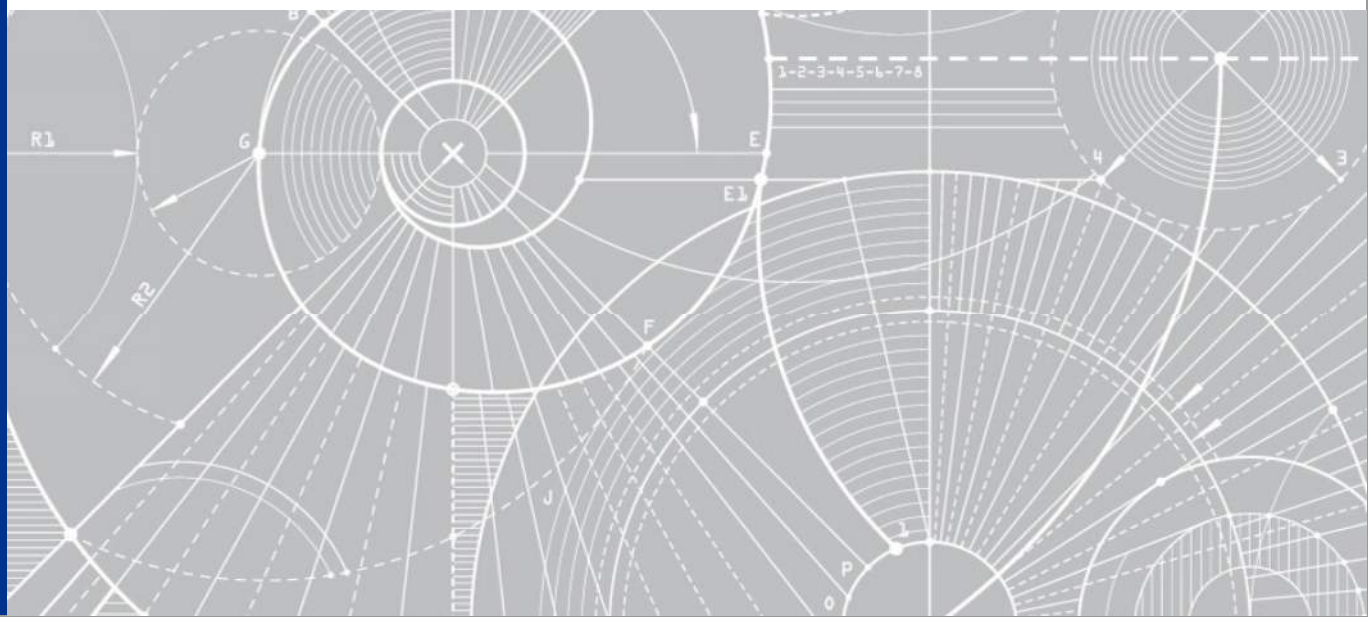
Gosford Hospital Redevelopment including Health and Wellbeing Precinct

NSW HEALTH INFRASTRUCTURE

Traffic Modelling Study

IA040600 | Rev A

19 June 2015



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Gosford Hospital Redevelopment

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Document history and status

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Contents

Glossary

Table A: Terminology definition

Term	Definition
Degree of Saturation	Degree of Saturation (DoS) is a ratio of traffic volume divided by capacity (per lane) that is provided as an output by LinSig to provide an indication of how close to capacity an approach is operating.
Passenger Car Unit	The Passenger Car Unit (PCU) is the standard unit for specification of traffic volumes in LinSig. The PCU aims to account for the different performance and physical characteristics of vehicle types in the network. It does this by assigning a higher conversion factor to larger, slower vehicles.
Practical Reserve Capacity	LinSig has a cycle time optimisation tool that plots Practical Reserve Capacity (PRC) and delay for a range of cycle times. In practical terms the cycle time impacts not only on intersection delay and capacity but also on pedestrian delays, queue lengths and coordination.
Saturation flows	Each lane at a signalised stop line will exhibit a unique saturation flow based upon intersection characteristics such as geometry, turning radii, visibility, on-street parking, proportion of turning traffic and pedestrian activity.
Level of Service	Level of Service (LoS) is a standard classification of delay experienced by drivers at intersections. The LoS is based on criteria outlined in Table A as defined by the Roads and Maritime Services Guide to Traffic Generating Developments (version 2.2, 2002). For traffic signals, the average delay for all movements through the intersection defines the Level of Service (LoS). For roundabouts and priority-controlled intersections, the movement with the highest average vehicle delay defines the LoS.

Table B: Level of Service criteria

LoS	Average delay per vehicle (seconds)	Traffic signals	Roundabout, give way and stop signs
A	<14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause delays	At capacity, requires other control mode
F	>70	Extra capacity required	Extreme delay, traffic signal or other major treatment required

Source: RMS Guide to Traffic Generating Developments,(version 2.2, 2002

1. Introduction

1.1 Background

Jacobs has been commissioned by Health Infrastructure (HI) to perform the planning and design works for the redevelopment of Gosford Hospital. As part of this project, Jacobs has conducted a traffic modelling study to assess the impact of future development and proposed internal road closures on the local traffic network. LinSig modelling has been used to provide a comprehensive understanding of traffic operations.

The study approach for the base LinSig model development is illustrated in **Figure 1**.

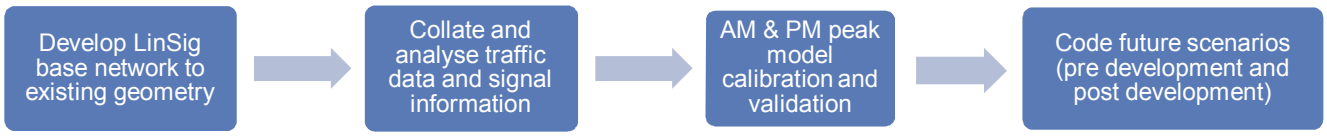


Figure 1: Study approach

Three future scenario models for the opening year (2019) and ultimate development year (2027) have been developed to assess potential traffic impacts of the development.

1.2 Scope of this report

The purpose of this report is to document the calibration and validation of the base LinSig peak models and conduct future traffic impact assessments of the Gosford Hospital Redevelopment.

This remainder of this report is set out as follows:

- **Section 2** identifies the study area
- **Section 3** details the base model development parameters and assumptions
- **Section 4** summarises the model calibration and validation results
- **Section 5** describes each of the modelled development scenarios
- **Section 6** outlines the traffic distribution assumptions used in developing develop origin-destination matrices for each scenario
- **Section 7** covers the modelling results for the base model
- **Section 8** provides the intersection upgrade options
- **Section 9** provides a summary and conclusion on the network performance and performance of major intersections.

2. Project area

Intersections surrounding Gosford Hospital that were assessed are shown in **Table 1**. The extent of the study area and location of key intersections are shown in **Figure 1**.

Table 1: Key intersections in study area

Intersection	Control type
Racecourse Road / Holden Street	Priority
Racecourse Road / Showground Road	Roundabout
Beane Street West / Holden Street	Priority
Beane Street West / Showground Road	Priority
Ward Street / Holden Street	Priority
Faunce Street West / Holden Street	Priority
Faunce Street West / Showground Road	Roundabout
Racecourse Road / Hospital Road	Priority
Racecourse Road / Beane Street West	Priority
Beane Street West / Hospital Road	Priority
Racecourse Road / Pacific Highway	Signals
Cape Street North / Hospital Entry / Sinclair Street	Priority
Pedestrian mid-block crossing – Racecourse Road (between Holden Street and Showground Road)	Signals
Pedestrian mid-block crossing - Showground Road (north of Racecourse Road / Showground Road)	Signals

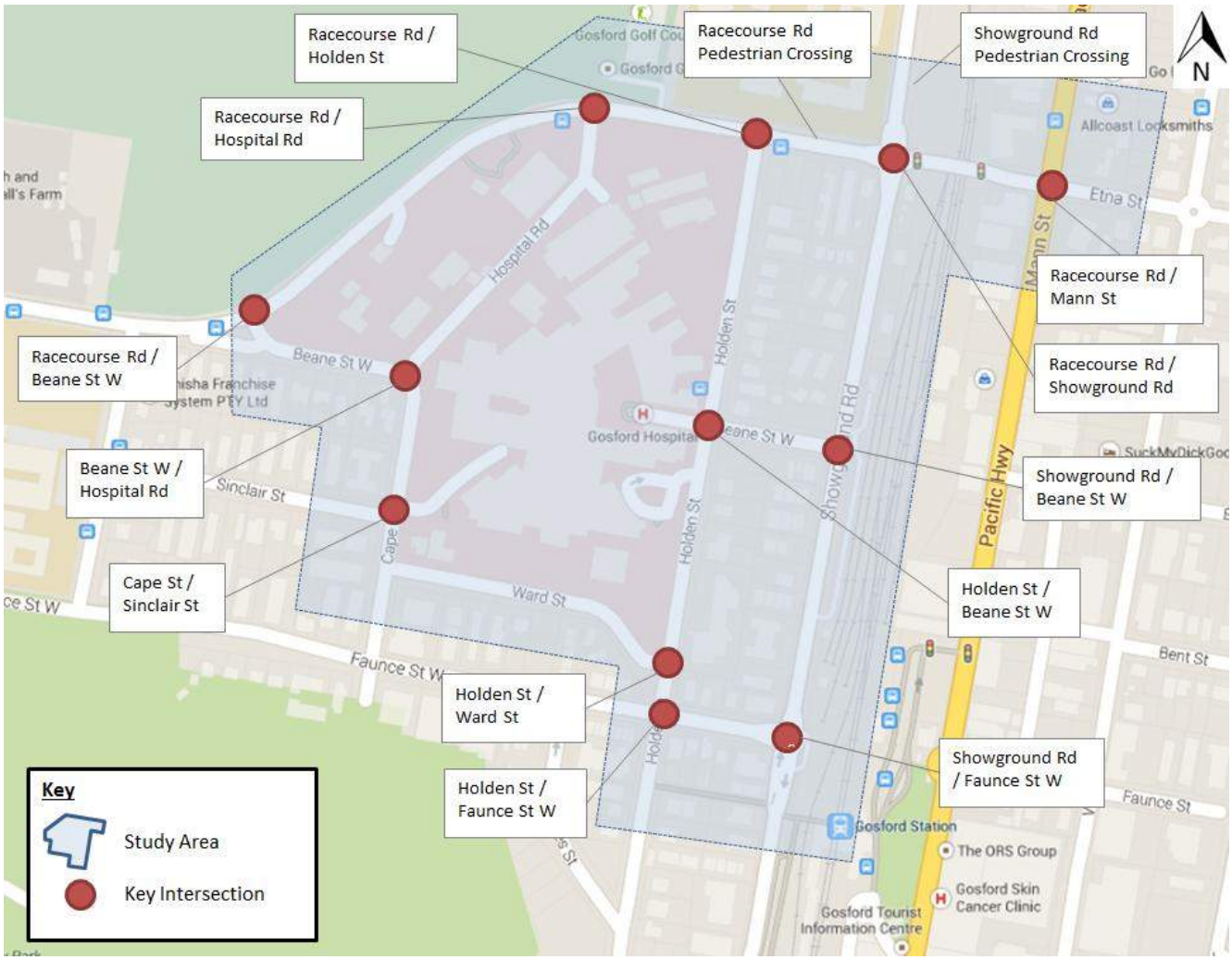


Figure 1: Study area

(Source: Google Maps)

3. Development of base model network

3.1 Software

The traffic assessment was undertaken using LinSig modelling software (v3). LinSig was developed by JCT Consultancy Ltd (JCT) and is used for detailed intersection design and assessment of scheme proposals. It combines geometric layout, traffic and controller modelling to ensure the model accurately reflects the operation of existing intersections and the impact of design proposals on operation. LinSig is able to optimise intersection performance by maximising the efficiency of intergreen design, and is also capable of optimising signal timings for either minimum delay, or maximum Practical Reserve Capacity (PRC).

3.2 Methodology Overview

Base year (2015) AM and PM peak hour LinSig models were developed, calibrated and validated to observed conditions. The models were developed based on the information described in the following sections and in accordance with the Roads and Maritime Services (Roads and Maritime) *Traffic Modelling Guidelines* (version 1, February 2013).

Base models were developed using the following approach:

1) Collate model input data:
    a) Study area geometry
    b) Signals - The signal phasing designs were based on the Roads and Maritime traffic control signal (TCS) plots
    c) Classified intersection counts
    d) Queue length surveys
2) Develop the base road network from the study area geometry, signal timings and speed restrictions.
3) Estimate the origin-destination matrix and calibrate the base model against classified intersection count data. Conduct scatter plot checks of observed against modelled traffic data in the morning and evening peak models.
4) Validate the base model against observed queue lengths at key intersections.

3.3 Traffic data

Comprehensive traffic data for the study area was collected to assist with the development of the base LinSig model to ensure an accurate reflection of existing conditions. An overview of the collected data is given in **Table 2.**

Table 2: Key intersections in study area

Data type	Collection date	Description
Turning movement counts	6th and 7th May 2015	Classified intersection turn counts for all intersections in the study area
Queue length surveys	6th and 7th May 2015	Maximum queue length observed at key intersections at 5 minute intervals
Travel time surveys	6th and 7th May 2015	Floating car method with 5 journey time runs each direction in each peak hour along Racecourse Road
TCS graphics	December 2014	Site graphics showing signal plan for signalised intersection at Racecourse Road / Pacific Highway

3.4 Model network

The key study intersections are described below:

Racecourse Road / Holden Street

- Racecourse Road / Holden Street is a three-arm, priority controlled intersection to the north of the study area. There is no pedestrian crossing facility at this intersection.
- The northbound approach to this intersection is via Holden Street. This is a single lane approach with a 'give-way' sign control at the intersection. The lane is unmarked with a nominal width of approximately 3.25m.
- The eastbound approach to this intersection is via Racecourse Road. This is an uncontrolled, single lane approach sharing through and right-turn movements. The lane has a standard width of approximately 3.25m.
- The westbound approach to this intersection is via Racecourse Road. This is an uncontrolled, single lane approach sharing through and left-turn movements. The lane has a standard width of approximately 3.25m.

Racecourse Road / Showground Road

- Racecourse Road / Showground Road is a four-arm, single-lane roundabout to the north of the study area.
- The northbound approach to this intersection is via Showground Road. This is a single lane approach with a nominal width of approximately 3.25m. The north and southbound lanes are separated by a triangular island with a pedestrian refuge located 8m south of the intersection.
- The southbound approach to this intersection is via Showground Road. There are two lanes at the intersection approach; one lane for through and right-hand turning movements, and a short flared lane for left-turning traffic. This approach has a relatively steep gradient of approximately 10%. There are no pedestrian crossing facilities at the intersection and fencing prevents pedestrians from crossing; pedestrians are encouraged to cross Showground Road at a set of midblock traffic signals 40m north of the intersection.
- The eastbound approach to this intersection is via Racecourse Road. This is a single lane approach with a nominal width of approximately 3.25m. There are no pedestrian facilities provided.
- The westbound approach to this intersection is via Racecourse Road. This is a single lane approach with a nominal width of approximately 3.25m. There are no pedestrian facilities provided.

Beane Street West / Holden Street

- Beane Street West / Holden Street is a four-arm, priority controlled intersection to the east of the study area.
- The northbound approach to this intersection is via Holden Street. This approach is uncontrolled, with a single shared lane for all turning movements. There are no pedestrian crossing facilities provided.
- The southbound approach to this intersection is via Holden Street. This approach is uncontrolled, with a single shared lane for all turning movements. There are no pedestrian crossing facilities provided.
- The eastbound approach to this intersection is via Beane Street West, which also acts as a public exit road from Gosford Hospital. The approach is 'stop' sign controlled at the intersection. There are no pedestrian facilities at the intersection, however there is a zebra crossing located approximately 30m upstream of the intersection.
- The westbound approach to this intersection is via Beane Street West. This is a single lane approach with a nominal width of approximately 3.25m. This approach is 'give-way' sign controlled at the intersection, and no pedestrian crossing facilities are provided.

Beane Street West / Showground Road

- Beane Street West / Showground Road is a three-arm, priority controlled intersection to the east of the study area.
- The northbound approach to this intersection is via Showground Road. This is an uncontrolled, single lane approach with a nominal width of approximately 3.25m. There are no pedestrian facilities provided on this approach.
- The southbound approach to this intersection is via Showground Road. This is an uncontrolled, single lane approach with a nominal width of approximately 3.25m. There are no pedestrian facilities provided on this approach.
- The eastbound approach to this intersection is via Beane Street West. This is a single lane approach which is 'give-way' sign controlled at the intersection. There are no pedestrian facilities provided on this approach.

Ward Street / Holden Street

- Ward Street / Holden Street is a three-arm, priority controlled intersection to the south of the study area.
- The northbound approach to this intersection is via Holden Street. This is a single lane, uncontrolled approach with a nominal lane width of approximately 3.25m. There is a raised zebra crossing located 15m south of the intersection, spanning all lanes.
- The southbound approach to this intersection is via Holden Street. This is a single lane, uncontrolled approach with a nominal lane width of approximately 3.25m. There are no pedestrian facilities provided at this approach.
- The eastbound approach to this intersection is via Ward Street. This is a single-lane approach which is 'give-way' sign controlled (currently un-signposted). Due to on-street parking on the northern side of Ward Street, the lane width is reduced to approximately 2.7m.

Faunce Street West / Holden Street

- Faunce Street West / Holden Street is a four-arm, priority controlled intersection to the south of the study area.
- The northbound approach to this intersection is via Holden Street. This is a single lane, uncontrolled approach with a nominal lane width of approximately 3.25m. There are no pedestrian facilities provided.
- The southbound approach to this intersection is via Holden Street. This is a single lane, uncontrolled approach with a nominal lane width of approximately 3.25m. There is a raised zebra crossing located 15m north of the intersection, spanning all lanes.

- The eastbound approach to this intersection is via Faunce Street West. This is a single-lane approach which is 'give-way' sign controlled. The approach lane has a nominal width of approximately 3.25m. There are no pedestrian facilities provided.
- The westbound approach to this intersection is via Faunce Street West. This is a single-lane approach which is 'give-way' sign controlled. The approach lane has a nominal width of approximately 3.25m. There are no pedestrian facilities provided.

Faunce Street West / Showground Road

- Faunce Street West / Showground Road is a four-arm, single-lane roundabout to the south-east of the study area.
- The northbound approach to this intersection is via Showground Road. This is a single lane approach with a nominal width of approximately 3.25m. The north and southbound lanes are separated by a triangular island with a pedestrian refuge located 20m south of the intersection.
- The southbound approach to this intersection is via Showground Road. This is a single lane approach with a nominal width of approximately 3.25m. The north and southbound lanes are separated by a triangular island, which provides refuge for pedestrians waiting to cross.
- The eastbound approach to this intersection is via Faunce Street West. This is a single lane approach with a nominal width of approximately 3.25m. The east and westbound lanes are separated by a triangular island with a pedestrian refuge located 5m west of the intersection. This approach has a steep downhill gradient of greater than10%.
- The westbound approach of this intersection is the entry to a short-term car park (10 spaces) serving Gosford railway station. The car park exit is located some 20m south of the intersection. There are no pedestrian crossing facilities provided.

Racecourse Road / Hospital Road

- Racecourse Road / Hospital Road is a three-arm, priority controlled intersection to the north of the study area.
- The northbound approach to this intersection is via Hospital Road. This is an uncontrolled, single lane approach with left turning movements permitted only. The approach has a nominal lane width of approximately 3.25m. No pedestrian crossing facilities are provided.
- The eastbound approach to this intersection is via Racecourse Road. This is a single lane, uncontrolled approach with a nominal lane width of approximately 3.25m. There are no pedestrian facilities provided.
- The westbound approach to this intersection is via Racecourse Road. This is a single lane, uncontrolled approach with a nominal lane width of approximately 3.25m. There are no pedestrian facilities provided.

Racecourse Road / Beane Street West

- Racecourse Road / Beane Street West is a three-arm, priority controlled intersection to the north-west of the study area.
- The northbound approach to this intersection is via Beane Street West. This is a single lane approach which is 'give-way' sign controlled. It has a nominal lane width of approximately 3.25m. There are no pedestrian crossing facilities provided.
- The eastbound approach to this intersection is via Racecourse Road. This is a single lane, uncontrolled approach with a nominal lane width of approximately 3.25m. There are no pedestrian facilities provided.
- The westbound approach to this intersection is via Racecourse Road. This is a single lane, uncontrolled approach with a nominal lane width of approximately 3.25m. There are no pedestrian facilities provided.

Beane Street West / Hospital Road

- Beane Street West / Hospital Road is a three-arm, priority controlled intersection to the west of the study area.
- The northbound approach to this intersection is via Cape Street North. This is a single-lane approach with a nominal lane width of approximately 3.25m. The priority movement is the left turn movement into Beane Street West; through movements into Hospital Road are not permitted. No pedestrian crossing facilities are provided on this approach.
- The southbound approach to this intersection is via Hospital Road. This is a single-lane, one-way approach which is 'stop' sign controlled. It has a lane width of approximately 4.2m. A raised threshold and kerb ramps at the intersection allows pedestrians to cross.
- The eastbound approach to this intersection is via Beane Street West. This is a single-lane approach with a nominal lane width of approximately 3.25m. The priority movement is the right turn movement into Cape Street North; left turn movements into Hospital Road are not permitted. No pedestrian crossing facilities are provided on this approach.

Racecourse Road / Pacific Highway

- Racecourse Road / Pacific Highway is a four-arm signalised intersection to the north of the study area.
- The northbound approach to this intersection is via Pacific Highway (Mann Street). This approach has a dedicated left turning lane as well as a through lane; right turning movements into Etna Street are not permitted. Lanes have a nominal width of approximately 3.25m. There are no pedestrian crossing facilities provided.
- The southbound approach to this intersection is via Pacific Highway (Mann Street). There are two long lanes, one sharing left-turn and through movements and one sharing right-turn and through movements. Lanes have a nominal width of approximately 3.25m. A signalised pedestrian crossing is provided on this approach.
- The eastbound approach to this intersection is via Racecourse Road. There is shared long lane for left-turn and through movements, as well as a flared lane sharing right-turn and through movements. Lanes have a nominal width of approximately 3.25m. A signalised pedestrian crossing is provided on this approach.
- The westbound approach to this intersection is via Etna Street. There is shared long lane for through and right-turn movements, as well as a flared lane for left-turn and through movements. Lanes have a nominal width of approximately 3.25m. A signalised pedestrian crossing is provided on this approach.

Cape Street North / Hospital Entry / Sinclair Street

- Cape Street North / Hospital Entry / Sinclair Street is a four-arm, priority controlled, staggered intersection to the west of the study area.
- The northbound approach to this intersection is via Cape Street North. This is a single-lane, uncontrolled approach. While there are no pavement markings, lanes have a nominal width of approximately 3.25m. Kerb extensions located 10m south of the intersection are used to reduce crossing width for pedestrians.
- The southbound approach to this intersection is via Cape Street North. This is a single-lane, uncontrolled approach. There are no pavement markings, however lanes have a nominal width of approximately 3.25m. No pedestrian crossing facilities are provided at this approach.
- The eastbound approach to this intersection is via Sinclair Street. This is a single lane, uncontrolled approach. On-street parking reduces the effective lane width to 2.4m. No pedestrian crossing facilities are provided.
- The westbound approach to this intersection is via the Hospital Entry Road, which is restricted to service vehicles only. This is a single lane driveway approach with a nominal lane width of approximately 3.25m. There are no pedestrian crossing facilities provided.

Cape Street North / Ward Street/ Hospital Rd

- Cape Street North / Ward Street is a three-arm, priority controlled intersection to the south-west of the study area.

- The northbound approach to this intersection is via Cape Street North. This is a single-lane, uncontrolled approach. While there are no pavement markings, lanes have a nominal width of approximately 3.25m. No pedestrian crossing facilities are provided at this approach.
- The southbound approach to this intersection is via Cape Street North. This is a single-lane, uncontrolled approach. While there are no pavement markings, lanes have a nominal width of approximately 3.25m. Kerb extensions located 20m north of the intersection are used to reduce crossing width for pedestrians.
- The westbound approach to this intersection is via Ward Street. This is a single-lane, uncontrolled approach. While there are no pavement markings, lanes have a nominal width of approximately 3.25m.

Pedestrian mid-block crossing (Racecourse Road between Holden Street and Showground Road)

- The pedestrian mid-block crossing between Holden Street and Showground Road is a two-arm intersection to the north of the study area.
- The eastbound and westbound approaches to this intersection are via Racecourse Road. On either side of the crossing, Racecourse Road has a single through lane with a nominal width of approximately 3.25m. There is a signalised crossing which is pedestrian actuated.

Pedestrian mid-block crossing (Showground Road north of Racecourse Road)

- The pedestrian mid-block crossing north of Showground Road / Racecourse Road is a two-arm intersection to the north of the study area.
- The northbound and southbound approaches to this intersection are via Racecourse Road. On either side of the crossing, Showground Road has a single through lane of approximately 3.25m. There is a signalised crossing which is pedestrian actuated.

3.5 Zoning system

The modelling zone system for the study area is provided in **Figure 2**. There are eighteen zones as shown which are labelled alphabetically in a clockwise direction around the network. The zoning system is based on the origin-destination matrices used as input into the model and is detailed in **Table 3**.

Zones A through O represent existing access points to the road network, including significant car parking locations on Hospital Road and Racecourse Road between Holden Street and Hospital Road (comprising the Gosford Golf Club car park and on-street parking).

Zones P and Q represent proposed future parking locations included in the hospital redevelopment and commercial development proposals.

Zone R represents the existing staff car park on the corner of Ward Street / Holden Street. This car park has not been modelled in the existing network layout; however it has been used to reflect changed access patterns following the hospital redevelopment.

Table 3: Description of zones

LinSig zones	Road name	Location
A	Racecourse Road	Western end
B	Sinclair Street	Western end
C	Cape Street North	Southern end
D	Hospital Entry	Eastern entry
E	Hospital Entry	Western entry
F	Faunce Street West	Western end
G	Holden Street	Southern end
H	Showground Road	Southern end
I	Pacific Highway	Southern end
J	Etna Street	Eastern end
K	Pacific Highway	Northern end
L	Showground Road	Northern end
M	Gosford Golf Club car park and on-street parking	Racecourse Road, between Holden Street and Hospital St
N	Gosford Hospital car parks (existing multi-storey car park; fleet compound)	Hospital Road, between Racecourse Road
O	Gosford railway station short term parking	Showground Road / Faunce Street West
P	New hospital multi-storey car park (dummy zone)	Beane Street West, between Holden Street and Showground Road. Access via Showground Road.
Q	New commercial car park	Beane Street West, between Holden Street and Showground Road. Access via Holden Street (North)
R	Staff car park, Ward Street	Mid-block Ward Street

Figure 2: LinSig model zoning system

3.6 Traffic signals

The signalised intersection at Racecourse Road / Pacific Highway / Etna Street (TCS 1624) was coded to reflect existing signal plans obtained from TCS graphics. The intersection operates with three major phases and a fourth vehicle actuated phase; in the base model the intersection has been coded with a fixed phase sequence incorporating all four phases.

In line with Section 13.2.8 of the Roads and Maritime *Traffic Modelling Guidelines*, the average phase timings at the Racecourse Road / Pacific Highway / Etna Street intersection for the peak hour were coded into the LinSig model and are shown by timing dials for each intersection. The phase sequence was determined from TCS plots and inspection of video footage.

The average phase timings were derived from video footage of the intersection. The phase timing data includes:

- Phase definitions
- Phase sequence
- Average phase times
- Average cycle time
- Number of times phase is demanded.

For each peak period, a minimum of four consecutive cycles were observed within the peak hour to determine the average phase timings. In the AM peak, the average cycle time between 7:45-8:00 was 89 seconds, whereas the cycle time between 8.15am – 8.30am was 120 seconds. A higher cycle time of 120 seconds has been adopted.

In the PM peak, a cycle time of 120 seconds was adopted, reflecting the intersection operation during the peak 15 minute period from 3.15pm – 3.30pm.

Phase timings for the signalised pedestrian crossings on Racecourse Road and Showground Road were estimated from inspection of video footage. In reality, both crossings are pedestrian actuated; however in LinSig it is necessary to model a constant phasing arrangement throughout the modelled period. In both peak hours, the pedestrian phase is modelled to run for 21 seconds in every 70 second cycle.

