# Showground Precinct Planning Proposal

## Traffic Impact Assessment

Prepared for:

Showground Corporation Pty Ltd

8/11/2017

The Transport Planning Partnership

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Client: Showground Corporation Pty Ltd

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**Quality Record**

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Imagine on the front cover of this report obtained from the Showground Station Precinct Proposal prepared by the Department of Planning and Environment

# Table of Contents

# Tables



# Figures

# 1 Introduction

This traffic assessment report has been prepared to accompany a planning proposal to the Department of Planning and Environment (DoPE) and The Hills Shire Council (THSC) in relation to two proposals across properties within the Showground Station Precinct.

The Showground Station Precinct is one of the urban renewal sites identified by the DoPE and is supported by THSC. The Showground Station Precinct was developed as part of the North West Rail Link Corridor Strategy. Stage 1 of the Sydney Metro North West project is anticipated to open in 2019. The precincts will provide new homes, jobs, shops and public domain places around station sites along the rail link that will run from Epping to Rouse Hill.

The Showground Station Precinct has been identified to provide approximately 5,000 new homes and up to 10,000m$^2$ of retail floor area with new 2,300 jobs by 2036.

Showground Corporation controls a number of key sites located within the Showground Station Precinct. Showground Corporation has prepared a planning proposal which seeks to include incentive-based provisions in The Hills Local Environmental Plan 2012 to drive the delivery of both transit-oriented developments and also improvements to the public domain.

The Transport Planning Partnership (TTPP) has been commissioned by the Showground Corporation to undertake a traffic and parking impact assessment of the proposal. This report contains the findings of the traffic and parking assessment.

The remainder of the report is set out as follows:

- Chapter 2 discusses the existing road network conditions surrounding the site
- Chapter 3 describes the Showground Station Precinct proposal
- Chapter 4 describes the proposed development uplift
- Chapter 5 discusses the potential traffic effects of the proposed development uplift
- Chapter 6 assesses the parking requirements, and
- Chapter 7 presents the summary and conclusions of the investigation.

# 2 Existing Conditions

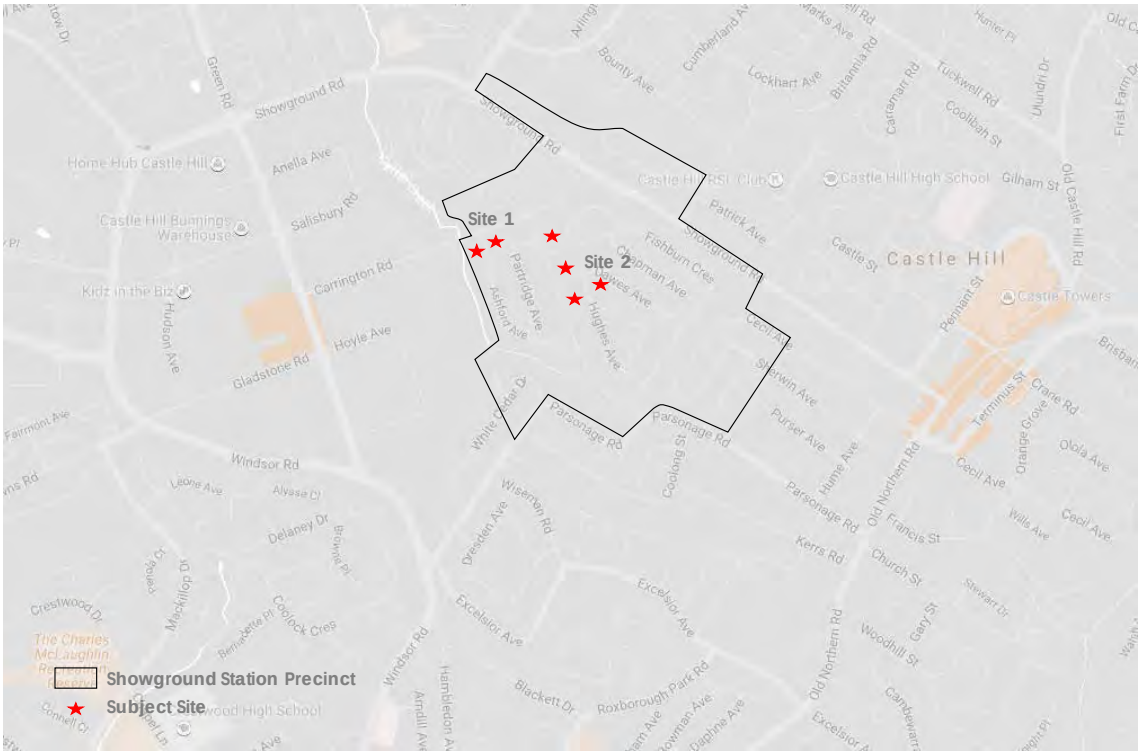
## 2.1 Site Description

The proposal affects key sites situated within the Showground Station Precinct which will be undergoing an urban renewal process over the next 20 years as part of the Sydney Metro Northwest Priority Precincts. The sites include:

- Site 1 is bound by Carrington Road to the north, Partridge Avenue to the east, a proposed road and an adjacent property to the south, and an adjacent property to the west. The site is divided into the eastern and western portions by Ashford Avenue.
- Site 2 is generally bound by Carrington Road to the north, Sexton Avenue/Dawes Avenue/Hughes Avenue to east and north-east, Cadman Crescent to the south and south-east and Middleton Avenue to the west.

The location of the sites and their surrounding environs is shown in Figure 2.1, and Figure 2.2 shows the sites on aerial imagery.

**Figure 2.1: Subject Site and Its Environs**




*Base Map Source: Google Maps Australia*

**Figure 2.2: Location of the Subject Sites within the Showground Station Precinct**


*Source: Showground Corporation Pty Ltd*

## 2.2 Road Network

The sites are primarily serviced by Carrington Road which is classified as a RMS regional road, and also by Showground Road which is a key arterial road in the vicinity of the sites. The sites are accessible from many regions of the metropolitan area via the Westlink M7, M2 Hills Motorway, Windsor Road and Norwest Boulevard. The road network in this area also comprises a number of local streets providing direct access to the surrounding residential land uses.

Below is a description of the key roads in the local road network.

Showground Road is a declared RMS State Road (MR157) and is located east of the sites. Currently Showground Road is a four lane divided road north of Carrington Road and becomes a two-lane, two-way road south of Carrington Road. It is undergoing an upgrade between Carrington Road and Old Northern Road to a four lane divided road to increase traffic capacity to meet predicted traffic growth from development in the area. The posted speed limit along Showground Road is 60km/h.

Carrington Road is a declared RMS regional road (RR7471) and is located in the northern boundary of the Showground Station Precinct. Carrington Road is a 12m wide two-lane two-way undivided road generally with no parking restrictions on both sides of the road. The posted speed limit along Carrington Road is 50km/h.

Middleton Avenue is a local road under the jurisdiction of The Hills Shire Council. Middleton Avenue is a 9m wide two-lane, two-way road with unrestricted parking on both sides of the road. Middleton Avenue connects with Carrington Road at its northern end to form a three-way, single lane roundabout. At the southern end, it connects with Parsonage Road to form a priority control intersection. The posted speed limit along Middleton Avenue is 50 km/h.

