the Principal prior to implementation and will identify the following:

- The item;
- Area/location;
- Reference of all documents affected by the change;
- The nature of the change;
- The reason for the change (which includes pre-obtained approval by Lendlease and the Principal for all items affecting the project Brief); and
- The implications, which are to be assessed as a minimum for impact on:
    1. Site health and safety management
    2. Cost and construction time
    3. Durability, functionality, aesthetics, maintenance
    4. Impact on other elements of the works.

Lendlease will add to the register any details of when proposals/implemented changes have been submitted to the Principal, when a response has been received and status of design documentation updates and/ or other implications.

The key streams of documentation approval required during this phase are detailed in the below sections.

5.0 OPERATIONS AND SITE MANAGEMENT

5.1 OVERVIEW

The Randwick Campus Redevelopment project will require precise site establishment, staging and operation, to ensure both safety, appropriate security, interface management and productivity are achieved. Lendlease's nominated delivery team has developed this detailed plan, which is integral to program and construction methodology.

Close attention to detail and the quality of the finished product are paramount, particularly on this multifaceted Healthcare Project. Lendlease believes this focus on quality must be promoted and fostered amongst the workforce on the project. This begins with an efficient site establishment strategy, and clean amenities which will set the standard for a high-quality outcome.

The planning and methodology assessment for the project has identified a number of key stages in the general configuration of the site during construction. This section provides an overview of the overall approach adopted with detail description of these stages provided below.

5.2 DILAPIDATION SURVEYS AND MONITORING

Prior to commencing works Lendlease will complete an extensive dilapidation survey of existing infrastructure covering roads, footpaths, external and internal areas of the existing buildings adjacent and interfacing with the construction site. Coordinated access to internal hospital areas will be arranged through the Principal. The resulting report will be provided to the Principal as a pre-commencement record of the existing built works on the precinct adjacent to the construction areas.

Our team also propose to inspect existing plant and equipment conditions in the initial periods of the ECI to determine the capacity of any plant and equipment that the new works interface with. This is critical to inform design scope and establish key opportunities and risks for consideration during interface planning.

Considering the above, we carry out the following works:

- Lendlease has allowed to engage an acoustic consultant during the course of the construction works to provide detailed advice and practical methodologies in the form of a Construction Noise and Vibration Management Plan in order to manage the potential noise issues with the adjacent sensitive receivers. Lendlease has extensive experience in managing these issues on similar health projects and will look to introduce the following measures on this project such as:
  - Adopt and modify the protection strategy for any heritage or significant buildings located on the site.
- The necessary vibration monitoring and back to base alarm monitoring to ensure the nominated accepted level stipulated by the SESLHD and associated buildings is not breached.
- Positioning major plant away from sensitive receiver boundaries where possible concrete pumping zones, cranage, and loading zones have been positioned away from operational existing facilities. Where applicable treating plant with mufflers and noise mitigating filters.
- The Construction Noise and Vibration Management Plan mentioned previously, will detail the criteria and protocols for vibration and noise protocols to the surrounding properties. This report details a number of sensitive receivers above ground in relation to vibration being:
  - Children's Hospital;
  - Existing "Core" Facilities; and
  - University of New South Wales.

5.3 SITE ESTABLISHMENT

Proposed methodology for site establishment, including crane location and swing radius

5.3.1 Hours of Work

The site working hours will be subject to the final SS approval conditions from the Department of Planning and Environment and Randwick City Council. For the purposes of initial construction planning we anticipate these to be:

Monday to Friday:	7am – 6pm
Saturday:	8am – 5pm
Sunday:	No work

In addition to regular working hours, there will be occasional short periods when out of hours works are required.

Lendlease will agree the process with HI, LHD, TMC Lightrail, SCO and Randwick City Council to address the approvals and additional measures required prior to scheduling any out of hour's works. The nature of these works would typically include erection of hoardings, works to footpaths, services connections and other works that interface with the surrounding operational hospital.

5.2.3 Proposed Site Plan

During the course of Randwick Campus Redevelopment Demolition and Site Clearance Works, see below proposed site establishment to be completed in the following stages:

- Stage 2 - Piling & Bulk Excavation
- Stage 3 - Main Works

This plan highlights the location of the site accommodation, project office inclusive of clients office, this plan also demonstrates how the site will be accessed by delivery drivers and couriers on a day by day.

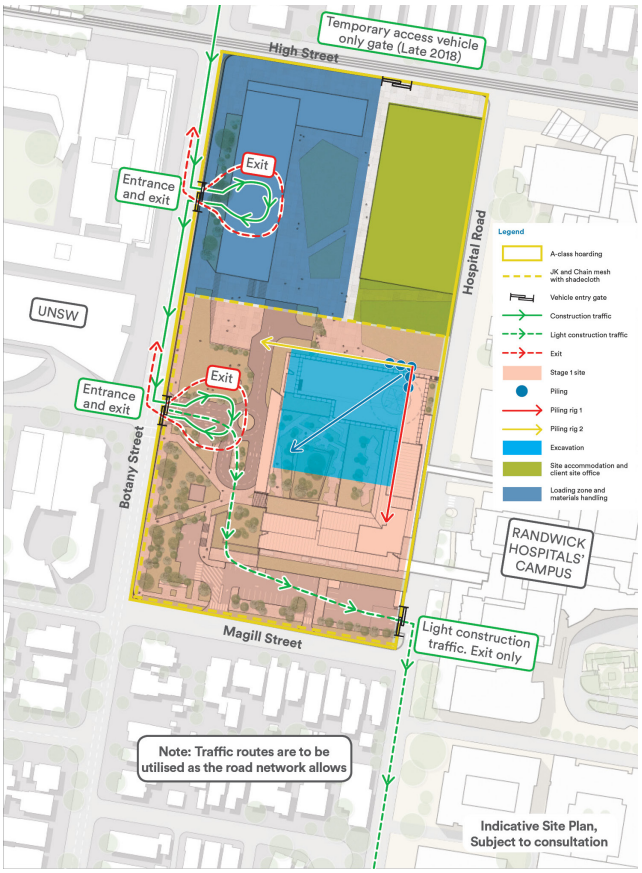


Figure 2 – Early Works Site Establishment Plan

5.3.3 Site Establishment Schedule

To meet the site possession date late 2018, a well-planned site mobilisation strategy will be finalised during the ECI Planning Phase.

The Lendlease delivery team will continue to finalise the construction methodology plan through subcontractor procurement, on-site investigations and validation.

5.3.4 Site Considerations

Lendlease has carefully planned and considered the staging requirements for the demolition and site clearance works. These established strategies are to best manage logistics of the project within a live hospital campus. In doing so we have identified the following key considerations for management of the site:

- Site establishment schedule;
- Worker transport and parking;
- Pedestrian access and circulation routes;
- Site evacuation / major incident response;
- Site compound and amenities;
- Temporary services;
- Site temporary services;
- Fencing and hoarding for site segregation;
- Site access points, construction traffic and deliveries;
- Materials storage and handling;
- Working adjacent to residential and business properties;
- Site management controls;
- Business continuity of Randwick Hospital, Sydney Children's Hospital, and the University of New South Wales, Royal Hospital for Women;
- Risk management;
- Construction methodology; and
- Project completion.

5.3.5 Site Access Points, Construction Traffic and Deliveries

Lendlease understand that one of the keys to the successful delivery of the demolition and site clearance works for the RCR will be the flow of materials and equipment into and out of the construction site. We believe it is imperative that our planning considers and successfully manages:

- The maintenance of pedestrian and traffic flows to the surrounding roads
- The unimpeded continued use of existing vehicular and pedestrian entry and exit points to the Randwick Precinct; and
- 24-hour access to the ambulance drop off area.

To achieve this, an extensive Traffic and Pedestrian Management Plan will be developed giving specific focus to:

- Carpark entry and egress: Carpark operations will be maintained at all times, including all car park services and emergency egress. Particular focus will be on peak flow access and egress during hospital shift change overs and strategies will be employed to ensure flows are maintained.
- Supplementary offsite parking: LendLease have identified supplementary parking for hospital staff, visitors, contractors, and consultants which could potentially alleviate current parking pressures over the 3 year life of the redevelopment. Lendlease will continue to work with HI, SESLHD and Randwick City Council to explore and realise any supplementary offsite parking opportunities during the ECI stage. (Please Refer to Section 8 Traffic Management)
- Disabled pedestrian access and paths of travel: Throughout all activities, disabled pedestrian access will be maintained with details of alternate routes and distances of paths of travel.
- All swept paths to be updated through the design phase with our coordination with the TfNSW.
- Lendlease will consult with all suppliers to ensure the correct size and weight vehicles are allocated to the project and are cognisant of carriage weight constraints.
- Ambulance entry: No works or vehicle movements will be allowed to affect the access of ambulance entry and parking area.

- Construction Vehicles: Mitigating impact to the Hospital precinct and surrounding roads will be considered along with a detailed analysis of delivery frequency in conjunction with the program and access routes to the site from the various approaches. Procedures for timely delivery notification will be developed (e.g. call prior to arrival and also advise on aborted deliveries).

5.3.6 Fencing and Hoarding for Site Segregation and Safety

We understand the critical importance of maintaining a secure and safe perimeter hoarding line to protect the public and staff from construction activities and prevent unauthorised access into the construction site 24 hours a day. Segregation of the site accommodation compound from the main site is equally important for worker safety.

Site security is paramount for public safety and we will implement security turnstiles on the entry to the site to prevent unauthorised access. Vehicle management will be managed by Traffic Controllers and security guards will be utilised out of working hours during the later stages of the works.

An “A Class” plywood hoarding and any sections of permanent chain wire fencing will be covered with Randwick Campus Redevelopment shadecloth and will be updated and maintained throughout the project in line with the project requirements.

A “B Class Gantry” will be investigated along Botany Street while stormwater activities are completed to ensure the welfare and safety of pedestrians, workers and hospital staff.

5.3.7 Site Security and Gates

The site perimeter will be secure at all times with no unauthorised access permitted. As detailed above the perimeter of the site will be secure with full height plywood A Class hoardings.

Out of hours security patrols will be utilised during the shutdown periods, Christmas and Easter will also be monitored by external security services.

CCTV with active motion sensors will be used to track any unauthorised access to site, worker and materials hoists or site accommodation.

Construction worker access to the site will be strictly controlled through our secured gate system. Individuals will require a personalised identity swipe card to gain access to site. This also creates a live record of who is on site at any given time in order to provide check list if the site is ever evacuated in case of emergency.

The above and below ground areas will be further segregated by an additional secure line to ensure the appropriate time that only rail accredited staff can access the areas designated as such.

5.3.8 Site Compound and Amenities

Lendlease places emphasis on the quality and amenity of the project and accommodation facilities. Quality facilities set a standard and a level of expectation that we expect our staff and subcontractors to take with them to the workface on site.

Accommodation and amenities for the construction workforce will be provided in demountable site sheds.

These site sheds will be erected, relocated and disestablished throughout the redevelopment to cater for fluctuating workforce demand and moving work areas.

Multiple locations have been considered throughout the Randwick Campus Redevelopment stages. Final site accommodation planning will be further developed with HI & SESLHD. Preliminary site accommodation planning locations identified across Randwick Campus Redevelopment staging as follows:

- Piling and Bulk Excavation Stage 2 – Single stacked accommodation established to cater for 120 person workforce. The site accommodation compound will remain in this location until the completion of the program or until the Principal instructs Lendlease to relocated due to the future development of the vacant site.

Please refer to Appendix 1 for Site Establishment Staging Plans. These solutions will be further refined in consultation with HI and SESLHD.

The capacity of the above site accommodation and amenities will be further expanded as the size of the construction team grows. The site accommodation as previously mentioned will be sized for a maximum site workforce of 60 personnel.

All site accommodation will be joined by covered walkways to ensure the workforce and office staff can move around the area and stay dry from any inclement weather.

5.3.9 Pedestrian Access and Circulation Routes

Lendlease have identified that the existing hospital access is to be maintained throughout each construction stage of the Randwick Campus Redevelopment. See Figure 6 (pg 22) for proposed pedestrian and vehicular circulation routes.

Lendlease note that all boundaries are still accessible by pedestrians, and a local diversion that will be in place exists at the eastern end of Magill Street which will direct pedestrians across the road to ensure their safety and welfare at all times.

5.3.10 Worker Transportation and Parking

Due to existing heavy traffic flows in the area from UNSW, the Randwick Campus Redevelopment and other surrounding construction works, site workers will be encouraged to take public transport to and from site while on-site parking is not available.

With the site in close proximity to UNSW and the existing Randwick Hospital, there are a number of bus lines which run from main stations in the Sydney city region to around the site.

- 891 – Central Station to High Street;
- 339 – Central Station on Foveaux Street just East of Elizabeth Street;
- 372 – Central Station to Belmore Road;
- 373 – Museum Station to Belmore Road;
- 37 – Central Station to Alison Road;
- 376 – Museum Station to Belmore Road;
- 377 – Museum Station;
- 304 – Central Station to Barker Street;
- Metrobus 10 (M10) – Leichhardt to Maroubra Junction via Anzac Parade;
- Metrobus 50 (M50) – Drummoyne to Coogee via the City, Anzac Parade and High Street;
- 370 - Leichardt to Coogee via Anzac Parade and High Street;
- 400 - Burwood to Bondi Junction via High Street; and
- CBD South East Light Rail Project (CSELR) linking Circular Quay to High Street Via, Rail currently under construction with planned construction completed in 2018 and light rail operational in 2019. See below several alternate strategies to facilitate offsite parking options for the HI, SESLHD and Randwick City Council's consideration.

Lendlease has completed a preliminary investigation of transport and parking opportunities on and off site to ensure minimalist disturbance to the operation of POWH.

Lendlease in consultation with SESLHD and HI, through the course of the project team will consult with SCHN and coordinate with TfNSW to ensure an adequate pickup/ drop off zone facility for SCHN is maintained during the construction period.

A number of parking options in the surrounding area will be investigated during the planning phase.

Any on-site worker parking proposal would be subject to agreement with SESLHD, HI and TfNSW.

Investigations and consultation conducted by Lendlease have concluded the Australian Turf Club (ATC) as the most suitable location for an off-site parking facility. At present the ATC car park is an underutilised resource that can make available 300 spaces to the Randwick Campus Redevelopment project site.

Initial planning has occurred in consultation with the ATC to determine the most appropriate transport routes and drop off zones from within the ATC facilities.

Consideration will be given to ATC and UNSW event calendars to ensure arrangements do not impact the parking and transportation demands of major events.

An opportunity is available for the La Perouse Local Aboriginal Land Council to operate a to-site shuttle service "Gamay Transport". The La Perouse Local Aboriginal Land Council estimates this shuttle service would provide new employment opportunities for seven local Aboriginal people.

Bus timetabling will reflect peak worker start and finish times with additional services operated throughout the course of the day. Shuttle services will be monitored and revised to ensure timetabling remains reflective of demand.

Further, the construction workforce will be encouraged to use public transport to alleviate the number of vehicles entering the wider Randwick area.

This proposal is subject to agreement with SESLHD, HI and TfNSW.

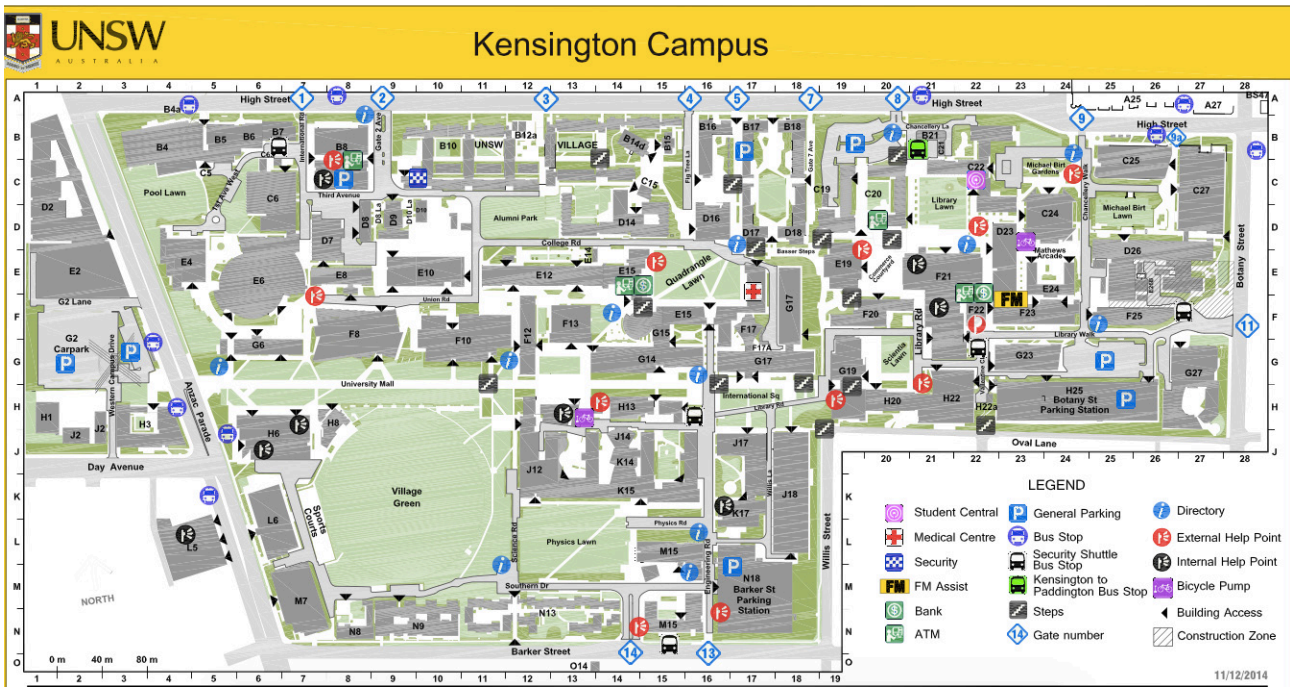


Figure 4 – Kensington Campus parking options

1. The UNSW directly to the West of the site provides metered parking spaces around campus. The Barker Street and Botany Street Carparks provide all day meter parking on upper floors.

   There are a number of 2P parking spaces around campus with 200 parking bays in the Western Campus Carpark and a number of parking bays in the University Terraces, International House and the Kensington Colleges.

2. The Royal Randwick Shopping Centre is 0.4km to the North-East of the site and provides 530 undercover parking bays charged as casual rates per entry.

3. The Spot Wilson Carpark is 0.6km East of the site and provides undercover parking charging casual rates per entry.

4. The Silver Street Carpark 0.6km North of the site provides parking charging at casual rates per entry.

5. The Royal Randwick Racecourse is 1.4km North-West of the site and provides around 300 metered parking spaces.

6. There is also 2P metered parking on all streets surrounding the area of the site.

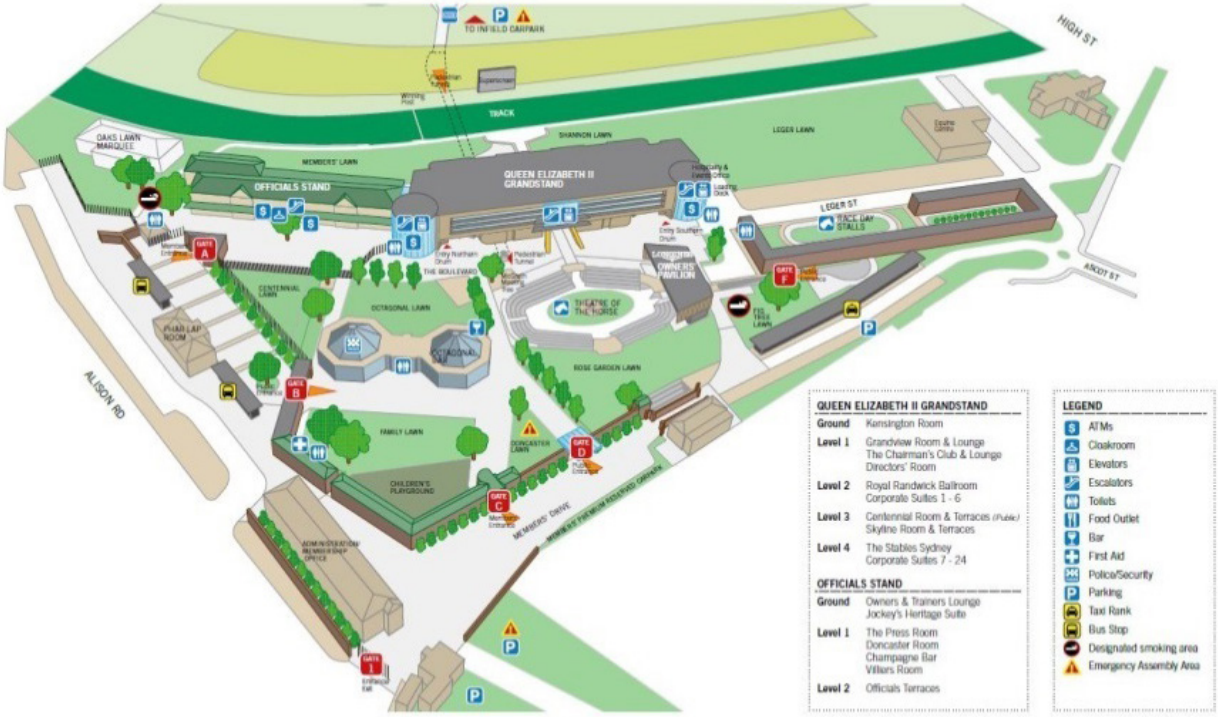


Figure 5 – Royal Randwick Racecourse parking options

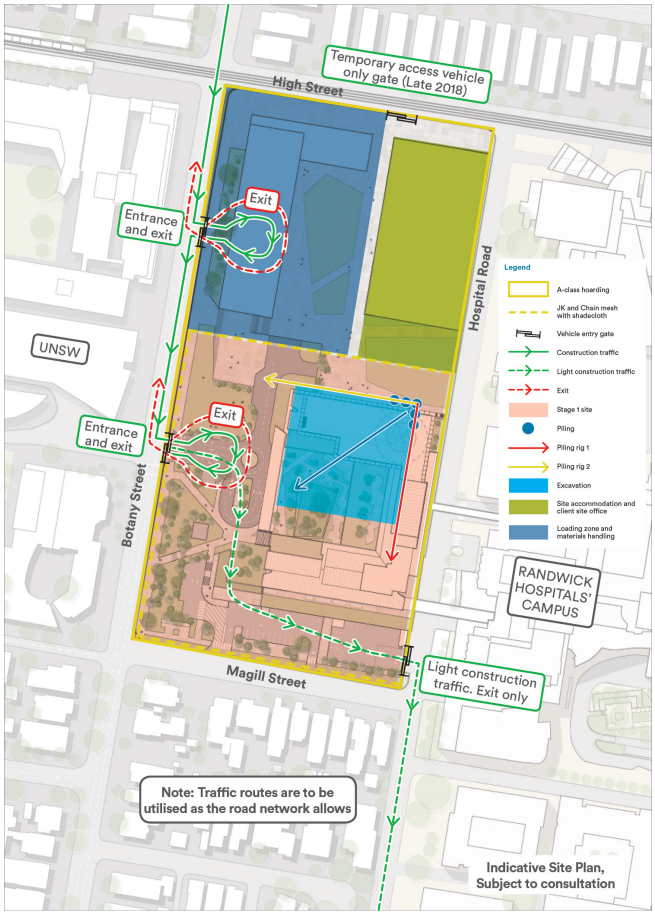


Figure 6 – Proposed access path to Eurimbla Avue.

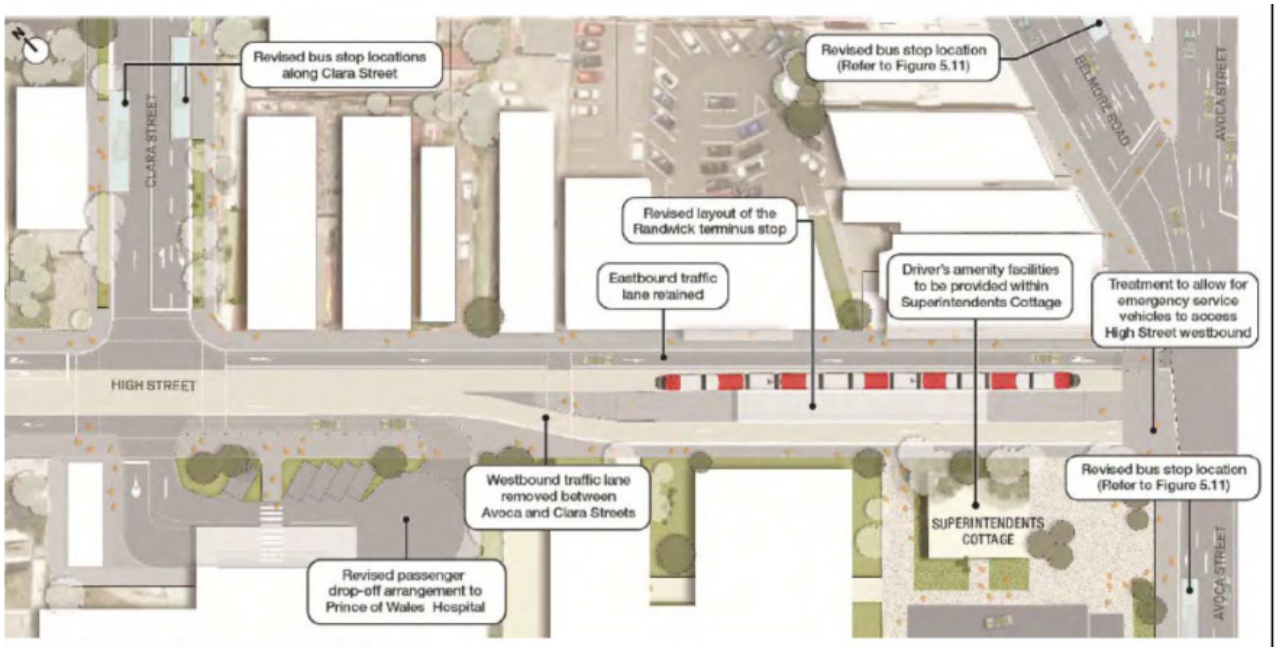
Interface with Light Rail along High Street

Lendlease understand through consultation with TfNSW (Transport for New South Wales), TMC (Transport Management Centre) and the light rail contractor the sensitivities around the High Street interchange. Lendlease propose to utilise the following traffic flow to enter the construction site Clara Street then turn right onto High Street then left into Eurimbla access path for the first 8 weeks to ensure a safe and successful site establishment and demolition sequence. In this period Lendlease will ensure that correctly sized vehicles are mobilised to site to ensure no disruption to essential light rail operations.

