Proposed Residential Development

2 Fishburn Crescent,
Castle Hill

REVISED TRAFFIC AND PARKING ASSESSMENT REPORT

28 April 2026

Ref 23513

VARGA TRAFFIC PLANNING Pty Ltd
Transport, Traffic and Parking Consultants

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1.0 INTRODUCTION

1.1 Project Summary

This revised report has been prepared on behalf of *Arada* to accompany an Environmental Impact Statement (EIS) to the *NSW Department of Planning, Housing and Infrastructure (DPHI)* for a residential development proposal to be located at 2 Fishburn Crescent, Castle Hill (Lot 1 in DP 1316896) (Figures 1 and 2).

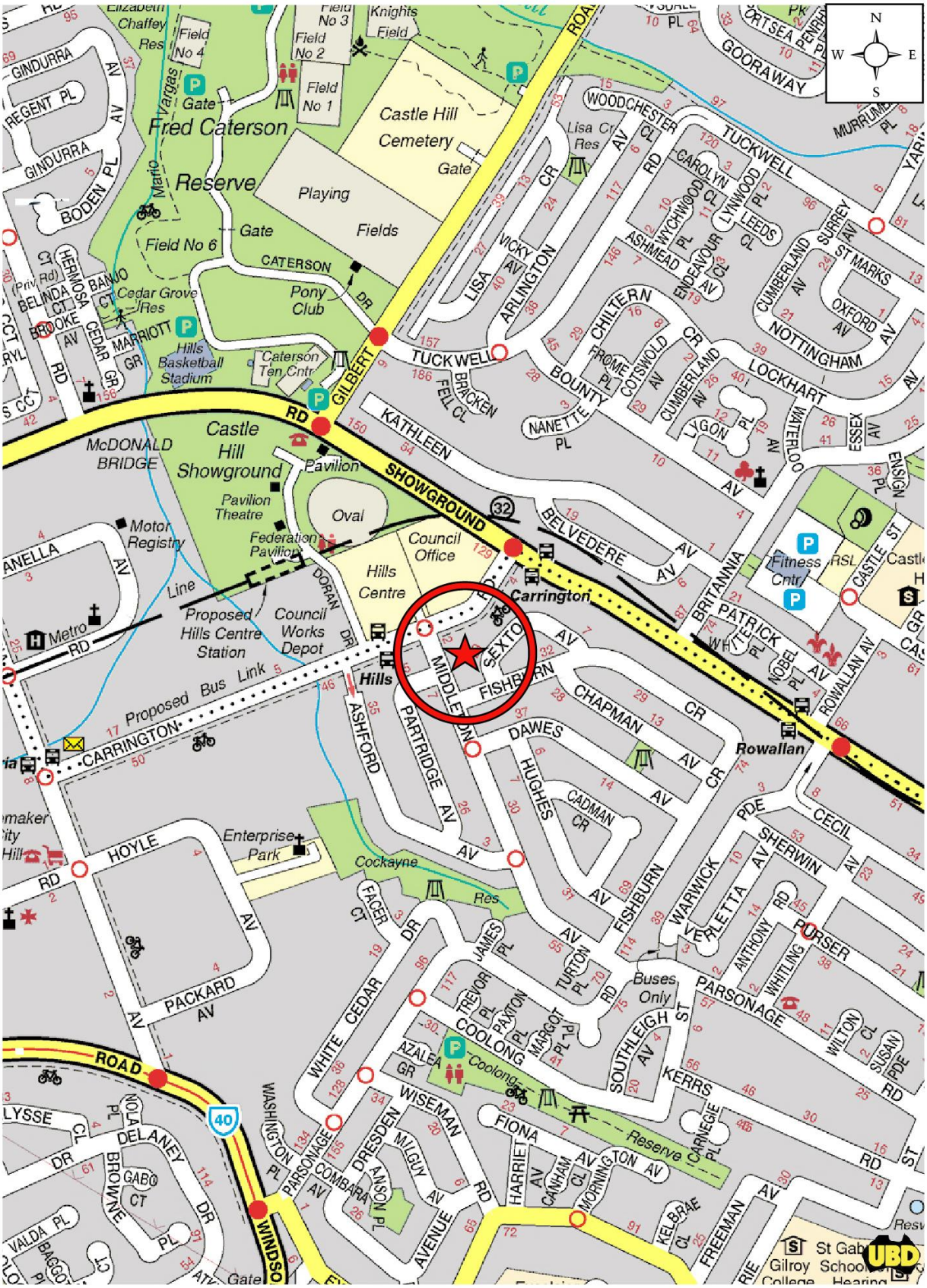
The proposed development involves demolition of existing structures on the site to facilitate the construction of a residential flat building with a basement parking area.

The development proposal is defined as a State Significant Development (SSD) in accordance with *State Environmental Planning Policy (Planning Systems) 2021*, therefore this revised traffic report has been prepared to accompany an EIS to the *NSW Department of Planning, Housing and Infrastructure.*

In 2018, the NSW Government released a document called *'Greater Sydney Region Plan: A Metropolis of Three Cities"*. As the population grows, the goal is to rebalance economic and social opportunities across Greater Sydney by dividing Sydney into three core cities to allow residents to live within 30 minutes of their jobs, education and health facilities, services and other great places.

