Doran Drive Precinct – Proposed Mixed Use Development

Lot 55, DP 1253217
2 Mandala Parade, Castle Hill

TRAFFIC AND PARKING ASSESSMENT REPORT

12 April 2022

Ref 20417

VARGA TRAFFIC PLANNING Pty Ltd
Transport, Traffic and Parking Consultants

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Executive Summary

This report has been prepared to accompany an Environmental Impact Statement (EIS) to *NSW Department of Planning* for a mixed-use development to be located at Lot 55, DP 1253217, 2 Mandala Parade, Castle Hill.

The Hills Showground Station Precinct is bounded by De Clambe Drive to the north and west, Carrington Road to the south and Showground Road to the east.

Landcom on behalf of *Sydney Metro* lodged a Concept State Significant Development Application (SSDA) as part of a State Significant Development Application (SSDA) application – SSD9653, which was approved by the Executive Director, Industry and Key Sites, as delegate to the Minister for Planning and Public Spaces in January 2021.

The approved concept of the Hills Showground Precinct includes:

- three development precincts (Precinct West, Doran Drive Precinct and Precinct East)
- building envelopes of varying heights between three to 20 storeys (12m to 68m)
- a maximum total gross floor area (GFA) of 166,486m², consisting:
    - a maximum residential GFA of 152,546m²
    - a maximum non-residential GFA of 13,940m², of which 10,935m^2 GFA is proposed within the Doran Drive Precinct – i.e. the subject site
- a maximum of 1,620 dwellings (including a minimum 5% affordable housing)
- a maximum of 1,957 cars and 705 bicycle spaces
- public domain improvements, public open space and a new road
- concept subdivision of Lot 56 DP 1253217 (Precinct East).

The SSDA would facilitate development by providing increased residential and employment density in proximity to existing and planned transport infrastructure upgrades, that provides employees with greater access to public transport and employment options while promoting the use of sustainable travel options.

The Hills Showground Station offers high-frequency metro services, typically with 4-minute interval services during the peak periods. Additionally, there are currently seven bus routes traversing along Doran Drive, with bi-directional bus services offering up to 35 bus services per hour during the weekday commuter peak periods.

The Traffic and Transport Assessment Report which accompanied the Concept Masterplan of the Hills Showground Precinct, prepared by *SCT Consulting*, recommended parking rates as follows.

Table 7: Doran Drive Precinct Residential Car Parking Spaces

	Minimum (per unit)	Maximum (per unit)	Affordable Housing Minimum (per unit)	Affordable Housing Maximum (per unit)
1 bedroom units	0.4	Average of 1 across all bedroom apartment mix	0.4	0.4
2 bedroom units	0.7		0.5	0.5
3 bedroom units	1.0		1	1
	Minimum (per area)	Maximum		
Retail	1 space per 130m² GFA	A maximum car parking cap of 341 spaces for retail and commercial development for Doran Drive Precinct, or 1 space per 32m², whichever is lower		
Commercial	1 space per 145m² GFA			
Office	1 space per 145m² GFA	1 space per 100m² GFA		

Table 8: Doran Drive Precinct Bicycle Parking Facility Rates

	Rate (minimum)
Residential flat buildings	1 resident space per 3 apartments 1 visitor space per 12 apartments
Commercial use	1 space per 600m² GFA for staff
Retail use	1 space per 450m² GFA for staff

Source: Hills Showground Station Precinct: Site Urban Design Guidelines (June 2020) and SSD 9653 MOD 1, Modification to amend the retail and commercial car parking rates (10 December 2021)

The Traffic and Transport Assessment Report which accompanied the Concept Masterplan, also estimated the precinct would generate in the order of 702 and 964 peak hour trips during the *morning* and *afternoon* peak periods respectively, as set out below.

Table 4-13 Peak hour vehicle trip generation of Hills Showground Station Precinct site

Land Use	Indicative Yield	Proposed AM Peak trip rates	AM Peak trips	Proposed PM Peak trip rates	PM Peak trips
Apartment	1,604 units	0.19 per unit	305 veh/h	0.15 per unit	241 veh/h
Townhouse	16 dwellings	0.57 per dwelling	9 veh/h	0.57 per dwelling	9 veh/h
Commercial	4,367m²	1.6 / 100m² GFA	70 veh/h	1.2 / 100m² GFA	52 veh/h
Retail	7,180m² ^	5.9 / 100m² GLFA *	318 veh/h	12.3 / 100m² GLFA *	662 veh/h
Total	**-**	**-**	**702 veh/h**	**-**	**964 veh/h**

Source: SCT Consulting, 2018

^Assuming GLFA: GFA=0.75:1 (refer to Section 5.7 Guide to Generating Traffic Development).

*A 25% reduction factor has also been applied to retail vehicular trip rates to account for high passing trade expected given the location of these retail next to metro station.

By way of comparison, the proposed development is expected to generate in the order of 444 and 821 peak hour trips during the *morning* and *afternoon* peak periods respectively.

An analysis of the operating performance of the nearby surrounding intersections using the SIDRA NETWORK capacity analysis program has found that the majority of the immediately surrounding intersections will continue to operate at acceptable *Levels of Service*, even in 2026 and 2031. The capacity analysis confirms that the development proposal will not result in any unacceptable traffic implications in terms of road network capacity, and that no additional road improvements or intersection upgrades would be required, other than the upgrade of the Showground Road and Carrington Road signalised intersection, consistent with the findings in the *SCT Consulting* report.

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1.0 INTRODUCTION

1.1 Project Summary

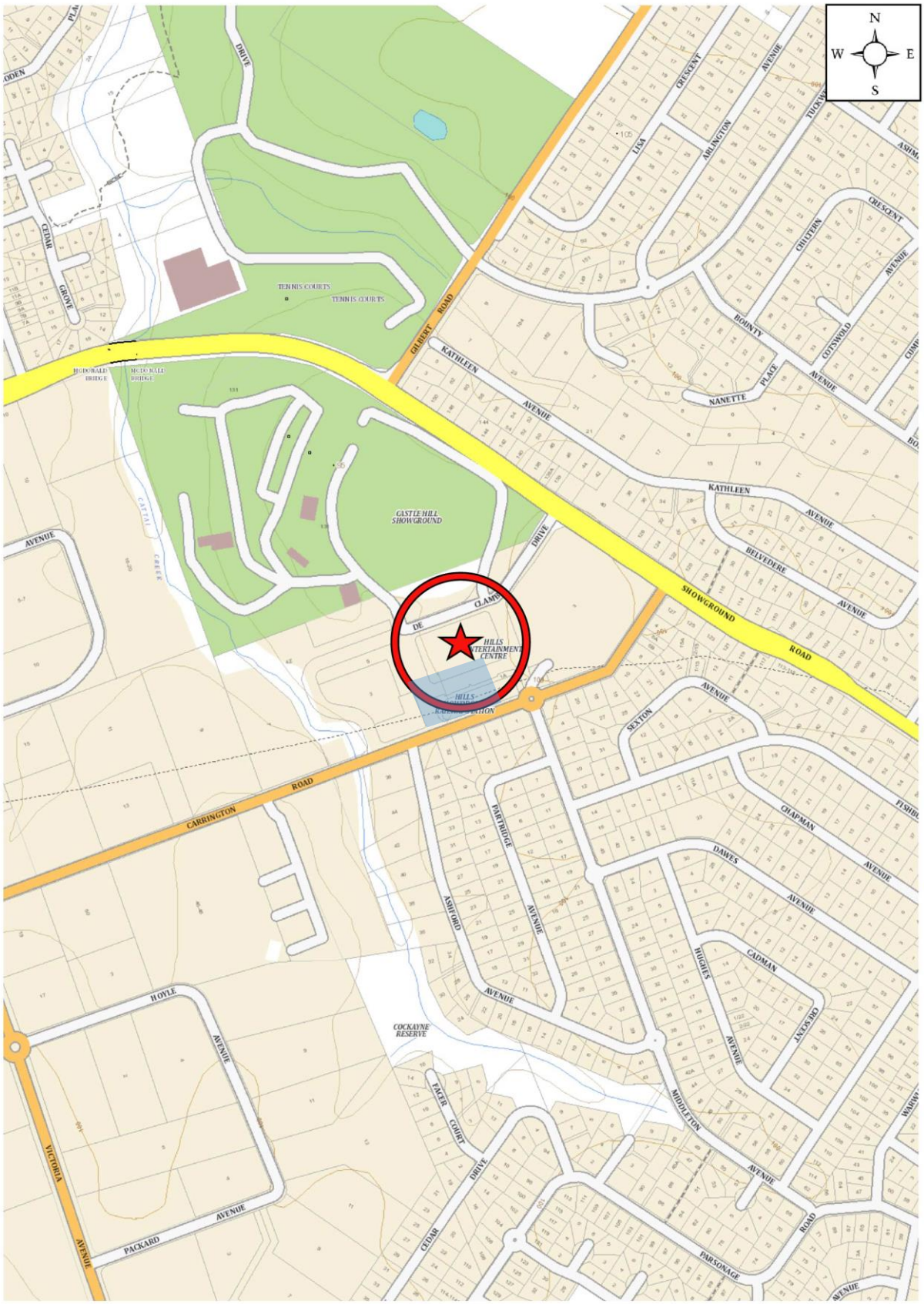
This report has been prepared on behalf of *Deicorp Projects Showground Pty Ltd* to accompany an Environmental Impact Statement to the *NSW Department of Planning* for a mixed use development to be located at Lot 55, DP 1253217, 2 Mandala Parade, Castle Hill (Figures 1 and 2).

In January-2021, a Concept State Significant Development Application (SSDA) was approved for the Hills Showground Station Precinct (SSD-9653), involving the concept subdivision, road hierarchy and precinct layout of a mixed-use precinct on Lots 53, 55 and 56, DP 1253217 and Part Lot 50 DP 1253217.

This development proposal therefore seeks approval for the construction of a new mixed-use development located within the Doran Drive Precinct of the approved Concept SSDA.

Off-street parking for the proposed Doran Drive development is to be provided in a new six-level basement car parking area in accordance with Council and *State Environmental Planning Policy No.65- Design Quality of Residential Apartment Development (SEPP 65)* requirements. Vehicular access to the parking facilities is to be provided via a new entry/exit driveway located towards the eastern end of the De Clambe Drive site frontage, in accordance with the Hills Showground Station Precinct Urban Design Guideline requirements.

Loading/servicing for the proposed development is expected to be undertaken by a variety of commercial vehicles and rigid trucks up to and including 12.5m HRV trucks. A dedicated service area is to be located on the ground floor level (Level 01) at the rear of the retail shop. Three dedicated loading docks are provided capable of accommodating 3 x 12.5m long HRV trucks. Vehicular access to the loading facilities is to be provided via a new service driveway located at the southern end of the Andalusian Way site frontage, also in accordance with the Hills Showground Station Precinct Urban Design Guideline requirements.



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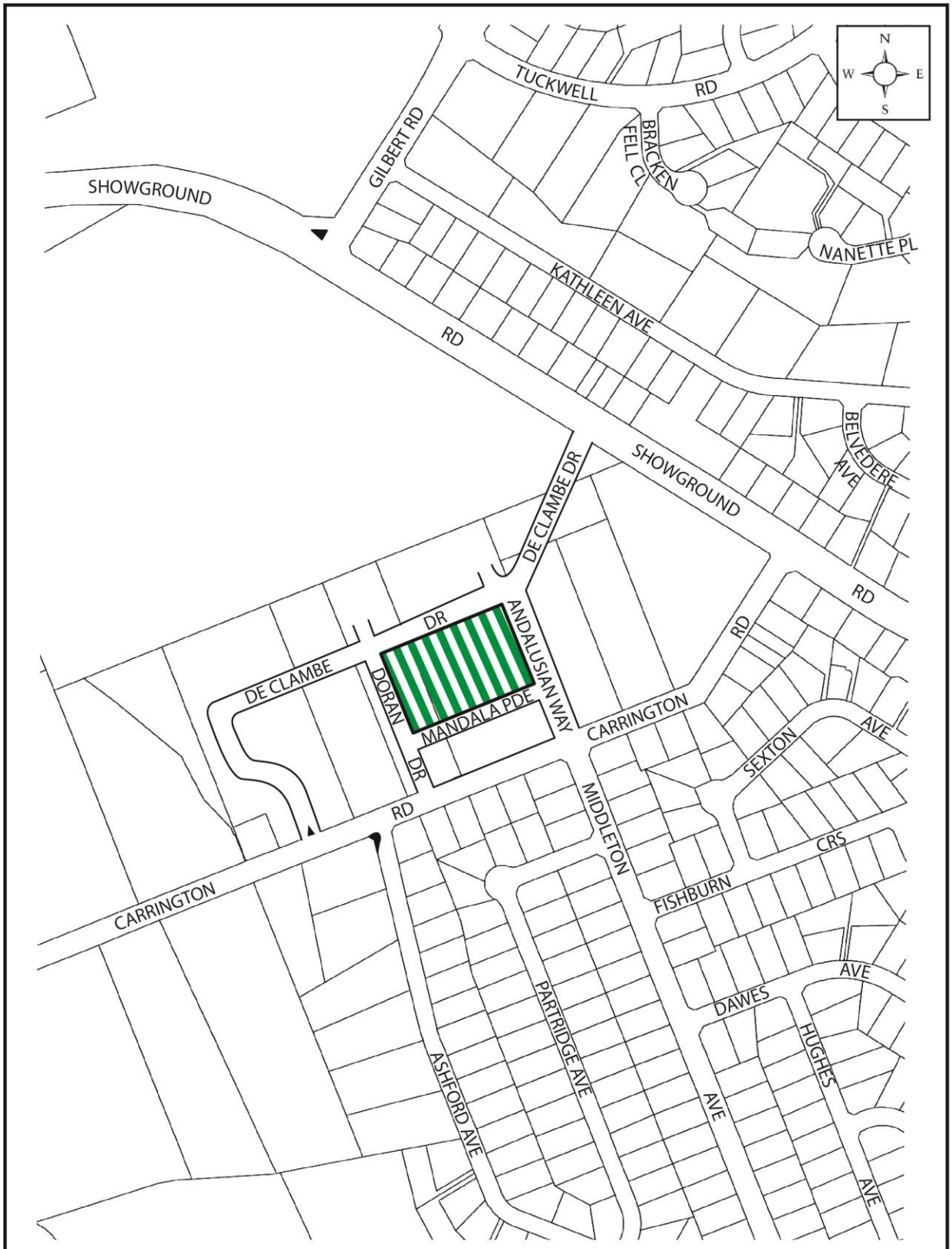
LOCATION
FIGURE 1