Lendlease will continue to work with the above authorities and contractors to ensure constant and open communication whilst to initial demolition and site remediation works along High Street civil and over infrastructure works are undertaken.

Key Considerations for Traffic and Material Movements

- Light rail Project (CSELR) – light rail is currently under construction with planned construction completed in 2018 and light rail operational in 2019. Light rail will impact vehicular along High Street with one-way eastbound, access west bound along High Street will not be possible from Avoca Street.



Note: Indicative only. Subject to detailed design

Figure 7 – Finished State of The Light Rail Infrastructure Along High Street

5.3.11 Construction Worker Support

Lendlease see that the health and wellbeing of our construction workers is paramount and provide our construction workforce on site with a more comfortable environment, and support healthier minds in the workplace. Initiatives Lendlease provide onsite include:

- Quit smoking support;
- Bupa Healthy Options;
- Healthy living courses; and
- Mates in Construction (MIC) - mental health support.

5.3.12 Site Evacuation / Major Incidence Response / Emergency Procedures

Prior to the commencement of demolition and site clearance, a detailed Emergency Evacuation Plan and Crisis Management Plan will be developed.

5.3.13 Temporary Services

Lendlease have developed a series of preliminary Temporary Services Plans for each Stage of the Redevelopment. These plans will be further developed following detailed site investigations during ECI Planning Phase.

5.3.14 Waste Management

Lendlease will ensure our supply chain is responsible and accountable for maintaining a clean, clear and safe working environment. Rubbish bins will be provided to all work areas and will be regularly removed to the central skip bin location by the subcontractors for collection and transport from site to the waste recycle facility.

Bins will be moved via the person and materials hoists or by the crane, dependant on the where they are being loaded from and the waste material that is being removed from site. Crane lifted steel bins will be used to service the top floors where structure trades are working, and large Otto bins will service the lower levels where fitout and service trades are working. The site skips will be centrally located at Ground Level to ensure an easier pick up from our bin contractor.

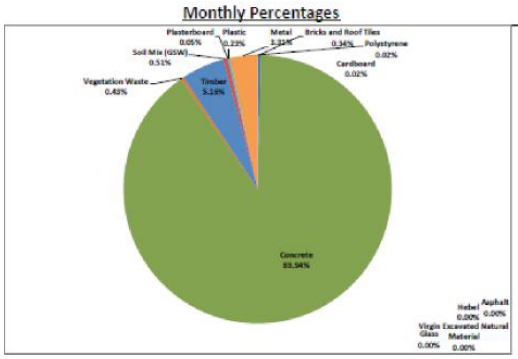
Waste will be separated at the approved waste management centre. Auditable records will be kept of quantities of all materials both recycled and disposed landfill. Records will be monitored to ensure Lendlease internal recycling targets are achieved or exceeded. This information will be collected and reported in compliance with our Environmental Management Plan and its Waste Management and Recycling Sub-Plan over the duration of the project. A sample summary is graphically and statistically referenced on the following pages.

To ensure the Randwick Campus Redevelopment project meets its sustainability targets, waste management reports will show monthly and cumulative performance.

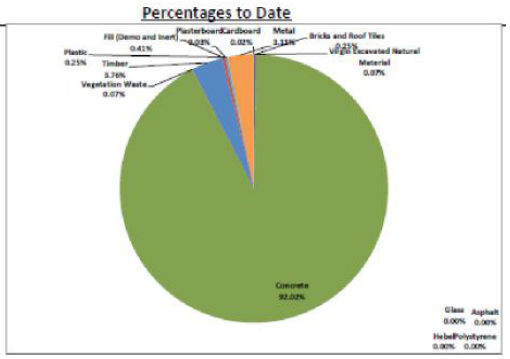
Percentage Waste Recycled to date =	2686.03 Tonnes / 2707.35 Tonnes	99.21%

Waste Fraction	Total Quantity Generated		Total Recycled		Total Disposed off		Recovery Rate
Heavy	411.11	Tonnes	411.11	Tonnes	0.00	Tonnes	100.00%
Light	29.67	Tonnes	28.19	Tonnes	1.49	Tonnes	94.99%
TOTAL	440.78	Tonnes	439.29	Tonnes	1.49	Tonnes	99.66%

Monthly Percentages



Percentages to Date



5.3.15 Temporary Works

At various stages of the construction life cycle protection decks, proprietary B - Class Hoardings or bespoke engineered items and other temporary works such as shoring, retaining walls etc will be required. These items will be carefully planned and scrutinised. Lendlease experience shows such temporary works are usually associated with high risk activities and will need to be fully engineered, certified and EHS compliant.

The temporary works that will be required to be undertaken during the course of the early and enabling works include:

1. Establishing temporary construction zones and localised traffic diversions

5.4 CRANES AND MATERIALS HANDLING

Proposed methodology for cranage and establishing a Helicopter Management Plan;

5.4.1 Crane Selection and Materials Handling

During the course of the Piling and Bulk Excavation scope no tower cranes will need to be established all works will be undertaken by the use of mobile cranes and “pick and carry” plant and equipment such as forklifts and telehandlers.

5.5 ENVIRONMENTAL PROTECTION

Proposed methodology for environment protection, including noise, dust, vibration & visual.

The site area will require careful management of site run-off. Perimeter protections installed during the Demolitin and Site Clearance will be reviewed on site during the VECI Planning Phase period. Once the Demolitin and Site Clearance contractor is novated, Lendlease will carry out daily site inspections and ad hoc inspections in response to changes in environmental conditions. These inspections will focus on protective measures for all site boundaries, access roads and stormwater pits.

These daily inspections will enable any issues to be identified and corrected immediately, resulting in no impact on the environment, local community and public ways.

The primary areas requiring specific environmental controls will be:

- Inspection of remediation capping layer for uncontrolled breaches;
- Managing site surface water run-off;
- Disposal of any retained stormwater;
- Protective measures during removal of hazardous materials;
- Monitoring and mitigation of dust, vibration and noise;
- Managed storage of hazardous construction materials;
- Dedicated wash down facilities; and
- Monitoring water table during groundworks.

5.5.2 Noise and Vibration

Monitoring for noise emissions, vibration and air quality during the redevelopment works is necessary to maintain the health and well-being of people who are involved in the works and of those within the existing hospital buildings

During demolition work, there will be some noise and vibration. To manage the impact on the community, demolition activities will predominantly be carried out during the day. The proposed equipment for demolition and site clearing activities include: excavator 30t with hydraulic rock hammer and ripper, skidsteer loaders/bobcats, trucks and trailers and other tools/machinery such as cement mixers, angle grinders, concrete saws, chainsaws, mulchers, drills and hammers. Lendlease will implement a CNVMP outlining the controls to be implemented on site. The CNVMP will confirm strategies that will be implemented to minimise disturbance to sensitive receivers in accordance with regulatory requirements.

In addition to the above any vibration sensitive equipment will be reviewed during the planning stages to advise if the works will have any impact of those pieces of equipment or hospital services.

Lendlease have identified particular noisy works, in particular those which directly interface with existing buildings where strategies will be implemented to minimise disturbance to sensitive receivers within the hospital.

Generally, the following controls will be implemented to ensure that noise and vibration related issues are controlled, addressed and resolved in accordance with regulatory requirements:

- Employees will receive training which will enable them to recognise areas where noise levels are likely to exceed 75dBA;
- Additional noise assessment of the site will be undertaken prior to or at the commencement of works on site with ongoing monitoring in strategic locations determined through consultation with HI during the construction period;
- As the work environment changes, additional assessments may be conducted, the timing of which will be determined in consultation between the site management, Site Safety Committee and the Principal;
- In conjunction with HI NSW, developing acceptable periods when specific "noisy works" can occur;
- Managing works within the approved site working hours;
- Planning and notification of noisy works via the Disruptive Works Notice procedure and in general consultation with HI;
- Warning signs shall be erected in areas where 85dBA is exceeded; and
- Where additional personnel protection equipment is required, the areas shall be identified by signage. The appropriate noise protection devices are to be issued to the effected personnel.

Noise emissions will be managed in accordance with the regulatory requirements and Lendlease management procedures, complying with the following:

- National Code of Practice for Noise
- Management and Protection of Hearing at Work [NOHSC:2009];
- AS/NZS 1269.0:2005: Occupational noise management – Series of several Standards;
- AS 2012.2: Acoustics - Measurement of airborne noise emitted by earth-moving machinery and agricultural tractors - Stationary test condition - Operator's position;
- AS 2436: Guide to noise control on construction, maintenance and demolition sites;
- AS 2221.1: Methods for measurements of airborne sound emitted by compressor units including prime movers and by pneumatic tools and machines;
- AS 3781: Acoustics – Noise labelling of machinery and equipment.

5.5.3 Air Quality Management

Objectives for the project are to implement appropriate controls to suppress dust and other suspended particles in accordance with legislation and risk management requirements minimising the generation of dust on the site and potential emission issues relating to plant and equipment.

The AQM Plan is included within the project EH&S Plan and our strategy for air quality management would include:

- Clear definition of trafficable and material storage areas to prevent unnecessary vehicle movement into other areas;
- Use of water cart to dampen work areas and exposed soils to prevent the emission of excessive dust;
- Installation of a wheel shaker grid and/or wash down facilities at the vehicle egress point;
- Ensuring trucks transporting materials to and from the site use covers to prevent wind blown dust or spillage;
- Ensuring truck tailgate locking mechanisms are operational and in use;
- Periodic inspection of surrounding roads to ensure no construction contamination and initiation of road sweeping if required;
- Careful selection of materials for temporary road surfacing;
- Aspergillus control during construction works within existing buildings;
- Subcontractors to maintain equipment / machinery to ensure exhaust emissions comply with relevant legislation and guidelines;
- All waste material to be sorted, collected and removed from site (for recycling where possible);
- Air quality monitoring;
- Dust screens and airlocks to be utilised with interior works;
- Provide construction filters to air intake vents; and
- Use of temporary exhaust fans and filters to circulate construction zone air to exterior of building.

6.0 CONSTRUCTION PROGRAM METHODOLOGY

6.1 SUMMARY PROGRAM OF WORKS

See below a summary of Randwick Campus Redevelopment submission program.

RANDWICK CAMPUS REDEVELOPMENT – INDICATIVE PROGRAM

Activity	2019											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
SSDA Approved												
Piling												
Capping Beam Installation												
Bulk Excavation												

6.2 CONSTRUCTION STAGING

Proposed methodology for managing staged handovers in a timely and efficient manner

6.2.1 Construction Staging Overview

The Lendlease project team fully appreciate the disruption and change the construction works will bring to hospital operations and understand the challenges the HI, SESLHD and Randwick Hospital Precinct management will have in communicating the staging sequences and the program of the works to the staff and public. The better hospital staff and public understand the timing and reasoning of the staging of the works, the more comfortable they will be with the temporary inconveniences.

We have completed and initial review of our construction program and methodology and documented a draft set of staging plans covering the works phases, these will provide the basis for a full set of staging control plans, which will be developed in conjunction with detailed design development during the VECI and ECI phase in consultation with HI, SESLHD and Randwick Hospital Precinct Management.

The staging plans will be developed to include:

- All site establishment items;
- Changed or modified egress paths;
- Pedestrian and vehicle circulation route changes;
- Temporary signage requirements; and
- Upcoming changes to works areas including approximated program dates.

6.2.2 Early and Enabling Works – Construction Staging

Prior to commencement of the Main Acute Services Building there are some Early and Enabling works that must be undertaken.

These include but are notlimited to:

- Site Establishment;
- Piling; and
- Bulk Excavation.

Site Establishment

During the site establishment phase of the project the following activities will be undertaken. An “A” Class plywood hoarding will be installed to the perimeter of the site; this hoarding will ensure that there is no unauthorised access to the site. The duration in time for this is shown on the indicative program on previous page.

The Lendlease site office at this time will be located within a dwelling or complex located on High Street as shown on the demolition staging plan.

The site will have four (4) gates installed during the site establishment phase, these being on High Street, two on Botany Street and one on Hospital Road. These gates will be steel and chain link mesh with large identification numbers and statutory Workplace Health and Safety signage installed on them.

The figure 9 on the following page shows what the site established will look like.

The demolition will be undertaken by using the following equipment:

- Multiple Excavators with various attachments;
- Skid steer loaders; and
- Truck and trailers to remove the recyclable waste.

A strategy to salvage any elements of existing buildings that are identified to be of conservation value is to be submitted to and approved by the Principal prior to the commencement of demolition.

These elements will be removed from site and held in storage prior to reselling.

The below figure 9 denotes the overall site plan, piling and demolition sequence site plans.

Piling

The piling works will be undertaken by using 2 x CFA (contiguous flight auger) Piling Rigs these rigs will be working from the North to the South and East to West. The piling rigs will drill and expel spoil that will be cleaned up by skid steer loaders once the pile location has been cleaned out the reinforcement will be placed into the pile and grout then placed into the hole to complete the piling activities.

Bulk Excavation

The bulk excavation works will be undertaken by large excavators, dozers, truck and trailers, and potentially moxy trucks to haul spoil from section on site to another. The bulk excavation will commence in the North – East corner of the site as illustrated in the below site establishment plan.

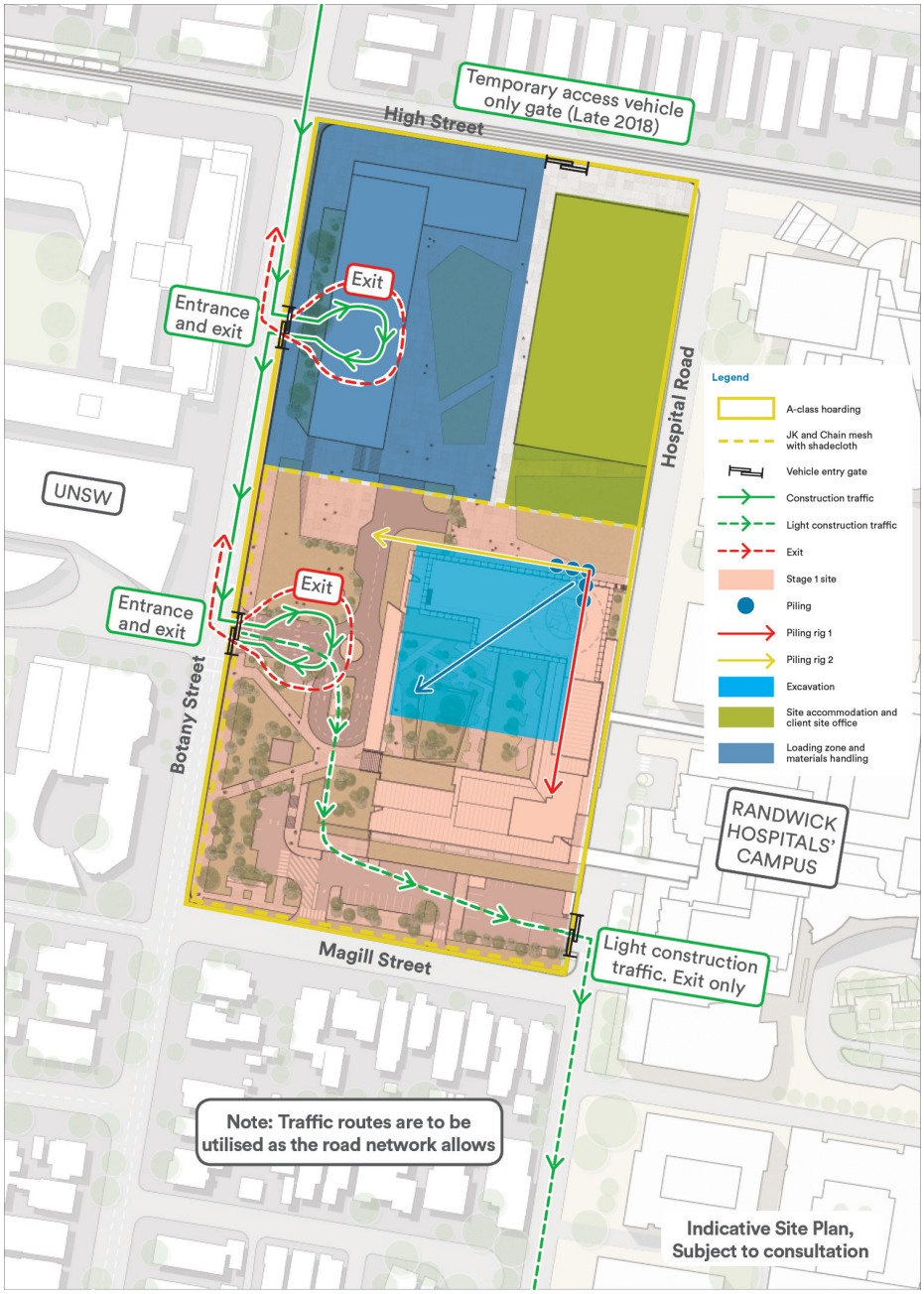


Figure 9 - Demolition sequence

7.0 COMBINED TRAFFIC AND PEDESTRIAN MANAGEMENT

7.1 TRAFFIC MANAGEMENT AND CONTROL

Proposed methodology for traffic management

Lendlease understand one of the keys to the successful delivery of the Randwick Campus Redevelopment project will be managing the flow of materials and equipment into and out of the construction site whilst maintaining a continuity of business for an operational Randwick Hospital. We also understand existing parking operation agreements are in place and the importance of maintaining currently parking numbers throughout the redevelopment works.

We believe it is imperative that our planning considers and successfully manages the maintenance of pedestrian, traffic flow and parking to the surrounding buildings and roads.

To do this Lendlease will be adopting a number of key traffic management strategies to minimise and mitigate Randwick Campus Redevelopment project's effects on the operational hospital:

- Engagement of Traffic Management Consultant to compile an overall Traffic Management Plan, specific Traffic Control Plans detailing each management of pedestrian, vehicular construction and operational traffic at each stage of works;
- Understanding existing parking provision, demand currently onsite, identifying temporary hospital and construction parking replacement options on and offsite to mitigate potential parking shortfalls during the redevelopment;
- Adopting an online materials booking system called the virtual superintendent to facilitate efficient just in time delivery of construction materials, alleviating traffic congestion;
- Encouraging staff, consultants and Subcontractors to adopt a Green Travel Plan for this project with use of public transport to and from site – in particular bus services proximity to the site.

Traffic management and control will be established across all major roads and interfaces across the project. Traffic control will ensure that materials and deliveries will not block off roadways and will streamline the truck movements in and off the project site.

7.2 CONSTRUCTION PEDESTRIAN ACCESS AND CIRCULATION ROUTES

Proposed methodology for traffic management;

Proposed methodology for working within an operational hospital environment and maintaining pedestrian traffic and vehicular traffic to the main entry.

The following marked up street overlays shows the various ways delivery drivers will be accessing the Randwick Campus Redevelopment. Careful consideration has been given to all these options to ensure there are no impacts to the daily Hospital Operations, and the surrounding businesses and residents.

Lendlease through consultation with TfNSW, TMC, SCO and RMS will ensure a left in and a right out approach to the demolition and site clearance works and this is represented in the following figures.

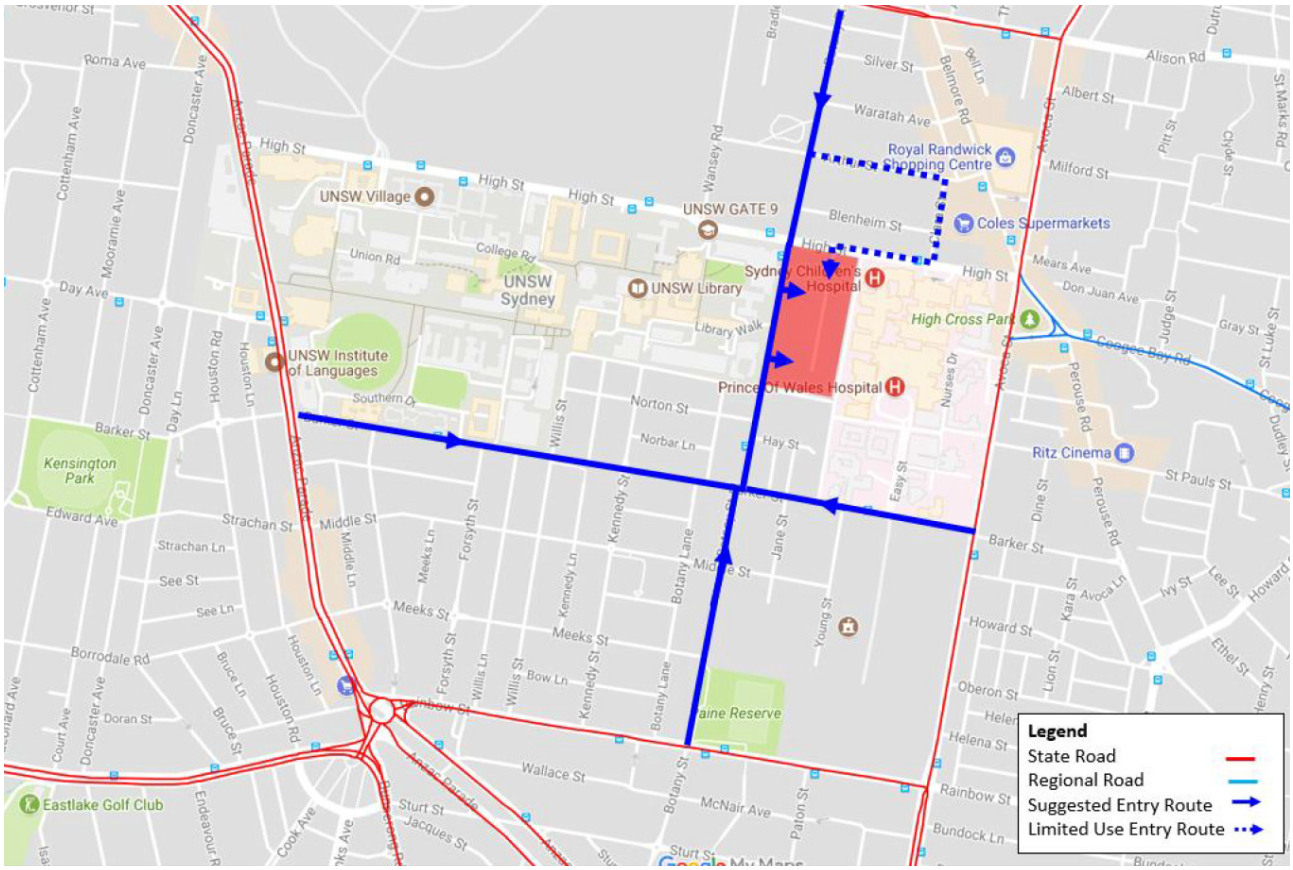


Figure 12 - Haul road to access to the site via arterial roads – left-in, right-out

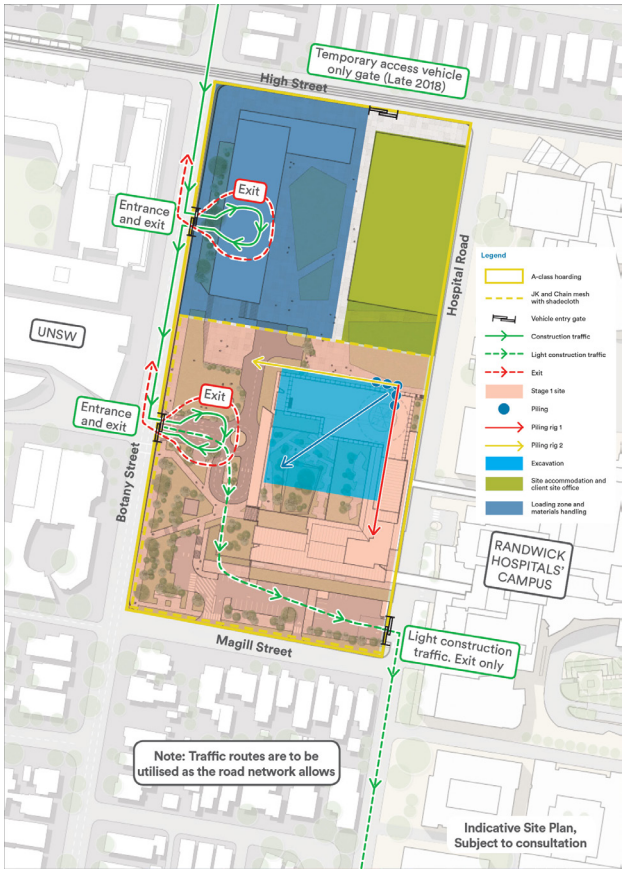


Figure 13 - Site Egress – East and West – left-in, right-out

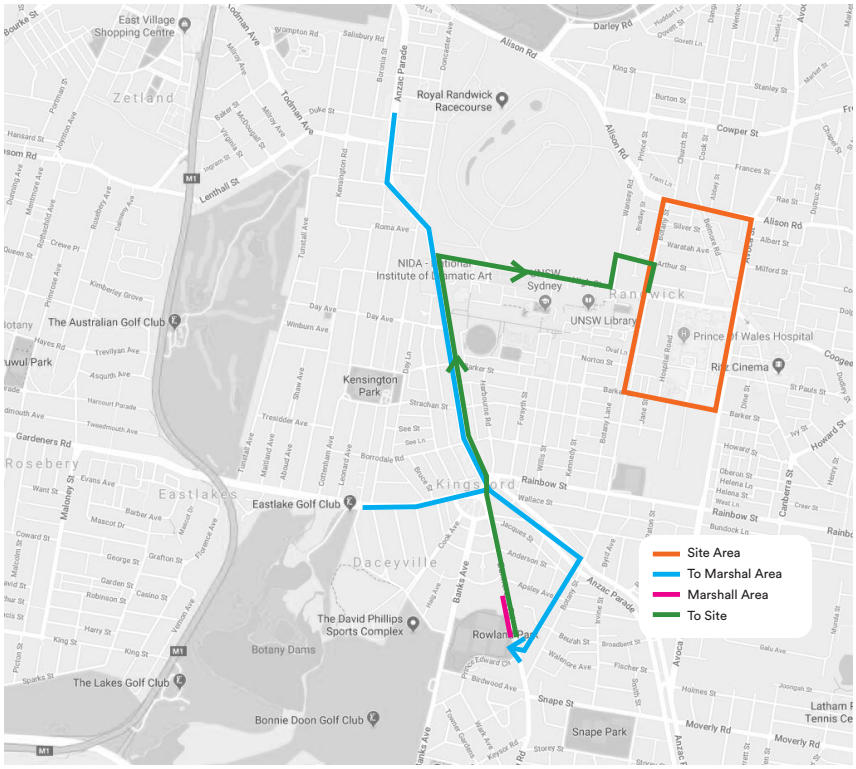


Figure 14 - Preliminary marshalling area and truck routes

Lendlease through consultation with Randwick City Council, TfNSW, UNSW, SCO and TMC have adjusted our approach route from the marshalling area to now come by Anzac Parade, High St, Wansey Rd and Botany St.