The document envisages Castle Hill as becoming a "Strategic Centre" with a focus on *"Transit Orientated Development"* such as the *Showground Station Precinct* in which the subject site is located. The *Showground Station Precinct* is envisaged to become an attractive and well-connected neighbourhood that achieves housing targets supported by necessary infrastructure.

The location of the site has excellent connectivity to public transport services including the Sydney Metro service, and is ideally located to encourage a greater use of alternate and sustainable modes of transport.



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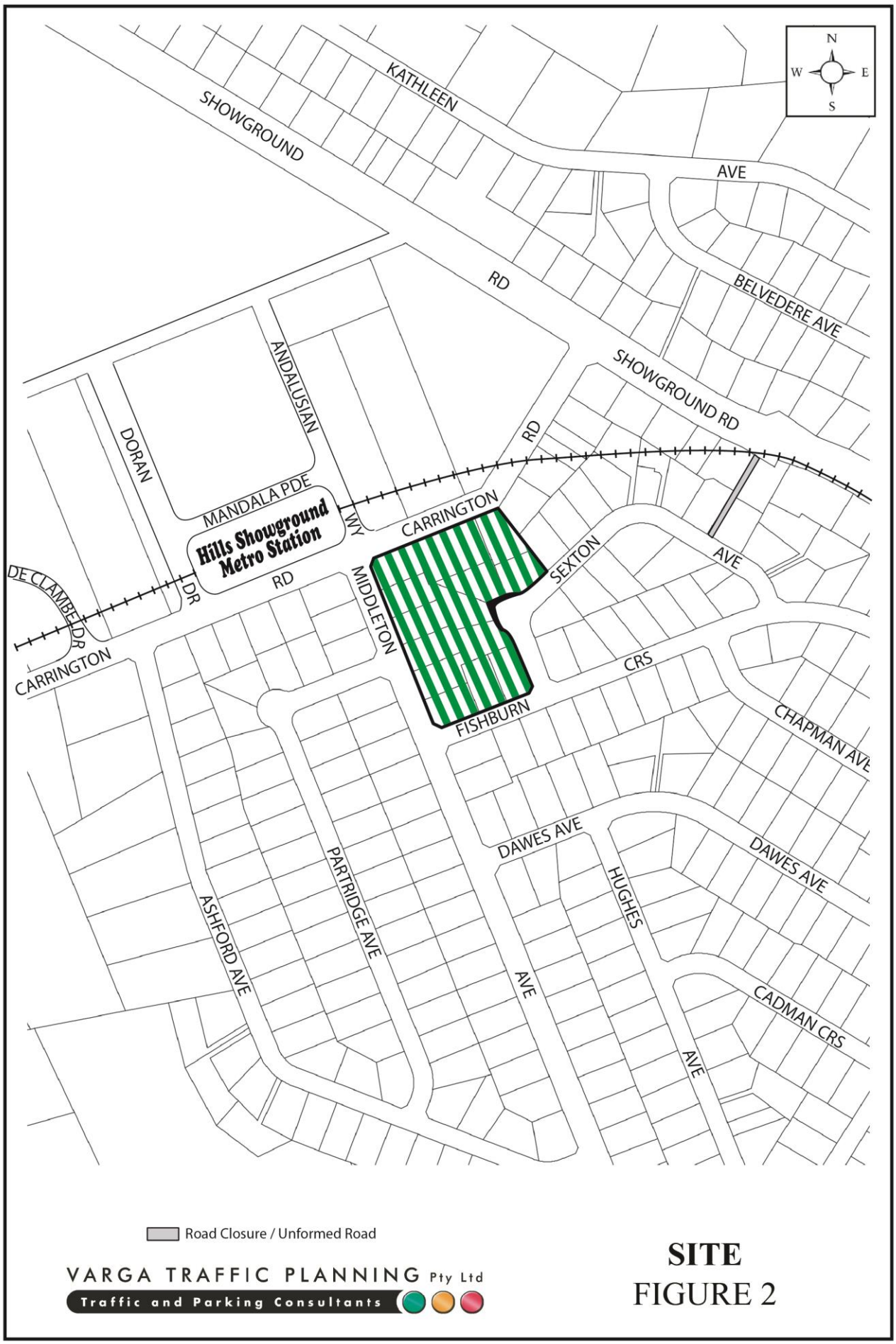
LOCATION
FIGURE 1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SHOWGROUND RD
ANDALUSIAN
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Hills Showground
Metro Station
CARRINGTON
RD
SEXTON
AVE
DE CLAMBE DR
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RD
MIDDLETON
CARRINGTON
FISHBURN
CRS
CHAPMAN AVE
DAWES AVE
DAWES AVE
ASHFORD AVE
PARTRIDGE AVE
AVE
HUGHES
AVE
CADMAN CRS
Road Closure / Unformed Road
VARGA TRAFFIC PLANNING Pty Ltd
Traffic and Parking Consultants
SITE
FIGURE 2

Off-street parking is to be accommodated in a multi-level basement parking area in accordance with Council's *Showground Station Precinct DCP* requirements.