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SITE
FIGURE 2

1.2 Purpose of this Report

The purpose of this report is to assess the traffic and parking implications of the development proposal and to that end this report:

- describes the site and provides details of the development proposal
- reviews the road network in the vicinity of the site and the traffic conditions on that road network
- reviews the sustainable forms of transport available in the vicinity of the site
- estimates the traffic generation potential of the development proposal and assigns that traffic generation to the road network serving the site
- assesses the traffic implications of the development proposal on the surrounding local and arterial road network in terms of road network capacity
- describes high-level construction traffic management methodology
- reviews the geometric design features of the proposed car parking and loading facilities for compliance with the relevant codes and standards
- assesses the adequacy and suitability of the quantum of off-street parking and loading provided on the site.

2.0 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

2.1 SEARS

This report addresses the Secretary's Environmental Assessment Requirements (SEARs) for the State Significant Development (SSD), SSD-15882721.

Table 1 below details where the responses to each of the items raised under *Item 10* of the SEARs have been addressed in this report.

Table 1: Secretary's Environmental Assessment Requirements	
Item 10 – Transport, traffic, parking and access (operation and construction)	**Report Section**
The predicted transport mode share split for the development	Refer to Green Travel Plan
An analysis of the existing traffic network, including the road hierarchy, current daily and peak hour vehicles, public transport, pedestrian and bicycle movements and existing performance levels of nearby intersections	Chapter 3.6
A forecast of additional daily and peak hour vehicle movements as a result of the development (using SIDRA modelling or similar at 5-year intervals) and identification of potential traffic impacts on road capacity, intersection performance and road safety (including pedestrian and cycle conflict). Including, but not limited to the following intersections: • Showground Rd at Carrington Rd • Showground Rd at De Clambe Dr	Chapter 4.3
Mitigation measures for any traffic impacts, including intersection upgrades to achieve acceptable performance.	Chapter 4.3
Details of car parking provision, having regard to relevant parking rates, specifications and standards	Chapter 4.5
A vehicular servicing and management plan providing details of proposed vehicular access for off-street loading, deliveries and servicing arrangements, and any proposed infrastructure improvements or measures to reduce potential conflicts with pedestrians and cyclists.	Refer to Vehicular Servicing & Management Plan (VSMP)
Proposals to improve walking and cycling, such as connections into existing walking and cycling networks, high quality end-of-trip facilities and adequate bicycle parking for visitors, employees and residents (provided in accordance with the relevant rates, specifications and standards)	Chapter 3.4
Measures to promote sustainable travel choices for employees, residents or visitors, such as minimising car parking provision, encouraging car share and public transport, cycling and walking, implementing a green travel plan and providing end of trip facilities	Chapter 3.4 & Refer to GTP

2.2 Transport for NSW Requirements

Comments were also sought from Transport for NSW (TfNSW) for the SEARs development proposal, with comments issued to DPIE on 25 March 2021 which included a number of matters to be addressed in the DA submission. Table 2 below details where responses to each of the matters raised by TfNSW have been addressed in this report.

Table 2: Transport for NSW Requirements

TfNSW Matters	Report Section
Daily and peak traffic movements likely to be generated by the proposed development including the impact on nearby intersections and the need/associated funding for upgrading or road improvement works (if required)	Chapter 4.3 & 4.4 (Daily Traffic Assessment not required, as 'Peak Traffic Assessment' represents *worst-case* scenario)
Details of the proposed accesses and the parking provisions associated with the proposed development including compliances with the requirements of the relevant Australian Standards (i.e. Turn paths, sight distance requirements, aisle width, etc.)	Chapter 4.5 & 4.9
Proposed number of car parking spaces and compliance with the appropriate parking codes including compliance with the Hills Showground Station Precinct Concept SSDA	Chapter 4.5
Details of light and heavy vehicle movements (including vehicle type and likely arrival and departure times)	Chapter 4.1 & 4.2
Details of service vehicle movements (including vehicle type and likely arrival and departure times)	Chapter 4.1 & Refer to VSMP

2.3 Relevant Policies and Guidelines:

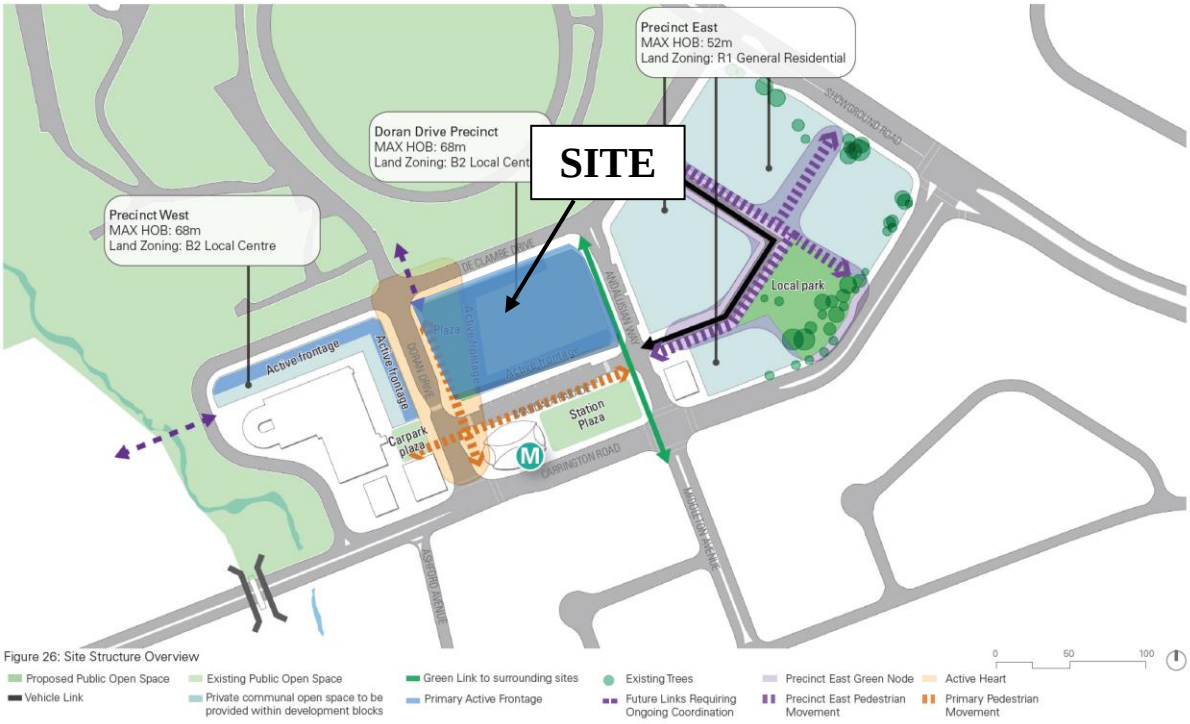
- Hills Showground Station Precinct Urban Design Guidelines
- The Hills Shire Council DCP 2012, Part C, Section 1 - Parking
- The Hills Shire Council DCP 2012, Part D, Section 19 - Showground Station Precinct
- Guide to Traffic Generating Developments (Roads and Maritime Services, 2002)
- EIS Guidelines – Road and Related Facilities (DUAP, 1996)
- Cycling Aspects of Austroads Guides
- NSW Planning Guidelines for Walking and Cycling (DIPNR, 2004)
- Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments (Austroads, 2020)
- Standards Australia AS2890.1 – 2004 (Part 1: Off-street Car Parking)

- Standards Australia AS2890.2 – 2018 (Part 2: Off-street commercial vehicle facilities)
- Standards Australia AS2890.3 – 2015 (Part 3: Bicycle Parking)
- Standards Australia AS2890.6 – 2009 (Part 6: Off-street parking for people with disabilities)
- Traffic Control at Work Sites 2020 (Transport for NSW)

3.0 EXISTING CONDITIONS

3.1 Site Location

The subject site is bounded by Doran Drive, Mandala Parade, Andalusian Way and De Clambe Drive and forms part of the *Hills Showground Station Precinct* located within The Hills Local Government Area (LGA). The site is known as the 'Doran Drive Precinct' and forms part of the three development precincts located at the new Hills Showground Station which is adjacent to the south of the site.



Source: Hills Showground Station Precinct: Site Urban Design Guidelines (June 2020)

The site has street frontages of approximately 63m in length to both Doran Drive and Andalusian Way and approximately 104m in length to both Mandala Parade and De Clambe Drive. The site occupies an area of approximately 7,969m^2.

Approved Concept SSDA – The Hills Showground Station Precinct (SSD-9653)

In January 2021, *SCT Consulting* undertook a Traffic and Transport Assessment to support the concept SSDA for the Hills Showground Station Precinct site located in The Hills Local Government Area (LGA).

The SSDA was approved, subject to conditions, for building envelopes and Gross Floor Area (GFA) for residential and non-residential development on the three development precincts located directly adjacent to the Hills Showground Station which opened in 2019. The approved concept of the Hills Showground Precinct includes:

- three development blocks (Hills Showground Precinct West, Doran Drive Precinct and Hills Showground Precinct East)
- building envelopes of varying heights between three to 21 storeys (12m to 68m)
- a maximum total gross floor area (GFA) of 166,486m², consisting:
- a maximum residential GFA of 152,546m²
- a maximum non-residential GFA of 13,940m², of which a total of 10,935m^2 are proposed within the Doran Drive Precinct – i.e. the subject site
- a maximum of 1,620 dwellings (including a minimum 5% affordable housing), of which a total of 440 dwellings are proposed within the subject site
- a maximum of 1,957 cars and 705 bicycle spaces
- public domain improvements, public open space and a new road
- concept subdivision of Lot 56 DP 1253217 (Precinct East).

3.2 Road Hierarchy

The road hierarchy allocated to the road network in the vicinity of the site by the Transport for NSW is illustrated on Figure 3.

Showground Road is classified by the TfNSW as an *Arterial Road* and provides the key north-south road link in the area, linking Windsor Road and Old Northern Road. It typically carries two traffic lanes in each direction in the vicinity of the site, with opposing traffic flows separated by a wide landscaped island. Additional lanes are provided at key locations including along the De Clambe Drive as well as the Carrington Road intersections.

Carrington Road is classified by the TfNSW as a *Sub-Arterial Road* which provides a key east-west road link in the area, linking Showground Road and Victoria Avenue. It typically carries one traffic lane in each direction in the vicinity of the site, with additional lanes provided at key locations. Notwithstanding, as noted in the foregoing, the TfNSW is proposing to upgrade Carrington Road, with the upgrade works to provide a left-turn slip lane turning onto Showground Road, additional turning lanes from Showground Road onto

Carrington Road and two continuous in both directions, between Showground Road and Andalusian Way. Clearway restrictions will ultimately apply during peak periods, with kerbside parking generally prohibited outside of peak periods.

De Clambe Drive, Doran Drive, Andalusian Way and Mandala Parade are local, unclassified roads which are primarily used to provide vehicular and pedestrian access to frontage properties. Kerbside parking is generally permitted along both sides of all these roads, subject to signposted restrictions.

