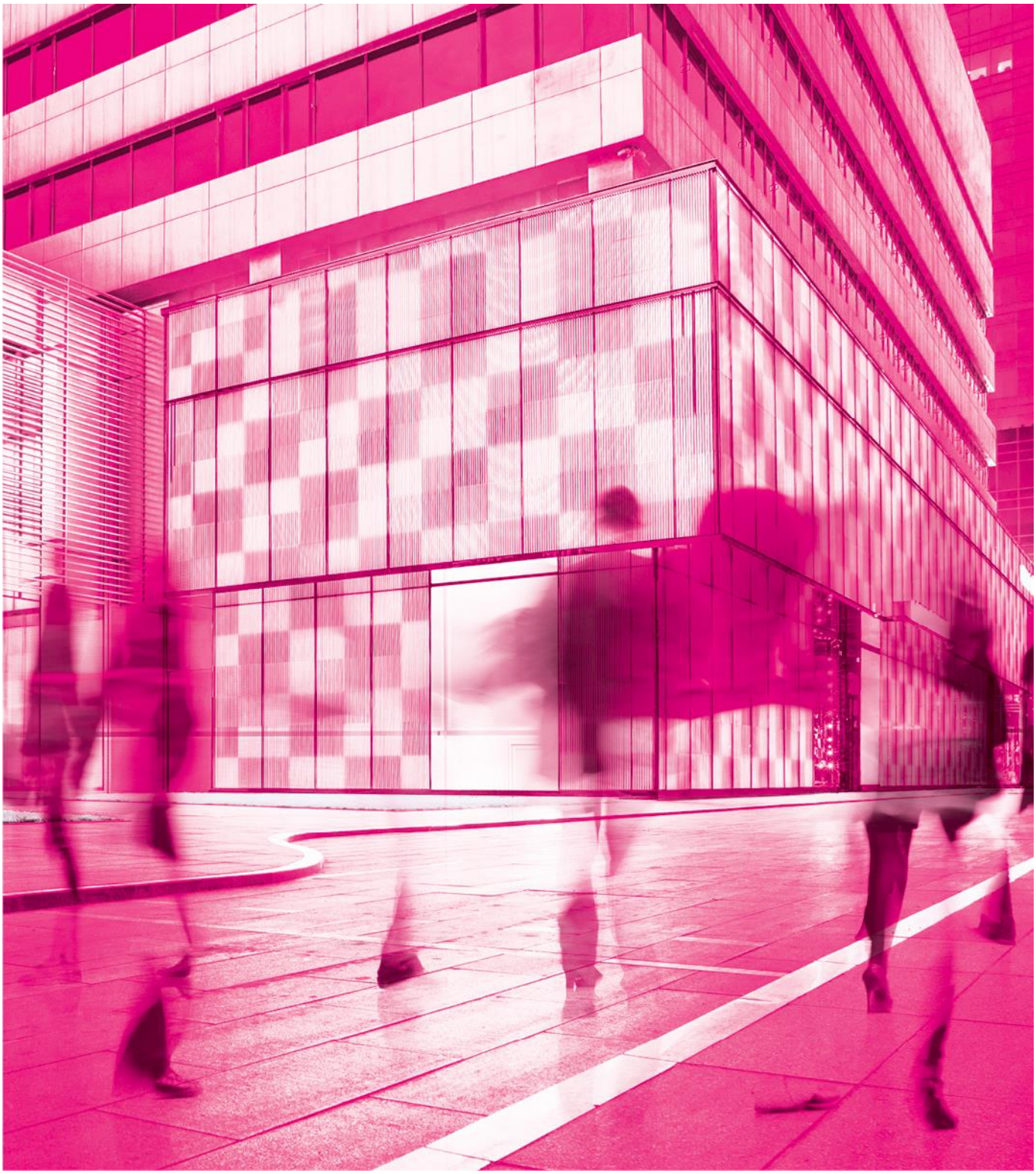

traffic impact assessment;

Nepean Hospital - Stage 2 Development (SSD-16928008)

For Health Infrastructure

15 December 2021

parking;
traffic;
civil design;
communication;

ptc.

Document Control

Nepean Hospital - Stage 2 Development (SSD-16928008) , Traffic impact assessment

Issue	Date	Issue Details	Author	Reviewed
1	25 November 2021	Final for SSDA	KW/AM	AM
2	15 December 2021	Test of Adequacy response	KW/AM	AM
3	16 May 2022	Response to Authority referrals	AM	AM
4				
5				

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Contents

Authority Comments

The following section presents the comments received from the authorities in relation to this Traffic Impact Assessment.

Each comment is accompanied by a high-level response below, while the body of the report and supporting analysis has been amended where required.

Each comment requiring an amendment to this report is identified with a symbol, which contains a link to the associated location within the report.

Where a comment is made that does not require an amendment to the report, the relevant section is identified with a symbol.

The and symbols throughout the report provide a link back to this page.

Department of Planning, Industry & Environment Key Issues

The Department considers traffic and parking management a critical issue for the proposed development. The Department offers the following comments in addition to those provided by Council and Transport for NSW (TfNSW):

The 43 on-street parking spaces proposed to be removed from the development site should be retained or relocated within the hospital campus.

The design has been revised to comprise two separate driveways which will intersect with the Barber Avenue carriageway at 90 degrees. As part of the redesign, the on-street parking arrangement has been largely retained and formalised with a loss of 14 spaces.

Given that the operating capacity of the hospital is increasing in terms of staff and patients, the Department remains concerned about the significant shortfall in on-site parking across the campus. Describe how the Nepean Hospital masterplan addresses this parking shortfall and whether it contains any measures to meet parking demand associated with the ongoing redevelopment of the hospital campus.

In response to changes in the services provided within the campus through the development of Stage 1 and Stage 2, the multi-storey car park constructed in 2019 was proposed to facilitate this associated parking demand ahead of the projects for the express purpose of accommodating the parking for Stages 1 and 2.

The traffic analysis undertaken to support the car park included all traffic activity associated with the stage 1 and Stage 2 projects based on forecast parking demands. It is important to assess the subject proposal in the context of the overall campus plan, which sees a net reduction in staff through the decanting of services off site. This reduces the overall parking demand, while the number of parking spaces is largely retained at approximately 2,000 spaces.

Transport for NSW

Traffic Impact Assessment (TIA) – Swept Paths

i. Drawing #04T_0004 – HRV reversing swept path indicates that truck will encroach into adjacent parking spot of hatched area. A parked vehicle would obstruct trucks ability to reverse into loading bay;

The swept path has been adjusted to remain within the hatched area

ii. Drawing #04T_0003 – Linen truck swept path appears to track over parking spaces – how will these spaces be kept empty to ensure that truck has clear swept path?

The layout has been designed to accommodate an articulated linen truck in the case that this type of vehicle is used in lieu of the Heavy Rigid Vehicle typically used. Noting that the current linen supplier (Healthshare) does not use articulated vehicles, but have requested that the design allow for these vehicle in case of operational changes. In this situation, these parking spaces will be closed for use on days when the articulated linen truck is planned to access the loading dock.

• Truck appears to turn from lane 2 on Parker St, truck should be straddling lanes 1 and 2 to ensure no vehicles can occupy lane 1 as vehicle turns left into Barber St

• Truck appears to use opposing traffic lane on Barber St upon entry – how is this safely being managed?

The swept paths have been revised to demonstrate the articulated vehicle straddling lanes 1 and 2. It is propoed to retain the exisitng Derby Street carriageway, which has provided access to the loading dock without incident as there rae passing opportunities and clear sight lines along the route.

Recommendation

TfNSW requests the abovementioned information to be addressed/provided for further assessment prior to the determination of the application. TfNSW will further review and provide response upon receipt of the additional information.

Swept path plans should be in accordance with Austroads Standards and consider the following:

• All vehicles are to enter and leave the site in a forward direction;

• Simultaneous entry/exit to the site for the longest vehicles is to be achieved;

• All vehicles are to be wholly contained on site before being required to stop;

• The swept path of the longest vehicle (including garbage trucks, building maintenance vehicles and removalists) entering and exiting the subject sites, as well as manoeuvrability through the site, shall be in accordance with AUSTROADS;

• Swept path diagrams should show linemarking and kerbs etc to see if the turning movements encroach the opposing direction of traffic / other parts of the

• shoulder/verge (i.e powerpole etc).

The swept paths comply with each of these requirements, and this would be confirmed based on the final design prior to the CC certification.

Traffic Impact Assessment (TIA) – Traffic Modelling

i. SIDRA reports to be provided for all state road intersections and scenarios (i.e. movement summary, phase timings). Further comments will be made once these can be reviewed;

The SIDRA file will be provided. Since the initial submission all intersections and scenarios have been collated into a single SIDRA 9.0 file.

ii. Great Western Highway & Parker St – showing a LOS of F in Scenario 6 where all other scenarios are LOS D or better;

The modelling has been rerun using the 2.0% annual background growth increase requested by Penrith City Council, which provides updated results.

iii. Have the road upgrades detailed in section 8.3.3 been captured in the revised modelling?

We confirm that the proposed lengthening of the right turn lanes on the north and south approaches to Somerset Street have been included within the 2031 scenarios.

Section 8.3.2 (Great Western Highway / Somerset Street Intersection) states:

Based on the modelling suggestions, the intersection needs to be signalised by the year 2021 to sustain the LOS well below the LOS D. The model output for this intersection after the signalisation for the ultimate scenario (S5) is turned out as LOS A, with a delay of 8 sec and the cycle time of 30 sec.

The signalisation of Great Western Highway/Somerset Street is not supported as it would likely have negative impacts for network efficiency along Great Western Highway with it's close proximity to other signalised intersection at Parker Street and Bringelly Road.

This application does not rely on this intersection being upgraded, but an upgrade to traffic signals would assist distribute the hospital and background traffic from the west and provide improved pedestrian connectivity to Kingswood railway station.

Traffic Impact Assessment (TIA) – Active Transport

i. The application does not offer support to upgrade active transport infrastructure to accommodate the increase of bicycle mode usage from current 1.5% to 8% target.

The proposed End-of-Trip facility proposed within Stage 2 provides for approximately 140 parking spaces with associated showers, change rooms and lockers, while the Stage 1 and 2 projects improve the pedestrian and cyclist facilities through the northern part of the campus.

ii. Consideration should be given to widening the path on Barber Avenue to accommodate future increase target for both pedestrian and cyclist.

Footpaths of a suitable width are provided on both sides of Barber Avenue, and the hospital recently completed a new access ramp from Parker Street to the southern side of the MSCP to improve DDA access.

iii. Consideration should be given to providing sharing path along the frontages of the Nepean Hospital site (Parker St, Great Western Highway, Somerset St, Derby Street) to accommodate the future increase of active transport mode share to the site.

The project does not propose to undertake any works on the surrounding footpaths as the existing footpaths provide suitable access.

Traffic Impact Assessment (TIA) – Coach Parking and Passenger Pick-Up and Set-Down Management

It is noted that Section 5.2 of the Traffic Impact Assessment states:

A new drop-off area comprising set-down/short-stay parking is proposed along the northern side of the Stage 2 building, connecting with Barber Avenue.

The Traffic Impact Assessment does not identify how many drop-off or pick-up spaces are proposed as part of this development nor what the signposted parking restrictions would be in these locations. It is also unclear how the number of spaces and selected signposting will meet the demand of the precinct.

The drop-off area accommodates 12 parking spaces (including 2 accessible spaces) and a space for shuttle buses / mini vans.

These spaces are intended for short term use only with medium/longer-term parking being provided within the MSCP, therefore these spaces are not considered as part of the overall parking strategy. In this regard the provision is able to accommodate upwards of 48 vehicles per hour based on a robust average of 15 minutes per vehicle.

It is also noted that Section 5.3 of the Traffic Impact Assessment states:

The drop-off area has also been designed to accommodate shuttle / minibuses.

The Traffic Impact Assessment does not identify coaches within the report. It is currently unclear if coaches are expected to service the development, and if so, how the site will accommodate these movements.

Recommended Condition of Consent

Prepare a Coach Parking and Passenger Pick-Up and Set-Down Management Plan, in consultation with the Customer Journey Planning within TfNSW, prior to the issue of any occupation certificate.

There is no proposal to accommodate coaches within the campus as there has been no demand for this type of vehicle in the history of the Nepean Hospital.

Preliminary Construction Traffic Management Plan

It is advised that several construction projects are likely to occur at the same time as this development within the precinct. The cumulative increase in construction vehicle movements from these projects could have the potential to impact on general traffic and bus operations in the precinct, as well as the safety of pedestrians and cyclists particularly during commuter peak periods.

Recommendation

It is requested that the applicant be conditioned to prepare a Construction Pedestrian and Traffic Management Plan (CPTMP) in consultation with TfNSW and submit a copy of the final CPTMP to TfNSW viadevelopment.CTMP.CJP@transport.nsw.gov.au for endorsement.

The applicant is willing to accept a condition as described above and a CTMP will be prepared, although it should be noted that the Stage 2 project will be undertaken in isolation to any other project within the precinct as Stage 1 will be complete.

Green Travel Plan

TfNSW appreciate the applicant's effort to provide a TIA document for Stage 2 of the development (SSD 1692 8008) but notes that in Item 5 of the SEARs the applicant is required to develop "travel demand management programs to increase sustainable transport (such as a Green Travel Plan)". It is also noted that

Section 6 of the Traffic Impact Statement states: As part of the transport management strategy for the campus and to satisfy the consent conditions relating to Stage 1, ptc. has prepared a campus-wide Green Travel Plan (GTP) for the hospital, which has established the existing and target mode share, and a working group within the hospital has been created to manage the GTP process.

A Green Travel Plan (GTP) has been prepared to satisfy the consent conditions for the Stage 1 occupation certificate and we confirm that the GTP applies to the entire campus including Stage 2, as Stage 2 will accommodate the EOTF and bike locker rooms required to underpin the active travel targets. Following consultation with TfNSW regarding the content, the GTP has recently been endorsed by TfNSW.

Penrith City Council

Planning and Cultural Considerations

Council has maintained emphasis and importance on the need for any proposed development on this site to ensure that all car parking demands are provided on the site without reliance on the local road network as the local road network is already heavily congested. It is again requested that the Department ensure that the modelling, the parking projections and the proposed on-site car parking provision is compliant without reliance within the local road network to supplement any existing or proposed parking deficit. Further comments in this letter raised concerns with the suggested loss of parking.

The MSCP was approved by Council and subsequently built to serve Stages 1 and 2. The parking demand analysis presented in this document demonstrates that the overall hospital is reducing its parking demand compared to the increase in parking provided.

Traffic Management and Road Design Considerations

The following matters are also identified as warranting further consideration and address:-

- *The proposed layout results in a large number of on-street public parking spaces being removed without being replaced which is not a suitable outcome without supplement.*

- *The proposed layout geometry involves Y shaped intersections however intersections should be perpendicular for increased safety*

The design has been revised to comprise two separate driveways which will intersect with the Barber Avenue carriageway at 90 degrees. As part of the redesign, the on-street parking arrangement has been largely retained and formalised with a loss of 14 spaces.

- *Insufficient detail is provided on how the proposed on-street parking will be managed.*

The design proposes the removal of some on-street parking from Barber Avenue in line with the changing character and use of this section of roadway. The increased parking provision along with the reduced demand within the hospital provides the opportunity for parking.

- *It is yet to be demonstrated that the resulting carriageway width and design complies with Councils road design requirements.*

The design of Barber Avenue will be subject to a detail civil design post approval to confirm that the design complies with Council's road design requirements and the consent could be conditioned as such.

Section 8.3 of the TIA report indicates an annual background growth of 1.5% is assumed which is not supported. The growth rate of 2% has been applied to all developments within the Penrith City Centre. This growth assessment is based on Council's Penrith Core Centre Transport Management Study and Plan

(PCCTMSP) for future traffic growth of 2% is required by Council (attached an extract the section 5.2). This requires remodelling.

We note the request to apply a 2% annual growth rate to the back ground traffic volumes and have undertaken revised SIDRA analysis which is presented in this report. Noting that we adopted 1.5% based on the agreed growth rate for both the MSCP and Stage 1 applications.

Section 8.3 and Table 8 indicates that Great Western Highway / Parker Street intersection is operating with satisfactory or operating near capacity Level of Service (LOS) up to Scenario S5 (2026 - existing + Hospital Development (Stage 2). However, Council's (PCCTMP) report Section 2.6.1.2 indicates the capacity level of the intersection operates at LOS E during the AM peak period and LOS F during the PM peak period (attached an extract the section 2.6.1.2) which is contrary to Section 8.3 and Table 8. This requires further address. Please note, the PCCTMSP model was signed off by TfNSW (former RMS) and DPIE.

The new Scenario 6, which includes a 2% growth rate aligns with Councils model.

In addition, the Section 8.3 and the Table 8 indicate that Parker Street / Derby Street intersection and Great Western Highway/ Somerset Street intersection are operating at capacity LOS E and F. The report has failed to identify and recommended any mitigation measures on each arm of the intersection. This needs to be addressed.

The hospital is located in an area of concentrated regional traffic which contribute to the capacity issues experienced at the major intersections. The SIDRA modelling highlights that the difference between the 'without development' and 'with development' results are quite minor, however the intersection performances are impacted under the growth scenarios.

Also noting that the MSCP was approved for 729 parking spaces, and that 100 of these have not been used and will be opened to support the Stage 2 project. In this regard the project involves a slight increase in traffic associated with drop-off and pick-up activity.

Council Officers are aware that the hospital currently provides a number of 'No Parking' areas that facilitates 2-minute patient drop off and pick up zones (or other short stay parking zones). It is understood that the proposal retains these zones. However a plan/map showing the locations of these zones is requested.

All parking proposals associated with the Stage 2 project have been document in the application and relate to the proposed pick-up and drop-off area.

The submitted traffic report identifies a shortfall of 726 on-site parking spaces in 2021/22 which changes to a shortfall of 635 on-site parking in 2031/32. The development should include additional car parking facilities to make up for the shortfall of on-site parking.

The parking associated with the Stage 1 and 2 projects is provided within the MSCP, which was constructed ahead of the projects in anticipation of the parking demand. The roof top will be opened for parking to provide an additional 100 spaces, plus the decanting of services from other parts of the campus will reduce the overall parking demand so that the impact on on-street parking will be less compared to the period prior to the MSCP, Stage 1 and Stage 2 projects.

The removal of 43 on-street parking spaces along Barber Avenue is not supported and the proposal should not reduce existing parking provision noting comments raised within the planning details within this correspondence.

This comment is addressed above

The report indicates that the Great Western Highway / Somerset Street & Parker Street / Derby Street Intersections are reaching capacity and the proposed development worsens their performance. The intersections must be upgraded to support the development if there is any suggestion that they adversely impacted as a consequence of this development which is detailed to be the case. This should be included in the scope of works to the satisfaction of Council and Transport for NSW.

This comment is addressed above

The swept paths for the proposed loading dock servicing arrangements show heavy vehicles reversing over car spaces and crossing into oncoming lanes which is not supported. This requires revision and address.

This comment is addressed above

The Study has not adequately assessed the road safety risks for the installation of a new rapid bus stop (shelter) at Parker Street and the impact this may have for pedestrians accessing the hospital. A Road Safety Audit should be considered to understand pedestrian desire lines, behavioural issues between the public domain and access to and from the Hospital (including pedestrians walking between footpaths, hospital driveways etc.).

The rapid bus stop location and shelter are being proposed by others and does not form part of this application, although noting that HI has recently completed a DDA compliant access ramp in the vicinity of this location to improve pedestrian access.

Any driveway crossover shall be at a minimum of 1m clearance from any public utility service lid, power / light pole or stormwater kerb inlet pit and lintel.

This requirement is noted and can form a condition within the consent.

The driveway shall also be located a minimum of 1.5m from any street tree. Utility services may be required to be relocated to accommodate the crossover. The applicant is to contact the utility service provider to obtain requirements.

This requirement is noted and can form a condition within the consent.

1. Executive Summary

1.1 Project Overview

Health Infrastructure NSW (HI) is the applicant for the proposed Stage 2 Redevelopment of Nepean Hospital in Penrith Local Government Area (LGA).

The proposal is State Significant Development (SSD) for the purposes of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and clause 14(a) of Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011* (SEPP SRD) as it involves development for the purposes of a hospital with a capital investment value in excess of $30 million.

The Stage 2 Redevelopment seeks to deliver significantly enhanced acute services, as well as a new campus main entry and drop-off area. It complements the recent Stage 1 Redevelopment (SSD 8766) approved in February 2019 and due for completion by early 2022.

The proposed Stage 2 Tower will be located west of, and connected to, the Stage 1 Tower. Portions of the North Block (north section) will be demolished with the remaining sections of the North Block (to the south of the Stage 2 Tower) to remain operational.

Departments to be provided in the Stage 2 Tower include:

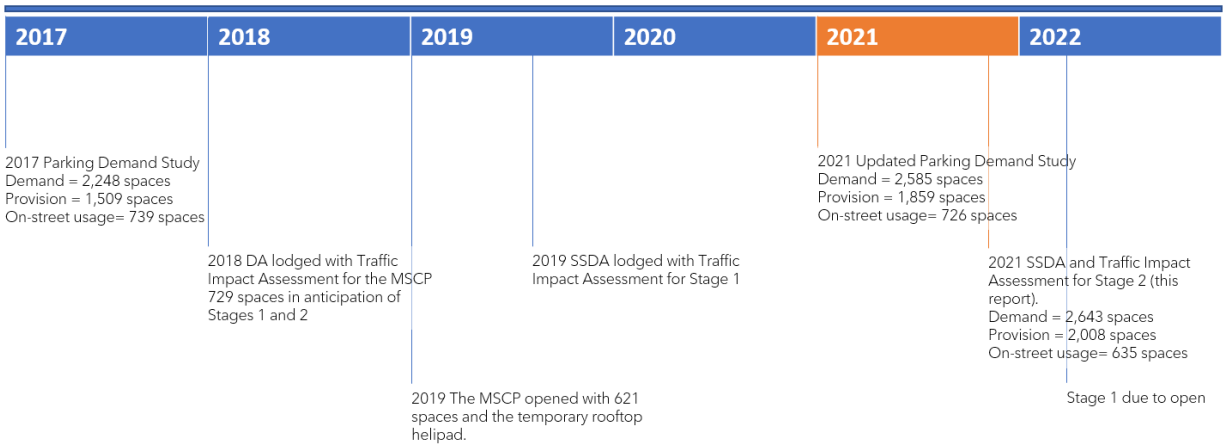
- Front of House, including retail,
- Education and Training Centre,
- Transit Lounge,
- Medical Imaging,
- Interventional Radiology,
- Intensive Care Unit and Close Observation Unit,
- In-Centre Dialysis and Renal Inpatient Unit,
- Paediatric In-patient Unit,
- Plant areas,
- Clinical Support areas and Kitchen.