Vehicular access to the site is proposed to be provided via a new combined entry/exit driveway located in the middle of Fishburn Crescent site frontage.

Loading/servicing for the proposed development is expected to be undertaken by a variety of commercial vehicles up to and including 12.5m long heavy rigid vehicles (HRV trucks). A 12.5m HRV loading bay is proposed on ground level, adjacent to the waste store room.

1.2 Purpose of this Report

The purpose of this revised report is to assess the traffic and parking implications of the expansion proposal and to that end this revised 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
- 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.

1.3 Response to Requests for Additional Information

The plans have been revised in part in response to the *DPHI's* letter dated 22 December 2025, as well as The Hills Shire Council's letters dated 16 December 2025 and 17 December 2025, requesting additional information in respect of the development proposal.

The following advice is provided in response to the "traffic" and "parking" matters raised in the abovementioned letters:

- the total number of off-street car parking spaces has been reduced from the previously proposed 740 car spaces to 674 car spaces, to better align with the Green Travel Plan and to commit to long-term travel behaviour change

- an off-street accessible car parking space has been provided for visitors

- whilst it is acknowledged that parts of the regional road network are at capacity in accordance with the SIDRA capacity analysis as part of *The Castle Hill and Norwest Precinct Plans – Transport Study (dated 15 Nov 24)* prepared by *Stantec*, the "base case" analysis was based on 2019 traffic survey data, whilst the SIDRA capacity analysis undertaken as part of this traffic study was based on 2024 traffic survey data which is more recent and considered more accurate

- in this regard, the SIDRA capacity analysis undertaken as part of this traffic study is reproduced in Chapter 4.4 of this report, demonstrating that intersections in the vicinity of the site will continue to operate at the same *Levels of Services A* or *B* as the "existing" scenarios, and that the proposed development will not result in any unacceptable traffic implications in terms of road network capacity

- the SIDRA capacity analysis undertaken by *Stantec* had already taken into account the maximum extent of potential redevelopment of the subject site in the "forecast years" 2026 and 2036, and had provided relevant recommendations to mitigate and alleviate negative traffic impacts

- furthermore, compared to the *LEP* controls which applied when the *Stantec* study was undertaken, the *floor space ratio* and *height* bonuses implemented in 2023 by the NSW Government for in-fill affordable housing allows for the provision of an additional 25 apartments units. This would result in a *nett increase* of 6 vehicle trips per hour during commuter peak periods in traffic generation potential of the site as a consequence of the development proposal, which is considered to be *statistically insignificant*

- as requested by the Council, vehicle trips have been derived using person trip rates and mode share in accordance with the TfNSW *Guide*, as demonstrated in Chapter 4.2 of this report

- *SEPP (Housing) 2021* takes precedence over *The Hills DCP 2012*. Moreover, as the proposed development is seeking approval under the State Significant Development Application pathway, *The Hills DCP 2012* does not apply to the proposed site. Therefore, the proposed shortfall of off-street car parking provision in accordance with *The Hills DCP 2012* is considered acceptable.

2.0 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

2.1 SEARS

On 30 April 2025, the *NSW Department of Planning, Housing and Infrastructure* issued the *Secretary's Environmental Assessment Requirements (SEARs)* for the State Significant Development (SSD), SSD-83112728, which included the following:

> *"Provide a Transport Impact Assessment (TIA) in accordance with the processes and methodology recommended in the Guide to Transport Impact Assessment (GTIA) published by TfNSW.*
>
> *If the construction of the development would cause interruptions to regular pedestrian and transport routes (including public transport, active transport or general traffic), a preliminary Construction Traffic (or Transport) Management Plan (CTMP) should be prepared as part of the TIA to mitigate any such impacts."*

This revised report addresses the SEARs requirement for a Traffic Impact Assessment (TIA).

A Construction Traffic Management Plan (CTMP) and a Green Travel Plan (GTP) have been prepared under separate cover.

2.2 Relevant Policies and Guidelines:

- The Hills Local Environmental Plan 2019
- The Hills Development Control Plan 2012 (August 2024)
- Roads Act 1993 (NSW)
- State Environmental Planning Policy (Transport and Infrastructure) 2021
- State Environmental Planning Policy (Housing) 2021
- Guide to Transport Impact Assessment (Transport for NSW, Version 1.1 2024)
- 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 – 2022 (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

Site

The subject site is located in land zoned *R4 – High Density Residential* in the southeast corner of the Carrington Road and Middleton Avenue intersection, approximately 200m southeast of the *Hills Showground Metro Station*.

The site has street frontages approximately 110 metres in length to Carrington Road, approximately 140 metres in length to Middleton Avenue, approximately 80 metres in length to Fishburn Crescent, approximately 110 metres in length to Sexton Avenue, and occupies an area of approximately 14,000m^2.

The subject site is currently a vacant lot of land. The site was previously occupied by 15 residential dwellings, each dwelling with its own off-street parking provision and vehicular access driveway.