3.3 Existing Traffic Controls

The existing traffic controls which apply to the road network in the vicinity of the site are illustrated on Figure 4. Key features of those traffic controls are:

- a 50 km/h SPEED LIMIT which applies to Carrington Road, De Clambe Drive and Andalusian Way
- a 40 km/h SPEED LIMIT which applies to Doran Drive and Mandala Parade in the vicinity of the Showground Metro Station, due to high pedestrian activity
- TRAFFIC SIGNALS in Showground Road where it intersects with De Clambe Drive and Carrington Road
- TRAFFIC SIGNALS in Carrington Road where it intersects with Andalusian Way / Middleton Avenue and also Doran Drive
- a CENTRAL MEDIAN ISLAND in Showground Road, with DEDICATED RIGHT TURN HOLDING LANES turning onto De Clambe Drive and also Carrington Road
- a LEFT TURN ONLY eastbound restriction in De Clambe Drive turning onto Showground Road
- DEDICATED RIGHT TURN BUS LANE in De Clambe Drive turning onto Showground Road
- a ROUNDABOUT in Middleton Avenue where it intersects with Davies Avenue

- PEDESTRIAN REFUGE ISLAND in Andalusian Way where it intersects De Clambe Drive

- RAISED/PEDESTRIAN CROSSING in the vicinity of the Hills Showground Station and Bus interchange along Doran Drive and Mandala Parade

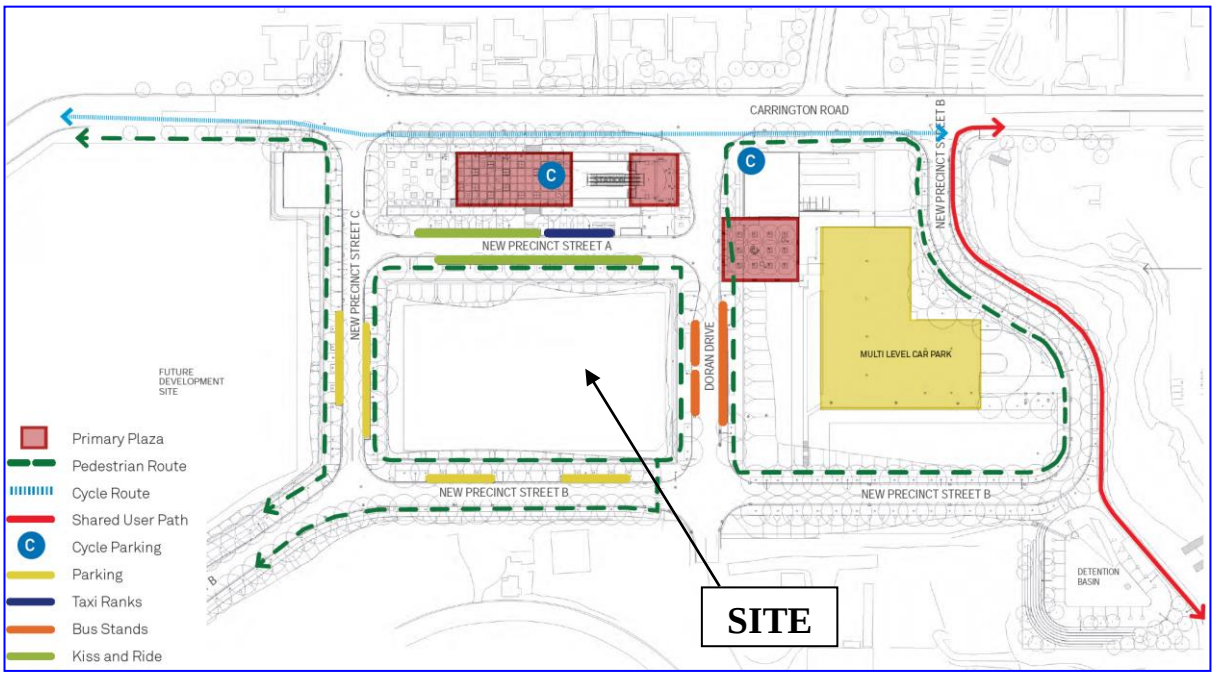
- GIVE WAY SIGN restrictions in Doran Drive where it intersects with De Clambe Drive

- GIVE WAY SIGN restrictions in Mandala Parade where it intersects with Doran Drive and also Andalusian Way

- NO RIGHT TURN restrictions in Carrington Road turning onto Ashford Avenue and also De Clambe Drive.

3.4 Existing Sustainable and Public Transport Options

The subject site is located within the centre of the Hills Showground Station Precinct where there is a variety of sustainable transport options in close proximity to the site, as illustrated in the access arrangement plan below and on Figure 5.




N
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CASTLE HILL SHOWGROUND
HILLS ENTERTAINMENT CENTRE
HILLS SHOWGROUND RAILWAY STATION
TENNIS COURTS
NETBALL COURTS
CASTLE HILL
COCKAYNE RESERVE
COOLONG RESERVE
Key:
Arterial Road
Sub-Arterial Road
VARGA TRAFFIC PLANNING Pty Ltd
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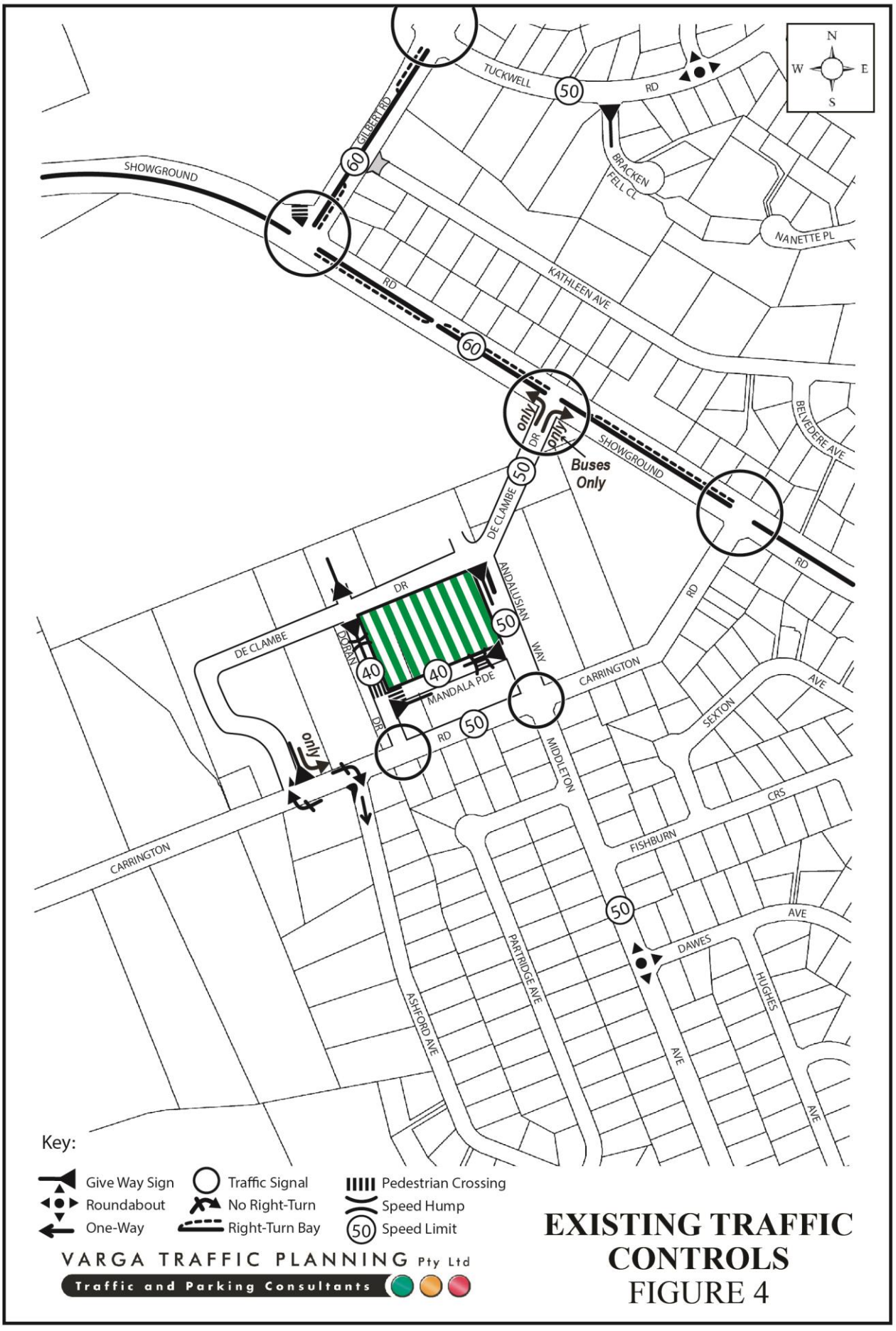
ROAD HIERARCHY
FIGURE 3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GILBERT RD
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BRACKEN FELL CL
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SHOWGROUND
BELVEDERE AVE
Buses Only
50
DE CLAMBE
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DE CLAMBE
ANDALUSIAN WAY
50
DORAN DR
40
40
MANDALA PDE
CARRINGTON
RD
SEXTON AVE
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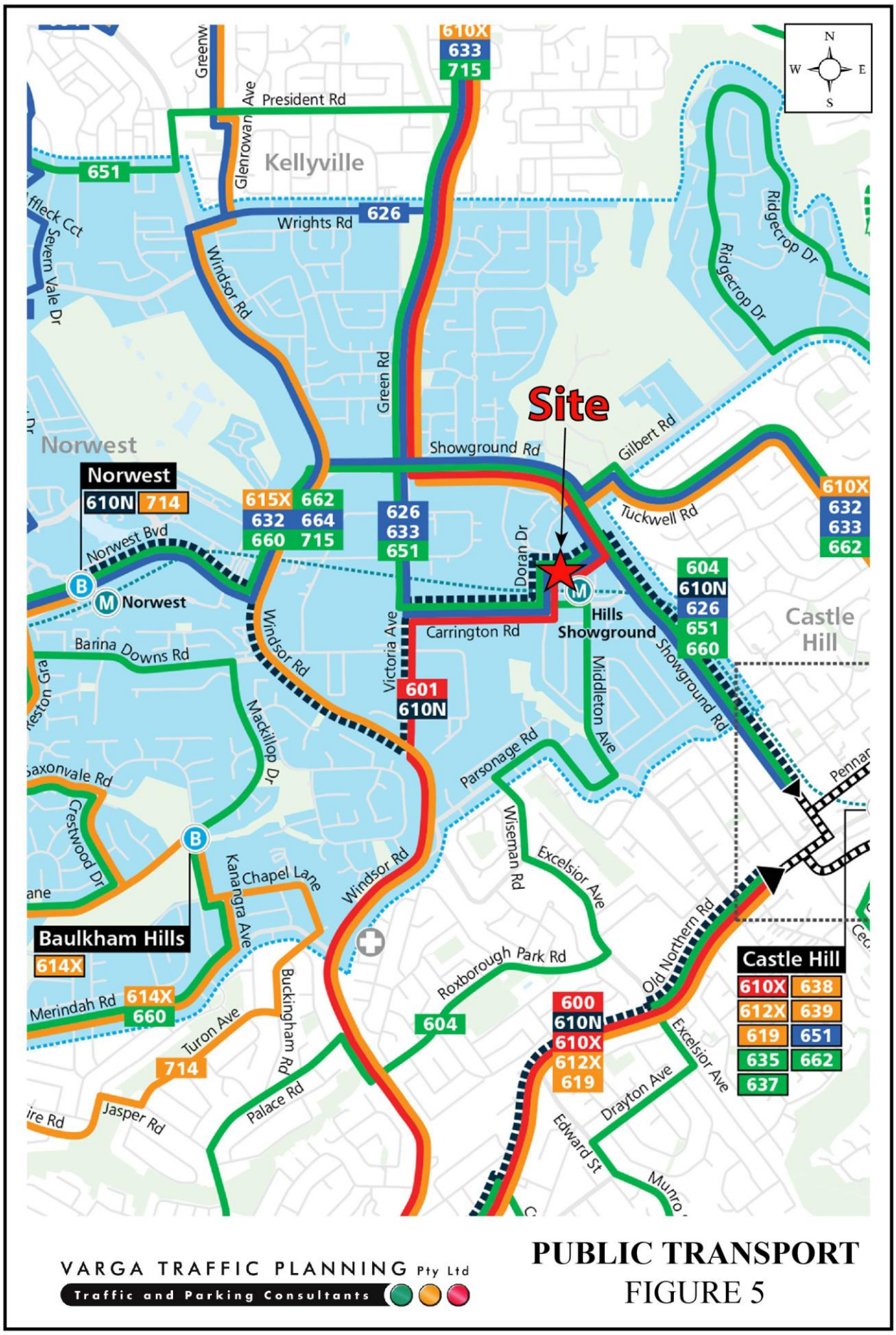
RD
50
MIDDLETON
CRS
CARRINGTON
FISHBURN
50
AVE
DAWES
PARTRIDGE AVE
HUGHES
ASHFORD AVE
AVE
AVE
Key:
Give Way Sign
Roundabout
One-Way
Traffic Signal
No Right-Turn
Right-Turn Bay
Pedestrian Crossing
Speed Hump
50 Speed Limit
VARGA TRAFFIC PLANNING Pty Ltd
Traffic and Parking Consultants
EXISTING TRAFFIC CONTROLS
FIGURE 4