Phase timings at Racecourse Road / Pacific Highway / Etna Street were not optimised with respect to the pedestrian crossings. This is reflective of the inconsistent behaviour of these pedestrian crossings, which appear to be significant contributors to local congestion during peak periods.

3.7 Modelling assumptions

The following assumptions have been applied into the LinSig base models:

- Cruise times have been input into the model based on an average free flow cruise speed equal to the prevailing speed limit, for through movements. Turning movements have been coded with a cruise speed of 35 km/h
- School zone 40km/h speed restrictions are in place throughout the entirety of both peak periods
- Give way parameters have been coded based on default settings provided within the model
- TCS plots have been used to develop the phasing sequence for each intersection
- There are signalised pedestrian crossings at four locations including in the network:
  - The southbound approach to Racecourse Road / Pacific Highway / Etna Street
  - The eastbound approach to Racecourse Road / Pacific Highway / Etna Street
  - The westbound approach to Racecourse Road / Pacific Highway / Etna Street
  - Racecourse Road midblock between Showground Road and Holden Street.
- Pedestrian protection has been provided for all pedestrian crossings at Racecourse Road / Pacific Highway, assuming a walk time of 15 seconds. This is to reflect the high demand for pedestrian crossings by local school students during the peak periods.

3.7.1 Saturation flows

Saturation flows of 1800 pcu/h have been assumed at the following intersections:

- Racecourse Road / Showground Road
- Racecourse Road pedestrian crossing
- Showground Road pedestrian crossing.

This value is estimated from the Austroads *Guide to Traffic Management* for urban mid-block capacities during peak periods. Otherwise, saturation flows of 1400 pcu/h have been assumed throughout the network.

3.8 Matrix demand development

The demand matrix was estimated using LinSig based on the available count data and consideration was given to the relative volume of traffic entering and exiting the network at each location. These turning counts were collected on Wednesday 6 May 2015 and Thursday 7 May 2015 between the hours of 7.30am – 9.30am and 3.00pm – 6.00pm.

Based on these surveys, the peak hours for the total LinSig model area were as follows:

- **AM peak:** 7.45am – 8.45am
- **PM peak:** 3.00pm – 4.00pm

These times were adopted as the LinSig model hours for the AM and PM models, respectively.

The surveyed vehicles were classified into light vehicles, heavy vehicles and buses and converted to PCUs as follows:

- **Light vehicle** = 1 PCU
- **Heavy vehicle** = 2 PCU
- **Bus** = 2 PCU

2015 PCU volumes were then balanced across the model network and used to create the demand matrix within LinSig. Traffic flow diagrams are presented in **Appendix A**.

4. Model calibration and validation

4.1 Peak hour models calibration

The models were calibrated to ensure an accurate reflection of observed traffic conditions. The criteria used to validate the success of the calibration were the GEH statistic and flow difference criteria from the Roads and Maritime *Traffic Modelling Guidelines*.

The GEH statistic is a modified Chi-Square empirical formula named after Geoffrey E. Harves, invented in the 1970s to compare two sets of traffic volumes. The use of the GEH statistic as an acceptance criterion is widely recognised in the traffic forecasting and traffic/ transport modelling practice areas. The formula is:

$$GEH = \sqrt{\frac{2(M-C)^2}{M+C}}$$

where:

M is the traffic flow output from model; and

C is the observed real-world traffic flow.

A GEH less than 5.0 is considered to be a good match between modelled and observed traffic volumes. According to the UK Highways Agency *Design Manual for Road and Bridges* (DMRB), more than 85% of model links should comprise GEH of less than 5.0'. GEH values between 5.0 and 10.0 may warrant further investigation and GEH values greater than 10.0 are not accepted and require further investigation.

4.1.1 Traffic flows

The traffic flows based on classified intersection counts were coded into the model and used to estimate an origin-destination matrix for the network. The calibration was undertaken by comparing the flows modelled using this estimated matrix with observed counts using the GEH statistic. As described above, where the GEH statistic is less than 5.0 a turning count is considered to be a good match compared to the modelled turning counts. The comparison between the modelled flows and the survey flows are shown in **Table 4.**

Table 4: GEH of modelled turning counts in AM and PM base models

	AM Base	PM Base
GEH <2 (%)	42%	54%
GEH 2-5 (%)	58%	46%
GEH >5 (%)	0%	0%

The model calibration results show that from a traffic modelling perspective an acceptable standard of matrix calibration has been achieved for the AM and PM peak modelled periods. In both peak periods, all turning counts have a GEH of less than 5, which indicates a good match between the modelled volumes and observed counts. These results are confirmed in scatter plots with very high R^2 (>0.97), which show the calibrated matrices reproduced observed traffic volumes across the network, as shown in **Figure 3** and **Figure 4** for the AM and PM peak periods.

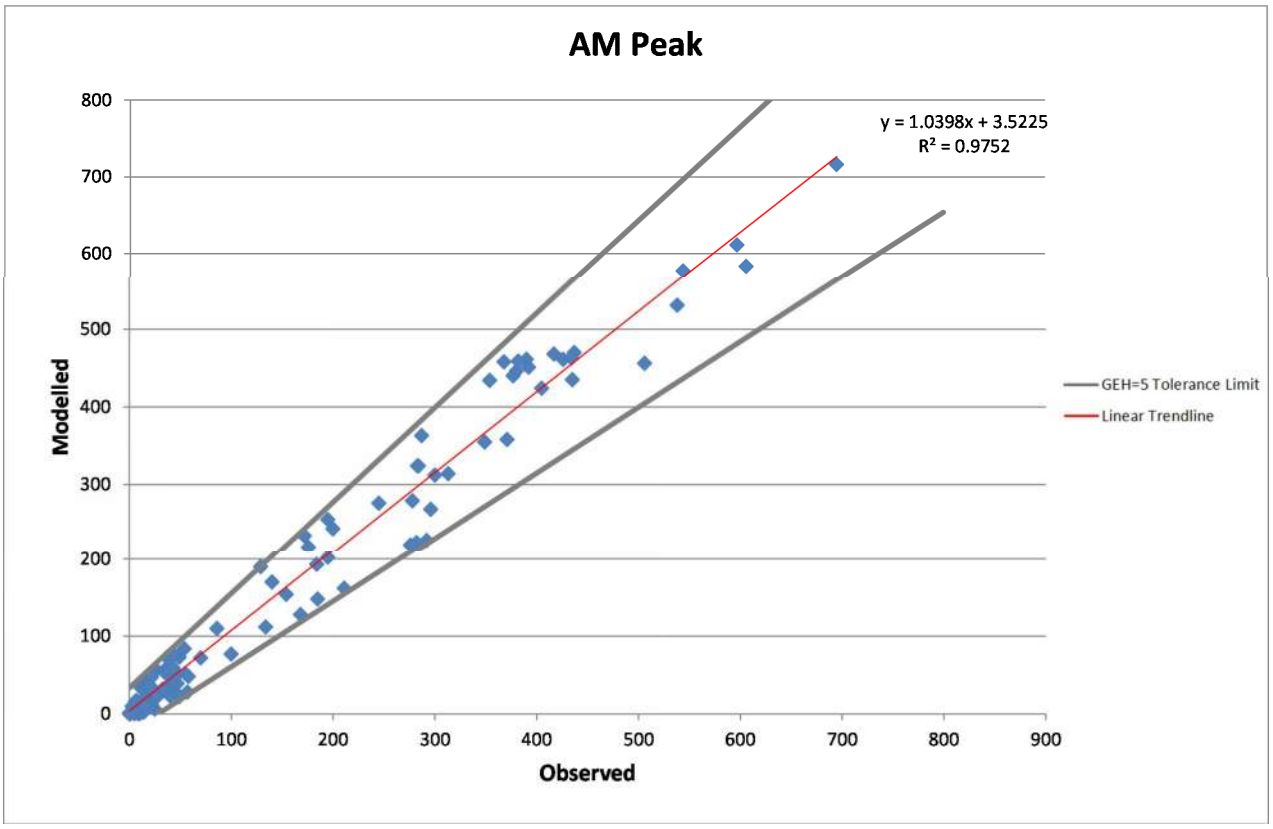


Figure 3: AM peak scatter plot

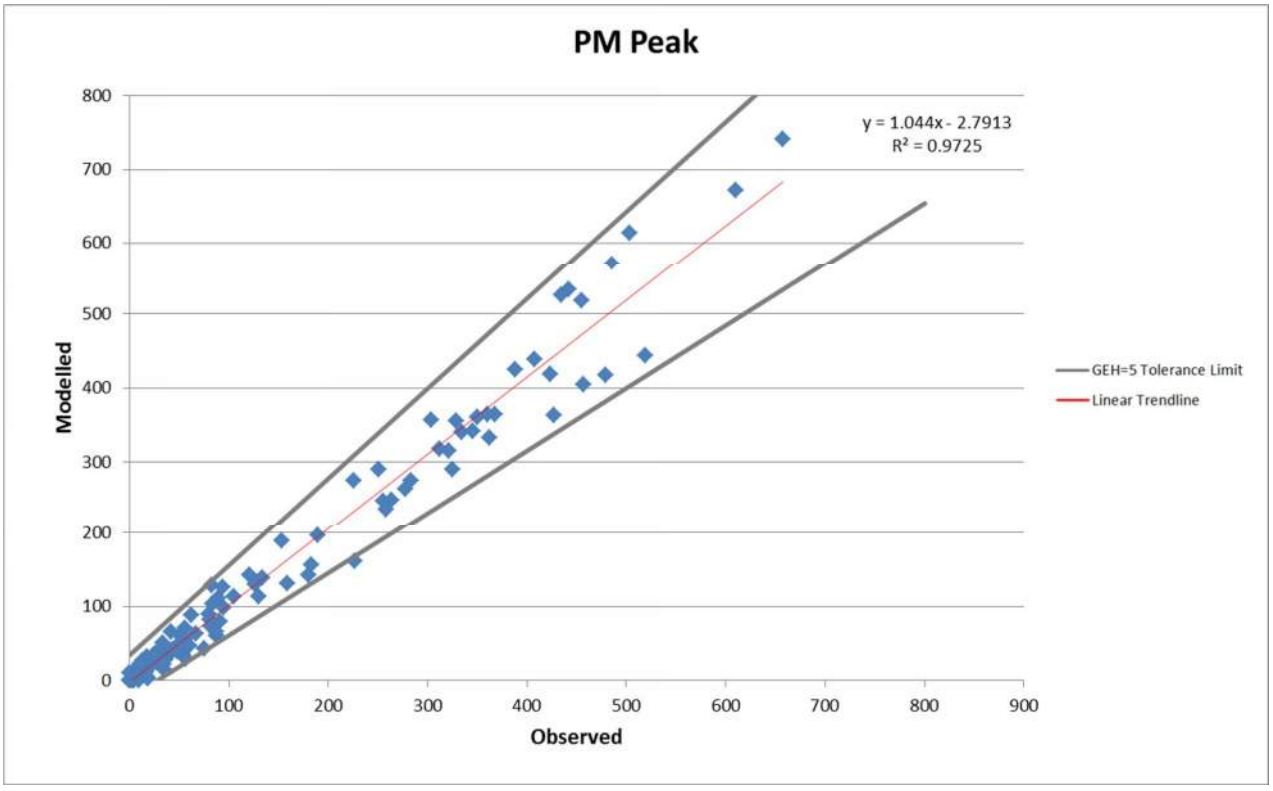


Figure 4: PM peak scatter plot

4.2 Peak hour models validation

Model validation has been undertaken in accordance with the Roads and Maritime *Traffic Modelling Guidelines* to confirm the model's credibility. It requires comparing the model results with independent observations recorded during surveys.

4.2.1 Queue length

The Roads and Maritime *Traffic Modelling Guidelines* states that queue length survey data could become highly variable on approaches that are operating at or close to capacity. As such LinSig struggles to provide an accurate prediction under these conditions and unless the site observations are based on a large sample size, the surveyed average queue length may not be representative. Therefore, the queue length surveys obtained in May 2015 are not considered suitable for validation. In addition, surveyed queue lengths are calculated using the maximum queue length per 5 minute interval, whereas the modelled queue length is calculated using maximum queue length every 2 minute cycle. However, the observations from site inspections provide a good reference for preliminary checking of model outputs. A comparison of the observed and modelled maximum queue length (averaged over the peak hour) in both peak periods is given in **Table 5** and **Table 6**.

Table 5: Comparison of the observed and modelled average maximum queue length in the AM peak

Intersection	Approach	Modelled (veh)	Observed (veh)	Difference
1: Racecourse Rd/Beane St	Racecourse Rd EB	0.2	0.0	0.2
	Beane St WB	0.1	1.4	1.3
	Racecourse Rd WB	0.2	0.7	0.5
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	0.6	1.5	1.3
	Racecourse Rd WB	0.3	0.0	0.3
	Hospital Rd NB	-	-	-
3: Beane St/Hospital Rd	Cape St NB	0.0	0.0	0.0
	Hospital Rd SB	0.1	0.0	0.1
	Beane St EB	0.0	0.6	0.6
4: Cape St/Sinclair St	Cape St SB	0.0	0.0	0.0
	Cape St NB	0.0	0.0	0.0
	Sinclair St EB	0.0	0.0	0.0
	Hospital Exit	0.0	0.0	0.0
5: Racecourse Rd/Holden St	Racecourse Rd EB	1.3	0.7	0.5
	Racecourse Rd WB	0.4	4.2	3.8
	Holden St NB	0.4	3.3	2.9
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	0.0	0.0	0.0
	Car Park Exit	0.0	0.3	0.3
	Hospital Road SB	0.1	0.0	0.1
7: Holden St/Beane St	Holden St SB	0.0	0.1	0.1
	Hospital Exit	0.0	1.1	1.1
	Holden St NB	0.1	0.0	0.1
	Beane St WB	0.0	0.2	0.2
8: Cape St/Ward St	Ward St WB	0.0	0.0	0.0

Intersection	Approach	Modelled (veh)	Observed (veh)	Difference
	Cape St SB	0.0	0.0	0.0
	Cape St NB	0.0	0.0	0.0
9: Ward St/Holden St	Holden St SB	0.0	0.2	0.2
	Holden St NB	0.1	0.0	0.1
	Ward Street	0.1	1.3	1.2
10: Holden St/Faunce St	Holden St NB	0.1	0.4	0.3
	Faunce St EB	0.1	1.6	1.5
	Faunce St WB	0.1	0.6	0.5
	Holden St SB	0.0	0.2	0.2
11: Showground Rd/Racecourse Rd	Showground Rd NB	5.2	5.9	0.7
	Racecourse Rd WB	6.5	6.1	0.4
	Showground Rd SB	8.2	5.0	3.2
	Racecourse Rd EB	7.5	6.1	1.4
12: Racecourse Rd/Mann St	Racecourse Rd EB	9.1	6.1	3.0
	Mann St NB Left	4.6	4.0	0.6
	Mann St NB Through	13.8	15.1	1.3
	Mann St SB Left/Th	10.0	7.3	2.7
	Mann St SB Right/Th	10.2	11.3	1.1
	Racecourse Rd WB	5.1	3.9	1.2
13: Showground Rd/Beane St	Showground Rd NB	0.1	0.3	0.2
	Beane St EB	0.0	1.0	1.0
	Showground Rd SB	0.1	0.3	0.2
14: Showground Rd/Faunce St	Faunce St EB	0.1	0.9	0.8
	Showground Rd NB	0.2	1.3	1.1
	Showground Rd SB	0.3	1.7	1.4
16: Golf Club Car Park	Racecourse Rd EB	0.2	0.3	0.1
	Racecourse Rd WB	5.2	5.8	0.6
	Car Park Exit	0.5	0.5	0.0

Table 6: Comparison of the observed and modelled average maximum queue length in the PM peak

Intersection	Approach	Modelled (veh)	Observed (veh)	Difference
1: Racecourse Rd/Beane St	Racecourse Rd EB	0.2	0.0	0.2
	Beane St WB	1.4	1.9	0.5
	Racecourse Rd WB	0.2	3.8	3.6
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	9.0	10.0	1.0
	Racecourse Rd WB	0.3	0.0	0.3
	Hospital Rd NB	-	-	-
3: Beane St/Hospital Rd	Cape St NB	0.0	0.0	0.0
	Hospital Rd SB	0.0	0.1	0.1

Intersection	Approach	Modelled (veh)	Observed (veh)	Difference
	Beane St EB	0.1	1.7	1.6
4: Cape St/Sinclair St	Cape St SB	0.0	0.3	0.3
	Cape St NB	0.0	0.6	0.6
	Sinclair St EB	0.0	0.5	0.5
	Hospital Exit	0.0	0.0	0.0
5: Racecourse Rd/Holden St	Racecourse Rd EB	0.2	0.2	0.0
	Racecourse Rd WB	0.4	2.8	2.4
	Holden St NB	5.6	7.0	1.4
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	0.6	
	Car Park Exit	0.0	0.0	0.0
	Hospital Road SB	0.1	0.3	0.2
7: Holden St/Beane St	Holden St SB	0.0	0.7	0.7
	Hospital Exit	0.0	0.8	0.8
	Holden St NB	0.1	0.6	0.5
	Beane St WB	0.0	0.2	0.2
8: Cape St/Ward St	Ward St WB	0.0	0.3	0.3
	Cape St SB	0.1	0.0	0.1
	Cape St NB	0.0	1.8	1.8
9: Ward St/Holden St	Holden St SB	0.0	0.2	0.2
	Holden St NB	0.1	0.0	0.1
	Ward Street	0.1	1.3	1.2
10: Holden St/Faunce St	Holden St NB	0.1	0.6	0.5
	Faunce St EB	0.1	2.4	2.3
	Faunce St WB	0.0	0.1	0.1
	Holden St SB	0.0	1.1	1.1
11: Showground Rd/Racecourse Rd	Showground Rd NB	0.9	0.6	0.3
	Racecourse Rd WB	7.0	9.2	2.2
	Showground Rd SB	7.8	6.0	1.8
	Racecourse Rd EB	10.0	9.2	0.8
12: Racecourse Rd/Mann St	Racecourse Rd EB	9.8	7.9	1.9
	Mann St NB Left	2.9	3.8	0.9
	Mann St NB Through	13.2	14.7	1.5
	Mann St SB Left/Th	5.6	4.3	1.4
	Mann St SB Right/Th	11.7	13.1	1.4
	Racecourse Rd WB	4.8	4.4	0.4
13: Showground Rd/Beane St	Showground Rd NB	0.1	1.7	1.6
	Beane St EB	0.0	1.5	1.5
	Showground Rd SB	0.1	0.2	0.1
14: Showground Rd/Faunce St	Faunce St EB	0.1	1.9	1.8
	Showground Rd NB	0.2	1.7	1.5

Intersection	Approach	Modelled (veh)	Observed (veh)	Difference
	Showground Rd SB	0.2	2.1	1.9
16: Golf Club Car Park	Racecourse Rd EB	0.2	1.8	1.6
	Racecourse Rd WB	0.4	0.0	0.4
	Car Park Exit	0.2	1.6	1.4

In general, the model provides a reasonably good match to observed queue lengths. In the AM peak, the worst modelled queue was at the southbound approach to Racecourse Road / Showground Road where modelled queues are over-estimated. This queue behaviour may be partly due to modelling of the pedestrian crossing on Showground Road, for which no observed data was available.

4.2.2 Travel time

Travel time surveys were undertaken by Skyhigh Traffic Data Australia Pty Ltd on the same days as the intersection and queue length surveys (Wednesday 6th and Thursday 7th May 2015). These surveys were carried out along Racecourse Road between Beane Street West and Hills Street as shown in **Figure 5**. Surveys were undertaken in both directions for both the AM and PM peak periods.

RMS guidelines state that due to the way LinSig simplifies midblock traffic flows and does not account for side friction from activities such as parking and loading, it can often be difficult to accurately model corridor journey times. Because of this, travel times within 25% of an observed average can be considered validated.

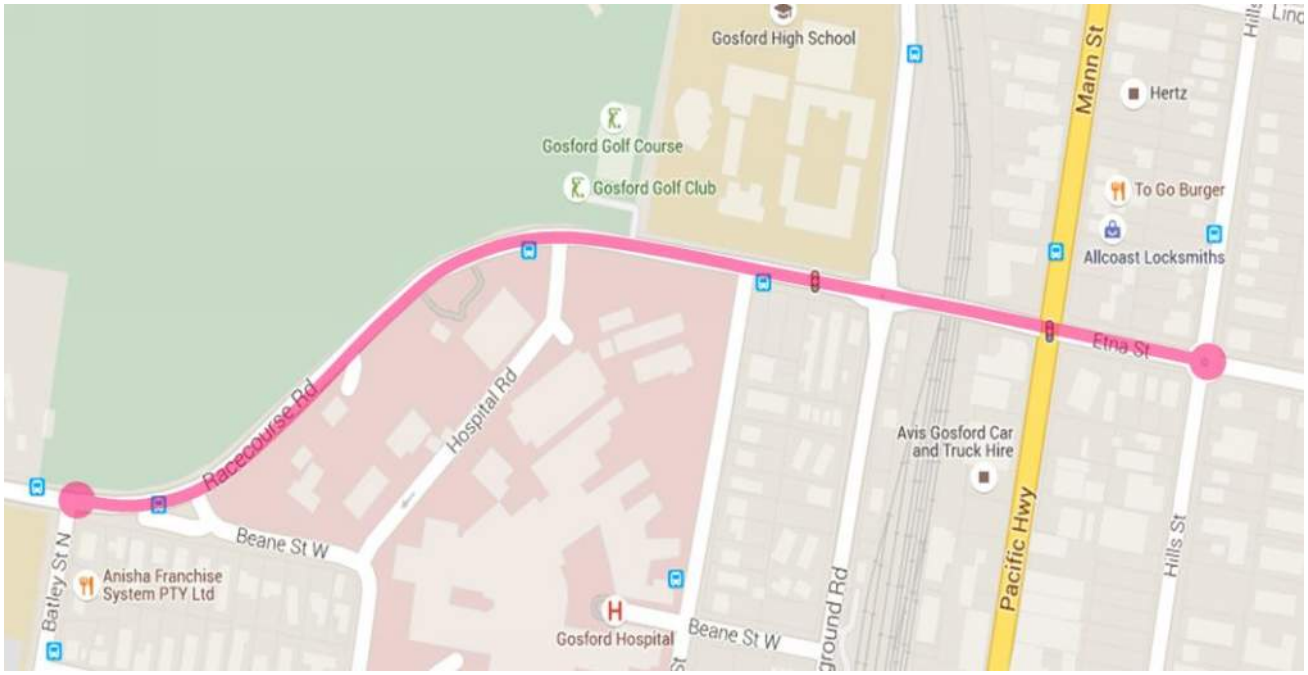


Figure 5: Travel time survey route

Results of travel time comparisons are shown in **Table 7** and **Figure 6**. The westbound route is shown to match the observed travel times relatively closely, with 9% variance in the AM and 15% in the PM. There is a strong overall correlation between most of the travel times. Routes where all three data sources are available show a close correlation. Overall travel time results demonstrate that both AM and PM base models accurately represent observed travel times.

Table 7: Travel time comparison

	Observed	Modelled	Difference	
Westbound AM	0:03:10	0:02:53	0:00:17	9%
Westbound PM	0:04:00	0:03:23	0:00:37	15%
Eastbound AM	0:03:12	0:02:42	0:00:30	15%
Eastbound PM	0:04:46	0:04:19	0:00:27	10%

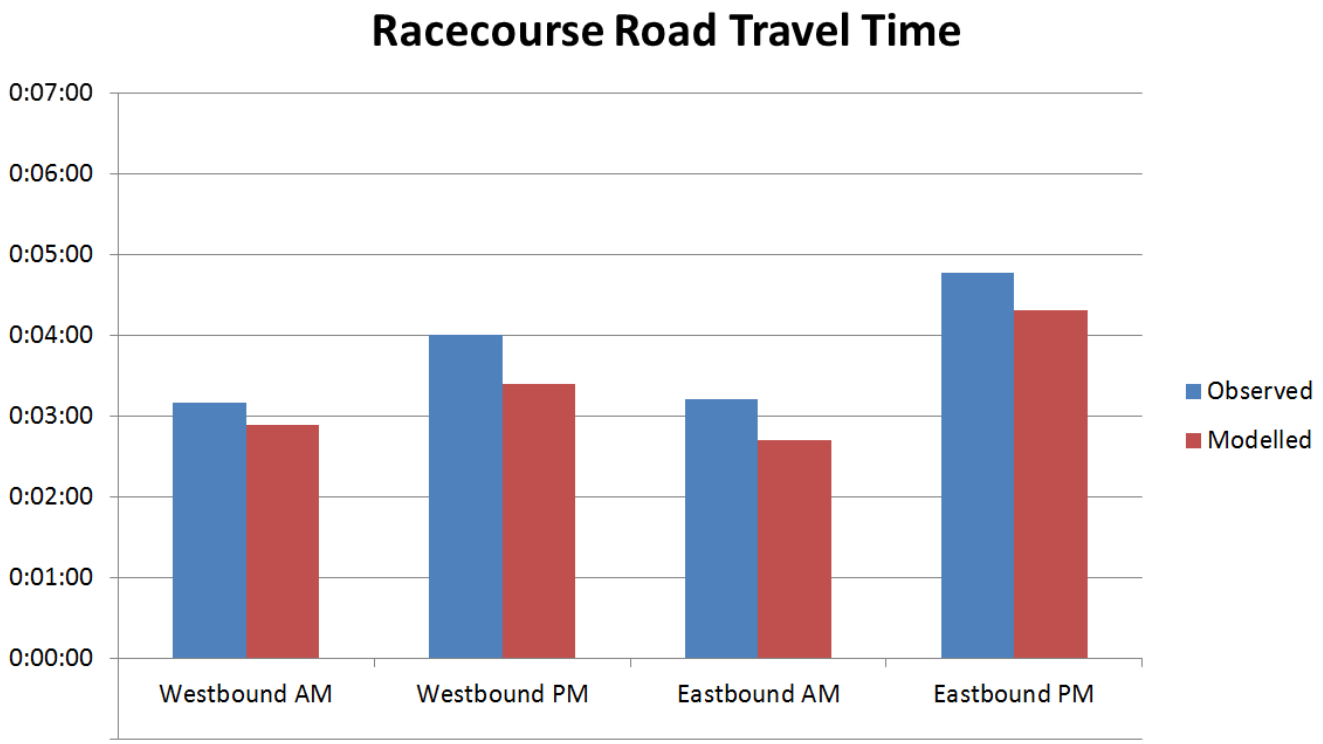


Figure 6: Travel time comparison

5. Future model scenarios

The tested model scenarios are listed below in **Table 8**. Scenario 1 is the base model for the year 2014 and reflects the existing site layout.

Table 8: Model scenarios

Name	Model year	Description
Scenario 1 (Base)	2015	Existing Situation
Scenario 2A	2019	Base + 1% Road network background growth
Scenario 2B	2019	Base + 2% Road network background growth
Scenario 3A	2027	Base + 1% Road network background growth
Scenario 3B	2027	Base + 2% Road network background growth
Scenario 4	2015	Future network + 2015 base demand + 2027 post development
Scenario 5A	2019	Future network + 2019 base demand (1%) + 2019 post development
Scenario 5B	2019	Future network + 2019 base demand (2%) + 2019 post development
Scenario 6A	2027	Future network + 2027 base demand (1%) + 2027 post development
Scenario 6B	2027	Future network + 2027 base demand (2%) + 2027 post development

5.1 Background traffic growth

The average annual growth in traffic was estimated using data from Roads and Maritime permanent counting station. Annual traffic recorded at two nearby locations: Central Coast Highway, Erina (Station ID 05008) and Pacific Highway, Narara (Station ID 05796) from 2006 – 2014 were averaged, giving an average growth rate of 1.0% per annum.

Accordingly, two future growth cases were considered, namely:

- 1% annual growth in background traffic (Scenario A), corresponding to **13%** growth from 2015 - 2027
- 2% annual growth in background traffic (Scenario B), corresponding to **27%** growth from 2015 – 2027.

5.2 Description of future scenarios

Scenario 2 models forecast 2019 traffic levels applied to the existing site layout. Two sub-scenarios have been considered, namely:

- Scenario 2A, which applies 1% annual growth in background traffic
- Scenario 2B, which applies 2% annual growth in background traffic.