The Stage 2 Redevelopment project scope includes:

- The Stage 2 Tower, being predominantly a 7-storey building, with roof plant,
- Demolition of parts of the existing North Block and other satellite buildings directly within the Stage 2 Tower footprint (excluding other buildings already approved under the Stage 1 SSD consent),
- Demolition of the Total Asset Management (TAM) facility,
- Reconfiguration of the loading dock area and back of house functions,
- Landscaping and other associated at-grade works within the Stage 2 Tower's immediate vicinity, and
- Barber Avenue upgrade and access road to the Stage 2 Tower's forecourt, port cochere, and front of house area.

1.2 Traffic and Parking Assessment Process

In order to present the traffic impacts and parking demands associated with the Stage 2 project, it is important to review the project in the context of the hospital campus and the Stage 1 project currently under construction. The following diagram summarises the process, which is described in more detail in the text below:



Both the Stage 1 and Stage 2 expansion projects involve the displacement of health services, building floor area and parking spaces. It is also noted that the campus provides a range of interconnected health services and facilities. In this regard, a traditional floor area-based assessment of the traffic generation and the parking provision associated only with the Stage 2 expansion is not suitable, particularly given that a Multi-storey car park (MSCP) was constructed and partially opened in 2019 to accommodate the planned demands associated with both Stages.

The following section presents a timeline and summary of the traffic and parking assessment leading to this application and the conclusions presented in this report.

2016 - 2017 – **ptc.** prepared a parking demand analysis for HI to determine the parking provision and demand for the entire public hospital campus (i.e. the Private Hospital is not included). At that time, it was concluded that the hospital accommodated 1,509 parking spaces and produced a peak demand of 2,248 spaces. The study also established the on-street parking supply within a 500m radius of the campus to conclude that this was able to accommodate the additional demand. The study included a projected future parking demand based on the planned expansion of the hospital (Stages 1 and 2), with reference to the clinical health plan and staff population projections established by the LHD. The **ptc.** assessment was used by HI in the car park business plan process, which underpinned the proposal to construct the MSCP to cater for the planned growth.

2018 - **ptc.** prepared a Traffic Impact Assessment to accompany a Development Application to Penrith Council for the construction of the MSCP on the corner of The Northern Road and Barber Avenue. The car park accommodates 621 spaces, in line with the **ptc.** parking demand assessment. The traffic analysis included peak hour modelling of the existing road conditions at that time, plus a post development and horizon model of 2026.

2019 - **ptc.** prepared a Traffic Impact Assessment to accompany an SSDA for the Stage 1 expansion. This was shortly after the MSCP assessment and therefore the MSCP TIA was referenced as the basis for the

Stage 1 traffic impact assessment. Approval for Stage 1 was granted in 2019 and the project is currently under construction for completion in 2020.

2019 – the MSCP was completed and opened for use with the exception of the roof level, which is being used to house the helipad until it can be relocated to the roof of the Stage 1 building. This will increase the parking supply from 621 to the approved 729 spaces.

2021 - ptc. prepared a revised parking demand assessment based on updated health projections and clinical health plan. The revised parking projections are referenced in this report and form the basis of the traffic analysis.

1.3 Traffic and Parking Findings

In summary, this assessment of the traffic and parking engineering associated with the proposal concludes the following:

- To accommodate the increased parking demands associated with the overall Nepean Redevelopment Program, a Multi-Deck Car Park (MSCP) has been constructed within the Hospital campus, adjacent to Barber Avenue. The MSCP was designed in the context of the overall Nepean Redevelopment Program of which the Stage 2 expansion forms only one component.
- The parking demand associated with the Stage 2 expansion will be accommodated within the completed MSCP, following the conversion of the upper level (currently a temporary helipad) and other parking areas being provided throughout the campus. In this regard, the traffic implications associated with the Stage 2 expansion have been assessed within the Development Approval (DA17/0665) for the MSCP, which assumed full capacity following the completion of Stage 1 and Stage 2. Additionally, to comply with the current SEARs and present a 10-year horizon model, a 2031 scenario demonstrates that the Stage 2 development has little impact on the road network compared to the background growth occurring on the network.
- With regard to parking demand and the overall provision, the parking demand assessment undertaken by ptc. and the projected parking provision within the campus demonstrated that the on-street parking demand associated with the hospital will reduce following the Stage 2 project compared to the situation prior to the MSCP, Stage 1 and Stage 2 projects. The decrease in on-street parking demand is primarily due to the MSCP and other new parking areas being created within the campus as a result of the Stage 1 and 2 projects.
- Drop-off parking demand will be accommodated by a new drop-off area on the north-western side of the Stage 2 building. The arrangement will enable drop-off at the main Stage 2 entrance, with a short distance to return to the MSCP so that the drop-off area is for short term parking only.
- Servicing will be accommodated within the existing location of the primary dock, although this is being remodelled to increase capacity and improve compliance with current design standards. A separate kitchen loading dock is proposed having access from the Stage 1 drop-off area, while the Bulk Gas area is being relocated to the eastern side of the campus. While there will be an increase in deliveries associated with Stage 2, the three locations balance the traffic activity across the road network rather than the western side only.

1.4 Response to SEARs

The Stage 2 Redevelopment's SEARs were issued by the Department of Planning, Industry and Environment on 22 April 2021. In preparing this report, the following SEARs General Requirements, Key Issues, and Agency's Advice letters have been addressed. The table below sets out the reference or location of these matters within this report.

SEARSs	Comments and Reference
Item 5 – Transport and Accessibility	
Provide a transport and accessibility impact assessment, which includes, but is not limited to the following:	
• analysis of the existing transport network, including: road hierarchy o pedestrian, cycle and public transport infrastructure. o details of current daily and peak hour vehicle movements based on traffic surveys and / or existing traffic studies relevant to the locality. o existing performance levels of nearby intersections utilising appropriate traffic modelling methods (such as SIDRA network modelling).	Refer to Section 4 for the existing road hierarchy, public transport , active travel infrastructure, and Section 8 for the existing and projected traffic modelling.
• details of the proposed development, including: o a map of the proposed access which identifies public roads, bus routes, footpaths and cycleways. o pedestrian site access and vehicular access arrangements, including for service and emergency vehicles and loading/unloading, including swept path analysis demonstrating the largest design vehicle entering and leaving the site and moving in each direction through intersections along the proposed transport routes. o car and motorcycle parking, bicycle parking and end-of-trip facilities. o drop-off / pick-zone(s) o pedestrian, public transport or road infrastructure improvements or safety measures.	Refer to Section 4 for the existing transport facilities, and Section 5 for the proposed campus transport facilities. The parking provisions are described in Section 7.
• analysis of the impacts due to the operation of the proposed development, including: o proposed modal split for all users of the development including vehicle, pedestrian, bicycle riders, public transport and other sustainable travel modes. o estimated total daily and peak hour vehicular trip generation. o a clear explanation and justification of the: ▪ assumed growth rate applied. ▪ volume and distribution of proposed trips to be generated. ▪ type and frequency of design vehicles accessing the site.	Refer to Section 6 for the existing and projected mode share analysis and Section 8 with regard to the projected traffic impacts.
o details of performance of nearby intersections with the additional traffic generated by the development both at the commencement of operation and in a 10-year time period (using SIDRA network modelling). o cumulative traffic impacts from any surrounding approved development(s). o adequacy of pedestrian, bicycle and public transport infrastructure and operations to accommodate the development. o adequacy of on-site car and motorcycle parking and bicycle parking provisions when assessed against the relevant car / bicycle parking codes and standards. o adequacy of the drop-off / pick-up zone(s) during peak-hour access. o adequacy of the existing / proposed pedestrian infrastructure to enable convenient and safe access to and from the site for all users.	Refer to Section 8

SEARSs	Comments and Reference
• measures to ameliorate any adverse traffic and transport impacts due to the development based on the above analysis, including: o travel demand management programs to increase sustainable transport (such as a Green Travel Plan). o arrangements for the Travel Coordinator roles. o governance arrangements or relationships with state and local government transport providers to update roads safety. o Infrastructure improvements, including details of timing and method of delivery.	Refer to Section 6 with regard to the mode share and Green Travel Plan initiatives being prepared for the campus (separate to, but including Stage 2).
• analysis of the impacts of the traffic generated during construction of the proposed development, including: o construction vehicle routes, types and volumes. o construction program (duration and milestones). o on-site car parking and access arrangements for construction, emergency and construction worker vehicles. o cumulative impacts associated with other construction activities in the locality (if any). o road safety at identified intersections near the site due to conflicts between construction vehicles and existing traffic in the locality. o measures to mitigate impacts, including to ensure the safety of pedestrian and cyclists during construction. • analysis of the impacts of construction works on the adjoining rail corridor prepared in consultation with the relevant rail infrastructure authority. • a preliminary Construction Traffic and Pedestrian Management Plan. Note: Further guidance is provided in the TfNSW advice attached to the SEARs.	A preliminary draft CTMP has been prepared and accompanies this application as a separate document noting that a contractor has not been engaged at this stage.

The following documents have been referenced in the preparation of this assessment:

- Infrastructure SEPP (Schedule 3).
- Guide to Traffic Generating Developments (Roads and Maritime Services, 2002).
- EIS Guidelines - Road and Related Facilities (Department of Urban Affairs and Planning (DUAP), 1996).
- Cycling Aspects of Austroads Guides.
- NSW Planning Guidelines for Walking and Cycling (Department of Infrastructure, Planning and Natural Resources (DIPNR), 2004).
- Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments (Austroads, 2020).
- Australian Standard 2890.3 Parking facilities, Part 3: Bicycle parking (AS 2890.3).

2. Introduction

ptc. has been engaged by Health Infrastructure (HI) to prepare a Traffic Impact Assessment (TIA) for the proposed Stage 2 Building, which is one part of the overall Nepean Hospital Redevelopment program. This assessment accompanies the State Significant Development (SSD) and will be presented to the Department of Planning & Environment (DPE).

The purpose of this assessment is to assess the traffic, parking and transport implications associated with the proposed the Stage 2 Building.

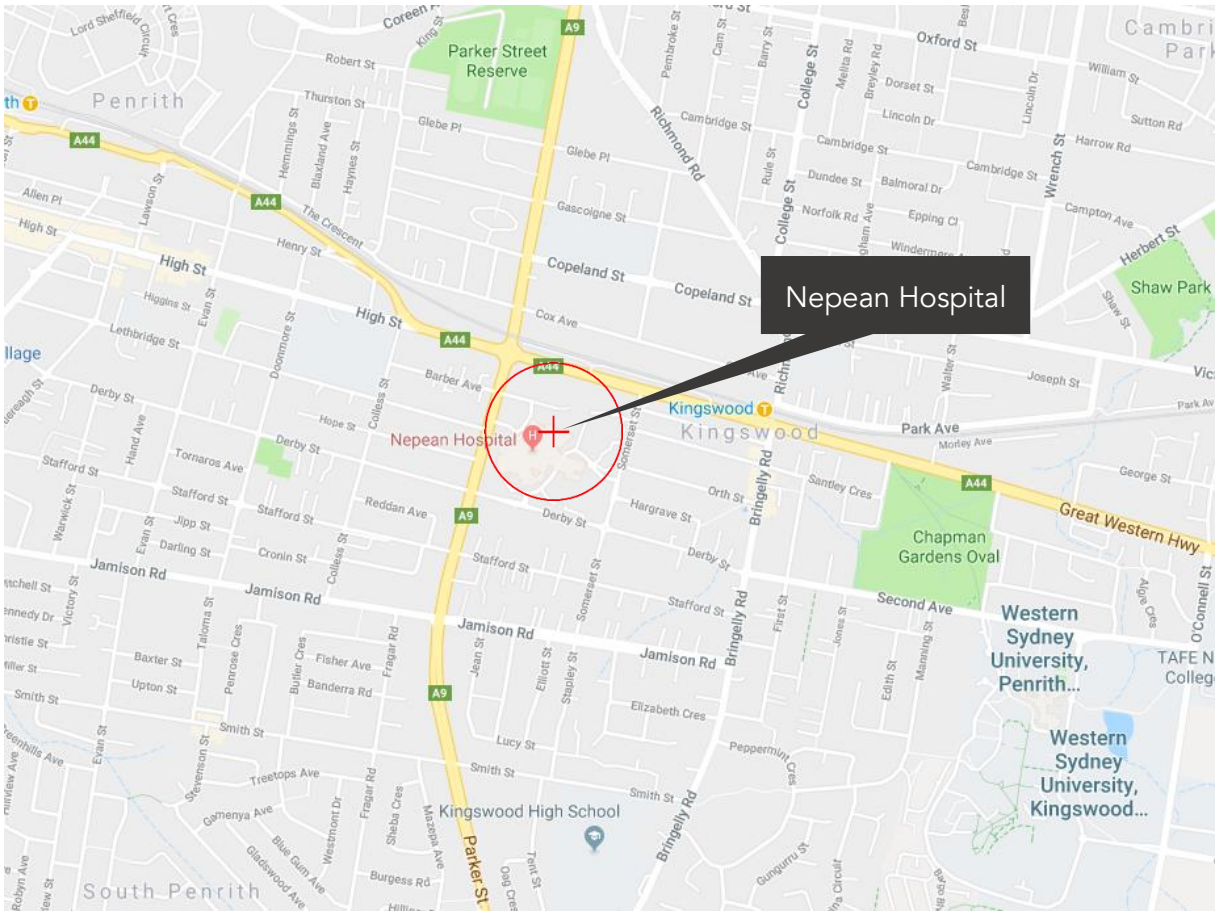


Figure 1 - Nepean Hospital Location (Source: Google Maps)

3. Background

3.1 Site Context

The proposal is located within Lot No. 4 of DP1238301, which comprises the entire Nepean Hospital (the Hospital) and an area of 138,952m^2.

The Hospital campus is located in Kingswood, which is approximately 60km west of the Sydney CBD and 3km to the east of the Penrith City Centre. The Penrith Local Government Area (LGA) accommodates a population of approximately 198,000, which has experienced growth of approximately 11.9% between 2006 and 2015 according to ABS Census Data. It is expected that this growth will continue, and the expansion of the Hospital is required to respond to this growth.

The Hospital campus is bordered by the Great Western Highway and a private hospital to the north, Parker Street to the west, Derby Street to the south and Somerset Street to the east, outlined in Figure 2.

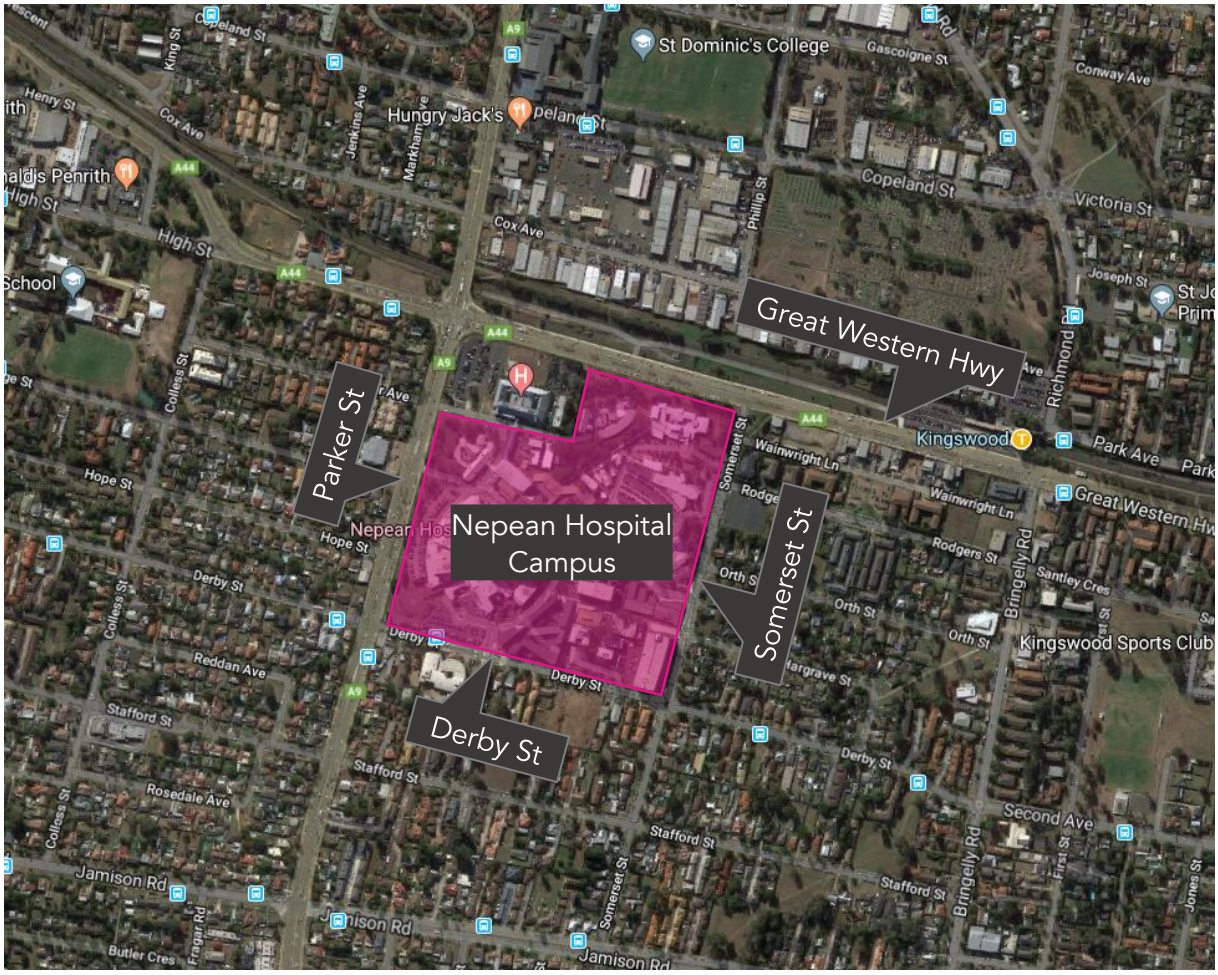


Figure 2 - Aerial View of the Nepean Hospital Campus (Source: Google Maps)

3.2 Surrounding Land Uses

In the context of the surrounding land use, the Hospital campus is classified as an Infrastructure Zone (SP2) and is surrounded by a variety of different land uses:

- The west of the hospital is characterised by Medium (R3) and High (R4) Density Residential housing.
- Immediately to the east and south of the hospital is a Mixed Use (B4) area, followed by Medium (R3) and High (R4) Density Residential housings and the Chapman Gardens Oval, zoned as Public Recreation (R1).
- To the north-east of the Hospital lies a General Industrial (IN1) area, accommodating railway tracks, the Kingswood Railway station and several automotive outlets along the Great Western Highway. Behind these is the Kingswood Cemetery, zoned as Special Activities (SP1).

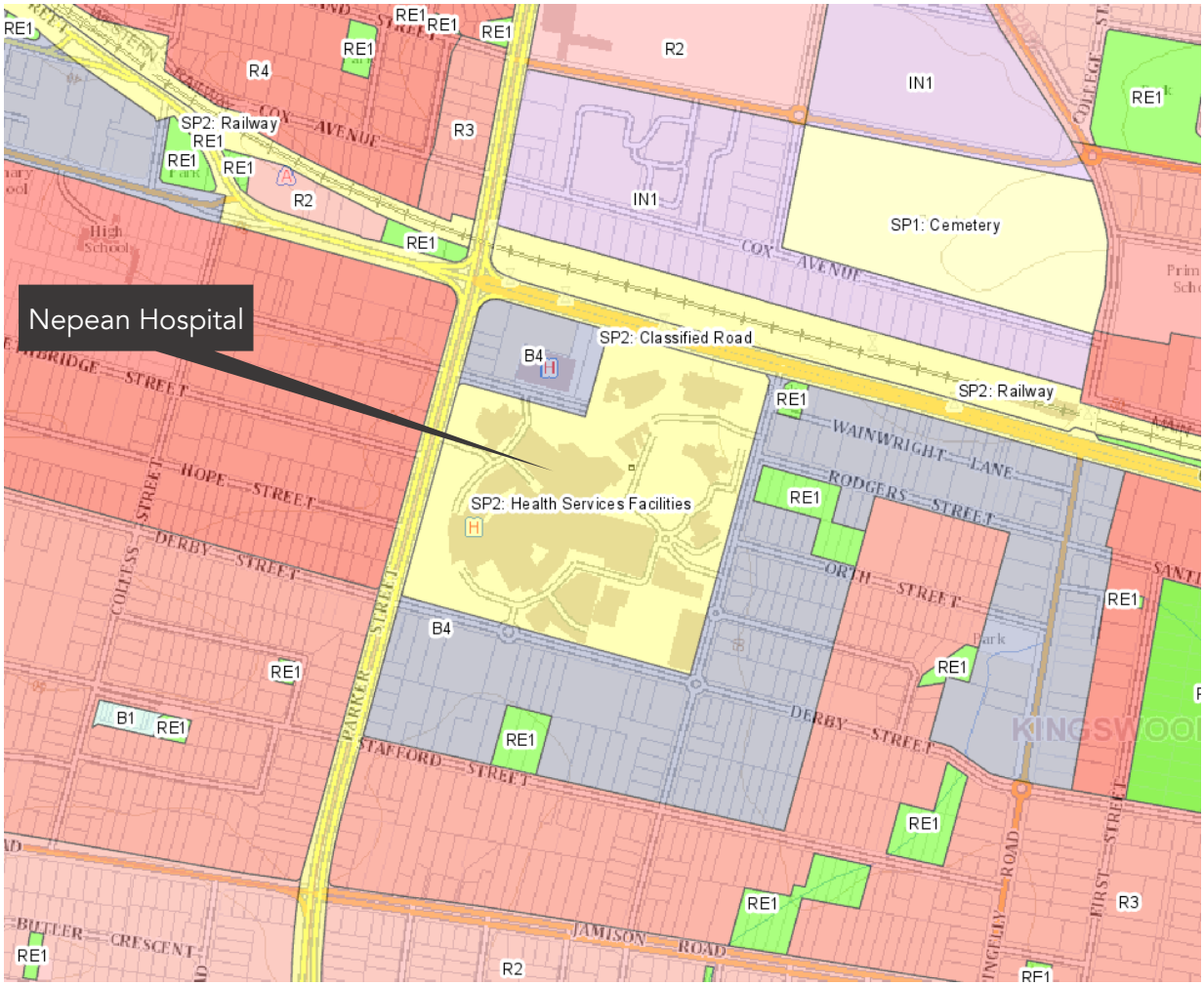


Figure 3 - Surrounding Land Use (Source: NSW Planning Portal 2021)

3.3 Future Surrounding Land Use

In 2007, the NSW Department of Planning and Penrith City Council published the Penrith City Centre Plan, which outlines the foundation to ensure the rapid growth of the Western Sydney hub will be accommodated

for within a 25-year period. The City Centre Plan aligns with the key objectives of the Council's vision for Penrith to ensure growth into a "prosperous, vibrant and attractive city".