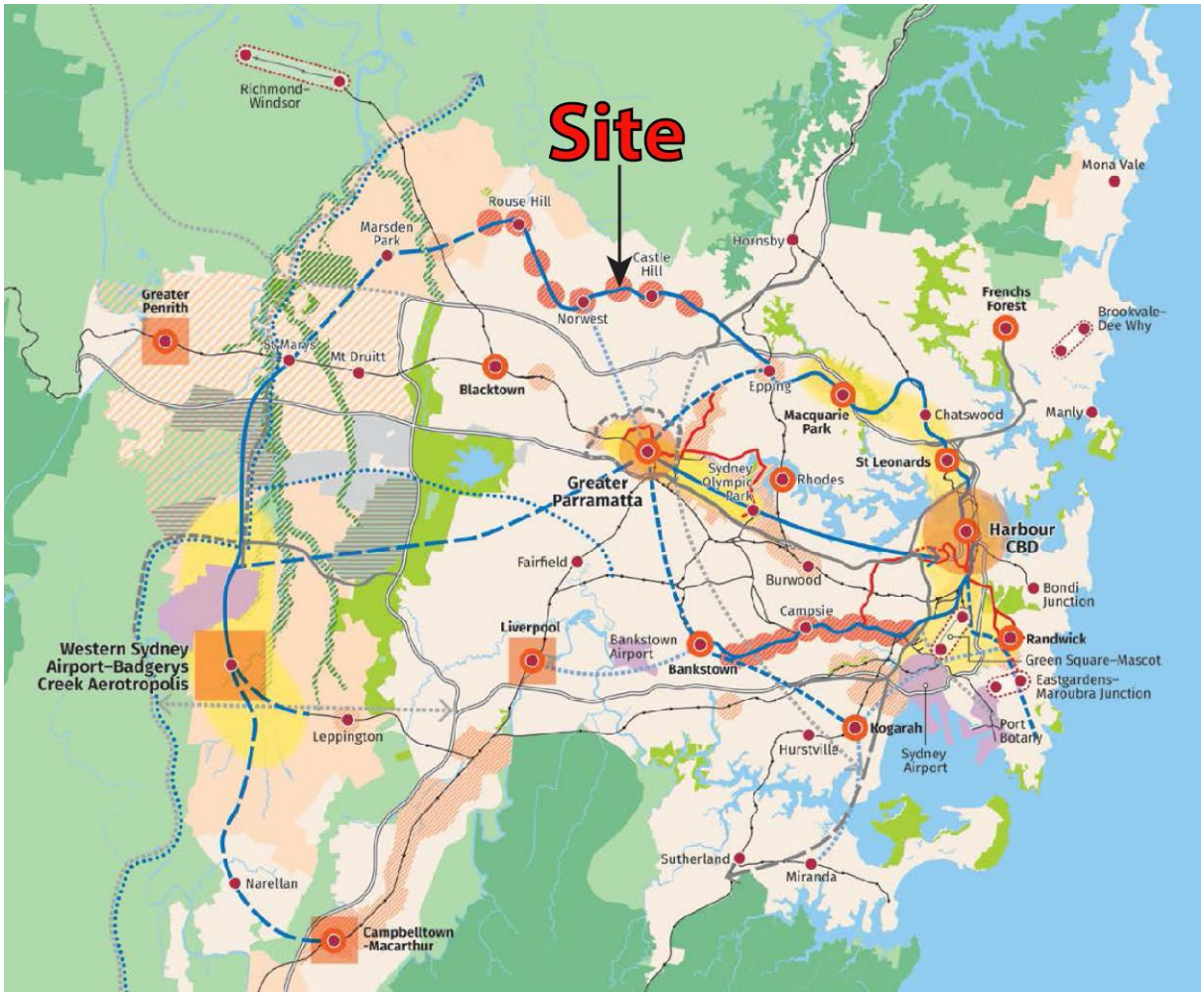
A recent aerial photography of the site and its surroundings is provided below:

Source: MetroMap

Greater Sydney Region Plan – A Metropolis of Three Cities

In 2018, the NSW Government released a document called *'Greater Sydney Region Plan: A Metropolis of Three Cities"*. As the population grows, the goal is to rebalance economic and social opportunities across Greater Sydney by dividing Sydney into three core cities to allow residents to live within 30 minutes of their jobs, education and health facilities, services and other great places.

The document envisages Castle Hill as becoming a "Strategic Centre" with a focus on *"Transit Orientated Development"* such as the *Showground Station Precinct* in which the subject site is located.



Showground Station Precinct DCP

The subject site is located in the *Showground Station Precinct* as detailed in *Part D, Section 9* of *The Hills Development Control Plan (DCP) 2012*.

Council's *LEP & DCP* envisage the redevelopment of the precinct as a *Transit Oriented Development* to increase the number of people who walk, cycle or use public transport as the main form of transport.

The subject site is zoned *R4 - High Density Residential* under *Part 9 - Showground Station Precinct of LEP 2019*, with a maximum height of 27m and an FSR of 1.9:1.