Ashford Avenue is a local road under the jurisdiction of The Hills Shire Council. Ashford Avenue is a 7m wide two-lane, two-way road with unrestricted parking on both sides of the road. A half road closure is provided at the northern end of Ashford Avenue, as such only left turn movement is permitted from Carrington Road into Ashford Avenue. The posted speed limit along Ashford Avenue is 50km/h.

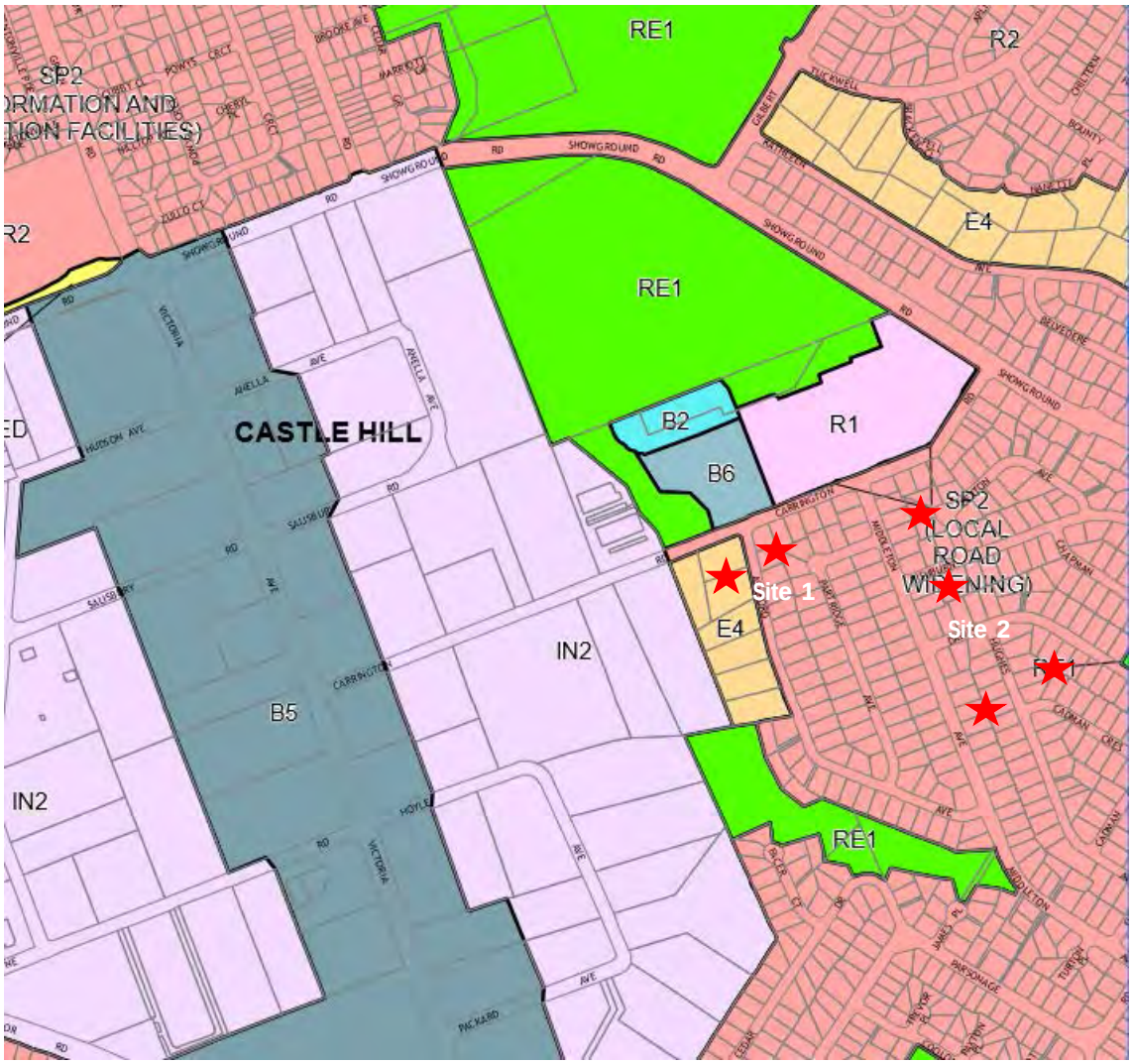
Parsonage Road is a collector road under the jurisdiction of The Hills Shire Council. Parsonage Road is a 9m wide two-lane, two-way road with unrestricted parking on both sides of the road. The posted speed limit along Parsonage Road is 50km/h.

## 2.3 Current Land Use

The subject sites are currently zoned as R2 Low Density Residential and E4 Environmental Living. Both zones permit dwelling houses in accordance with The Hills Shire Council Local Environmental Plan 2012.

Figure 2.3 shows the existing zoning of the sites.

**Figure 2.3: Current Land Use**




*Source: The Hills Shire Council LEP 2012*

## 2.4 Traffic Flows

Traffic count surveys have been undertaken on Thursday 1 September 2016 from 4:00pm to 6:00pm, and on Saturday 3 September 2016 from 11:00am to 1:00pm. The surveys were conducted at the following key intersections:

- Showground Road-Carrington Road
- Carrington Road-Middleton Road
- Carrington Road-Ashford Road, and
- Middleton Road-Parsonage Road.

Figure 2.4 presents the existing peak hour turning movement volumes at the surveyed intersections recorded on Thursday evening and Saturday mid-day.

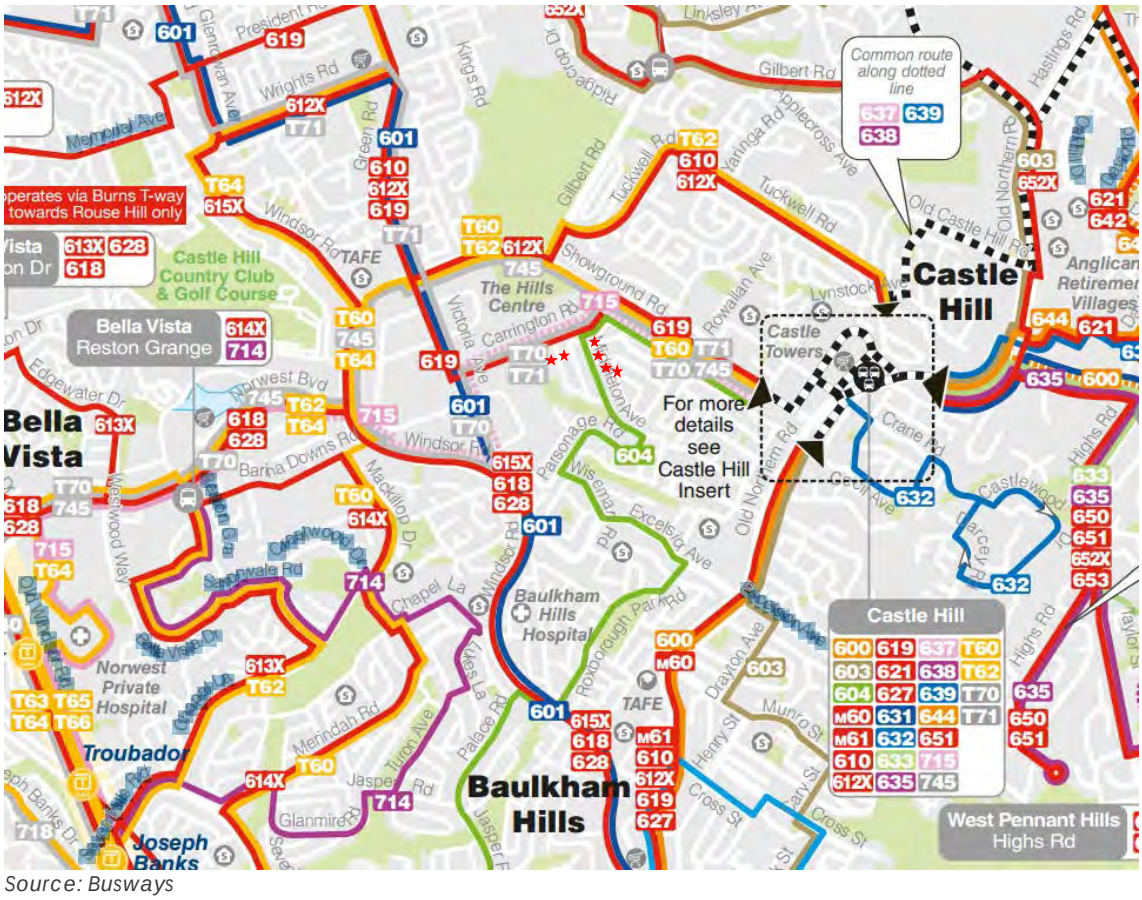
**Figure 2.4: Intersection Turning Movement Flows (2016 Existing)**