7.3 EXISTING PARKING PROVISION

Lendlease have completed a preliminary investigation of existing parking provision, demand and proposed supplementary parking opportunities' on and offsite.

The traffic and parking impact assessment report produced by Arup provides detailed information regarding the existing parking provision on campus, the allocation of spaces among users and the occupancy throughout the day.

7.4 VIRTUAL SUPERINTENDENT

In an effort to reduce and minimise impact of construction traffic within operational Randwick Hospital, Lendlease propose to adopt an online materials booking system called the virtual superintendent on the project. This system allows the external supply chain to book in a delivery to the project through an online portal which can be live streamed to the Site Managers computer or field device. This system facilitates an efficient just in time delivery of construction materials, alleviating further traffic congestion onsite.

This daily information can then be printed out or sent electronically to the team, RMS, Randwick City Council as required to ensure that effective just in time deliveries occur on-site and traffic congestion around construction loading zones are avoided.

Lendlease has used this system at Barangaroo and at the North Connex projects with great success, and will adopt it on this project given the operational hospitals logistical constraints.

8.0 CONSTRUCTION WORKER TRANSPORTATION STRATEGY

8.1 INTRODUCTION

The Construction Worker Transportation Strategy (CWPS) has been prepared in response to development consent for State Significant Development Application (SSDA) number SSD 9113. Specifically, the CWPS demonstrates compliance with Condition B42. Condition B42 provides for the following:

B42. The Applicant shall prepare a Construction Worker Transportation Strategy (CWTS) in consultation with the Sydney Coordination Office within TfNSW and Roads and Maritime Services. The Applicant shall submit a copy of the final place to the Coordinator General, Transport Coordination for endorsement prior to the commencement of any work on site. The Plan needs to specify, but not limited to, the following:

a) Initiatives that would discourage construction workers driving to the precinct and parking;

b) Provision of secure storage areas for construction worker tools and equipment on site;

c) Measures to encourage the use of ample public and active transport available within the vicinity of site; and

d) Details of the operation of off-site construction worker parking location/s, including how workers would be shuttled to the development site.

The Randwick Campus Redevelopment Acute Service Building (RCR-ASB) is a highly complex project with critical early milestone components that must be delivered on time. The management of construction impacts within this context are a key focus of project planning and delivery.

The objective of the CWPS is to set out the initiatives and actions of Lendlease that will effectively manage the workforce influx and associated transportation and parking demands. Through the implementation of this strategy Lendlease intends to ensure that minimal impact is had on parking availability for the local Randwick community inclusive of UNSW, the Randwick Hospitals Campus, local businesses and their respective stakeholders.

The CWPS will provide:

- Management of construction worker transportation and parking.
- Continued availability of in-demand parking spaces and facilities in the Randwick precinct.
- Dedicated worker parking facilities and associated shuttle services.
- Positive public perception of the project's workforce management

The success of this strategy will be monitored and revised as the project progresses.

8.2 TRAFFIC MANAGEMENT AND CONTROL

Lendlease understand one of the keys to the successful delivery of the project will be managing the flow of construction vehicles into and out of the project site whilst maintaining a continuity of business for an operational Hospital. We also understand the importance of maintaining currently parking numbers throughout the redevelopment works.

We believe it is imperative that our planning considers and successfully manages the maintenance of pedestrian, traffic flow and parking to the surrounding buildings and roads. To do this Lendlease will adopt a number of key traffic management strategies to minimise and mitigate Randwick Campus Hospital Redevelopment project's effects on the operational hospital:

- Lendlease along with Arup will detail a specific Traffic Control Plans which will detail the management of pedestrian, vehicular construction and operational traffic at each stage of works.
- Understanding existing parking provision, demand currently onsite, identifying temporary hospital and construction parking replacement options on and offsite to mitigate potential parking shortfalls during the Redevelopment.
- Adopting an online materials booking system called the virtual superintendent to facilitate efficient just in time delivery of construction materials, alleviating traffic congestion.
- Encouraging staff, consultants and subcontractors to adopt a Green Travel Plan for this project with use of public transport to and from site.

8.3 CONSTRUCTION WORKFORCE

At its peak the project will engage a workforce of approximately 600 individuals. It is anticipated that this peak will be reached in early 2020. All workers will undergo mandatory inductions to understand their responsibilities when working on the RCR project site and in close proximity to a live Hospital environment. This is inclusive of parking restrictions, dedicated parking facilities, transportation options and available on site storage facilities.

Planning for construction workforce transportation and parking management will be aligned with projected workforce counts and associated parking demands.

It is understood that a portion of the site worker population will elect to travel to site using private vehicles. Construction workers driving to sites in constrained parking environments, similar to the RCR, typically carpool reducing traffic impacts on the local road network.

The project site is well serviced by public transport providing site workers with alternative travel options.

2019									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oc
114	118	138	210	227	305	358	464	510	510
2020									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oc
525	576	576	576	504	504	261	181	166	166
2021									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oc
111	105	105	105	105	50	50	55	59	55

Figure 15 - RCR projected workforce numbers

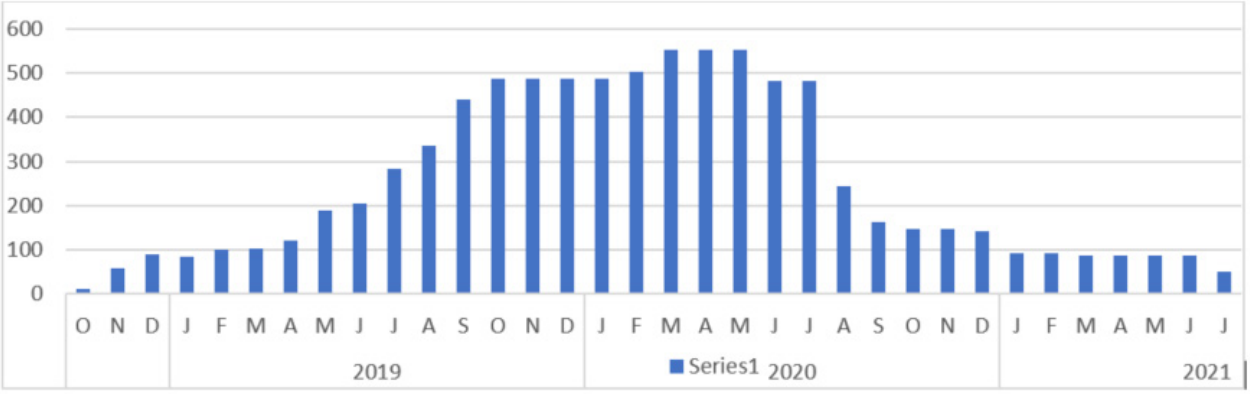


Figure 16 - Randwick Campus Redevelopment Labour Histogram

8.4 EXISTING PARKING SUPPLY AND UTILISATION

Assessments have been undertaken to understand existing parking opportunities in proximity to the project site. The following existing parking facilities have been identified:

1. The UNSW directly to the West of the site provides metered parking spaces around campus. The Barker Street and Botany Street Carparks provide all day meter parking on upper floors. There are a number of 2P parking spaces around campus with 200 parking bays in the Western Campus Carpark and a number of parking bays in the University Terraces, International House and the Kensington Colleges.
2. The Royal Randwick Shopping Centre is 0.4km to the North-East of the site and provides 530 undercover parking bays charged as casual rates per entry.
3. The Spot Wilson Carpark is 0.6km East of the site and provides undercover parking charging casual rates per entry.
4. The Silver Street Carpark 0.6km North of the site provides parking charging at casual rates per entry.
5. The Royal Randwick Racecourse is 1.4km North-West of the site and provides around 300 metered parking spaces.
6. There is also 2P metered parking on all streets surrounding the area of the site.

Construction workers will be prohibited from parking within the Hospital Car Park and streets immediately surrounding the project site.

Whilst a number of localised parking options are available within the Randwick community Lendlease has determined that alternative and dedicated site worker parking is required to accommodate the projects workforce.

8.5 MANAGEMENT OF WORKER PARKING AND TRANSPORT

Lendlease will provide monitoring of the transportation and parking behaviours of the project workforce to minimise impacts on local roads and existing parking availability. Management of worker parking and transport will occur via:

- Ensuring site workers are encouraged to use a variety of transport methods to commute to and from the project site.
- Making available information on modes of public transport, time tabling information and locations of public transport stations in proximity to the project site.
- Encouraging ride sharing and car pooling.
- Provision of bicycle storage and change facilities on site.
- Continual reinforcement of parking requirements and restrictions at part of mandatory site inductions, weekly sub-contractor meetings and prestart meetings.
- Implementation of warning and enforcement systems for workers demonstrating noncompliance with transport and parking requirements

8.6 WORKER TRANSPORTATION AND PARKING

First and foremost, Lendlease will encourage workers that are coming to site would be to use public transport to reduce the volume of light vehicles on the road and to ease congestion around the Randwick Precinct.

The following transport and parking options will be promoted to the project site workforce:

8.6.1 Public Transport

Bus

Due to existing heavy traffic flows in the area from UNSW, the Randwick Campus Redevelopment and other surrounding construction works, site workers will be encouraged to take public transport to and from site while on-site parking is not available.

With the site in close proximity to UNSW and the existing Randwick Hospital, there are a number of bus lines which run from main stations in the Sydney city region to around the site.

- 891 – Central Station to High Street.
- 339 – Central Station on Foveaux Street just East of Elizabeth Street.
- 372 – Central Station to Belmore Road.
- 373 – Museum Station to Belmore Road.
- 37 – Central Station to Alison Road.
- 376 – Museum Station to Belmore Road.
- 377 – Museum Station.
- 304 – Central Station to Barker Street.
- Metrobus 10 (M10) – Leichhardt to Maroubra.
- Junction via Anzac Parade.
- Metrobus 50 (M50) – Drummoyne to Coogee via the City, Anzac Parade and High Street.
- 370 – Leichardt to Coogee via Anzac Parade and High Street.
- 400 – Burwood to Bondi Junction via High Street

Light Rail (Future)

The eastern end of High Street, which forms the northern boundary of the Randwick Health Campus site, will feature the terminus for the CSELR Randwick line which is currently under construction. Light rail services will terminate at a stop on High Street, immediately west of the Belmore Road and Avoca Street intersection.

Light rail services will travel from High Street towards the CBD every eight minutes between 7am and 7pm on weekdays, starting in 2019. The introduction of Light Rail in late 2019 will align with peaks in project workforce numbers providing additional transportation options for site workers.

Figure 17 - Existing bus services and future Light Rail servicing the Randwick Campus

8.7 DEDICATED PARKING FACILITY – 'PARK AND RIDE' INITIATIVE

Off-site parking will be made available to all project workers. This facility will be located within grounds of the Australia Turf Club's (ATC) Randwick Racecourse located under 2km from the project site. The ATC car park is an underutilised resource that will make available 300 spaces to the Randwick Campus Redevelopment project site.

Through this arrangement workers will have access to unrestricted all-day parking at a rate competitive with local paid parking facilities.

A to-site shuttle service will be made available to transport workers to and from the project site. Bus timetabling will reflect peak worker start and finish times with additional off-peak services operated throughout the course of the day.

Shuttle services will be monitored and revised to ensure timetabling remains reflective of demand. Peak shuttle services will include:

- 6:00am – 7:00am Monday – Friday.
- 2:00pm – 5:00pm Monday – Friday.
- 7:00am – 8:00am Saturday.
- 12:00pm – 3:00pm Saturday.

A dedicated bus stop will be established within the ATC boundary providing a coordinated approach to the operation of the to-site shuttle service. Lendlease will work with ATC operations to continually monitor the effectiveness of this operation.

Consultation has occurred with the ATC to determine the most appropriate transport routes, collection points and drop off zones. Consideration will be given to ATC and UNSW event calendars to ensure arrangements do not impact the parking and transportation demands of major events.

Figure 18 - Australian Turf Club – Royal Randwick Racecourse

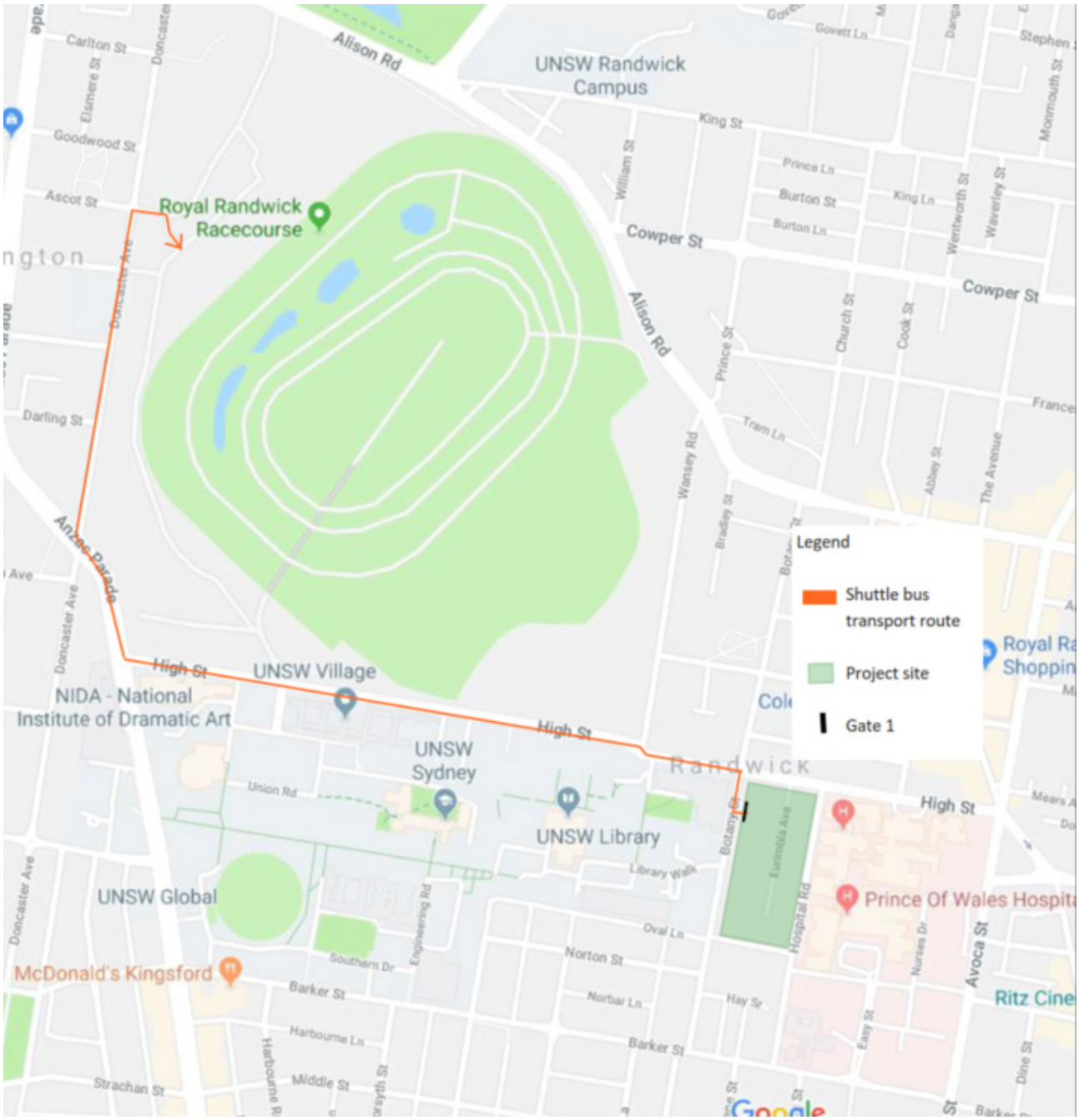


Figure 19 - Transportation Route – To site shuttle service

8.8 ON-SITE FACILITIES

Lendlease will make available facilities, within the site boundary, that enable and encourage site workers to utilise public transport and park and ride services. On-site facilities will include:

- Secure on-site storage for tools and equipment.
- Site worker amenities – change facilities and showers.
- Dedicated materials handling areas.

9.0 STAKEHOLDER MANAGEMENT

9.1 CONSULTING AND COMMUNICATING

Lendlease's approach to managing enquiries for the Randwick Campus Redevelopment project is to create a strategic framework which enables a consistent and transparent guide to engaging stakeholders throughout both the initial project engagement and Delivery Phase. The key principles which underpin our proposed approach are:

- Establish and maintain transparent and consistent communication channels which enable geographically dispersed and diverse stakeholders to engage which the project as required;
- Respect, involve and engage stakeholders to ensure their needs are recognised and considered throughout all phases of the project;
- Ensure a proactive, rather than reactive approach to all potential stakeholder related issues and engagement;
- Tailor communications to provide the right information, to the right people at the right time; and
- Should Lendlease receive any inquires or complaints through the RCR project hotline or email address these will be actioned in a timely fashion with the response to be circulated to the RCR project team.

The Lendlease Stakeholder Engagement Strategy supports the implementation of this CMP during demolition and site clearance activities. The Strategy outlines six key groups and their respective levels of interest in the project:

- End Users;
- Authorities / Service Providers / Utilities;
- Invested Parties;
- Impacted Parties (Primary);
- Impacted Parties (Secondary); and
- Interested Parties.

Figure 20 - Stakeholder Management Matrix

10.0 AUTHORITIES

10.1 LEGISLATIVE REQUIREMENTS

The works will be undertaken is accordance with Legislative Requirements including but not limited to:

- National Construction Code 2011 comprising the Building Code of Australia;
- Protection of the Environment Operations Act 1997 and Regulations;
- Environmentally Hazardous Materials Act 1985;
- Protection of the Environment Administration Act 1991and Regulations;
- Work, Health & Safety Act 2011 and relevant codes of practice and standards;
- Australian Standard 2601-2001: Demolition of Structures;
- Code of Practice for Safe Removal of Asbestos (NOHSC: 2002 (2005));
- Guide to the Control of Asbestos Hazards in Buildings & Structures (NOHSC: 3002 (1988));
- Resource & Recovery Act 2001;
- Environmental Planning and Assessment Act 1979;
- Heritage Act 1977;
- Local Government Act 1993; and
- National Parks and Wildlife Act 1974.

10.2 PLANNING APPROVAL AND CONSTRUCTION CERTIFICATE

In addition to the methodology outlined in Section 2.2 of the Planning Services Plan, for the Delivery Phase we note the following process:

- Development consent from Randwick City Council will be obtained by the Principal. Lendlease will liaise with HI NSW through this process to ensure all conditions are able to be met and adhered too; and
- This will allow the earliest start on site date possible and assist with providing delivery certainty to Health.

Our Design Manager - Building and Authorities will lead this process working closely with the PCA (Principal Certifier) and with the HI NSW Team. The Development Application approval will identify generic and specific deliverables required from HI NSW. These will include payment of development and administration fees. Our Design Manager will coordinate this process to ensure there is a clear and coordinated program to submit all DA requirements to the PCA so that no program delays arise.

The Principal is responsible for obtaining all other planning approvals required to deliver the RCR.

10.3 UTILITY PROVIDER AND ASSOCIATED EXTERNAL APPROVALS

At various stages external approvals of components of the works will be required. This will include:

- Randwick City Council (traffic);
- Ausgrid (or local electrical utility provider);
- NSW Fire and Rescue;
- Jemena (gas);
- Sydney Water (water, sewer and storm water);
- Roads and Maritime Services;
- NETS, Adult A&E, Children's A&E, Careflight Helicopters (helipad);
- Communication providers; and
- Other relevant utility providers.

Our approach with these authorities will differ dependent on the respective requirements, however fundamentally we will seek:

- Prior coordination with HI NSW to ensure all approaches are aligned and coordinated;
- Early contact to mitigate potential delays and identify potential issues; and
- Establish common contacts that can provide continuity of service on the project.

11.0 HOSPITAL INTERACTIONS AND MANAGEMENT

11.1 CRANAGE AND HELICOPTER MANAGEMENT PLAN

Proposed methodology for site establishment, including crane location and swing radius

During the Demolition and Site Clearance Works there are no fixed tower cranes erected. Lendlease will utilise mobile cranes for pick and carry operations which will not need to be approved by Civil Aviation Safety Authority (CASA) or Sydney Airport Corporation as the mobile crane jibs are lower than the PANS OPS and OLS guidelines for the area.

Lendlease understands through our conversations with the CASA and the Principal that the existing Helipad at the Randwick Hospital is operational.

Lendlease is also acutely aware of the sensitives that helicopter access brings to Randwick Hospital and the SESLHD, we will continue to work proactively with all stakeholders when mobile cranes are bought to site to undertake construction works.

11.2 WORKING IN AN OPERATIONAL HOSPITAL ENVIRONMENT

The successful delivery of the Project will depend on detailed pre-planning involving all stakeholders, and the provision of clear and concise communication for each area of interface, so as to allow the ongoing operation of the existing Hospital.

To meet these requirements the Lendlease Project team proposed a three tiered approach:

- A robust Stakeholder Communication Plan;
- Operational level construction interface management group with an established meeting schedule; and
- Strict implementation of the Disruptive Works Notice (DWN) procedure.

11.3 CONSTRUCTION INTERFACE GROUP (CIG)

Lendlease propose that a Construction Interface Group (CIG) is formed at the start of the works on site. The CIG will contain members from the project team, the Principal, Hospital management, Hospital engineering staff and the SESLHD.

The CIG will meet on a weekly basis to discuss short and medium interface works and be informed of the construction activities and progress. It would also provide the forum to review and approve current Disruptive work notices.

This process has been implemented very successfully in recent NSW health projects and provided to be the cornerstone in communication and coordination between the site operations and hospital operations.

Along with specific upcoming works program and DWN actions, each CIG meeting will status general interface issues such as:

- Access and traffic management;
- Planning and management of any major services shutdowns;
- Minimising and controlling disruptions;
- Protection of existing hospital assets;
- Maintenance of existing patient and staff privacy and security;
- Emergency after-hours call outs;
- Hazardous material identification and removal;
- Noise, dust and vibration control; and
- Out of hours work.

11.4 DISRUPTIVE WORKS NOTICE PROCESS

Working in live environments such as Hospitals, provide significant challenges and responsibilities. Health Infrastructure recognises that such challenges can only be addressed through planned and structured approaches, which identify key risks and implement construction delivery accordingly.