The *Showground Station Precinct* is envisaged to become an attractive and well-connected neighbourhood that achieves housing targets supported by necessary infrastructure. It is anticipated that the precinct will provide up to 9000 additional dwellings and 2300 additional jobs by 2036.

Extracts from the *Showground Station Precinct DCP* illustrating the land to which this section of the *DCP* applies, the Precinct Structure Plan, Indicative Street Network and Hierarchy, Existing and Proposed Cycleway Network and Local Street – Land Dedication Plan are reproduced in the following pages.

Fishburn Crescent and Sexton Avenue are defined as "local street" in the *DCP*, and the proposed development makes provision for land dedications to widen both Fishburn Crescent and Sexton Street to achieve the local street section as illustrated on Figure 13 of the *DCP* which is also reproduced below.

A number of road improvements and upgrades have been undertaken in the *Showground Station Precinct* in recent years to accommodate the projected increase in population and traffic flows.

In particular, intersection upgrades have been undertaken at the Showground Road/Carrington Road, Showground Road/De Clambe Drive, Carrington Road/Middleton Avenue, and Carrington Road/Doran Drive to accommodate the increased traffic flows.

These intersections have been designed to accommodate the upgraded four-lane sub-arterial status of Carrington Road.

In addition, kerbside parking has been prohibited on both sides of Carrington Road as part of its upgrade to a four-lane sub-arterial road. Signalised pedestrian crossings have been provided in the local area to accommodate the increased pedestrian movements generated by the *Hills Showground Metro Station*.