Based on the intersection turning movement counts, the network peak hours are between 5:00pm and 6:00pm in the Thursday evening period, and between 11:00am and 12noon in the Saturday peak period.

## 2.5 Public Transport Services

Local bus services are provided by Busways. These operate along Carrington Road, linking Castle Hill with Norwest Business Park, Seven Hills, Blacktown, Rouse Hill and Macquarie Park, as shown in Figure 2.5. Bus stops are located on Carrington Road west of Showground Road. Regular services are provided with a frequency of 15 – 30 minutes for each service during the morning and evening peak periods, and 30 – 60 minutes on Saturdays.

**Figure 2.5 Current Bus Network**




*Source: Busways*

## 2.6 Pedestrian and Bicycle Network

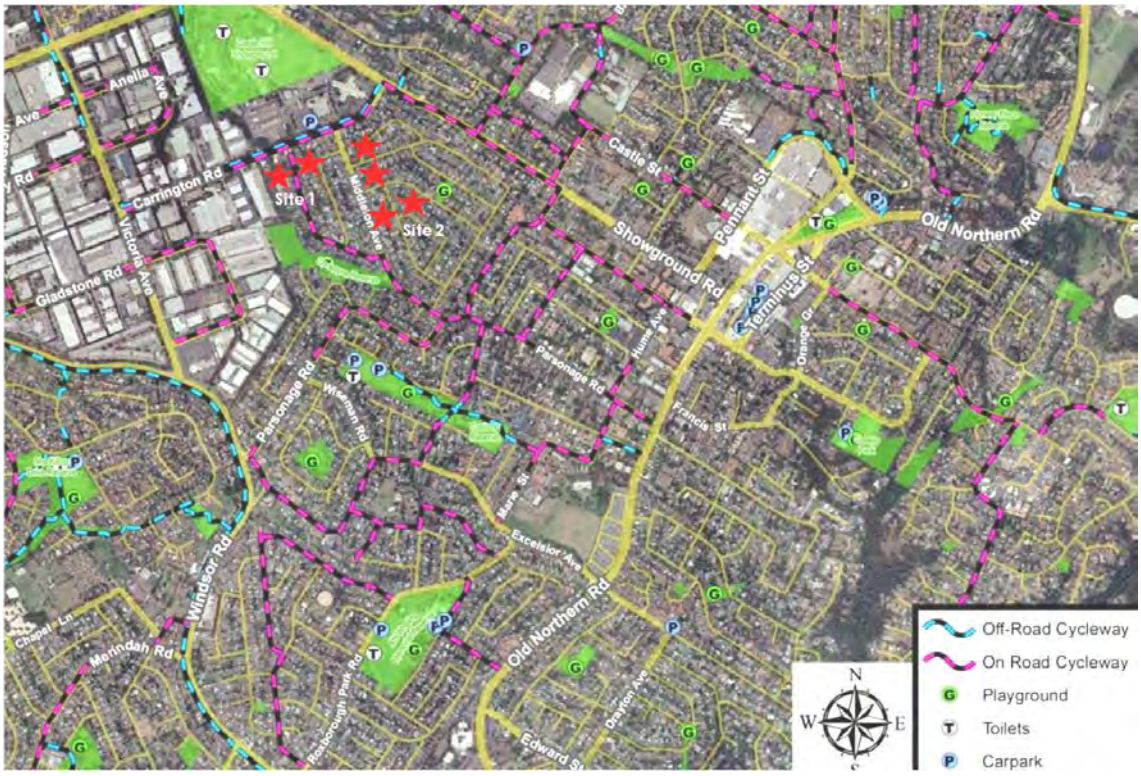
Fully formed footpaths alongside all roads surrounding the site are available. They provide good quality pedestrian access to surrounding areas.

The Hills Shire Council's cycling route map shows an on-road cycleway provided along Carrington Road and Showground Road. There is also an off-road cycleway provided along Carrington Road. These routes, however are not signposted.

The western side of Showground Road (north of Carrington Road) is signposted as a shared use path.

Figure 2.6 presents a map of the local bicycle routes.