Scenario 3 models forecast 2027 traffic levels applied to the existing site layout. Two sub-scenarios have been considered, namely:

- Scenario 3A, which applies 1% annual growth in background traffic
- Scenario 3B, which applies 2% annual growth in background traffic.

Scenario 4 models the impact of the post development road network, accounting for the completed Gosford Hospital redevelopment, as well as the commercial development located on Holden Street, adjacent to the Beane Street multi-storey car park.

Changes to the traffic network include:

- Hospital Road closed midblock between Racecourse Road and Beane Street West. Access to / from the existing multi-storey car park is provided via the northern segment of Hospital Road only

- Holden Street closed midblock between Racecourse Road and Beane Street West
- Closure of Beane Street West between Holden Street and Showground Road
- Removal of the existing emergency access via Holden Street.

This scenario also includes several changes to the on-site parking provision, namely:

- Construction of the Beane Street car park, which is a second multi-storey car park accessible via Showground Road only
- Relocation of existing fleet parking (currently located on Hospital Road) to the existing multi-storey car park on Hospital Road
- Relocation of emergency car parking into new Beane Street multi-storey car park
- Removal of 50% of on-street parking on Holden Street. These spaces will be relocated to the Beane Street multi-storey car park
- 288 public parking spaces in the existing multi-storey car park to be reallocated to the Beane Street multi-storey car park
- A second additional multi-storey car park servicing the commercial development. This car park will be located on Beane Street West, immediately north of the Beane Street multi-storey car park; it will be accessible via Holden Street only.

Scenario 5 models forecast 2019 traffic levels applied to the post development road network. Two sub-scenarios have been considered, namely:

- Scenario 5A, which applies 1% annual growth in background traffic
- Scenario 5B, which applies 2% annual growth in background traffic.

Scenario 6 models forecast 2027 traffic levels applied to the post development road network. Two sub-scenarios have been considered, namely:

- Scenario 6A, which applies 1% annual growth in background traffic
- Scenario 6B, which applies 2% annual growth in background traffic.

6. Traffic Distribution

This section outlines the assumptions made for the traffic distribution in each scenario. A summary of trips affected by changes in the parking provision is given in **Table 9**.

Table 9: Trips affected by changes in parking provision post-development

Existing parking location	Post-development parking location	2019		2027	
		AM Trips	PM Trips	AM Trips	PM Trips
Existing multi-Storey car park (Level 1-4 Public)	Beane Street multi-storey car park via Showground Road	107 (IN) 0 (OUT)	0 (IN) 39 (OUT)	107 (IN) 0 (OUT)	0 (IN) 39 (OUT)
Emergency car park Holden St	Beane Street multi-storey car park via Showground Road	17(IN) 17 (OUT)	19 (IN) 19 (OUT)	17 (IN) 17 (OUT)	19 (IN) 19 (OUT)
Staff car park (corner of Holden Street / Ward Street) via Holden Street	Staff car park via Ward Street	18 (IN) 0 (OUT)	0 (IN) 14 (OUT)	18 (IN) 0 (OUT)	0 (IN) 14 (OUT)
On-street parking, Hospital Rd	Beane Street multi-storey car park via Showground Road	3 (IN) 0 (OUT)	0 (IN) 1 (OUT)	3 (IN) 0 (OUT)	0 (IN) 1 (OUT)
Additional demand due to hospital redevelopment	Beane Street multi-storey car park via Showground Road	25 (IN) 3 (OUT)	18 (IN) 41 (OUT)	60 (IN) 7 (OUT)	42 (IN) 98 (OUT)
Additional demand due to Health and Wellbeing Precinct	Beane Street multi-storey car park via Holden Street	43 (IN) 5 (OUT)	11 (IN) 25(OUT)	118 (IN) 13 (OUT)	29 (IN) 69 (OUT)
Total (Showground Road Entry/Exit)		170 (IN) 20 (OUT)	37 (IN) 114(OUT)	205 (in) 24 (OUT)	61 (IN) 171 (OUT)
Total (Holden Street Entry/Exit)		43 (IN) 5 (OUT)	11(IN) 25(OUT)	118 (in) 13 (OUT)	29 (IN) 69 (OUT)

6.1 Scenario 1: 2014 (Base)

In Scenario 1, the traffic distribution assumptions were:

- Origins for trips to the hospital emergency car park and car parks on Hospital Road were determined using the observed traffic flows.
- Destinations for trips from the hospital emergency car park and car parks on Hospital Road were determined using the observed traffic flows.
- For car parks located on Hospital Road, the in/out split was assumed to be 75%/25% in the AM peak and 25%/75% in the PM peak.
- For the Gosford Golf Club car park located on Racecourse Road (also representing on-street parking on Racecourse Road between Holden Street and Hospital Road), the in/out split was assumed to be 90%/10% in the AM peak and 10%/90% in the PM peak.
- Origin and destination patterns do not change between 2014 and 2027.

6.2 Scenario 2 to 3 (No development)

In Scenario 2A, 2B, 3A and 3B, traffic distribution assumptions were as for Scenario 1. In addition, there is no growth in traffic to / from zones associated with car parks (at Gosford Hospital and Gosford Golf Club)

6.3 Scenario 4 to 6: 2027 (Post-development)

6.3.1 Hospital redevelopment

In Scenario 4A and Scenario 4B, the number of relocated peak hour trips due to the hospital redevelopment was provided by Parking & Traffic Consultants and were modelled as follows:

- Vehicles accessing the existing staff car park on the corner of Holden Street/ Ward Street via Holden Street redirected to the Ward Street entrance
- Relocation of public parking spaces from existing multi-storey to new Beane Street multi-storey car park
- Relocation of emergency car park spaces to new Beane Street multi-storey car park
- Additional demand resulting from redevelopment of Gosford Hospital.

The following changes to car parking locations were not modelled:

- The relocation of fleet parking and on-street parking on Hospital Road to the Hospital Road multi-storey car park
- Loss of on-street parking due to closure of Holden Street (10 trips in AM peak; 8 trips in PM peak)
- Transfer of nearby on-street parking to the new multi-storey car park (8 trips in AM peak; 3 trips in PM peak)
- Transfer of training and development car parking spaces to Beane Street multi-storey car park (1 trip in AM peak; 0 trips in PM peak).

Additional traffic assumptions associated with the hospital redevelopment were:

- The new multi-storey car park on Beane Street is accessible via Showground Road only.
- All public trips relocated from the existing multi-storey car park to the new multi-storey car park were inbound during the AM peak and outbound during the PM peak.
- The number of trips to / from the Holden Street emergency car park was obtained from existing counts.
- The origin and destination pattern for public trips relocated to the Beane Street multi-storey car park was assumed to be the same as for trips to/from the existing multi-storey car park. However, vehicles currently accessing the hospital via Holden Street were redirected via Showground Road.
- 'New' trips resulting from the redevelopment of Gosford Hospital were allocated to the Beane Street multi-storey car park. The origin and destination pattern for these trips was modelled in accordance with **Figure 7,** obtained from Parking and Traffic Consultants.

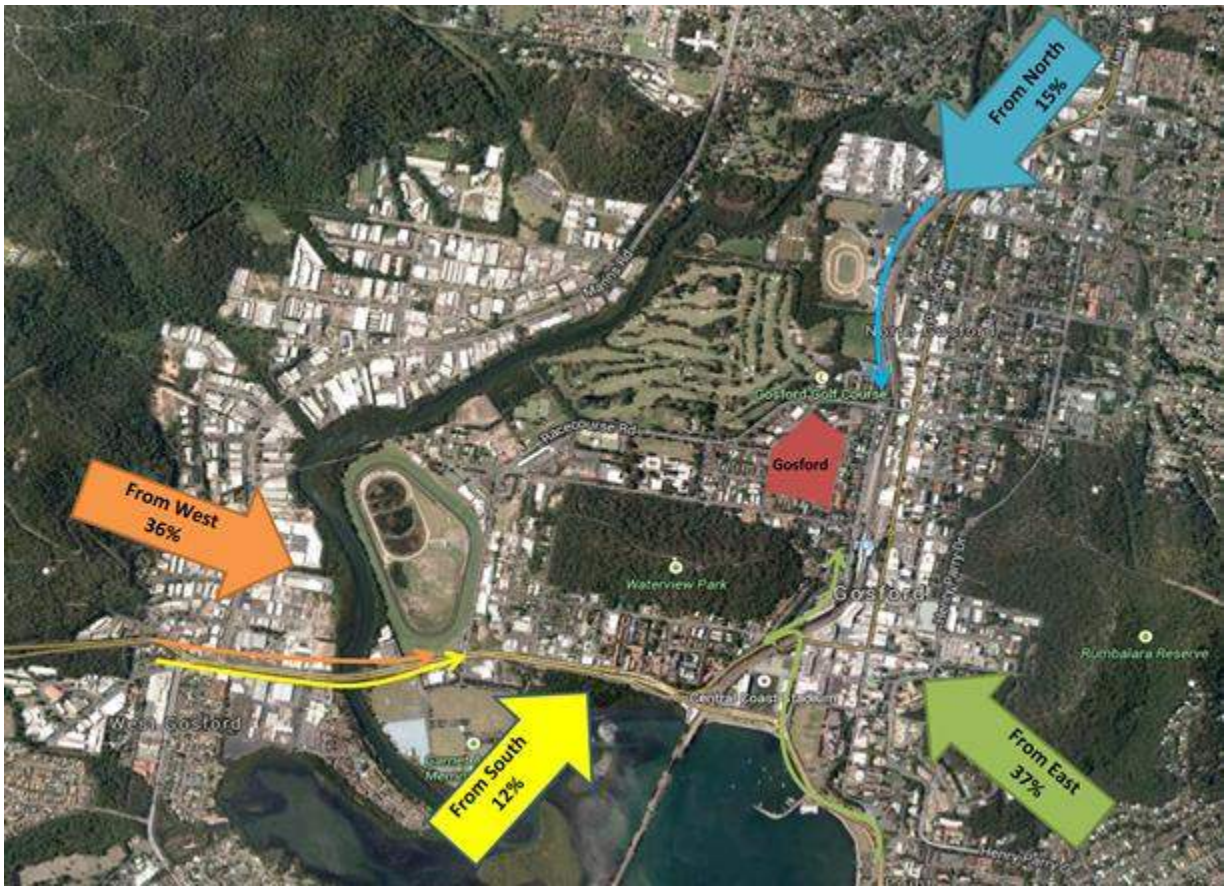


Figure 7: Origin-destination split for development generated traffic

- Trips to/ from the southern edge of the study area to destinations in the north and east of the study area that were previously undertaken via Holden Street were redistributed to reduce the number of right-turning movements required. These trips were redistributed as follows:
  - 20% transfer from Holden Street (southern end) to Racecourse Road (western end) (allowing for multiple entry-routes into study area for persons residing south-west of the Gosford CBD).
  - 60% transfer from Holden Street (southern end) to Showground Road (southern end)
  - 20% continue to travel via Holden Street, Ward Street, Cape Street North and Beane Street West

An exception was made for departing trips from the existing multi-storey car park on Hospital Road to the southern edge of the study area via Holden Street, where:

- 20% transfer from Holden Street (southern end) to Racecourse Road (western end)
- No transfer from Holden Street (southern end) to Showground Road (southern end)

This trip reallocation reflects driver preference for left-turning movements and avoids congestion at the Racecourse Road / Showground Road intersection

- It was conservatively assumed that 50% of drivers accessing the Beane Street multi-storey car park via the western end of Racecourse Road would alter their route to enter the study area by the southern end of Showground Road
- Bus movements through Holden Street (1 service in each peak) were redirected via Showground Road.

6.3.2 Commercial development

Traffic distribution assumptions associated with the commercial development were as follows:

- All trips generated by the commercial development access the commercial multi-storey car park on Beane Street via Holden Street
- The origin and destination pattern for these trips was modelled in accordance with **Figure ,** obtained from Parking & Traffic Consultants. Vehicles currently accessing the hospital via Holden Street were redirected via Showground Road
- In the AM peak, all trips generated by the commercial development were assumed to be inbound to the car park. In the PM peak, all trips were assumed to be outbound from the car park.

7. Model results

The results of the modelling are shown in **Table 7.1** and **Table 7.2**. The detailed model output result is located in **Appendix B**. The modelled results at key intersections are described below.

Table 7.1: AM peak intersection LoS summary

ID	Intersection	Existing Network					Future Network + Post Development				
		2015	2019		2027		2015	2019		2027	
		S1	S2A	S2B	S3A	S3B	S4	S5A	S5B	S6A	S6B
1	Racecourse Road / Beane Street West	A	A	A	A	A	A	A	A	A	A
2	Racecourse Road / Hospital Road	A	A	A	A	A	A	A	A	A	B
3	Beane Street West / Hospital Road	A	A	A	A	A	A	A	A	A	A
4	Cape Street North /Sinclair Street	A	A	A	A	A	A	A	A	A	A
5	Racecourse Road / Holden Street	A	A	A	A	A	A	A	A	A	A
6	Holden Street / Beane Street West	A	A	A	A	A	A	A	A	A	A
7	Cape Street North / Ward Street	A	A	A	A	A	A	A	A	A	A
8	Ward Street / Holden Street	A	A	A	A	A	A	A	A	A	A
9	Holden Street / Faunce Street West	A	A	A	A	A	A	A	A	A	A
10	Racecourse Road / Showground Road	B	B	C	C	F	B	B	B	D	E
11	Racecourse Road / Pacific Highway	C	C	C	C	D	C	C	C	C	F
12	Showground Road / Beane Street West	A	A	A	A	A	A	A	A	A	A
13	Showground Road / Faunce Street West	A	A	A	A	A	A	A	A	A	A
14	Racecourse Road Pedestrian Crossing	A	A	A	A	A	A	A	A	A	A

Table 7.2: PM peak intersection LoS summary

ID	Intersection	Existing Network					Future Network + Post Development				
		2015	2019		2027		2015	2019		2027	
		S1	S2A	S2B	S3A	S3B	S4	S5A	S5B	S6A	S6B
1	Racecourse Road / Beane Street West	B	B	B	B	D	A	A	A	A	A
2	Racecourse Road / Hospital Road	A	A	A	A	B	B	B	B	B	B
3	Beane Street West / Hospital Road	A	A	A	A	A	A	A	A	A	A
4	Cape Street North /Sinclair Street	A	A	A	A	A	A	A	A	A	A
5	Racecourse Road / Holden Street	C	C	C	C	D	A	A	A	A	A
6	Holden Street / Beane Street West	A	A	A	A	A	A	A	A	A	A
7	Cape Street North / Ward Street	A	A	A	A	A	A	A	A	A	A
8	Ward Street / Holden Street	A	A	A	A	A	A	A	A	A	A
9	Holden Street / Faunce Street West	A	A	A	A	A	A	A	A	A	A
10	Racecourse Road / Showground Road	D	D	E	F	F	D	D	E	F	F
11	Racecourse Road / Pacific Highway	C	C	C	C	D	C	C	C	C	F
12	Showground Road / Beane Street West	A	A	A	A	A	A	A	A	A	A
13	Showground Road / Faunce Street West	A	A	A	A	A	A	A	A	A	A
14	Racecourse Road Pedestrian Crossing	A	A	A	A	A	A	A	A	A	A

7.1 Racecourse Road / Showground Road

7.1.1 AM peak

In the 2014 AM peak (Scenario 1), the Racecourse Road / Showground Road roundabout operates at LoS B, however there is a relatively high degree of saturation of 82%.The worst performing approach is Showground Road (northbound) with average delay of 22 seconds. The model indicates queuing of greater than 9 pcu (or 63m) would occur on Racecourse Road (eastbound).

1% p.a. background traffic growth

In Scenario 2A (2019), LoS remains at B with a degree of saturation of 85%. The worst performing approach is Showground Road (northbound) with average delay of 24 seconds.

In Scenario 3A (2027), the intersection operates at LoS C with a degree of saturation of 93%. The worst performing approach is Showground Road (northbound) with average delay of 36 seconds.

Both 1% growth scenarios demonstrate performance gradually decreases at this intersection due to the growth in traffic.

Following the redevelopment of Gosford Hospital i.e. Scenario 5A (2019) and 6A (2027), the intersection is expected to operate similarly to the base scenarios. In Scenario 5A, LoS is B with Showground Road (northbound) experiences average delays of 28 seconds. In Scenario 6A, performance degrades to LoS D with Racecourse Road (westbound) experiences the worst delays of 44 seconds.

The increased delay is primarily due to the closure of Holden Street and resulting diversion of northbound vehicles via Showground Road. There is also a significant increase in westbound traffic, due to the transfer of parking spaces from the multi-storey car park on Hospital Road to the Beane Street multi-storey car park.

2% p.a. background traffic growth

In Scenario 2B (2019), the intersection operates at LoS C with a degree of saturation of 89%. The worst performing approach is Showground Road (northbound) with average delay of 29 seconds.

In Scenario 3B (2027), the intersection operates at LoS F with a degree of saturation of 107%. The worst performing approach is Racecourse Road (westbound) with average delay of 155 seconds.

Both 2% growth scenarios demonstrate that performance decreases at this intersection due to the growth in traffic. The intersection is expected to fail by 2027 if 2% annual traffic growth is achieved.

Following the redevelopment of Gosford Hospital i.e. Scenario 5B (2019) and 6B (2027), the intersection is expected to operate similarly to the base scenarios. In 5B, LoS is B with a degree of saturation of 89%. Racecourse Road (westbound) is the worst approach with average delay of 23 seconds. In 6B, the intersection is over-capacity, operating with LoS E and degree of saturation 101%. Racecourse Road (westbound) is again the worst approach with average delays of 67 seconds.

7.1.2 PM peak

In the 2014 PM peak, (Scenario 1), the Racecourse Road/ Showground Road operates at LoS D. The worst performing approach is Racecourse Road (westbound), with an average delay of 46 seconds. Significant queues (greater than 9 pcu) also form on Racecourse Road in both eastbound and westbound directions.

1% p.a. background traffic growth

In Scenario 2A (2019), LoS remains at D with a degree of saturation of 95%. The worst performing approach is Racecourse Road (westbound) with average delay of 43 seconds.

In Scenario 3A (2027), the intersection operates at LoS F with a degree of saturation of 104%. The worst performing approach is Racecourse Road (westbound) with average delay of 117 seconds.

Both of the growth scenarios demonstrate that performance decreases at this intersection due to the growth in traffic. The intersection is expected to fail by 2027 if 1% annual traffic growth is achieved.

Following the redevelopment of Gosford Hospital i.e. Scenario 5A (2019) and 6A (2027), the intersection is expected to operate similarly to the base scenarios. In Scenario 5A, LoS is C with Racecourse Road (westbound) experiencing average delays of 39 seconds. In Scenario 6A, performance degrades to LoS F with Racecourse Road (westbound) experiences the worst delays of 105 seconds.

2% p.a. background traffic growth

In Scenario 2B (2019), LoS is E with a degree of saturation of 99%. The worst performing approach is Racecourse Road (westbound) with average delay of 65 seconds.

In Scenario 3B (2027), the intersection operates at LoS F with a degree of saturation of 109%. The worst performing approach is Racecourse Road (westbound) with average delay of >120 seconds.

Both of the growth scenarios demonstrate that performance decreases at this intersection due to the growth in traffic. The intersection is expected to fail by 2019 if 2% annual traffic growth is achieved.

Following the redevelopment of Gosford Hospital i.e. Scenario 5B (2019) and 6B (2027), the intersection is expected to operate similarly to the base scenarios. In Scenario 5B, LoS is D with Racecourse Road (westbound) experiencing average delays of 52 seconds. In Scenario 6B, performance remains at LoS F with Racecourse Road (westbound) experiences the worst delays of 105 seconds.

7.2 Racecourse Road / Pacific Highway

7.2.1 AM peak

In the 2014 AM peak (Scenario 1), the intersection operates satisfactorily at LoS C, with average delay of 30 seconds.

1% p.a. background traffic growth

In Scenario 2A (2019), and Scenario 3A (2027), the intersection operates at LoS C with average delay of 31 and 32 seconds respectively

Both 1% growth scenarios demonstrate that there is sufficient capacity at this intersection to handle 1% growth until beyond 2027.

Following the redevelopment of Gosford Hospital i.e. Scenario 5A (2019) and 6A (2027), the intersection is expected to operate similarly to the base scenarios. LoS remains at C in both scenarios with average delay remaining between 30 and 32 seconds.

2% p.a. background traffic growth

In Scenario 2B (2019), the intersection operates at LoS C with average delay of 31 seconds. Performance degrades to LoS D in Scenario 3B (2027) with average delay of 45 seconds.

The 2% growth scenarios demonstrate that there is sufficient capacity at this intersection to handle 2% growth until 2027. The worsening performance in Scenario 3B however indicates that the intersection will reach capacity soon after 2027.

Following the redevelopment of Gosford Hospital the intersection is expected to operate similarly to the base scenario in Scenario 5B (2019). LoS remains at C with average delay of 32 seconds. However, in Scenario 6B (2027), the intersection degrades to LoS F with average delay of 84 seconds.

7.2.2 PM peak

In the 2014 PM peak (Scenario 1), the intersection operates satisfactorily at LoS C, with average delay of 36 seconds.

1% p.a. background traffic growth

In Scenario 2A (2019), and Scenario 3A (2027), the intersection operates at LoS C with average delay of 36 and 38 seconds respectively

Both of the growth scenarios demonstrate that there is sufficient capacity at this intersection to handle 1% growth until beyond 2027.

Following the redevelopment of Gosford Hospital i.e. Scenario 5A (2019) and 6A (2027), the intersection is expected to operate similarly to the base scenarios. LoS remains at C in both scenarios with average delay remaining between 36 and 37 seconds.

2% p.a. background traffic growth

In Scenario 2B (2019), the intersection operates at LoS C with average delay of 37 seconds. Performance degrades to LoS D in Scenario 3B (2027) with average delay of 43 seconds.

The 2% growth scenarios demonstrate that there is sufficient capacity at this intersection to handle 2% growth until 2027. The worsening performance in Scenario 3B however indicates that the intersection will reach capacity soon after 2027.

Following the redevelopment of Gosford Hospital the intersection is expected to operate similarly to the base scenario in Scenario 5B (2019). LoS remains at C with average delay of 36 seconds. However, in Scenario 6B (2027), the intersection degrades to LoS F with average delay of 93 seconds.

7.3 Racecourse Road / Holden Street

Results indicate that in the 2014 AM peak, the give way intersection at Racecourse Road / Holden Street operates at LoS A. The worst performing movement is Holden Street (northbound), with average delays of 6 seconds. The PM peak operates at LoS C with Holden Street (northbound) experiencing average delays of 39 seconds.

Performance remains acceptable in all of the future 'no hospital development' AM peak scenarios, with LoS remaining at A.

In the PM peak, performance remains at LoS C with the exception of Scenario 6B (2027 2% growth) where performance worsens to LoS D.

Following the redevelopment of Gosford Hospital, the closure of Holden Street and relocation of the emergency car park reduces the number of turning movements at Holden Street. Performance remains at LoS A in all of the future post-development development AM scenarios. Performance in the PM peak improves compared to the 'no hospital development' as a result of the reduced demand on Holden Street. LoS is A for all future post-development PM scenarios.

7.4 Racecourse Road / Hospital Road

In the existing network layout, turning movements out of Hospital Road onto Racecourse Road are not permitted, resulting in minimal delays (averaging less than 2 seconds) at this intersection in all scenarios.

In the post-development scenarios, mid-block road closure means that vehicles using car parks located on Hospital Road must also exit onto Racecourse Road via Hospital Road. In the AM peak, performance remains at LoS A in all future scenarios, with the exception of Scenario 6B (2% 2027) where performance is LoS C with average delay of 30 seconds for northbound Hospital Road traffic. In the PM peak, delays of less than 20 seconds are expected for all of the post-development scenarios.

In reality, it is possible that trips exiting Hospital Road may be highly concentrated around shift end times, causing average delays to be higher than those modelled, particularly in the AM peak.

7.5 Racecourse Road Pedestrian Crossing

The Racecourse Road pedestrian crossing performs with minimal delay to vehicles across all modelled scenarios. LoS is A for all existing and post development scenarios. There is no noticeable impact to this crossing as a result of background traffic growth or the hospital development.

7.6 Other priority intersections

Other priority intersections in the network are:

- Racecourse Road / Beane Street West
- Beane Street West / Hospital Road
- Cape Street North / Sinclair Street
- Holden Street / Beane Street West
- Cape Street North / Ward Street
- Ward Street / Holden Street
- Showground Road / Beane Street West
- Showground Road / Faunce Street West

Modelling indicates that in both background growth scenarios, all other priority intersections continue to operate at LoS A following the hospital redevelopment works.

8. Intersection upgrade options

Based on the modelling findings on Section 7, two alternative upgrade options are suggested for intersections at Racecourse Road / Showground Road and Racecourse Road / Pacific Highway and tested against the 2027 post-development scenarios (Scenario 6A and Scenario 6B).

Option 1 – Scenario 7

The following upgrades are suggested to be implemented in the post-development road network:

- Railway bridge on Racecourse Road (between Showground Road and Pacific Highway) widened to four lanes.
- At Racecourse Road / Pacific Highway:
  - Retain the full length left/through lane on the west approach
  - Extend the existing short through/right lane to become a full length lane
- At Racecourse Road / Showground Road:
  - Provide 1 shared left/through lane on the east approach. Provide 1 dedicated right turn lane on the east approach
  - Provide 2 circulating lanes through the roundabout for westbound traffic

The existing mid-block crossings on Racecourse Road and Showground Road are retained.

Option 2 – Scenario 8

- Railway bridge on Racecourse Road (between Showground Road and Pacific Highway) widened to four lanes.
- At Racecourse Road / Pacific Highway:
  - Retain the full length left/through lane on the west approach
  - Extend the existing short through/right lane to become a full length lane
- Convert existing Racecourse Road / Showground Road roundabout to a signalised intersection, with:
  - Dedicated right-turn lane and 20m left-turn bay on Racecourse Road (westbound)
  - Additional through lane and 40m right-turn bay on Racecourse Road (eastbound)
  - 20m right-turn bay on Showground Road (southbound)
  - Signalised pedestrian crossings on three approaches (North, South and West) to the Racecourse Road / Showground Road intersection.
- Remove midblock pedestrian crossings on Racecourse Road and Showground Road

Results

Both options have been modelled and the results are shown in **Table 8.1** and **Table 8.2**. Future results show the critical scenario of 2027 traffic demand with 2% growth. This represents the worst case of all modelled scenarios. Both options are able to improve performance of both intersections to LoS D or better.

Table 8.1: AM peak option results – 2027

ID	Intersection	Scenario 6B	Scenario 7B	Scenario 8B
10	**Showground Road / Racecourse Road**	E	D	D
11	**Racecourse Road / Pacific Highway**	F	C	C

Table 8.2: PM peak option results – 2027

ID	Intersection	Scenario 6B	Scenario 7B	Scenario 8B
10	**Showground Road / Racecourse Road**	F	D	D
11	**Racecourse Road / Pacific Highway**	F	C	C

9. Conclusions

The conclusions to this traffic study are summarised as follows:

- In both the AM and PM peak, the whole network currently performs satisfactorily
- Without development, by 2027 the network is expected continue to perform satisfactorily with the exception of Racecourse Road / Pacific Highway and Racecourse Road / Showground Road, which perform at LoS D and F respectively in 2027(considering up to 2% annual growth in background traffic)
- Following development, by 2027 the network is expected continue to perform satisfactorily with the exception of Racecourse Road / Pacific Highway and Racecourse Road / Showground Road, which both perform at LoS F in 2027(considering up to 2% annual growth in background traffic)

It is clear that the bridge over the railway between Showground Road and the Pacific Highway is the major constraint in the network and will reach capacity by 2027, with or without the hospital development.

Racecourse Road /Showground Road

- In the AM peak considering 1% annual growth in background traffic, the redevelopment results in 2027 intersection performance declining from LoS C to LoS D. Considering 2% annual growth, the increase in background traffic causes the intersection performance to decline to LoS F in both the no development and post-development scenarios. The worst performing approach is expected to be Racecourse Road (westbound).
- In the PM peak, the intersection performance is expected to decline from LoS C to LoS F in 2027 due to 1% annual background network growth. In addition, queues are expected to extend past the adjacent intersection on Racecourse Road (westbound). As expected, all other scenarios including 2% growth and post-development scenarios operate at LoS F.