Figure 1 Land to which this Section Applies

Showground Precinct Development Control Plan

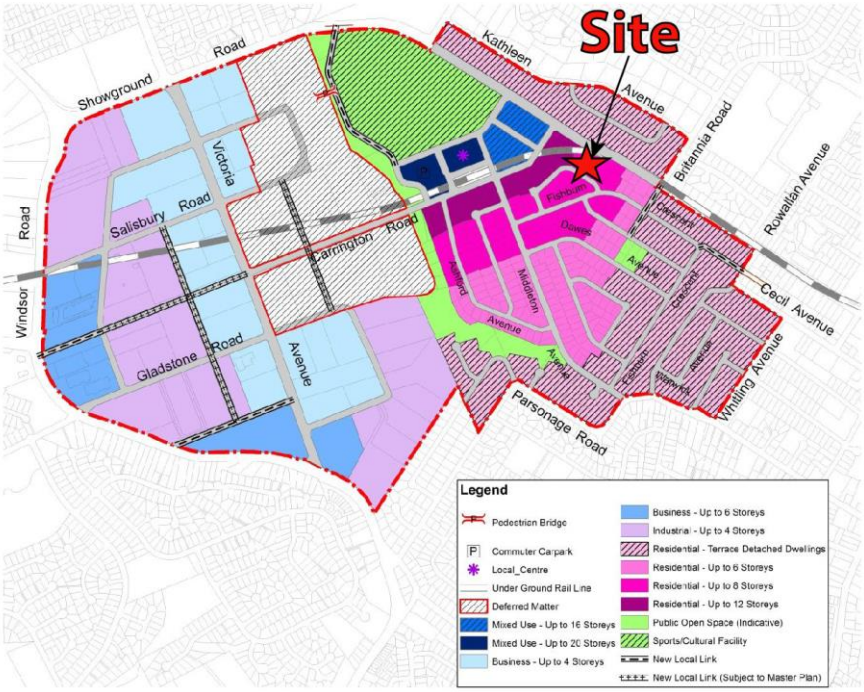


Figure 7 Showground Precinct Structure Plan

Showground Precinct Development Control Plan

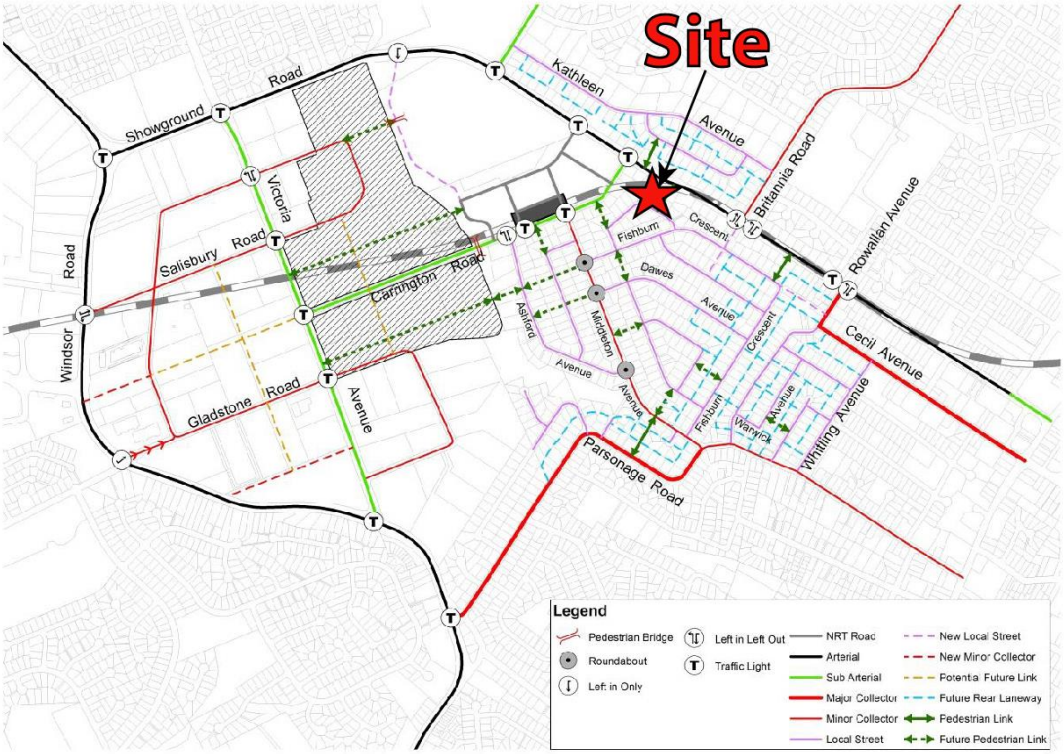


Figure 8 Indicative Street Network and Hierarchy
(Note: Land within the Deferred Area will be subject to further Master Planning)