**Figure 2.6 Existing Bicycle Routes**




*Source: The Hills Shire Council*

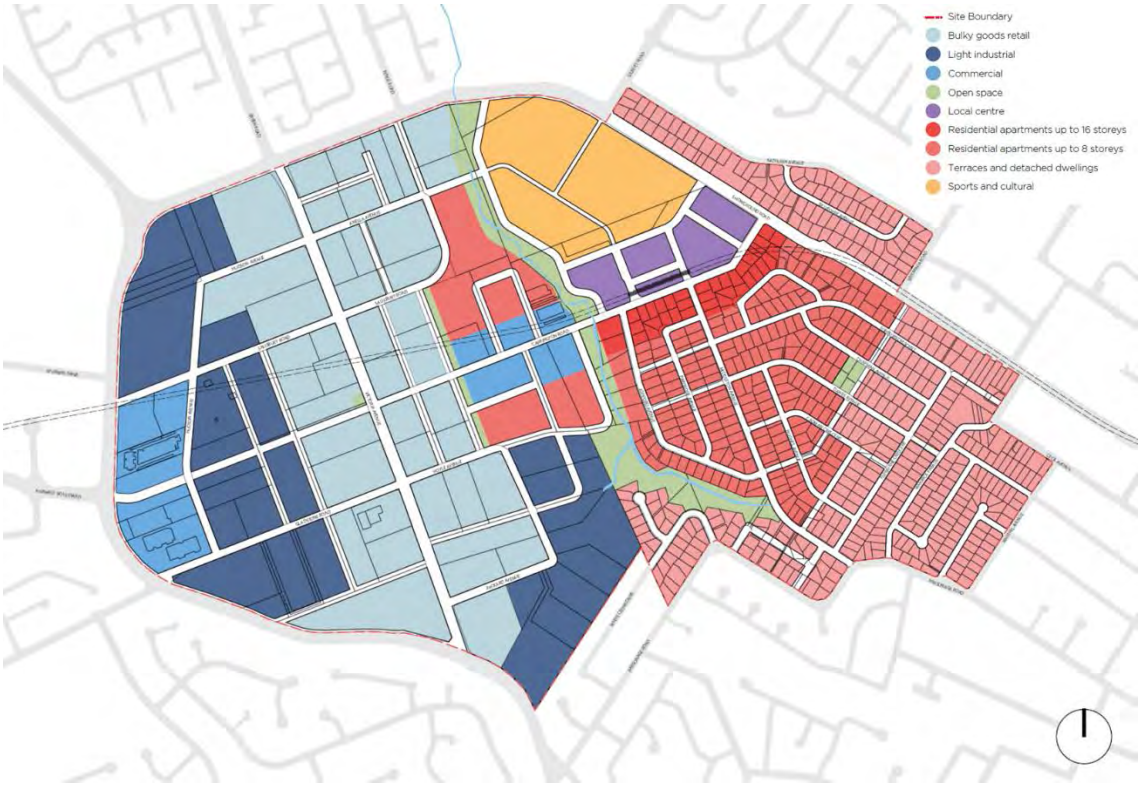
# 3 Showground Station Precinct

## 3.1 Proposal and Land Use

DoPE has prepared Precinct Proposals for three Sydney Metro Northwest urban renewal Priority Precincts – one of which is the Showground Station Precinct.

The Showground Station Precinct will be developed as a transit oriented development (TOD). Planning for the Showground Station Precinct envisages that it would comprise a local centre located above the new Showground Railway Station containing a mixture of retail, commercial and high density residential uses, commercial and light industrial areas, an employment spine along Carrington Road, as well as apartments, townhouses and detached dwellings spread throughout the Precinct as shown in Figure 3.1.

**Figure 3.1 Precinct Plan**




*Source: Showground Station Precinct Proposal (DoPE, December 2015)*

The future land uses for the Showground Station Precinct are summarised in Table 3.1 below.

**Table 3.1: Proposed Yield in the Showground Station Precinct**

| Land use | 2036 Yields |
|---|---|
| Residential | 5,000 dwellings |
| Retail | 10,000m² GFA |
| Employment | 2,300 jobs |

*Source: Showground Station Precinct Proposal, (DoPE, December 2015)*

The planning documents prepared by DoPE assume the yield shown in Table 3.1 will be fully developed by 2036.

## 3.2 Road Network Changes

With the integrated future network for public transport, pedestrian and bicycle connectivity and amenities, the proposed urban renewal in the Precinct has planned to have a significant shift from private vehicles to public and active transport for trips made both to and from the Precinct. The Transport Plan that accompanied the Showground Station Precinct Planning Proposal anticipated a mode share of 53 per cent to public and active transport for trips made both to and from the Precinct which is higher than many well-established station precincts across Sydney.

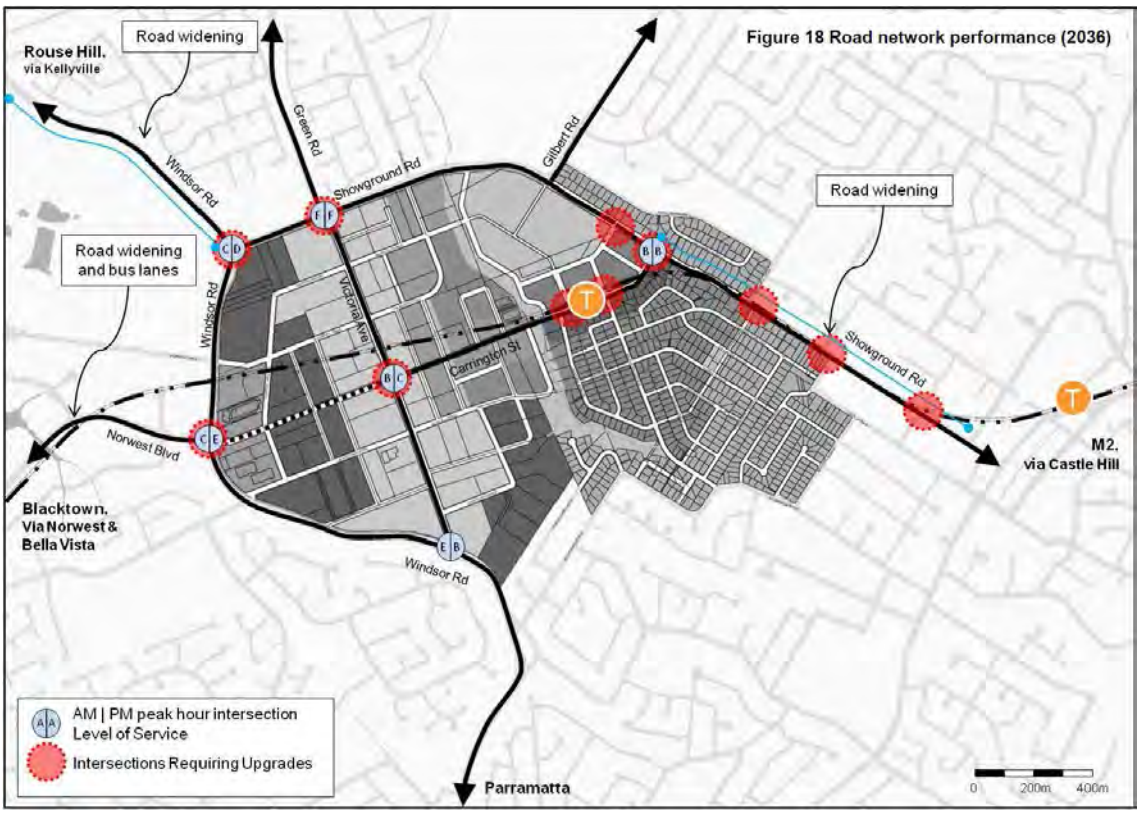
The Transport Plan has made a number of recommendations to upgrade local road network to support the forecast growth. These recommendations include:

- upgrade Showground Road intersection with Carrington Road (to be determined as the Precinct develops)
- extend Middleton Road across Carrington Road to form a new four-way signalised intersection
- create a new signalised intersection at Carrington Road intersection with Doran Drive, and
- widen Showground Road to a minimum of four lanes between Carrington Road and Old Northern Road (this is currently under construction).

## 3.3 Road Capacity

The transport report that accompanied the Showground Station Precinct Proposal conducted traffic modelling at local intersection level. Traffic modelling results from that transport report have been extracted and presented in this report as Figure 3.2.

**Figure 3.2 Showground Station Precinct Traffic Modelling Results**




*Source: Showground Station Precinct Transport Plan (DoPE, December 2015)*

The DoPE Transport Report concludes that the majority of the roads in the study area will operate within the available capacity with traffic generated by the Showground Station Precinct.

The DoPE Transport Report indicates that in 2036 the Showground Road intersection with Carrington Road would operate with an acceptable LoS B intersection performance. However, intersections along Carrington Road will need to be upgraded. The DoPE Transport Report did not provide any details on the required road improvement upgrade works.

# 4 Development Yield

## 4.1 Base Case Scenario

As indicated previously, the Showground Station Precinct Proposal anticipates there would be approximately 5,000 dwellings by 2036. However, given the high level nature of the planning documents, the types and make up of these dwellings is unclear.