The City Centre Plan identifies development opportunities in the context of the expected growth in population of 10,000 new residents and 10,000 new jobs within the City Centre.

The key initiatives identified within City Centre Plan include:

- Promoting office development in the commercial core.
- Promoting Government office accommodation options for the city centre.
- Investigating options for the development of the city park.
- Developing strategies to improve the educational facilities within the city centre; and
- Improving the accessibility within the city centre by investigating new transport options and planning for the necessary infrastructure.

In 2011, the Penrith Business Alliance (PBA) published the Penrith Health and Education Precinct Strategic Vision. The document aims to create local jobs by growing the skills base of the area as well as attract new investment to Penrith through the delivery of projects focused in four key areas:

- World leading health services.
- Education and training, related to health and wellbeing.
- Research, in medicine and preventative health; and
- Business opportunities, related to health, medicine and wellbeing.

Consequently, the proposed Nepean Hospital Redevelopment is consistent with the objectives relevant to the Penrith Health and Education Precinct Strategic Vision, which will promote future government and non-government investment and development in the region's health sector.

More recently, the Penrith Community Plan sets out goals relating to improved infrastructure planning and in a survey of residents, Healthcare was listed in the top ten issues, being number 8 being mostly transport related issues (e.g., roads, public transport, parking etc.).

3.4 Current Site Use

Nepean Hospital is part of the Nepean Blue Mountains Local Health District, providing public health services to the Greater Western Sydney Region. The area is served by a number of hospitals including Hawkesbury Hospital, Springwood Hospital, Blue Mountains Hospital and Lithgow Hospital.

The Hospital is the principal referral hospital and regional trauma centre for Western Sydney and provides a diverse range of services including emergency, intensive care, cancer care, cardiology, community health, drug & alcohol, medical imaging, mental health, sexual health, rehabilitation, pharma & allied health, and surgical services (including dental, neurosurgery, orthopaedic, plastic& reconstructive, thoracic, breast & endocrine, ENT, urology and vascular).

The Hospital is also a teaching hospital of the University of Sydney. Medical, nursing and allied health students are placed at the hospital for practical terms.

The existing Hospital Campus map is presented overleaf:

Figure 4 - Existing Nepean Hospital Campus Map (Source: NSW Health)

4. Existing Transportation Facilities

4.1 Road Hierarchy

The Hospital is served by a regional and local road network, which provides ready access to the City Centre and the surrounding region, while the Great Western Highway and Parker Street provide the primary connection to the Sydney CBD. The road network in this area is also comprised of State and Regional roads, as well as local roads providing access to the surrounding land uses.

The surrounding road network is illustrated in Figure 5.

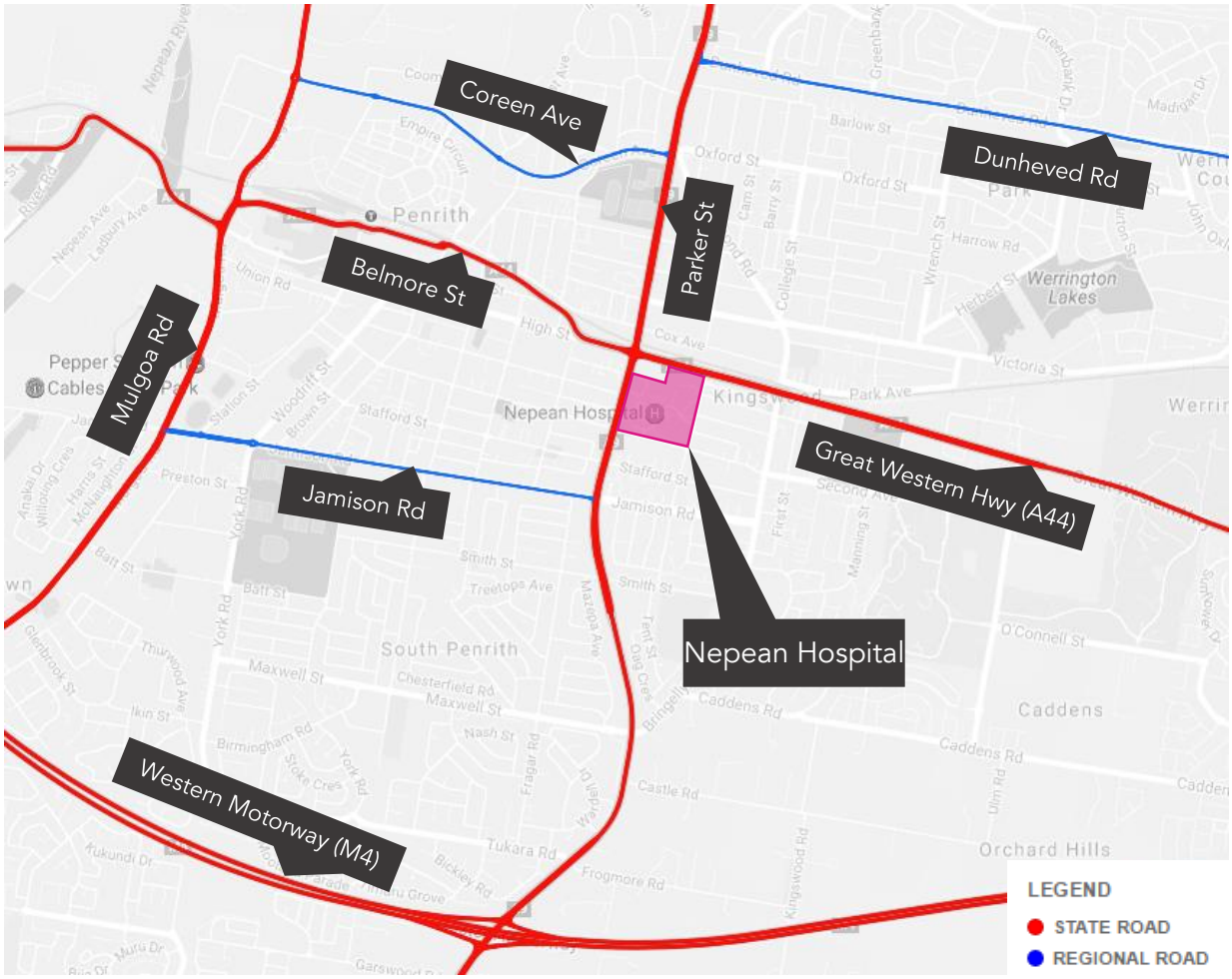


Figure 5 - Road Hierarchy (Source: RMS Road Hierarchy Review)

The NSW administrative road hierarchy comprises the following road classifications, which align with the generic road hierarchy as follows:

- State Roads: Freeways and Primary Arterials (RMS Managed)
- Regional Roads: Secondary or sub-arterials (Council Managed, Part funded by the State)
- Local Roads: Collector and local access roads (Council Managed)

The road network serving the site includes:

Great Western Highway	
Road Classification	State Road
Alignment	East – West
Number of Lanes	3 lanes in each direction
Carriageway Type	Divided
Carriageway Width	22.5 metres
Speed Limit	60kph
School Zone	No
Parking Controls	Eastbound: unrestricted parking on the outer most lane; Westbound: partially unrestricted parking on the outer most lane, partially 'No Stopping'
Forms Site Frontage	Yes

Figure 6 - Streetview of Great Western Highway, Eastbound (Source: Google)

Parker Street	
Road Classification	State Road
Alignment	North – South
Number of Lanes	3 lanes in each direction
Carriageway Type	Divided
Carriageway Width	22.5 metres
Speed Limit	70kph
School Zone	No
Parking Controls	Southbound: unrestricted parking on the outer most lane; Northbound: partially unrestricted parking on the outer most lane, partially 'No Stopping'.
Forms Site Frontage	Yes

Figure 7 - Streetview of Parker Street, Northbound (Source: Google)

Derby Street	
Road Classification	Local Road
Alignment	East – West
Number of Lanes	1 lane in each direction
Carriageway Type	Un-divided
Carriageway Width	12 metres
Speed Limit	50kph
School Zone	No
Parking Controls	Eastbound: partially 'No Stopping' and 'Bus Zone' areas, partially free 2 hour parking; Westbound: partially 'Bus Zone' and free 15 min parking, partially free 4 hour parking.
Forms Site Frontage	Yes

Figure 8 - Streetview of Dorby Street, Eastbound (Source: Google)

Somerset Street	
Road Classification	Local Road
Alignment	North – South
Number of Lanes	1 lane in each direction
Carriageway Type	Un-divided
Carriageway Width	12 metres
Speed Limit	50kph
School Zone	No
Parking Controls	Free 2 hour parking northbound and 4 hour parking southbound
Forms Site Frontage	Yes

Figure 9 - Streetview of Somerset Street, Northbound (Source: Google)

Barber Avenue

Road Classification	Local Road
Alignment	East – West
Number of Lanes	One lane for 2-way traffic
Carriageway Type	Un-Divided
Carriageway Width	9 metres
Speed Limit	50kph
School Zone	No
Parking Controls	Free 2 hour parking on the southern road side, 'No Stopping' on the northern road side
Forms Site Frontage	Yes

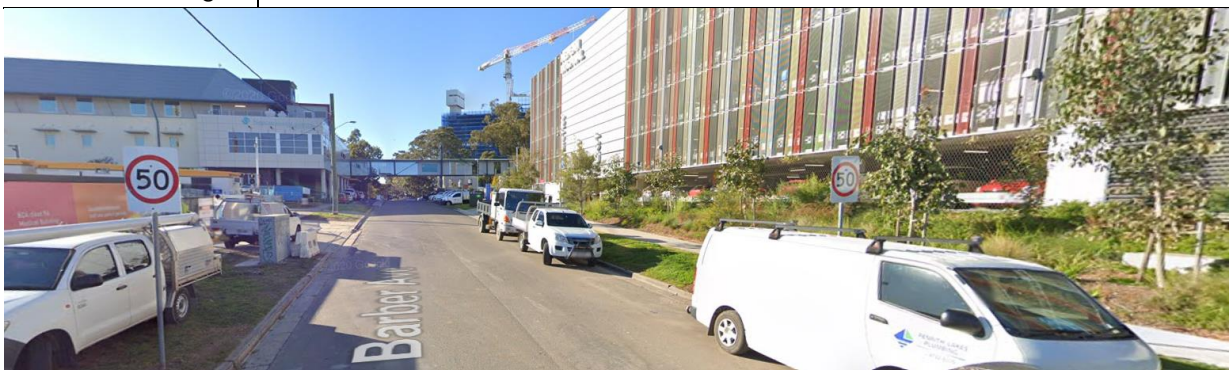


Figure 10 - Streetview of Barber Avenue, Eastbound (Source: Google)

4.2 Vehicular Access to the Site

Vehicle access to the Hospital Campus is provided in several locations in order to serve the various car parks, loading areas and the Emergency Vehicle areas. The key inbound vehicle routes to the Hospital are as follows, and the existing vehicle access locations are presented in Figure 11, which illustrates the access arrangements following the completion of Stage 2.

- **Route 1: West** – Inbound vehicles travel along the Great Western Highway, then onto Parker Street to access the Hospital either via Barber Street or the Hospital Entrance; 29% of Hospital arrivals originate from this direction.
- **Route 2: North** – There is no vehicular access along the northern boundary of the Hospital precinct.
- **Route 3: South** – Inbound vehicles travelling along Derby Street can access the Hospital via the Sydney Medical School entrance or utilise the off-street car park within the campus; 30% of the Hospital arrivals originate from this direction.
- **Route 4: East** – Inbound vehicles travelling along Somerset Street are able to access the Hospital via the Hospital entrances at Somerset Street north of Hargrave Street and Somerset Street north of Rodgers Street, as well as via the multi-level car park entry off Somerset Street; 41% of Hospital arrivals originate from this direction.

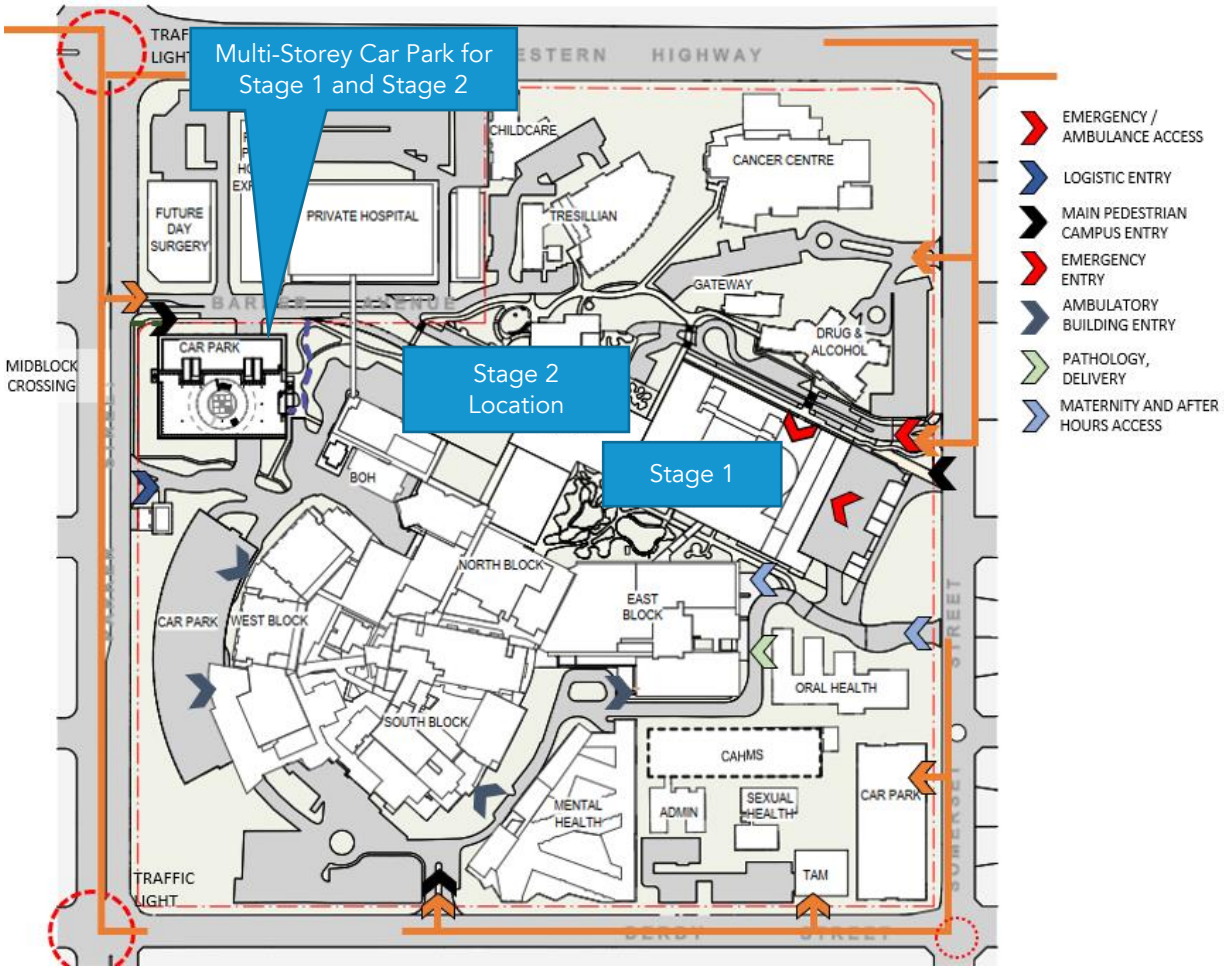


Figure 11 - Existing Nepean Hospital Campus Access Locations (Vehicular)

4.3 Existing and Planned Parking Facilities

As per the Parking Demand report prepared by **ptc.** in May 2020 for the parking supply and demand within the Nepean Hospital Precinct, the existing parking facilities within the hospital precinct are shown in Figure 12 and Table 1.

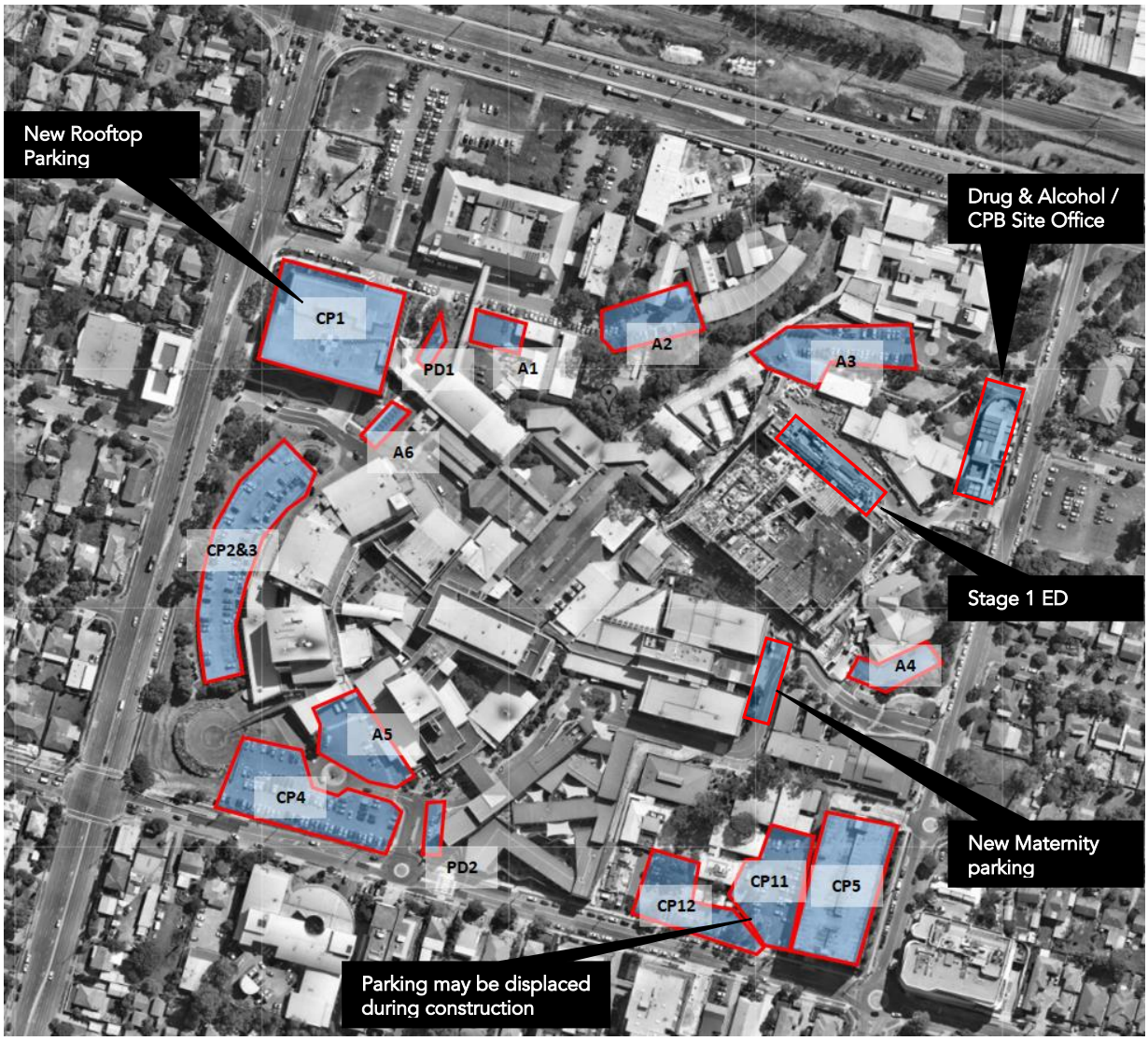


Figure 12 - Existing Parking Provisions

It is important to note the Stage 2 project involves some additional parking spaces within the proposed drop-off area. Other additional parking within the campus is being provided as part of the Stage 1 completion works, the opening of the roof-level of the MSCP and other changes in the parking arrangements within the campus. These are summarised in the following table to provide an overview of the existing parking provision and the projected provision following the completion of Stage 2.

Table 1 - Existing and Planned Parking Supply

Main Car Parks	Staff / Public	DDA	Fleet	Other	Total
CP1 - Barber Avenue MSCP (with helipad)	607	14			**621**
CP2 - WB Upper	77	13			**90**
CP3 - WB Lower	167				**167**
CP4 - South-west	89	2			**91**
CP5 - Somerset MSC	632	21			**653**
CP11- Fleet Vehicles*			42	4	**46**
CP12- Derby Street *	23				**23**
Sub Total - Main Car Parks	**1595**	**50**	**42**	**4**	**1691**
Other Car Parks					
PD1 - 10min Pickup/Dropoff				4	**4**
PD2 - Drop off				3	**3**
A1 - Maintenance				14	**14**
A2 - Tresillian	16				**16**
A3 - Cancer Care Centre	38	2		6	**46**
A4 - Childcare	6	1			**7**
A5 - Near Emergency				20	**20**
A6 - Near Loading Dock				11	**11**
Total - Other Car Parks	**60**	**3**	**0**	**58**	**121**
Known Future Car Parks					
CP1 MSCP upper level (removal of helipad)	108				**108**
Drug & Alcohol	50	2			**52**
Stage 1 ED	17	1			**18**
Stage 2 ED	12				**12**
VMO (Kitchen Loading Dock)	5				**5**
New Maternity (East block)	12				**12**
A2 – Tresillian (adjustment, no gain/loss)	0				**0**
A6 - Near Loading Dock (removal)				-11	**-11**
Total - Future Car Parks	**204**	**3**	**0**	**0**	**196**
Grand Total	**1,836**	**56**	**42**	**51**	**2008**

* maybe temporarily displaced during the construction of the future CAHMS and TAM projects

In summary, the following existing parking supply associated with the Hospital comprises:

- On-campus supply (including planned new parking) = 2,008 spaces.
- Existing off-campus supply = 1,080 spaces within the local road network (within a 500-metre radius).

4.4 Public Transport

Several public transport options are available in the vicinity of the Hospital in the form of buses and rail. The NSW Planning Guidelines for Walking and Cycling 2004 (the Guide) suggests a distance of 400mm as a walkable catchment to access local amenities. The Guide also recommends that an 800m catchment is an acceptable, walkable distance if the development is within an area with public transport links. Furthermore, the document also suggests a distance of 1,500m is a suitable catchment for cycling for accessibility to public transport facilities and local amenities.

The Hospital location has been assessed in the context of available forms of public transport that may be utilised by prospective staff and visitors. Public transport options within the recommended catchments are shown in Figure 13.