N
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Site
Kellyville
Norwest
Castle Hill
Baulkham Hills
Hills Showground
Norwest
Castle Hill
610X 633 715
President Rd
Glenrowan Ave
651
Wrights Rd
626
Windsor Rd
Green Rd
Ridgecrop Dr
Showground Rd
Gilbert Rd
Tuckwell Rd
610X 632 633 662
Norwest
610N 714
615X 662 632 664 660 715
626 633 651
Norwest Blvd
Doran Dr
604 610N 626 651 660
Barina Downs Rd
Carrington Rd
Victoria Ave
601 610N
Middleton Ave
Showground Rd
Mackillop Dr
Parsonage Rd
Wiseman Rd
Excelsior Ave
Old Northern Rd
Roxborough Park Rd
Crestwood Dr
Chapel Lane
Kanangra Ave
Buckingham Rd
Palace Rd
Merindah Rd
614X 660
Turon Ave
714
Jasper Rd
604
600 610N 610X 612X 619
Drayton Ave
Edward St
Castle Hill
610X 638
612X 639
619 651
635 662
637
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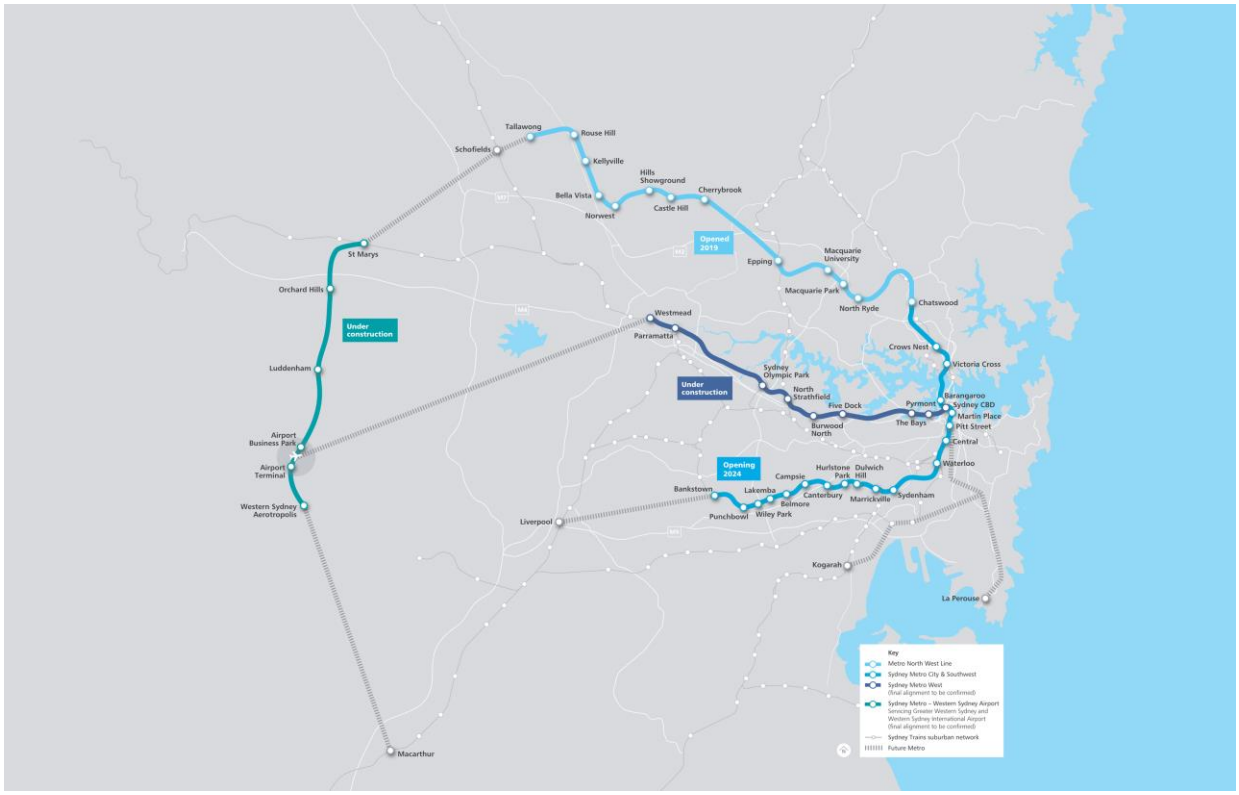
PUBLIC TRANSPORT
FIGURE 5

Metro North West Line

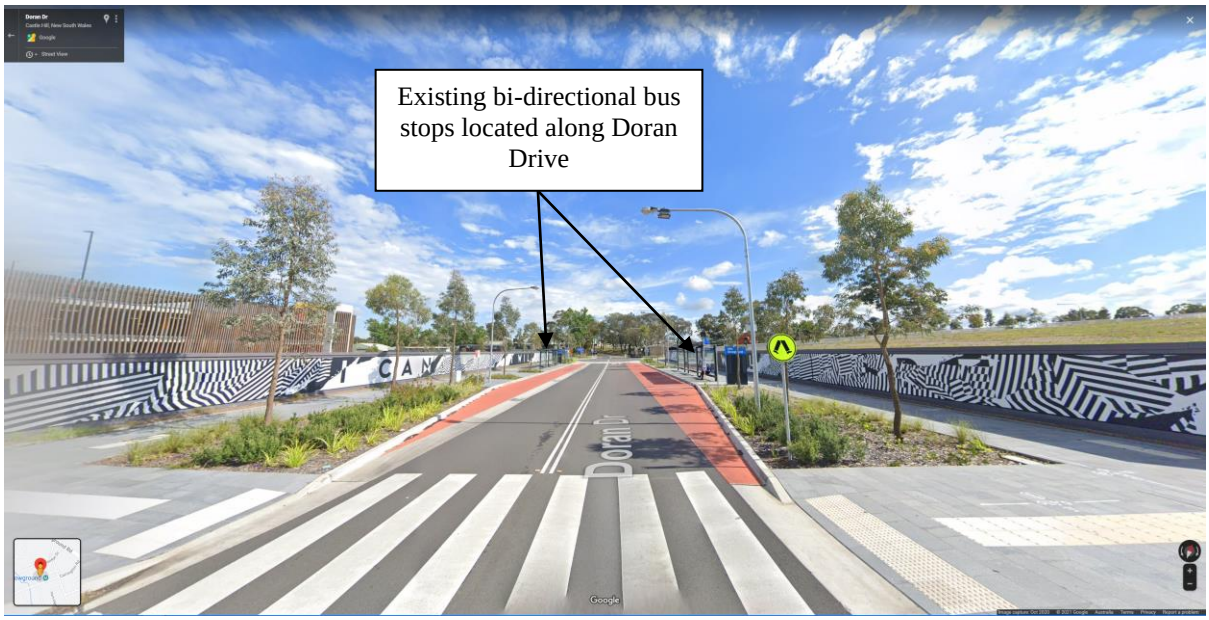
Sydney's first metro line, the Metro North West, opened on 26 May 2019. Services at the 13 metro stations operate every four minutes in the peak in each direction on Australia's first driverless railway. The line is being extended into the Sydney CBD and beyond, to open in 2024.



Sydney Metro Network **Source:** ***Sydney Metro West Scoping Report (June 2021)***

A bus interchange is located adjacent the Hills Showground Station with direct access to the bus services, listed as follows. It is noted that Figure 5 is the most recent version currently available online for download (access date January 24th 2021).

- 601 – Rouse Hill Station to Parramatta via Hills Showground
- 604 – Dural to Parramatta via Castle Hill
- 626 – Pennant Hills to Kellyville Station via Cherrybrook
- 633 – Pennant Hills to Rouse Hill Station via Kellyville & Castle Hill
- 651 – Epping to Rouse Hill Station via Castle Hill
- 730 – Castle Hill to Blacktown via Glenwood
- N92 – City Town Hall to Tallawong Station (Night Service)

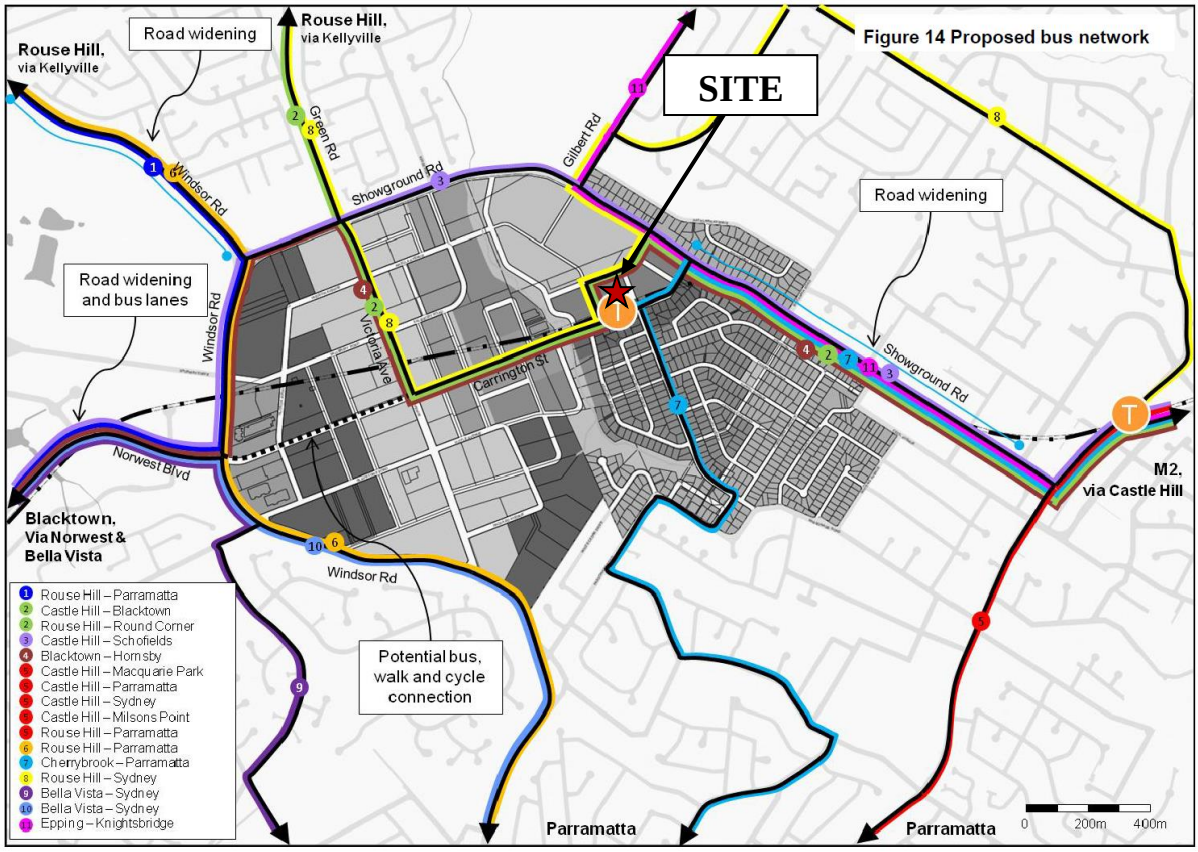


Southern end of Doran Drive at the Mandala Parade intersection – site located on the eastern side

Northern end of Doran Drive at the De Clambe Drive intersection - site located on the western side

Other bi-directional bus stops in the vicinity of the site are also located on Middleton Avenue (around 50m south of the Carrington Road / Middleton Avenue intersection), Carrington Road (around 75m southwest of the Carrington Road / Showground Road intersection) and Showground Road (around 70m of the Carrington Road / Showground Road intersection).

In addition, improved service routing and frequencies are also planned for the precinct to increase the accessibility to the Precinct and the rail station for residents and workers in the region. Utilising Sydney's Bus Future, a proposed future bus network is illustrated in the figure below.