Racecourse Road / Pacific Highway

- In the AM peak, the intersection is expected to perform at LoS D in the existing network 2027 scenarios, for background traffic growth of up to 2% per annum. In the post development scenario, performance worsens to LoS F.
- In the PM peak, the proposed redevelopment causes the 2027 intersection performance to remain at LoS C (considering 1% annual background growth) but worsen from LoS D to LoS F (considering 2% annual background growth). The development also causes an increase in queuing on Racecourse Road (eastbound). It is likely that this queue will extend across the existing railway bridge and past the adjacent intersection at Racecourse Road / Showground Road.

Racecourse Road / Holden Street

- In the AM peak and with background growth of up to 2% per annum, Racecourse Road / Holden Street operates at LoS A in 2027 in both the existing and post-development scenarios, with delays of less than 5 seconds to vehicles exiting Holden Street onto Racecourse Road.
- In the PM peak, the intersection operates at LoS C or D in all exiting network scenarios. The hospital redevelopment is expected to reduce the traffic volumes at Holden Street and intersection performance improves to LoS A for all post development scenarios. Further, vehicles accessing the commercial car park via Holden Street are expected to experience minor delays of less than 4 seconds.

Racecourse Road / Hospital Road

- In the AM peak, all modelled scenarios operate at LoS A with the exception of Scenario 6B (2% 2027) where performance is LoS C with average delay of 30 seconds for northbound Hospital Road traffic.
- In the PM peak, delays of less than 20 seconds are expected for all of the existing and post-development scenarios representing LoS B or better.

Racecourse Road Pedestrian Crossing

The Racecourse Road pedestrian crossing performs with minimal delay to vehicles across all modelled scenarios. LoS is A for all existing and post development scenarios. There is no noticeable impact to this crossing as a result of background traffic growth or the hospital development.

Other priority intersections

Traffic modelling outputs indicate that all other priority intersections continue to operate at LoS A following hospital redevelopment works.

Scenario 7 and 8

Based on the traffic modelling findings, two alternative upgrade options have been modelled.

Scenario 7 involves widening the Racecourse Road railway bridge and providing two circulating lanes through the Showground Road roundabout.

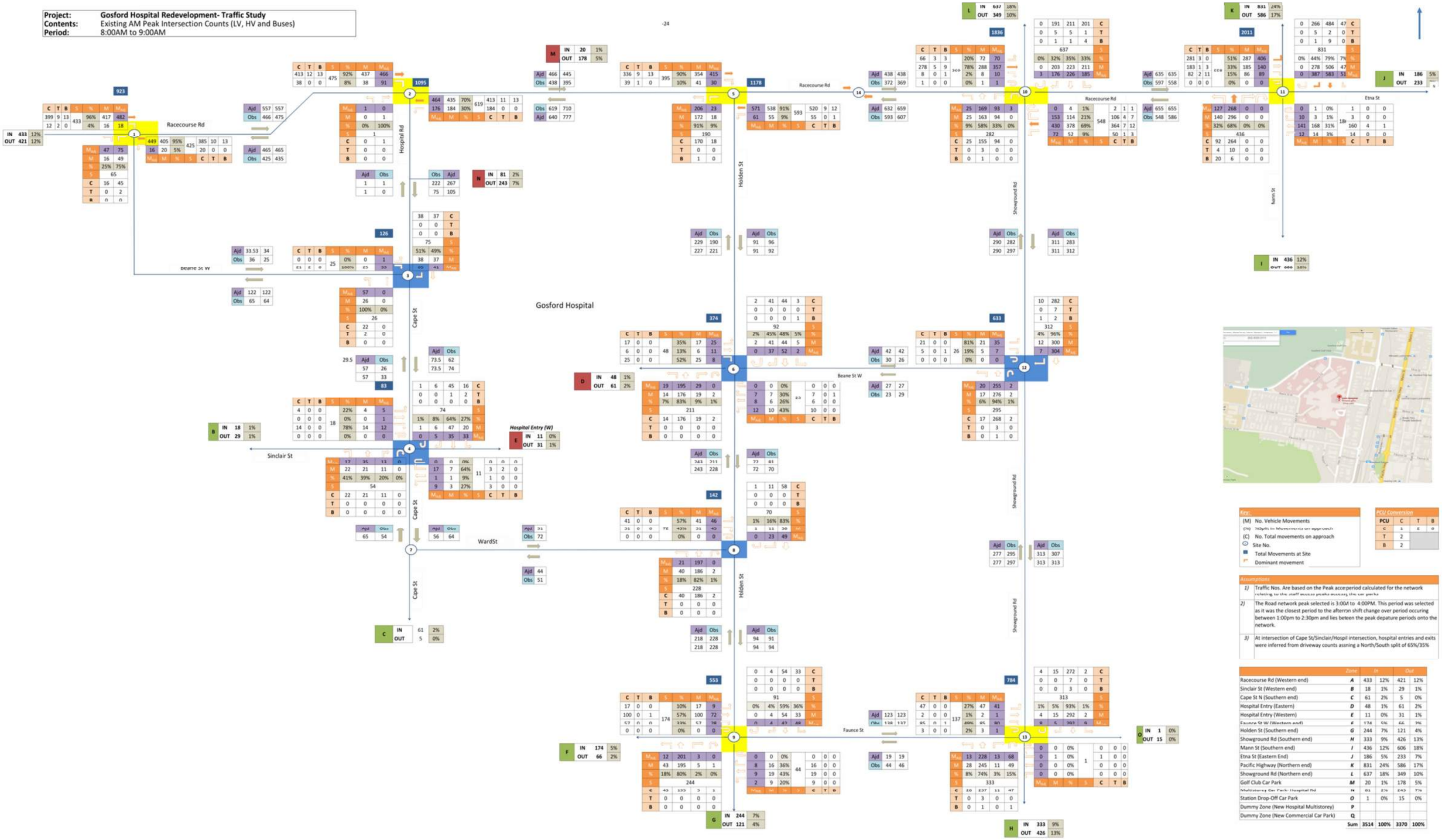
Scenario 8 involves widening the Racecourse Road railway bridge and converting the Showground Road roundabout into a signalised intersection.

Both of these options are able to improve performance at Racecourse Road / Showground Road and Racecourse Road / Pacific Highway to at least LoS D in the 2027 2% growth post development scenarios.

Appendix A. Network Traffic Flows

A.1 AM Peak (7.45am – 8.45am)

Project: Gosford Hospital Redevelopment- Traffic Study
Contents: Existing AM Peak Intersection Counts (LV, HV and Buses)
Period: 8:00AM to 9:00AM



Key:
(M) No. Vehicle Movements
(%) Split in Movements on approach
(C) No. Total movements on approach
Site No.
Total Movements at Site
Dominant movement

PCU Conversion

PCU	C	T	B
C	1	E	0
T	2		
B	2		

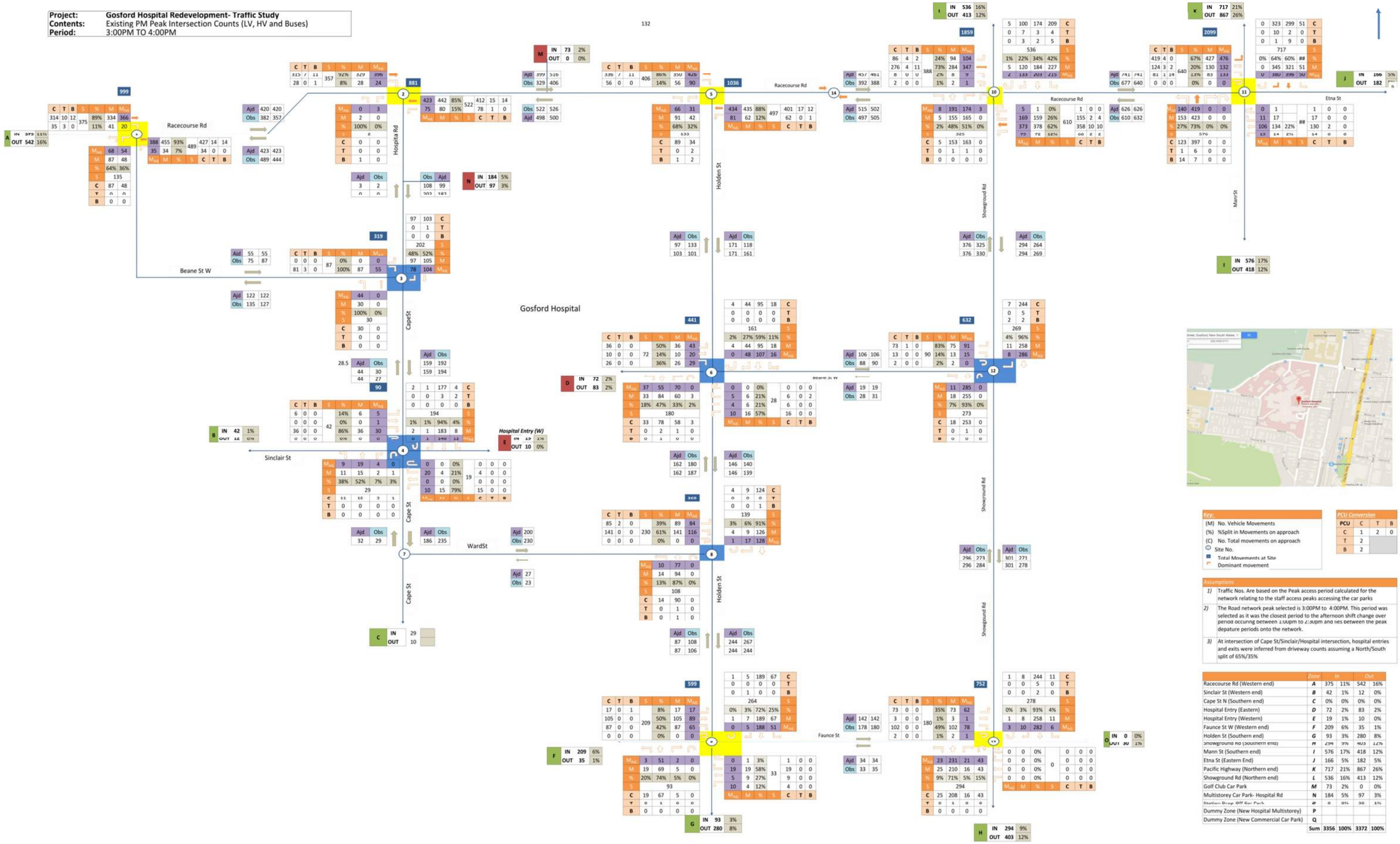
Assumptions

1) Traffic Nos. Are based on the Peak acce:period calculated for the network relating to the staff access peaks across the car parks
2) The Road network peak selected is 3:00M to 4:00PM. This period was selected as it was the closest period to the afteron shift change over period occuring between 1:00pm to 2:30pm and lies beteen the peak depature periods onto the network.
3) At intersection of Cape St/Sinclair/Hospil intersection, hospital entries and exits were inferred from driveway counts assning a North/South split of 65%/35%

	Zone	In		Out	
Racecourse Rd (Western end)	A	433	12%	421	12%
Sinclair St (Western end)	B	18	1%	29	1%
Cape St N (Southern end)	C	61	2%	5	0%
Hospital Entry (Eastern)	D	48	1%	61	2%
Hospital Entry (Western)	E	11	0%	31	1%
Faunce St W (Western end)	F	174	5%	66	2%
Holden St (Southern end)	G	244	7%	121	4%
Showground Rd (Southern end)	H	333	9%	426	13%
Mann St (Southern end)	I	436	12%	606	18%
Etna St (Eastern End)	J	186	5%	233	7%
Pacific Highway (Northern end)	K	831	24%	586	17%
Showground Rd (Northern end)	L	637	18%	349	10%
Golf Club Car Park	M	20	1%	178	5%
Multistorey Car Park- Hospital Rd	N	81	2%	243	7%
Station Drop-Off Car Park	O	1	0%	15	0%
Dummy Zone (New Hospital Multistorey)	P				
Dummy Zone (New Commercial Car Park)	Q				
	Sum	3514	100%	3370	100%

A.2 PM Peak (3.00pm – 4.00pm)

Project: Gosford Hospital Redevelopment- Traffic Study
Contents: Existing PM Peak Intersection Counts (LV, HV and Buses)
Period: 3:00PM TO 4:00PM



Key:

- (M) No. Vehicle Movements
- (%) %Split in Movements on approach
- (C) No. Total movements on approach
- Site No.
- Total Movements at Site
- Dominant movement

PCU Conversion

PCU	C	T	B
C	1	2	0
T	2		
B	2		

Assumptions

1) Traffic Nos. Are based on the Peak access period calculated for the network relating to the staff access peaks accessing the car parks
2) The Road network peak selected is 3:00PM to 4:00PM. This period was selected as it was the closest period to the afternoon shift change over period occuring between 1:15apm to 2:30pm and lies between the peak depature periods onto the network.
3) At intersection of Cape St/Sinclair/Hospital intersection, hospital entries and exits were inferred from driveway counts assuming a North/South split of 65%/35%

	Zone	In		Out	
Racecourse Rd (Western end)	A	375	11%	542	16%
Sinclair St (Western end)	B	42	1%	12	0%
Cape St N (Southern end)	C	0%	0%	0%	0%
Hospital Entry (Eastern)	D	72	2%	83	2%
Hospital Entry (Western)	E	19	1%	10	0%
Faunce St W (Western end)	F	209	6%	35	1%
Holden St (Southern end)	G	93	3%	280	8%
Showground Rd (Southern end)	H	294	9%	403	12%
Mann St (Southern end)	I	576	17%	418	12%
Etna St (Eastern End)	J	166	5%	182	5%
Pacific Highway (Northern end)	K	717	21%	867	26%
Showground Rd (Northern end)	L	536	16%	413	12%
Golf Club Car Park	M	73	2%	0	0%
Multistorey Car Park- Hospital Rd	N	184	5%	97	3%
Station Prop. Off Ser Park	O	0	0%	30	1%
Dummy Zone (New Hospital Multistorey)	P				
Dummy Zone (New Commercial Car Park)	Q				
	Sum	3356	100%	3372	100%

Appendix B. Model Output

B.1 Scenario 1: 2015 (No development)

AM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	506	31%	1.6	A	0.2
	Beane St WB	134	28%	5.1	A	0.2
	Racecourse Rd WB	435	24%	1.3	A	0.2
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	541	37%	2	A	0.3
	Racecourse Rd WB	627	35%	1.5	A	0.3
	Hospital Rd NB	-	-	-	-	-
3: Beane St/Hospital Rd	Cape St NB	73	4%	1	A	0
	Hospital Rd SB	95	15%	3.5	A	0.1
	Beane St EB	49	3%	1	A	0
4: Cape St/Sinclair St	Cape St SB	83	5%	1.2	A	0
	Cape St NB	69	5%	1.3	A	0
	Sinclair St EB	28	4%	3	A	0
	Hospital Exit	27	4%	3	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	489	33%	1.8	A	0.2
	Racecourse Rd WB	583	42%	2.2	A	0.4
	Holden St NB	264	47%	6	A	0.4
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	75	7%	1.7	A	0
	Hospital Road SB	263	15%	1.2	A	0.1
7: Holden St/Beane St	Holden St SB	108	8%	1.5	A	0
	Hospital Exit	51	8%	2.8	A	0
	Holden St NB	265	16%	1.3	A	0.1
	Beane St WB	18	2%	2	A	0
8: Cape St/Ward St	Ward St WB	58	9%	3	A	0
	Cape St SB	64	4%	1	A	0
	Cape St NB	68	5%	1.5	A	0
9: Ward St/Holden St	Holden St SB	83	6%	1.3	A	0
	Holden St NB	284	16%	1.2	A	0.1
	Ward St WB	75	7%	1.9	A	0
10: Holden St/Faunce St	Holden St NB	248	14%	1.2	A	0.1
	Faunce St EB	169	20%	2.7	A	0.1
	Faunce St WB	59	10%	3.4	A	0.1
	Holden St SB	119	7%	1.1	A	0
11: Showground Rd/Racecourse Rd	Showground Rd NB	249	76%	22.1	B	1.9
	Racecourse Rd WB	577	82%	13.7	A	5.7
	Showground Rd SB	623	60%	6.3	A	8

	Racecourse Rd EB	464	64%	11.4	A	9.4
12: Racecourse Rd/Mann St	Racecourse Rd EB	621	75%	29.9	C	10.2
	Mann St NB Left	170	28%	18.7	B	2.5
	Mann St NB Through	268	47%	38.9	C	7.6
	Mann St SB Left/Th	507	43%	14.7	B	9
	Mann St SB Right/Th	279	60%	48.7	D	8.9
	Racecourse Rd WB	140	39%	50.3	D	4.3
13: Showground Rd/Beane St	Showground Rd NB	228	13%	1.1	A	0.1
	Beane St EB	29	5%	2.9	A	0
	Showground Rd SB	324	19%	1.3	A	0.1
14: Showground Rd/Faunce St	Faunce St EB	142	16%	2.3	A	0.1
	Showground Rd NB	324	32%	2.7	A	0.2
	Showground Rd SB	314	34%	2.9	A	0.3
16: Golf Club Car Park	Racecourse Rd EB	470	26%	1.4	A	0.2
	Racecourse Rd WB	764	53%	2.6	A	0.6
	Car Park Exit	60	14%	8.2	A	0.5

PM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	375	24%	1.5	A	0.2
	Beane St WB	99	51%	20.7	B	1.4
	Racecourse Rd WB	533	30%	1.4	A	0.2
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	379	59%	6.7	A	0.7
	Racecourse Rd WB	622	35%	1.5	A	0.3
	Hospital Rd NB	-	-	-	-	-
3: Beane St/Hospital Rd	Cape St NB	38	2%	1	A	0
	Hospital Rd SB	50	3%	1	A	0
	Beane St EB	198	30%	3.9	A	0.2
4: Cape St/Sinclair St	Cape St SB	187	10%	1.1	A	0.1
	Cape St NB	28	2%	1	A	0
	Sinclair St EB	40	7%	3.2	A	0
	Hospital Exit	10	1%	2.6	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	416	29%	1.8	A	0.2
	Racecourse Rd WB	614	44%	2.3	A	0.4
	Holden St NB	145	71%	39.1	C	3.3
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	167	13%	1.6	A	0.1
	Hospital Road SB	113	6%	1.1	A	0
7: Holden St/Beane St	Holden St SB	144	11%	1.5	A	0.1
	Hospital Exit	88	13%	3	A	0.1
	Holden St NB	201	14%	1.5	A	0.1
	Beane St WB	15	2%	2.6	A	0
8: Cape St/Ward St	Ward St WB	29	4%	2.8	A	0
	Cape St SB	194	11%	1.1	A	0.1
	Cape St NB	92	10%	2.2	A	0.1
9: Ward St/Holden St	Holden St SB	137	8%	1.1	A	0
	Holden St NB	148	8%	1.1	A	0
	Ward St WB	181	15%	1.8	A	0.1
10: Holden St/Faunce St	Holden St NB	114	6%	1.1	A	0
	Faunce St EB	200	26%	3.2	A	0.2
	Faunce St WB	25	4%	3.2	A	0
	Holden St SB	236	14%	1.2	A	0.1
11: Showground Rd/Racecourse Rd	Showground Rd NB	290	62%	10.1	A	0.8
	Racecourse Rd WB	666	97%	46.1	D	18.5
	Showground Rd SB	518	59.7%	11.2	A	7.7
	Racecourse Rd EB	425	79%	25.4	B	10
12: Racecourse Rd/Mann St	Racecourse Rd EB	605	73.7%	35.3	C	10.1
	Mann St NB Left	189	32%	19.6	B	2.9
	Mann St NB Through	419	70%	44.6	D	13.2

	Mann St SB Left/Th	365	31.9%	12.3	A	5.6
	Mann St SB Right/Th	342	73.5%	55.1	D	11.7
	Racecourse Rd WB	169	46.4%	52.1	D	4.8
13: Showground Rd/Beane St	Showground Rd NB	275	15%	1.2	A	0.1
	Beane St EB	70	12%	3.5	A	0.1
	Showground Rd SB	248	15%	1.3	A	0.1
14: Showground Rd/Faunce St	Faunce St EB	142	16%	2.3	A	0.1
	Showground Rd NB	290	29%	2.5	A	0.2
	Showground Rd SB	263	28%	2.6	A	0.2
16: Golf Club Car Park	Racecourse Rd EB	355	20%	1.2	A	0.1
	Racecourse Rd WB	606	38%	1.8	A	0.3
	Car Park Exit	134	23%	7.6	A	1.1

B.2 Scenario 2: 2019 (No development)

B.2.1 Scenario 2A: 1% annual growth in background traffic

AM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	523	36%	1.9	A	0.3
	Beane St WB	141	29%	5.3	A	0.2
	Racecourse Rd WB	448	25%	1.3	A	0.2
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	557	56%	4.1	A	0.6
	Racecourse Rd WB	643	36%	1.6	A	0.3
	Hospital Rd NB	-	-	-	-	-
3: Beane St/Hospital Rd	Cape St NB	76	4%	1	A	0
	Hospital Rd SB	99	16%	3.5	A	0.1
	Beane St EB	52	3%	1	A	0
4: Cape St/Sinclair St	Cape St SB	86	6%	1.2	A	0
	Cape St NB	72	5%	1.3	A	0
	Sinclair St EB	28	4%	3	A	0
	Hospital Exit	27	4%	3	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	507	46%	3.1	A	2.1
	Racecourse Rd WB	599	43%	2.2	A	0.4
	Holden St NB	278	50%	6.6	A	0.5
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	77	7%	1.7	A	0
	Hospital Road SB	266	15%	1.2	A	0.1
7: Holden St/Beane St	Holden St SB	111	9%	1.5	A	0
	Hospital Exit	52	8%	2.9	A	0
	Holden St NB	272	16%	1.3	A	0.1
	Beane St WB	19	2%	2	A	0
8: Cape St/Ward St	Ward St WB	61	9%	3	A	0.1
	Cape St SB	66	4%	1	A	0
	Cape St NB	69	5%	1.5	A	0
9: Ward St/Holden St	Holden St SB	86	6%	1.3	A	0
	Holden St NB	292	16%	1.2	A	0.1
	Ward St WB	77	8%	1.9	A	0
10: Holden St/Faunce St	Holden St NB	254	14%	1.2	A	0.1
	Faunce St EB	173	21%	2.7	A	0.1
	Faunce St WB	64	11%	3.4	A	0.1
	Holden St SB	122	7%	1.1	A	0
11: Showground Rd/Racecourse Rd	Showground Rd NB	246	77%	24	B	2.2
	Racecourse Rd WB	595	85%	16.6	B	7.5
	Showground Rd SB	646	63.0%	7.1	A	8.9
	Racecourse Rd EB	489	67%	13.1	A	10.4

12: Racecourse Rd/Mann St	Racecourse Rd EB	642	73.1%	26.9	B	10.2
	Mann St NB Left	174	28%	18.6	B	2.7
	Mann St NB Through	268	54%	44.9	D	8.2
	Mann St SB Left/Th	525	46.6%	16.8	B	10.1
	Mann St SB Right/Th	289	58.4%	46.3	D	9
	Racecourse Rd WB	144	45.4%	55	D	4.6
13: Showground Rd/Beane St	Showground Rd NB	233	13%	1.1	A	0.1
	Beane St EB	22	3%	2.9	A	0
	Showground Rd SB	337	20%	1.3	A	0.1
14: Showground Rd/Faunce St	Faunce St EB	146	16%	2.4	A	0.1
	Showground Rd NB	331	33%	2.7	A	0.2
	Showground Rd SB	327	35%	3	A	0.3
16: Golf Club Car Park	Racecourse Rd EB	486	27%	1.4	A	0.2
	Racecourse Rd WB	784	55%	2.7	A	0.6
	Car Park Exit	63	17%	10	A	0.6

PM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	364	24%	1.5	A	0.2
	Beane St WB	99	48%	19.2	B	1.3
	Racecourse Rd WB	515	29%	1.4	A	0.2
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	367	55%	6.1	A	0.6
	Racecourse Rd WB	606	34%	1.5	A	0.3
	Hospital Rd NB	-	-	-	-	-
3: Beane St/Hospital Rd	Cape St NB	38	2%	1	A	0
	Hospital Rd SB	51	3%	1	A	0
	Beane St EB	200	30%	3.9	A	0.2
4: Cape St/Sinclair St	Cape St SB	190	11%	1.1	A	0.1
	Cape St NB	29	2%	1.1	A	0
	Sinclair St EB	42	7%	3.2	A	0
	Hospital Exit	10	1%	2.6	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	406	29%	1.8	A	0.2
	Racecourse Rd WB	606	43%	2.3	A	6.2
	Holden St NB	145	66%	30.8	C	3
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	167	13%	1.6	A	0.1
	Hospital Road SB	115	6%	1.1	A	0
7: Holden St/Beane St	Holden St SB	152	11%	1.5	A	0.1
	Hospital Exit	88	13%	3	A	0.1
	Holden St NB	205	15%	1.5	A	0.1
	Beane St WB	19	3%	2.5	A	0
8: Cape St/Ward St	Ward St WB	31	5%	2.8	A	0
	Cape St SB	199	11%	1.1	A	0.1
	Cape St NB	96	11%	2.2	A	0.1
9: Ward St/Holden St	Holden St SB	148	8%	1.1	A	0
	Holden St NB	150	8%	1.1	A	0
	Ward St WB	186	16%	1.8	A	0.1
10: Holden St/Faunce St	Holden St NB	117	7%	1.1	A	0
	Faunce St EB	200	26%	3.2	A	0.2
	Faunce St WB	27	5%	3.3	A	0
	Holden St SB	248	15%	1.2	A	0.1
11: Showground Rd/Racecourse Rd	Showground Rd NB	288	61%	9.8	A	0.8
	Racecourse Rd WB	660	95%	37.8	C	16.1
	Showground Rd SB	514	54.8%	8.7	A	5.2
	Racecourse Rd EB	415	77%	24.3	B	9.7
12: Racecourse Rd/Mann St	Racecourse Rd EB	590	75.5%	32.9	C	10.1
	Mann St NB Left	166	29%	20.3	B	2.6
	Mann St NB Through	407	71%	47.1	D	13.1

	Mann St SB Left/Th	357	31.2%	12.2	A	5.4
	Mann St SB Right/Th	355	71.7%	51.9	D	11.9
	Racecourse Rd WB	169	46.4%	52.1	D	4.8
13: Showground Rd/Beane St	Showground Rd NB	274	15%	1.2	A	0.1
	Beane St EB	73	12%	3.5	A	0.1
	Showground Rd SB	246	15%	1.3	A	0.1
14: Showground Rd/Faunce St	Faunce St EB	155	17%	2.4	A	0.1
	Showground Rd NB	287	29%	2.5	A	0.2
	Showground Rd SB	260	27%	2.6	A	0.2
16: Golf Club Car Park	Racecourse Rd EB	343	19%	1.2	A	0.1
	Racecourse Rd WB	590	38%	1.8	A	0.3
	Car Park Exit	138	22%	7.3	A	1.1

B.2.2 Scenario 2B: 2% annual growth in background traffic

AM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	538	37%	2	A	0.3
	Beane St WB	150	31%	5.5	A	0.2
	Racecourse Rd WB	463	26%	1.3	A	0.2
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	575	58%	4.4	A	0.7
	Racecourse Rd WB	663	37%	1.6	A	0.3
	Hospital Rd NB	-	-	-	-	-
3: Beane St/Hospital Rd	Cape St NB	80	4%	1	A	0
	Hospital Rd SB	105	17%	3.6	A	0.1
	Beane St EB	54	3%	1	A	0
4: Cape St/Sinclair St	Cape St SB	89	6%	1.2	A	0
	Cape St NB	74	5%	1.3	A	0
	Sinclair St EB	30	5%	3	A	0
	Hospital Exit	28	5%	3	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	526	49%	3.4	A	3.5
	Racecourse Rd WB	621	44%	2.3	A	0.4
	Holden St NB	291	54%	7.2	A	0.6
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	81	7%	1.7	A	0
	Hospital Road SB	271	15%	1.2	A	0.1
7: Holden St/Beane St	Holden St SB	114	9%	1.5	A	0
	Hospital Exit	54	8%	2.9	A	0
	Holden St NB	279	16%	1.2	A	0.1
	Beane St WB	20	2%	2	A	0
8: Cape St/Ward St	Ward St WB	64	10%	3.1	A	0.1
	Cape St SB	68	4%	1	A	0
	Cape St NB	72	6%	1.5	A	0
9: Ward St/Holden St	Holden St SB	89	6%	1.3	A	0
	Holden St NB	300	17%	1.2	A	0.1
	Ward St WB	80	8%	1.9	A	0
10: Holden St/Faunce St	Holden St NB	258	15%	1.2	A	0.1
	Faunce St EB	178	21%	2.7	A	0.1
	Faunce St WB	70	12%	3.5	A	0.1
	Holden St SB	126	7%	1.1	A	0
11: Showground Rd/Racecourse Rd	Showground Rd NB	246	81%	29	C	2.5
	Racecourse Rd WB	617	89%	22.2	B	9.2
	Showground Rd SB	673	66.2%	8.3	A	10.3
	Racecourse Rd EB	513	71%	15.1	B	11
12: Racecourse Rd/Mann St	Racecourse Rd EB	663	71.8%	24.7	B	10.2
	Mann St NB Left	181	35%	22.2	B	2.9