Figure 13 - Public Transport Map

We note that within these catchments, the land use is predominantly low, medium and high density residential, with mixed-use business centres to the north, east and south.

4.4.1 Bus Services

There are five bus stops within 400m of the Hospital, as summarised below in Table 2 and Figure 14.

Table 2 - Bus Service Summary[1]

Route No.	Frequency	Coverage	Stop Location
677	Every 60-120mins on weekdays; every 120mins on weekends	Richmond to Penrith via Londonderry	• High St opp Kradle Krayons
774	Every 30mins on weekdays; every 60mins on weekends	Mount Druitt to Penrith via Nepean Hospital	• Derby St before Somerset St • Derby St after Somerset St
775	Every 30mins on weekdays; every 60mins on weekends	Mount Druitt to Penrith via Erskine Park	• Derby St before Somerset St • Derby St after Somerset St
776	Every 25-30mins on weekdays; every 60mins on weekends	Mount Druitt to Penrith via St Clair	• Derby St before Somerset St • Derby St after Somerset St
780	Every 15-30mins on weekdays; every 60mins on weekends	Mount Druitt to Penrith via Ropes Crossing	• High St opp Kradle Krayons

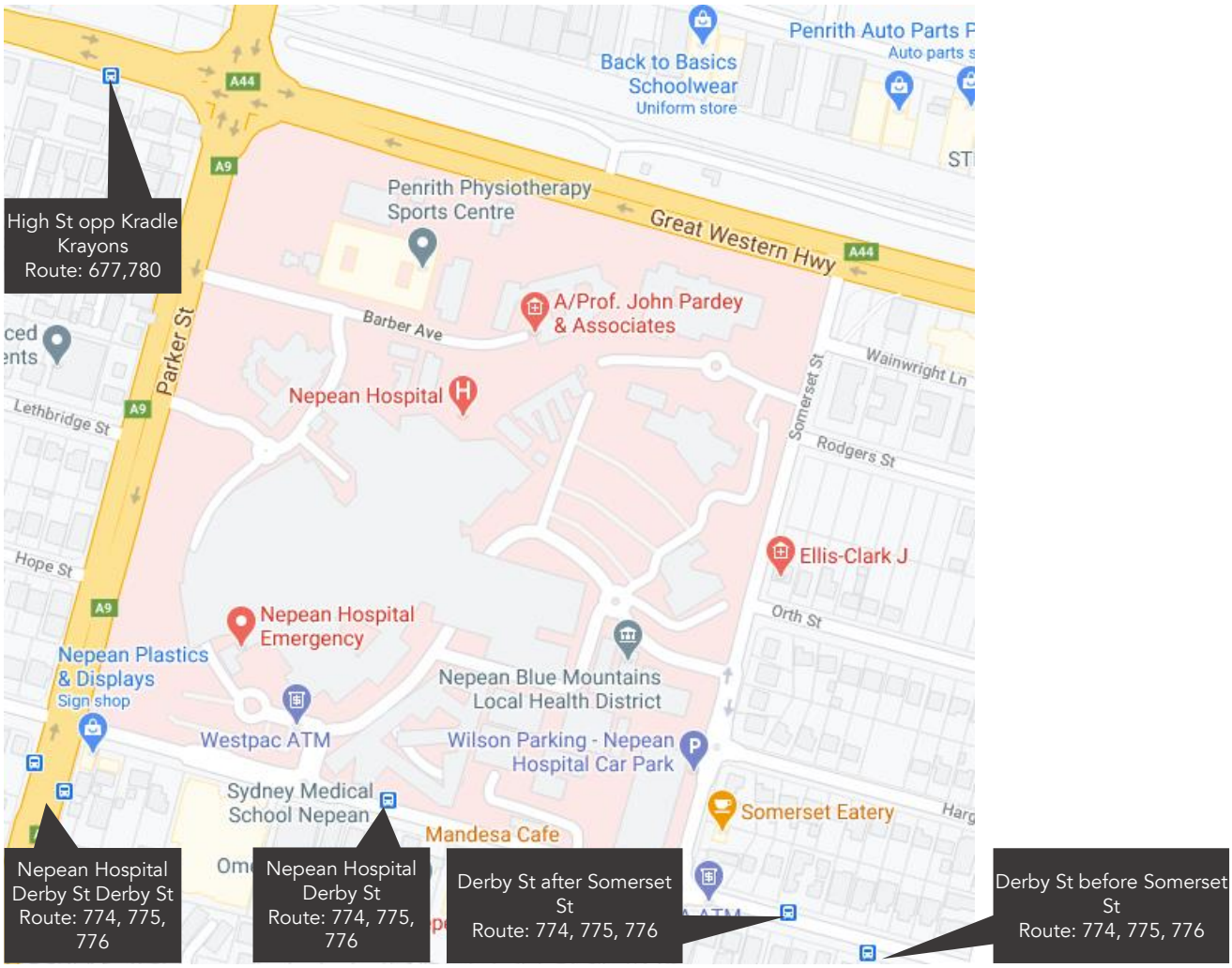


Figure 14 - Bus Stop Locations

[1] https://transportnsw.info/

The Hospital is relatively well serviced by buses, with a number of routes and regular services (approximately every 30 mins on weekdays) and therefore provides a reasonably attractive transport option for some Hospital-related users, subject to the availability of convenient bus stops close to their home location.

This appears to be confirmed by surveys[2], which show 4% of outpatients and 4% of visitors utilising bus services to travel to the Hospital. However, only 1% of staff utilise bus to travel to work.

4.4.2 Future Rapid Bus Service

A rapid bus service is currently being planned by TfNSW to operate between Penrith and the Second Sydney Airport. As of 9th November 2021, TfNSW has provided an updated indicating that the route will pass along Parker Street with stops on Parker Street within the Hospital Frontage. While no detail has been provided, the imagery in the TfNSW update suggests that the stops will be at the southern end of the frontage, near Derby Street. This location does not affect the design or layout of the Stage 2 project and we understand that HI is working with TfNSW as the Rapid Bus plans develop.

In the broader context of traffic and transport impacts, the provision of a new rapid service will assist in moving the mode share towards public transport as a proportion of total trips.

4.4.3 Train Services

Kingswood railway station is located approximately 400 metres (5 minute walk) from the western boundary of the Hospital, which is within reasonable walking distance for staff and, potentially, outpatients and visitors. It is recognised that Hospital attendees with walking difficulties may find this a less attractive transport mode share, although taxi connections are available from the Station to the Hospital.

Kingswood Railway Station is operated by the Sydney Train Network and is served by the T1 Western Line, from Emu Plains and Richmond to the City. Services operate seven days a week with city-bound services approximately every 10-15 minutes on weekdays (3:16am-12:19am) and weekends (3:48am-12:02am)[3].

The distance from the Hospital and relative frequency of services could make heavy rail a reasonably attractive mode share option for some Hospital-related users, subject to the availability of a convenient railway station close to their home location.

This appears to be confirmed by surveys[4], which show 2% of outpatients and 4% of visitors utilising heavy rail mode share to travel to the Hospital. However, only 1% of staff utilised heavy rail (or a combination of heavy rail and bus) as their mode share option.

It is noted that the pedestrian access to the Station is located at the eastern end of the platform. Whereas the desire line when walking to the Hospital would be to enter/exit the Station at the western end of Platform 2 (the southern platform). Access to the Station could be improved through a new access at the western end of Platform 2 and an improved crossing across the Highway in the vicinity of the Hospital.

[2] Car Parking Demand Study – March 2017

[3] https://transportnsw.info/

[4] Car Parking Demand Study – March 2017

4.5 Active Travel

4.5.1 Walking

Walking is a viable transport option for distances under 800m (approximately 12 - 20mins) and is often quicker for short trips door to door. Walking is also the most space efficient mode of transport for short trips and presents the highest benefits. Co-benefits where walking replaces a motorised trip include improved health for the individual, reduced congestion on the road network, and reduced noise and emission pollution.

The Hospital campus is surrounded by a reasonable volume of low-density (mostly single storey) residential development (apart from the area to the north of the Great Western Highway which is predominantly light industrial and bulky goods) and the topography of the area is relatively flat. Therefore, walking should be a viable option for persons living within an 800m – 1km walk from the Hospital.

Footpaths are currently provided around the Hospital frontage, which are generally wide and can adequately accommodate two-way pedestrian flow.

The existing pedestrian facilities are considered adequate for the purposes of the Hospital.

Walking as an option appears to be supported by surveys[5], which show 2% of staff, 4% of outpatients and 3% of visitors walking to the Hospital.

4.5.2 Cycling

It is noted that the cycling infrastructure in the Penrith region is relatively underdeveloped, with no dedicated bicycle paths in the vicinity of the Hospital (as shown in Figure 15). However, the surrounding road network comprises a grid of "bicycle-friendly" residential roads with relatively level terrain, making cycling a viable method of travel for those comfortable riding on roads.

[5] Car Parking Demand Study – March 2017

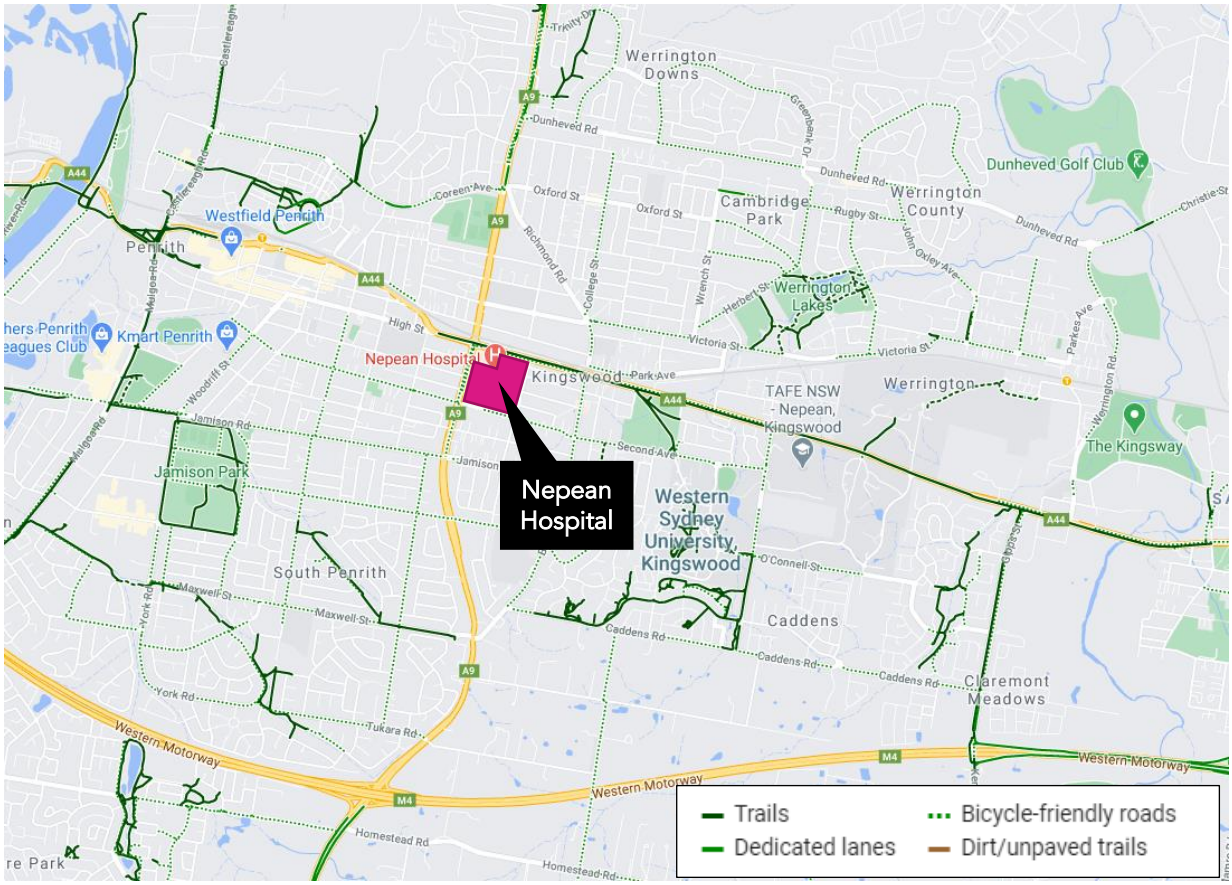


Figure 15 - Cycling Route Map[6]

Consistent with many other hospitals, cycling is an attractive mode share for daytime staff, and for those who live within a relatively close distance of the campus.

[6] Source: Google Maps

5. Development Proposal

5.1 Hospital Redevelopment Context

The Hospital is currently undergoing a redevelopment program to provide additional services to support the local and regional health demand requirements within the Sydney's Western region.

While the additional services within the Hospital may have the potential to increase traffic activity and demand for parking spaces. To accommodate the parking demands of the overall redevelopment project, inclusive of the Stage 2 Building, a Multi-storey car park (MSCP) with a capacity of 621 spaces and rooftop helipad was completed in 2019 under a separate DA (DA17/0665).

To support the Development Application for the MSCP a campus-wide parking demand study was undertaken to determine the appropriate parking provision based on the planned hospital expansion, comprising Stages 1 and 2. The MSCP was developed through the DA process to provide parking for the increase in activity associated with the Stage 1 and Stage 2 buildings and to increase the overall parking provision within campus, with the aim of no net impact on the surrounding on-street parking once both stages are complete.

5.2 Proposal: Nepean Hospital Redevelopment – Stage 2 Building

The subject the Stage 2 Building development falls within the scope of the overall Nepean Hospital Redevelopment.

The Stage 2 building will be located adjacent and to the west of the Stage 1 building (currently under construction) as illustrated in the following figure.

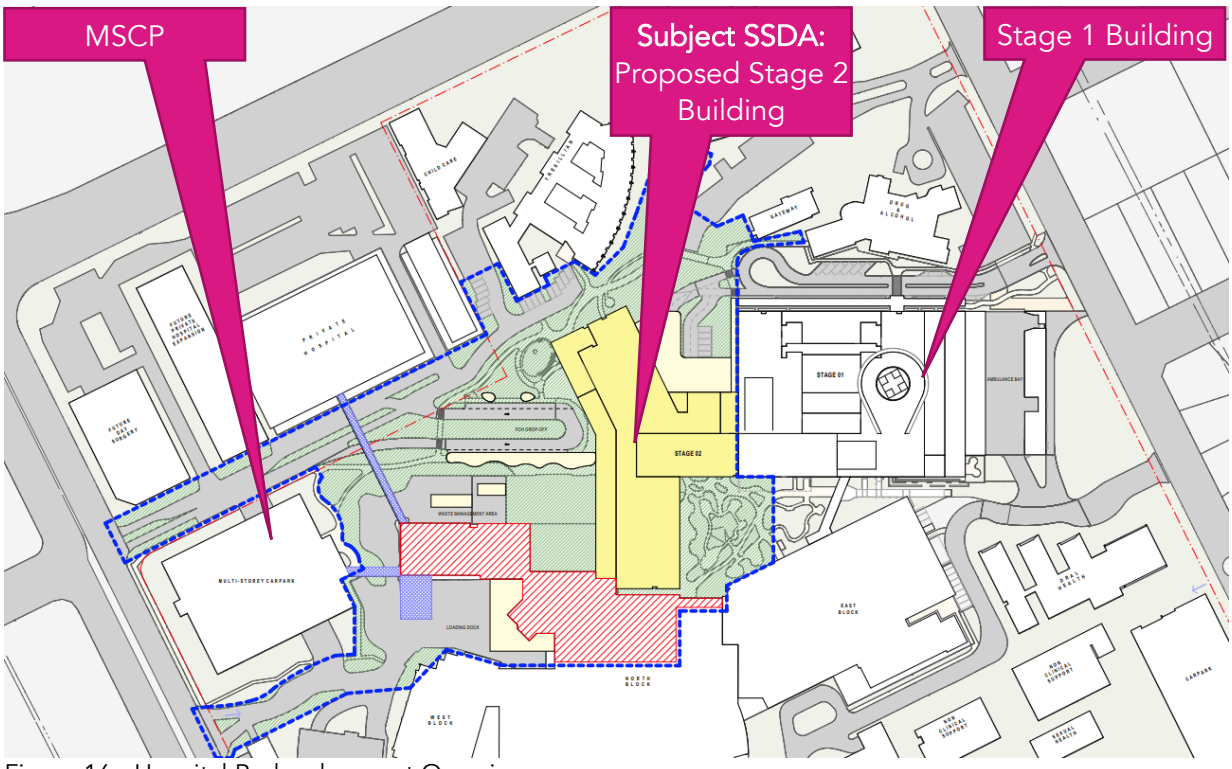


Figure 16 - Hospital Redevelopment Overview

The building will accommodate a range of health services including Intensive care, Renal Unit, Paediatric Unit Radiology etc. and will accommodate a total of 78 overnight beds. The building will include an upgraded back-of-house area and connecting loading dock, which will replace the existing loading dock on the southern side of the building. A new and separate loading dock for the Stage 2 kitchens will be located on the northern side of the building with vehicle access provided from the Stage 1 access road / drop-off area.

A new drop-off area comprising set-down/short-stay parking is proposed along the northern side of the Stage 2 building, connecting with Barber Avenue.

As described above, the parking demands associated with the Stage 1 and Stage 2 expansion projects is provided within the completed MSCP. Between the completion of the MSCP and the expected completion of the Stage 1 building, the helipad has occupied the roof level, resulting in a parking provision of 621 spaces. Following the completion of the Stage 1 Building, the helipad will be relocated to the roof of the Stage 1 Building, increasing the MSCP capacity to 729 spaces. This additional capacity will ensure that the on-street parking demands are not impacted compared to the levels recorded prior to the MSCP, Stage 1 and Stage 2 projects.

5.3 Vehicle and Bicycle Access

A new access arrangement is proposed via Barber Avenue as part of the Stage 2 Building development.

A drop-off area is proposed on the northern side of the Stage 2 building, which will be accessed from Barber Avenue in the form of separated entry and exit lanes. The access serving the MSCP enables access from Barber Avenue so that vehicles can be parked after dropping off a passenger, without needing to pass back on to the road network. The drop-off area has also been designed to accommodate shuttle / mini-buses.

The vehicular access, circulation, aisle width and car space dimensions will comply with AS 2890.1 & 2890.6. Two-way circulation will be provided inside the car park, pick-up & drop-off and vehicular access points, thus no potential queuing on public roads.

The access arrangement for the various user groups and transport modes is presented in the following figure, noting that new pedestrian / cyclist links are proposed along the northern side of the Stage 2 building to connect with Stage 1 and the eastern part of the campus.

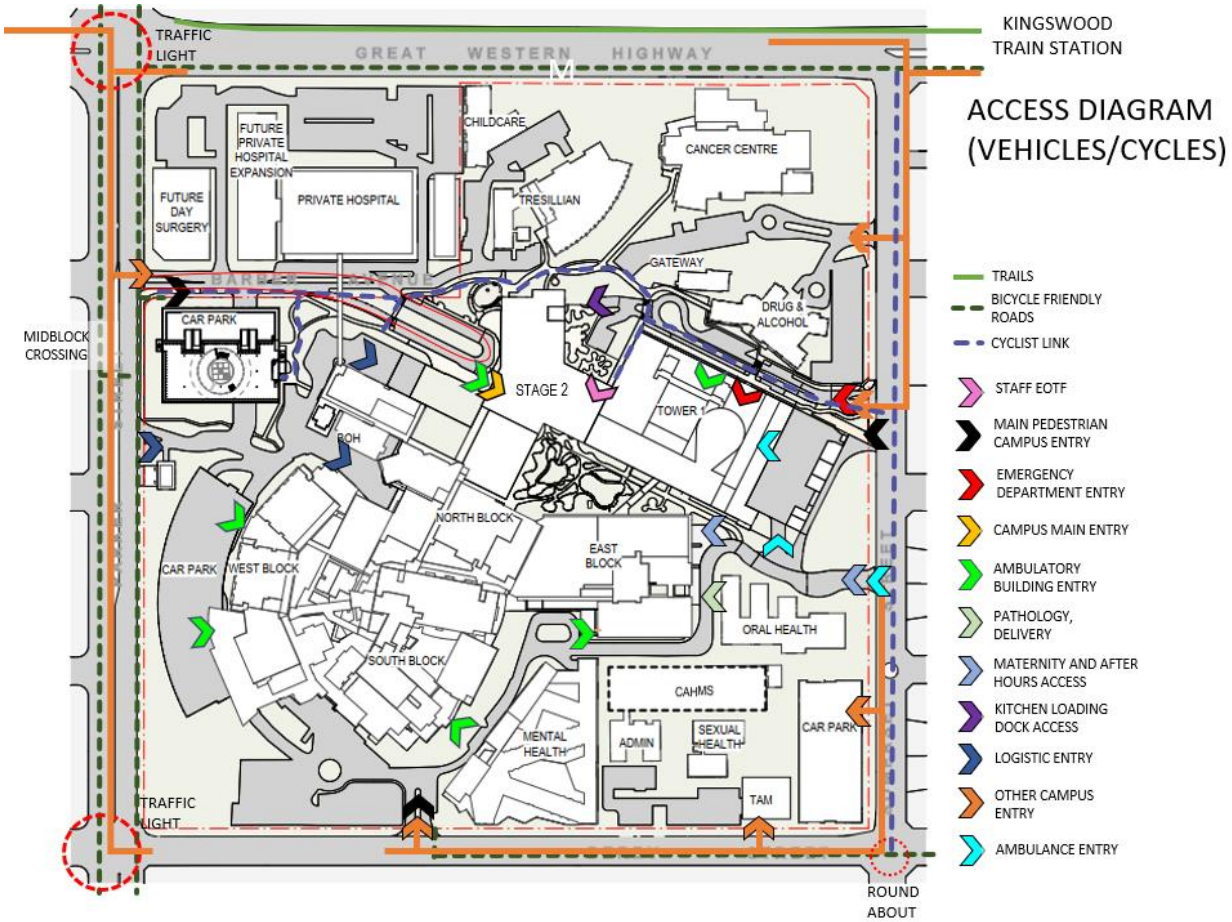


Figure 17 - Proposed Vehicle and Bicycle Access Routes

5.4 Pedestrian Access

The stage 2 project provides an opportunity to connect multiple access routes for pedestrians, including the landscaped east-west connection between Stage 2 and Stage 1, Tresillian, Cancer Centre etc. Access from the MSCP is provided along a continuous footpath to the main entrance of the Stage 2 building.