As different dwelling types have different traffic generation rates, it is critical to understand the make-up of these 5,000 dwellings. The make-up of the dwelling types has been ascertained as described below.

Based on anticipated floor space ratios provided in the planning documents and land areas for the relevant sites measured from an aerial photo, an estimate of the make-up of these 5,000 dwellings have been ascertained. Table 4.1 presents the estimates of development yield by dwelling types estimated this way.

**Table 4.1: Estimated Dwelling Mix within the Showground Station Precinct**

| Land Use | Estimated Yield (Apartments) |
|---|---|
| High Density Apartments | 4,588 |
| Detached Dwellings | 206 |
| Townhouses | 206 |
| **Total** | **5,000** |

The above estimated dwelling types and make-up (as presented in Table 4.1) together with the indicated retail area located of 10,000m$^2$ gross floor area form the future base case in this traffic assessment – Scenario S2 as discussed in Section 5.

## 4.2 Proposed Development Uplift

Based on work conducted by the project architects engaged by Showground Corporation, the anticipated maximum gross floor areas permissible under the planning controls proposed for the Showground Station Precinct for each of the two sites are presented in Table 4.2.

**Table 4.2: Maximum Permissible Gross Floor for Subject Sites**

| Site | Max. Permissible GFA (m$^2$) |
|---|---|
| Site 1 | 85,185m$^2$ |
| Site 2 | 148,394m$^2$ |
| **Total** | **233,579m$^2$** |

Showground Corporation's planning proposal is seeking approval for additional development uplift above that anticipated in the Showground Station Precinct

Proposal for the two amalgamated sites under their control. The extra development uplift sought for these two sites are presented in Table 4.4.

**Table 4.3: Proposed Gross Floor for Subject Sites**

| Site | Max. Permissible GFA ($m^2$) | Proposed GFA ($m^2$) | Difference (Proposed Development Uplift) |
|---|---|---|---|
| Site 1 | 85,185$m^2$ | 116,000$m^2$ | 30,815$m^2$ |
| Site 2 | 148,394$m^2$ | 193,000$m^2$ | 44,606$m^2$ |
| Retail (Site 1 & Site 2) | - | 4,181$m^2$ | 4,181$m^2$ |
| **Total** | **233,579$m^2$** | **313,181$m^2$** | **79,602$m^2$** |

Based on their market research, Showground Corporation has developed and designed their apartment products to suit the local market. Using Showground Corporation's proposed apartment mix and sizes, an average apartment size of 77$m^2$ has been determined. Based on this average apartment size, the proposed development uplift would provide an additional 979 residential apartments as shown in Table 4.4.

**Table 4.4: Estimated Development Uplift (Residential Use Only)**

| Site | Difference (Proposed Development Uplift) | Average Apartment Size | Estimated Uplift (Apartments) |
|---|---|---|---|
| Site 1 | 30,815$m^2$ | 77$m^2$ | 400 |
| Site 2 | 44,606$m^2$ | 77$m^2$ | 579 |
| **Total** | **75,421$m^2$** | **-** | **979** |

The traffic effects of the proposed development uplift of 979 apartments and 4,181$m^2$ of retail use, in addition to the 5,000 dwellings has been assessed in Scenario S3 as discussed in Section 5.

The planning proposal includes improvements to the local road network including the creation of boulevards along Ashford Avenue, Middleton Avenue and Hughes Avenue as well as intersection upgrades along Carrington Road.

# 5 Traffic Impact Assessment

## 5.1 Assessment Scenarios

The following assessment scenarios were undertaken to provide an analysis of the potential traffic impact of the proposed development on the surrounding road network in 2036:

- Scenario S1, 2016 Base Year Traffic Conditions – this scenario represents the current performance of the network and a baseline for comparative purposes
- Scenario S2, 2036 Future Base Case – this scenario includes the forecast background traffic growth (for 2036 future year) plus the development traffic associated with the development of the Showground Station Precinct (i.e. 5,000 dwellings and 10,000m$^2$ GFA retail area as discussed in Sections 3 and 4.1), and
- Scenario S3, 2036 Future with Precinct Development and Proposed Uplift – Scenario S2 plus the traffic generation associated with the proposed uplift at the two sites (as discussed in Section 4.2).

## 5.2 Scenario S2 Traffic Flows

### 5.2.1 Showground Road Baseline Traffic Forecasts

In order to determine the future background traffic growth along Showground Road and Carrington Road, a review was undertaken on the Traffic and Transport Assessment of the Showground Road Upgrade between Carrington Road and Old Northern Road, Castle Hill (GHD February 2014).

This document provides traffic forecasts for years 2016 and 2026 with consideration to the following information and traffic assessment reports:

- background traffic growth based on outputs from the RMS Strategic Highway Assignment Model
- Proposed Expansion of Castle Towers Shopping Centre, Section 96 Application Transport Report (GTA Consultants, July 2013)
- Showground Road Intersection Analysis, Transport Impact Assessment Report (GTA Consultants, April 2012)
- Castle Towers Paramics Model (as part of the Section 96 Application), GTA Consultants, and
- North West Rail Link (NWRL), Operation Traffic and Transport Report (AECOM October 2012).

TTPP has estimated the 2036 traffic flows by extrapolating the 2016 and 2026 traffic volumes from the traffic report prepared by GHD as part of the Showground Road upgrade traffic assessment which then formed the basis for future baseline traffic in this traffic assessment.

### 5.2.2 Traffic Generation of the Showground Station Precinct

The following traffic generation rates have been applied to the residential trips:

- High density apartments: 0.15 trips per hour during the weekday evening peak hour and 0.25 trips per hour during the Saturday peak hour
- Town houses: 0.37 trips per hour during the weekday evening peak hour and 0.62 trips per hour during the Saturday peak hour, and
- Detached dwellings: 0.99 trips per hour during the weekday evening peak hour and 1.67 trips per hour during the Saturday peak hour.

The above rates are in accordance with the RMS Guide to Traffic Generating Developments Updated Traffic Surveys TDT 2013/04.

Traffic generation rates for the retail component of the development has been derived from the RMS Guide to Traffic Generating Developments (2002):

- Thursday evening peak hour – 12.3 trips per peak hour per 100m$^2$ GLFA, and
- Saturday morning peak hour –16.3 trips per peak hour per 100m$^2$ GLFA.

In addition, the above RMS traffic generation rates relate to a parking rate of 6.1 car parking spaces per 100m$^2$ of GLFA. However, it is noted that the Showground Station Precinct Proposal recommended significantly lower parking rates for retail uses at one space per 50m$^2$ which is essentially half the parking rates in the RMS guidelines. In the light of this, this traffic assessment has assessed the traffic effects of the proposed retail uses by converting RMS traffic generation rates from one that relates to floor area to one that relates to car space provided.

As such, the modified traffic generation rates for retail uses are as follow:

- Thursday evening peak hour – 2.02 trips per peak hour per car space provided, and
- Saturday morning peak hour – 2.67 trips per peak hour per car space provided.

The residential trips are expected to be distributed 80 per cent inbound and 20 per cent outbound during the Thursday evening peak period. During the Saturday peak period, the distribution is expected to be 50 per cent inbound and 50 per cent outbound.

The retail trips are expected to be distributed 50 per cent inbound and 50 per cent outbound during both the Thursday and Saturday peak periods.

Table 5.1 provides a summary of the traffic generation potential of the Showground Station Precinct in the Thursday evening and Saturday peak hours.