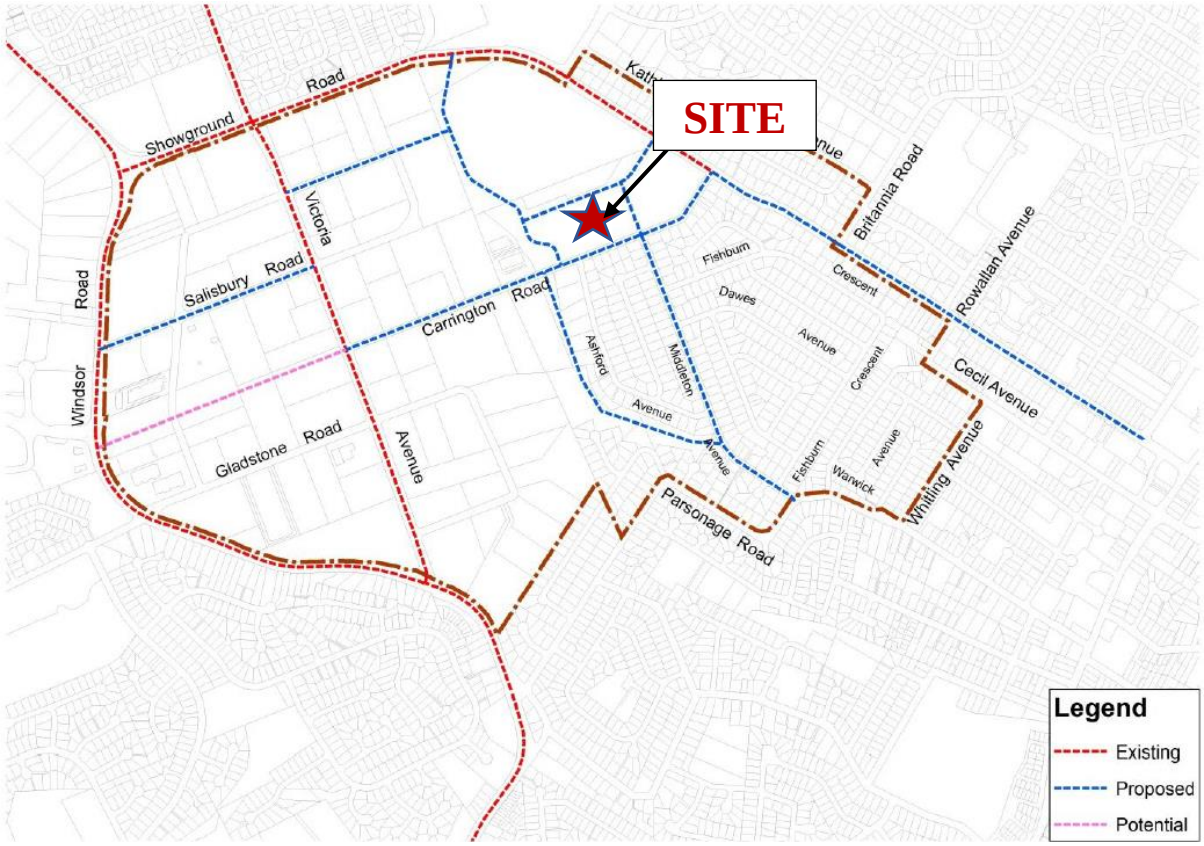


Source: Showground Station Precinct Transport Plan - Dec 2015

Walking and Cycling Infrastructure

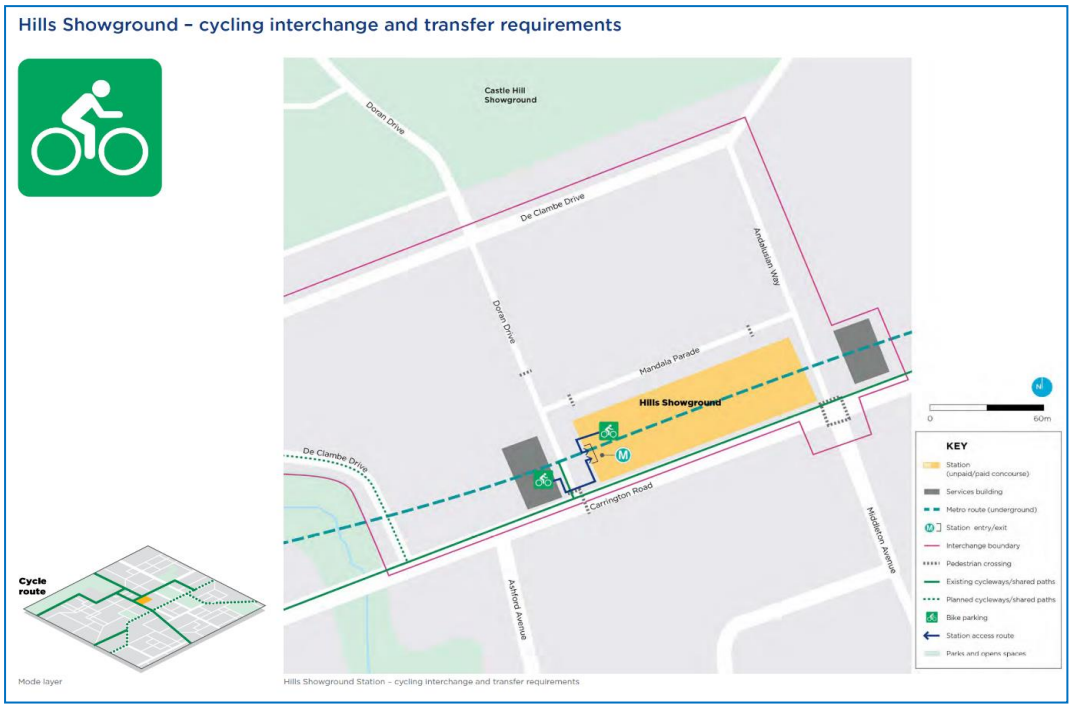
As part of the development of the Hills Showground Station Precinct, a pedestrian and cycle strategy was developed by Council which identified preliminary options for improvements to on and off-road cycle and pedestrian networks.

The existing cycleways in the immediate vicinity of the site are shown below, with Showground Road and Carrington Road forming the major cycling network in the local area. Carrington Road, De Clambe Drive (along Cattai Creek) and Showground Road in the vicinity of the site all have off-road shared paths connecting to the wider cycling network.

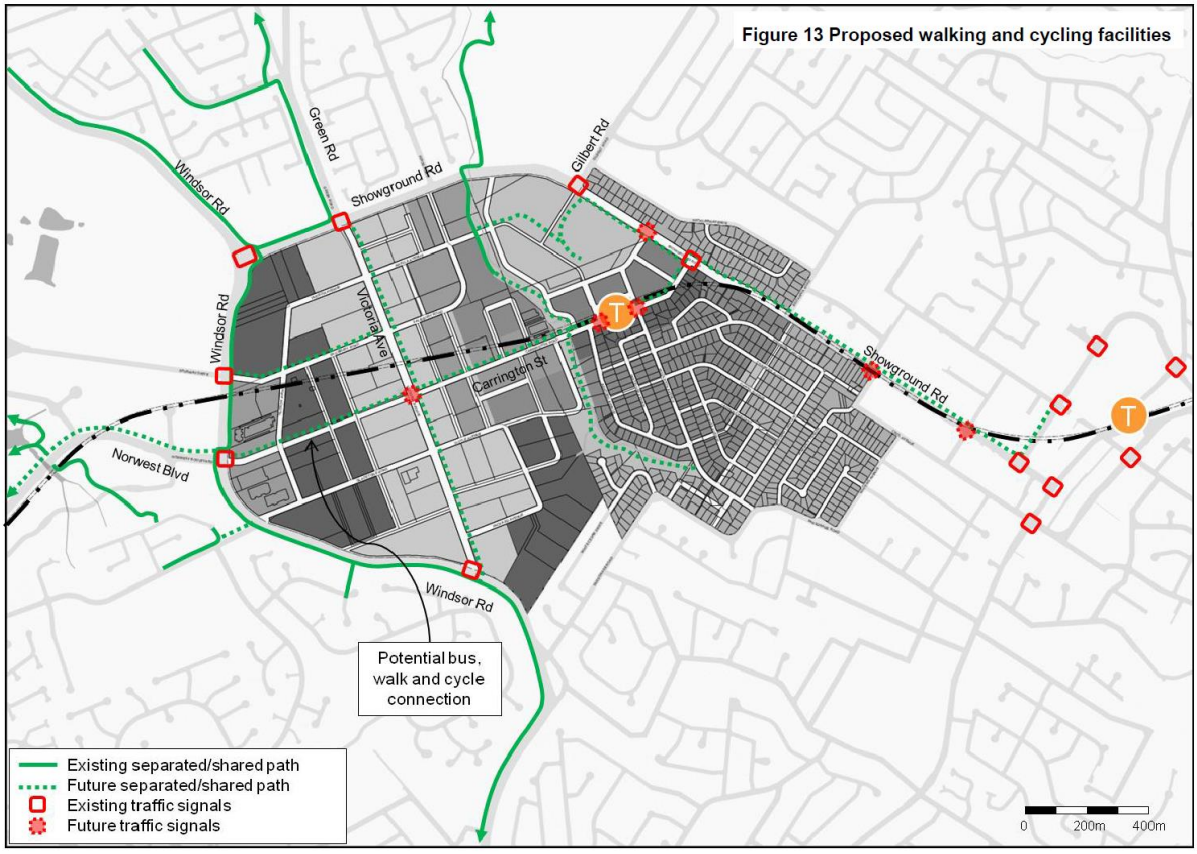


Source: Showground Station Precinct DCP (September 2018)

In addition, the Hills Showground Interchange Access Plan, which illustrates the cycling access for the station precinct as well as the future proposed walking and cycling network improvements, have been reproduced in the figures on the following page.



Source: Interchange Access Plan - Sydney Metro Northwest - Hills Showground, cycling interchange



Source: Showground Station Precinct Transport Plan - Dec 2015

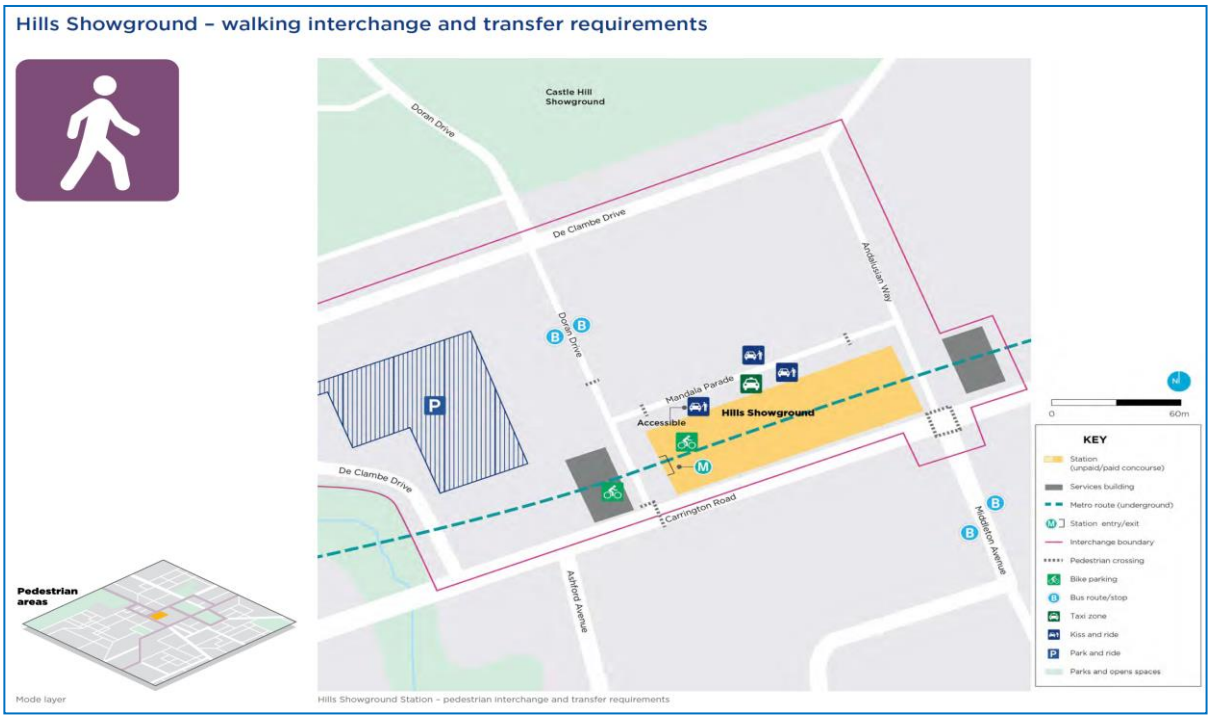
An off-road cycle path exists on Carrington Road and main cycling routes connecting to the station are provided along Cattai Creek to the west of the site. Planned new cycle routes include a 2.5m wide shared path from Carrington Road at De Clambe Drive to the existing pathway at the northern boundary of the site.

Existing Pedestrian Infrastructure

Hills Showground Station is an origin station, meaning that in the morning peak, the majority of trips are from Hills Showground Station to other stations on the metro due to the predominately existing and future residential nature of land uses around the station.

Pedestrian activity clusters around the station entry points and dissipates further afield from those entrance points. Adequate pedestrian facilities are provided to connect to the surrounding land uses in a safe and convenient manner.

The Hills Showground Interchange Access Plan which describes walking access requirements for the station precinct has been reproduced below.



Source: Interchange Access Plan - Sydney Metro Northwest - Hills Showground, pedestrian interchange

Pedestrian infrastructure includes a footpath network that provides safe and accessible access for pedestrians to station entry points, including:

- Footpaths along both sides of the new local roads created surrounding the metro station including Doran Drive, Andalusian Way and Mandala Parade;
- A shared path (off-road), linking Carrington Road to Cattai Creek in the west;
- A shared 2.5m wide pathway from Carrington Road at De Clambe Drive to the existing pathways at the site;
- Multiple crossings on Doran Drive and Mandala Parade; and
- Signalised pedestrian crossings at the intersection of Showground Road / De Clambe Drive, Showground Road / Carrington Road, Doran Drive / Carrington Road, Andalusian Way / Carrington Road, connecting residents from surrounding areas (including the site) to the station via these crossing points along Showground Road and Carrington Road.