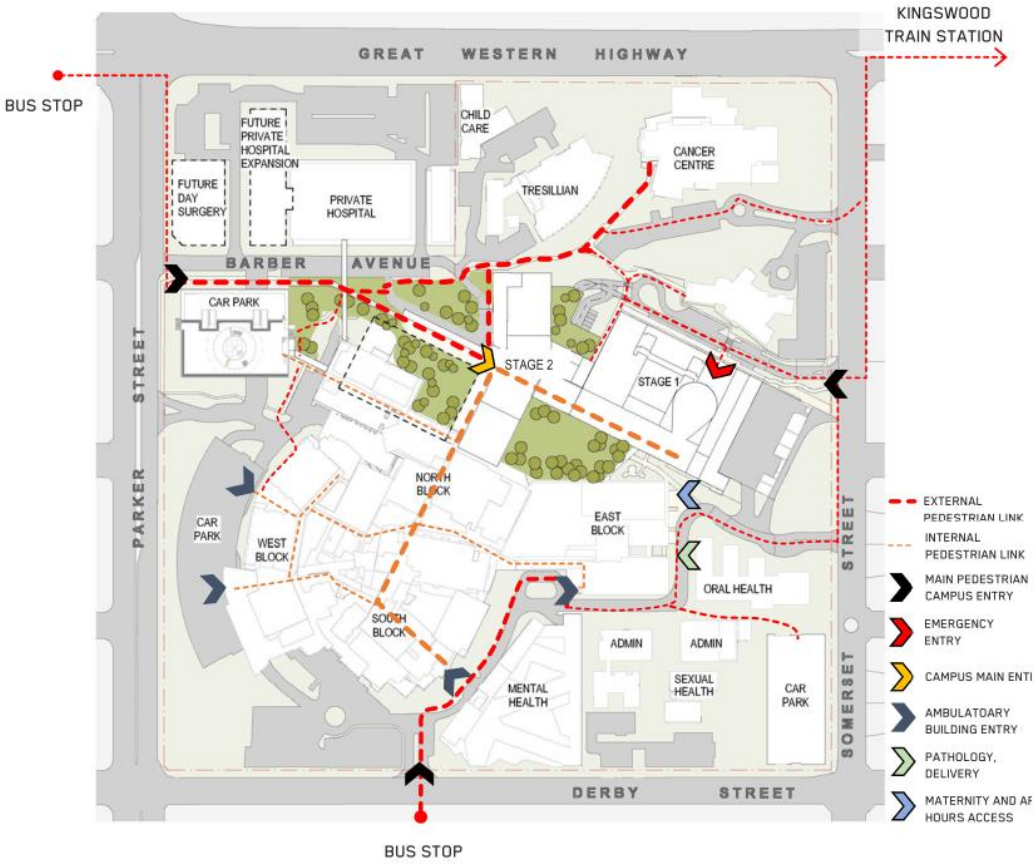
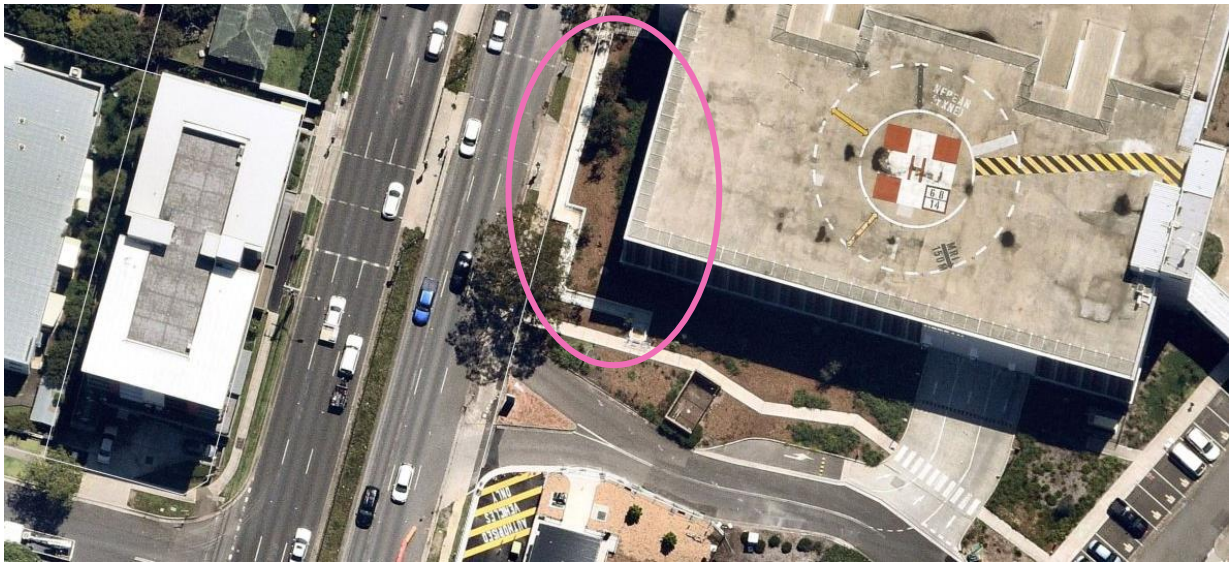


Figure 18 - Proposed Pedestrian Routes

A new pedestrian ramp from Parker Street has recently been completed to provide DDA compliant access to the southern side of the MSCP and connect with the mid-block crossing.



6. Travel Mode Share

As part of the transport management strategy for the campus and to satisfy the consent conditions relating to Stage 1, ptc. has prepared a campus-wide Green Travel Plan (GTP) for the hospital, which has established the existing and target mode share, and a working group within the hospital has been created to manage the GTP process. This GTP has been endorsed by TfNSW and approved by DPIE as part of the Stage 1 OC process.

The existing mode share data was recorded during intercept and online surveys collected to support the parking demand assessments that have been prepared for the hospital over the past few years. The existing mode share and projected targets for the primary user groups are summarised in the following chart and table:

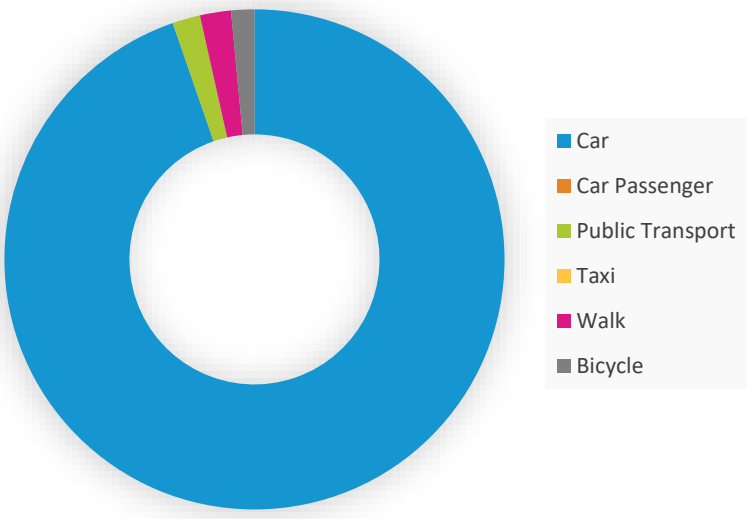


Table 3 - Existing and Target Mode Share

Mode of Transport	Staff		Outpatients		Visitors	
	Current	Future	Current	Future	Current	Future
Car	94.7%	80%	85.4%	80%	83.7%	80%
Car as passenger/carpool		4%		0%		0%
Public Transport – bus, train	1.8%	5%	6.6%	10%	7.6%	10%
Taxi	0%	0%	2.2%	3.0%	4.8%	3.0%
Walk	2.0%	3.0%	1.4%	2.0%	0.5%	2.0%
Bicycle	1.5%	8.0%	4.4%	4.0%	3.4%	4.0%

The targets will be achieved through a series of initiatives being implemented by HI and the LHD as an ongoing process, including a new bike parking and end-of-trip facility within the Stage 2 building, in the area where Stage 1 and Stage 2 interface, as highlighted below:

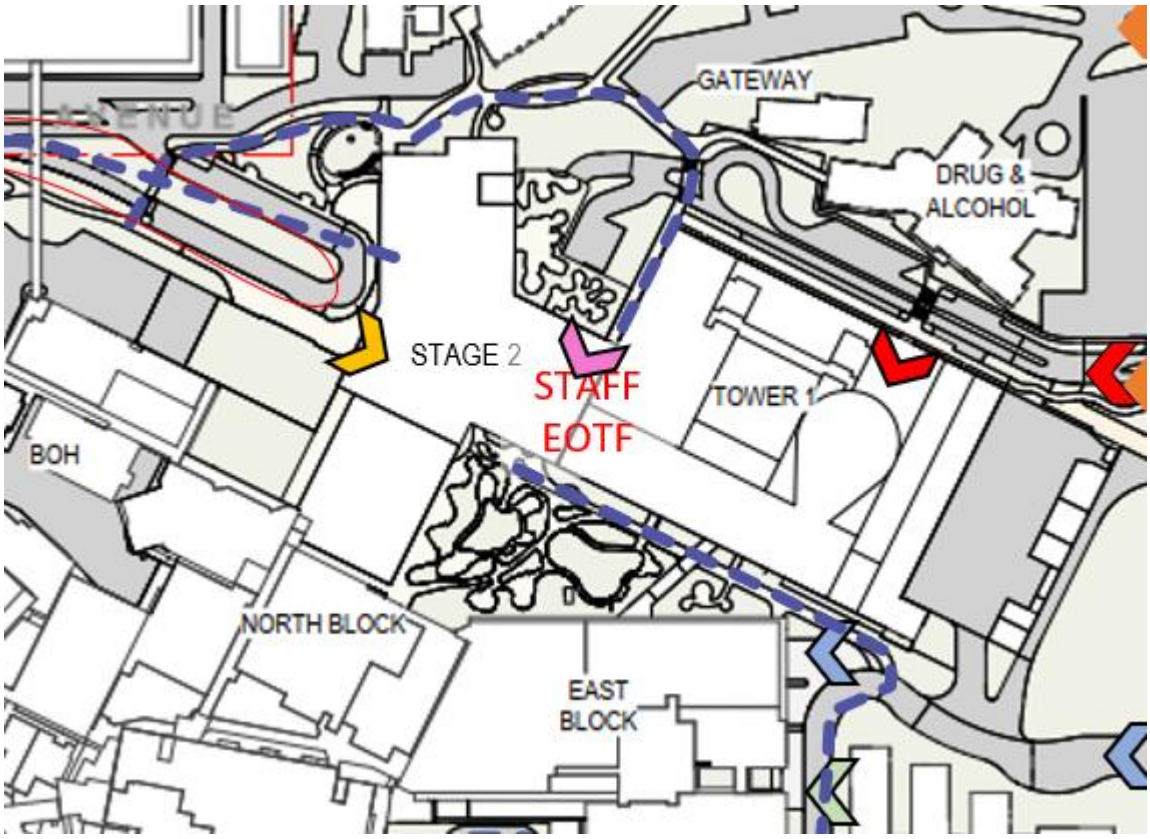


Figure 19 - Proposed Bike Parking and EOTF Location

The GTP process has identified the following potential initiatives to assist in change mode share towards public and active transport, noting that the GTP is not finalised and therefore these initiatives are in draft form at the time of writing.

Table 4 - Draft GTP Mode Share Initiatives

Target	Strategy
Public Transport	
Increase journeys to work by Public Transport	Create a map identifying the location of bus stops and routes and make this available to all residents.
	Improve the promotion of Public Transport on the Hospital website. It currently refers to public transport (below the section describing the parking, and available parking concessions) and doesn't provide maps or links to transport websites.
	Discuss with stakeholders, the feasibility of providing entry to the western end of Platform 2 of Kingswood Station.

Cycling	
Increase journeys to site by cycling	Provide an End-of Trip facility to facilitate the campus and the projected population of circa 4,000 staff. With a target of just 8%, this could result in 320 people cycling to work.
	Create maps and bike routes, which link to surrounding key amenities and available facilities
	Provide facilities on-site for staff and visitors to repair bikes. Ensure visitor bicycle racks are positioned in an accessible and sheltered location that provides good passive surveillance and is easily recognisable to visitors.
Walking	
Encourage staff and visitors to walk to work as part of their journey	Work in partnership with Council and TfNSW to determine whether there are opportunities to improve the pedestrian connectivity to the Hospital. For example, ensure that pedestrians are considered within the proposed TfNSW road upgrades.
Car Pooling/Car Share	
Improve accessibility to car share	Work with carpooling networks (e.g. Western Sydney Carpool or the Liftango carpooling app) to increase the ability for staff to carpool.
	Promote the existence of car share within the building and surrounding areas, via potential promotional campaigns on site.
	Engage with a car share provider to provide spaces/pods within the Hospital. This would provide staff with the ability to undertake short trips during their shift, without having to bring a vehicle to the campus.

7. Parking Provision

7.1 Car Parking

The proposed Stage 2 Building includes on-site parking along the northern frontage, for the purposes of set-down and pick-up. The principal parking demand associated with Stage 2 Building will be met within the completed MSCP (plus the rooftop level), which was designed and approved to accommodate the future developments associated with the Nepean Hospital Redevelopment program.

As stated earlier, the MSCP was completed in 2019 and accommodates a temporary rooftop helipad. Following the completion of the Stage 1 Building (during 2022), the helipad will be relocated to the roof level. This will enable the conversion of the upper levels of the MSCP, resulting in a net gain of further 108 spaces, providing a total parking provision of 729 spaces.

The development of the hospital will involve the displacement and rearrangement of at-grade parking in addition to the completed MSCP. Following the completion of the Stage 2 Building, the MSCP roof levels and the at-grade parking, the campus will accommodate a total of 2,008 parking spaces for including staff, patients, visitors, couriers & emergency vehicles. This represents a net increase of approximately 500 spaces over the provision prior to the MSCP, Stage 1 and Stage 2 projects.

During December 2016 ptc. undertook a parking demand study for the hospital, which was revised in January 2021 to reflect changes in the clinical services plan and staffing populations within the campus. The methodology used to estimate the parking demand is outlined in Figure 20.

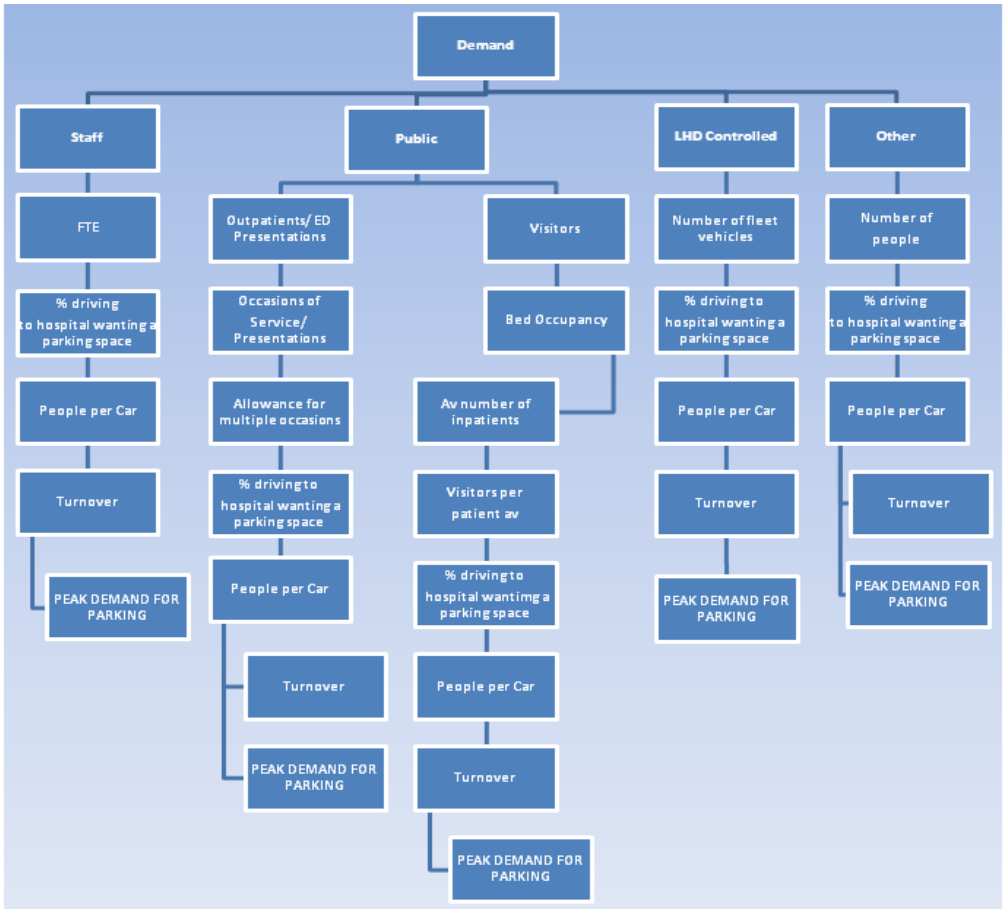


Figure 20 - Parking demand estimate methodology overview

To estimate the current and future parking demand at the Hospital, ptc. was provided with certain information by the Hospital, Health Infrastructure and the Nepean/Blue Mountains Local Health District and NBMLHD.

In addition, ptc. carried out the following surveys:

- Staff – via online methodology;
- Outpatients and visitors – via face to face interviews, on 2nd & 3rd November 2016;
- Car park occupancy and length of stay surveys of the entire car parking, on 2nd & 3rd November 2016;
- Parking supply and demand surveys within the Relevant Parking Zone (typically 500m from the approximate centre of the Hospital campus);
- Site visit and surveys (on Tuesday 18th October 2016) to audit the campus parking supply, review the campus generally, and review the transport environment and Relevant Parking Zone.

Information reviewed to obtain an understanding of the parking demand generators at the Hospital included:

- Staff numbers (FTE)
- Visiting Medical Officers (VMOs)
- Overnight bed numbers and occupancy %
- Outpatient Service Events
- Emergency Department Presentations
- Education & Training (including students)
- Retail & Volunteer staff
- Available nearby on-street parking
- Other off-street parking in the area (if any)
- External parking demand drivers (if any)
- Staff, outpatient and visitor survey responses
- Results of the on-campus car park surveys (occupancy)
- Parking data reports issued by Secure Parking

Following the processing of the collected data, and a review of on-campus and on-street parking usage, the parking study derived an overall demand that was then projected based on future growth scenarios. Table 33 of the Parking Demand Study[7] estimates that the increase in parking following the development of the Stage 1 Building will be entirely accommodated within the campus, due to the construction of the approved MSCP (i.e. no net impact in the on-street parking demand), as summarised in Table 5 below.

Table 5 - Parking Supply / Demand Summary

Total Parking Supply/Demand Analysis	2017 Demand	2021/22 Demand	2031/32 Demand
Project Status	Pre Stage 1	Post Stage 1	Post Stage 2
On Campus Supply			
Total On-Campus Supply	1,509	1,859	2,008
Demand			
Staff	1,740	1,967	1,895
Public	409	501	598
LHD Controlled – Fleet Vehicles	29	35	44
Other users	70	82	106

[7] Car Park Demand Study for Nepean Hospital prepared by ptc. dated January 2021

Total Demand	2,248	2,585	2,643
On-street /off-site parking usage	739	726	635

The Stage 2 building forms part of the overall campus redevelopment and therefore the parking demand (and traffic activity, refer section 8) is not a simple process of adding the proposed floor and applying a parking rate.

The parking demand has been assessed as a campus-wide study as the Stage 2 building will decant certain services and the Clinical Services Plan involves changes to staffing and services that affect the parking demand. The key finding is that the provision of parking within the campus will increase more than the demand for parking, following the completion of the Stage 1 and Stage 2 buildings. This reduces the demand for on-street parking by approximately 97 spaces comparing the 2017 and 2031 demand assessments. This is prior to the adjustments made as a result of the Green Travel Plan, which is being implemented as a condition of Stage 1, to reduce car usage among staff.

7.2 Barber Avenue Parking Changes

The access arrangement for the Stage 2 drop-off area will involve the rearrangement of the Barber Avenue frontage and the rearrangement of the on-street parking spaces. The proposed access driveways result in a loss of 14 spaces with 29 spaces being retained (including the 5 parallel spaces at the western end of Barber Avenue, which are not impacted in anyway).

In order to assess whether this will alter the parking demand and provision ratio of the campus (including Barber Avenue) it is important to summarise the parking provision within the campus in the context of the calculated parking demand. The demand assessments indicate that based on the Clinical Services Plan and other inputs associated with staff population and the services to be provided on the campus, the parking provision has increased more than the demand comparing the situation prior to the completion of the MSCP and the projected situation following the completion of the Stage 1 development. The demand for on-street parking over this period is reduced by approximately 100 spaces.

In this regard the removal of some parking from Barber Avenue still results in a net reduction in parking demand associated with the entire campus in the order of 50 spaces.

The parking provision within Barber Avenue has been considered throughout the design process, and the layout of Barber Avenue has been developed in the context that its role has changed, and will further change following Stage 2, to provide the primary access road to both the public and private hospitals, plus the new development fronting Parker Street. In this regard it must perform as an efficient and safe roadway, which is not necessarily compatible with its current use as a pseudo parking aisle and the associated pedestrian activity that this brings.

7.3 Proposed Drop-off Area

The Stage 2 Building includes on-site parking along the northern frontage, for the purposes of set-down and pick-up.

These spaces have been designed in accordance with AS2890.1 as parallel parking spaces intended for short-term use, with longer term parking available in the MSCP following the dropping off of passengers.

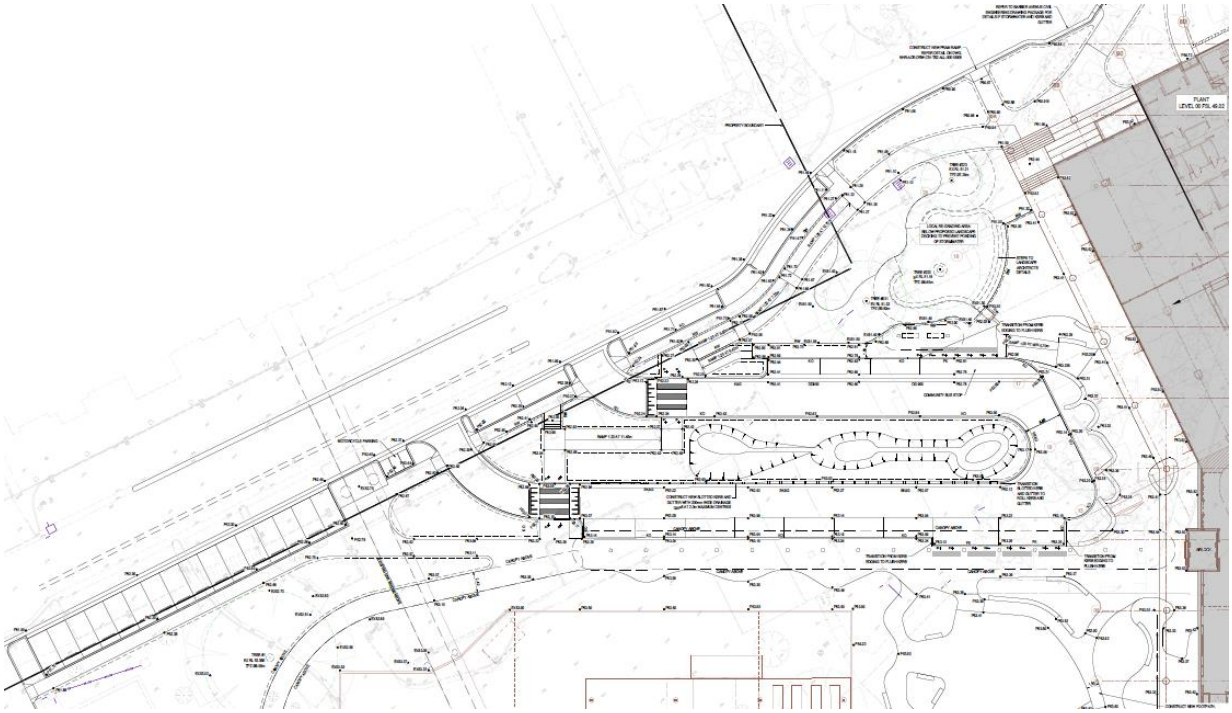


Figure 21 - Proposed Drop-off area and access driveways

The design of the access road has been amended to minimise the impact on the on-street parking provision and comprises two driveways, being perpendicular to the Barber Avenue carriageway.