The Contractor's construction methodology and systems for managing works, including works which cause disruption to the existing site are imperative in delivering the Project within expectations.

As the proposed team has a major influence on the success of a project, so does the manner in which the Contractor has understood, and planned the project based on its key risks. It is therefore critical that the Contractor understands such risks, and delivers this via response during the tender process.

The Project will provide a number of challenges that will require a logical, clearly defined strategic approach that the successful Contractor must be able to competently manage during construction, without impact to the business continuity of the hospital.

A strict approach to maintaining business continuity at the Hospital at all times is imperative and must be closely considered at every stage of the works. Forward planning, and the stringent implementation of the Disruptive Works Notice Procedure system (refer to Preliminaries for further guidance), will provide early warning and planning of works required to be carried out, where business continuity impacts may be felt to the hospital.

The Contractor's adherence to this existing procedure and innovations to better the process will be welcomed.

10.4.1 Process and Inclusions

In alignment with RFT requirements and Lendlease experience on recent health projects, a formal notification process will be developed to manage communications in the program, details and impacts of all works which will have an impact or potential impact on the hospital operations or create heightened risk of impacts.

Disruptive Works Notices (DWN) will be submitted on a regular basis for activities ranging from major interfaces such as the service diversions, demolition works, traffic diversions, link bridge punch throughs, service interfacing works, Medical Services Construction Phasing (MSCP) works and works on public roads. DWN's will also be submitted for all other activities that could have the potential to disrupt the operation of the hospital, such as possible fumes caused by paint and vinyl laying activities etc.

An example of a major DWN would be the linking of the existing and new Pneumatic Tube Systems.

Along with the agreed DWN protocols, notice periods and technical descriptions, the DWN would include:

- Design sign-off on the planned modification;
- Marked-up sketch of works area and access routes;
- List of equipment and areas affected by works - are any critical to life safety;
- Proposed workarounds during the outage period
- Clearance that any impacts on emergency services are addressed;
- Sign-off from hospital areas impacted that they aware of works and impacts;
- Responsible persons list and emergency contacts;
- Planned duration of works and outage; and
- Contingency plan if works encounter delays/ unforeseen technical issues.

DWN's shall be issued two weeks prior to the works being undertaken, but for more major activities, these notifications will be provided with a minimum of six weeks' notice. These notifications are provided to allow the Principal and the WSLHD sufficient time to review the interface and manage the impact where possible, or if the impact is unavoidable, allow the hospital to plan and re-sequence their activities to ensure that any potential interruptions are minimised.

10.4.2 Disruptive Works Notice Format / LiveOps

Lendlease understand the challenging nature of the Randwick Campus Redevelopment works located in close proximity to a complex live hospital environment. All construction works that interface with the existing Hospital facility will require meticulous planning to ensure that hospital business continuity is maintained at all times Our experience on projects such as Gosford Hospital that is currently in delivery and the large scale refurbishment of the existing Clinical Services Building (CSB) at Liverpool Hospital, we estimate around 500 to 1,000 unique disruptive works notifications will be transmitted during the construction phase at the Randwick Hospital.

Typically these Disruptive Works notifications are managed via a paper based template through email or Aconex systems. However, this solution is difficult to track, maintain version control and relies on stakeholders manually checking systems for information.

Our aim for Randwick Hospital is 'Zero Unplanned Disruptions'.

To achieve this, we propose to leverage smart technology to ensure the LHD, HI and Randwick Project Team are kept informed of Lendlease daily construction operations, agreed Disruptive Work events and proposed future Disruptive Works events.

Lendlease propose to manage the Disruptive Works notification process via an online mobile SharePoint platform.

Through transitioning from a paper based system to an online platform we will achieve increased auditability, efficiency, transparency and collaboration within Disruptive Works processes.

This platform allows relevant project stakeholders to submit and approve Disruptive Work requests electronically via a mobile friendly online form on PC or iPhone. Each DWN will be categorised by building, level, impact to live areas, dates, service types, or any other data set captured in the DWN forms, to allow the listing to be filtered and sorted as needed.

The home page dashboard includes a clickable visual representation of the project allowing stakeholders to click a zone and quickly view all related Disruptive Works related to that area.

A colour-coded Calendar will display all DWN's by approval status over the month for an 'at a glance' look ahead. The DWN calendar can be populated by both the construction team and the LHD, to ensure that Disruptive Works are not planned during peak Hospital work periods.

Figure 21 - Example Interactive Calendar displaying DWN items, showing approval statuses

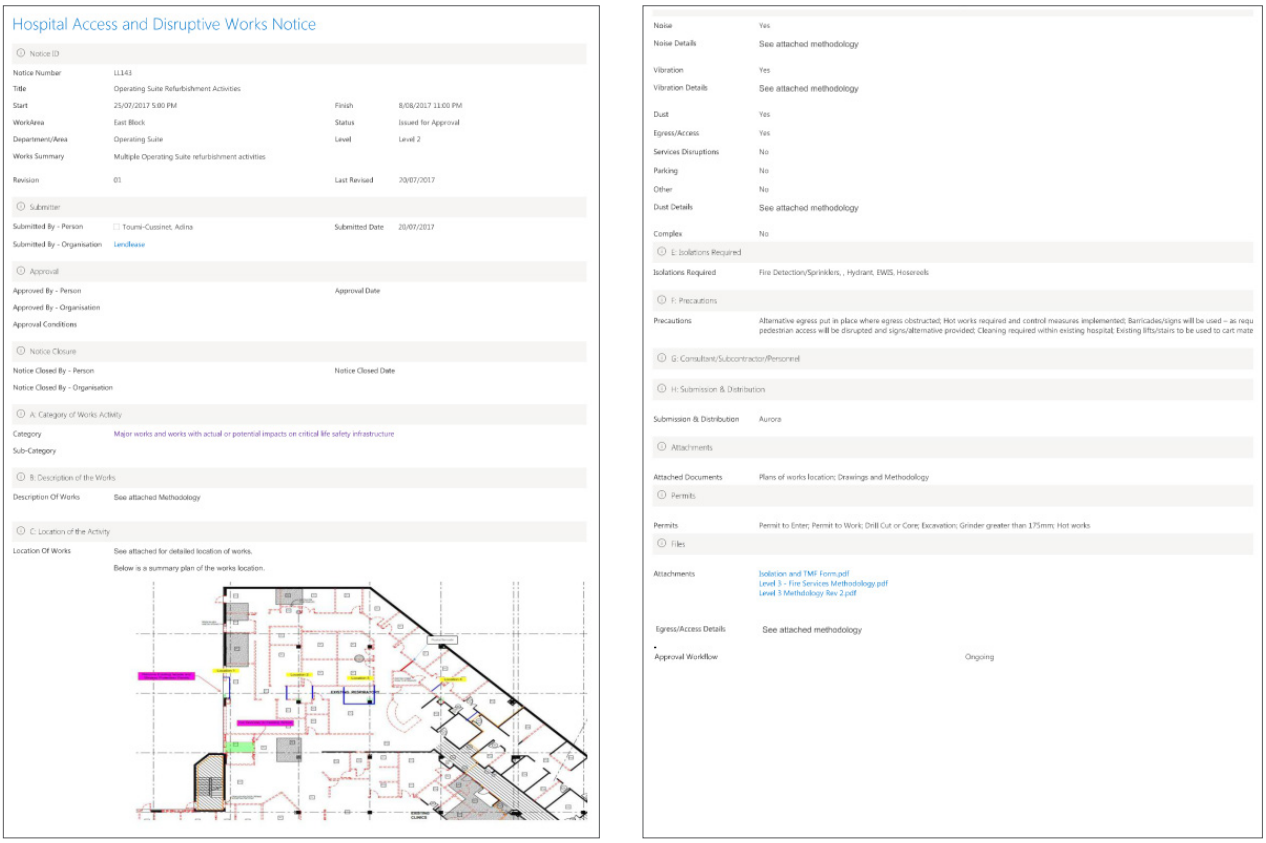
Each Disruptive Work notification will also be provided in a printable detailed form with images and attachments for the LHD to distribute to all affected Hospital users. Further, when a Disruptive work is approved or rejected by the LHD/HI, an automated email notification can be sent to a customisable distribution list to ensure all relevant parties are kept informed of Disruptive Works planning.

The site will be secure and will automatically maintain versions of all active and completed Disruptive Works for auditing and reporting purposes.

Figure 22 – Filtering and viewing entire DWN listing

The DWN platform will be used in conjunction with the weekly Construction Interface Group meetings that review all short and medium term interface works between the Health Precinct and the construction.

Once a Disruptive Works activity has been agreed to proceed using the online DWN platform, a copy of the DWN form will be printed in Microsoft Word and submitted to the Principal and LHD through Aconex for permanent record and any further distribution.



Hospital Access and Disruptive Works Notice

Notice ID

Notice Number	L1143		
Title	Operating Suite Refurbishment Activities		
Start	25/07/2017 5:00 PM	Finish	8/08/2017 11:00 PM
WorkArea	East Block	Status	Issued for Approval
Department/Area	Operating Suite	Level	Level 2
Works Summary	Multiple Operating Suite refurbishment activities		
Revision	01	Last Revised	20/07/2017

Submitter

Submitted By - Person	Tourni-Cussinet, Adina	Submitted Date	20/07/2017
Submitted By - Organisation	Lendlease		

Approval

Approved By - Person		Approval Date	
Approved By - Organisation			
Approval Conditions			

Notice Closure

Notice Closed By - Person		Notice Closed Date	
Notice Closed By - Organisation			

A: Category of Works Activity

Category	Major works and works with actual or potential impacts on critical life safety infrastructure
Sub-Category	

B: Description of the Works

Description Of Works	See attached Methodology

C: Location of the Activity

Location Of Works	See attached for detailed location of works. Below is a summary plan of the works location.

Noise	Yes
Noise Details	See attached methodology
Vibration	Yes
Vibration Details	See attached methodology
Dust	Yes
Egress/Access	Yes
Services Disruptions	No
Parking	No
Other	No
Dust Details	See attached methodology
Complex	No

E: Isolations Required

Isolations Required	Fire Detection/Sprinklers, , Hydrant, EWIS, Hosereels

F: Precautions

Precautions	Alternative egress put in place where egress obstructed; Hot works required and control measures implemented; Barricades/signs will be used – as requ pedestrian access will be disrupted and signs/alternative provided; Cleaning required within existing hospital; Existing lifts/stairs to be used to cart mate

G: Consultant/Subcontractor/Personnel

H: Submission & Distribution

Submission & Distribution	Aurora

Attachments

Attached Documents	Plans of works location; Drawings and Methodology

Permits

Permits	Permit to Enter; Permit to Work; Drill Cut or Core; Excavation; Grinder greater than 175mm; Hot works

Files

Attachments	Isolation and TMF Form.pdf Level 3 - Fire Services Methodology.pdf Level 3 Methodology Rev 2.pdf
Egress/Access Details	See attached methodology
Approval Workflow	Ongoing

Figure 23 - Example of a printable Disruptives Works Notice from the LiveOps system

The content of the DWN form will include:

- Title, number and date of submission;
- Description of the task to be undertaken;
- Highlight whether services will or will not be disrupted;
- Detail of works, who will undertake the works and durations (date and times);
- Details of the planned disturbance e.g. noise, impact of access;
- Plan and or sections of the area;
- Out of hours work requirements;
- Risk assessment and mitigation strategies;
- Authority notifications if required;
- Required services isolations and impacts;
- Lendlease sign off;
- Impacted Area Manager sign off; and
- Randwick Campus Redevelopment project Manager approval.

Using the online DWN platform in conjunction with the Aconex system, we will achieve a reportable, efficient, transparent and collaborative approach to Disruptive Works.

11.5 COORDINATION OF SERVICES SHUTDOWNS AND RECONNECTIONS

Proposed methodology for co-ordination of services shutdowns, diversions and reconnection; Proposed methodology for working within an operational hospital environment;

Lendlease understand that it is imperative that key building services be uninterrupted when constructing within a live hospital environment and we have developed a process to ensure that there are no unplanned disruption to these key life critical services.

No services affecting the project will be shut down without the prior written permission of the Principal via the Disruptive Works Notice procedure. All services will be treated with lock-out / tag-out procedures. For all services requiring modification as part of our scope of works, the Lendlease team will ensure that approval is obtained prior to commencement.

Any modifications affecting other sectors of the live operating hospital will be agreed with the Principal prior to the works to ensure the timing is acceptable. Services shut downs and cutovers will be programmed to occur at appropriate times to address all risks associated with the activity.

In accordance with the Disruptive Works Notice process, the following steps will also be engaged for all shutdowns and cutovers:

- Step 1: 2 weeks' notice is provided to advice on shutdowns and cutovers along with appropriate risk analysis and proposed mitigation procedures.
- Step 2: Discuss in weekly CIG coordination meeting with the Principal and review responses from all stakeholders on timing / duration and agree what actions need to be addressed and closed out.
- Step 3: 1 week prior to shutdown / cutover, confirm with the Principal the procedure and work methodology.
- Step 4: 1 day prior, confirm works are still proceeding.

Permits are to be completed prior to the commencement of all service shutdowns or cutovers. In addition, permits are to be completed for de-energisation and energisation of live services noting that two points of isolation are required as part of Lendlease's Global Minimum Requirements for safety before any works occur on live services.

The Lendlease Permit Controller will be appointed by the Project Manager and will be the central controller of all services related permits.

11.6 INFECTION PREVENTION AND CONTROL MANAGEMENT

Proposed methodology for infection prevention and control management;

Infection control is one of the critical areas where works in health precincts are more challenging than conventional complex construction projects. The SES LHD Infection Control Policy 2011 and the Australian Guidelines for the Prevention and Control of Infection in Healthcare provide a very robust set of processes for assessing and implementing infection control measures during construction works.

The project specific Infection Control Plan is developed prior to commencing the demolition works. In preparing this plan Lendlease will make reference to the 'Infection Control Principles for the Management of Construction, Renovation, Repairs and Maintenance within Healthcare Facilities.

The plan will identify the different types and locations of works planned on the Randwick Campus Redevelopment and specify the level of infection control required for each type of activity. This plan prescribes the upfront the measures required to achieve a standardised response to compliance.

The measures that will be implemented for the project will vary from minor within the new works footprint to extensive for refurb works to clinical areas and have been grouped below:

10.6.1 Safe Work Practises

- Hand sanitisers at work entry and exit points;
- Daily Pre-start Safety Briefings that reinforce Infection Control measures;
- Daily wet mopping to works areas to control dust;
- Contain construction waste before transport in tightly covered containers; and
- Daily cleaning of work area and debris removal.

Regular supervisor and Lendlease audits of the work environment

- Upgrade and replace mechanical air intake filters which could be exposed to increased air borne particulates from the construction works. This is critical to the operating theatres areas and any other areas adjoining the new works such as level 3 day oncology;
- Hoardings will have a cleanable face and skirting details;
- Seal holes, pipes, conduits and punctures appropriately; and
- Air quality monitoring adjacent critical clinical areas.

12.0 PROJECT COMPLETION

12.1 OVERVIEW

Lendlease has proven track record when it comes to delivering, highly complex and challenging projects and the Randwick Campus Redevelopment project is no different. Over the many years in operation Lendlease has created a number of succinct processes and systems to manage and coordinate seamless project completion, commissioning and handover. A detailed construction program will be developed as the design is progressed throughout the next phases of the project.

12.2 QUALITY MANAGEMENT

Lendlease will implement a comprehensive Quality Management Plan to manage and monitor delivery quality on the project. The QMP will provide the framework for managing and monitoring delivery quality on the project.

Specifically the following areas will be addressed in the QMP:

- Setting and monitoring document control processes across the project including require control documents and tracking of construction documentation;
- Setting out individual responsibilities for quality management on the project: people and roles including competencies;
- Determining level of QA documentation required from subcontractors and consultants which will be incorporated in respective packages;
- Set out ITP process and requirements of submitted and approving ITP forms;
- Management of Project internal administration documentation;
- System and subcontractor audit process and timetable;
- Corrective Action procedures and Non-Conformances;
- Running the QA system on the Aconex or Zutec platform; and
- Compliance with Lendlease certifications including AS/NZS ISO 9001:2008.

This QMP is a management tool and control measure, however the real driver for delivering high quality on the project will be the culture driven through the project by the Lendlease Project Team with their subcontractors working collaboratively in setting and maintaining standards.

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13.0 APPENDICES

APPENDIX 1 – SITE ESTABLISHMENT PLAN

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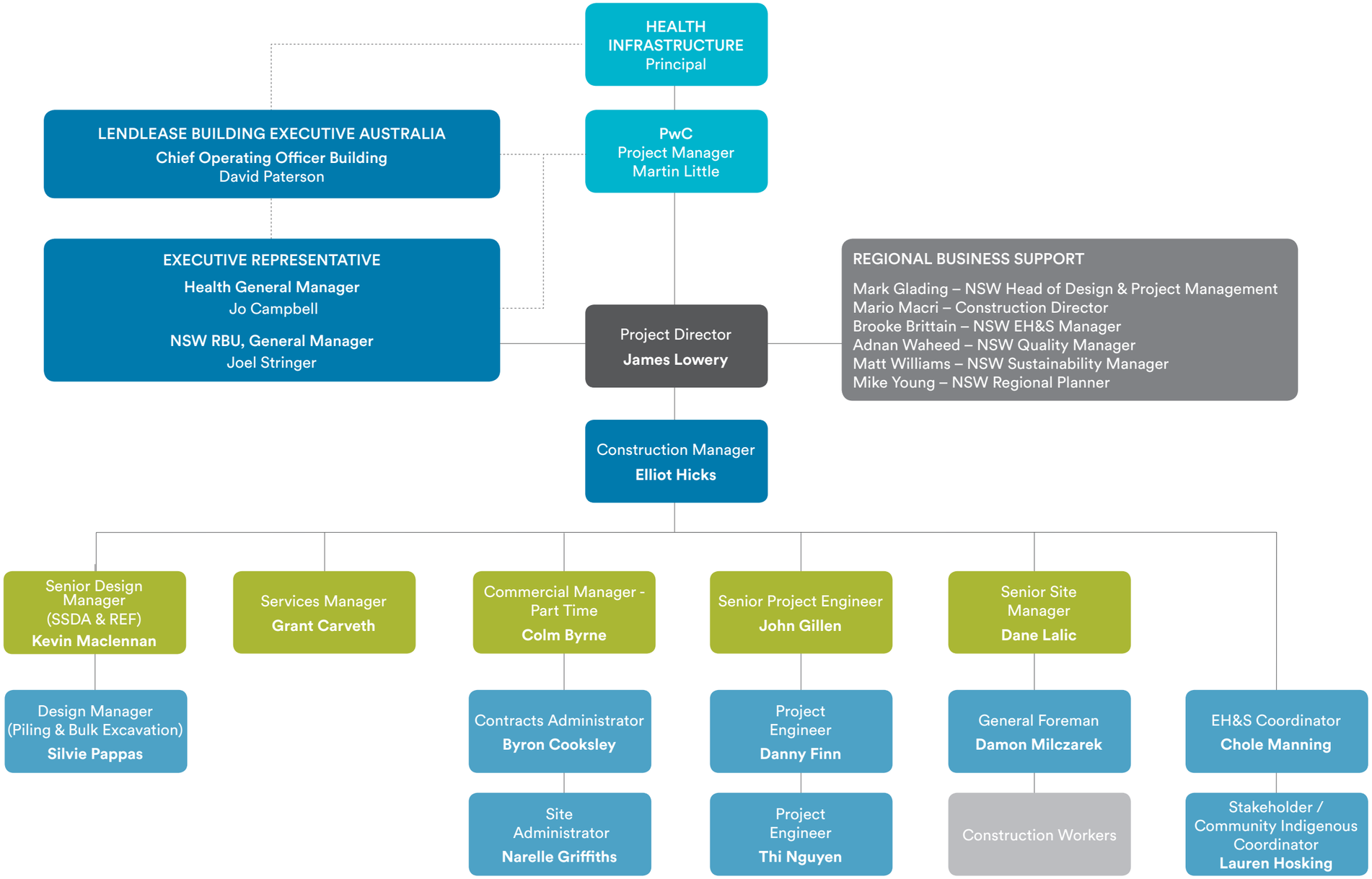
APPENDIX 2 – PROJECT ORGANISATION CHART

See below proposed Project Organisational Chart for the Demolition and Site Clearance Works



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APPENDIX 3

TRAFFIC MANAGEMENT PLAN

DEMOLITION AND SITE CLEARANCE - TRAFFIC AND TRANSPORT REPORT

TABLE OF CONTENTS

Arup has prepared this report to accompany the development application for the proposed demolition and site clearance works associated with the redevelopment of the Randwick Health Campus (Campus). This report has considered the traffic and transport implications for following works:

- Demolition of 92 dwellings and ancillary structures. This includes the removal of vegetation and site remediation. This area is bound by Botany Street to the west, High Street to the north, Hospital Road to the east and Magill Street to the south (excluding Eurimbla Avenue). This is shown in Figure 1.

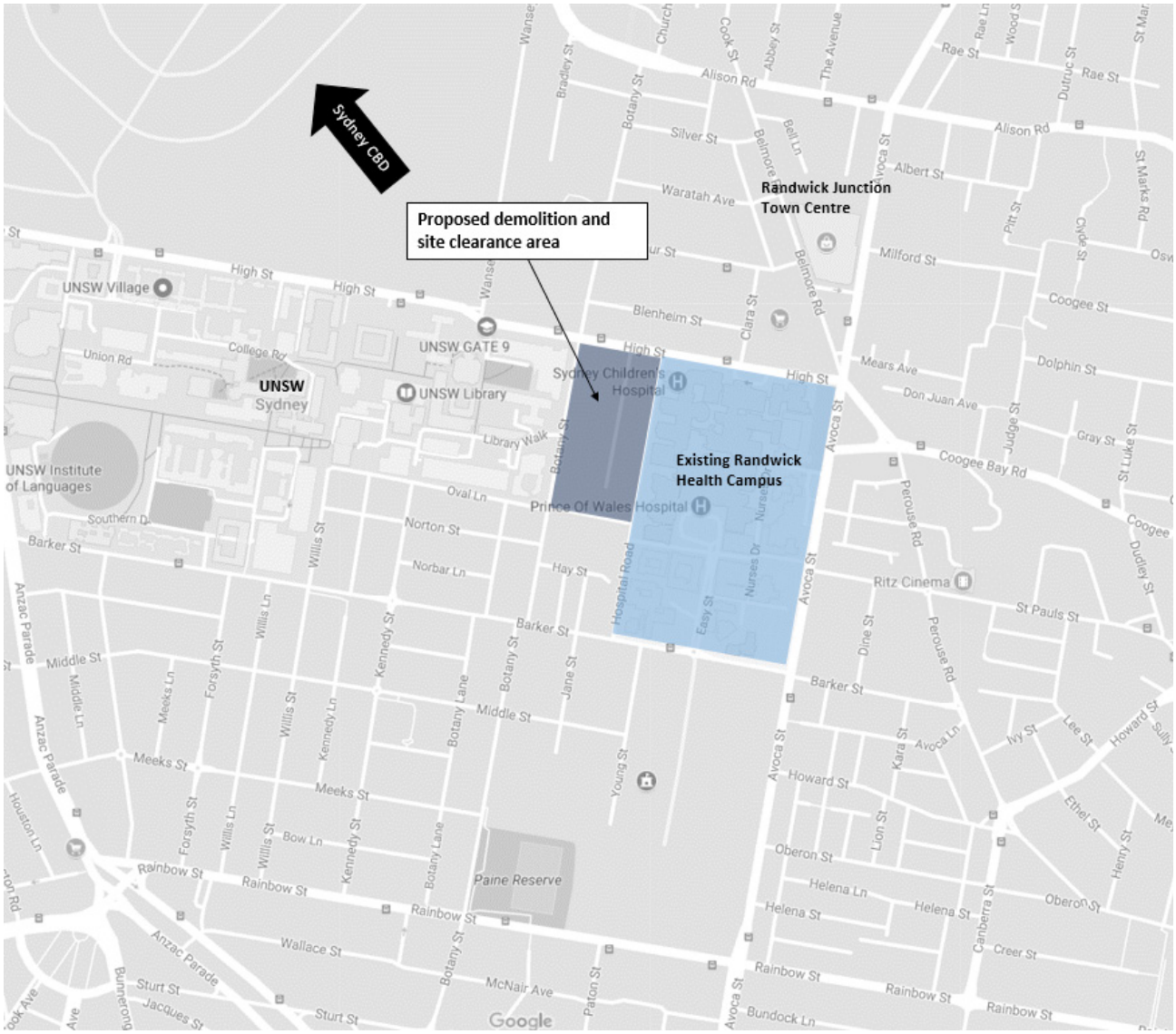


Figure 1: Proposed area for demolition and site clearance (Base map source: Google Maps, 2017).

EXISTING TRANSPORT CONTEXT

Review of existing transport conditions investigated travel behaviours relative to mode for staff, visitors and patients. Data indicated that over 40% of staff live within 5km of the Campus and 12% live within the suburb of Randwick itself. The majority of those accessing the Campus use private vehicles as a primary mode of transport, however staff public transport use is high relative to other hospitals.