In addition to the above, Council has developed a draft Concept Master Plan for Cattai Creek Corridor, between Middleton Avenue and Showground Road in Castle Hill. The draft Concept Masterplan shows Council's vision for the creek, which is to connect the community and deliver environmental, social and recreational benefits to the community.

This will include areas for:

- recreational activities such as walking and running
- enjoying the natural and environment of the Creek
- play spaces
- picnic and rest area
- shared pathways.

The project will also improve access to the Cattai Creek Corridor while protecting the natural environment that makes the Creek so special. The aim of the Masterplan is to create a link between the Creek and the Castle Hill Showground as well as existing open spaces in the area.

Car Share Services

Car sharing is becoming increasingly popular in Sydney and offers a convenient, affordable and sustainable alternate transport option for residents and businesses located in close proximity to public transport.

Car sharing encourages more sustainable travel habits and helps keep everyone connected. It also makes more efficient use of available parking by allowing a single vehicle to be used by a large number of people. This reduces road congestion and the competition for parking spaces, which ultimately benefits all road users.

In this regard, given the *Hills Showground Station Precinct* is newly established, no existing car share operators are currently available in the vicinity of the site, however as part of the development proposal the site will provide 7 x car share spaces, thereby encouraging car sharing opportunities in the development.

The proposed dedicated car share spaces within basement level 1 will be retained as common property managed by the Owners Corporation of the site. In addition, on-street designated car share spaces will also be provided for the specific use of visitors and/or customers, which is subject to implementation by Council's Local Traffic Committee.

3.5 Existing Kerbside Parking Restrictions

The existing kerbside parking restrictions which apply to the road network in the vicinity of the site are illustrated on Figure 6. Key features of those parking restrictions are:

- CLEARWAY restrictions along both sides of the Showground Road, between 6am-7pm, Monday to Fridays and 8am-8pm, Saturdays, Sundays & Public Holidays

- generally NO STOPPING / NO PARKING restrictions along both sides of Showground Road at all other times

- generally 2 HOUR PARKING restrictions along both sides of Andalusian Way and along the southern side of De Clambe Drive, in the vicinity of the site

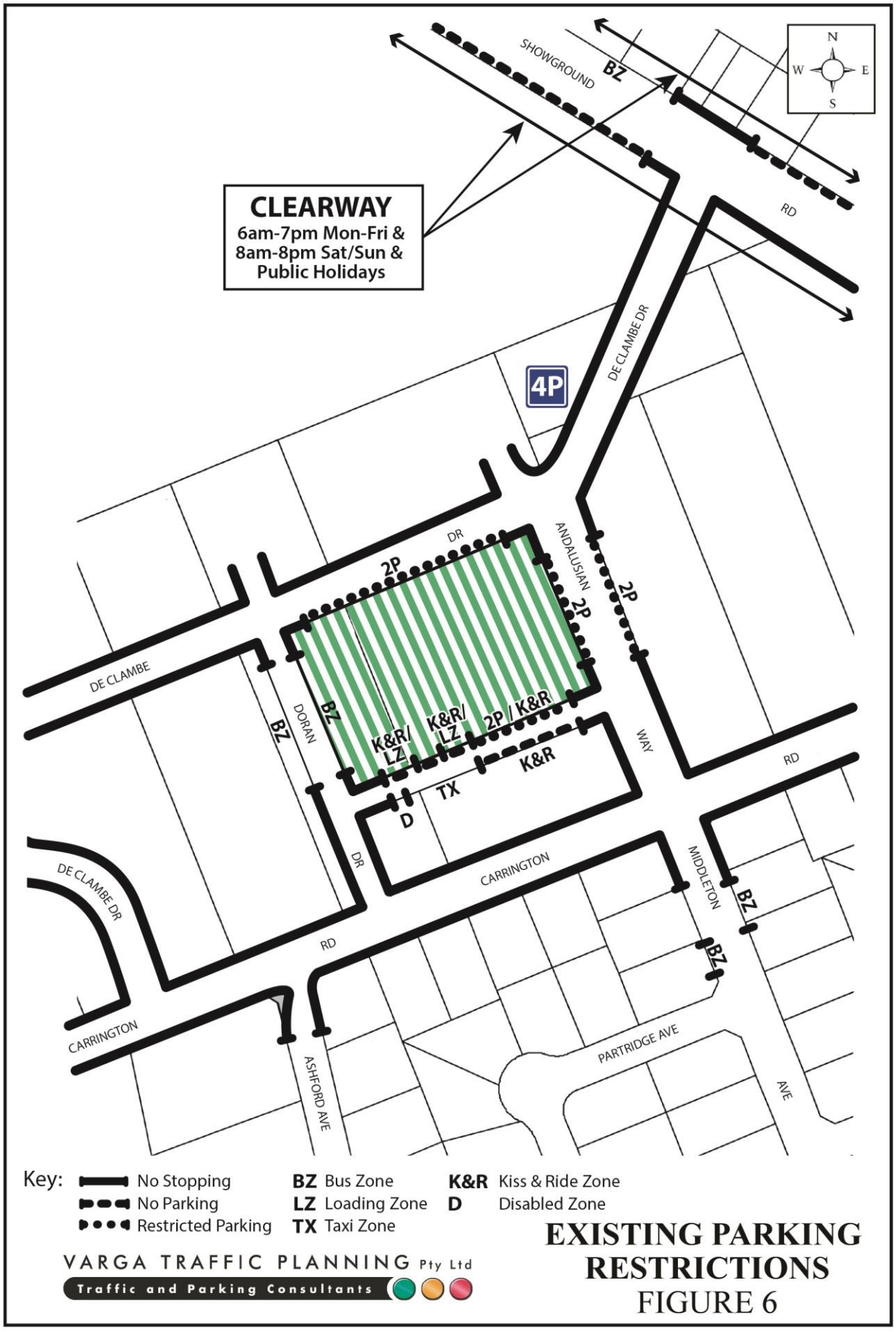
- KISS & RIDE restrictions along the northern side of Mandala Parade, including along the entire site frontage, during the *commuter* peak periods

- 2 HOUR PARKING restrictions along the northern side of Mandala Parade, extending along the eastern portion of the site frontage at all other times

- LOADING ZONE restrictions along the northern side of Mandala Parade, extending along the western portion of the site frontage at all other times

- KISS & RIDE restrictions along the southern side of Mandala Parade, extending along the eastern end of the site, at all times

- DISABLED / TAXI ZONE restrictions along the southern side of Mandala Parade, extending along the western end of the site, outside the entrance of the Hills Showground Station


CLEARWAY
6am-7pm Mon-Fri &
8am-8pm Sat/Sun &
Public Holidays
SHOWGROUND
BZ
N
W
E
S
RD
DE CLAMBE DR
4P
DR
ANDALUSIAN
2P
2P
2P
DE CLAMBE
BZ
DORAN
K&R/
LZ
K&R/
LZ
2P / K&R
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DE CLAMBE DR
DR
CARRINGTON
MIDDLETON
BZ
BZ
RD
CARRINGTON
PARTRIDGE AVE
ASHFORD AVE
AVE
Key:
No Stopping
No Parking
Restricted Parking
BZ Bus Zone
LZ Loading Zone
TX Taxi Zone
K&R Kiss & Ride Zone
D Disabled Zone
VARGA TRAFFIC PLANNING Pty Ltd
Traffic and Parking Consultants
EXISTING PARKING RESTRICTIONS
FIGURE 6

- generally NO STOPPING / NO PARKING restrictions elsewhere along all other local roads within the surrounding Hills Showground Precinct area

- BUS ZONES located at regular intervals along both sides of Showground Road, Doran Drive including directly outside the site, and also along Middleton Avenue.

3.6 Existing Traffic Conditions

An indication of the existing traffic conditions on the road network in the vicinity of the site is provided by peak period traffic surveys undertaken as part of this traffic study.

The traffic surveys were undertaken at the following intersections in early 2021:

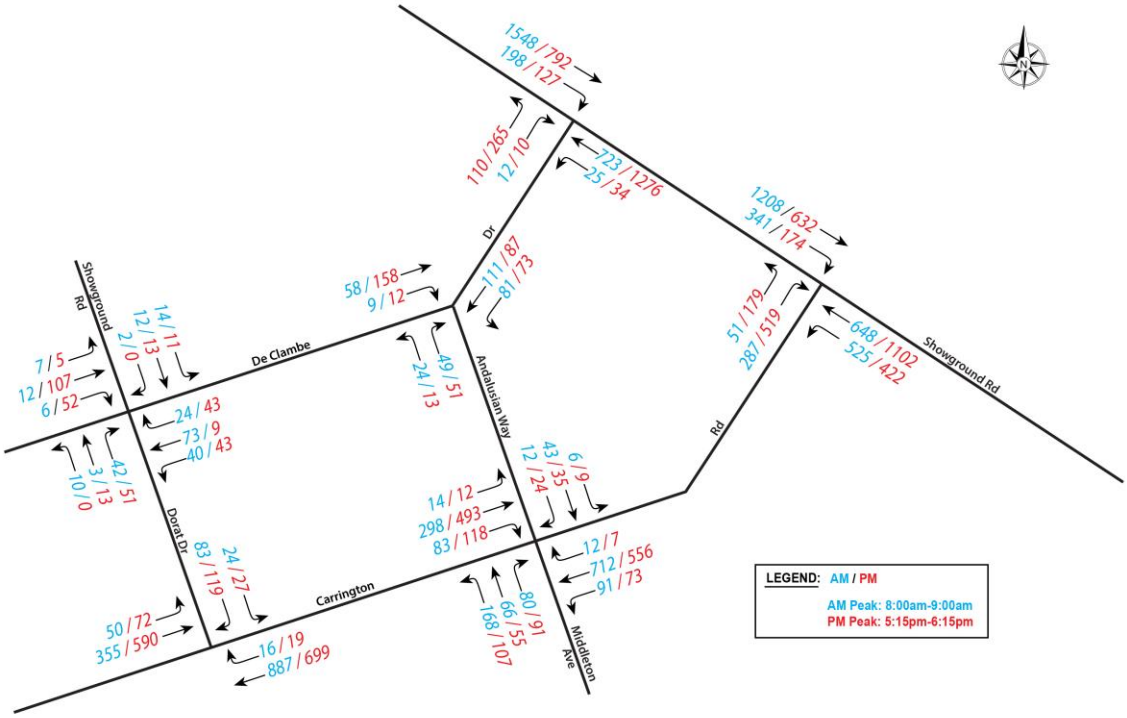
- Showground Road & Carrington Road
- Showground Road & De Clambe Drive
- Carrington Road & Andalusian Way/Middleton Avenue
- Carrington Road & Doran Drive
- De Clambe Drive & Andalusian Way/Middleton Avenue
- De Clambe Drive & Doran Drive

The results of the traffic surveys are summarised on Figure 7 on the following page, revealing that:

- the *morning* network peak period occurred between 8am and 9am whilst the *afternoon* network peak period occurred between 5:15pm and 6:15pm

- two-way traffic flows along the Showground Road in the vicinity of the De Clambe Drive intersection are typically in the order of 2,300 vehicles per hour (vph) during peak periods

- two-way traffic flows along the Showground Road in the vicinity of the Carrington Road intersection are typically in the order of 1,900 vehicles per hour (vph) during peak periods



EXISTING 2021 PEAK TRAFFIC VOLUMES
FIGURE 7

- two-way traffic flows in Carrington Road, between Showground Road and Andalusian Way/Middleton Avenue are typically in the order of 1,300 vph during the *morning* network peak period, increasing to 2,100 vph during the *afternoon* network peak period

- two-way traffic flows in De Clambe Drive, between Showground Road and Andalusian Way intersection are significantly lower in the order of 330-370 vph during the peak periods

- two-way traffic flows in De Clambe Drive, past the Andalusian Way intersection are lower still in the order of 200-255 vph during the peak periods

- two-way traffic flows in Andalusian Way are even lower in the order of 100-200 vph during the peak periods

- two-way traffic flows in Doran Drive are also typically in the order of 100-200 vph during the peak periods.