**Table 5.1: Traffic Generation Potential of the Showground Station Precinct**

| Land Use | Estimated Yield | Traffic Generation Rate | | Traffic Generation (vehicles/ hour) | | | |
|---|---|---|---|---|---|---|---|
| | | Thur. Evening Peak | Sat. Morning Peak | Thur. Evening Peak | | Sat. Morning Peak | |
| | | | | In | Out | In | Out |
| High Density Apartments | 4,588 Dwellings | 0.15 trips/ dwelling | 0.25 trips/ dwelling | 537 | 134 | 565 | 565 |
| Detached Dwellings | 206 Dwellings | 0.99 trips/ dwelling | 1.67 trips/ dwelling | 163 | 41 | 172 | 172 |
| Townhouses | 206 Dwellings | 0.37 trips/ dwelling | 0.62 trips/ dwelling | 61 | 15 | 64 | 64 |
| Retail | 10,000m² GFA | 2.02 trips/ parking space | 2.67 trips/ parking space | 202 | 202 | 267 | 267 |
| **Total** | **5,000 Dwellings + 10,000m² GFA** | **-** | **-** | **963** | **392** | **1,068** | **1,068** |

## 5.3 Scenario S3 Traffic Flows

The proposed development uplift involves an additional 922 residential apartments above the 5,000 dwellings envisaged in the Showground Station Precinct Proposal. In addition, the proposed development uplift would also add approximately 4,181m² of non-residential (retail/commercial) uses floor area.

Similar to the S2 traffic generation, the following traffic generation rates have been applied to the high density residential trips:

- 0.15 trips per hour during the weekday evening peak hour
- 0.25 trips per hour during the Saturday morning peak hour.

Retail/commercial component of the development comprises a number of small shops on the ground floor and is expected to serve the local catchment generating walk in customs only i.e. pedestrian trips. Notwithstanding this, for traffic analytical purposes the traffic generation potential of the additional retail/commercial components has been estimated using traffic generation rates suggested in the RMS Guide to Traffic Generating Developments (2002) for office developments. The applicable rates are as follow:

- 1.2 trips per peak hour per 100m² GFA during Thursday evening peak hour, and
- 1.6 trips per peak hour per 100m² GFA during Saturday morning peak hour.

The expected development traffic arising from the proposed uplift is presented in Table 5.2.

**Table 5.2: Traffic Generation Potential of Proposed Development Uplift**

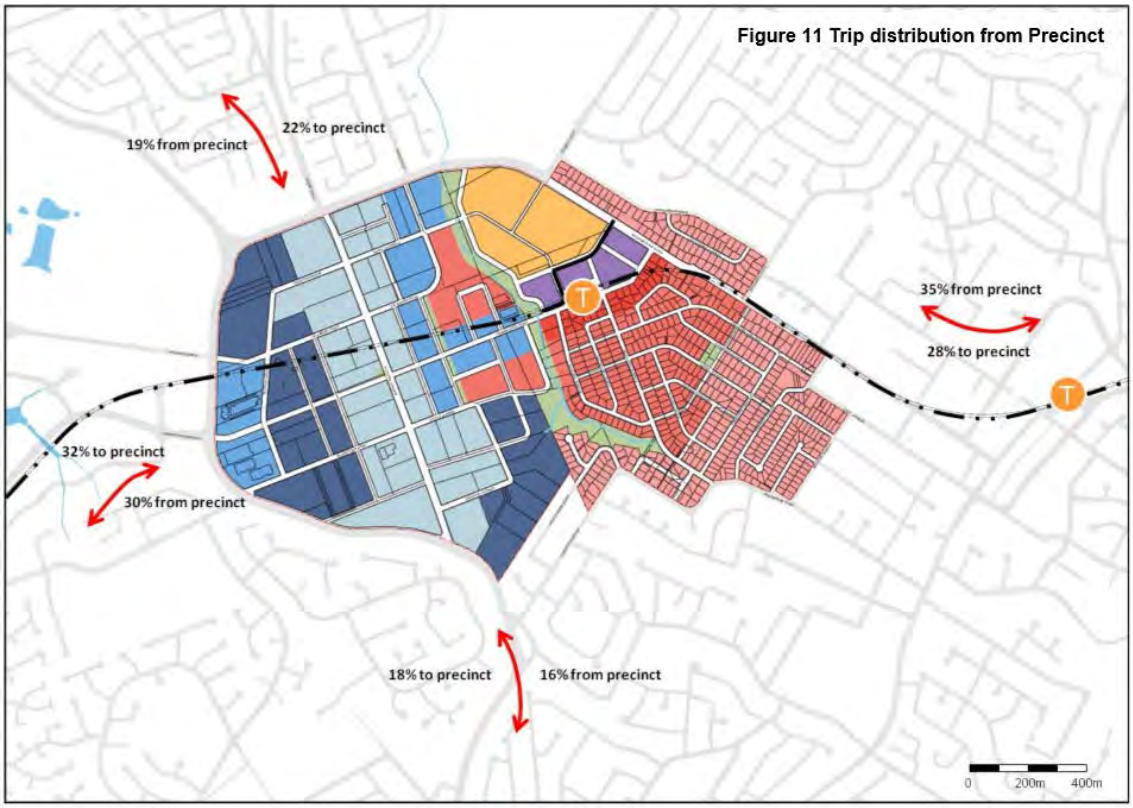
| Site | Additional Development Uplift | Traffic Generation Rate | | Traffic Generation (vehicles/ hour) | | | |
|---|---|---|---|---|---|---|---|
| | | Thur. Evening Peak | Sat. Morning Peak | Thur. Evening Peak | | Sat. Morning Peak | |
| | | | | In | Out | In | Out |
| Site 1 | 400 Apartments | 0.15 trips/ dwelling | 0.25 trips/ dwelling | 47 | 12 | 49 | 49 |
| | 1,579m² GFA Retail | 1.2 trips/ 100m² GFA | 1.6 trips/ 100m² GFA | 9 | 9 | 13 | 13 |
| Site 2 | 579 Apartments | 0.15 trips/ dwelling | 0.25 trips/ dwelling | 68 | 17 | 71 | 71 |
| | 2,602m² GFA Retail | 1.2 trips/ 100m² GFA | 1.6 trips/ 100m² GFA | 16 | 16 | 21 | 21 |
| **Total** | **957 Apartments** | **-** | **-** | **115** | **29** | **121** | **121** |
| | **4,181m² GFA Retail** | **-** | **-** | **25** | **25** | **33** | **33** |
| | **Apartment and Retail** | **-** | **-** | **140** | **54** | **154** | **154** |

## 5.4 Traffic Distribution

The directional distribution and assignment of traffic generated by developments within the Showground Station Precinct is based on the trip distribution factors contained within the Showground Station Precinct Transport Plan (TfNSW December 2015). These distributions are shown in Figure 5.1. The distribution factors are as follow:

- via Showground Road (east): 28% to the Precinct and 35 % from the Precinct
- via Showground Road and Windsor Road (north): 22% to the Precinct and 19% from the Precinct
- via Carrington Road (west): 32% to the Precinct and 30% from the Precinct, and
- via Parsonage Road (south): 18% to the Precinct and 16% from the Precinct.