The Campus is bound to the east by Avoca Street, a state owned arterial road. Barker Street, which sits along the south of the Campus and primarily functions as a collector road linking the main hospital access roads (Hospital Road and Easy Street) to the arterial road network. High Street (northern boundary of the site) plays a similar role. However, with the development of the CBD and South East Light Rail, its function will likely transition to a more transit focused corridor.

The majority of intersections are performing within practical capacity. However, the key intersections along Avoca Street, mainly with Barker Street and Alison Road, are currently operating at capacity during peak periods.

There is approximately 2,300 on-campus car parking bays available to staff and the public. Parking demand peaks during the middle of the day (11am to 2pm) and is effectively at capacity, however sufficient parking is available outside of this peak period.

Randwick is a district hub for buses in Sydney's eastern suburbs. A number of bus routes frequent the area. The majority of these buses provide all-day services to the CBD. Some buses also provide access to surrounding areas, including Green Square, Mascot, Bondi Junction and Maroubra Junction.

TRANSPORT ASSESSMENT

This report incorporates a high-level review of construction traffic impacts associated with the demolition and site clearance work. Following the appointment of the Contractor (Contractor), a detailed Construction and Environmental Management Plan (CEMP) is to be prepared to the satisfaction of Health Infrastructure (HI) and Randwick City Council (RCC) during the pre-construction phase and consultation will occur with the Sydney Coordination Office and endorsed by the Coordinator General, Transport Coordination within TfNSW.

The proposed works will require the demolition of 92 dwellings. A review of the RMS Guide to Traffic Generating Developments (RMS, 2002) indicates that the demolition of 92 dwellings would correlate to the reduction of between 400 and 700 vehicle trips per day from the surrounding road network. In comparison, daily construction volumes are assumed to be in the order of 50 vehicles per day during phase of works. Construction traffic generation of this magnitude is significantly less than the amount of vehicle trips currently generated by dwellings within the site area. As a result, the potential traffic impacts on the surrounding road network are anticipated to be minimal.

Construction traffic access routes are to be clearly defined and are to predominantly utilise arterial roads and minimise the use of local roads including Magill Street, Arthur Street, Belmore Road and Clara Street where possible.

Any loss in on-street parking as a result of work zones will be managed in consultation with RCC. The Construction Management Plan (Lendlease, 2018) proposes to develop a green travel plan to promote non-car modes of transport for construction workers. This will aim to minimise the impact of on construction site parking during this phase of construction.

CONSTRUCTION TRAFFIC MANAGEMENT PRINCIPLES

The Contractor will be required to prepare a CEMP for approval by Randwick City Council and Health Infrastructure prior to the commencement of works.

As a general principle, construction works will be staged to minimise impacts to traffic and other modes of transport. Some key principles for traffic management will likely include, maintaining access to properties, limiting interaction of construction traffic with hospital traffic (especially ambulance routes), maintaining capacity on the surrounding road network, provision for pedestrian movements, minimising impact on local streets (e.g. Magill Street) and managing interactions with CBD and South East Light Rail construction traffic.

1.0 INTRODUCTION

Arup was engaged by Health Infrastructure (HI) to provide traffic and transport consultancy services for the Randwick Campus Redevelopment project (the Project). This report has been prepared to accompany the development application for the demolition and site clearance works associated with the Project.

The proposed works are summarised in detail in Section 3. The key aspects relating to traffic and transport are as follows:

- Demolition of 92 dwellings and ancillary structures. This includes the removal of vegetation and site remediation. This area is bound by Botany Street to the west, High Street to the north, Hospital Road to the east and Magill Street to the south (excluding Eurimbla Avenue). This is shown in Figure 2.

This report is to be read in conjunction with the relevant drawings and the Construction Management Plan (CMP) (Lendlease, 2018).

A review of RCC's Development Control Plan (DCP, 2013) has been conducted and the relevant intent of the respective transport requirements has been considered in the preparation of this traffic and transport report.

Figure 2: Proposed work site (Base map source: Google Maps, 2017).

2.0 EXISTING TRANSPORT CONDITIONS

2.1 CURRENT TRAVEL BEHAVIOUR

Staff home postcode data was supplied to Arup by the South East Local Health District (SELHD). This is graphically shown in Figure 3. The information indicated that over 40% of staff live within the eastern suburbs (within 5 km of the campus). Randwick currently accommodates the highest number of staff out of any suburb. This accounts for 12% of the total staff population at the Randwick Health Campus. The high proportion of staff living in proximity to the campus provides great opportunities for travel via non-car modes of transport – those being public transport, walking and cycling.

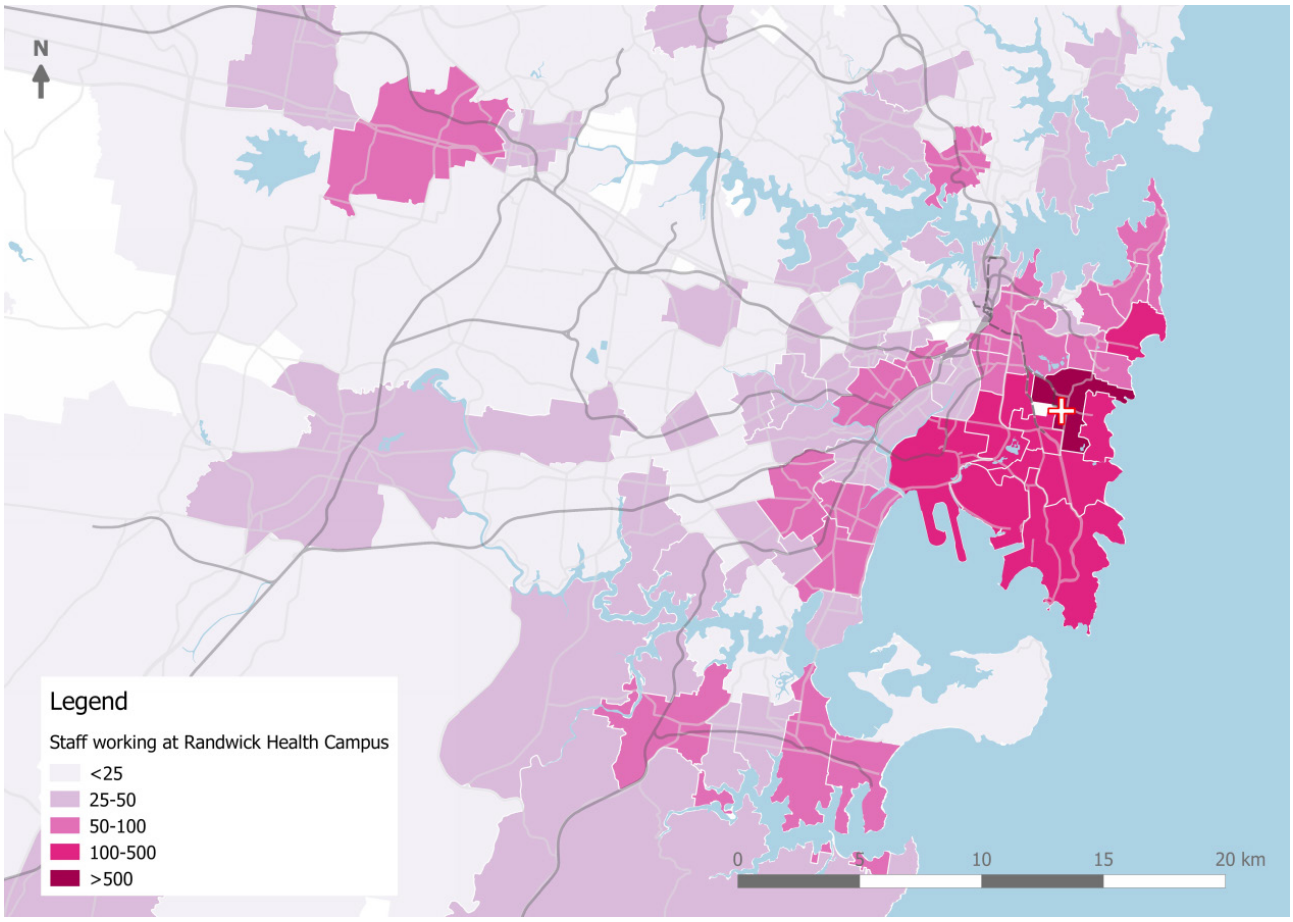


Figure 3: Randwick Health Campus staff post codes (Source: SELHD, 2017).

Stated preference surveys were conducted in March 2012 (TTW, 2013) to understand the travel behaviours of staff and visitors.

The travel characteristics of staff indicated that the majority access the campus as a car driver or passenger; amounting to a mode share of 58% (52% as driver and 6% as a passenger). An average car occupancy of 1.2 was noted, indicating that some form of carpooling may be informally practised. The next highest mode is public transport, which accounts for 25%, while 14% access the campus via walking. This is summarised in Figure 4.

Staff driver mode shares was compared against other hospitals in Sydney (Figure 5). This benchmarking exercise showed staff at Randwick Health Campus utilises a higher proportion of non-private vehicle mode, such as public transport and walking as a primary method of commuting to their place of employment.

The travel characteristics of visitors and outpatients showed that the majority access the campus via private vehicle, either as a driver or a passenger. Approximately 20% of visitors and outpatients utilised public transport. With the high concentration of bus activity occurring within the Randwick Junction Town Centre, respondents who used public transport were more likely to access the campus via the High Street entrance. This is summarised in Figure 6.

CURRENT STAFF MODE SHARE

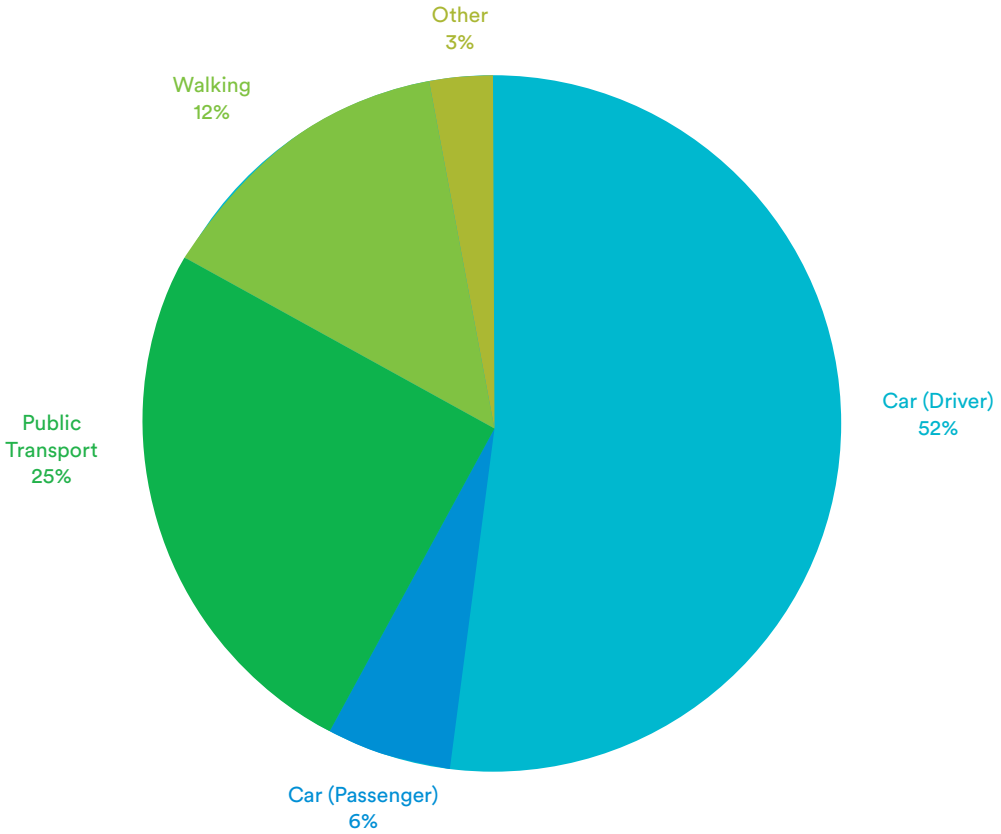


Figure 4: Staff mode share (TTW, 2013).

COMPARISON OF STAFF MODE SHARES

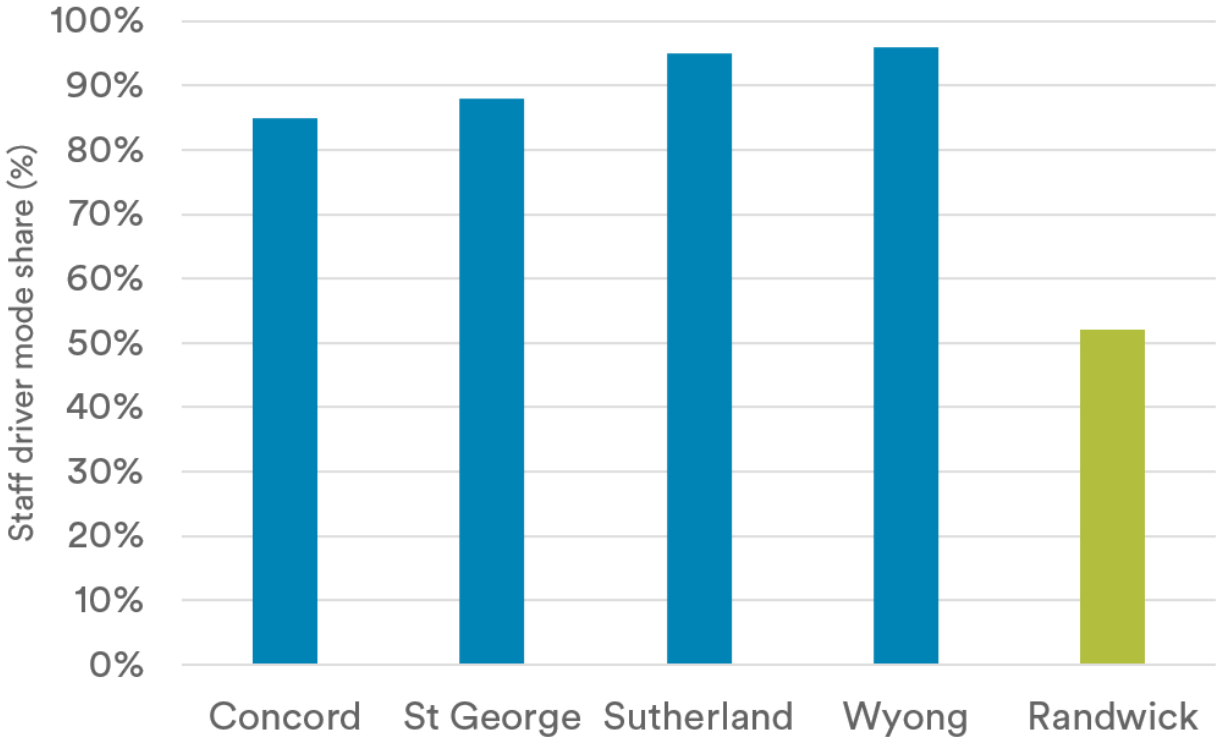


Figure 5: Comparison of staff driver mode shares for hospitals (Source: Various previous Arup projects, 2012 – 2017)

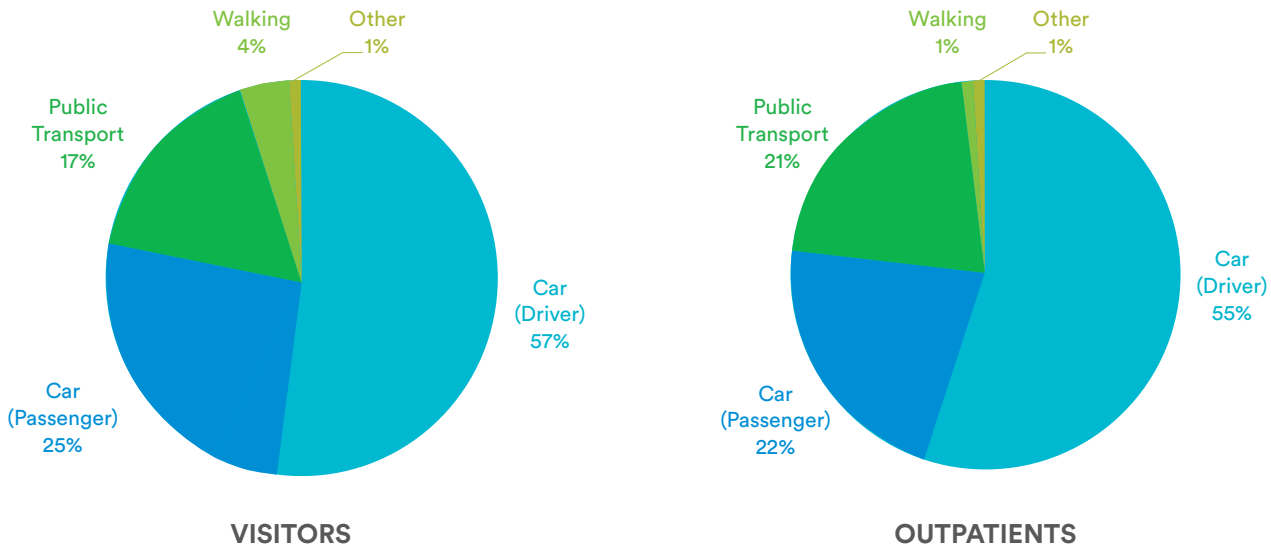


Figure 6: Visitor and outpatient mode shares (Source: TTW, 2013).

2.2 ROAD NETWORK

The Randwick Health Campus is currently bound by High Street to the north, Avoca Street to the east, Barker Street to the south and Hospital Road to the west. The proposed site is located immediately to the west of the Campus and is bound by Hospital Road to the east, High Street to the north, Botany Street to the west and Magill Street to the south.

- Avoca Street is a Roads and Maritime Services (RMS) controlled State road and carries the highest volume of traffic in the surrounding area.
- Barker Street, owned by RCC, acts as a collector road and functions to link traffic from the arterial road network to the main campus entry road (via Easy Street) for the general public. Easy Street provides direct access to the primary drop-off area and car parking for the Prince of Wales Hospital, Royal Hospital for Women and the Prince of Wales Private Hospital. Easy Street also provides access to the Prince of Wales Hospital emergency department.
- Hospital Road, owned by the Health Administration Corporation, is a private road that traverses the western boundary of the campus. This road acts as a local access street and attracts a low proportion of through traffic. This road is predominantly used for ambulance access, service vehicles accessing the campus loading docks as well as staff movements to and from parking.
- Botany Street, owned by RCC, acts as north-south connector road joining the arterial roads of Alison Road to the north and Rainbow Street to the south. Botany Street accommodates the eastern traffic access to the University of New South Wales (UNSW) via Library Walk.
- High Street acts as a collector road and provides access to the Sydney Children's Hospital's drop-off facility as well as the respective emergency department. High Street also provides a secondary drop-off facility for the Prince of Wales Hospital. As part of the Central Business District (CBD) and South East Light Rail (CSELR), High Street is currently limited (as part of the construction phase) to one way movement between Wansey Road and Avoca Street. The majority of these movement restrictions will be retained with the completion of the light rail. The current traffic movement restrictions along High Street is summarised in Figure 7.

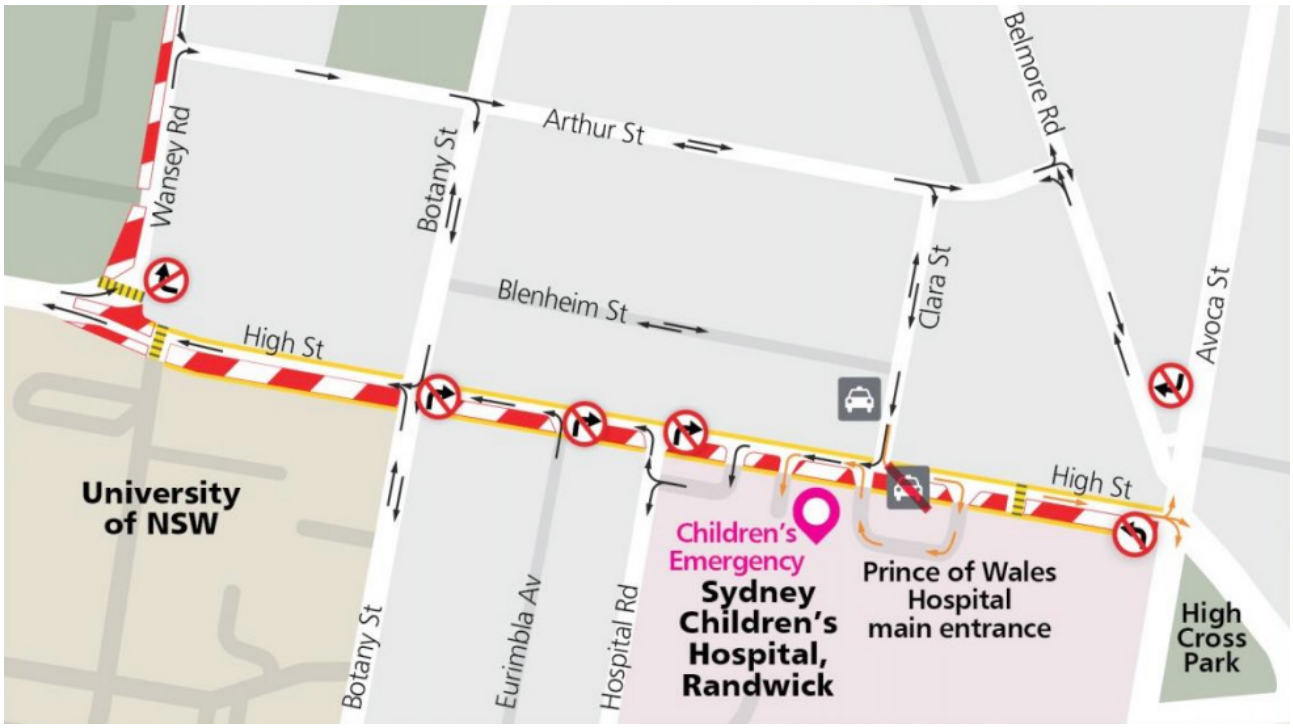


Figure 7: Traffic movement restrictions along High Street (Transport for NSW, 2017).

Figure 8 shows the existing road network surrounding the hospital campus as well as the location of signalised intersections.

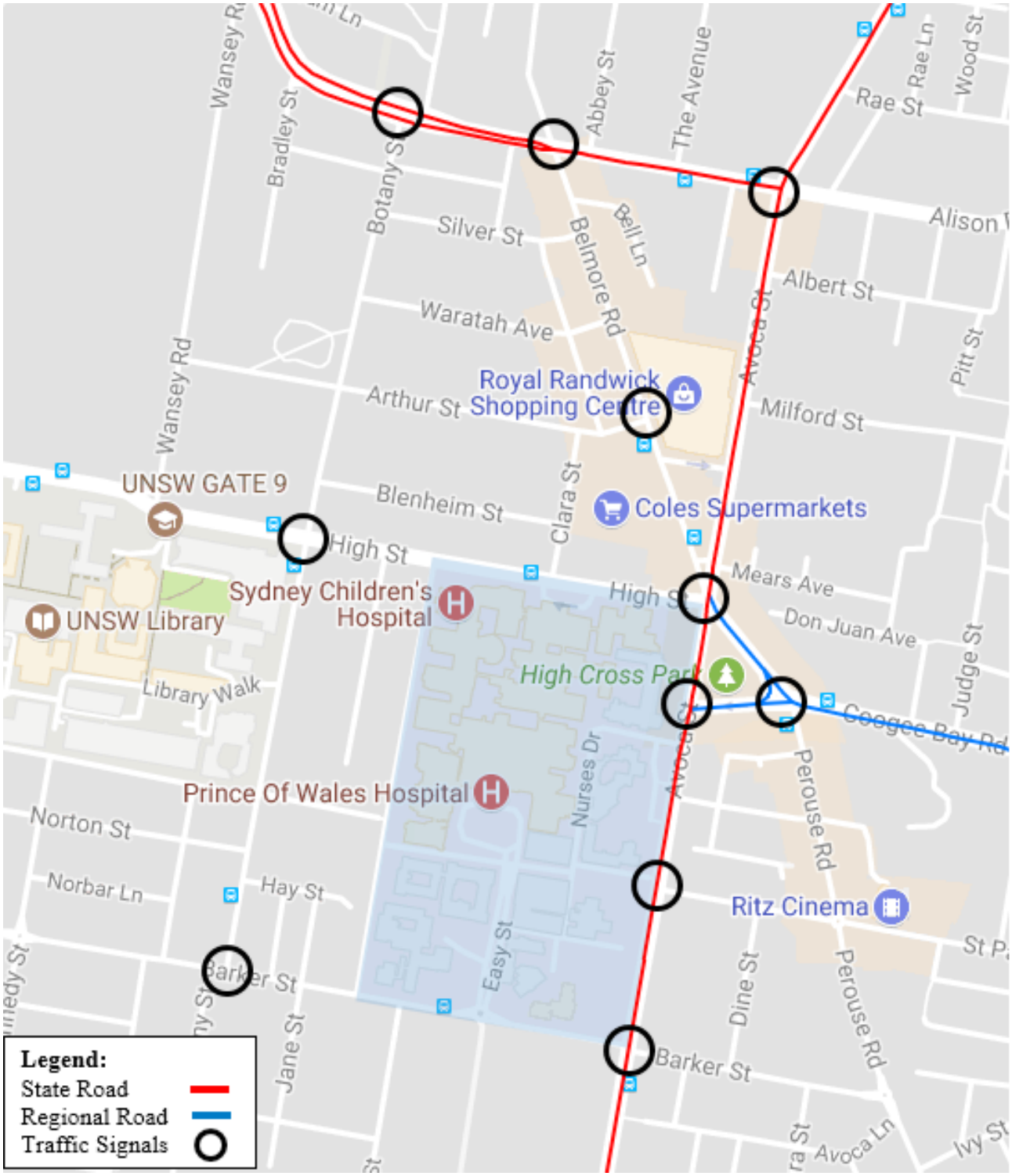


Figure 8: Existing road network and the associated signalised intersections (Base map source: Google Maps, 2017).