4.0 PROPOSED DEVELOPMENT

4.1 Overview of Proposed Development

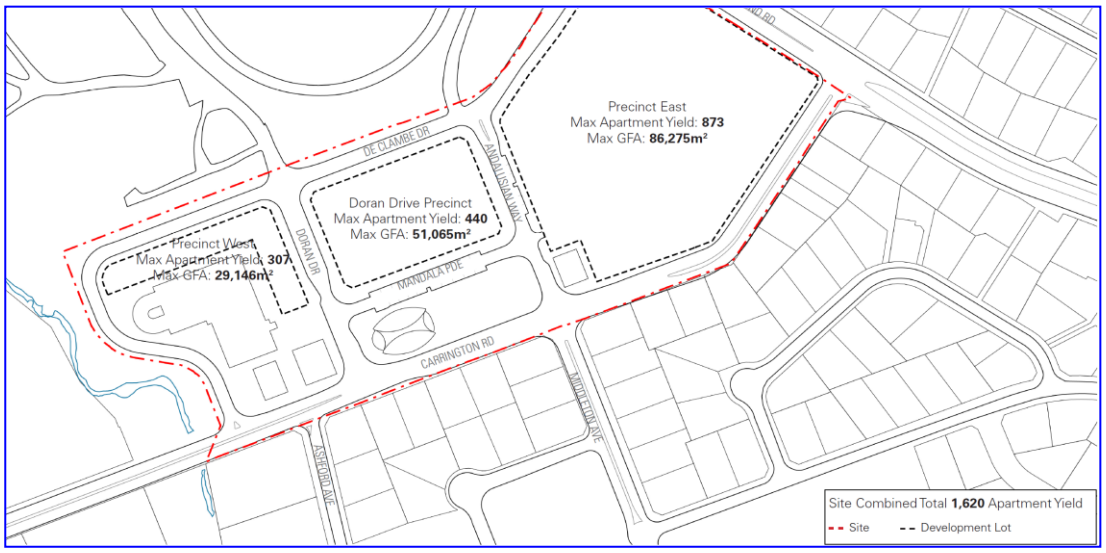
The proposed development involves the construction of a new mixed use development on the Doran Drive Precinct site, comprising a large format retail/commercial component, including a supermarket located on the ground and upper floor levels of the development. Key development statistics of the proposed development are detailed in the table below.

Proposed Development	
Residential	
1-bedroom apartments:	76 apartments
2-bedroom apartments:	311 apartments
3-bedroom apartments:	43 apartments
TOTAL APARTMENTS:	**430 apartments**
Non-Residential	
TOTAL FLOOR AREA:	**10,935m^2**

Off-street parking is to be provided for a total of 762 cars with a total of 771 after 10 years, in a new six-level basement car parking area in accordance with Council's and *Deicorp's* modification application (SSD-9653) to amend the *Hills Showground Station Precinct: Urban Design Guidelines* requirements in relation to the non-residential car parking rates, noting the residential component complies with these rates. Vehicular access to the site is to be provided via a new entry/exit driveway located towards the eastern end of the De Clambe Drive site frontage.

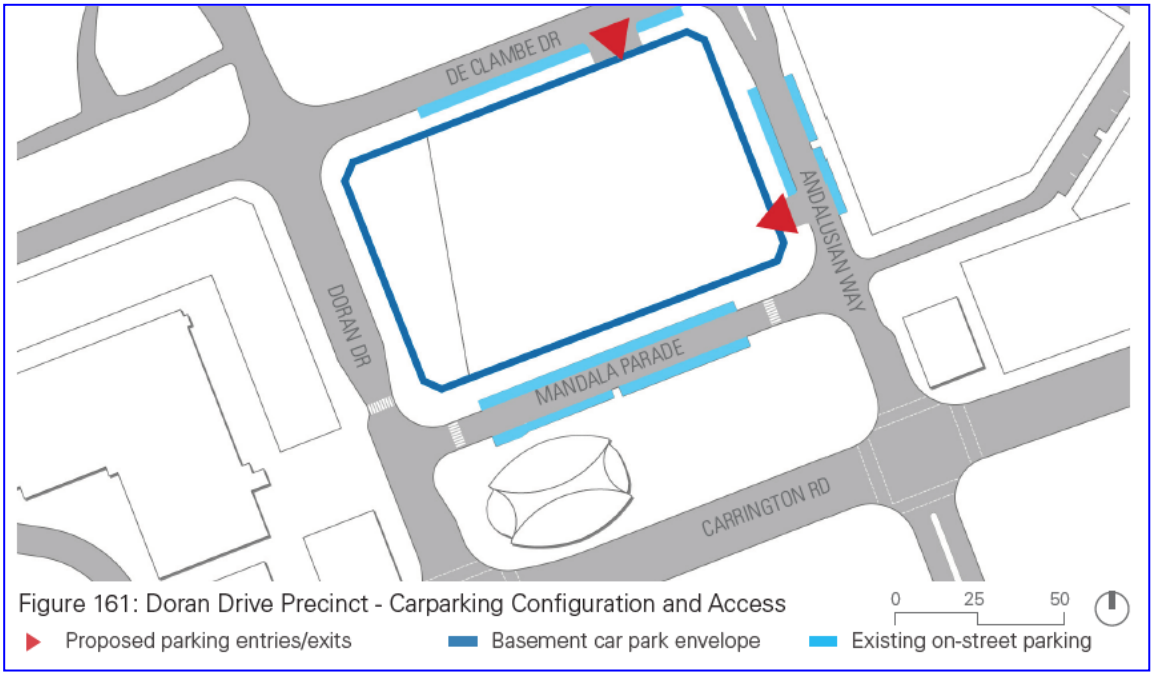
Loading/servicing for the proposed development is expected to be undertaken by a variety of commercial vehicles and rigid trucks up to and including 12.5m HRV trucks. A dedicated service area is to be located on the ground floor level (Level 01) at the rear of the retail shop, which will be capable of accommodating 3 x 12.5m long HRV trucks. A truck turntable is provided to allow these trucks to enter and exit the loading dock whilst travelling in forward gear at all times. All of these trucks can access each of the loading bays *independently*, with the retail tenancies typically using trucks ranging from small and medium trucks up to and including 8.8m in length. Vehicular access to the loading dock is to be provided via a new service driveway located at the southern end of the Andalusian Way site frontage.

In this regard, it is noted that the proposed development yields have been designed in accordance with the Hills Showground Station Precinct Concept Approval (SSD 9653) and comply with the maximum yields imposed within the Doran Drive Precinct, as reproduced below.



Source: COX Architecture Concept Plan Approval

Furthermore, it is also noted that the proposed vehicular access arrangements are also in accordance with 'Car Parking Configuration and Access' plan as specified within the Hills Showground Station Precinct: Site Urban Design Guidelines, which has also been reproduced below.



Source: Showground Station Precinct: Site Urban Design Guidelines (June 2020)

4.2 Projected Traffic Generation Potential

The traffic implications of the development proposal primarily concern the effects of the *additional* traffic flows generated as a result of the development and its impact on the operational performance of the adjacent road network.

An indication of the traffic generation potential of the development proposal is provided by reference to the Roads and Maritime Services publication *Guide to Traffic Generating Developments, Section 3 - Landuse Traffic Generation (October 2002)* and the updated traffic generation rates in RMS *Technical Direction (TDT 2013/04a)* document.

The *TDT 2013/04a* document specifies that it replaces those sections of the RMS *Guidelines* indicated, and that it must be followed when RMS is undertaken trip generation and/or parking demand assessments.

The RMS *Guidelines* and the updated *TDT 2013/04a* are based on extensive surveys of a wide range of land uses and nominate the following traffic generation rates which are applicable to the residential component of the proposed development:

High Density Residential Flat Dwellings

AM: 0.19 peak hour vehicle trips per unit

PM: 0.15 peak hour vehicle trips per unit

Shopping Centres (0-10,000m^2)

12.3 peak hour vehicle trips per 100m^2 GLFA

Notwithstanding, the RMS *Guidelines* and their *TDT 2013/04a* only specifies a traffic generation rate for the evening or midday peak of Thursday through to Sunday, however, does not specify the morning road network peak trip generation rate.

As such, in accordance with the *SCT Consulting* report conducted for the approved concept SSDA undertaken at the Hills Showground Station Precinct, the raw survey information adopted from the *TDT 2013/04a* has been used to estimate the typical Thursday AM peak generation, all of which has been reproduced in the table on the following page.

Range in floor area (m^2 GLFA)	Trip generation rate per 100m^2 GLFA				
	Thursday PM peak	Friday PM peak	Saturday midday	Sunday midday	Thursday AM peak
0-10,000	**12.3**	12.5	16.3	-	**5.9**
10,000 – 20,000	7.6	6.2	7.5	6.6	Not estimated
20,000 – 30,000	5.9	5.6	7.5	6.3	Not estimated
30,000 – 40,000	4.6	3.7	6.1	-	Not estimated

Source: Roads and Maritime Service, analysis by SCT Consulting (Thursday AM peak), 2019

In addition to the above, the 'Shopping Centres' trip generation rate nominated in the *TDT 2013/04a* are based on GLFA, which provides a better indication of trip generation than GFA. As a general guide, 100m² GFA is the equivalent of approximately 75m² GLFA.

Furthermore, given the site is located in the heart of the Hills Showground Station Precinct, with a large existing and future residential catchment located within the precinct itself, it is reasonable to assume that a proportion of the traffic generated by the proposed development will comprise *passing traffic* and *linked trips*, that is, customers drawn from *within* the precinct such that that component of traffic flows will already using the adjacent road network.

Reference to the RMS *Guidelines* and the *approved* concept SSDA report indicates that the *passing traffic* component of the development proposal is likely to contribute to a 25% discount to the overall estimated traffic generation of the site.

Application therefore of the above traffic generation rates to the various components of the development proposal yields a traffic generation potential of 444 vph during the AM peak period and 821 vph during the PM peak period, as set out below:

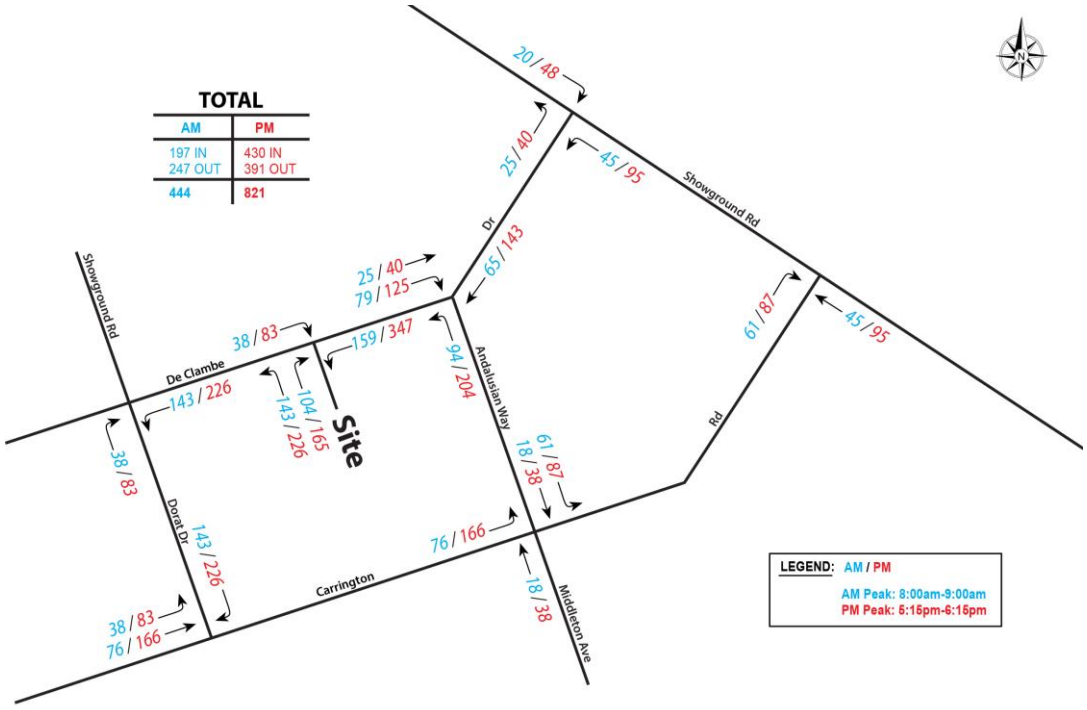
Projected Traffic Generation Potential of Proposed Development

	AM	**PM**
Residential (430 apartments):	82 vph	65 vph
Retail shops & supermarket (9,426m^2 GLFA*):	362 vph^	756 vph^
TOTAL TRAFFIC GENERATION POTENTIAL:	**444 vph**	**821 vph**

*Assuming GLFA: GFA=0.75:1 (refer to Section 3.6.1, Guide to Traffic Generating Development)

^25% reduction factor (refer to Section 3.6.1 Guide to Traffic Generating Development)

The distribution of those volumes onto the surrounding road network is shown on Figure 8.



PROJECTED ADDITIONAL PEAK TRAFFIC VOLUMES
FIGURE 8

That projected increase in traffic activity as a consequence of the development proposal is consistent with the *approved* Concept SSDA for the Hills Showground Precinct site, and it is therefore considered that the proposal will not have any unacceptable traffic implications in terms of road network capacity, as is demonstrated in the following section of this report.

4.3 Traffic Implications - Road Network Capacity

The traffic implications of development proposals primarily concern the effects that any *additional* traffic flows may have on the operational performance of the nearby road network.

Those effects can be assessed using the SIDRA NETWORK 9 program which is widely used by the TfNSW and many LGA's for this purpose. Criteria for evaluating the results of the analysis are reproduced in the following pages.

The results of the SIDRA capacity analysis of the 6 intersections surrounding the development proposal, plus the proposed site access driveway off De Clambe Drive, are summarised in the table on the following pages.