	Mann St NB Through	268	60%	49.5	D	8.5
	Mann St SB Left/Th	543	50.4%	19.1	B	11.3
	Mann St SB Right/Th	299	60.4%	46.9	D	9.4
	Racecourse Rd WB	149	35.3%	45.3	D	4.4
13: Showground Rd/Beane St	Showground Rd NB	237	13%	1.2	A	0.1
	Beane St EB	18	3%	2.9	A	0
	Showground Rd SB	350	20%	1.3	A	0.1
14: Showground Rd/Faunce St	Faunce St EB	151	17%	2.4	A	0.1
	Showground Rd NB	338	34%	2.7	A	0.3
	Showground Rd SB	339	36%	3	A	0.3
16: Golf Club Car Park	Racecourse Rd EB	504	28%	1.4	A	0.2
	Racecourse Rd WB	811	57%	2.9	A	4.4
	Car Park Exit	64	20%	17.8	B	0.9

PM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	377	25%	1.6	A	0.2
	Beane St WB	100	51%	22.4	B	1.5
	Racecourse Rd WB	531	30%	1.4	A	0.2
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	378	59%	6.8	A	0.7
	Racecourse Rd WB	625	35%	1.5	A	0.3
	Hospital Rd NB	-	-	-	-	-
3: Beane St/Hospital Rd	Cape St NB	39	2%	1	A	0
	Hospital Rd SB	53	3%	1	A	0
	Beane St EB	203	31%	3.9	A	0.2
4: Cape St/Sinclair St	Cape St SB	195	11%	1.1	A	0.1
	Cape St NB	31	2%	1.1	A	0
	Sinclair St EB	43	7%	3.2	A	0
	Hospital Exit	11	2%	2.6	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	418	30%	1.8	A	0.2
	Racecourse Rd WB	634	45%	2.3	A	8.6
	Holden St NB	153	74%	32.8	C	3.7
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	168	13%	1.6	A	0.1
	Hospital Road SB	118	7%	1.1	A	0
7: Holden St/Beane St	Holden St SB	164	12%	1.5	A	0.1
	Hospital Exit	89	13%	3	A	0.1
	Holden St NB	215	16%	1.6	A	0.1
	Beane St WB	26	4%	2.6	A	0
8: Cape St/Ward St	Ward St WB	33	5%	2.9	A	0
	Cape St SB	205	11%	1.1	A	0.1
	Cape St NB	100	11%	2.3	A	0.1
9: Ward St/Holden St	Holden St SB	163	9%	1.1	A	0.1
	Holden St NB	156	9%	1.1	A	0
	Ward St WB	192	17%	1.9	A	0.1
10: Holden St/Faunce St	Holden St NB	120	7%	1.1	A	0
	Faunce St EB	203	27%	3.2	A	0.2
	Faunce St WB	30	5%	3.3	A	0
	Holden St SB	263	15%	1.2	A	0.1
11: Showground Rd/Racecourse Rd	Showground Rd NB	291	64%	10.9	A	0.9
	Racecourse Rd WB	686	99%	64.5	E	24.5
	Showground Rd SB	534	57.8%	9.5	A	5.9
	Racecourse Rd EB	431	81%	28.4	B	10.4
12: Racecourse Rd/Mann St	Racecourse Rd EB	607	73.5%	30	C	9.8
	Mann St NB Left	172	33%	22	B	2.8
	Mann St NB Through	407	78%	53.7	D	14

	Mann St SB Left/Th	369	33.6%	13.9	A	6
	Mann St SB Right/Th	369	74.5%	53.6	D	12.6
	Racecourse Rd WB	175	42.9%	48.2	D	4.8
13: Showground Rd/Beane St	Showground Rd NB	279	16%	1.2	A	0.1
	Beane St EB	78	13%	3.5	A	0.1
	Showground Rd SB	249	15%	1.3	A	0.1
14: Showground Rd/Faunce St	Faunce St EB	167	18%	2.4	A	0.1
	Showground Rd NB	292	29%	2.5	A	0.2
	Showground Rd SB	262	28%	2.6	A	0.2
16: Golf Club Car Park	Racecourse Rd EB	354	20%	1.2	A	0.1
	Racecourse Rd WB	610	39%	1.9	A	0.3
	Car Park Exit	141	24%	8.2	A	1.2

B.3 Scenario 3: 2027 (No development)

B.3.1 Scenario 3A 1% annual growth in background traffic

AM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	554	38%	2	A	0.3
	Beane St WB	160	34%	5.7	A	0.3
	Racecourse Rd WB	479	27%	1.4	A	0.2
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	593	59%	4.4	A	0.7
	Racecourse Rd WB	684	38%	1.6	A	0.3
	Hospital Rd NB	-	-	-	-	-
3: Beane St/Hospital Rd	Cape St NB	86	5%	1.1	A	0
	Hospital Rd SB	111	18%	3.6	A	0.1
	Beane St EB	57	3%	1	A	0
4: Cape St/Sinclair St	Cape St SB	94	6%	1.3	A	0
	Cape St NB	79	5%	1.3	A	0
	Sinclair St EB	31	5%	3	A	0
	Hospital Exit	29	5%	3	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	546	47%	3.2	A	0.4
	Racecourse Rd WB	643	46%	2.4	A	0.4
	Holden St NB	305	57%	7.9	A	0.7
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	83	7%	1.7	A	0
	Hospital Road SB	276	15%	1.2	A	0.1
7: Holden St/Beane St	Holden St SB	117	5%	1.4	A	0
	Hospital Exit	56	8%	2.9	A	0
	Holden St NB	286	16%	1.2	A	0.1
	Beane St WB	21	2%	1.9	A	0
8: Cape St/Ward St	Ward St WB	67	10%	3.1	A	0.1
	Cape St SB	70	4%	1	A	0
	Cape St NB	75	6%	1.5	A	0
9: Ward St/Holden St	Holden St SB	92	3%	1.3	A	0
	Holden St NB	308	17%	1.2	A	0.1
	Ward St WB	82	8%	1.9	A	0
10: Holden St/Faunce St	Holden St NB	263	15%	1.2	A	0.1
	Faunce St EB	185	22%	2.8	A	0.1
	Faunce St WB	76	13%	3.5	A	0.1
	Holden St SB	129	7%	1.1	A	0
11: Showground Rd/Racecourse Rd	Showground Rd NB	246	84%	35.7	C	3.1
	Racecourse Rd WB	638	93%	31.7	C	14.7
	Showground Rd SB	701	69.7 : 69.7%	9.7	A	11.2
	Racecourse Rd EB	540	75%	17.7	B	11.9

12: Racecourse Rd/Mann St	Racecourse Rd EB	687	74.5%	26	B	11.5
	Mann St NB Left	187	33%	20.6	B	2.9
	Mann St NB Through	268	58%	47.9	D	8.4
	Mann St SB Left/Th	563	52.2%	19.4	B	11.9
	Mann St SB Right/Th	309	64.4%	49.4	D	10
	Racecourse Rd WB	154	39.3%	48	D	4.6
13: Showground Rd/Beane St	Showground Rd NB	244	14%	1.2	A	0.1
	Beane St EB	12	2%	3	A	0
	Showground Rd SB	364	21%	1.3	A	0.1
14: Showground Rd/Faunce St	Faunce St EB	158	18%	2.4	A	0.1
	Showground Rd NB	346	35%	2.8	A	0.3
	Showground Rd SB	353	38%	3.1	A	0.3
16: Golf Club Car Park	Racecourse Rd EB	522	29%	1.4	A	0.2
	Racecourse Rd WB	837	59%	3.1	A	9.8
	Car Park Exit	67	23%	23.1	B	1

PM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	392	26%	1.6	A	0.2
	Beane St WB	101	56%	27.4	B	1.8
	Racecourse Rd WB	551	31%	1.4	A	0.2
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	392	64%	8.2	A	0.9
	Racecourse Rd WB	647	36%	1.6	A	0.3
	Hospital Rd NB	-	-	-	-	-
3: Beane St/Hospital Rd	Cape St NB	40	2%	1	A	0
	Hospital Rd SB	54	3%	1	A	0
	Beane St EB	205	31%	3.9	A	0.2
4: Cape St/Sinclair St	Cape St SB	198	11%	1.1	A	0.1
	Cape St NB	32	2%	1.2	A	0
	Sinclair St EB	46	8%	3.3	A	0
	Hospital Exit	11	2%	2.6	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	434	31%	1.9	A	0.2
	Racecourse Rd WB	665	46%	2.4	A	9
	Holden St NB	159	81%	34.9	C	4.6
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	168	13%	1.6	A	0.1
	Hospital Road SB	120	7%	1.1	A	0
7: Holden St/Beane St	Holden St SB	176	13%	1.5	A	0.1
	Hospital Exit	89	13%	3.1	A	0.1
	Holden St NB	223	16%	1.6	A	0.1
	Beane St WB	32	4%	2.6	A	0
8: Cape St/Ward St	Ward St WB	35	5%	2.9	A	0
	Cape St SB	210	12%	1.1	A	0.1
	Cape St NB	104	12%	2.3	A	0.1
9: Ward St/Holden St	Holden St SB	177	10%	1.1	A	0.1
	Holden St NB	162	9%	1.1	A	0
	Ward St WB	197	17%	1.9	A	0.1
10: Holden St/Faunce St	Holden St NB	124	7%	1.2	A	0
	Faunce St EB	206	27%	3.3	A	0.2
	Faunce St WB	32	6%	3.4	A	0
	Holden St SB	278	16%	1.3	A	0.1
11: Showground Rd/Racecourse Rd	Showground Rd NB	295	66%	11.5	A	0.9
	Racecourse Rd WB	713	104%	116.8	F	63
	Showground Rd SB	552	61.7%	10	A	6.2
	Racecourse Rd EB	450	85%	33.8	C	11.3
12: Racecourse Rd/Mann St	Racecourse Rd EB	623	78.8%	33.2	C	11.3
	Mann St NB Left	179	34%	22.3	B	2.9
	Mann St NB Through	407	78%	53.7	D	14

	Mann St SB Left/Th	382	34.3%	13.5	A	6.3
	Mann St SB Right/Th	383	75.1%	53	D	13.1
	Racecourse Rd WB	181	46.1%	50	D	5.1
13: Showground Rd/Beane St	Showground Rd NB	284	16%	1.2	A	0.1
	Beane St EB	82	14%	3.5	A	0.1
	Showground Rd SB	253	15%	1.3	A	0.1
14: Showground Rd/Faunce St	Faunce St EB	181	20%	2.5	A	0.1
	Showground Rd NB	295	30%	2.6	A	0.2
	Showground Rd SB	264	28%	2.6	A	0.2
16: Golf Club Car Park	Racecourse Rd EB	368	20%	1.3	A	0.1
	Racecourse Rd WB	632	41%	2	A	0.3
	Car Park Exit	145	27%	9.6	A	1.4

B.3.2 Scenario 3B: 2% annual growth in background traffic

AM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	611	43%	2.3	A	0.4
	Beane St WB	189	41%	6.6	A	0.3
	Racecourse Rd WB	527	29%	1.4	A	0.2
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	651	66%	5.3	A	1
	Racecourse Rd WB	745	41%	1.7	A	0.4
	Hospital Rd NB	-	-	-	-	-
3: Beane St/Hospital Rd	Cape St NB	101	6%	1.1	A	0
	Hospital Rd SB	126	21%	3.8	A	0.1
	Beane St EB	66	4%	1	A	0
4: Cape St/Sinclair St	Cape St SB	104	7%	1.3	A	0
	Cape St NB	90	6%	1.2	A	0
	Sinclair St EB	36	6%	3.1	A	0
	Hospital Exit	31	5%	3.1	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	611	55%	4	A	0.6
	Racecourse Rd WB	707	49%	2.5	A	0.5
	Holden St NB	355	71%	12.5	A	2.6
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	91	8%	1.7	A	0
	Hospital Road SB	289	16%	1.2	A	0.1
7: Holden St/Beane St	Holden St SB	129	6%	1.4	A	0
	Hospital Exit	60	9%	3	A	0
	Holden St NB	336	19%	1.3	A	0.1
	Beane St WB	24	3%	2	A	0
8: Cape St/Ward St	Ward St WB	78	12%	3.2	A	0.1
	Cape St SB	78	4%	1	A	0
	Cape St NB	84	7%	1.5	A	0
9: Ward St/Holden St	Holden St SB	104	4%	1.4	A	0
	Holden St NB	362	20%	1.3	A	0.1
	Ward St WB	92	10%	2.1	A	0.1
10: Holden St/Faunce St	Holden St NB	282	16%	1.2	A	0.1
	Faunce St EB	202	25%	3	A	0.2
	Faunce St WB	111	19%	3.9	A	0.1
	Holden St SB	144	8%	1.1	A	0
11: Showground Rd/Racecourse Rd	Showground Rd NB	237	89%	48.4	D	3.5
	Racecourse Rd WB	708	107%	155.2	F	69.3
	Showground Rd SB	787	80.5%	15.6	B	13.7
	Racecourse Rd EB	628	87%	29.6	C	15.4
12: Racecourse Rd/Mann St	Racecourse Rd EB	762	68.1%	17.2	B	10.4
	Mann St NB Left	206	57%	33.3	C	3.9

	Mann St NB Through	268	99%	154.4	F	16.6
	Mann St SB Left/Th	625	71.7%	33.4	C	17.8
	Mann St SB Right/Th	345	71.9%	53	D	11.6
	Racecourse Rd WB	170	28.2%	33.7	C	4.3
13: Showground Rd/Beane St	Showground Rd NB	235	13%	1.2	A	0.1
	Beane St EB	14	2%	2.9	A	0
	Showground Rd SB	409	23%	1.4	A	0.2
14: Showground Rd/Faunce St	Faunce St EB	166	18%	2.4	A	0.1
	Showground Rd NB	370	37%	2.9	A	0.3
	Showground Rd SB	397	42%	3.3	A	0.4
16: Golf Club Car Park	Racecourse Rd EB	580	32%	1.5	A	0.2
	Racecourse Rd WB	916	65%	4	A	13
	Car Park Exit	77	29%	25.2	B	1.3

PM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	433	29%	1.7	A	0.2
	Beane St WB	102	70%	50.2	D	2.6
	Racecourse Rd WB	609	34%	1.5	A	0.3
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	428	88%	27.6	B	3.3
	Racecourse Rd WB	712	39%	1.6	A	0.3
	Hospital Rd NB	-	-	-	-	-
3: Beane St/Hospital Rd	Cape St NB	41	2%	1	A	0
	Hospital Rd SB	59	3%	1	A	0
	Beane St EB	212	32%	4	A	0.2
4: Cape St/Sinclair St	Cape St SB	210	12%	1.1	A	0.1
	Cape St NB	36	3%	1.3	A	0
	Sinclair St EB	50	8%	3.3	A	0
	Hospital Exit	13	2%	2.6	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	477	34%	2	A	0.3
	Racecourse Rd WB	758	46%	2.4	A	7.8
	Holden St NB	183	112%	46.9	D	21.1
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	170	13%	1.6	A	0.1
	Hospital Road SB	127	7%	1.1	A	0
7: Holden St/Beane St	Holden St SB	211	15%	1.5	A	0.1
	Hospital Exit	92	14%	3.1	A	0.1
	Holden St NB	252	19%	1.6	A	0.1
	Beane St WB	55	7%	2.8	A	0
8: Cape St/Ward St	Ward St WB	41	6%	3	A	0
	Cape St SB	227	13%	1.1	A	0.1
	Cape St NB	116	13%	2.4	A	0.1
9: Ward St/Holden St	Holden St SB	222	13%	1.2	A	0.1
	Holden St NB	181	10%	1.1	A	0.1
	Ward St WB	215	20%	2	A	0.1
10: Holden St/Faunce St	Holden St NB	135	9%	1.3	A	0
	Faunce St EB	218	30%	3.5	A	0.2
	Faunce St WB	42	8%	3.5	A	0
	Holden St SB	325	19%	1.3	A	0.1
11: Showground Rd/Racecourse Rd	Showground Rd NB	306	69%	13.1	A	1.1
	Racecourse Rd WB	799	109%	183.8	F	76.7
	Showground Rd SB	612	73.8%	13.8	A	8.4
	Racecourse Rd EB	507	96%	68.3	E	16.8
12: Racecourse Rd/Mann St	Racecourse Rd EB	675	75.6%	43.2	D	12.1
	Mann St NB Left	200	35%	25.5	B	2.9
	Mann St NB Through	407	71%	61.2	E	13.1

	Mann St SB Left/Th	424	42.0%	14.6	B	8.2
	Mann St SB Right/Th	429	119.2%	59.5	E	56.9
	Racecourse Rd WB	200	40.3%	49.6	D	5.2
13: Showground Rd/Beane St	Showground Rd NB	303	17%	1.2	A	0.1
	Beane St EB	95	16%	3.6	A	0.1
	Showground Rd SB	266	17%	1.4	A	0.1
14: Showground Rd/Faunce St	Faunce St EB	225	25%	2.6	A	0.2
	Showground Rd NB	309	31%	2.6	A	0.2
	Showground Rd SB	271	29%	2.7	A	0.2
16: Golf Club Car Park	Racecourse Rd EB	404	22%	1.3	A	0.1
	Racecourse Rd WB	700	45%	2.2	A	0.4
	Car Park Exit	157	35%	15.9	B	2.1

B.4 Scenario 4: 2015 (Post development)

AM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	549	38%	2	A	0.3
	Beane St WB	171	38%	6.5	A	0.3
	Racecourse Rd WB	542	30%	1.4	A	0.2
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	637	72%	8.8	A	8.4
	Racecourse Rd WB	639	36%	1.5	A	0.3
	Hospital Rd NB	75	13.5%	7	A	0.4
3: Beane St/Hospital Rd	Cape St NB	171	10%	1.1	A	0.1
	Hospital Rd SB	-	-	-	-	-
	Beane St EB	158	9%	1.1	A	0
4: Cape St/Sinclair St	Cape St SB	158	10%	1.2	A	0.1
	Cape St NB	167	10%	1.2	A	0.1
	Sinclair St EB	27	5%	3.1	A	0
	Hospital Exit	27	5%	3.1	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	499	59%	7.2	A	5
	Racecourse Rd WB	719	51%	2.6	A	0.5
	Holden St NB	15	3%	4.2	A	0
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	75	4%	1	A	0
	Hospital Road SB	243	14%	1.2	A	0.1
7: Holden St/Beane St	Holden St SB	-	-	-	-	-
	Hospital Exit	-	-	-	-	-
	Holden St NB	-	-	-	-	-
	Beane St WB	-	-	-	-	-
8: Cape St/Ward St	Ward St WB	137	24%	4.1	A	0.2
	Cape St SB	138	8%	1.1	A	0
	Cape St NB	76	7%	1.9	A	0
9: Ward St/Holden St	Holden St SB	-	-	-	-	-
	Holden St NB	146	8%	1.1	A	0
	Ward St WB	130	7%	1.1	A	0
10: Holden St/Faunce St	Holden St NB	312	33%	2.9	A	0.2
	Faunce St EB	190	23%	2.8	A	0.1
	Faunce St WB	86	15%	3.8	A	0.1
	Holden St SB	130	7%	1.1	A	0
11: Showground Rd/Racecourse Rd	Showground Rd NB	417	83%	20.5	B	2.5
	Racecourse Rd WB	585	84%	15.2	B	6.7
	Showground Rd SB	635	61.8%	6.5	A	8.5
	Racecourse Rd EB	425	60%	10	A	7
12: Racecourse Rd/Mann St	Racecourse Rd EB	617	69.9%	25.2	B	8.8
	Mann St NB Left	165	32%	22.4	B	2.6

	Mann St NB Through	268	56%	46.4	D	8.3
	Mann St SB Left/Th	507	45.0%	16.5	B	9.6
	Mann St SB Right/Th	293	57.5%	45.1	D	9
	Racecourse Rd WB	139	32.9%	44.9	D	4
13: Showground Rd/Beane St	Showground Rd NB	589	33%	1.5	A	0.2
	Beane St EB	12	6%	8.9	A	0
	Showground Rd SB	351	22%	1.4	A	0.1
14: Showground Rd/Faunce St	Faunce St EB	405	46%	3.8	A	0.4
	Showground Rd NB	444	44%	3.2	A	0.4
	Showground Rd SB	328	35%	2.9	A	0.3
16: Golf Club Car Park	Racecourse Rd EB	566	31%	1.5	A	0.2
	Racecourse Rd WB	690	47%	2.3	A	0.4
	Car Park Exit	60	17%	14.6	B	0.7

PM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	380	26%	1.6	A	0.2
	Beane St WB	33	20%	13.2	A	0.1
	Racecourse Rd WB	844	47%	1.9	A	0.4
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	365	62%	17.1	B	5.8
	Racecourse Rd WB	752	42%	1.7	A	0.4
	Hospital Rd NB	167	24.2%	5.7	A	1.5
3: Beane St/Hospital Rd	Cape St NB	33	2%	1	A	0
	Hospital Rd SB	302	17%	1.2	A	0.1
	Beane St EB	-	-	-	-	-
4: Cape St/Sinclair St	Cape St SB	302	17%	1.2	A	0.1
	Cape St NB	23	1%	1	A	0
	Sinclair St EB	40	7%	3.3	A	0
	Hospital Exit	10	1%	2.6	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	394	26%	1.6	A	0.2
	Racecourse Rd WB	667	48%	2.5	A	0.5
	Holden St NB	60	17%	11.5	A	0.5
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	167	12%	1.5	A	0.1
	Hospital Road SB	82	5%	1	A	0
7: Holden St/Beane St	Holden St SB	2	0%	1	A	0
	Hospital Exit	-	-	-	-	-
	Holden St NB	4	0%	1	A	0
	Beane St WB	2	0%	3	A	0
8: Cape St/Ward St	Ward St WB	26	4%	2.7	A	0
	Cape St SB	309	17%	1.2	A	0.1
	Cape St NB	92	11%	2.4	A	0.1
9: Ward St/Holden St	Holden St SB	2	0%	1	A	0
	Holden St NB	23	1%	1	A	0
	Ward St WB	291	16%	1.2	A	0.1
10: Holden St/Faunce St	Holden St NB	128	17%	2.8	A	0.1
	Faunce St EB	204	27%	3.3	A	0.2
	Faunce St WB	10	2%	2.7	A	0
	Holden St SB	293	17%	1.2	A	0.1
11: Showground Rd/Racecourse Rd	Showground Rd NB	426	91%	35.3	C	4.2
	Racecourse Rd WB	670	98%	51.2	D	20
	Showground Rd SB	521	65.8%	14.3	A	9.4
	Racecourse Rd EB	372	74%	23.1	B	8.6
12: Racecourse Rd/Mann St	Racecourse Rd EB	617	74.3%	35.3	C	10.5
	Mann St NB Left	189	32%	19.6	B	2.9
	Mann St NB Through	419	70%	44.6	D	13.2

	Mann St SB Left/Th	365	31.9%	12.3	A	5.6
	Mann St SB Right/Th	346	74.4%	55.6	D	12
	Racecourse Rd WB	169	46.4%	52.1	D	4.8
13: Showground Rd/Beane St	Showground Rd NB	503	28%	1.4	A	0.2
	Beane St EB	95	23%	5.6	A	0.1
	Showground Rd SB	264	16%	1.3	A	0.1
14: Showground Rd/Faunce St	Faunce St EB	350	39%	3.3	A	0.3
	Showground Rd NB	308	31%	2.6	A	0.2
	Showground Rd SB	301	32%	2.8	A	0.2
16: Golf Club Car Park	Racecourse Rd EB	358	20%	1.2	A	0.1
	Racecourse Rd WB	711	45%	2	A	0.4
	Car Park Exit	134	34%	12.1	A	1.4

B.5 Scenario 5: 2019 (Post development)

B.5.1 Scenario 5A 1% annual growth in background traffic

AM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	529	37%	2	A	0.3
	Beane St WB	133	30%	5.9	A	0.2
	Racecourse Rd WB	569	32%	1.5	A	0.2
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	591	72%	10.1	A	8.3
	Racecourse Rd WB	665	37%	1.6	A	0.3
	Hospital Rd NB	77	13.6%	6.7	A	0.4
3: Beane St/Hospital Rd	Cape St NB	133	7%	1.1	A	0
	Hospital Rd SB	-	-	-	-	-
	Beane St EB	160	9%	1.1	A	0
4: Cape St/Sinclair St	Cape St SB	160	10%	1.2	A	0.1
	Cape St NB	129	8%	1.2	A	0
	Sinclair St EB	27	4%	3.1	A	0
	Hospital Exit	27	4%	3.1	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	451	39%	2.5	A	0.3
	Racecourse Rd WB	728	52%	2.7	A	0.5
	Holden St NB	6	1%	3.9	A	0
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	77	4%	1	A	0
	Hospital Road SB	244	14%	1.2	A	0.1
7: Holden St/Beane St	Holden St SB	-	-	-	-	-
	Hospital Exit	-	-	-	-	-
	Holden St NB	-	-	-	-	-
	Beane St WB	-	-	-	-	-
8: Cape St/Ward St	Ward St WB	111	19%	3.8	A	0.1
	Cape St SB	139	8%	1.1	A	0
	Cape St NB	77	8%	2.1	A	0
9: Ward St/Holden St	Holden St SB	-	-	-	-	-
	Holden St NB	120	7%	1.1	A	0
	Ward St WB	143	8%	1.1	A	0
10: Holden St/Faunce St	Holden St NB	304	33%	2.9	A	0.2
	Faunce St EB	190	23%	2.8	A	0.1
	Faunce St WB	66	12%	3.5	A	0.1
	Holden St SB	143	8%	1.1	A	0
11: Showground Rd/Racecourse Rd	Showground Rd NB	440	89%	28.1	B	4.3
	Racecourse Rd WB	594	85%	16.9	B	8.2
	Showground Rd SB	652	63.6%	6.9	A	8.9
	Racecourse Rd EB	426	61%	12.3	A	8.4

12: Racecourse Rd/Mann St	Racecourse Rd EB	637	69.9%	24.4	B	9.1
	Mann St NB Left	169	32%	21.9	B	2.6
	Mann St NB Through	268	58%	47.9	D	8.4
	Mann St SB Left/Th	525	48.0%	18.1	B	10.6
	Mann St SB Right/Th	295	59.6%	46.7	D	9.3
	Racecourse Rd WB	142	33.6%	45	D	4.1
13: Showground Rd/Beane St	Showground Rd NB	582	32%	1.5	A	0.2
	Beane St EB	10	5%	9.2	A	0
	Showground Rd SB	360	22%	1.4	A	0.1
14: Showground Rd/Faunce St	Faunce St EB	410	47%	3.8	A	0.4
	Showground Rd NB	410	41%	3	A	0.3
	Showground Rd SB	339	36%	3	A	0.3
16: Golf Club Car Park	Racecourse Rd EB	520	29%	1.4	A	0.2
	Racecourse Rd WB	716	48%	2.3	A	0.5
	Car Park Exit	63	17%	14.5	B	0.7