2.3 TRAFFIC VOLUMES

Traffic surveys were conducted to provide an understanding of the existing performance at the intersections surrounding and in the vicinity of the site. Intersections considered as part of the analysis include the following:

- Alison Road / Belmore Road / Cook Street (signalised)
- Alison Road / Avoca Street (signalised)
- Belmore Road / Arthur Street (signalised)
- Avoca Street / High Street / Belmore Road (signalised)
- High Street / Botany Street (signalised)
- High Street / Hospital Road
- Avoca Street / Nurses Drive
- Avoca Street / Barker Street (signalised)
- Barker Street / Easy Street
- Barker Street / Hospital Road
- Barker Street / Botany Street (signalised)
- Botany Street / University of NSW (UNSW) Gate 11 access

The surveys were collected on a typical weekday – Thursday 20th July and Thursday 26th October in 2017 – outside of school and university holiday periods. The network peak across all intersections was identified as:

- AM peak hour: 7:30 – 8:30am; and
- PM peak hour: 4:45 – 5:45pm

A summary of the peak hour traffic volumes across the key mid-block road links and intersections are shown in Figure 9 to Figure 12.

A high proportion of traffic is identified through the intersections along Avoca Street. As discussed in Section 2.2, Avoca Street is a State Road providing a major north-south traffic movement through the area. Total intersection volumes are identified as exceeding 2,000 vehicular movements per hour at the intersections with Alison Road, High Street and Barker Street in both peak periods.

Barker Street is a key collector road through the study area, carrying a high volume of vehicular traffic to local roads from the state roads such as Alison Road and Avoca Street. Intersection volumes along Barker Street have also been shown to account for a range between 1,300 and 2,600 vehicles in both peak periods.

Further analysis of the intersection capacity and operations at all intersections around the study area are detailed in section 2.5.

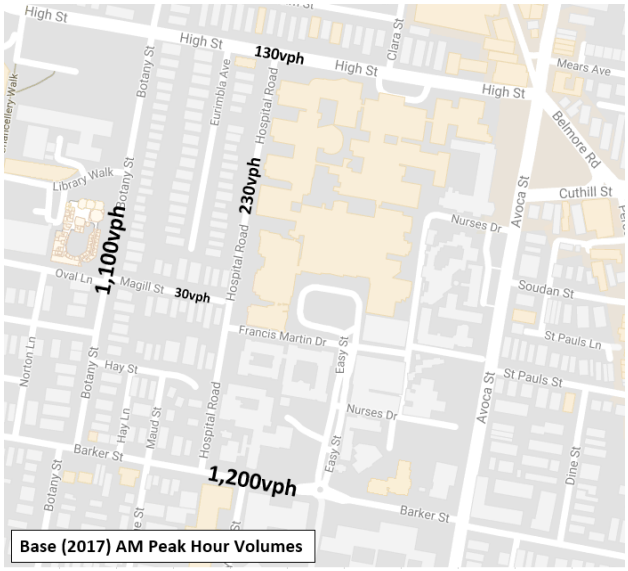


Figure 9: AM peak mid-block traffic volumes (7:30-8:30am).

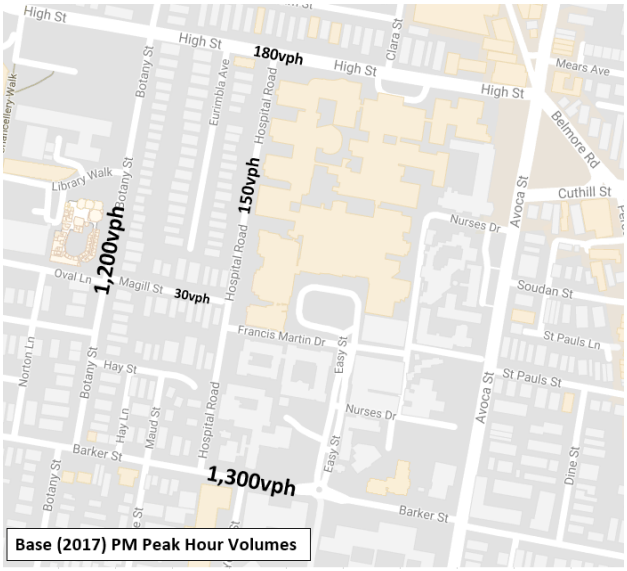


Figure 10: PM peak mid-block traffic volumes (4:45-5:45pm).

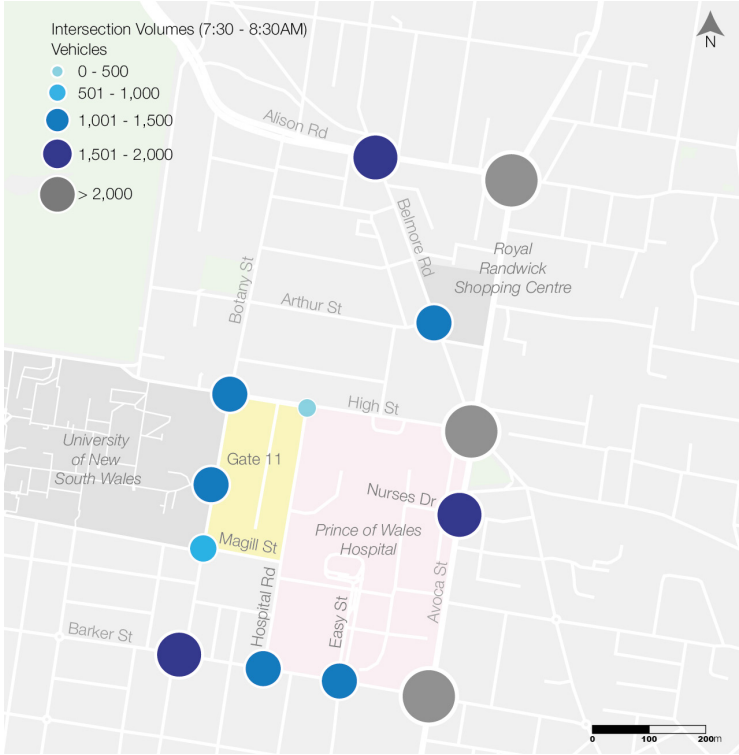


Figure 11: AM peak hour total intersection vehicular volumes (7:30-8:30am).

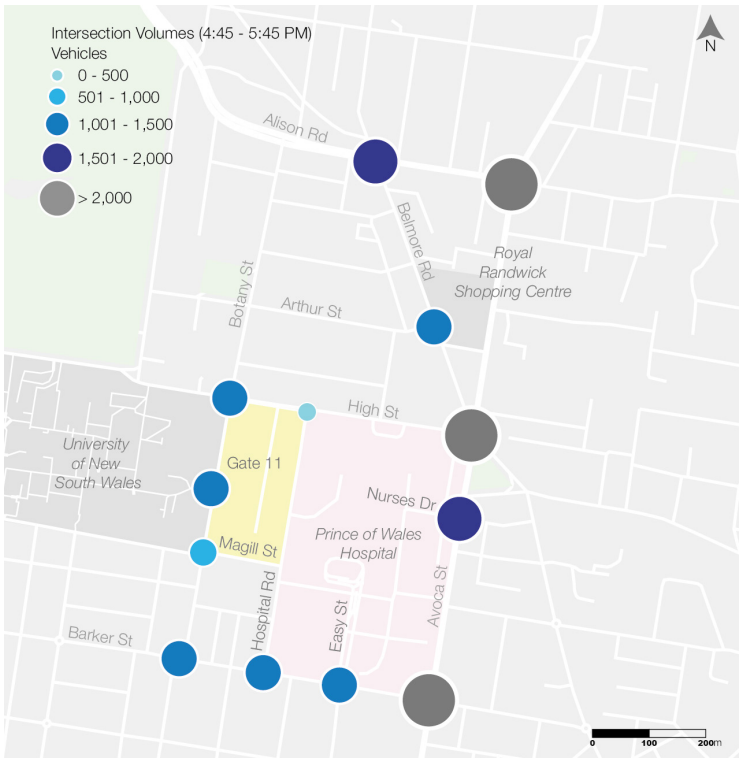


Figure 12: PM peak hour total intersection vehicular volumes (4:45-5:45pm).

2.4 CAR PARKING

2.4.1 Existing parking supply

There are currently 2,302 on-site parking spaces which serve the Randwick Health Campus, comprised of the following:

- Staff: 1,483 spaces
- Visitors: 819 spaces
- Total: 2,302

This provision of on-site parking corresponds to a rate of 1.56 spaces / 100m2 GFA or 2.16 spaces / bed. This amount is low when benchmarked against other health campuses, as shown in Figure 13.

An on-street parking review conducted by TTW (2013) on the surrounding road network indicated a total of 207 spaces. Further counts were conducted by Arup (October and November 2017) to update the on-street parking supply in light of construction works along High Street and Botany Street in relation to the CSELR and redevelopment of UNSW. As a result, there is likely to be a total of 222 on-street parking spaces (Table 1).

2.4.2 Existing parking demand

Parking demand surveys previously undertaken (PTC, 2014) for the campus indicate peak occupancies for staff and visitor parking of over 90% during the middle of a typical weekday. It is typically considered that parking occupancy of 90% represents the practical capacity of a car park where drivers have significant difficulty in locating parking spaces. Therefore, the existing car parking areas on-site are considered to be operating at maximum capacity on weekdays.

Previous surveys have also estimated that demand generated by approximately 550 vehicles are accommodated in parking areas off-campus – predominantly on surrounding streets. The surveys indicate there is a difference between on-site supply and total demand of approximately 440 parking spaces at peak times, as summarised in the table opposite.

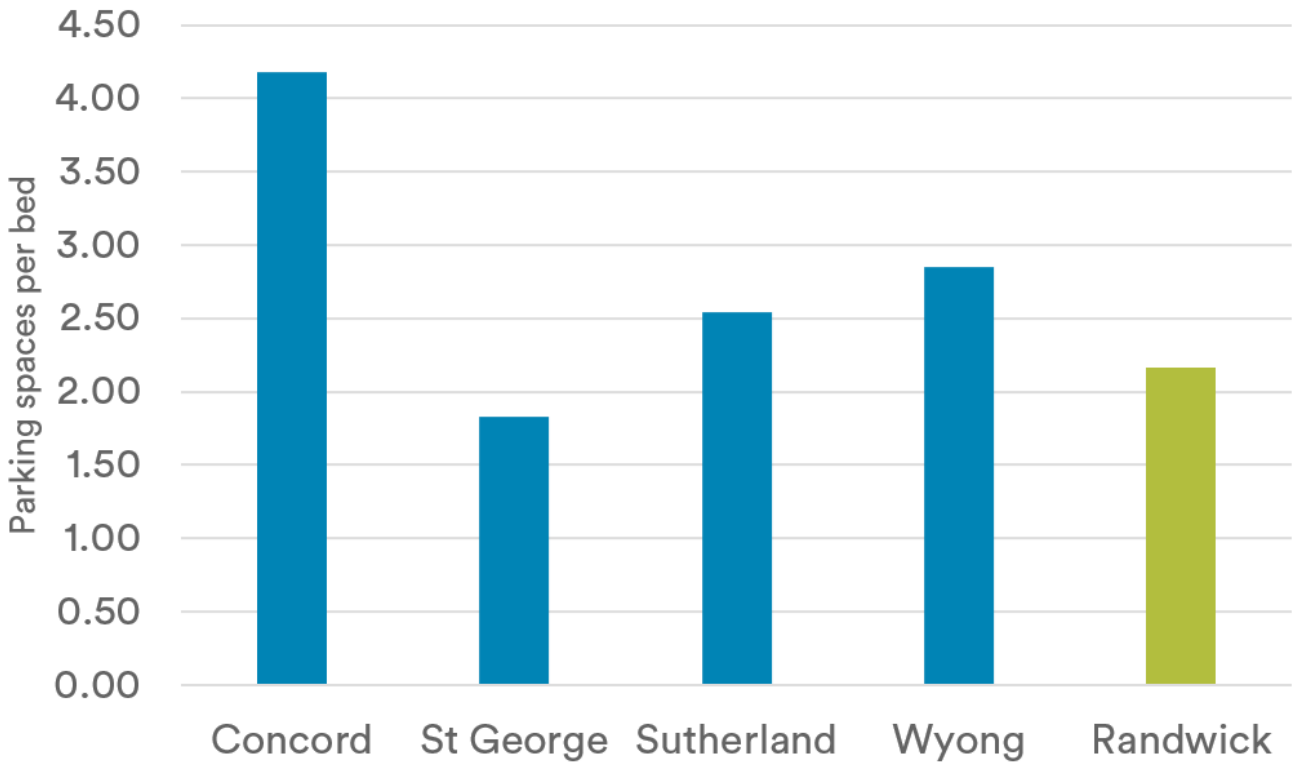


Figure 13: Parking rates at NSW Hospital campuses (Source: Various previous Arup projects, 2012 – 2017).

On-street Parking Spaces		
Street	**Location**	**Parking Supply**
High Street	Between Avoca Street and Botany Street	0*
Botany Street	Between High Street and Barker Street	45**
Barker Street	Between Botany Street and Avoca Street	60
Avoca Street	Between High Street and Barker Street	50
Magill Street	Between Botany Street and Hospital Road	22
Eurimbla Avenue	South of High Street	51
Hospital Road^	Between Barker Street and High Street	-
Total		**228**

Table 1: On-street parking spaces (TTW, 2013; Arup, 2017).

* The current construction works along High Street for the CSELR project has removed all parking from this section of High Street

** The construction works currently carried out by UNSW has resulted in the removal of approximately 8 on-street spaces on the western side of Botany Street

^Parking along Hospital Road has been included within the on-campus parking supply

Existing Parking Demand										
Staff	**8:00**	**9:00**	**10:00**	**11:00**	**12:00**	**13:00**	**14:00**	**15:00**	**16:00**	**17:00**
Monday	71%	85%	89%	90%	91%	90%	89%	83%	69%	45%
Tuesday	72%	88%	91%	92%	93%	94%	89%	83%	69%	45%
Wednesday	69%	84%	91%	92%	92%	93%	92%	86%	72%	53%
Thursday	71%	86%	92%	91%	92%	93%	94%	88%	73%	52%
Friday	66%	79%	83%	82%	83%	85%	84%	78%	64%	45%
Staff	**8:00**	**9:00**	**10:00**	**11:00**	**12:00**	**13:00**	**14:00**	**15:00**	**16:00**	**17:00**
Monday	46%	65%	81%	86%	78%	72%	76%	68%	59%	49%
Tuesday	46%	68%	85%	93%	91%	81%	79%	73%	62%	44%
Wednesday	49%	78%	96%	96%	94%	86%	87%	76%	60%	46%
Thursday	43%	67%	85%	89%	81%	78%	76%	68%	57%	46%
Friday	45%	73%	89%	91%	88%	82%	77%	64%	52%	42%

Figure 14: Existing parking occupancy (Source: PTC, 2014).

Existing Parking Supply & Demand					
User	**Parking Demand**			**Parking Supply**	**Difference**
	On-Campus	**Off-Campus**	**Total**	**On-Campus**	
Staff	1,395	205	1,600	1483	-117
Visitors	710	345	1,055	819*	-236
Total	**2,105**	**550**	**2,655**	**2,302**	**-353**

Table 2: Existing parking supply and demand (PTC, 2014).

*The number of visitor parking spaces was updated following a parking inventory audit was conducted by Arup (October and November 2017).

The parking demand can also be expressed as a ratio of total gross floor area (GFA) and beds, as follows:

- 1.90 spaces / 100m2 GFA
- 2.60 spaces / bed

The campus has a low staff car driver mode share compared to other health campus, as illustrated in Figure 15.

STAFF CAR MODE SHARE

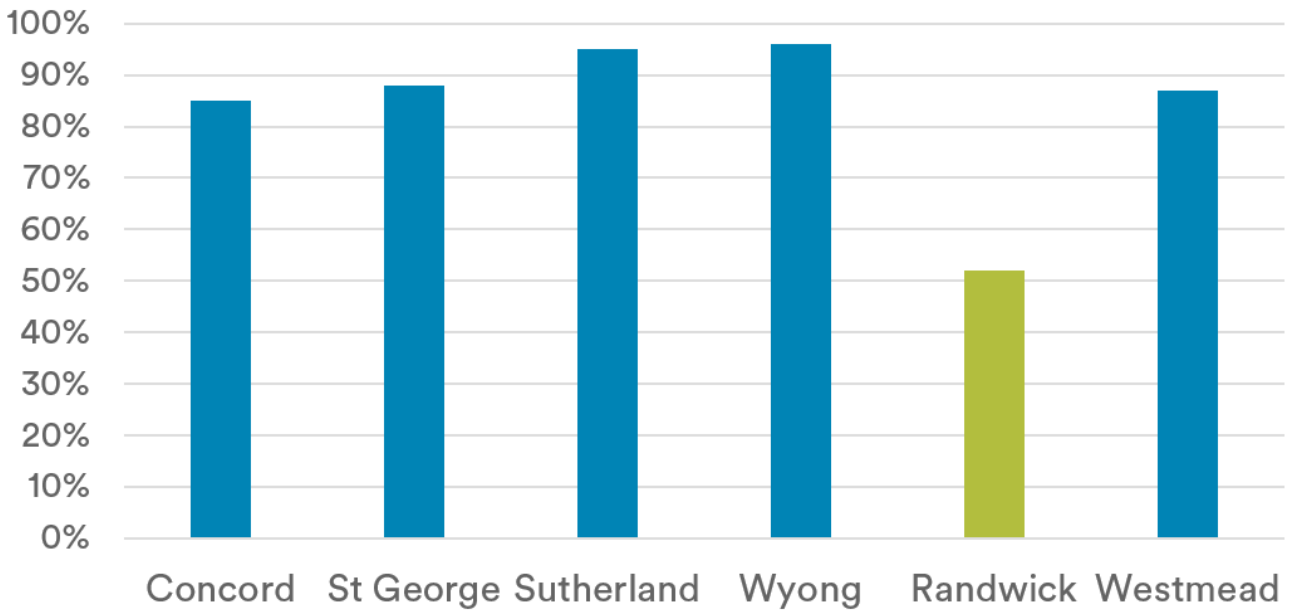


Figure 15: Existing staff driver mode share to NSW Hospitals (Source: Various previous Arup projects, 2012 – 2017).

2.5 INTERSECTION OPERATION

Intersection modelling was undertaken on all key intersections within the study area to provide an understanding of the existing performance of the nearby road network.

SIDRA, an industry standard static modelling software package, was utilised to assess the identified intersections. The intersection performance is assessed in terms of the following metrics:

- Level of service;
- Degree of saturation; and
- 95 percentile back of queue.

In urban areas, the traffic capacity of the major road network is generally a function of the performance of traffic intersections. This performance is quantified in terms of the Level of Service (LOS), which is an index of the operational performance of traffic at an intersection and is based on the average delay per vehicle. LOS ranges from A = very good to F = highly congested travel conditions, as shown in Table 3.

Generally, it is desirable to aim at achieving a LOS C or greater at all major road intersections. However, in practice, it is reasonable for some intersections to operate at LOS D at peak times.

Another common measure of intersection performance is the degree of saturation (DOS), which provides an overall measure of the capability of the intersection to accommodate additional traffic. A DOS of 1.0 indicates that an intersection is operating at capacity. The desirable maximum DOS are as follows for the respective intersection types:

- Signalised intersection – 0.9
- Roundabout – 0.85
- Priority intersection – 0.8

The signal operations (including phasing and cycle times) were recorded during peak hour video recordings.

The intersection modelling was undertaken for the intersections in isolation, and does not quantify the network impacts. Queue extents affecting adjacent intersections have been noted and the impacts are considered. It should be noted that the 95 percentile back of queue does not represent the worst-case queue, rather it indicates the queue length that will only be exceeded 5% of the time over the peak hour on the average day.

Description	Level of Service	Average Delay per Vehicle (s)
Very Good	A	< 14.5
Good	B	14.5 ≤ 28.5
Satisfactory	C	28.5 ≤ 42.5
Near Capacity	D	42.5 ≤ 56.5
At Capacity	E	56.5 ≤ 70.5
Over Capacity	F	≥ 70.5

Table 3: Roads and Maritime Services NSW Level of service definitions (RMS NSW Guide to Traffic Generating Developments, 2002).

A summary of the modelled existing intersection performance at all the intersections are provided in Table 4 and illustrated in Figure 16 (AM Peak) and Figure 17 (PM Peak).

Intersection	AM Peak Hour			PM Peak Hour		
	DoS	LoS	95% Back of Queue (m)	DoS	LoS	95% Back of Queue (m)
Belmore Rd / Avoca St / High St	0.75	B	233 (Avoca St south)	0.72	C	192 (Avoca St north)
Belmore Rd / Arthur St	0.50	B	98 (Belmore Rd south)	0.49	C	108 (Belmore Rd north)
Alison Rd / Belmore Rd	0.59	B	111 (Alison Rd east)	0.64	C	125 (Alison Rd west)
Alison Rd / Avoca St	0.84	C	234 (Avoca St south)	0.91	D	260 (Alison Rd west)
High St / Botany St	0.45	B	84 (Botany St south)	0.65	C	98 (Botany St south)
High St / Hospital Rd	0.09	A	1 (Hospital Rd south)	0.08	A	2 (Hospital Rd south)
Avoca St / Nurses Dr	0.30	A	1 (Nurses Dr west)	0.22	A	1 (Nurses Dr west)
Avoca St / Barker St	0.92	D	303 (Avoca St south)	0.91	D	249 (Avoca St south)
Barker St / Easy St	0.57	A	39 (Barker St east)	0.53	A	33 (Barker St west)
Barker St / Hospital Rd	0.38	A	9 (Barker St east)	0.35	A	12 (Hospital Rd north)
Barker St / Botany Rd	0.79	C	104 (Barker St west)	0.73	C	108 (Botany St north)
Botany St / UNSW Gate 11 access	0.42	A	9 (Botany St south)	0.49	B	16 (UNSW gate 11 access)

Table 4: Existing intersection performance.

The intersection modelling results in Table 4 suggests that the existing performance of the majority of key intersections are operating satisfactorily. Queues have been observed to extend through priority intersections with local roads, as well as modelled queues extending to signalised intersections.

The Avoca Street / Barker Street intersection is operating at capacity with queues extending to an adjacent signalised intersection in the evening peak period. The southbound queues along Avoca Street extend from the intersection through the Avoca Street / St Pauls Street intersection. However there is no impact on any movements coming out from the local road due to a one-way exit arrangement. The intersection of Avoca Street and Barker Street is a pinch point, where the lane capacity of each approach is restricted by on-street parking and the shared usage of each lane.

The model has also identified queues along Alison Road from the Alison Road / Avoca Street intersection in the evening peak period. The eastbound queues extend 260 metres, past the intersection at Alison Road / Belmore Road and are verified with on-site video observations.

The Avoca Street / Belmore Road / High Street intersection modelling suggests southbound queues along Belmore Road to extend 90 metres, and do not span to the intersection with Arthur Street. Video observations indicate that the queues extend to Arthur Street at various times over the peak hour. Given these intersections are modelled in isolation, network impacts from adjoining intersections, such as Short Street, have not been considered. Furthermore, multiple bus stops along Belmore Road will impact the capacity of this link and contribute to the queues observed.

In summary, the network is operating satisfactorily with a couple of key intersections on Avoca Street constraining operations in peak periods which is typical of an urban network.

Figure 16: Intersection capacity in the morning (7:30-8:30am) peak period.

Figure 17: Intersection capacity in the evening peak period (4:45-5:45pm).

2.6 PUBLIC TRANSPORT

2.6.1 Bus

The southern end of Belmore Road, which is located at the north-eastern boundary of the Randwick Health Campus site, is a district hub for buses in Sydney's eastern suburbs. A number of bus routes, shown in Figure 18, frequent the area, including:

- All-day services connecting the south-eastern suburbs with the Sydney CBD via Moore Park – routes 372, 373, 374, 376, 377 and M50;
- A range of express service variants of these routes that operate during peak hours;
- North-south services that connect centres in the Eastern Suburbs, including Bondi Junction and Maroubra Junction – routes 314, 316, 317;
- East-west services that connect Randwick with Bondi Junction, Green Square, Mascot and various locations in the inner western and southern suburbs – routes 348, 400, 410 and 418;
- Leichhardt to Coogee – route 370; and
- UNSW express bus services – routes 891, 893 and 898.