**Figure 5.1: Traffic Distribution**




*Source: Showground Station Precinct Transport Plan (TfNSW December 2015)*

## 5.5 Future Intersection Flows

Accordingly, the estimated development traffic has been assigned to the local road network as discussed above. The resultant intersection flows are presented in Figure 5.2 and Figure 5.3 for Scenarios S2 and S3 respectively.

**Figure 5.2: Intersection Turning Movement Flows (S2 Future with Precinct Development)**

**Figure 5.3: Intersection Turning Movement Flows (S3 Future with Precinct Development and Proposed Uplift)**

## 5.6 Proposed Road Network Changes

In Scenarios S2 and S3, these relate to the future year 2036 which will include a number of significant land use and road infrastructure changes affecting traffic operation in the general vicinity. These changes include:

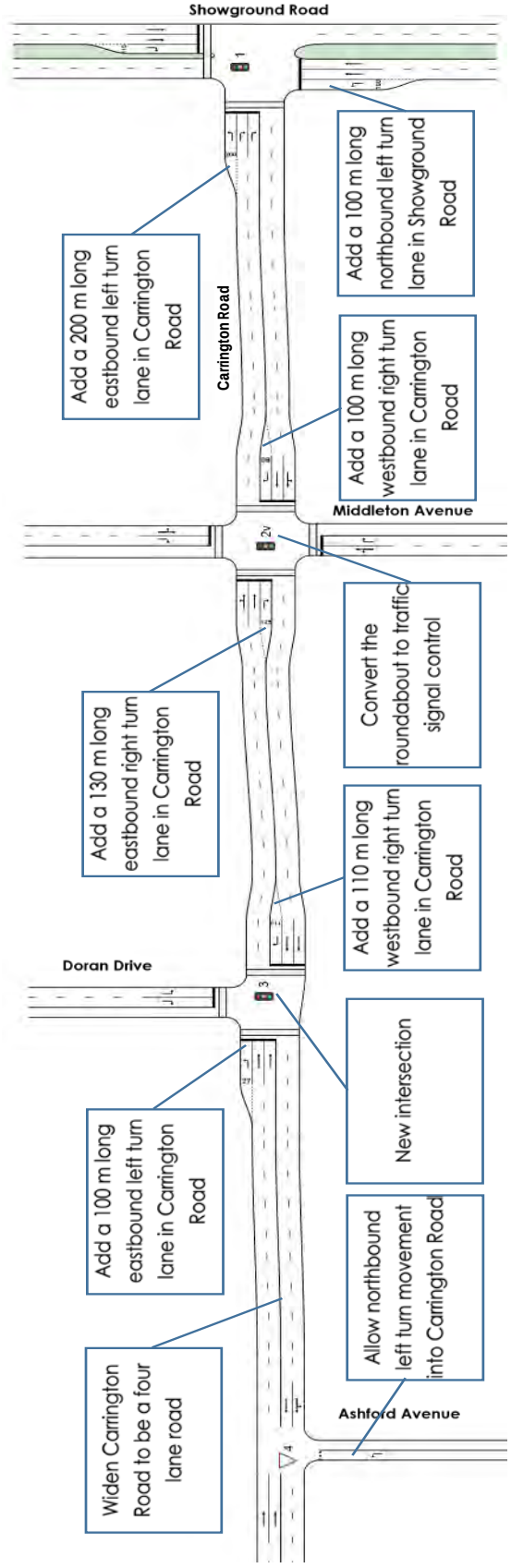
- the upgrade of Showground Road to four lanes
- the completion of the proposed expansion of Castle Towers Shopping Centre
- the completion of the Showground Station Precinct, and
- other growth of the background traffic originated outside of the study area.

As such, the analysis for Scenario S2 and S3 includes the following suggested future road network changes:

- widen Carrington Road four lanes
- Showground Road-Carrington Road intersection:
  - add a 100m long northbound left turn lane in Showground Road
  - add a 200m long eastbound left turn lane in Carrington Road
- Carrington Road- Middleton Avenue:
  - extend Middleton Avenue across Carrington Road to form a four-way signalised intersection
  - add a 130m long eastbound right turn lane in Carrington Road
  - add a 100m long westbound right turn lane in Carrington Road
- Carrington Road-Doran Drive intersection:
  - create a new intersection (as proposed in the Showground Station Precinct Proposal)
  - add a 100 m long eastbound left turn lane in Carrington Road
  - add a 110 m long westbound right turn lane in Carrington Road
- Carrington Road-Ashford Avenue intersection:
  - allow northbound left turn movement into Carrington Road.

These road changes are presented in Figure 5.4.

**Figure 5.4: Proposed Road Network Changes**



It is noted that the DoPE Transport Report states that intersection upgrade works would be required at a number of nearby intersections in order to development traffic arising from the Showground Station Precinct. However, it did not provide details on what the required works would be.

Based on TTPP's assessment the above road improvement works would be required to accommodate development traffic from the proposed Showground Station Precinct.

The existing layout for the Middleton Avenue-Parsonage Road intersection would be retained in the assessed future year.

## 5.7 Performance of the Key Intersections

The operation of the intersections along Carrington Road has been assessed using SIDRA Intersection Version 7, a computer based modelling package which calculates intersection performance for a given set of prevailing traffic conditions. Intersection configurations were sourced from RMS traffic signal plans and aerial photos. Signal phasing information was obtained from site inspections for both peak periods assessed.

The SIDRA modelling has been calibrated to the conditions observed during the site inspections.

### 5.7.1 Model Performance Indicators

The SIDRA modelling provides useful indicators to determine the level of intersection performance. Level of Service (LoS) is a key performance parameter used by RMS to describe the operation of an intersection under prevailing traffic conditions. LoS indicators range from A (indicating good intersection operation) to F (indicating over-saturated conditions with long delays and queues). At signalised intersections, the LoS criteria relate to the overall average intersection delay (seconds per vehicle). At priority controlled (give-way and stop controlled) and roundabout intersections, the LoS is based on the travel delay (seconds per vehicle) for the most delayed movement (refer to Table 5.3).

**Table 5.3: Level of Service Criteria for Intersections**

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

*Source: RMS Guide to Traffic Generating Developments, 2002*

### 5.7.2 Scenario S1 2016 Existing Condition Analysis Results

Intersection analysis has been conducted for the four nominated surveyed intersection discussed in the preceding sections of this report. The analysis was conducted for the Thursday evening and Saturday morning peak periods using intersection flows shown in Figure 2.4.

**Table 5.4: Intersection Analysis Results (S1 2016 Existing)**

| Intersection | Existing Intersection Control | Thur. Evening Peak | | Sat. Morning Peak | |
|---|---|---|---|---|---|
| | | Average Delay (sec) | Level of Service (LoS) | Average Delay (sec) | Level of Service (LoS) |
| Showground Rd-Carrington Rd | Signals | 44 | D | 62 | E |
| Carrington Rd-Middleton Av | Roundabout | 18 | B | 18 | B |
| Carrington Rd-Ashford Av | Priority | 5 | A | 5 | A |
| Middleton Av-Parsonage Rd | Priority | 9 | A | 7 | A |

*Note: Intersection delays and level of service for priority controlled intersections are based on the highest average delay.*

The analysis indicates that the Showground Road-Carrington Road intersection is currently nearing or over capacity during both peaks and is operating at an unsatisfactory LoS E during the Saturday peak. This is due to extensive queuing occurring outside of the study area. These observed extensive queues along Showground Road and Carrington Road have been replicated in the model.