The drop-off area provides parking for shuttle buses and mini-vans and the area has not been designed to accommodate larger vehicles such as full-size buses or NSW fire vehicles. Discussions with TfNSW bus team resulted in a preference for off-campus services including the proposed rapid bus services connecting with the Metro stations, rather than the additional time required to enter the campus. The fire control panel for Stage 2 will be located within the Stage 1 building as planned and therefore there is no demand for fire vehicles to enter the drop-off area.

7.5 Emergency vehicles

Approximately 30% of Nepean Hospital Emergency Department presentations arrive by ambulance, with most of the remainder arriving in a private vehicle. Table 6 presents the projections for annual and average daily ambulance arrivals at the hospital in 2026/27 (i.e., following the completion of the Stage 2 Building), compared to current figures.

Table 6 - Future ambulance arrivals at Nepean Hospital Emergency Department

Ambulance arrivals	Current	2026/27
Annual ED Presentations	69,9108	100,1679
Arrivals by Ambulance (30%)	20,973	30,050
Daily average (365 days)	57	82 (+44% compared to current)

The new arrangements for access to the hospital Emergency Department within Stage 1 are shown in Figure 22 and demonstrate that there is no impact on this arrangement as a result of the Stage 2 project. Under these arrangements, access is to be relocated from Derby Street to Somerset Street and ambulances (1) will be separated from the private vehicle drop-off area (2).

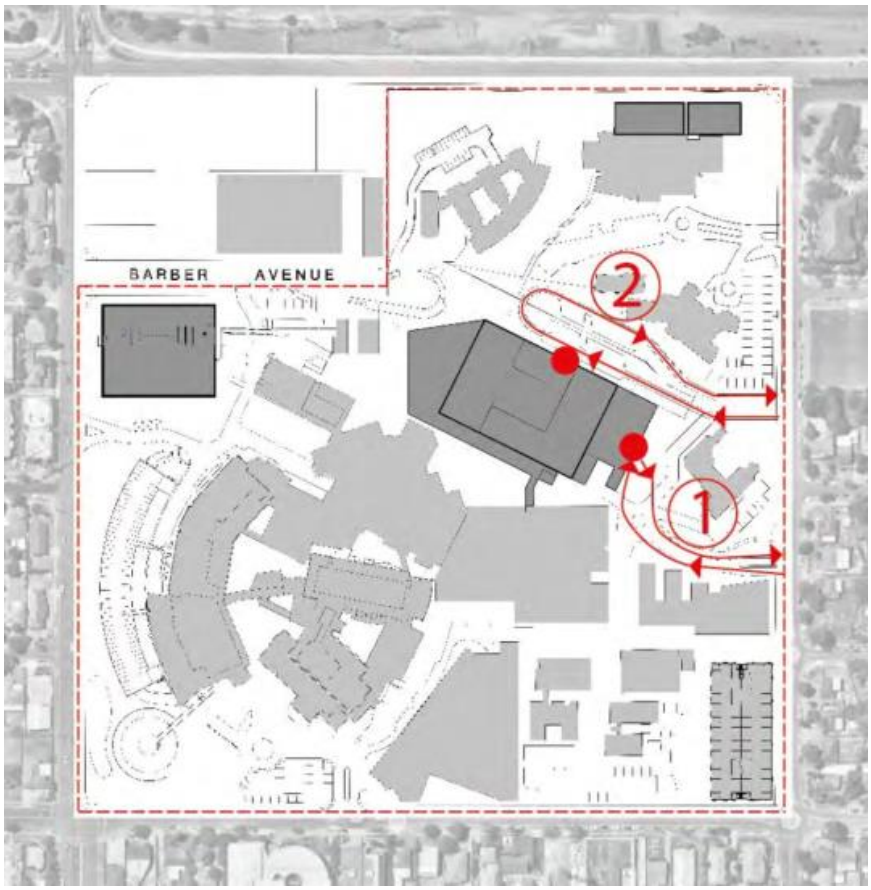


Figure 22 - Future Nepean Hospital Emergency Department and ambulance access

[8] Per **ptc.** parking demand studies (2017)

[9] Per **ptc.** parking demand studies

8. Traffic Impact Assessment

8.1 Daily Traffic Activity

The recording of the total daily traffic activity associated with a hospital of this size is not generally possible to undertake given the timespan and the number of entry and exit locations. This has been particularly difficult to undertake under the Covid-19 lock-down situations and the related impacts on the operation of the hospital. Other factors such as the provision of free parking also change the typical travel dynamic.

Through the parking demand assessment process at Nepean Hospital and numerous other HI hospitals in NSW, we are able to ascertain the average turnover of the staff parking and public parking separately, through the following process.

- There are several parking locations throughout the campus, some of which are defined as staff parking, fleet or special uses, the remaining are open to the public and staff, therefore there is no distinct definition of staff / public parking.
- The 2021 parking demand assessment established a parking distribution of 77% staff parking spaces and 23% public parking spaces based on our intercept and online surveys. *Note: the parking distribution for Nepean Hospital is based on the demand assessment rather than physical surveys of every parking space. However, ptc. surveys undertaken at Campbelltown Hospital for a similar process included 'average length of stay' (ALOS) and 'average turnover' of all parking spaces. Based on a split of those spaces having an ALOS of less than 5 hours being primarily public use and those more than 5 hours being staff (we have found this to be a reliable method at numerous hospitals) Campbelltown Hospital presents a distribution of 76% staff parking and 24% public parking use.*
- At the time of the 2021 parking demand assessment, there were 1,812 parking spaces within the campus, which can be considered to be the 'existing' scenario.
- Application of the staff / public distribution means that approximately 1,395 spaces are used by staff and 417 spaces are used by the public.
- These figures can be converted to daily usage by applying an average turnover rate. While the parking demand assessment for Nepean Hospital didn't record average turnover, we have established an average turnover for the public parking of 2.81 vehicles per space per day (based on surveys at 11 NSW hospitals). In relation to staff parking, generally each space turnover once per day, with some margin for afternoon and night shift staff on a small proportion of spaces. In our modelling, we have adopted a rate of 1.2 cars per space per day, based on data provided by a car park operator managing multiple hospital car parks.

8.1.1 Existing Daily Traffic Activity

Application of the turnover rates to the parking usage figures is summarised in the following formulas:

- Staff = 1,395 spaces x 1.2 turnover = 1,674 uses per day x 2 (entry/exit) = 3,349 vehicle movements
- Public = 417 spaces x 2.81 turnover = 1,171 uses per day x 2 (entry/exit) = 2,342 vehicle movements

8.1.2 Post Stage 2 Daily Traffic Activity

The Stage 2 development proposes some additional parking in the drop-off area; however, the primary additional parking being provided between the 2021 parking assessment figure of 1,812 spaces and the post Stage 2 figure of 2,008 spaces is due to the opening of the MSCP roof level and other adjustments / replacement of parking associated with the Stage 1 constriction site.

Application of the distribution split of 77% staff use and 23% public use to the increase parking provision results in 1,546 spaces used by staff and 462 spaces used by the public.

Application of the turnover rates to the post Stage 2 parking usage is summarised in the following formulas:

- Staff = 1,546 spaces x 1.2 turnover = 1,849 uses per day x 2 (entry/exit) = 3,698 vehicle movements
- Public = 462 spaces x 2.81 turnover = 1,293 uses per day x 2 (entry/exit) = 2,586 vehicle movements

8.2 Daily Traffic Increase

Comparing the 2021 daily activity with the post Stage 2 daily activity for staff and the public is summarised as:

- Staff daily traffic activity = 3,349 (existing) to 3,710 (post Stage 2) = 361 additional daily vehicle movements
- Public daily traffic activity = 2,342 (existing) to 2,586 (post Stage 2) = 244 additional daily vehicle movements

This represents a total increase in daily traffic activity of 605 vehicle movements, which occur at various times throughout each weekday.

In terms of weekend activity, there is 37% of the weekday staff population on campus on weekends and public parking demand (ALOS less than 5 hours) is 68% of the weekday activity. This approximates to an increase of 411 daily movements following the same process, made up of 134 additional staff movements and 166 public movements.

It should be noted that some of this projected activity is associated with Stage 1 (parking to be replaced within the construction site) and the MSCP once the roof level is opened. As such, the majority of this traffic activity has been previously modelled up to 2026 (further details are provided within the Peak Hour traffic assessment presented in the following section).

8.3 Peak Hours Staff and Visitor Traffic Activity

Typically, an addition to a hospital will result in an increase in traffic activity and this is partially described in the previous sections. However, for the subject application, there are several factors that affect the methodology whereby a simple floor area-based calculation does not represent a suitable approach to determining or modelling the peak hour activity. The following timeline provides a context for the current traffic assessment:

- In 2019, the MSCP was completed and partially opened (108 spaces on the roof level are not in use due to the temporary helipad). The Development Application for the car park was accompanied by a Traffic Impact Assessment prepared by ptc., which modelled the peak hour traffic impact associated with the entire car park. The modelling included background traffic up to 2026 (being 10 years after the compilation of the MSCP TIA) and the traffic generated by the car park was predicted to be associated

with the Stage 1 and Stage 2 buildings. This was largely based on the Parking Demand Assessment, which determined the extent of the MSCP based on the projected health data and Stage 1 and 2 parameters at the time.

- In February 2019, the Stage 1 building was approved through the SSDA process. ptc. prepared a traffic impact assessment to accompany the SSDA which adopted the traffic modelling undertaken to support the MSCP.
- The Stage 2 project represents a continuation of the traffic modelling undertaken to support the MSCP in that the remaining 108 spaces will be made available for parking following the relocation of the helipad onto the roof of the Stage 1 building.
- The SEARS for the Stage 2 application require the assessment of traffic including the 10-year scenario, which represents 2031 from the date of submission. As this goes beyond the previous modelling up to 2026, a revised 10-year scenario has been prepared using the SIDRA modelling software (scenarios 6 and 7) based on the previous modelling scenarios:
  - Scenario 1 - Base 2017
  - Scenario 2 - Base plus growth at 2% P/A to 2021 (assumed year of Stage 1 opening)
  - Scenario 3 - Post Development 2021 (complete MSCP including the Stage 1 traffic activity)
  - Scenario 4 - 10 years background growth (2026) at 2% P/A
  - Scenario 5 - 10 years background growth plus development (5% growth P/A for Stage 1 and 2 between 2017 and 2026 to represent the gradual increase in services up to the completion of Stage 2)
  - Scenario 6*- *Extended 10-year horizon (2026 to 2031) based on 2% P/A for background growth without the development*
  - *Scenario 7*- Extended 10-year horizon (2026 to 2031) based on 2% P/A for background growth and 0.5% P/A for Stage 2 traffic to account for the use of the drop-off area as the Stage 2 building gradually increases services.*

* New model for this application

The traffic activity associated with the Stage 2 Building project has already been assessed in that the proposed MSCP has been assessed and approved as a separate application. The MSCP project determined the traffic activity based on the generation rate of parking within the campus, which was then applied to the new car park. However, the addition of Scenario 6 meets the requirements of the SEARs to provide a 10-year modelling form the date of the submission.

Table 7 – Sidra Traffic Modelling Scenarios

Scenario	Year	Network description
S1	2017	As existing – do nothing
S2	2021	As existing – do nothing – 2% Growth
S3	2021	As existing + Hospital Development (Stage 1) – 2% Growth
S4	2026	As existing – do nothing – 2% Growth

S5	2026	As existing + Hospital Development (Stage 2) – 2% Growth
S6	2031	Road Upgrades, without development
S7	2031	Road Upgrades + 2.0% Growth and 0.5% Development Growth

Table 8 – Sidra Traffic Modelling Results

Intersection	Peak Period	Existing Scenario	Previous Scenarios			New Scenario (10-years to 2031)		
		S1	S2	S3	S4	S5	S6	S7
1. Great Western Highway / Parker Street	AM	B	B	B	B	B	C	C
	PM	B	C	C	C	D	E	F
2. Parker Street / Barber Road	AM	A	A	A	A	A	A	A
	PM	A	A	A	A	A	A	A
3. Parker Street / Hospital Entrance	AM	A	A	A	A	A	A	A
	PM	A	A	A	A	A	A	A
4. Parker Street / Derby Street	AM	B	B	B	B	C	C	C
	PM	D	E	F	F	F	F	F
5. Derby Street / Hospital Entrance (south)	AM	A	A	A	A	A	A	A
	PM	A	A	A	A	A	A	A
6. Derby Street / Somerset Street	AM	A	A	A	A	A	A	A
	PM	A	A	A	A	A	A	A
7. Somerset Street / Hospital Entrance 1 (east)	AM	A	A	A	A	A	A	A
	PM	A	A	A	A	A	A	A
8. Somerset Street / Hospital Entrance 2 (east)	AM	A	A	A	A	A	A	A
	PM	A	A	A	A	A	A	A
9. Somerset Street / Great Western Highway	AM	B	B	B	C	F	F	F
	PM	D	F	E	F	F	F	F

Note, the worst movement is report at the roundabouts and Give Way controls.

8.3.1 Parker Street / Derby Street Intersection

In regard to Parker Street / Derby Street, the modelling states that the intersection was operating with a Level of Service D during the PM peak and prior to any background growth. This is reasonable for a regional road intersection during the peak periods, although the Degree of Saturation was over 140% in the 2017 conditions. Typically, this indicates that any slight increase in traffic activity or interruption to traffic flow results in extended delays and a poor performance. This is evident in the modelling results which indicate a Level of Service F in all future scenarios regardless of the Stage 2 development.

Given the current Degree of Saturation, it is evident that the intersection upgrades will be required in coming years regardless of the Hospital Redevelopment, and that the additional traffic activity associated with the Project will have very limited impact on the intersection.

8.3.2 Great Western Highway / Somerset Street Intersection

In regard to the Great Western Highway/ Somerset Street intersection, the modelling results indicate that this intersection will operate at Level of Service F in 2021 under the 1.5% growth scenario (based on the growth scenario, as 2021 traffic conditions are impacted by the covid lockdowns), without the development traffic. This is caused by the right turning movement from westbound Great Western Highway to Somerset Street. The arrangement of priority junction is not anticipated to operate at the required LOS in future years.

Based on the modelling suggestions, the intersection needs to be signalised by the year 2021 to sustain the LOS well below the LOS D. The model output for this intersection after the signalisation for the ultimate scenario (S5) is turned out as LOS A, with a delay of 8 sec and the cycle time of 30 sec.

8.3.3 Road network capacity expansion

In response to general background traffic growth in the road network, various intersections have been upgraded through the following initiatives.

Firstly, in August 2016, a $1m upgrade by TfNSW under the NSW Government's Pinch Point Program was completed, benefiting traffic approaching the intersection along Parker Street from the north and south. The Pinch Point Program aims to reduce traffic delays, manage congestion and improve travel times on Sydney's major roads, particularly during weekday peak periods. The upgrade project (Figure 23) included:

- Extension of the northbound and southbound right-turn bays on Parker Street
- Installation of CCTV to monitor traffic
- Adjustments to traffic light phasing
- New asphalt and line marking.

Figure 23 - Pinch Point upgrade at the Parker and Derby Street intersection

Relevant projects have been completed by Council (funded through the Australian Government's $200m Local Roads Package that is part of the WSIP) to improve road safety and traffic flow efficiency at two

intersections on The Northern Road / Parker Street: with Derby Street (eastern and western approaches) and with the Great Western Highway.

The WSIP-funded deliverables at these two intersections include:

- Derby Street and Parker Street intersection New designated left and right turn lanes on both Derby Street approaches
    - Adjustments to kerb lines and footpaths
    - Removal of some on-street parking on Derby Street to facilitate these additional turning lanes
    - Relocation of bus stops to facilitate turning lanes.
- Great Western Highway and The Northern Road / Parker Street intersection
    - 50m extension of the right-turn lane northbound on Parker Street
    - 100m extension of the right-turn lane westbound on Great Western Highway
    - Widening of the right turn lane and realignment of median island, southbound on The Northern Road
    - New pedestrian fencing in the median island of the Great Western Highway.

In the medium term, the pressure of increased traffic will be particularly experienced near PHC on The Northern Road, including its intersection with the Great Western Highway. For this location, TfNSW should consider future land footprint requirements for an expanded intersection of these two regional routes and protect this with a corridor reservation extending north of the Jamison Road end point of the existing reservation.

9. Service Vehicles and Waste

The Stage 2 project encompasses part of the hospital that currently provides the primary loading facility for the campus. In this regard, the loading area is proposed to be redesigned and situated in its current location to the south of the new stage 2 building.

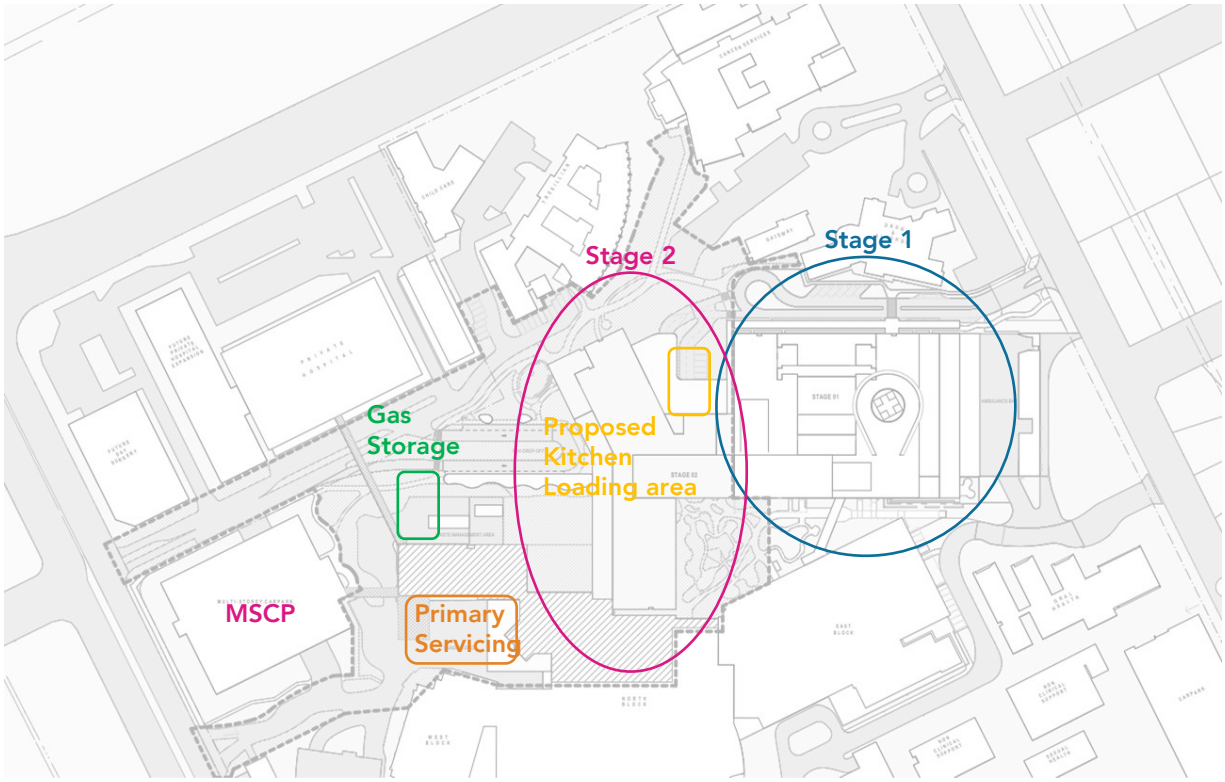
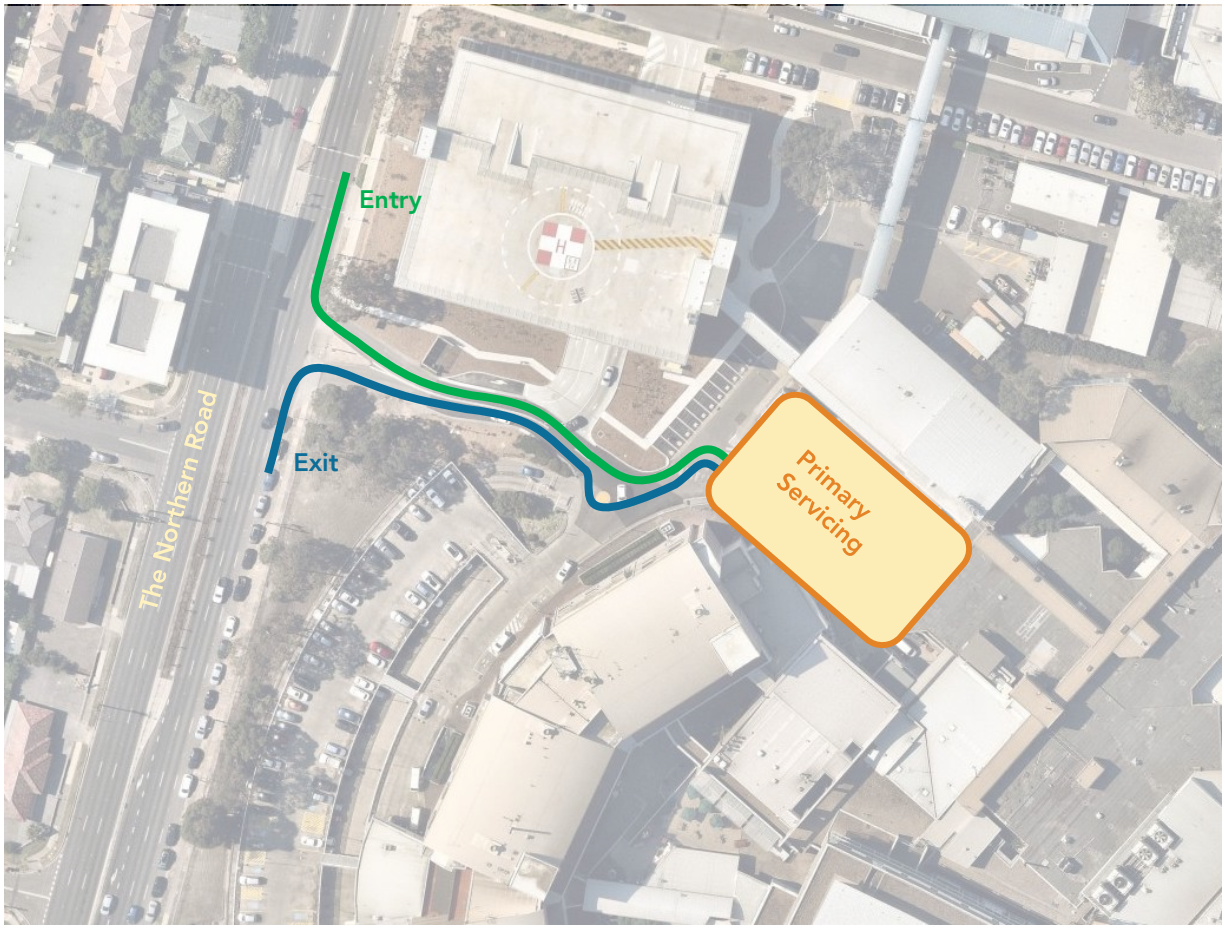


Figure 24 - Servicing Locations in context of the Stage 1 and 2 projects

9.1 Existing Loading Activity and Arrangement

The existing loading area is located on the western side of the campus with access from The Northern Road via a private internal roadway which intersects as a left-in / left-out priority intersection.