PM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	344	24%	1.6	A	0.2
	Beane St WB	35	18%	11.3	A	0.1
	Racecourse Rd WB	804	45%	1.8	A	0.4
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	331	54%	14.3	A	4.6
	Racecourse Rd WB	712	40%	1.7	A	0.3
	Hospital Rd NB	167	22.6%	6.7	A	1.4
3: Beane St/Hospital Rd	Cape St NB	35	2%	1	A	0
	Hospital Rd SB	309	17%	1.2	A	0.1
	Beane St EB	-	-	-	-	-
4: Cape St/Sinclair St	Cape St SB	309	17%	1.2	A	0.1
	Cape St NB	25	1%	1	A	0
	Sinclair St EB	42	7%	3.3	A	0
	Hospital Exit	10	1%	2.6	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	359	21%	1.3	A	0.1
	Racecourse Rd WB	653	47%	2.4	A	2
	Holden St NB	25	7%	9.8	A	0.2
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	167	12%	1.5	A	0.1
	Hospital Road SB	82	5%	1	A	0
7: Holden St/Beane St	Holden St SB	-	-	-	-	-
	Hospital Exit	-	-	-	-	-
	Holden St NB	-	-	-	-	-
	Beane St WB	-	-	-	-	-
8: Cape St/Ward St	Ward St WB	26	4%	2.7	A	0
	Cape St SB	317	18%	1.2	A	0.1
	Cape St NB	96	11%	2.4	A	0.1
9: Ward St/Holden St	Holden St SB	-	-	-	-	-
	Holden St NB	19	1%	1	A	0
	Ward St WB	296	16%	1.2	A	0.1
10: Holden St/Faunce St	Holden St NB	78	10%	2.6	A	0.1
	Faunce St EB	204	26%	3.1	A	0.2
	Faunce St WB	10	2%	2.7	A	0
	Holden St SB	296	17%	1.3	A	0.1
11: Showground Rd/Racecourse Rd	Showground Rd NB	411	86%	25.4	B	2.9
	Racecourse Rd WB	647	93%	31.7	C	12.1
	Showground Rd SB	517	62.9%	12.8	A	8.2
	Racecourse Rd EB	358	70%	21.1	B	8.1
12: Racecourse Rd/Mann St	Racecourse Rd EB	585	74.3%	32.2	C	9.7
	Mann St NB Left	163	29%	20.3	B	2.6
	Mann St NB Through	407	71%	47.1	D	13.1

	Mann St SB Left/Th	357	31.2%	12.2	A	5.4
	Mann St SB Right/Th	348	70.3%	51.2	D	11.5
	Racecourse Rd WB	166	45.6%	51.9	D	4.7
13: Showground Rd/Beane St	Showground Rd NB	452	25%	1.3	A	0.2
	Beane St EB	59	14%	4.8	A	0.1
	Showground Rd SB	251	14%	1.2	A	0.1
14: Showground Rd/Faunce St	Faunce St EB	305	34%	3	A	0.3
	Showground Rd NB	302	30%	2.6	A	0.2
	Showground Rd SB	288	30%	2.7	A	0.2
16: Golf Club Car Park	Racecourse Rd EB	324	18%	1.2	A	0.1
	Racecourse Rd WB	668	42%	1.9	A	0.4
	Car Park Exit	138	28%	9.5	A	1.2

B.5.2 Scenario 5B: 2% annual growth in background traffic

AM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	544	38%	2	A	0.3
	Beane St WB	192	42%	6.8	A	0.4
	Racecourse Rd WB	562	31%	1.5	A	0.2
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	633	75%	10.8	A	9.2
	Racecourse Rd WB	658	37%	1.6	A	0.3
	Hospital Rd NB	81	16.7%	7.9	A	0.4
3: Beane St/Hospital Rd	Cape St NB	192	11%	1.1	A	0.1
	Hospital Rd SB	-	-	-	-	-
	Beane St EB	167	9%	1.1	A	0.1
4: Cape St/Sinclair St	Cape St SB	167	10%	1.2	A	0.1
	Cape St NB	186	11%	1.2	A	0.1
	Sinclair St EB	29	5%	3.2	A	0
	Hospital Exit	28	5%	3.2	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	494	43%	2.8	A	0.4
	Racecourse Rd WB	721	52%	2.6	A	0.5
	Holden St NB	6	1%	3.6	A	0
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	81	5%	1	A	0
	Hospital Road SB	247	14%	1.2	A	0.1
7: Holden St/Beane St	Holden St SB	-	-	-	-	-
	Hospital Exit	-	-	-	-	-
	Holden St NB	-	-	-	-	-
	Beane St WB	-	-	-	-	-
8: Cape St/Ward St	Ward St WB	154	27%	4.3	A	0.2
	Cape St SB	145	8%	1.1	A	0
	Cape St NB	80	8%	1.8	A	0
9: Ward St/Holden St	Holden St SB	-	-	-	-	-
	Holden St NB	163	9%	1.1	A	0
	Ward St WB	135	8%	1.1	A	0
10: Holden St/Faunce St	Holden St NB	308	31%	2.7	A	0.2
	Faunce St EB	195	24%	2.9	A	0.2
	Faunce St WB	85	15%	3.7	A	0.1
	Holden St SB	135	8%	1.1	A	0
11: Showground Rd/Racecourse Rd	Showground Rd NB	396	81%	19	B	2.1
	Racecourse Rd WB	616	89%	22.6	B	10.1
	Showground Rd SB	678	66.8%	8.1	A	10.4
	Racecourse Rd EB	463	65%	14.5	B	9.8
12: Racecourse Rd/Mann St	Racecourse Rd EB	658	73.6%	26.5	B	10.7
	Mann St NB Left	176	28%	18.6	B	2.7

	Mann St NB Through	268	56%	46.4	D	8.3
	Mann St SB Left/Th	543	48.9%	17.7	B	10.8
	Mann St SB Right/Th	305	61.6%	47.4	D	9.6
	Racecourse Rd WB	147	46.4%	55.2	D	4.7
13: Showground Rd/Beane St	Showground Rd NB	538	30%	1.4	A	0.2
	Beane St EB	10	4%	6.7	A	0
	Showground Rd SB	371	22%	1.4	A	0.1
14: Showground Rd/Faunce St	Faunce St EB	381	43%	3.6	A	0.4
	Showground Rd NB	417	42%	3.1	A	0.4
	Showground Rd SB	350	37%	3.1	A	0.3
16: Golf Club Car Park	Racecourse Rd EB	563	31%	1.5	A	0.2
	Racecourse Rd WB	715	49%	2.4	A	0.5
	Car Park Exit	64	19%	14.9	B	0.8

PM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	357	25%	1.7	A	0.2
	Beane St WB	37	20%	12.3	A	0.2
	Racecourse Rd WB	829	46%	1.9	A	0.4
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	343	59%	17.1	B	5.3
	Racecourse Rd WB	737	41%	1.7	A	0.3
	Hospital Rd NB	168	23.8%	7.8	A	1.6
3: Beane St/Hospital Rd	Cape St NB	37	2%	1	A	0
	Hospital Rd SB	320	18%	1.2	A	0.1
	Beane St EB	-	-	-	-	-
4: Cape St/Sinclair St	Cape St SB	320	18%	1.2	A	0.1
	Cape St NB	26	1%	1	A	0
	Sinclair St EB	43	7%	3.3	A	0
	Hospital Exit	11	2%	2.6	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	371	21%	1.3	A	0.1
	Racecourse Rd WB	678	48%	2.5	A	5.9
	Holden St NB	25	7%	10.8	A	0.2
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	168	13%	1.5	A	0.1
	Hospital Road SB	83	5%	1	A	0
7: Holden St/Beane St	Holden St SB	-	-	-	-	-
	Hospital Exit	-	-	-	-	-
	Holden St NB	-	-	-	-	-
	Beane St WB	-	-	-	-	-
8: Cape St/Ward St	Ward St WB	26	4%	2.7	A	0
	Cape St SB	327	18%	1.2	A	0.1
	Cape St NB	100	12%	2.4	A	0.1
9: Ward St/Holden St	Holden St SB	-	-	-	-	-
	Holden St NB	19	1%	1	A	0
	Ward St WB	305	17%	1.2	A	0.1
10: Holden St/Faunce St	Holden St NB	79	10%	2.6	A	0.1
	Faunce St EB	207	27%	3.1	A	0.2
	Faunce St WB	10	2%	2.7	A	0
	Holden St SB	305	18%	1.3	A	0.1
11: Showground Rd/Racecourse Rd	Showground Rd NB	421	91%	35.8	C	4.2
	Racecourse Rd WB	672	98%	51.6	D	20.5
	Showground Rd SB	537	60.9%	11.7	A	7.8
	Racecourse Rd EB	370	74%	24.3	B	8.6
12: Racecourse Rd/Mann St	Racecourse Rd EB	601	75.3%	32	C	10.2
	Mann St NB Left	169	31%	20.9	B	2.7
	Mann St NB Through	407	73%	49	D	13.4

	Mann St SB Left/Th	369	32.7%	12.8	A	5.8
	Mann St SB Right/Th	362	73.1%	52.7	D	12.2
	Racecourse Rd WB	172	45.4%	50.8	D	4.8
13: Showground Rd/Beane St	Showground Rd NB	463	26%	1.3	A	0.2
	Beane St EB	59	14%	4.9	A	0.1
	Showground Rd SB	260	15%	1.2	A	0.1
14: Showground Rd/Faunce St	Faunce St EB	312	35%	3.1	A	0.3
	Showground Rd NB	307	31%	2.6	A	0.2
	Showground Rd SB	297	31%	2.8	A	0.2
16: Golf Club Car Park	Racecourse Rd EB	336	19%	1.2	A	0.1
	Racecourse Rd WB	693	44%	2	A	0.4
	Car Park Exit	141	31%	11.1	A	1.4

B.6 Scenario 6: 2027 (Post development)

B.6.1 Scenario 6A 1% annual growth in background traffic

AM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	595	41%	2.1	A	0.4
	Beane St WB	216	49%	7.9	A	0.5
	Racecourse Rd WB	586	33%	1.5	A	0.2
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	699	79%	12.2	A	11
	Racecourse Rd WB	683	38%	1.6	A	0.3
	Hospital Rd NB	83	23.5%	13.6	A	0.7
3: Beane St/Hospital Rd	Cape St NB	216	12%	1.1	A	0.1
	Hospital Rd SB	-	-	-	-	-
	Beane St EB	176	10%	1.1	A	0.1
4: Cape St/Sinclair St	Cape St SB	176	11%	1.2	A	0.1
	Cape St NB	209	13%	1.2	A	0.1
	Sinclair St EB	30	5%	3.2	A	0
	Hospital Exit	29	5%	3.2	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	562	68%	9.4	A	6.3
	Racecourse Rd WB	763	55%	2.8	A	0.6
	Holden St NB	15	3%	3.7	A	0
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	83	5%	1	A	0
	Hospital Road SB	248	14%	1.2	A	0.1
7: Holden St/Beane St	Holden St SB	-	-	-	-	-
	Hospital Exit	-	-	-	-	-
	Holden St NB	-	-	-	-	-
	Beane St WB	2	0%	3	A	0
8: Cape St/Ward St	Ward St WB	179	31%	4.5	A	0.2
	Cape St SB	151	8%	1.1	A	0
	Cape St NB	83	8%	1.9	A	0
9: Ward St/Holden St	Holden St SB	-	-	-	-	-
	Holden St NB	188	10%	1.1	A	0.1
	Ward St WB	145	8%	1.1	A	0
10: Holden St/Faunce St	Holden St NB	325	33%	2.8	A	0.2
	Faunce St EB	206	25%	3	A	0.2
	Faunce St WB	107	19%	4	A	0.1
	Holden St SB	145	8%	1.1	A	0
11: Showground Rd/Racecourse Rd	Showground Rd NB	418	88%	28.8	C	3.3
	Racecourse Rd WB	646	95%	43.9	D	16.8
	Showground Rd SB	712	71.0%	9.9	A	11.5
	Racecourse Rd EB	479	68%	13.8	A	10.2

12: Racecourse Rd/Mann St	Racecourse Rd EB	683	72.7%	24.1	B	10.8
	Mann St NB Left	182	38%	24.1	B	3
	Mann St NB Through	268	64%	53.1	D	8.9
	Mann St SB Left/Th	563	53.0%	20.2	B	12.2
	Mann St SB Right/Th	323	63.3%	47.1	D	10.2
	Racecourse Rd WB	153	33.9%	43.1	D	4.4
13: Showground Rd/Beane St	Showground Rd NB	590	33%	1.5	A	0.2
	Beane St EB	12	6%	9	A	0
	Showground Rd SB	390	24%	1.4	A	0.2
14: Showground Rd/Faunce St	Faunce St EB	410	47%	3.9	A	0.4
	Showground Rd NB	466	47%	3.4	A	0.4
	Showground Rd SB	367	39%	3.2	A	0.3
16: Golf Club Car Park	Racecourse Rd EB	631	35%	1.5	A	0.3
	Racecourse Rd WB	743	51%	2.5	A	0.5
	Car Park Exit	67	25%	19.4	B	0.9

PM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	381	26%	1.7	A	0.2
	Beane St WB	40	23%	14	A	0.3
	Racecourse Rd WB	890	49%	1.9	A	0.5
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	365	66%	20	B	6.2
	Racecourse Rd WB	798	43%	1.8	A	0.4
	Hospital Rd NB	168	25.6%	8.2	A	1.8
3: Beane St/Hospital Rd	Cape St NB	40	2%	1	A	0
	Hospital Rd SB	344	19%	1.2	A	0.1
	Beane St EB	-	-	-	-	-
4: Cape St/Sinclair St	Cape St SB	344	19%	1.2	A	0.1
	Cape St NB	28	2%	1	A	0
	Sinclair St EB	46	8%	3.4	A	0
	Hospital Exit	11	2%	2.6	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	399	24%	1.5	A	0.2
	Racecourse Rd WB	711	50%	2.5	A	4.4
	Holden St NB	70	22%	13.2	A	0.7
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	168	13%	1.5	A	0.1
	Hospital Road SB	83	5%	1	A	0
7: Holden St/Beane St	Holden St SB	-	-	-	-	-
	Hospital Exit	-	-	-	-	-
	Holden St NB	-	-	-	-	-
	Beane St WB	-	-	-	-	-
8: Cape St/Ward St	Ward St WB	33	5%	2.9	A	0
	Cape St SB	352	19%	1.2	A	0.1
	Cape St NB	104	13%	2.5	A	0.1
9: Ward St/Holden St	Holden St SB	-	-	-	-	-
	Holden St NB	26	1%	1	A	0
	Ward St WB	334	18%	1.2	A	0.1
10: Holden St/Faunce St	Holden St NB	90	12%	2.6	A	0.1
	Faunce St EB	212	28%	3.2	A	0.2
	Faunce St WB	13	2%	2.9	A	0
	Holden St SB	334	19%	1.3	A	0.1
11: Showground Rd/Racecourse Rd	Showground Rd NB	445	97%	63.7	E	9
	Racecourse Rd WB	703	103%	104.4	F	60.1
	Showground Rd SB	558	65.7%	13.7	A	8.5
	Racecourse Rd EB	393	79%	30.7	C	9.5
12: Racecourse Rd/Mann St	Racecourse Rd EB	628	79.8%	34.2	C	11.7
	Mann St NB Left	176	33%	21.7	B	2.9
	Mann St NB Through	407	75%	51.2	D	13.7

	Mann St SB Left/Th	382	33.8%	13	A	6
	Mann St SB Right/Th	379	74.3%	52.5	D	12.8
	Racecourse Rd WB	179	47.4%	51.4	D	5.1
13: Showground Rd/Beane St	Showground Rd NB	499	28%	1.4	A	0.2
	Beane St EB	89	22%	5.6	A	0.1
	Showground Rd SB	277	16%	1.2	A	0.1
14: Showground Rd/Faunce St	Faunce St EB	349	39%	3.3	A	0.3
	Showground Rd NB	326	33%	2.7	A	0.2
	Showground Rd SB	330	35%	2.9	A	0.3
16: Golf Club Car Park	Racecourse Rd EB	358	20%	1.2	A	0.1
	Racecourse Rd WB	758	47%	2.2	A	0.4
	Car Park Exit	145	39%	14.6	B	2.1

B.6.2 Scenario 6B: 2% annual growth in background traffic

AM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	650	46%	2.4	A	0.4
	Beane St WB	270	64%	11.9	A	0.9
	Racecourse Rd WB	642	34%	1.5	A	0.3
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	792	88%	19.5	B	15.3
	Racecourse Rd WB	737	39%	1.6	A	0.3
	Hospital Rd NB	91	50.4%	30	C	1.2
3: Beane St/Hospital Rd	Cape St NB	270	15%	1.2	A	0.1
	Hospital Rd SB	-	-	-	-	-
	Beane St EB	184	10%	1.1	A	0.1
4: Cape St/Sinclair St	Cape St SB	184	11%	1.2	A	0.1
	Cape St NB	262	16%	1.3	A	0.1
	Sinclair St EB	35	6%	3.4	A	0
	Hospital Exit	31	5%	3.3	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	651	78%	13.4	A	8.2
	Racecourse Rd WB	817	56%	2.9	A	0.6
	Holden St NB	15	3%	3.7	A	0
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	91	5%	1.1	A	0
	Hospital Road SB	254	14%	1.2	A	0.1
7: Holden St/Beane St	Holden St SB	-	-	-	-	-
	Hospital Exit	-	-	-	-	-
	Holden St NB	-	-	-	-	-
	Beane St WB	-	-	-	-	-
8: Cape St/Ward St	Ward St WB	229	39%	5.1	A	0.3
	Cape St SB	160	9%	1.1	A	0
	Cape St NB	92	8%	1.8	A	0
9: Ward St/Holden St	Holden St SB	-	-	-	-	-
	Holden St NB	238	13%	1.2	A	0.1
	Ward St WB	153	9%	1.1	A	0
10: Holden St/Faunce St	Holden St NB	341	34%	2.7	A	0.3
	Faunce St EB	223	28%	3.1	A	0.2
	Faunce St WB	134	24%	4.3	A	0.2
	Holden St SB	153	9%	1.1	A	0
11: Showground Rd/Racecourse Rd	Showground Rd NB	415	90%	34.6	C	4
	Racecourse Rd WB	716	99%	66.5	E	24
	Showground Rd SB	797	81.7%	16.2	B	14.4
	Racecourse Rd EB	561	81%	23	B	12.9
12: Racecourse Rd/Mann St	Racecourse Rd EB	757	74.9%	26	B	12.9
	Mann St NB Left	201	32%	18.7	B	3

	Mann St NB Through	268	48%	40	C	7.7
	Mann St SB Left/Th	625	63.6%	25.9	B	15.7
	Mann St SB Right/Th	359	119.7%	398.3	F	48.5
	Racecourse Rd WB	169	33.0%	39.9	C	4.6
13: Showground Rd/Beane St	Showground Rd NB	587	33%	1.5	A	0.2
	Beane St EB	12	6%	8.8	A	0
	Showground Rd SB	446	26%	1.5	A	0.2
14: Showground Rd/Faunce St	Faunce St EB	404	46%	3.8	A	0.4
	Showground Rd NB	490	49%	3.5	A	0.5
	Showground Rd SB	423	43%	3.4	A	0.4
16: Golf Club Car Park	Racecourse Rd EB	724	40%	1.7	A	0.3
	Racecourse Rd WB	804	55%	2.8	A	0.6
	Car Park Exit	77	42%	29	C	1.3

PM peak

Intersection	Approach	Demand (veh)	DoS	Delay/veh	LoS	Mean Max Queue
1: Racecourse Rd/Beane St	Racecourse Rd EB	422	29%	1.8	A	0.2
	Beane St WB	44	25%	14.3	A	0.4
	Racecourse Rd WB	969	48%	1.9	A	0.5
2: Racecourse Rd/Hospital Rd	Racecourse Rd EB	402	68%	19.3	B	6.7
	Racecourse Rd WB	877	43%	1.7	A	0.4
	Hospital Rd NB	170	25.4%	7.1	A	1.7
3: Beane St/Hospital Rd	Cape St NB	44	2%	1	A	0
	Hospital Rd SB	372	20%	1.3	A	0.1
	Beane St EB	-	-	-	-	-
4: Cape St/Sinclair St	Cape St SB	372	20%	1.3	A	0.1
	Cape St NB	31	2%	1	A	0
	Sinclair St EB	50	9%	3.4	A	0
	Hospital Exit	13	2%	2.6	A	0
5: Racecourse Rd/Holden St	Racecourse Rd EB	439	26%	1.5	A	0.2
	Racecourse Rd WB	792	49%	2.5	A	1.3
	Holden St NB	70	24%	13.8	A	0.7
6: Multi-Storey Car Park Hospital Rd	Hospital Rd NB	-	-	-	-	-
	Car Park Exit	170	13%	1.5	A	0.1
	Hospital Road SB	85	5%	1	A	0
7: Holden St/Beane St	Holden St SB	-	-	-	-	-
	Hospital Exit	-	-	-	-	-
	Holden St NB	-	-	-	-	-
	Beane St WB	-	-	-	-	-
8: Cape St/Ward St	Ward St WB	34	5%	2.9	A	0
	Cape St SB	381	21%	1.3	A	0.1
	Cape St NB	116	14%	2.5	A	0.1
9: Ward St/Holden St	Holden St SB	-	-	-	-	-
	Holden St NB	27	2%	1	A	0
	Ward St WB	360	20%	1.2	A	0.1
10: Holden St/Faunce St	Holden St NB	93	12%	2.6	A	0.1
	Faunce St EB	224	29%	3.3	A	0.2
	Faunce St WB	10	2%	2.7	A	0
	Holden St SB	360	20%	1.3	A	0.1
11: Showground Rd/Racecourse Rd	Showground Rd NB	476	104%	130.2	F	44.1
	Racecourse Rd WB	787	108%	174.2	F	74.3
	Showground Rd SB	618	75.1%	17.8	B	11
	Racecourse Rd EB	436	90%	48.9	D	12.4
12: Racecourse Rd/Mann St	Racecourse Rd EB	677	75.5%	30.7	C	12
	Mann St NB Left	197	34%	20.5	B	2.8
	Mann St NB Through	407	70%	45.3	D	12.9

	Mann St SB Left/Th	424	41.4%	17.6	B	8.1
	Mann St SB Right/Th	425	118.1%	371.7	F	55
	Racecourse Rd WB	198	41.2%	43.3	D	5.2
13: Showground Rd/Beane St	Showground Rd NB	534	30%	1.4	A	0.2
	Beane St EB	89	23%	6.2	A	0.2
	Showground Rd SB	309	18%	1.3	A	0.1
14: Showground Rd/Faunce St	Faunce St EB	369	42%	3.5	A	0.4
	Showground Rd NB	340	34%	2.7	A	0.3
	Showground Rd SB	362	38%	3.1	A	0.3
16: Golf Club Car Park	Racecourse Rd EB	395	22%	1.3	A	0.1
	Racecourse Rd WB	836	47%	2.2	A	0.4
	Car Park Exit	157	44%	15.3	B	2.3

Attachment 2 - Architectural Drawings

fitzpatrick+partners

LEGEND

- EXISTING HOSPITAL
- EXISTING LOT BOUNDARIES

1:2000 @ A3

0 20m 50m 100m

Gosford Hospital Redevelopment

SSDA Submission

CLIENT NSW Government Health Infrastructure

PROJECT NORTH

SCALE @ A3 1:2000

PRINT DATE 24/03/2015

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DRAWING SITE PLAN - EXISTING

PROJECT NO. 21421

DRAWING NO. DA-02

ISSUE B

fitzpatrick+partners

LEGEND

- EXISTING HOSPITAL
- BUILDINGS TO BE DEMOLISHED
- DEMOLITION AREAS
- TREES
- EXISTING LOT BOUNDARIES
- SCOPE OF WORKS

NOTE:
REFER HOSPITAL REDEVELOPMENT DRAWINGS FOR FURTHER DETAIL AND STAGING.

1:2000 @ A3

0 20m 50m 100m

Gosford Hospital Redevelopment

SSDA Submission

CLIENT
NSW GOVERNMENT Health Infrastructure

PROJECT NORTH

SCALE @ A3: 1:2000

PRINT DATE: 24/03/2015

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DRAWING: SITE PLAN - DEMOLITION

PROJECT NO.: 21421

DRAWING NO.: DA-03

ISSUE: B

fitzpatrick+partners

LEGEND

- HEALTH AND WELL-BEING PRECINCT
- HOSPITAL REDEVELOPMENT
- EXISTING HOSPITAL
- FUTURE HWP DEVELOPMENT SITE
- EXISTING LOT BOUNDARIES
- SCOPE OF WORKS
- MAJOR SIGNAGE LOCATIONS

NOTE:
REFER HOSPITAL REDEVELOPMENT DRAWINGS FOR FURTHER DETAIL AND STAGING.