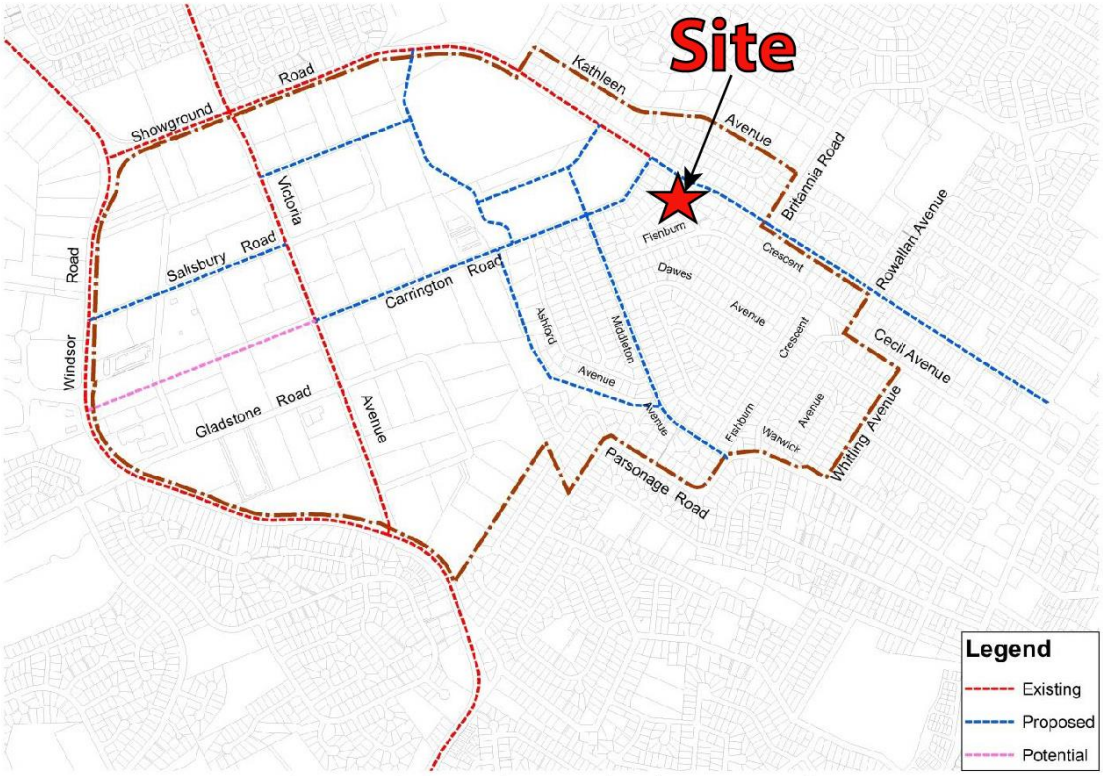


Figure 9 Existing and Proposed Cycleway Network

Showground Precinct Development Control Plan

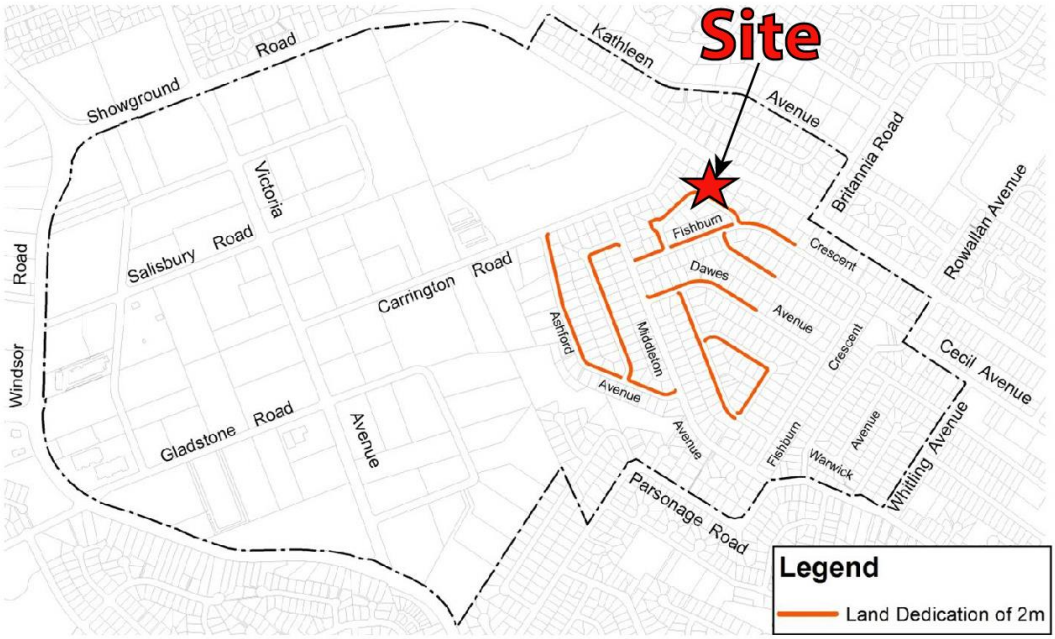
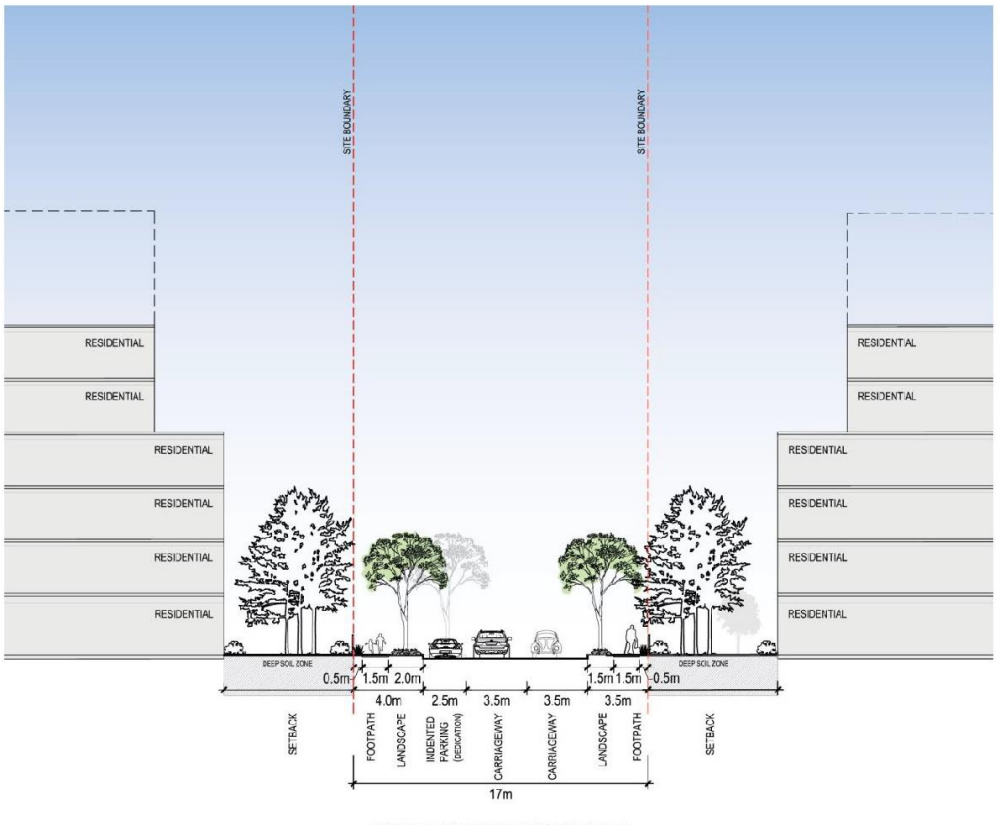


Figure 10 Local Street - Land Dedication Plan

Showground Precinct Development Control Plan



PROFILE 1 LOCAL STREET SECTION & PLAN

Figure 13 - Local Street

3.2 Road Hierarchy

The road hierarchy allocated to the road network in the vicinity of the site by Transport for New South Wales (TfNSW) is illustrated on Figure 3.

Windsor Road is classified by TfNSW as a *State Road* and provides the key north-south road link in the area, linking Windsor suburb in the north to the Westlink M7 motorway in the south. It typically carries two traffic lanes in each direction in the vicinity of the site, with opposing traffic flows separated by a central median island. Parking is not permitted on both sides of the road.