This arrangement has been in operation for many years, since the earliest development of the Hospital site, and the only recent change has involved the completion of the multi-storey car park to the north of the access road.

The existing activity at the servicing area has been collected over a period of two typical weeks (29th November to 17th December), including the type of vehicle, which recorded the following total and daily activity.

Utes and Vans		SRV		MRV		HRV	
Total	Per Day	Total	Per Day	Total	Per Day	Total	Per Day
372	37	178	18	169	17	124	12

The following chart illustrates the hourly truck activity expressed as an average of the weekdays over the period of two weeks, noting that there is no activity on weekends.

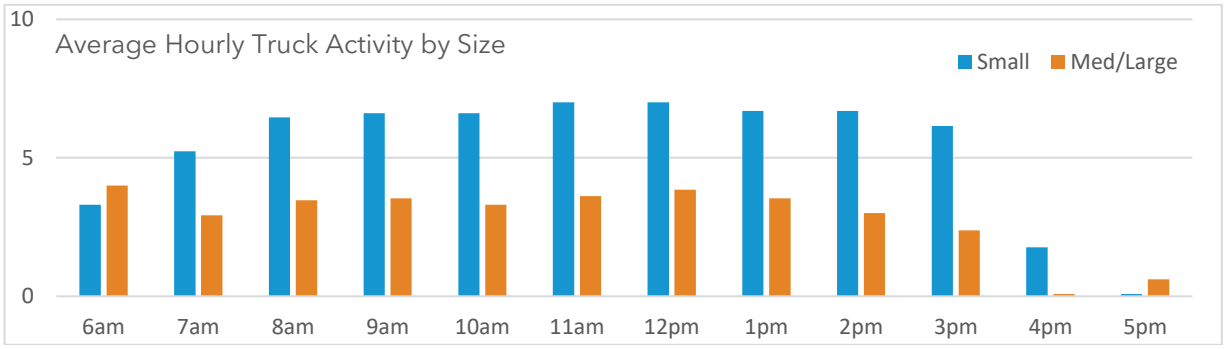


Figure 25 - Current Servicing Activity

The majority of movements are made using small service vehicles (SRVs or smaller), which peak at 6-7 vehicles per hour through much of each day, while there are approximately 3-4 medium or large vehicles per hour. Due to the nature of the hospital operation, these volumes are fairly consistent throughout each day of the survey.

9.2 Alternative Options Assessment

The development of the hospital provides an opportunity to improve the loading arrangements within the campus, however it should be noted that there are constraints associated with the layout of existing buildings, the internal and external roads and access locations. As with many hospitals, Nepean has been developed in multiple stages since opening on the current site in 1956.

The option of constructing alternative loading areas within the hospital or relocating the access to the existing western loading area away from The Northern Road have been explored by the design team as part of the Stage 2 development planning.

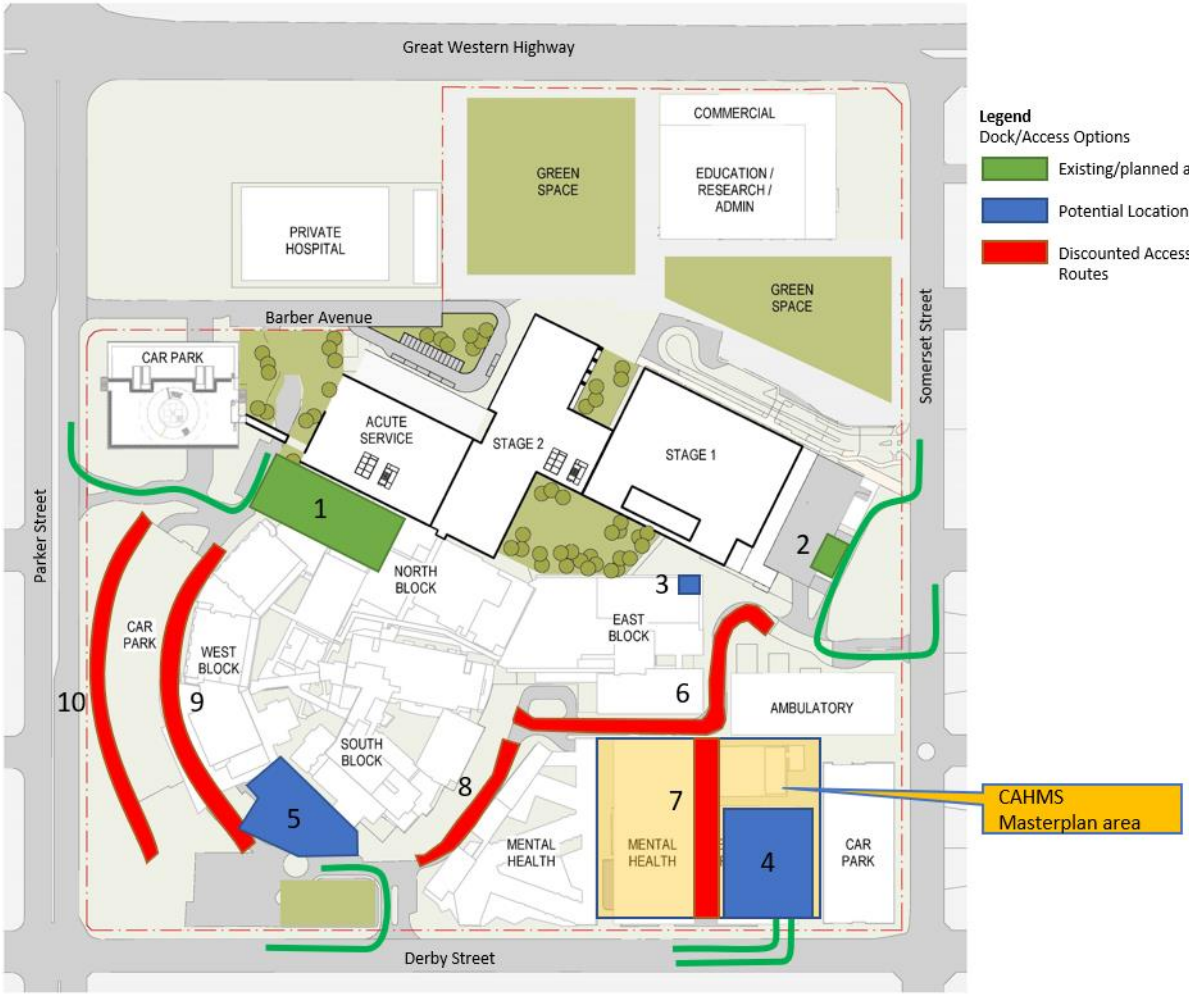
Other locations within the campus have been assessed through modelling of the clinical services, and vehicle swept paths, however the location of buildings, road alignments, parking and other infrastructure prevent the ability to gain access with large service vehicles or provide logical servicing within the buildings, in relation to the clinical arrangements.

Through that process an under-croft area with access from Somerset Street has been identified as the only potential alternative main loading area opportunity. However, due to the constructed height of the area and the geometry of the road and existing buildings leading to this area, this loading area would accommodate vans and SRVs, but not MRVs or HRVs. This area is described in more detail in the following section.

In terms of providing access to the existing western dock, options include access along an existing drop off area, a new road along the western boundary or access via Barber Street. Each of these is unavailable due to height restrictions, or unsuitable grades, as summarised in the following diagrams:

Given the constraints of the site, while recognising the need to manage the impact of service vehicle traffic on the road network, a suitable strategy has been established, which relocates some clinical services/storage areas to an available under-croft area off Somerset Street, moving some servicing activity to the eastern side of the campus, a potential increase in the storage areas around the western dock to reduce the number of trucks required, with options being tested to increase the number of loading docks to better accommodate the demand.

A summary of the alternative options that have been considered is presented overleaf, along with a pros and cons analysis



Option	Pros	Cons
1 – Existing Dock (expanded)	Utilises existing infrastructure and access road Provides access to vehicles up to 12.5m Heavy Rigid Vehicles (HRV) Sufficient area to accommodate multiple loading docks Isolated from major pedestrian / public areas Direct access form non-residential roads	Requires reconfiguration and expansion to perform at required capacity
2 – Proposed Bulk Gas	Removes truck activity from the western side Already designed and modelled	None (already designed and approved as part of Stage 1)

Discounted Options (the following options have been tested but discounted due to existing constraints)	
3 – Under-croft Area	Slight modification to the access road due to swept paths Will only accommodate smaller vehicles (6.4m SRV maximum) May only provide for a limited number of services Increases traffic activity on Somerset Street
4 – CAHMS Site	Removes a large area from the CAHMS development Generates truck activity opposite residential apartments
5 – Southwest Car Park	Would require the displacement of parking and reconfiguration of the existing building.
6 – East Access Road	The existing road internal road within the campus does not provide sufficient geometry between buildings to accommodate service vehicles
7 – Road Through CAHMS	The existing roads (see above) within the campus do not provide sufficient geometry between buildings, therefore this link would have limited value This link would also divide the CAHMS site and impact on the master planning
8 – Central-south Road	This existing road and area between the buildings does not provide sufficient geometry for service vehicles.
9 – Western Porte Cochere	The geometry of the porte cochere between columns etc. does not provide sufficient geometry for large service vehicles. Also question whether the suspended slab is structurally able to support service vehicles.
10 – Western Verge	The available land width between the western boundary and the existing car park is not sufficient to accommodate a two-way service road (one-way would also be tight and remove most trees along this frontage). The levels around the helipad and the south-western car park are excessive to accommodate an access road.

The proposed arrangements will improve the use of the loading area, and affect the number of service vehicles in three ways:

- Larger storage areas will reduce the truck turnover,
- Formalised and expanded loading areas with loading docks will accommodate peak activity,
- The relocation of the bulk gas storage and potentially Pathology or Pharmaceuticals will remove some activity from the western side of the campus.

Further details are provided in the following sections.

9.3 Larger Storage

The development of the Stage 2 project provides an opportunity to improve the current servicing arrangements. The current loading area has been established through the evolution of the hospital buildings, rather than as a dedicated and purpose-designed loading dock. In this regard, the area for loading is not optimised, while the associated storage areas are small, increasing frequency of deliveries required. This is important in the context of the potential service vehicle activity, as the layout and the ability to store receivables and waste has a bearing on the number of trucks required to access the campus.

Options are being tested to streamline this. These include 1) Larger storage areas (for Linen or Bulk Storage) which will reduce truck turnover; 2) A shift to using larger trucks (HRVs) which will reduce the number and frequency of deliveries; 3) Potential for offsite warehousing. All of these would reduce truck throughput.

9.4 Loading Dock Layout

Optimising and streamlining the design of the loading area will prevent queuing and bottlenecking, which currently contributes to congestion around the loading area. While this has no impact on the public road network, it is considered to be better design practice to accommodate all queuing activity within the loading area. Options being tested as part of the Strategic Business Case and VMS include 3-bay and 4-bay loading dock options

9.5 New Loading Areas

One of the options under consideration is a dedicated additional loading dock area on the eastern side of the campus. This would serve Pathology or the Kitchen if these are relocated. These options would remove this associated activity from the western dock.

Stage 1 development is under construction, which includes a new bulk gas area and delivery facility to the east of the campus. Current gas deliveries take place around the bulk gas tank adjacent to the western loading dock. These involve vehicles associated with gas bottles, while the larger gas tanks are refilled using semi-trailers. Once operational, the new Stage 1 bulk gas supply will further reduce delivery activity at the western edge of the site, as the western bulk tank will be removed.

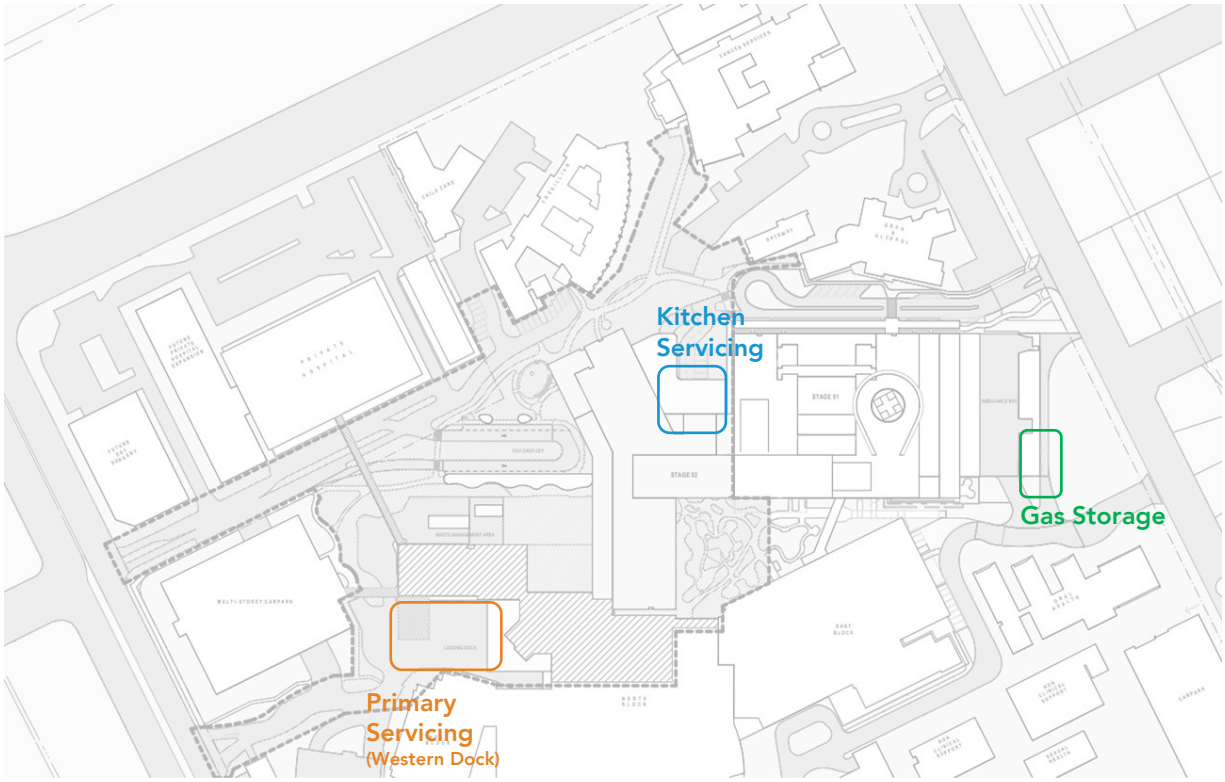


Figure 26 - Future Servicing Locations

9.6 Proposed Western Dock Activity

Presuming no changes to the existing operation, or the location of various activities occurs, the completion of the Stage 1 and Stage 2 expansions could involve an increase of 15-20% over time in delivery activity, which based on the projected use of the western dock would result in 100 vehicles per day.

Following the relocation of the bulk gas tank, along with the potential efficiencies resulting from the larger storage areas, the activity within the western dock would increase marginally by 16 vehicles per day based on the current operation of the hospital, i.e. a pro-rata increase to each truck size.

However, the larger storage areas would enable the use of more HRVs in order to reduce the overall total number of vehicles. The following table presents a model where the total number of vehicles could be maintained through the use of more HRVs.

Primary Servicing – Per Day

	Utes and Vans	SRV	MRV	HRV	Total
Existing	37	18	17	12	84
Proposed	32	16	14	22	84

Based on HRV = 4 Utes/vans, 3 SRVs and 2 MRVs

The proposed development of Stage 2 and the completion of the Stage 1 expansion will require an increase in the back-of-house and servicing activity at the hospital. Through the relocation of certain activity (bulk gas etc) to the eastern side of the campus, the potential expansion of storage areas, and improved truck size management the current activity associated with the western loading area can be maintained. Options being tested to redesign of the loading area could also increase the vehicle capacity to improve access.

It is paramount that the operation of the hospital access road and its intersection with Parker Street is safe and efficient, and that the operation of the hospital has minimal impact on the southbound through traffic on Parker Street. In this regard, the strategies described in this letter will enable the expansion of the hospital with no change to the operation of Parker Street.

9.7 Loading Dock Design

9.7.1 Western Dock

The reconfigured eastern loading area has been designed to accommodate three Heavy Rigid Vehicles (HRV) and one articulated linen truck for potential future use, although the current operator does not use a vehicle of this size.

The dock layout provides the ability for all vehicles to enter and exit the loading area in a forward direction and will comprise dedicated vehicle parking areas separate from the manoeuvring areas. This is an improvement over the existing situation which his undersized for this scale of hospital activity.

The loading area has been designed to comply with the requirements of AS2890.2, and a swept path assessment has been undertaken, which is presented in Attachment 1.

9.7.2 Kitchen Dock

A new loading dock for the kitchens within the Stage 2 building is proposed to be located between the Stage 1 and 2 buildings along with parking for patient transfer vehicles.

The loading area has been designed to accommodate two Small Rigid Vehicles (SRV) with the ability for all vehicles to enter and exit the loading area in a forward direction.

Access will be provided from the Stage 1 drop-off roadway to balance the service vehicle traffic activity away from the eastern side of the campus.

The loading area has been designed to comply with the requirements of AS2890.2, and a swept path assessment has been undertaken, which is presented in Attachment 2 .

10. Conclusion

The Stage 2 redevelopment is situated within the central part of the Nepean Hospital Campus and will benefit from existing campus infrastructure to support the development.

10.1 Access

Vehicle access will be provided via Barber Avenue along with a new drop-off area intersecting the southern side of Barber Avenue.

Pedestrian and cyclist access will be provided via the existing road network and infrastructure outside the campus, while new internal pathways and connections with the Stage 1 project will facilitate safe and convenient connections within the campus.

The connections to public transport will be retained, comprising the Kingswood Station and bus stops on Derby Street. According to TfNSW the rapid bus services associated with the St Marys Metro and Western Sydney Airport will run along Derby Street using the existing bus stops. The campus includes internal connections throughout so that safe access is provided between these public transport facilities and the Stage 2 building.

Emergency access for the public and ambulances is being provided within the Stage 1 project and is not impacted in anyway by the Stage 2 development.

10.2 Parking

Car parking will be facilitated within the existing MSCP, which was specifically constructed to accommodate the increase parking demand associated with the Stage 1 and Stage 2 developments. The capacity of the MSCP will be increased following the removal of the rooftop helipad. The overall parking demand of the campus is projected to increase as a result of the Stage 2 project; however, the parking provision will increase by a greater amount resulting in a slight reduction in the use of on-street parking compared to the period prior to the MSCP, Stage 1 and Stage 2 projects.

10.3 Traffic Activity

The traffic activity associated with the Stage 2 development was initially included within the approval for the MSCP, which includes the 108 spaces to be made available within the roof level. In response to the SEARs and the time that has elapsed since the MSCP traffic assessment a new scenario for the 10-year horizon (2031) has been undertaken. To establish the net impacts of the Stage 2 project in 2031, the modelling includes a with and without development scenario for the Am and PM peaks. The results demonstrate that the traffic activity associated with the Stage 2 project has very little impact on the road network and nearby intersections.

10.4 Servicing and Loading

The project involves a revised back-of-house and loading docks to replace the existing loading area, which is undersized due to the staged expansion of the hospital over many years. The new dock will provide a safer and more formalised area for the unloading of vehicles, while a larger storage area and the ability to accommodate larger vehicles concurrently will offset the increased goods being moved, maintaining the current number of daily vehicle trips. Other factors such as the relocation of the kitchen servicing and gas

storage areas to the eastern side of the campus also assist in containing the impacts on the Parker Street activity.