1:2000 @ A3

0 20m 50m 100m

Gosford Hospital Redevelopment

SSDA Submission

CLIENT
NSW GOVERNMENT Health Infrastructure

PROJECT NORTH

SCALE @ A3
1:2000

PRINT DATE
24/03/2015

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DRAWING
SITE PLAN - SSDA

PROJECT NO.
21421

DRAWING NO.
DA-04

ISSUE
B

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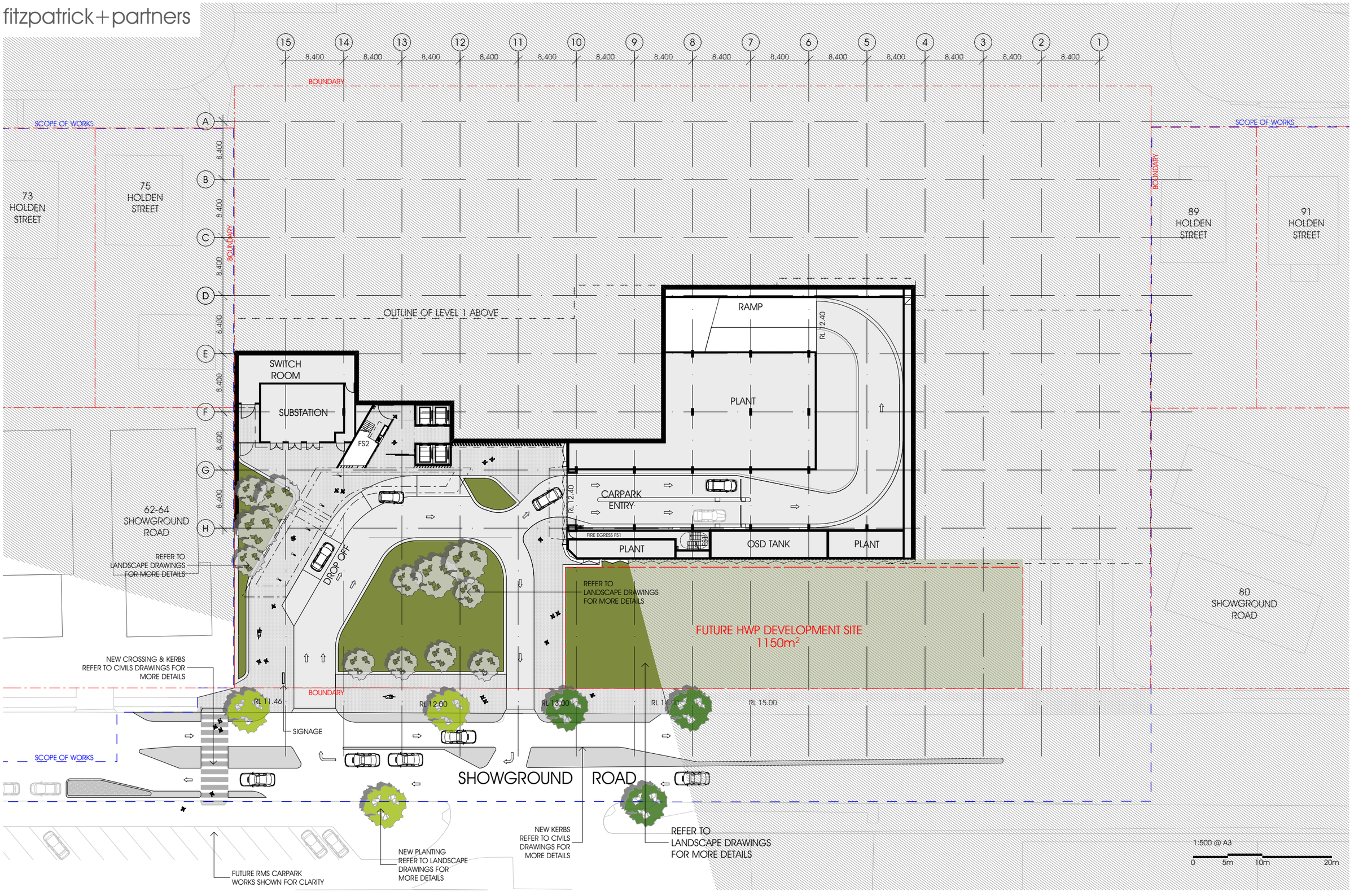

Gosford Hospital Redevelopment

SSDA Submission

CLIENT

NSW GOVERNMENT Health Infrastructure

PROJECT NORTH

SCALE @ A3: 1:500

PRINT DATE: 24/03/2015

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DRAWING: GROUND LEVEL

PROJECT NO.: 21421

DRAWING NO.: DA-05

ISSUE: B

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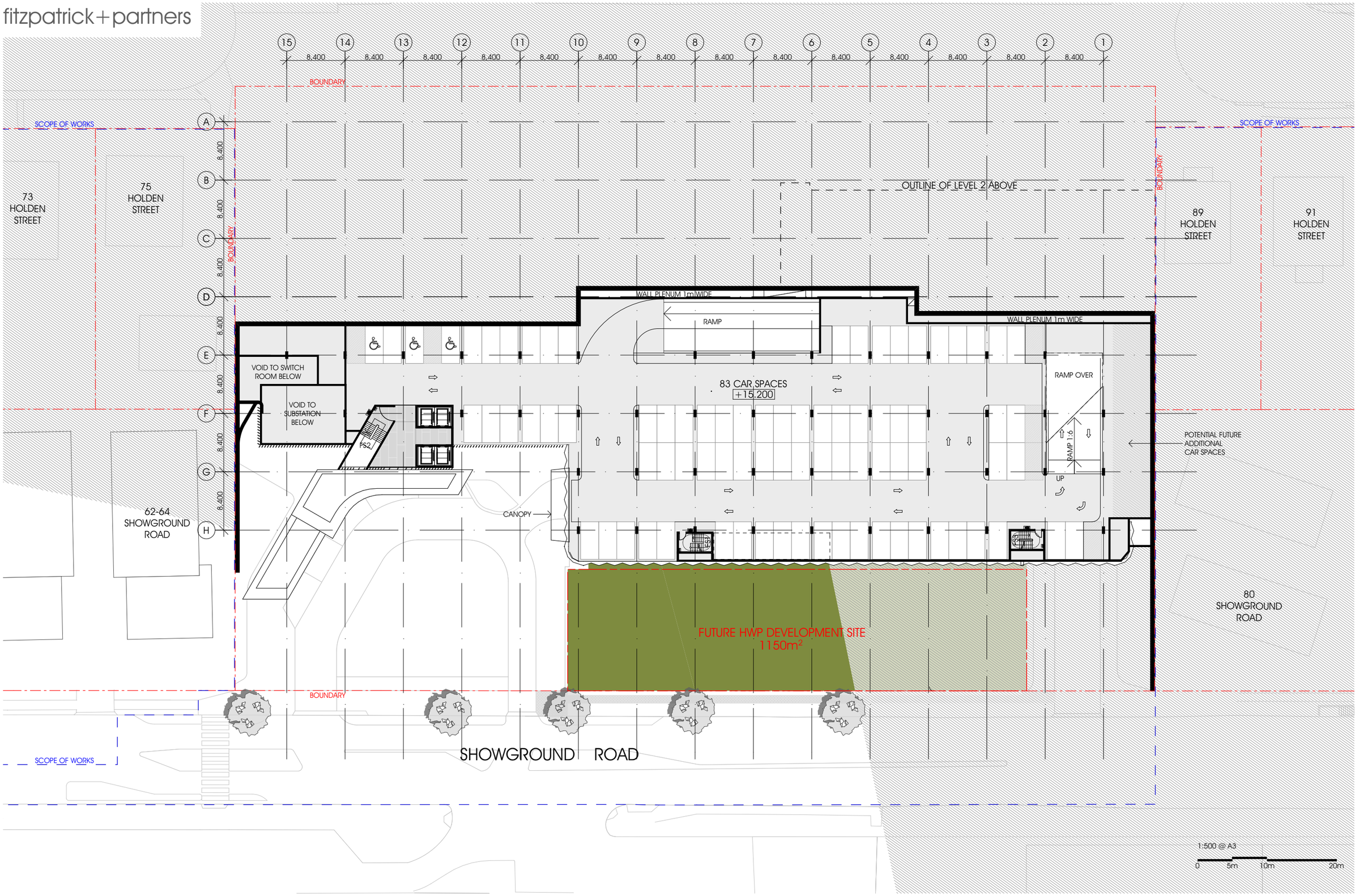

Gosford Hospital Redevelopment

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NSW GOVERNMENT Health Infrastructure

PROJECT NORTH

SCALE @ A3
1:500

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DRAWING
LEVEL 1

PROJECT NO.
21421

DRAWING NO.
DA-06

ISSUE
B

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15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

8,400

BOUNDARY

SCOPE OF WORKS

A B C D E F G H

73 HOLDEN STREET

75 HOLDEN STREET

62-64 SHOWGROUND ROAD

OUTLINE OF LEVEL 3 ABOVE

WALL PLENUM 2m WIDE

WALL PLENUM 1m WIDE

SMALL CAR SPACE

FS1

FS2

FS3

FS4

TRAFFIC TO & FROM L1

DN

UP

RAMP 1:8

RAMP 1:6

RAMP

120 CAR SPACE
+18.000

POTENTIAL FUTURE ADDITIONAL CAR SPACES

89 HOLDEN STREET

91 HOLDEN STREET

80 SHOWGROUND ROAD

+18.00
ONE-WAY EXIT

CANOPY OVER

FUTURE HWP DEVELOPMENT SITE
1150m²

NEW PATHWAY

18.00

18.50

20.33

NEW STAIRS TO REPLACE EXISTING

EXISTING FOOTPATH

SHOWGROUND ROAD

NEW KERBS REFER TO CIVILS DRAWINGS FOR MORE DETAILS

1:500 @ A3

0 5m 10m 20m

Gosford Hospital Redevelopment

SSDA Submission

CLIENT

NSW GOVERNMENT Health Infrastructure

PROJECT NORTH

SCALE @ A3 1:500

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DRAWING LEVEL 2

PROJECT NO. 21421

DRAWING NO. DA-07

ISSUE B

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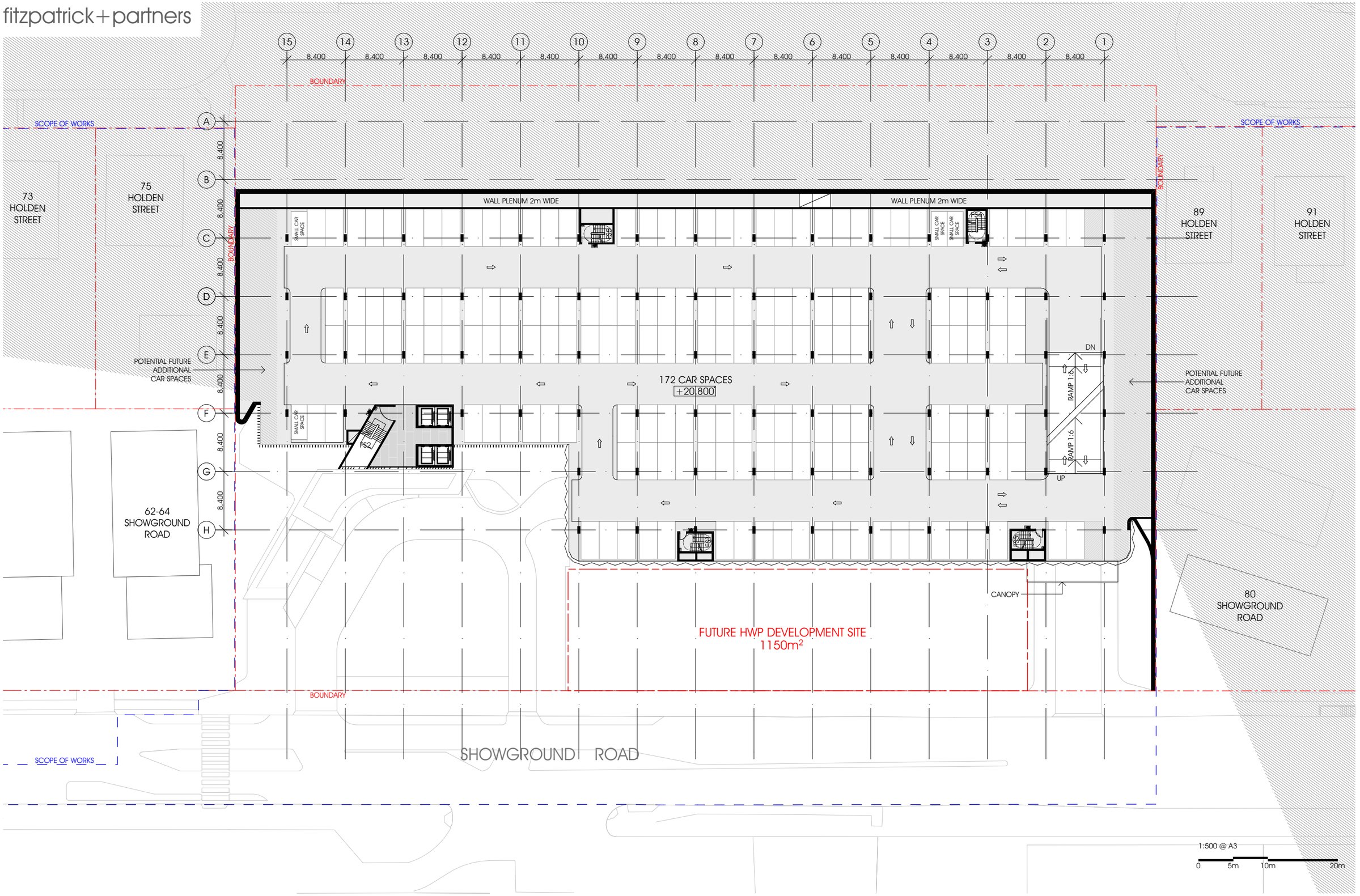

Gosford Hospital Redevelopment

SSDA Submission

CLIENT NSW GOVERNMENT Health Infrastructure

PROJECT NORTH

SCALE @ A3 1:500

PRINT DATE 24/03/2015

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DRAWING LEVEL 3

PROJECT NO. 21421

DRAWING NO. DA-08

ISSUE B

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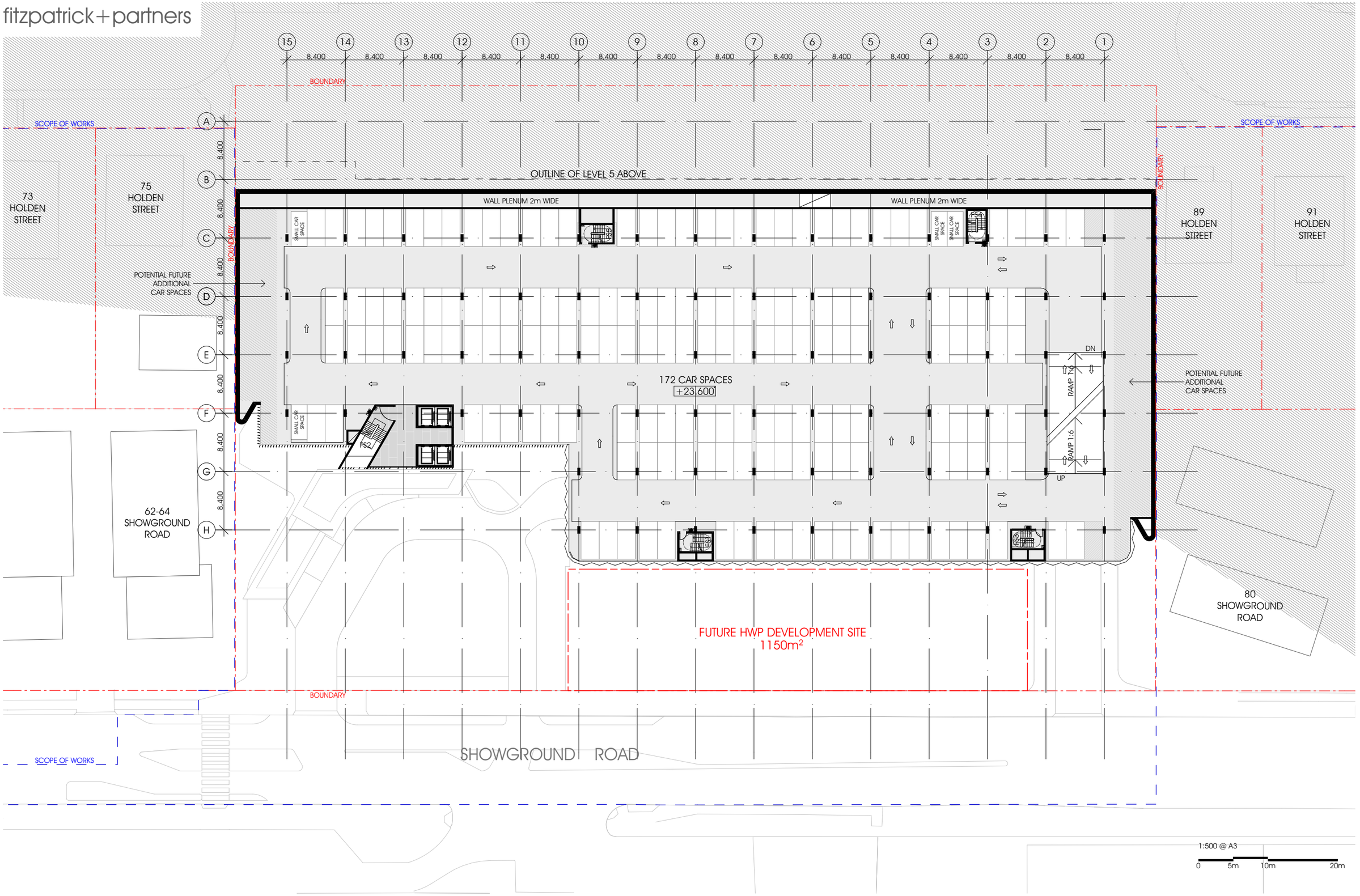

Gosford Hospital Redevelopment

SSDA Submission

CLIENT NSW GOVERNMENT Health Infrastructure

PROJECT NORTH

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DRAWING LEVEL 4

PROJECT NO. 21421

DRAWING NO. DA-09

ISSUE B

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15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

8,400

BOUNDARY

SCOPE OF WORKS

A B C D E F G H

73 HOLDEN STREET

75 HOLDEN STREET

62-64 SHOWGROUND ROAD

WALL PLENUM 3.5m WIDE

LIFT PITS

SMALL CAR SPACE

FS1

FS2

C/P EXHAUST

FAN ROOM

89 HOLDEN STREET

91 HOLDEN STREET

80 SHOWGROUND ROAD

POTENTIAL FUTURE ADDITIONAL CAR SPACES

166 CAR SPACES

+26.400

RAMP 1:6

DN

UP

FUTURE HWP DEVELOPMENT SITE
1150m^2

SHOWGROUND ROAD

1:500 @ A3

0 5m 10m 20m

Gosford Hospital Redevelopment

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PROJECT NORTH

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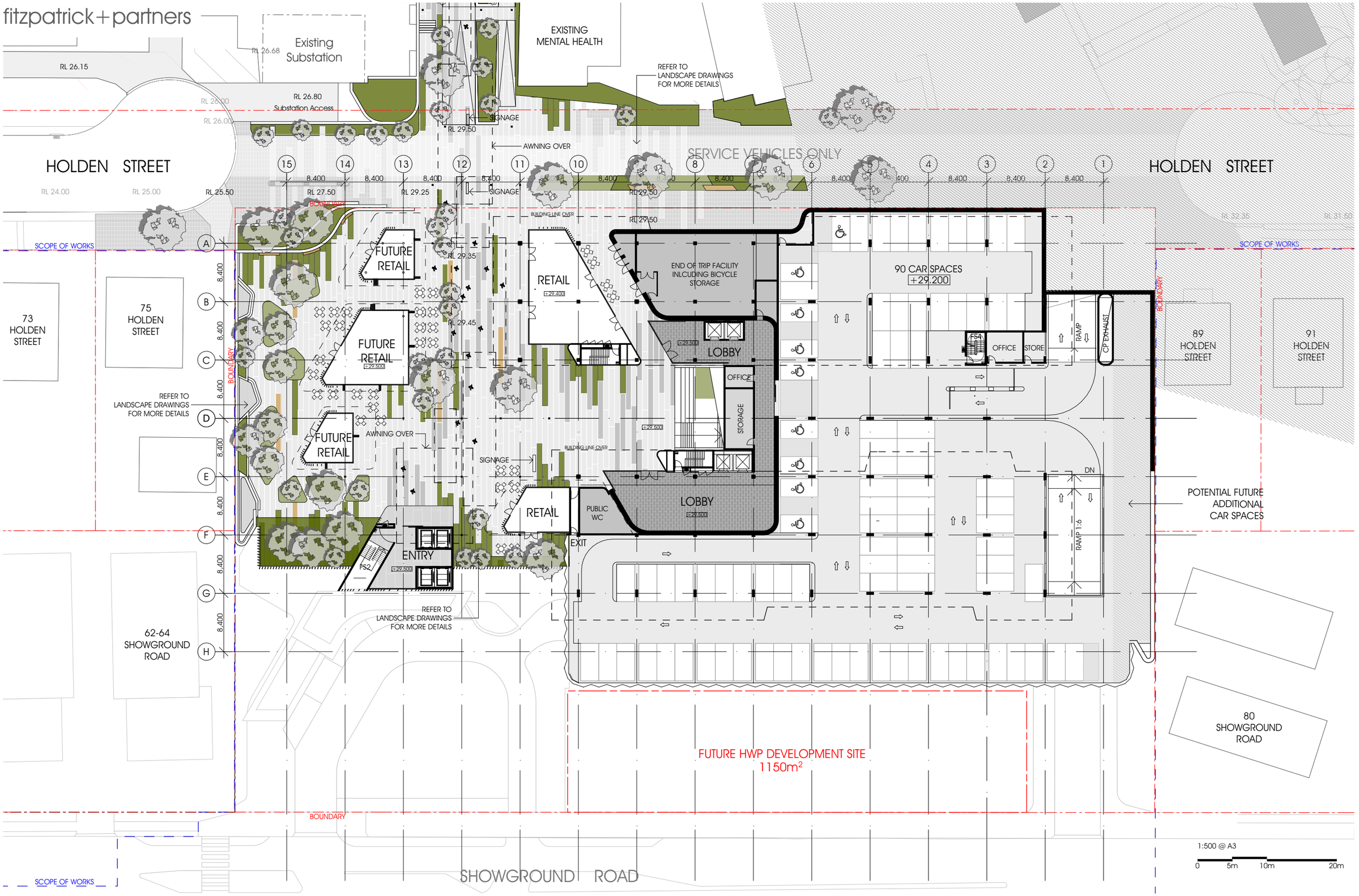
DRAWING LEVEL 5

PROJECT NO. 21421

DRAWING NO. DA-10

ISSUE B

fitzpatrick+partners



Gosford Hospital Redevelopment

SSDA Submission

CLIENT
NSW GOVERNMENT Health Infrastructure

PROJECT NORTH

SCALE @ A3
1:500

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24/03/2015

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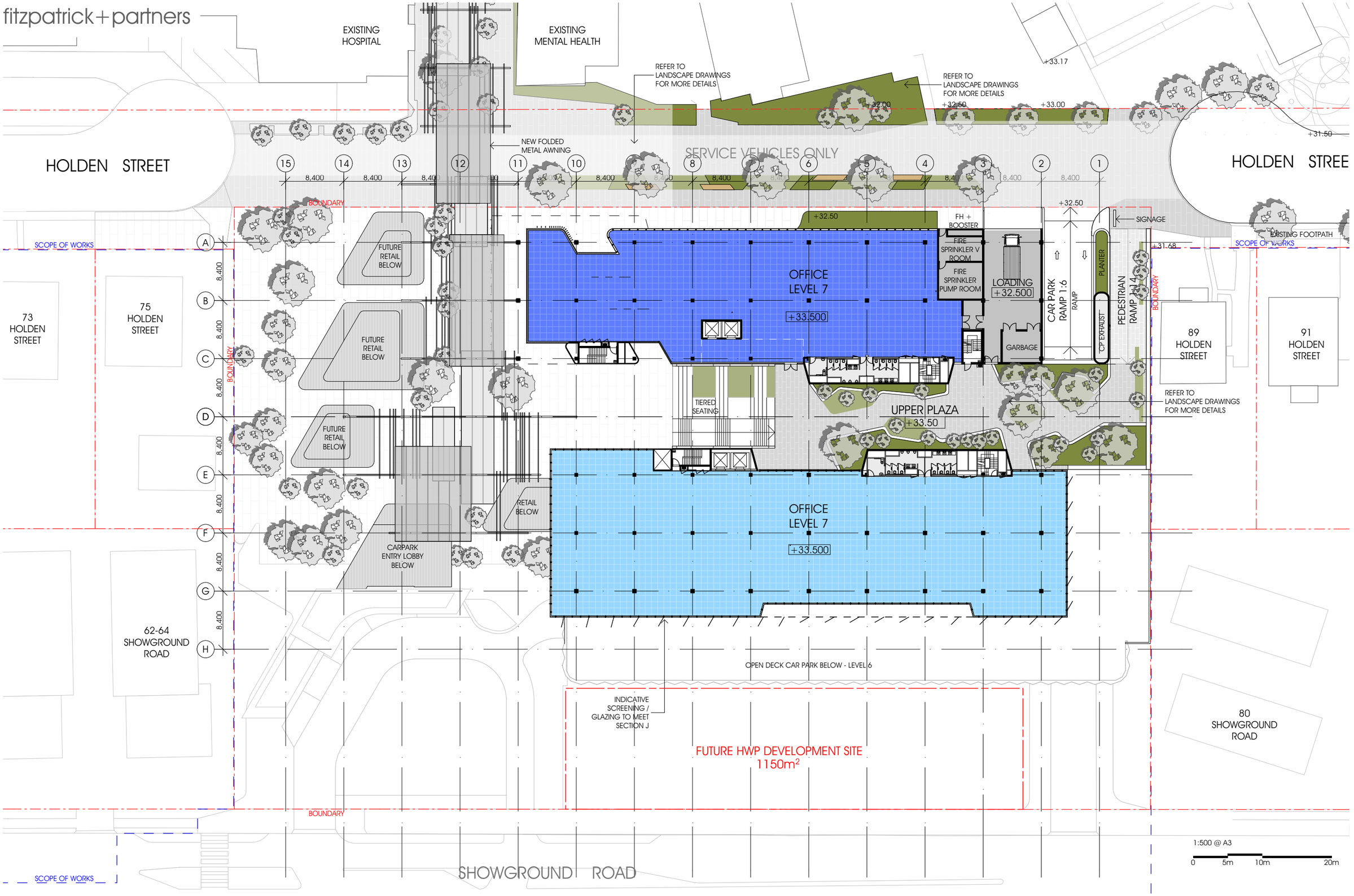
DRAWING
LEVEL 6 PLAZA / LOBBY

PROJECT NO.
21421

DRAWING NO.
DA-11

ISSUE
B

fitzpatrick+partners



Gosford Hospital Redevelopment

SSDA Submission

Drawings show design intent only. Shop drawings are to be provided for approval prior to construction or manufacture.
Inconsistencies are to be reported to fitzpatrick + partners.

CLIENT
NSW GOVERNMENT Health Infrastructure

PROJECT NORTH

SCALE @ A3
1:500

PRINT DATE
24/03/2015

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DRAWING
LEVEL 7

PROJECT NO.
21421

DRAWING NO.
DA-12

ISSUE
B

Attachment 3 - Northern Traffic Planning & Engineering Report

SIDRA Intersection Performance Assessment

Prepared by NTPE 17th April 2015

Racecourse Rd/Central Coast Hwy

Summary of Worst Turning Movements based on Queues

Approach	Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
2014 Existing Traffic Flows - Existing Layout												
AM West: Central Coast Hwy (West)	11	T1	1373	1.9	0.878	33.4	LOS C	34.2	243	0.97	0.88	38.8
PM West: Central Coast Hwy (West)	11	T1	2020	1.8	1.006	66.7	LOS E	91.3	648.9	1	1.08	28.7
2014 Existing Traffic Flows with RMS Upgrade												
AM East: Central Coast Hwy (East)	5	T1	1687	3.8	0.852	45.9	LOS D	37	267.1	0.97	0.86	34.3
PM West: Central Coast Hwy (West)	11	T1	2020	1.8	1.001	77.1	LOS E	63	447.9	1	1.04	26.5
2019 1% Growth with RMS Upgrade												
AM East: Central Coast Hwy (East)	5	T1	1771	3.8	0.88	46.9	LOS D	40.1	289.9	0.98	0.88	33.9
PM West: Central Coast Hwy (West)	11	T1	2121	1.8	1.035	102.9	LOS F	75.4	536	1	1.17	22.4
2019 2% Growth with RMS Upgrade												
AM East: Central Coast Hwy (East)	5	T1	1855	3.8	0.908	48	LOS D	43.5	314.5	0.99	0.89	33.6
PM West: Central Coast Hwy (West)	11	T1	2222	1.8	1.069	131	LOS F	88.5	629.4	1	1.31	19.1
2027 1% Growth with RMS Upgrade												
AM East: Central Coast Hwy (East)	5	T1	1906	3.8	0.911	47.9	LOS D	45.3	327.2	0.99	0.9	33.6
PM West: Central Coast Hwy (West)	11	T1	2283	1.8	1.098	156.9	LOS F	99.2	704.8	1	1.42	16.8
2027 2% Growth with RMS Upgrade												
AM East: Central Coast Hwy (East)	5	T1	2126	3.8	1.025	90.8	LOS F	69.6	502.9	1	1.13	24.1
PM West: Central Coast Hwy (West)	11	T1	2545	1.8	1.206	253	LOS F	141	1002.2	1	1.8	11.7

Discussion

These results indicate that the intersection upgrade currently being considered by RMS will marginally improve the performance of the intersection. However, queue lengths on both the Eastern and Western approaches will still exceed 250m.

Predicted traffic flows in 2019 with 2% growth will result in queue lengths increase to approximately 650m similar to those currenly being experienced on the western approach.

By 2027 queue lengths will increase to over 1000m on the western approach.

Conclusion

Traffic growth along this section of the Central Coast Highway will continue put significant presssion on the performance of this intersection during peak periods.
Further upgrades will be necessary to accommodate predicted increases in traffic flows.