The majority of bus routes travel along Belmore Road, with some services also using High Street, Alison Road and Avoca Street. Recent changes associated with the construction and operation of the CBD and South East Light Rail have resulted in buses using Arthur Street instead of High Street.

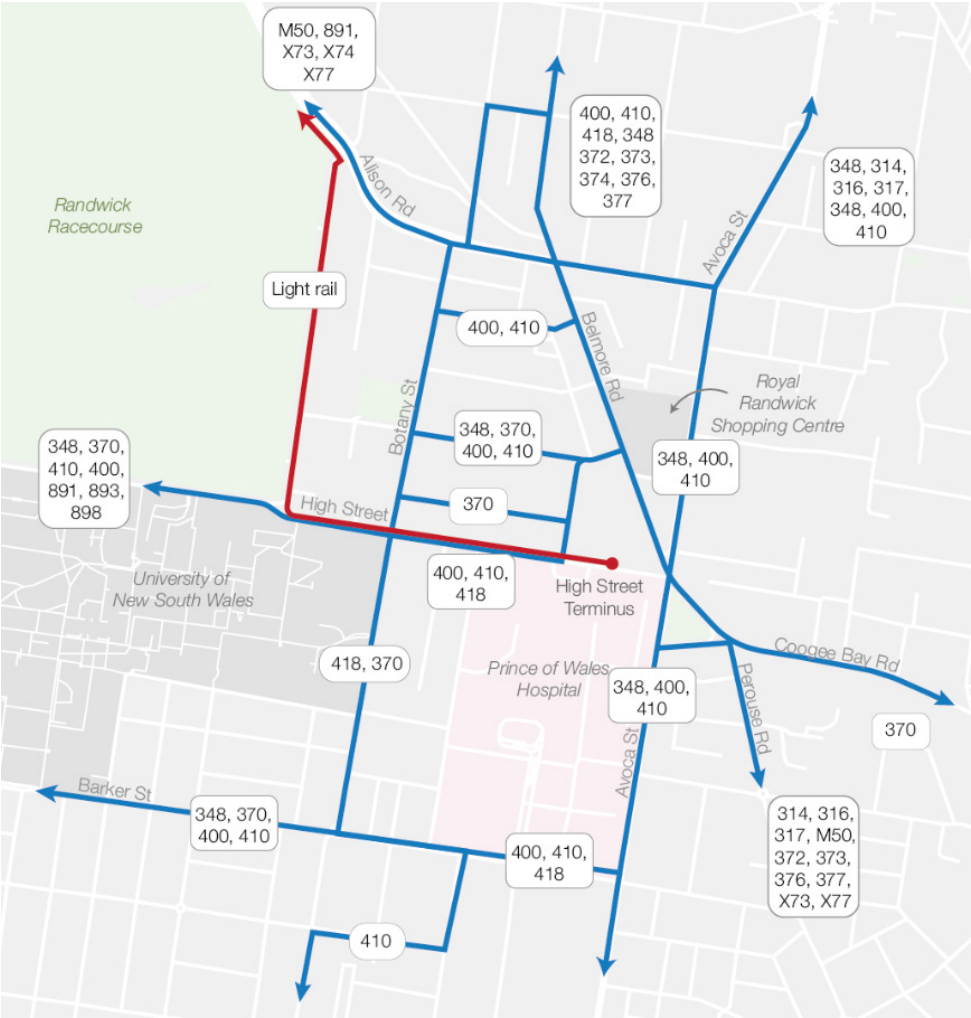


Figure 18: Existing bus services and future light rail servicing the Randwick Health Campus.

2.7 FUTURE TERMINUS OF LIGHT RAIL

The eastern end of High Street, which forms the northern boundary of the Randwick Health Campus site, will feature the terminus for the CSELR Randwick line which is currently under construction. Light rail services will terminate at a stop on High Street, immediately west of the Belmore Road and Avoca Street intersection.

Light rail services will travel from High Street towards the CBD every eight minutes between 7am and 7pm on weekdays, starting in 2019. There will be a number of bus operational changes associated with the introduction of light rail. These operational changes will also result in amendments to a number of city-bound bus routes. These will potentially decrease the number of bus services using Belmore Road, especially at peak times.

2.8 ACTIVE TRANSPORT

Active transport modes, including walking and cycling, currently accounts for approximately 17% of staff travel modes to and from the Campus. The majority of active transport accounted for by walking (14%) rather than cycling. As highlighted in Section 2.1, over 40% of staff currently reside in the eastern suburbs, with 14% living in the suburb of Randwick. This proximity, in conjunction with limited availability of parking on the Campus, has initiated a shift towards more active modes. 5, 10, 15 and 20 minute walking isochrones from the Randwick Health Campus shown in Figure 19.

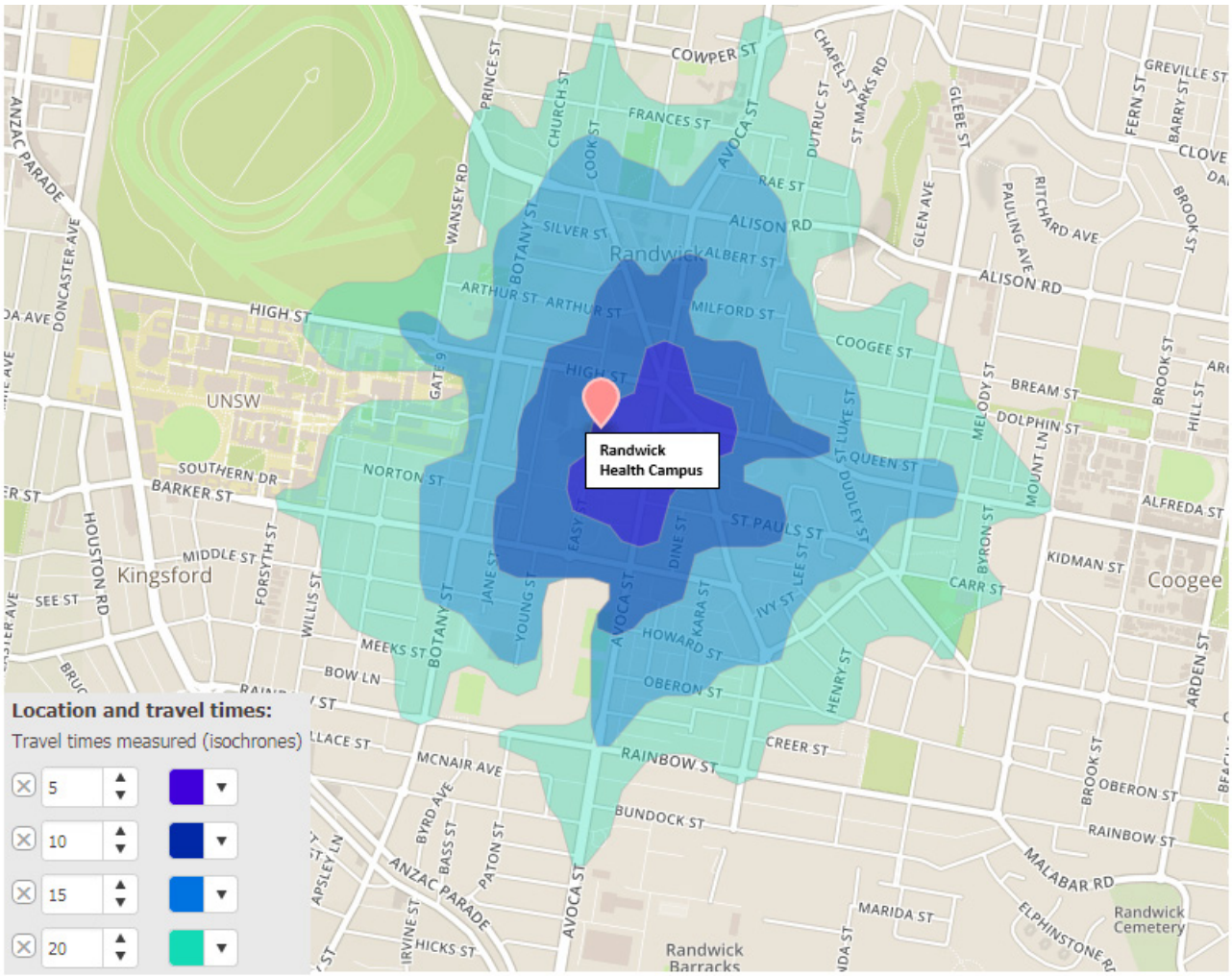


Figure 19: Walking isochrones to/from Randwick Health Campus (Source: Arup, 2017).

3.0 PROPOSED WORKS

The proposed demolition and site clearance works will include the following:

- Demolition of 92 dwellings and ancillary structures.
- Removal of vegetation and site remediation.

4.0 TRANSPORT ASSESSMENT

4.1 OVERVIEW

This report incorporates a high-level review of construction traffic impacts associated with the demolition and site clearance phase of the works. Following the appointment of the Contractor, a detailed Construction and Environmental Management Plan (CEMP) is to be prepared during the pre-construction phase. The CPTMP will be prepared to the satisfaction of Health Infrastructure (HI) and Randwick City Council (RCC) during the pre-construction phase and consultation will occur with the Sydney Coordination Office and endorsed by the Coordinator General, Transport Coordination within TfNSW.

4.2 CONSTRUCTION VEHICLES

Heavy vehicles including Articulated Vehicles (AV) for machinery delivery and Heavy Rigid Vehicles (HRV) including truck and trailer combinations will be used for removal of demolition spoil.

Truck turning paths have been developed for the two driveways on Botany Street indicating that both Articulated Vehicles (AV) for machinery delivery and Heavy Rigid Vehicles (HRV) including truck and trailer combinations can turn left into and right out of each driveway. It is proposed to provide 11.0m wide gates to facilitate these movements as shown in Appendix A.

At the northern driveway, trucks will generally be able to turn out utilising the bus zone when it is not occupied. Gaps in the southbound traffic will occur due to the High Street traffic lights to assist with these turns.

4.3 SITE ACCESS

The Construction Management Plan, Lendlease 2018, identified the following proposed construction vehicle access locations as shown in Figure 20:

- Botany Street (x2).
- High Street (utilising the existing Eurimbla Avenue).
- Hospital Road.

It should be noted that High Street is currently limited due to the construction of the CSELR. As such, the Contractor is to factor this into the decision making process for granting access to the work site via High Street. Access restrictions limit eastbound traffic movements on High Street between Botany Street and Clara Street. Any access via High Street will likely be restricted to exit only, however this will require concurrence from Transport for NSW (TfNSW).

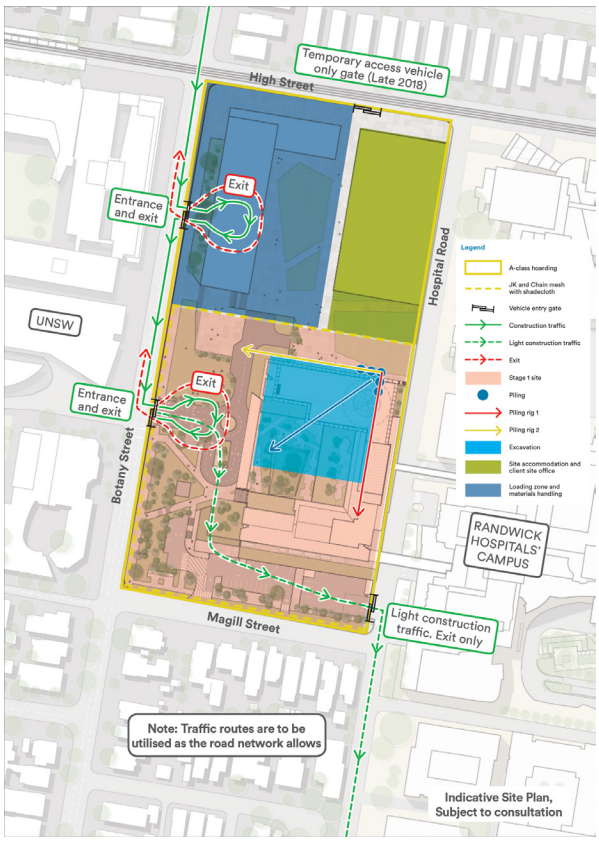


Figure 20: Proposed construction site access (Lendlease, 2018).

It is noted that construction vehicles over 8.8m in length should use alternative access arrangements, such as Botany Street, due to High Street constraints.

Arup understands that Magill Street will remain closed at Hospital Road during construction works. Any construction traffic access along Magill Street should be avoided to limit impacts on local residents.

The access points on Botany Street will be predominantly utilised as left turn entry for trucks with vehicles approaching from Alison Road on Botany Street and using the kerbside lane for turning into the driveway. This will minimise impacts on through traffic. Trucks will then exit turning right onto Botany Street to travel north towards Alison Road.

4.4 CONSTRUCTION TRAFFIC VOLUMES

For this report, an assumption of approximately 50 vehicle movements per day are expected during the demolition and site clearance phase of works (Lendlease, 2018). This assumption is consistent with similar works undertaken for the UNSW Bioscience Project Stage 2 which is nearing completion on Botany Street.

As the CPTMP is developed the size and type of vehicles that will be required will be identified. Given that the works are predominantly demolition, a steady flow of materials off the site will occur by a fleet of trucks.

4.5 CONSTRUCTION VEHICLE ROUTES

To keep construction related traffic to a minimum on the surrounding roads, it is necessary to define routes for construction traffic to and from the work site. These access routes are to predominantly utilise arterial roads and minimise the use of local roads including Magill Street, Arthur Street and Clara Street where possible. Construction traffic through the Randwick Junction Town Centre (i.e. Belmore Road) is to also be avoided. The key arterial roads surrounding the site are Avoca Street, Anzac Parade and Alison Road.

Access to the site will primarily be via Botany Street. The CMP currently allows for two construction access gates along Botany Street. Access via Hospital Road is to be coordinated to minimise impact on Hospital operations.

Construction access to the site via the High Street/ Eurimbla Avenue intersection is understood to be necessary during the commencement of demolition works. However, access via High Street will be limited due to the construction and ultimate operation of the CSELR. The Contractor will need to seek approval from the relevant authorities to ensure access to the site is coordinated with other construction and light rail activities, as well as limiting impacts to residential properties. Recommended construction vehicle access routes to and from the site are shown in Figure 21 and Figure 22, respectively.

Access routes shown via a dotted line require access via High Street as well as the local roads of Arthur Street and Clara Street. These routes are not to be relied upon as a primary access route.

Right turn out of the project onto Botany Street will be utilised where the road network can facilitate this traffic manoeuvre.

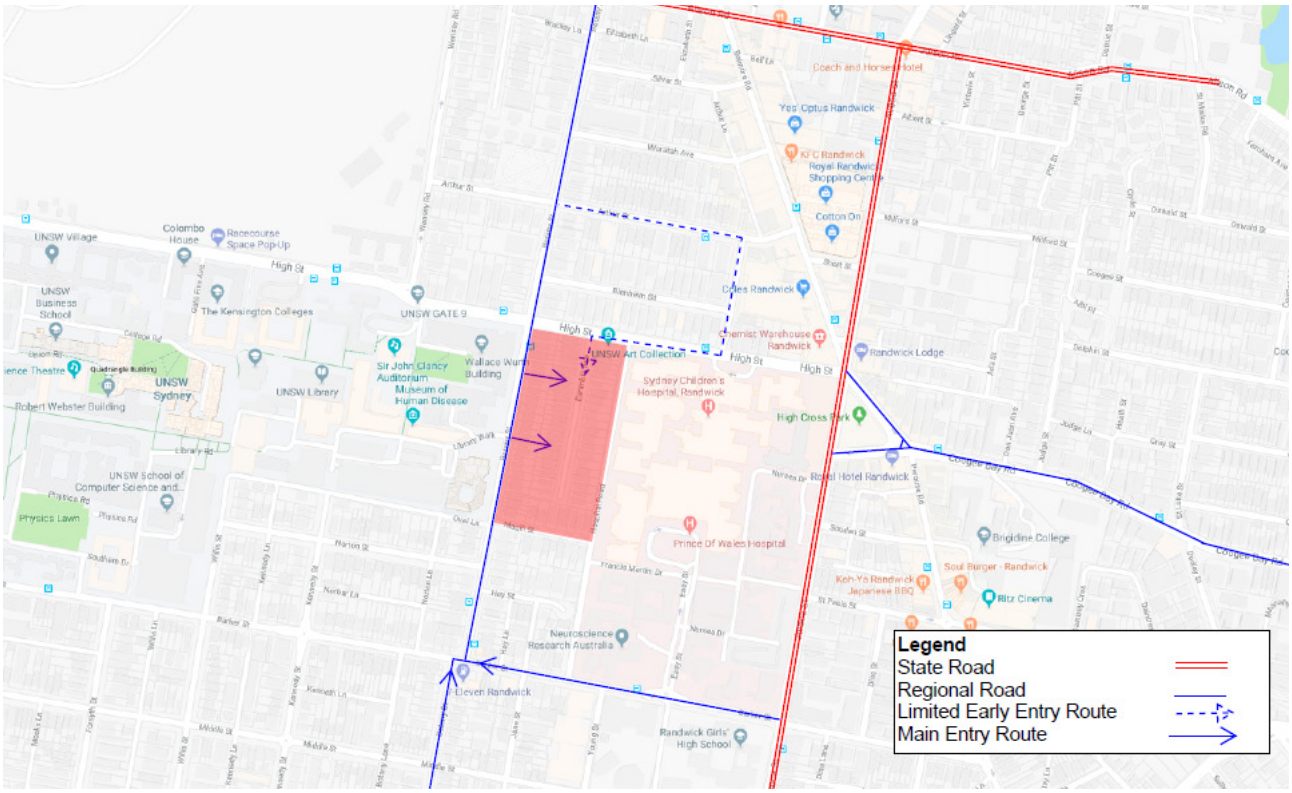


Figure 21: Recommended construction traffic entry routes.

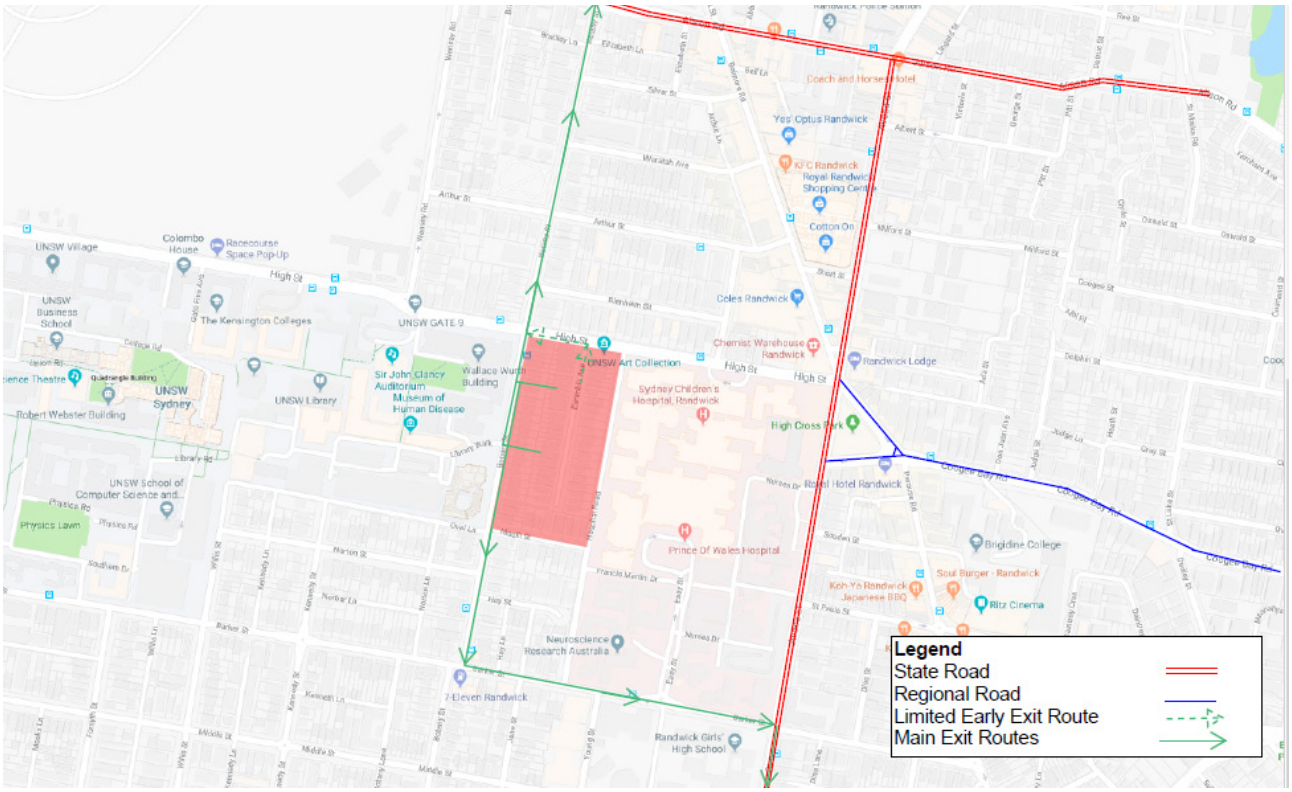


Figure 22: Recommended construction traffic exit routes.

4.6 CONSULTATION

Initial consultation has occurred with the Sydney Coordination Office, Randwick City Council, and Roads and Maritime.

- RCC Traffic and Construction Update Meeting 3/7/18.
- TfNSW Monthly Meeting 4/7/18.
- Traffic Coordination Meeting (RCC) - 10/7/18.
- SCO / RMS / LLB /HI Meeting - 12/7/18

Discussions with relevant stakeholders including the Sydney Coordination Office, TfNSW, Roads and Maritime Services and Randwick City Council are ongoing.

4.7 TRAFFIC IMPACTS

Workers will generate additional traffic to the site although with minimal parking opportunities the numbers are expected to be low. Road network impacts will be mitigated by the fact that construction workers generally start earlier and finish earlier than the commuter peak periods, and would likely not coincide with the peak traffic period of the surrounding road network. A comparison of indicative hours of operations with current road network peaks is shown in Table 5.

Construction workers driving to sites in constrained parking environments, such as this site, typically carpool – further reducing the impact on the road network. There is ample public transport available that will encourage workers to minimise private vehicle use which will further reduce the impacts on the local road network. Furthermore, the CMP proposes to prepare and adopt a green travel plan in order to encourage construction workers to minimise private car trips, promoting carpooling and the use of public and active transport modes.

The proposed works will require the demolition of 92 dwellings. A review of the RMS Guide to Traffic Generating Developments (RMS, 2002) indicates that dwelling houses generate 9 daily vehicle trips. Houses located in this area are likely to have a lesser traffic generation due to the density of development and location adjacent to employment generators. At a trip rate one half of the RMS rate, the removal of 92 dwellings from the site should result in an approximate decrease of 414 vehicle trips per day (i.e. 4.5 daily trips x 92 dwellings) from the surrounding road network.

Description	Hours of Operation / Peak Periods
Site working hours	Monday - Friday: 6am - 6pm Saturday: 8am - 5pm Sunday: No works
Truck minimisation periods	AM Peak: 7:30am - 9:00am PM Peak: 3:00pm - 4:30pm

Table 5: Comparison of hours of operations with current road network peak periods (Source: Aurecon, 2017; Arup 2017)

Traffic counts were conducted on Eurimbla Ave and on Magill Street from Saturday 23 June to Friday 29 June, 2018. Eurimbla Ave carries approximately 500 vehicles per day and Magill Street approximately 400 vehicles per day. With Eurimbla Ave closed and Magill Street having properties on one side, a traffic reduction of up to 700 vehicles per day could be expected.

Daily construction volumes of 50 vehicles per day during the demolition and site clearance works (refer to Section 4.4) has been assumed for the purposes of this report. Construction traffic movements will be scheduled to minimise operations occurring during the Monday to Friday morning (7:30am - 9am) and afternoon (3:00pm – 4.30pm) peak traffic periods.

The CMP proposes to implement an online booking system for delivery of materials to the site (known as the virtual superintendent). Whilst minimal movement of materials onto the site is expected during the demolition stages, this will allow management of the delivery traffic to spread peak movements throughout the work day, avoid peak background traffic periods and implement "just in time" delivery to avoid trucks queuing on the wider road network.

Furthermore, construction traffic generation of this magnitude is significantly less than the amount of vehicle trips currently generated by dwellings within the site area. As result, the potential impacts on the surrounding road network are anticipated to be minimal.

Any lane closures that may impact two-way traffic flow and throughput along these roads is to be conducted outside of peak hours. The Contractor will need to consult with the relevant authorities during the development of the CEMP to ensure impacts to the surrounding road network are minimised.

4.8 CUMULATIVE IMPACTS

There will be a number of other developments surrounding the subject development site which could overlap with the suite works. These include the Inglis Stables site to the south of Barker Street and developments on the UNSW campus. The UNSW Bioscience Project Stage 2 is nearing completion on Botany Street and consultation with UNSW will identify any new upcoming projects that need coordination.