Attachment 1– Western Loading Dock Swept Paths

comments A3

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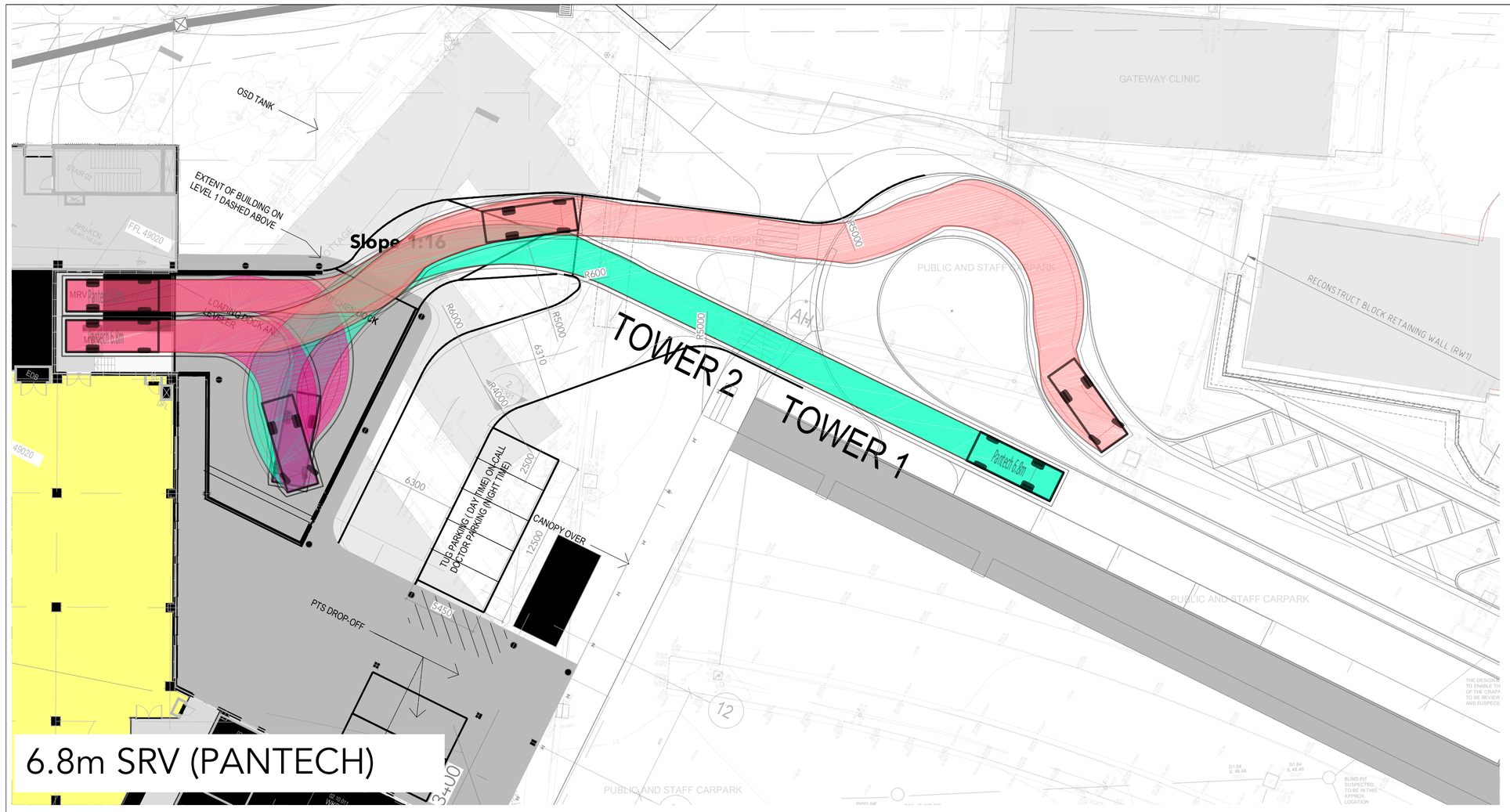
REV	DATE	COMMENT / DESCRIPTION	DRAWN	REVIEWED
P2	.	.	.	.
P1	25/05/22	FOR INFORMATION	AM	AM

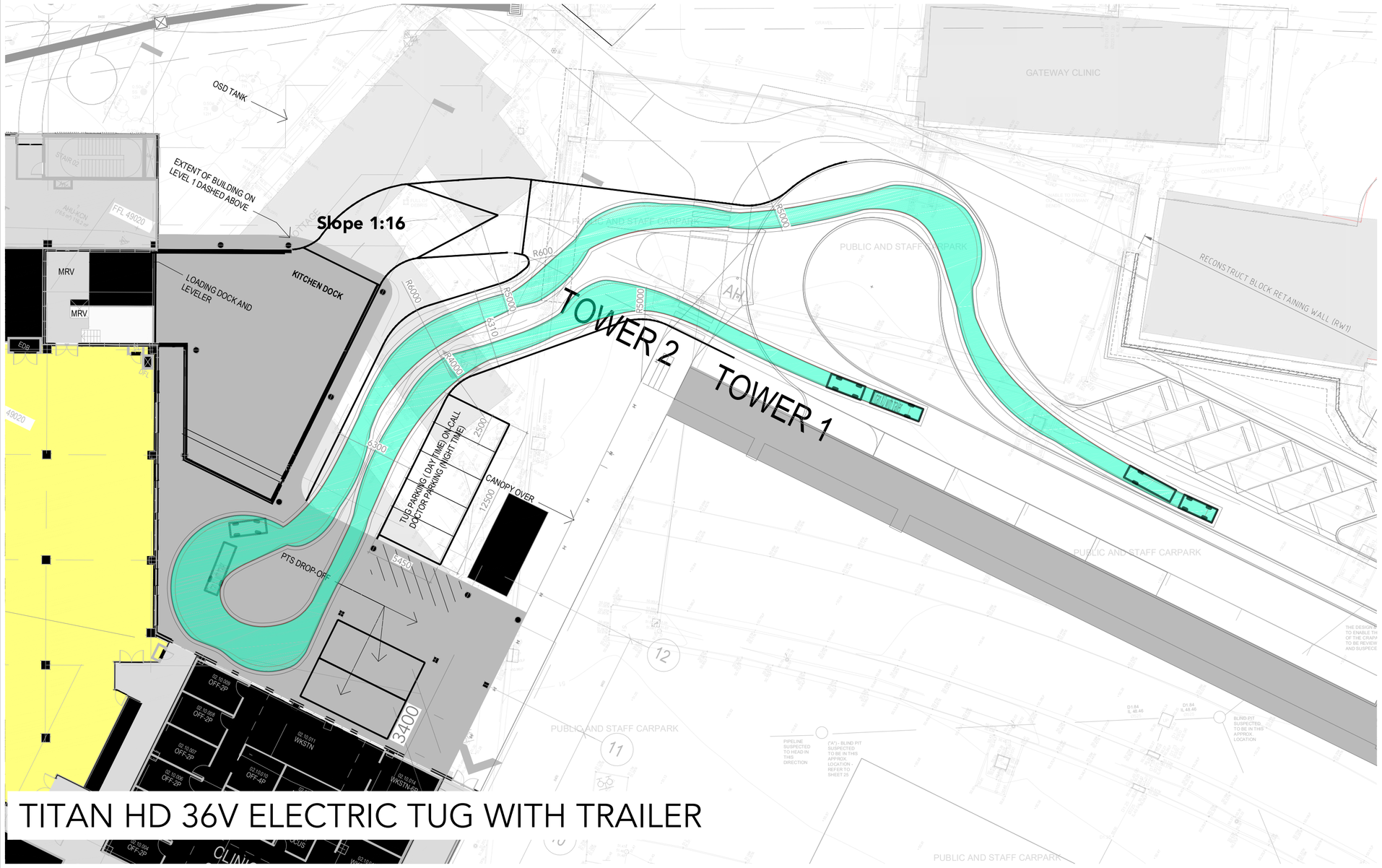
PROJECT
NEPEAN HOSPITAL - STAGE 2

DRAWING TITLE
BARBER AVENUE - SRV Swept Paths

CLIENT	HEALTH INFRASTRUCTURE PRELIMINARY
DRAWING #	PTC-001
PROJECT #	22-0037
SCALE	1 : 100 @ A3

REV P1

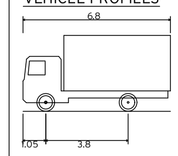




comments

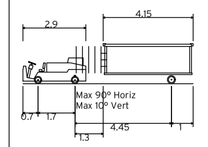
A1

VEHICLE PROFILES



Pantech 6.8m

Overall Length	6.800m
Overall Width	2.330m
Overall Body Height	3.500m
Min Body Ground Clearance	0.398m
Track Width	2.330m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	7.100m



Titan XD with trailer

Overall Length	7.850m
Overall Width	1.130m
Overall Body Height	1.850m
Min Body Ground Clearance	0.120m
Max Track Width	1.050m
Lock-to-lock time	3.00s
Wall to Wall Turning Radius	3.250m

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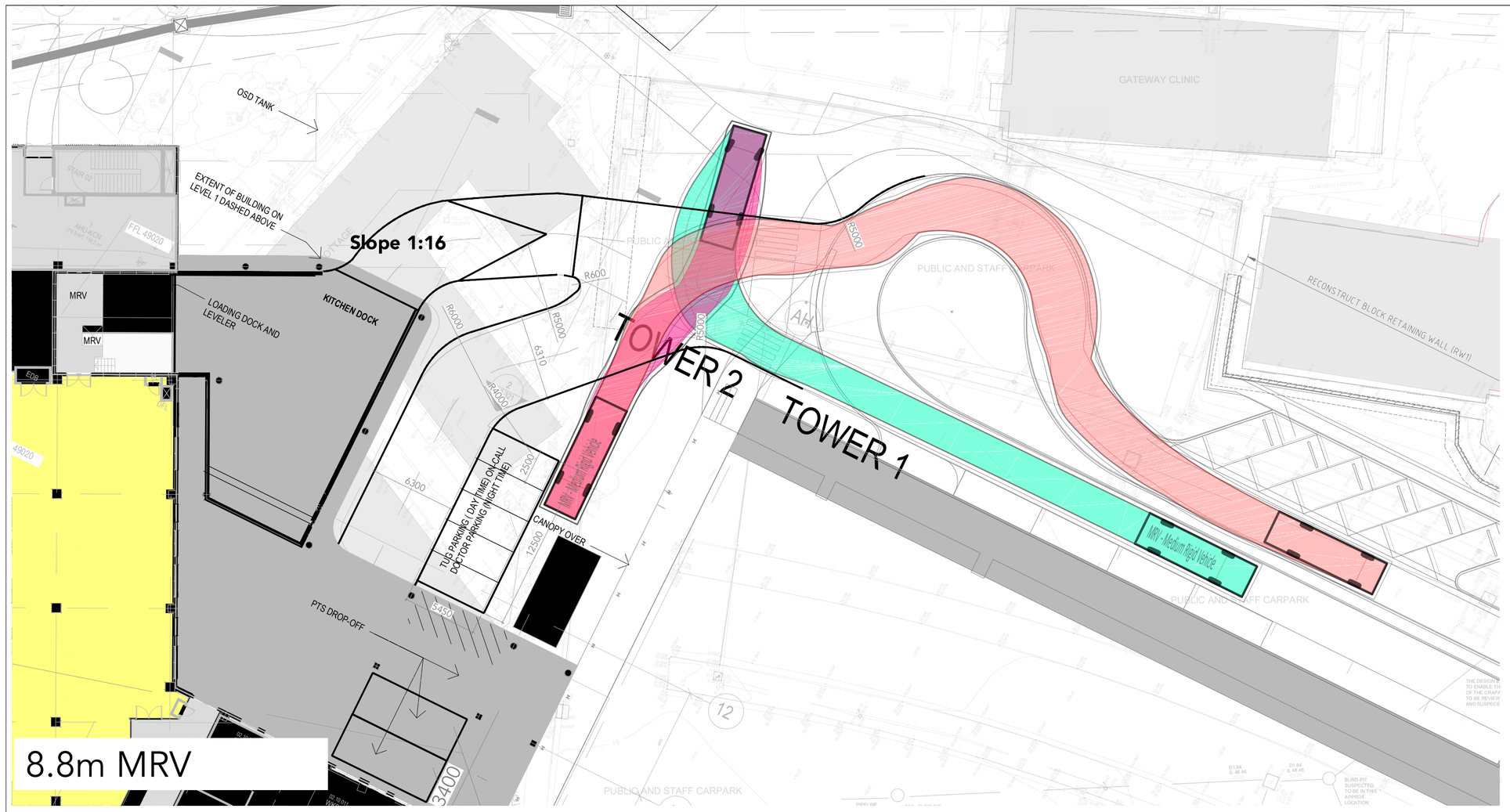
2	11/11/21	FOR COORDINATION	DS	SN
1	28/10/21	FOR COORDINATION	DS	SN

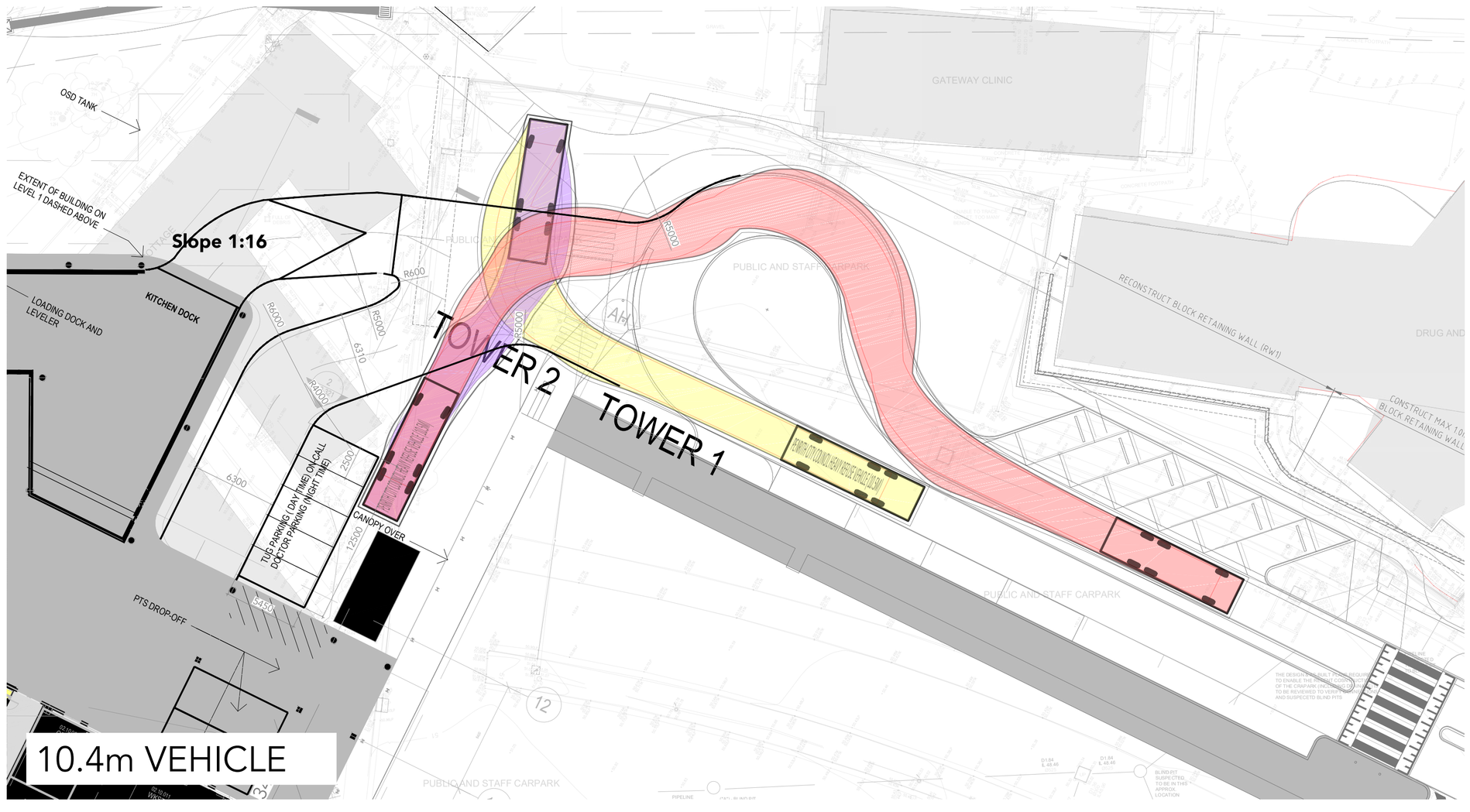
PROJECT
NEPEAN HOSPITAL - STAGE 2

DRAWING TITLE
KITCHEN LOADING DOCK & PTC AREA
6.8m SRV (PANTECH) AND TITAN HD 36V TUG
SWEPT PATH ANALYSIS

CLIENT	HEALTH INFRASTRUCTURE / CBRE
DRAWING #	04T_0002
PROJECT #	22-0037
SCALE	1 : 250

REV 2

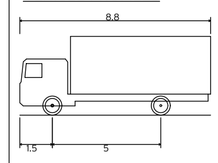




comments

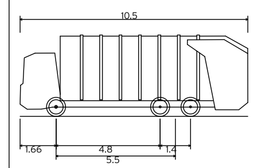
A1

VEHICLE PROFILES



MRV - Medium Rigid Vehicle

Overall Length	8.800m
Overall Width	2.500m
Overall Body Height	3.633m
Min Body Ground Clearance	0.428m
Track Width	2.500m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	10.000m



HEAVY REFUSE VEHICLE (10.5M)

Overall Length	10.500m
Overall Width	2.800m
Overall Body Height	3.751m
Min Body Ground Clearance	0.304m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	11.250m

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2	11/11/21	FOR COORDINATION	DS	SN
1	28/10/21	FOR COORDINATION	DS	SN

PROJECT
NEPEAN HOSPITAL - STAGE 2

DRAWING TITLE
KITCHEN LOADING DOCK & PTC AREA
8.8m MRV AND 10.4m HEAVY TRUCK
SWEPT PATH ANALYSIS

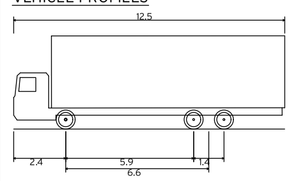
CLIENT	HEALTH INFRASTRUCTURE / CBRE
DRAWING #	04T_0001
PROJECT #	22-0037
SCALE	1 : 250

REV 2

Attachment 2 – Kitchen Dock Swept Paths

comments A1

VEHICLE PROFILES



HRV - Heavy Rigid Vehicle	
Overall Length	12.500m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.417m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m

STREET

PARKER

HRV - Heavy Rigid Vehicle

CANOPY OUTLINE

NORTH BLOCK

STAGE 3

18395

1500

300

12.5m HRV

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2	11/11/21	FOR COORDINATION	DS	SN
1	28/10/21	FOR COORDINATION	DS	SN

PROJECT
NEPEAN HOSPITAL - STAGE 2

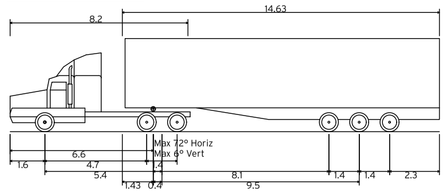
DRAWING TITLE
BOH LOADING DOCK
HRV SWEPT PATHS

CLIENT	HEALTH INFRASTRUCTURE / CBRE
DRAWING #	04T_0004
PROJECT #	22-0037
SCALE	1 : 250

REV 2

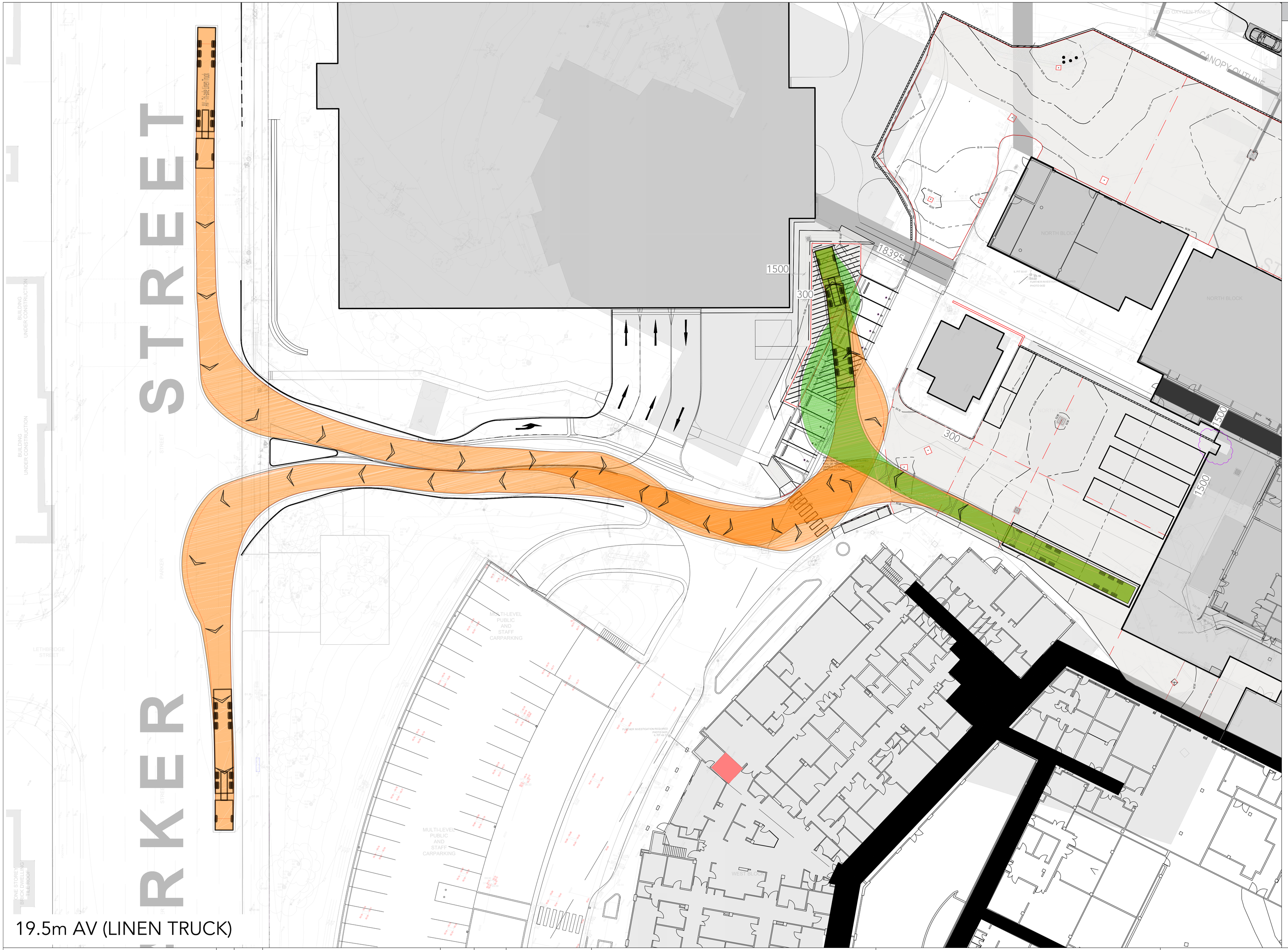
comments A1

VEHICLE PROFILES



AV - Tri-axle Linen Truck

Overall Length	19.800m
Overall Width	2.500m
Overall Body Height	4.301m
Min Body Ground Clearance	0.418m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m



19.5m AV (LINEN TRUCK)

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2	11/11/21	FOR COORDINATION	DS	SN
1	28/10/21	FOR COORDINATION	DS	SN

PROJECT
NEPEAN HOSPITAL - STAGE 2

DRAWING TITLE
BOH LOADING DOCK
LINEN TRUCK SWEPT PATHS

CLIENT	HEALTH INFRASTRUCTURE / CBRE
DRAWING #	04T_0003
PROJECT #	22-0037
SCALE	1 : 250

REV 2