Site: Racecourse Rd / Central Coast Hwy AM

Predicted Traffic AM Peak

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Racecourse Rd											
1	L2	11	18.2	0.175	47	LOS D	1	7.7	0.87	0.68	33.5
2	T1	4	0	0.175	41.3	LOS D	1	7.7	0.87	0.68	34.3
3	R2	25	0	0.175	58.7	LOS E	1	7.7	0.93	0.69	30.4
Approach		**40**	**5**	**0.175**	**53.8**	**LOS D**	**1**	**7.7**	**0.91**	**0.68**	**31.6**
East: Central Coast Hwy (East)											
4	L2	42	4.8	0.752	36.6	LOS D	26.6	192.4	0.9	0.81	38.8
5	T1	1687	3.8	0.752	30.8	LOS C	26.7	193.1	0.89	0.8	39.8
6	R2	58	3.4	0.391	61.5	LOS E	3.1	22.4	0.96	0.75	29.5
Approach		**1787**	**3.8**	**0.752**	**31.9**	**LOS C**	**26.7**	**193.1**	**0.9**	**0.8**	**39.3**
North: Racecourse Rd											
7	L2	35	5.7	0.405	41.2	LOS D	7.5	55.2	0.87	0.79	35.2
8	T1	6	0	0.405	35.6	LOS D	7.5	55.2	0.87	0.79	35.9
9	R2	301	7.3	0.405	43.8	LOS D	7.7	57.6	0.87	0.79	34.6
Approach		**342**	**7**	**0.405**	**43.4**	**LOS D**	**7.7**	**57.6**	**0.87**	**0.79**	**34.7**
West: Central Coast Hwy (West)											
10	L2	477	5.5	0.359	6.2	LOS A	2.3	16.7	0.17	0.63	52.9
11	T1	1373	1.9	0.878	33.4	LOS C	34.2	243	0.97	0.88	38.8
12	R2	29	6.9	0.2	60.2	LOS E	1.5	11.3	0.94	0.72	29.8
Approach		**1879**	**2.9**	**0.878**	**26.9**	**LOS C**	**34.2**	**243**	**0.77**	**0.81**	**41.4**

Predicted Traffic PM Peak

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Racecourse Rd											
1	L2	14	0	0.367	47.3	LOS D	1.5	10.5	0.98	0.74	33.6
2	T1	6	0	0.367	41.8	LOS D	1.5	10.5	0.98	0.74	34.1
3	R2	41	0	0.367	74.5	LOS E	2.1	14.5	0.98	0.72	26.9
Approach		**61**	**0**	**0.367**	**65**	**LOS E**	**2.1**	**14.5**	**0.98**	**0.73**	**28.8**
East: Central Coast Hwy (East)											
4	L2	44	0	0.51	30.7	LOS C	23.9	169.8	0.68	0.63	41.4
5	T1	1506	1.9	0.51	25.1	LOS C	24	170.6	0.68	0.62	42.4
6	R2	14	0	0.162	85	LOS F	1	7.2	0.97	0.68	24.9
Approach		**1564**	**1.8**	**0.51**	**25.8**	**LOS C**	**24**	**170.6**	**0.68**	**0.62**	**42.1**
North: Racecourse Rd											
7	L2	70	0	0.736	74.6	LOS E	20.8	147	0.96	0.91	26.7
8	T1	9	0	0.736	69.1	LOS E	20.8	147	0.96	0.91	27.1
9	R2	540	1.7	0.736	69.8	LOS E	20.9	148.3	0.96	0.87	27.8
Approach		**619**	**1.5**	**0.736**	**70.3**	**LOS E**	**20.9**	**148.3**	**0.96**	**0.88**	**27.7**
West: Central Coast Hwy (West)											
10	L2	365	1.4	0.248	5.9	LOS A	1.5	10.6	0.11	0.61	53.2
11	T1	2020	1.8	1.006	66.7	LOS E	91.3	648.9	1	1.08	28.7
12	R2	35	0	0.404	87	LOS F	2.6	18.5	0.98	0.72	24.5
Approach		**2420**	**1.7**	**1.006**	**57.8**	**LOS E**	**91.3**	**648.9**	**0.87**	**1.01**	**30.7**

Site: Racecourse Rd / Central Coast Hwy AM - RMS Upgrade

Predicted Traffic with RMS Upgrade AM Peak

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Racecourse Rd											
1	L2	11	18.2	0.058	42.5	LOS D	1	7.3	0.74	0.66	35
2	T1	4	0	0.058	36.7	LOS D	1	7.3	0.74	0.66	35.9
3	R2	25	0	0.058	54.6	LOS D	1.1	7.8	0.81	0.69	31.5
Approach		**40**	**5**	**0.058**	**49.4**	**LOS D**	**1.1**	**7.8**	**0.79**	**0.68**	**32.8**
East: Central Coast Hwy (East)											
4	L2	42	4.8	0.852	51.8	LOS D	36.8	266.2	0.97	0.87	33.5
5	T1	1687	3.8	0.852	45.9	LOS D	37	267.1	0.97	0.86	34.3
6	R2	58	3.4	0.41	77.2	LOS E	4	28.5	0.97	0.75	26.4
Approach		**1787**	**3.8**	**0.852**	**47**	**LOS D**	**37**	**267.1**	**0.97**	**0.86**	**33.9**
North: Racecourse Rd											
7	L2	35	5.7	0.041	6	LOS A	0.1	0.8	0.09	0.55	54.4
8	T1	6	0	0.422	54.7	LOS D	9.3	68.7	0.89	0.79	30.3
9	R2	301	7.3	0.422	60.4	LOS E	9.3	68.7	0.89	0.79	30
Approach		**342**	**7**	**0.422**	**54.7**	**LOS D**	**9.3**	**68.7**	**0.81**	**0.76**	**31.5**
West: Central Coast Hwy (West)											
10	L2	477	5.5	0.365	6.1	LOS A	2.3	17	0.14	0.57	54.2
11	T1	1409	4.4	0.691	42.4	LOS D	27.5	199.9	0.89	0.79	35.4
12	R2	29	6.9	0.21	75.5	LOS E	1.9	14.4	0.95	0.72	26.5
Approach		**1915**	**4.7**	**0.691**	**33.8**	**LOS C**	**27.5**	**199.9**	**0.7**	**0.73**	**38.6**

Predicted Traffic with RMS Upgrade PM Peak

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Racecourse Rd											
1	L2	14	0	0.092	49.5	LOS D	1.7	11.8	0.79	0.68	33
2	T1	6	0	0.092	44	LOS D	1.7	11.8	0.79	0.68	33.5
3	R2	41	0	0.092	59.4	LOS E	1.8	12.6	0.83	0.7	30.3
Approach		**61**	**0**	**0.092**	**55.6**	**LOS E**	**1.8**	**12.6**	**0.82**	**0.7**	**31.2**
East: Central Coast Hwy (East)											
4	L2	44	0	0.71	49.2	LOS D	31.8	226	0.89	0.8	34.3
5	T1	1506	1.9	0.71	43.6	LOS D	31.9	227	0.89	0.79	35
6	R2	14	0	0.162	85	LOS F	1	7.2	0.97	0.68	25
Approach		**1564**	**1.8**	**0.71**	**44.1**	**LOS D**	**31.9**	**227**	**0.89**	**0.79**	**34.8**
North: Racecourse Rd											
7	L2	70	0	0.107	22.7	LOS C	2.5	17.3	0.52	0.68	43.8
8	T1	9	0	0.701	57.1	LOS E	18.1	128.9	0.93	0.83	29.7
9	R2	575	2.1	0.701	63.4	LOS E	20.6	146.9	0.94	0.83	29.4
Approach		**654**	**1.8**	**0.701**	**59**	**LOS E**	**20.6**	**146.9**	**0.89**	**0.82**	**30.4**
West: Central Coast Hwy (West)											
10	L2	365	1.4	0.266	6	LOS A	1.5	10.6	0.11	0.56	54.4
11	T1	2020	1.8	1.001	77.1	LOS E	63	447.9	1	1.04	26.5
12	R2	35	0	0.404	87	LOS F	2.6	18.5	0.98	0.72	24.5
Approach		**2420**	**1.7**	**1.001**	**66.5**	**LOS E**	**63**	**447.9**	**0.87**	**0.96**	**28.8**

Site: Racecourse Rd / Central Coast Hwy AM Year 2019 1% Growth - RMS Upgrade

Predicted Traffic with RMS Upgrade AM Peak Year 2019 1% Growth

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Racecourse Rd											
1	L2	11	18.2	0.06	44.8	LOS D	1	7.7	0.75	0.66	34.2
2	T1	4	0	0.06	39	LOS D	1	7.7	0.75	0.66	35.1
3	R2	26	0	0.06	56.2	LOS E	1.2	8.2	0.82	0.69	31.1
Approach		**41**	**4.9**	**0.06**	**51.4**	**LOS D**	**1.2**	**8.2**	**0.8**	**0.68**	**32.2**
East: Central Coast Hwy (East)											
4	L2	44	4.5	0.88	52.9	LOS D	40	288.9	0.99	0.89	33.1
5	T1	1771	3.8	0.88	46.9	LOS D	40.1	289.9	0.98	0.88	33.9
6	R2	61	3.3	0.403	77.7	LOS E	4.2	30.3	0.96	0.75	26.3
Approach		**1876**	**3.8**	**0.88**	**48**	**LOS D**	**40.1**	**289.9**	**0.98**	**0.87**	**33.6**
North: Racecourse Rd											
7	L2	37	5.4	0.044	6	LOS A	0.1	0.8	0.09	0.55	54.4
8	T1	6	0	0.454	56.8	LOS E	10	73.9	0.9	0.79	29.8
9	R2	316	7.3	0.454	62.5	LOS E	10	74.7	0.9	0.79	29.5
Approach		**359**	**7**	**0.454**	**56.6**	**LOS E**	**10**	**74.7**	**0.82**	**0.77**	**31**
West: Central Coast Hwy (West)											
10	L2	501	5.4	0.382	6.1	LOS A	2.5	18.5	0.14	0.57	54.2
11	T1	1479	4.4	0.761	43.3	LOS D	32.4	235.6	0.9	0.8	35.2
12	R2	30	6.7	0.203	76	LOS E	2	15	0.94	0.72	26.4
Approach		**2010**	**4.7**	**0.761**	**34.5**	**LOS C**	**32.4**	**235.6**	**0.71**	**0.74**	**38.4**

Predicted Traffic with RMS Upgrade PM Peak Year 2019 1% Growth

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Racecourse Rd											
1	L2	15	0	0.096	49.6	LOS D	1.8	12.4	0.79	0.69	32.9
2	T1	6	0	0.096	44	LOS D	1.8	12.4	0.79	0.69	33.5
3	R2	43	0	0.096	59.4	LOS E	1.9	13.3	0.83	0.71	30.3
Approach		**64**	**0**	**0.096**	**55.7**	**LOS E**	**1.9**	**13.3**	**0.82**	**0.7**	**31.1**
East: Central Coast Hwy (East)											
4	L2	46	0	0.732	49.1	LOS D	33.7	239	0.9	0.81	34.3
5	T1	1581	1.8	0.732	43.4	LOS D	33.8	240	0.9	0.8	35
6	R2	15	0	0.173	85.2	LOS F	1.1	7.8	0.97	0.69	25
Approach		**1642**	**1.8**	**0.732**	**44**	**LOS D**	**33.8**	**240**	**0.9**	**0.8**	**34.9**
North: Racecourse Rd											
7	L2	74	0	0.116	23.4	LOS C	2.7	18.7	0.53	0.68	43.5
8	T1	9	0	0.711	57.9	LOS E	17.9	127	0.93	0.83	29.5
9	R2	567	1.6	0.711	64.3	LOS E	20.5	145.7	0.94	0.83	29.2
Approach		**650**	**1.4**	**0.711**	**59.5**	**LOS E**	**20.5**	**145.7**	**0.9**	**0.82**	**30.3**
West: Central Coast Hwy (West)											
10	L2	383	1.3	0.278	6	LOS A	1.6	11.4	0.11	0.56	54.4
11	T1	2121	1.8	1.035	102.9	LOS F	75.4	536	1	1.17	22.4
12	R2	37	0	0.427	87.1	LOS F	2.8	19.6	0.98	0.73	24.5
Approach		**2541**	**1.7**	**1.035**	**88.1**	**LOS F**	**75.4**	**536**	**0.87**	**1.07**	**24.6**

Site: Racecourse Rd / Central Coast Hwy AM Year 2027 1% Growth - RMS Upgrade

Predicted Traffic with RMS Upgrade AM Peak Year 2027 1% Growth

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Racecourse Rd											
1	L2	12	16.7	0.068	47.4	LOS D	1.2	8.9	0.77	0.66	33.5
2	T1	5	0	0.068	41.6	LOS D	1.2	8.9	0.77	0.66	34.3
3	R2	28	0	0.068	59.1	LOS E	1.3	9.4	0.83	0.69	30.3
Approach		**45**	**4.4**	**0.068**	**54.1**	**LOS D**	**1.3**	**9.4**	**0.8**	**0.68**	**31.5**
East: Central Coast Hwy (East)											
4	L2	47	4.3	0.911	54	LOS D	45.1	326	1	0.9	32.8
5	T1	1906	3.8	0.911	47.9	LOS D	45.3	327.2	0.99	0.9	33.6
6	R2	65	3.1	0.41	79.6	LOS E	4.6	33.2	0.96	0.76	26
Approach		**2018**	**3.8**	**0.911**	**49.1**	**LOS D**	**45.3**	**327.2**	**0.99**	**0.89**	**33.3**
North: Racecourse Rd											
7	L2	39	5.1	0.048	5.9	LOS A	0.1	0.9	0.09	0.55	54.4
8	T1	7	0	0.513	60.2	LOS E	11.2	82.8	0.92	0.8	29
9	R2	340	7.4	0.513	66	LOS E	11.5	85.8	0.92	0.8	28.7
Approach		**386**	**7**	**0.513**	**59.8**	**LOS E**	**11.5**	**85.8**	**0.83**	**0.78**	**30.2**
West: Central Coast Hwy (West)											
10	L2	539	5.4	0.409	6.1	LOS A	2.9	21.1	0.14	0.57	54.2
11	T1	1592	4.4	0.816	44.1	LOS D	38.2	277.4	0.91	0.81	34.9
12	R2	33	6.1	0.212	77.7	LOS E	2.3	16.9	0.94	0.73	26.1
Approach		**2164**	**4.7**	**0.816**	**35.2**	**LOS D**	**38.2**	**277.4**	**0.72**	**0.75**	**38.1**

Predicted Traffic with RMS Upgrade PM Peak Year 2027 1% Growth

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Racecourse Rd											
1	L2	16	0	0.104	48.8	LOS D	1.9	13.2	0.78	0.69	33.2
2	T1	7	0	0.104	43.3	LOS D	1.9	13.2	0.78	0.69	33.7
3	R2	46	0	0.104	59.4	LOS E	2	14.3	0.83	0.71	30.3
Approach		**69**	**0**	**0.104**	**55.3**	**LOS E**	**2**	**14.3**	**0.82**	**0.7**	**31.2**
East: Central Coast Hwy (East)											
4	L2	50	0	0.776	49.5	LOS D	37	262.9	0.92	0.83	34.2
5	T1	1702	1.9	0.776	43.8	LOS D	37.1	264	0.92	0.83	34.9
6	R2	18	0	0.208	85.5	LOS F	1.3	9.3	0.97	0.69	24.9
Approach		**1770**	**1.8**	**0.776**	**44.4**	**LOS D**	**37.1**	**264**	**0.92**	**0.82**	**34.7**
North: Racecourse Rd											
7	L2	79	0	0.126	24.1	LOS C	2.9	20.5	0.55	0.69	43.1
8	T1	10	0	0.792	59.8	LOS E	19.6	139	0.95	0.84	29.1
9	R2	610	1.6	0.792	66.3	LOS E	22.8	162	0.97	0.85	28.7
Approach		**699**	**1.4**	**0.792**	**61.5**	**LOS E**	**22.8**	**162**	**0.92**	**0.83**	**29.8**
West: Central Coast Hwy (West)											
10	L2	413	1.5	0.3	6	LOS A	1.8	12.7	0.12	0.56	54.4
11	T1	2283	1.8	1.098	156.9	LOS F	99.2	704.8	1	1.42	16.8
12	R2	40	0	0.462	87.3	LOS F	3	21.2	0.99	0.73	24.5
Approach		**2736**	**1.7**	**1.098**	**133.1**	**LOS F**	**99.2**	**704.8**	**0.87**	**1.28**	**18.9**

Site: Racecourse Rd / Central Coast Hwy AM Year 2019 2% Growth - RMS Upgrade

Predicted Traffic with RMS Upgrade AM Peak Year 2019 2% Growth

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Racecourse Rd											
1	L2	12	16.7	0.066	45.6	LOS D	1.1	8.5	0.75	0.67	34
2	T1	4	0	0.066	39.8	LOS D	1.1	8.5	0.75	0.67	34.8
3	R2	28	0	0.066	57.6	LOS E	1.3	9	0.82	0.69	30.7
Approach		**44**	**4.5**	**0.066**	**52.7**	**LOS D**	**1.3**	**9**	**0.8**	**0.68**	**31.9**
East: Central Coast Hwy (East)											
4	L2	47	6.4	0.908	54	LOS D	43.3	313.4	1	0.9	32.8
5	T1	1855	3.8	0.908	48	LOS D	43.5	314.5	0.99	0.89	33.6
6	R2	64	3.1	0.398	78.3	LOS E	4.5	32.2	0.96	0.76	26.2
Approach		**1966**	**3.8**	**0.908**	**49.1**	**LOS D**	**43.5**	**314.5**	**0.99**	**0.89**	**33.3**
North: Racecourse Rd											
7	L2	38	5.3	0.046	5.9	LOS A	0.1	0.9	0.09	0.55	54.4
8	T1	7	0	0.49	58.8	LOS E	10.7	79.4	0.91	0.8	29.4
9	R2	331	7.3	0.49	64.6	LOS E	11	81.5	0.91	0.8	29.1
Approach		**376**	**6.9**	**0.49**	**58.6**	**LOS E**	**11**	**81.5**	**0.83**	**0.77**	**30.5**
West: Central Coast Hwy (West)											
10	L2	525	5.5	0.4	6.1	LOS A	2.8	20.2	0.14	0.57	54.2
11	T1	1550	4.4	0.808	44.2	LOS D	36.5	265.2	0.91	0.81	34.8
12	R2	32	6.3	0.204	76.5	LOS E	2.2	16.1	0.94	0.72	26.3
Approach		**2107**	**4.7**	**0.808**	**35.2**	**LOS D**	**36.5**	**265.2**	**0.72**	**0.75**	**38.1**

Predicted Traffic with RMS Upgrade PM Peak Year 2019 2% Growth

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Racecourse Rd											
1	L2	15	0	0.101	49.6	LOS D	1.9	13	0.79	0.69	33
2	T1	7	0	0.101	44.1	LOS D	1.9	13	0.79	0.69	33.5
3	R2	45	0	0.101	59.5	LOS E	2	13.9	0.83	0.71	30.2
Approach		**67**	**0**	**0.101**	**55.7**	**LOS E**	**2**	**13.9**	**0.82**	**0.7**	**31.1**
East: Central Coast Hwy (East)											
4	L2	48	0	0.755	49	LOS D	35.5	252.5	0.91	0.82	34.4
5	T1	1657	1.9	0.755	43.3	LOS D	35.7	253.6	0.91	0.81	35.1
6	R2	15	0	0.173	85.2	LOS F	1.1	7.8	0.97	0.69	25
Approach		**1720**	**1.8**	**0.755**	**43.8**	**LOS D**	**35.7**	**253.6**	**0.91**	**0.81**	**34.9**
North: Racecourse Rd											
7	L2	77	0	0.123	24	LOS C	2.8	19.9	0.55	0.69	43.1
8	T1	10	0	0.77	59.5	LOS E	19	135.1	0.95	0.83	29.2
9	R2	594	1.7	0.77	66	LOS E	22.1	156.6	0.96	0.84	28.8
Approach		**681**	**1.5**	**0.77**	**61.1**	**LOS E**	**22.1**	**156.6**	**0.91**	**0.82**	**29.9**
West: Central Coast Hwy (West)											
10	L2	402	1.5	0.291	6	LOS A	1.7	12.2	0.12	0.56	54.4
11	T1	2222	1.8	1.069	131	LOS F	88.5	629.4	1	1.31	19.1
12	R2	39	0	0.45	87.3	LOS F	3	20.7	0.99	0.73	24.5
Approach		**2663**	**1.7**	**1.069**	**111.5**	**LOS F**	**88.5**	**629.4**	**0.87**	**1.19**	**21.3**

Site: Racecourse Rd / Central Coast Hwy AM Year 2027 2% Growth - RMS Upgrade

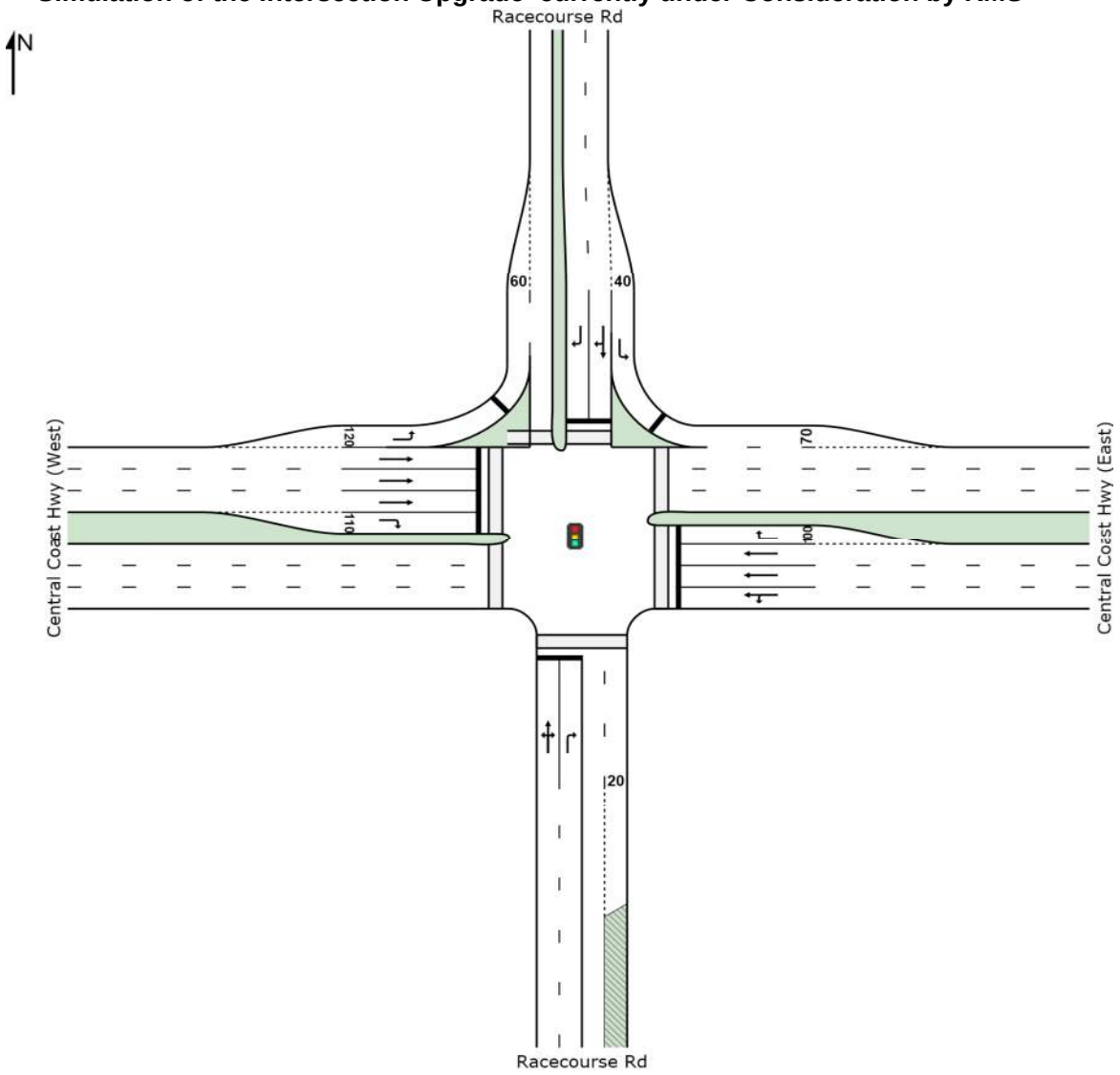
Predicted Traffic with RMS Upgrade AM Peak Year 2027 2% Growth

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Racecourse Rd											
1	L2	14	21.4	0.078	34.3	LOS C	1	7.5	0.81	0.69	37.9
2	T1	5	0	0.078	28.5	LOS C	1	7.5	0.81	0.69	39
3	R2	32	0	0.078	56.9	LOS E	1.5	10.8	0.84	0.7	30.9
Approach		**51**	**5.9**	**0.078**	**47.9**	**LOS D**	**1.5**	**10.8**	**0.83**	**0.7**	**33.3**
East: Central Coast Hwy (East)											
4	L2	53	5.7	1.025	95.4	LOS F	69.2	501.1	1	1.12	23.9
5	T1	2126	3.8	1.025	90.8	LOS F	69.6	502.9	1	1.13	24.1
6	R2	74	4.1	0.439	79.4	LOS E	5.3	38.2	0.96	0.76	26
Approach		**2253**	**3.9**	**1.025**	**90.5**	**LOS F**	**69.6**	**502.9**	**1**	**1.12**	**24.2**
North: Racecourse Rd											
7	L2	45	6.7	0.056	6.1	LOS A	0.2	1.4	0.1	0.55	54.3
8	T1	8	0	0.584	61.5	LOS E	12.6	93.4	0.93	0.81	28.7
9	R2	380	7.4	0.584	67.5	LOS E	13.4	99.5	0.93	0.81	28.4
Approach		**433**	**7.2**	**0.584**	**61**	**LOS E**	**13.4**	**99.5**	**0.85**	**0.78**	**29.9**
West: Central Coast Hwy (West)											
10	L2	601	5.5	0.454	6.1	LOS A	3.5	25.9	0.15	0.57	54.2
11	T1	1775	4.4	0.915	47	LOS D	45.4	330	0.96	0.86	33.9
12	R2	37	8.1	0.226	77.4	LOS E	2.6	19.3	0.94	0.73	26.1
Approach		**2413**	**4.7**	**0.915**	**37.3**	**LOS D**	**45.4**	**330**	**0.76**	**0.79**	**37.3**

Predicted Traffic with RMS Upgrade PM Peak Year 2027 2% Growth

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Racecourse Rd											
1	L2	18	0	0.117	49	LOS D	2.1	15	0.79	0.69	33.1
2	T1	8	0	0.117	43.5	LOS D	2.1	15	0.79	0.69	33.7
3	R2	52	0	0.117	59.6	LOS E	2.3	16.3	0.84	0.71	30.2
Approach		**78**	**0**	**0.117**	**55.5**	**LOS E**	**2.3**	**16.3**	**0.82**	**0.71**	**31.2**
East: Central Coast Hwy (East)											
4	L2	55	0	0.85	50.8	LOS D	42.9	304.6	0.96	0.87	33.8
5	T1	1897	1.8	0.85	45.1	LOS D	43	306	0.96	0.87	34.5
6	R2	18	0	0.208	85.5	LOS F	1.3	9.3	0.97	0.69	24.9
Approach		**1970**	**1.8**	**0.85**	**45.7**	**LOS D**	**43**	**306**	**0.96**	**0.87**	**34.3**
North: Racecourse Rd											
7	L2	88	0	0.144	25	LOS C	3.4	23.6	0.56	0.7	42.6
8	T1	11	0	0.916	62.2	LOS E	22.3	158.3	0.98	0.85	28.6
9	R2	680	1.6	0.916	69	LOS E	26.6	188.9	0.99	0.86	28.1
Approach		**779**	**1.4**	**0.916**	**63.9**	**LOS E**	**26.6**	**188.9**	**0.94**	**0.84**	**29.3**
West: Central Coast Hwy (West)											
10	L2	460	1.3	0.333	6	LOS A	2.1	15	0.12	0.57	54.4
11	T1	2545	1.8	1.206	253	LOS F	141	1002.2	1	1.8	11.7
12	R2	44	0	0.508	87.6	LOS F	3.3	23.4	0.99	0.74	24.4
Approach		**3049**	**1.7**	**1.206**	**213.4**	**LOS F**	**141**	**1002.2**	**0.87**	**1.6**	**13.4**

Simulation of the Intersection Upgrade currently under Consideration by RMS



Sisnal Phasing Used to Assess Intersection Performance

PHASING SUMMARY

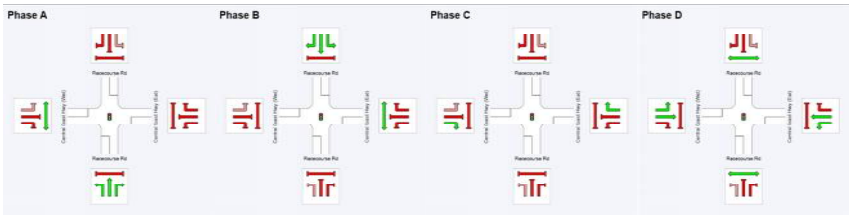
Site: Racecourse Rd / Central Coast Hwy PM Year 2027 2% Growth - RMS Upgrade

Predicted Traffic with RMS Upgrade
PM Peak Year 2027 2% Growth
Signals - Actuated Cycle Time = 150 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Split Phasing
Movement Class: All Movement Classes
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Reference Phase	No	No	No	Yes
Phase Change Time (sec)	66	98	137	0
Green Time (sec)	26	33	7	60
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	32	39	13	66
Phase Split	21 %	26 %	9 %	44 %



	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class Running		Other Movement Class Stopped
	Mixed Running & Stopped Movement Classes		
	Undetected Movement		Phase Transition Applied

Central Coast Highway at Racecourse Road West Gosford - Proposed Intersection Improvements