4.4 Intersection Operations

Table 3: Network Performance in 2021 under Modelled Scenarios

Intersection	Existing Volumes			Existing Volumes + Development		
	AVD	LoS	DoS	AVD	LoS	DoS
2021 AM PEAK (EXISTING TRAFFIC DEMAND)						
Showground Road & Carrington Road	18.7	B	0.439	20.8	B	0.454
Showground Road & De Clambe Drive	5.1	A	0.464	5.4	A	0.464
Carrington Road & Andalusian Way/Middleton Avenue	15.6	B	0.507	16.4	B	0.528
De Clambe Drive & Andalusian Way	2.2	A	0.105	2.7	A	0.138
Doran Drive & Carrington Road	12.2	A	0.405	16.4	B	0.519
Doran Drive & De Clambe Drive	3.9	A	0.077	4.4	A	0.155
De Clambe Drive & Proposed Site Access Driveway	-	-	-	1.8	A	0.206
2021 PM PEAK (EXISTING TRAFFIC DEMAND)						
Showground Road & Carrington Road	23.0	B	0.586	24.4	B	0.663
Showground Road & De Clambe Drive	9.9	A	0.626	10.5	A	0.636
Carrington Road & Andalusian Way/Middleton Avenue	14.3	A	0.458	15.6	B	0.568
De Clambe Drive & Andalusian Way	1.8	A	0.093	2.8	A	0.232
Doran Drive & Carrington Road	13.0	A	0.419	19.3	B	0.752
Doran Drive & De Clambe Drive	4.1	A	0.089	5.0	A	0.202
De Clambe Drive & Proposed Site Access Driveway	-	-	-	2.6	A	0.360

Table 4: Network Performance in 2026 under Modelled Scenarios

Intersection	Existing Volumes with background growth			Existing Volumes with background growth + Development		
	AVD	LoS	DoS	AVD	LoS	DoS
2026 AM PEAK (FUTURE 5+ YEAR DEMAND)						
Showground Road & Carrington Road	19.7	B	0.527	21.6	B	0.514
Showground Road & De Clambe Drive	5.3	A	0.531	5.7	A	0.532
Carrington Road & Andalusian Way/Middleton Avenue	15.4	B	0.541	16.3	B	0.563
De Clambe Drive & Andalusian Way	2.2	A	0.105	2.7	A	0.138
Doran Drive & Carrington Road	11.9	A	0.423	16.1	B	0.558
Doran Drive & De Clambe Drive	3.9	A	0.077	4.4	A	0.155
De Clambe Drive & Proposed Site Access Driveway	-	-	-	1.8	A	0.206
2026 PM PEAK (FUTURE 5+ YEAR DEMAND)						
Showground Road & Carrington Road	23.1	B	0.665	25.1	B	0.745
Showground Road & De Clambe Drive	9.7	A	0.646	11.1	A	0.636
Carrington Road & Andalusian Way/Middleton Avenue	14.0	A	0.482	15.4	B	0.600
De Clambe Drive & Andalusian Way	1.8	A	0.093	2.8	A	0.230
Doran Drive & Carrington Road	13.3	A	0.454	19.8	B	0.752
Doran Drive & De Clambe Drive	4.1	A	0.089	5.0	A	0.202
De Clambe Drive & Proposed Site Access Driveway	-	-	-	2.6	A	0.360

Table 5: Network Performance in 2031 under Modelled Scenarios

Intersection	Existing Volumes with background growth			Existing Volumes with background growth + Development		
	AVD	LoS	DoS	AVD	LoS	DoS
2031 AM PEAK (FUTURE 10+ YEAR DEMAND)						
Showground Road & Carrington Road	21.0	B	0.606	22.6	B	0.609
Showground Road & De Clambe Drive	5.7	A	0.599	6.1	A	0.599
Carrington Road & Andalusian Way/Middleton Avenue	14.8	B	0.584	16.0	B	0.610
De Clambe Drive & Andalusian Way	2.2	A	0.105	2.7	A	0.138
Doran Drive & Carrington Road	12.1	A	0.441	16.3	B	0.563
Doran Drive & De Clambe Drive	3.9	A	0.077	4.4	A	0.155
De Clambe Drive & Proposed Site Access Driveway	-	-	-	1.8	A	0.206
2031 PM PEAK (FUTURE 10+ YEAR DEMAND)						
Showground Road & Carrington Road	24.0	B	0.761	27.6	B	0.833
Showground Road & De Clambe Drive	10.4	A	0.646	11.9	A	0.705
Carrington Road & Andalusian Way/Middleton Avenue	13.8	A	0.508	15.7	B	0.625
De Clambe Drive & Andalusian Way	1.8	A	0.093	2.8	A	0.230
Doran Drive & Carrington Road	13.4	A	0.496	20.5	B	0.785
Doran Drive & De Clambe Drive	4.1	A	0.089	5.0	A	0.202
De Clambe Drive & Proposed Site Access Driveway	-	-	-	2.6	A	0.360

In essence, the capacity analysis has found that all intersections will continue to operate at the same *Levels of Service* as the existing scenarios, with *negligible* increases in average vehicle delays, if any.

On the above basis, it is clear that the surrounding road network will operate at satisfactory *Levels of Service* in all three scenarios – i.e. 2021, 2026 & 2031 – and that the proposed development will not result in any unacceptable traffic implications in terms of road network capacity.

Criteria for Interpreting Results of Sidra Analysis

1. Level of Service (LOS)

LOS	Traffic Signals and Roundabouts	Give Way and Stop Signs
'A'	Good operation.	Good operation.
'B'	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
'C'	Satisfactory.	Satisfactory but accident study required.
'D'	Operating near capacity.	Near capacity and accident study required.
'E'	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode.	At capacity and requires other control mode.
'F'	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode.

2. Average Vehicle Delay (AVD)

The AVD provides a measure of the operational performance of an intersection as indicated on the table below which relates AVD to LOS. The AVD's listed in the table should be taken as a guide only as longer delays could be tolerated in some locations (i.e. inner-city conditions) and on some roads (i.e. minor side street intersecting with a major arterial route).

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

3. Degree of Saturation (DS)

The DS is another measure of the operational performance of individual intersections.

For intersections controlled by traffic signals[1] both queue length and delay increase rapidly as DS approaches 1, and it is usual to attempt to keep DS to less than 0.9. Values of DS in the order of 0.7 generally represent satisfactory intersection operation. When DS exceeds 0.9 queues can be anticipated.

For intersections controlled by a roundabout or GIVE WAY or STOP signs, satisfactory intersection operation is indicated by a DS of 0.8 or less.

[1] *The values of DS for intersections under traffic signal control are only valid for cycle length of 120 secs.*

4.5 Parking Assessment

Land Use		Proposed Units/Floor Area	Parking Rate Applied	Required Parking (maximum)
Residential	**1-bedroom**	76	1/dwelling (max)	76
	2-bedroom	311	1/dwelling (max)	311
	3-bedroom	43	1/dwelling (max)	43
***Residential Sub-Total**		**430**		**421**
*Residential Affordable housing to be reinstated after 10 years.				**9**
Retail/Commercial		**10,935m^2**	1 space per 32m² GFA	**341**
Retail/Commercial Sub-Total				**341**
TOTAL OFF-STREET PARKING REQUIREMENT				**771**

*Assuming GLFA: GFA=0.75:1 (refer to Section 3.6.1, Guide to Traffic Generating Development)

The proposed development makes provision for a total of 762 off-street parking spaces with a total 771 after a period of 10 years, comprising 430 residential spaces and 341 retail/commercial spaces, thereby satisfying both Council's DCP and the *Hills Showground Station Precinct: Urban Design Guidelines* parking rates. The basement car parking area has also been designed to accommodate 38 x electrical charging stations and 8 x car share spaces.

4.6 Residential Parking Provision

The proposed provision of 421 with a total of 430 after a period of 10 years for 430 apartments (9 parking spaces to be reinstated after 10 years) equates to a parking rate of *1 space per dwelling* which is in accordance with the Approved Concept SSDA as well as the *Hills Showground Station Precinct: Urban Design Guidelines* document and will cater for the requirements of the residential component of the development.

4.7 Non-Residential Parking Provision

The proposed provision of 341 retail parking spaces for 10,935m^2 GFA of non-residential floor space equates to a *maximum* parking rate of approximately *1 space per 32m^2 GFA* which is considered necessary to cater for the requirements of the retail component of the development for the following reasons:

- the proposed car parking provision is in line with the *Woolworths* car parking average of *1 space per 21m²* as outlined within the *Hill PDA Consulting Report*
- the proposed provision of 341 retail car parking spaces is in line with the minimum parking requirements set out in many other Greater Sydney Council's *DCPs* which typically require *1 space per 25m² GFA*

- the site is ideally located within a transit-oriented area, with the Hills Showground Station located directly opposite the site. The ready accessibility of the site by public transport will facilitate reduced car usage by employees and customers of the development proposal.

4.8 Off-Street Bicycle Parking Provisions

The off-street bicycle parking rates applicable to the development proposal are specified in Table 8 of the *Hills Showground Station Precinct: Urban Design Guidelines* document in the following terms:

Table 8: Doran Drive Precinct Bicycle Parking Facility Rates

	Rate (minimum)
Residential flat buildings	1 resident space per 3 apartments 1 visitor space per 12 apartments
Commercial use	1 space per 600m² GFA for staff
Retail use	1 space per 450m² GFA for staff

Application of the above bicycle parking rates to the various components of the development proposal yields an off-street bicycle requirement of 144 residential spaces, 36 visitor spaces and 24 retail staff spaces.

The proposed development makes provision for 144 residential spaces in private storage cages, 36 visitor spaces and 24 retail staff spaces with end-of-trip facilities, thereby satisfying the bicycle parking requirement.

In this regard, these end-of-trip facilities include separate male and female amenities comprising secured lockers, change rooms, toilets and shower facilities within the upper

basement level as well as Class B/Class C bicycle parking facilities in accordance with *AS2890.3* for the respective users of the development located within the basement parking levels.

4.9 Australian Standards Design Requirements

The geometric design layout of the proposed car parking facilities have been designed to comply with the relevant requirements specified in the Standards Australia publication *Parking Facilities Part 1 - Off-Street Car Parking AS2890.1* in respect of ramp gradients, parking bay dimensions, aisle widths, overhead clearances etc.

The vehicular access arrangements have been designed to accommodate the swept turning path requirements of the B99 design vehicle as specified in *AS2890.1*, allowing them to circulate the internal ramps without difficulty, and to enter and exit the site in a forward direction at all times.

The geometric design layout of the proposed loading facilities have been designed to comply with the relevant requirements specified in the Standards Australia publication *Parking Facilities Part 2 - Off-Street Commercial Vehicle Facilities AS2890.2* in respect of loading dock dimensions and service area requirements for HRV trucks.

The vehicular access arrangements have been designed to accommodate the swept turning path requirements of the 12.5m HRV truck as specified in *AS2890.2*, allowing it to enter and exit the site in a forward direction at all times via the mechanical turntable.

5.0 CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

This Traffic and Parking Assessment Report has been prepared in accordance with the Planning Secretary's Environmental Assessment Requirements (SEARs), Council's *DCP/ LEP* and the RMS *Guidelines*, to accompany an Environmental Impact Statement to the *NSW Department of Planning, Infrastructure and Environment* for a proposed mixed use development.

The parking requirements of the proposed development have been designed in accordance with the approved concept SSDA rates, *The Hills DCP 2012*, and the *Urban Design Guidelines*.

The proposed *maximum* provision of 771 car parking spaces, comprising 430 residential spaces for 422 apartments and 341 retail/commercial spaces for 10,935m^2 GFA of retail floor area is considered sufficient to satisfy the anticipated *actual* parking likely to be generated by the development to ensure its viability.

In addition, an extensive amount of bicycle parking is proposed to be provided, in addition to excellent end-of-trip facilities, ensuring the development is encouraging the use of active transport modes of travel for future building occupants, residents, visitors, employees and customers.

Extensive traffic surveys and SIDRA modelling were also undertaken at the following intersections in early 2021:

- Showground Road & Carrington Road
- Showground Road & De Clambe Drive
- Carrington Road & Andalusian Way/Middleton Avenue
- Carrington Road & Doran Drive
- De Clambe Drive & Andalusian Way/Middleton Avenue
- De Clambe Drive & Doran Drive

The SIDRA analysis confirmed that the surrounding road network will operate at satisfactory *Levels of Service* in all three scenarios – i.e. 2021, 2026 & 2031 – and that the proposed development will not result in any unacceptable traffic implications in terms of road network capacity.

In terms of the geometric design layout of the vehicular access, parking and loading facilities, the proposed arrangements have been designed in accordance with the *AS2890* series. Importantly, all vehicles are able to enter and exit the site in a forward direction at all times.

In the circumstances it is therefore concluded that the proposed mixed use development is generally consistent with the approved Concept Masterplan and suitable in terms of associated traffic impact, car and bicycle parking provision and pedestrian amenity.