4.9 PARKING

4.9.1 On-street parking

The establishment of on-street work zones will impact the supply of on-street parking. The current CMP highlights potential work zones along Botany Street; either side of the proposed access gates. The existing on-street car parking along the eastern side of Botany Street is time restricted with resident permit holders excepted. Given that the properties fronting Botany Street are being removed, there will no longer be a need for these resident parking spaces.

The location of any on-street work zones and their impact on parking supply is to be discussed and agreed with RCC. It is envisaged that the impacts on kerbside uses will be as shown in Figure 23:

- Bus stops maintained on Botany Street
- No kerbside parking on Botany Street east kerb
- CSELR works continue on High Street
- No change to parking in Magill Street

4.9.2 Staff parking

Construction worker parking is generally proposed to be off-site and also not in the streets surrounding the site. Any parking on site would be subject to discussion and agreement with PwC (representing LHD and HI) and TfNSW. The contractor will allow for maintaining a temporary car park for safe use by construction contractors / staff to deliver tools and equipment to secure onsite storage areas.

An offsite location away from the precinct could be considered with a traffic assessment required to be undertaken on the potential traffic generations impact. The requirement for this parking facility is to be reviewed during the development the CEMP. Other construction activity in the area (e.g. UNSW) has made no additional allowance for on-site parking. Furthermore, given the ample availability of public transport, construction staff will be encouraged to either car-pool or arrive to the site via public transport.

Figure 23: Impacts to kerbside parking

4.10 PEDESTRIANS

Pedestrians on High Street and Botany Street may be impacted from walking past the site during construction. Traffic controllers will manage all construction vehicles and pedestrians interactions.

During all phases of construction, construction vehicles entering, exiting and driving around the site will be required to give way to pedestrians at all times, as required under the NSW Road Rules.

4.11 PUBLIC TRANSPORT

The proposed works will interface with a number of existing bus routes on Botany Street and High Street. The Contractor is to ensure that trucks do not queue along these roads and instead, directly enter and be wholly accommodated within the site. Any changes to bus stop locations to facilitate loading/works zones will be undertaken in consultation with TfNSW and RCC.

4.12 CONSTRUCTION TRAFFIC MANAGEMENT PRINCIPLES

The Contractor will be required to prepare a CEMP for approval by RCC and HI in consultation with the SCO prior to the commencement of works.

As a general principle, construction of the proposed works will be staged to minimise impacts to traffic and other modes of transport. The overall principles for traffic management during construction of the proposed works will include:

- Maintain access to properties located in the vicinity of the site at all times.
- Manage and control construction traffic movements on the adjacent road networks and vehicles movements to and from the construction site.
- Limit the interaction of construction traffic with hospital traffic, especially heavy vehicle and light vehicle conflicts.
- Trucks to enter and exit the site in a forward direction.
- Maintain traffic capacity at intersections and mid-block in the vicinity of the site.
- Restrict construction vehicle activity to designated truck routes in the area.
- Construction access driveways and on-street work zones to be managed and controlled by site personnel.
- Provide an appropriate environment for pedestrians at all times.
- Maintain convenient access and circulation for public transport.
- Pedestrian movements adjacent to construction activity, across construction access driveways and to/from public transport facilities, will be managed and controlled by an authorised and qualified traffic controller.
- Pedestrian warning signs and construction safety signs/devices to be utilised in the vicinity of the site and to be provided in accordance with WorkCover and any applicable legislative requirements.
- Construction activity is to be carried out in accordance with RCC's approved hours of work.
- Minimise vehicle usage of Magill Street.

5.0 SUMMARY

Arup has prepared this report to accompany the development application for the site demolition and clearance works associated with the redevelopment of the Randwick Health Campus. This report has considered the traffic and transport implications for the demolition of 92 dwellings and ancillary structures. This includes the removal of vegetation and site remediation.

The reduction in traffic generation related to the removal of 92 existing residential dwellings is likely to offset any increases in traffic associated with construction activities.

Any associated works along the surrounding road network is to maintain the availability of on-street parking supply where possible and maintain two-way traffic flow. Any road closures are to be conducted outside of peak periods and construction traffic should be separated from hospital operations where possible.

6.0 REFERENCES

Aurecon. (2017). Preliminary Construction Management Plan.

Lendlease. (2018). Construction Management Plan

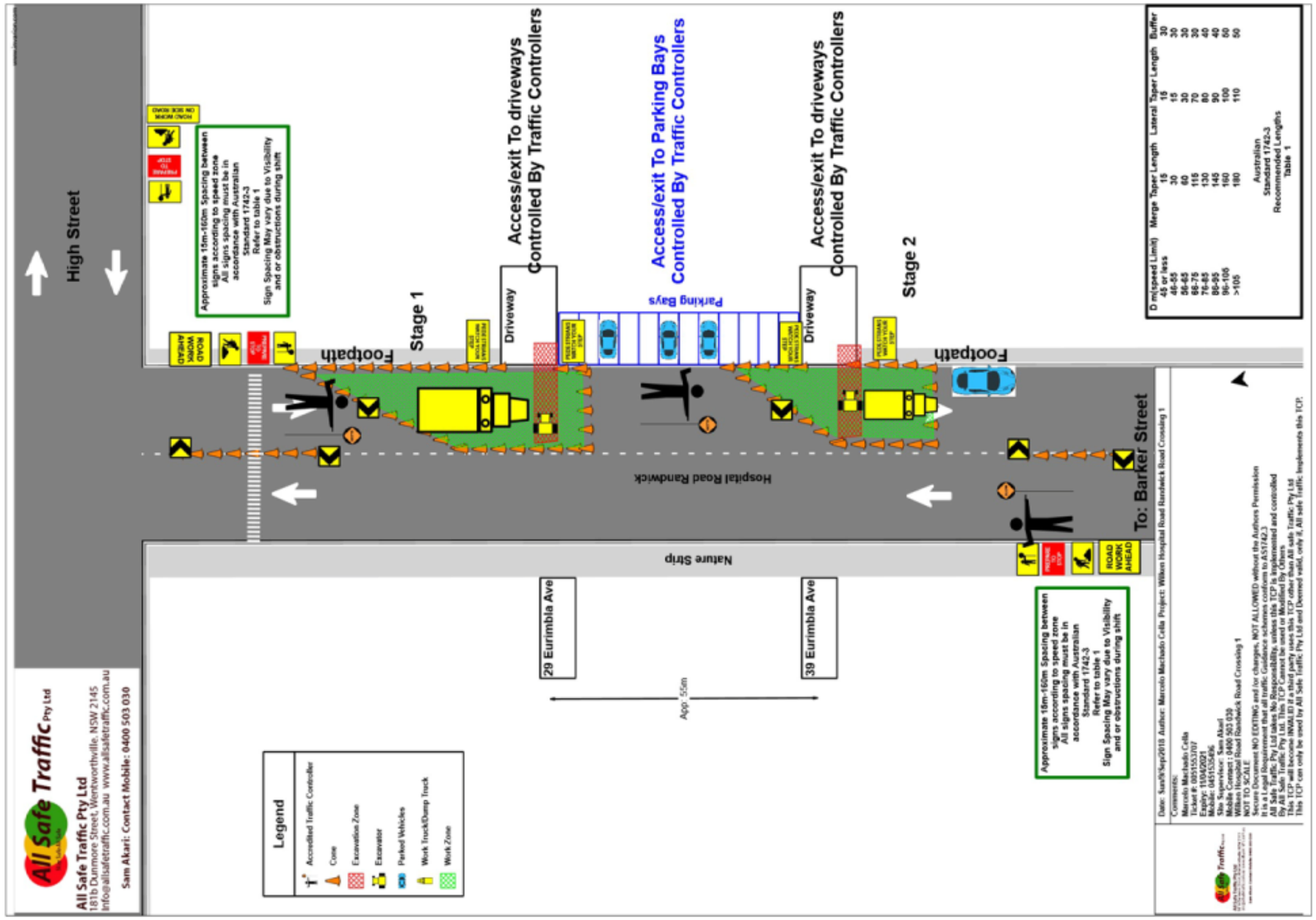
Parking and Traffic Consultants. (2014). Demand Study Relating to Car Parking at Randwick Hospital's Campus Randwick. Sydney: Health Infrastructure.

Roads and Maritime Services. (2002). Guide to Traffic Generating Developments. Sydney.

TTW. (2013). Parking Report for Randwick Hospitals Campus. Sydney: Health Infrastructure.

7.0 APPENDICES

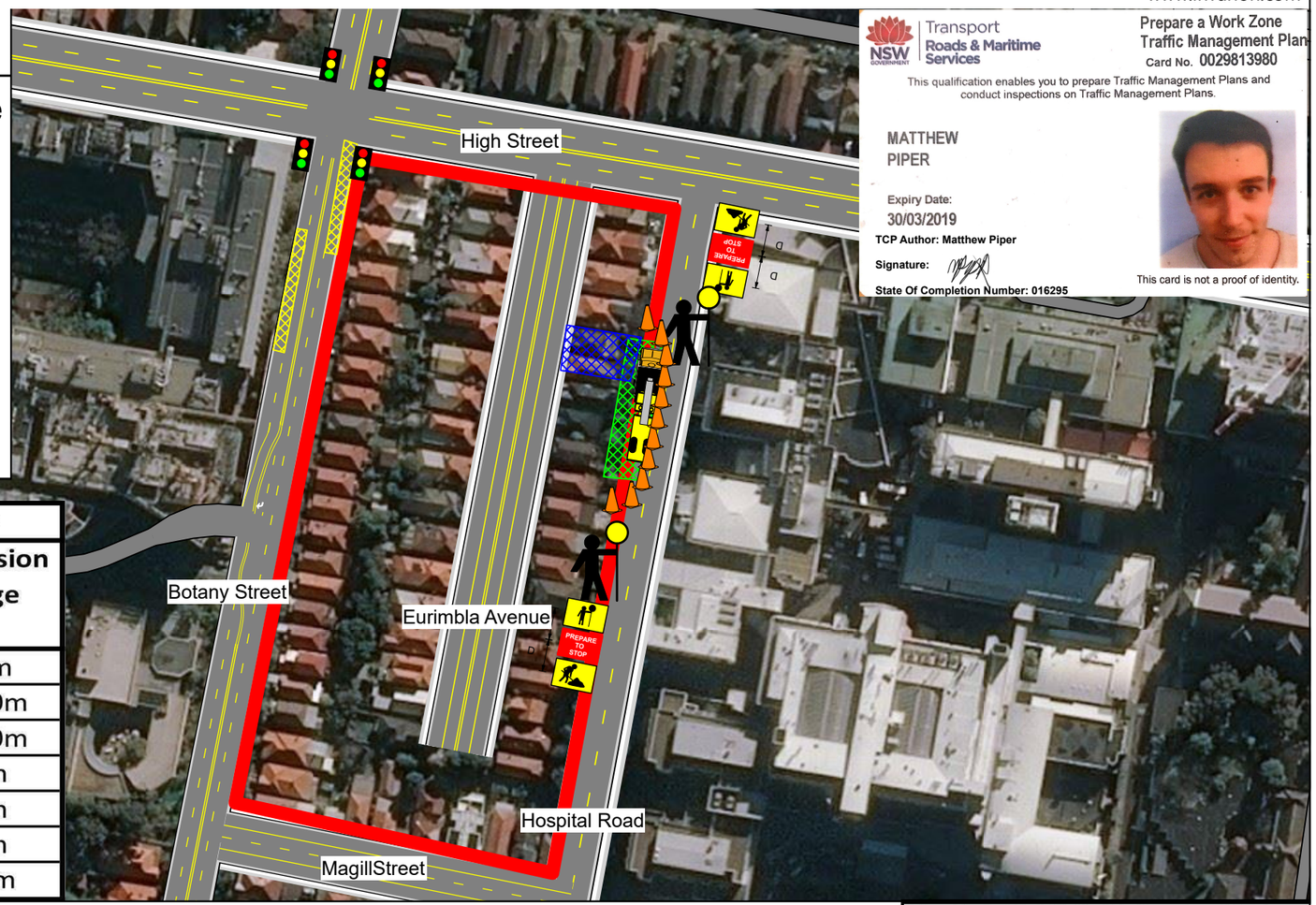
APPENDIX 1 – TRUCK TURNING PATH



www.invarion.com

Legend

- 17 Eurimbla Avenue
- A Class Hoarding
- Bus Stop
- Concrete Pump
- Concrete Truck
- Cone
- Work Area



Signs Spacing's

Estimated Speed Of Traffic (D)	Dimension Range
0-40km	0-5m
50km	15-50m
60km	45-60m
70km	70m
80km	80m
90km	90m
100km	100m

ADMIRAL

Larimda Pty Ltd T/A
Admiral Traffic Control
p: 1300 405 223
e: matthew@admiralpersonnel.com.au

Date: 07/09/2018 **Author:** Matthew Piper **Project:** Oriel Randwick Hospital

Comments:

Concrete Pour
Concrete Truck/Pump to Park at rear of Eurimble Avenue on Hospital Road
Traffic controllers to implement stop procedure whilst trucks reverse into position
Traffic controllers to implement stop/slow procedure as pour occurs
Pedestrians to be guided as required.

Traffic control works shall be installed & maintained in accordance with Australian Standard 1742.3 (Traffic Control Devices for Work on Roads) &/or RTA Traffic Control at Work Sites Manual Version 4 June 2010.
Local constraints may not allow sign and devices to be placed exactly in accordance wit the TCP judgement, therefore it may be necessary to place sign and devices as close a possible to the spacing indicated.
Signs spacing measurements may extend across some intersections, therefore warning signs may need to be placed in the side streets.
Signs should generally be placed 1 metre clear of the travelled path.
Signs are to be Class 1 retro-reflective (day/night), positioned adjacent to footpath or where vehicle parking occurs place signs in the parking lane or elevated on posts. They must be positioned so that they are in clear view of passing motorists.
At the end of the work, or when traffic controllers are absent for an extended period, the T1-18 aand T1-200 signs shall be removed.
When traffic controllers are not controlling vehicles they are to control pedestrians on a hold and release basis as work on site dictates.

Works by WILKEN,

Hospital Road Randwick Road Crossing and Road Trench.

Traffic

Management Plan

All Safe Traffic Pty Ltd
181b Dunmore Street, Wentworthville. NSW 2145
Info@allsafetraffic.com.au www.allsafetraffic.com.au

Sam Akari: Contact Mobile: 0400 503 030

Prepared by

Marcelo Machado Cella

Licence # 0051553707 Expiry : 11/04/2021

Prepare a Workzone Traffic Management Plan

Contact Sam Akari: 0400 503 030

All Safe Traffic Pty Ltd

181b Dunmore Street, Wentworthville, NSW 2145

Contents

A: General Notes

- 1: The RTA/RMS is required to approve the TMP
- 2: This CTMP shall be endorsed by Council or its Sub-delegates.
- 3: Should the information supplied not be sufficient or address all of the requirements then Council Will be advised and further assessment of the TMP will be subject to this information being received.

B: Approval Procedure

Flow Chart

As required by the delegation to Councils- Regulation of Traffic

TMP is required for certain proposed measures

The TMP must be approved by RMS prior to these measures being formally considered by the Local Traffic Committee (LTC).

The approval process is as follows.

C: TMP FORMAT

1: Description of Proposed measures

- Access and exit to Hospital Road Randwick from all directions (North, South, East and West), Will be via Barker Street and/or High Street.
  See Figure 1.1 Traffic Flow

- Accredited Traffic Controllers to direct Traffic around Hospital Road, works controlled by Stop/Slow Situation. Onsite Parking and Driveway access controlled by Accredited Traffic Controllers.
  see Figure 1.2 TCP and 1.3 TCP.

- Pedestrian access to Footpath on Hospital Road will be open guided by Traffic Controllers, around/through Work Area,
- In the case of Footpath requiring to be closed, Pedestrians will be directed to other footpath, guided by accredited traffic controllers.

- Traffic entering and exiting Hospital Road will be controlled by stop/slow situation, guided by Accredited Traffic Controllers

- Location of works by Satellite view

  See figure 1.4 Satellite view

- Pedestrian Access to Properties outside of workhours, vehicle access is to be provided to the satisfaction of Councils design engineer.

2: Assessment of Impact of Proposed Measures.

- Local Residents and Workers Access guided by traffic Control
- Medium Density Traffic Accessing Hospital Road.
- Very Little impact on surrounding Streets/roads/ave
- No weight restrictions for heavy vehicles around work site

3: Assessment Of Public Transport

- NO impact on Public Transport
- Public Transport for Workers is available, By Train and Bus. From Central Station, catch bus M50 or 374 or 373 or 377, and a short walk to Work site

4: Details of Provisions made for Emergency Vehicles, heavy vehicles, Cyclists and Pedestrians.

- Full Access/Exit will be Granted for Emergency Vehicles, Guided by Accredited Traffic Controllers at Hospital Road

- No Heavy Vehicle access, except for Works being conducted by WILKEN.
- All Cyclist Will be Granted Entry.
- Pedestrians Will be directed to other footpath guided by Accredited Traffic Controllers, or guided through Work Area.

5: Assessment of Effect on Existing and Future developments with transport implications in the Vicinity of the proposed measures.

- Very little IMPACT on existing or future developments.

6: Assessment of Effect of proposed measures on Traffic movements in adjoining Council Areas.

- No assessment required for any impact on traffic movements in adjoining council Areas.

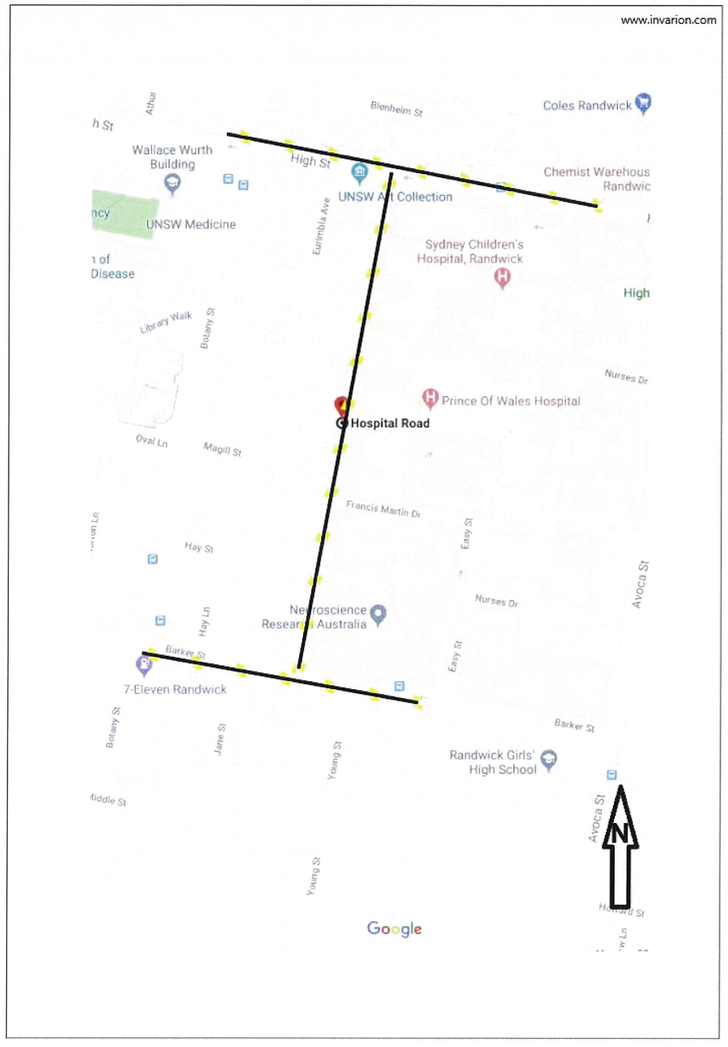
7: Duration Of Works.

Planned dates and hours of Operation.

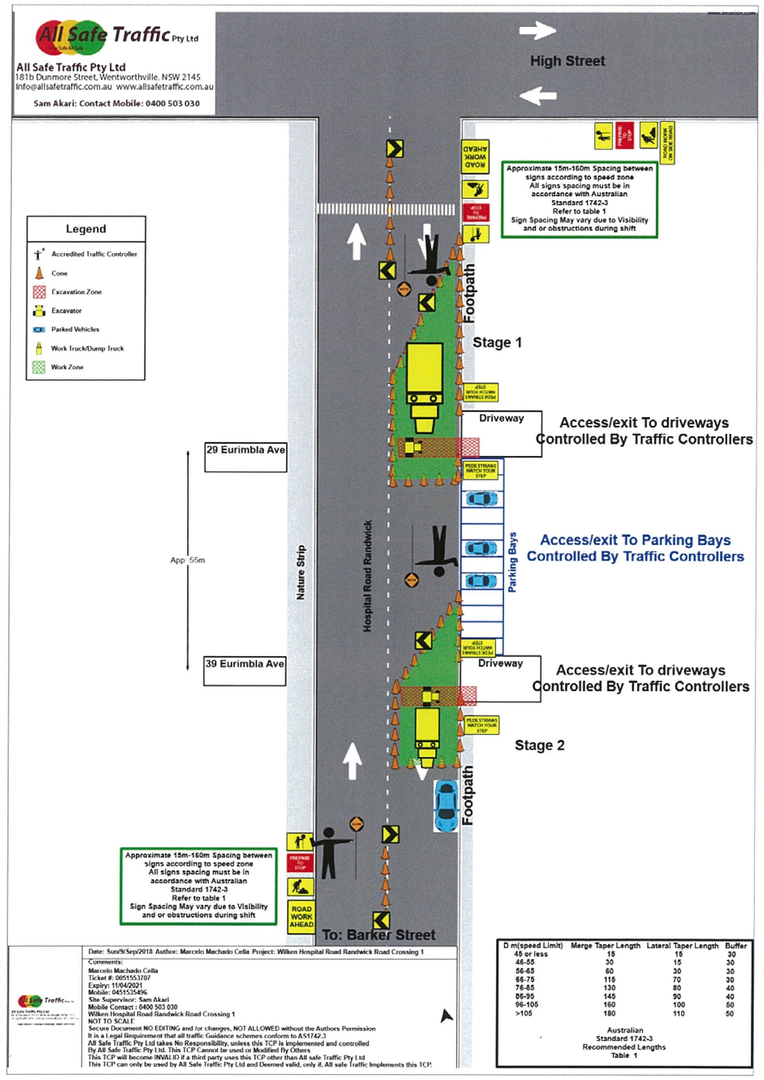
- 12/09/2018 - 12/02/2019,
- 07:00 to 17:00 Monday To Saturday
- 09.00 to 16.00 Sunday

No Work Christmas Day or Public Holidays.

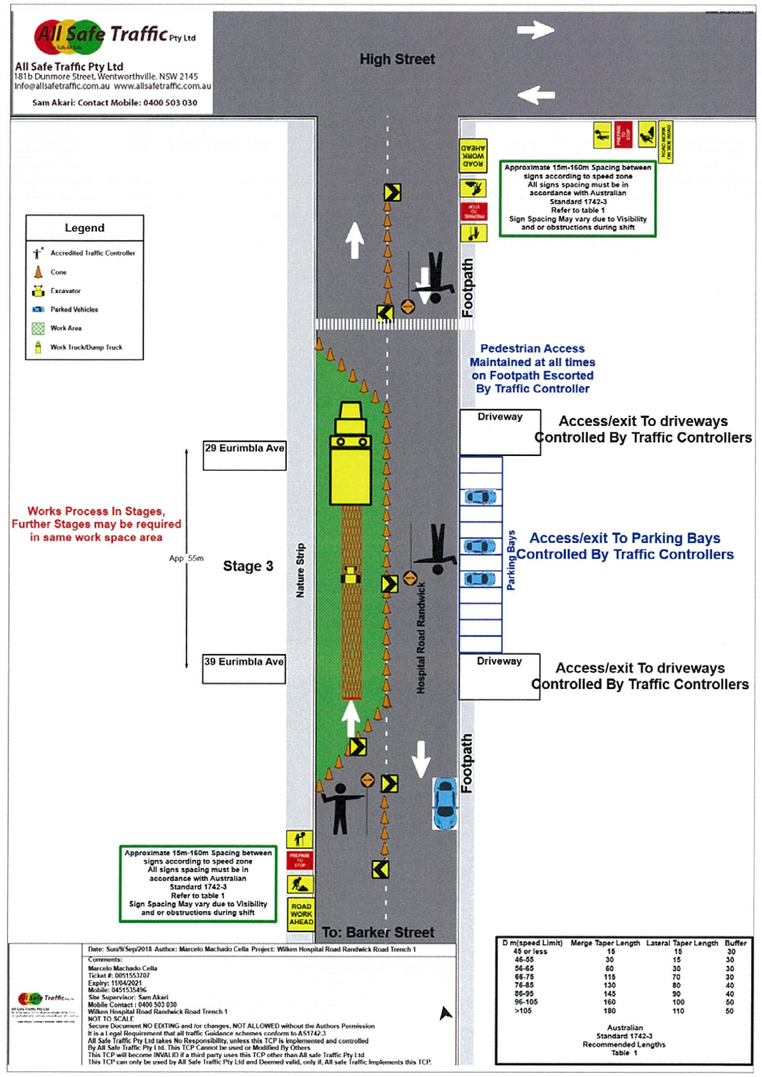
D: FIGURE 1.1 TRAFFIC FLOW



E: FIGURE 1.2 TCP



F: FIGURE 1.3 TCP



G: FIGURE 1.3 Satellite View