The other signalised intersections within the surrounding road network are currently operating with acceptable levels of service (LoS B or better) during either peak period.

### 5.7.3 Scenario S2 2036 Future Base Case (with No Development Uplift)

The analysis results for Scenario S2 future with the Precinct Development (i.e. 5,000 dwellings and 10,000m$^2$ GFA retail area) are presented in Table 5.5. This scenario does not include any development traffic from the proposed development uplift contemplated by Showground Corporation. The analysis for this scenario includes the road network changes discussed in 5.6.

**Table 5.5: Intersection Analysis Results (S2 Future with Precinct Development)**

| Intersection | Existing Intersection Control | Thur. Evening Peak | | Sat. Morning Peak | |
|---|---|---|---|---|---|
| | | Average Delay (sec) | Level of Service (LoS) | Average Delay (sec) | Level of Service (LoS) |
| Showground Rd-Carrington Rd | Signals | 58 | E | 55 | D |
| Carrington Rd-Middleton Av | Signals | 23 | B | 37 | C |
| Carrington Rd-Doran Dr | Signals | 22 | B | 16 | B |
| Carrington Rd-Ashford Av | Priority | 6 | A | 8 | A |
| Middleton Av-Parsonage Rd | Priority | 9 | A | 10 | A |

*Note: Intersection delays and level of service for priority controlled intersections are based on the highest average delay.*

In 2036 with the additional development traffic arising from the Showground Station Precinct and other known development, the majority of intersections would continue to operate satisfactorily with similar level of service as that found under existing traffic conditions albeit the average delays have increased marginally.

The upgrade of the Showground Road intersection with Carrington Road is expected to maintain its performance at LoS E, similar to the existing operating conditions. As noted in Section 3 the Transport Report that accompanied the Showground Station Precinct indicates that this intersection would operate with LoS B. However, it is not clear what intersection upgrades (if any) are required to achieve this level of performance.

In addition, the new signalised intersection at Doran Avenue is expected to operate at LoS B in the future.

### 5.7.4 Scenario S3 2036 Future with Precinct Development and Proposed Uplift

The analysis results for Scenario S3 future with the Showground Station Precinct development and the proposed development uplift are presented in Table 5.6. The analysis for this scenario includes the future road network changes as shown in Section 5.6.

It is noted that both Scenarios S2 and S3 were analysed using identical phase times and cycle times as well as the road improvement works described in Section 5.6. As such, the relative difference in intersection performance between these two scenarios is the impacts imposed by the traffic associated with the proposed development uplift.

**Table 5.6: Intersection Analysis Results (S3 Future with Precinct Development and Proposed Uplift)**

| Intersection | Existing Intersection Control | Thur. Evening Peak | | Sat. Morning Peak | |
|---|---|---|---|---|---|
| | | Average Delay (sec) | Level of Service (LoS) | Average Delay (sec) | Level of Service (LoS) |
| Showground Rd-Carrington Rd | Signals | 60 | E | 66 | E |
| Carrington Rd-Middleton Av | Signals | 24 | B | 43 | D |
| Carrington Rd-Doran Dr | Signals | 26 | B | 30 | C |
| Carrington Rd-Ashford Av | Priority | 6 | A | 8 | A |
| Middleton Av-Parsonage Rd | Priority | 10 | A | 10 | A |

*Note: Intersection delays and level of service for priority controlled intersections are based on the highest average delay.*

The addition of the proposed development uplift traffic would result in increase to traffic delays at the Carrington Road intersections with Showground Road and Middleton Avenue. But nevertheless, these intersections would continue to have satisfactory operation generally. The Showground Road intersection with Carrington Road would operate with LoS E during the Saturday peak period. However, it is noted that the assessment assumes there would be no change to the timing of the traffic signals. Re-allocation of traffic signal timing would improve the performance of this intersection in the future. This is a matter for discussion with RMS as the proposed development progresses.

The Carrington Road-Ashford Avenue and Middleton Avenue-Parsonage Road intersections would continue to operate with the same performance to the Scenario S2 conditions without any increases in traffic delays.

The Carrington Road-Doran Drive intersection would experience relatively higher delays due to the increased traffic flows, but the intersection would continue to operate at an acceptable level.

In summary, the additional development arising from the proposal is not expected to create any adverse traffic effects to the assessed intersections.

# 6 Car Park Assessment

Parking requirements for the two amalgamated sites have assessed against the recommended parking rates contained in the Showground Station Precinct Planning Report. This is presented in Table 6.1.

**Table 6.1: Required Parking Provision**

| Site | Land Use | Apartment Type | Yield | Parking Rates | Required Parking |
|---|---|---|---|---|---|
| Site 1 | Residential | - 1-Bedroom | 290 units | 1 space per dwelling | 290 |
| | | - 2-Bedroom | 899 units | 1 space per dwelling | 899 |
| | | - 3-Bedroom | 164 units | 1.5 spaces per dwelling | 246 |
| | | - Visitors | - | 1 space per 10 dwellings | 135 |
| | Retail | - | 1,579 m² GFA | 1 space per 80m² GFA | 20 |
| | *Site 1 Total* | - | - | - | *1,589* |
| Site 2 | | - 1-Bedroom | 458 units | 1 space per dwelling | 458 |
| | | - 2-Bedroom | 1418 units | 1 space per dwelling | 1,418 |
| | | - 3-Bedroom | 258 units | 1.5 spaces per dwelling | 388 |
| | | - Visitors | - | 1 space per 10 dwellings | 213 |
| | Retail | - | 2,602 m² GFA | 1 space per 80m² GFA | 33 |
| | *Site 2 Total* | - | - | - | *2,509* |
| ***Total*** | - | - | - | - | ***4,098*** |

It is proposed to comply with the above required parking provision.

In addition, the Showground Station Precinct Planning Report also recommended bicycle parking provision rates as follow:

- residential tenants – 1 space per three apartments
- residential visitors – 1 space per 12 apartments
- commercial 1 space for 600m² GFA for staff, and
- shops/cafes/restaurants 1 space per 450m² for staff.

It is also proposed to comply with the above bicycle parking requirements.

# 7 Conclusions

This traffic report examines the traffic effects of the proposed development uplift for two sites under the control of Showground Corporation located within the Showground Station Precinct.

The Showground Station Precinct is anticipated to be redeveloped to permit 5,000 dwellings and 10,000m$^2$ of retail with additional employment by 2036.

Showground Corporation is proposing additional development uplift for two sites within the Showground Precinct Plan. These two sites have a combined permissible maximum gross floor area of 233,579m$^2$ under proposed planning controls stipulated in the Showground Station Precinct. Showground Corporation is proposing development uplift resulting in an additional 75,421m$^2$ of residential floor area and 4,181m$^2$ of retail/commercial GFA.

The proposed development uplift will result in 979 residential apartments and approximately 4,181m$^2$ of retail/commercial floor areas. The proposed development uplift has been estimated to generate approximately 308 trips per peak hour during the busiest peak period.

Traffic capacity analysis indicates that the proposed development uplift is not expected to create any adverse traffic impacts relative to the traffic conditions arising from the redevelopment of the Showground Station Precinct as envisaged by DoPE.

In terms of car and bicycle parking provision, it is recommended that these be provided in accordance with the provision rates set out in the Showground Station Precinct Planning Report.

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