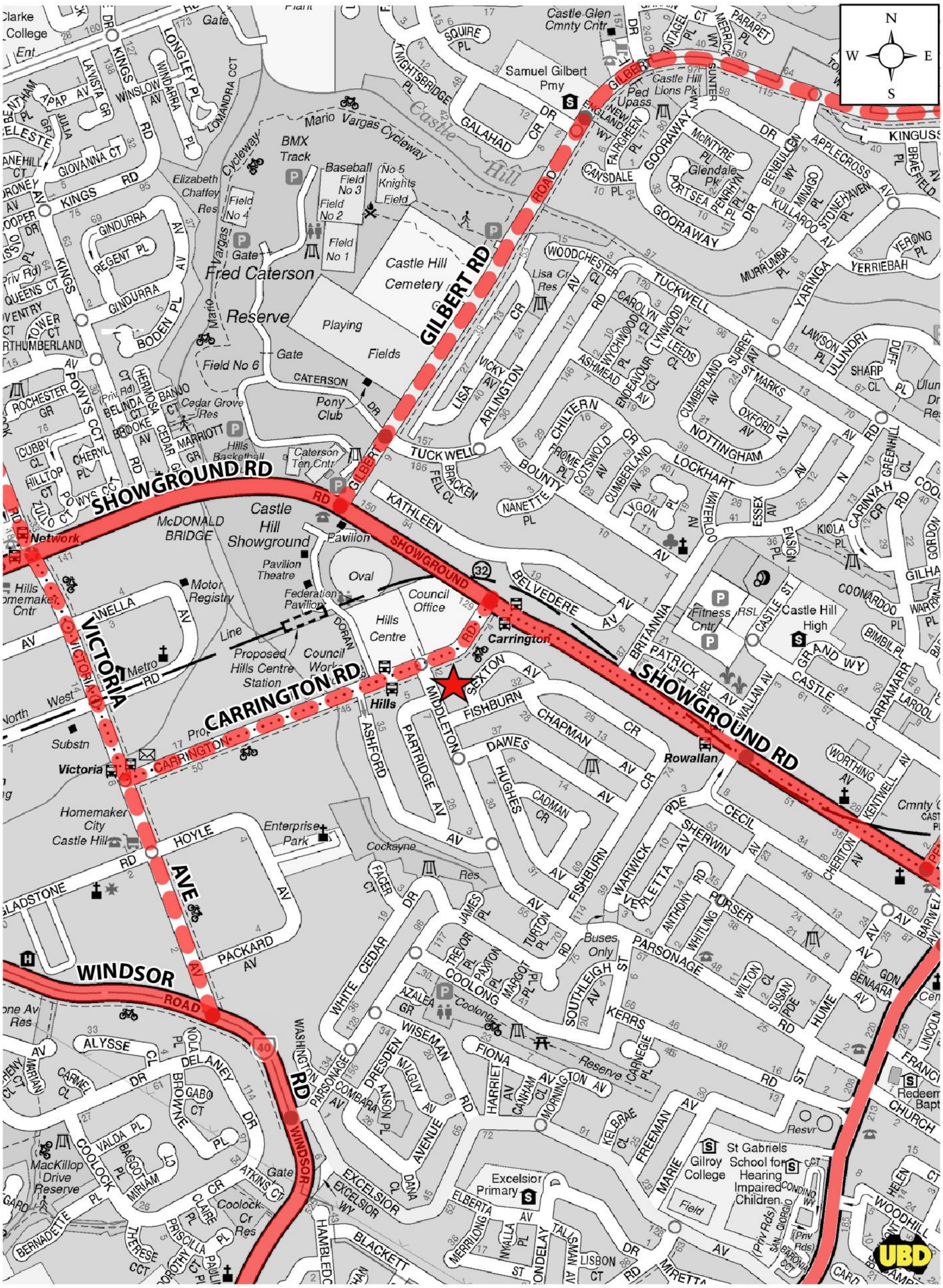
Showground Road is also classified by TfNSW as a *State Road* and provides the key east-west road link in the area. Showground Road has recently been widened and upgraded to provide *additional and extended* left and right-turn lanes at its intersections with Carrington Road and with De Clambe Drive, with bus priority lanes also being provided at the Showground Road/De Clambe Drive intersection.

Victoria Avenue and Gilbert Road are classified by TfNSW as *Regional Roads* and provide further road links in the local area. They typically carry two traffic lanes in each direction in the vicinity of the site, with opposing traffic flows separated by a central median island.

Carrington Road is classified by TfNSW as a *Regional Road* and provides further road link in the local area, linking Showground Road and Victoria Avenue. Carrington Road has recently been upgraded to 4-lane sub-arterial route status, carrying 2 lanes in each direction, with kerbside parking prohibited on both sides of the road.

Middleton Avenue, Fishburn Crescent and Sexton Avenue are local, unclassified roads which are primarily used to provide vehicular and pedestrian access to frontage properties. Kerbside parking is permitted in some sections of these roads, subject to sign-posted restrictions.

Both Fishburn Crescent and Sexton Avenue are to be widened to achieve the local street section as illustrated on Figure 13 of the Council's *Showground Station Precinct DCP,* which is reproduced in the previous page.



Key:

State Road

Regional Road

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ROAD HIERARCHY

FIGURE 3

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 60 km/h SPEED LIMIT which applies to Showground Road

- a 50 km/h SPEED LIMIT which applies to Carrington Road, Middleton Avenue and all other roads in the local area

- TRAFFIC SIGNALS in Carrington Road where it intersects with Andalusian Way, Showground Road, and Doran Drive, and in Showground Road where it intersects with De Clambe Drive

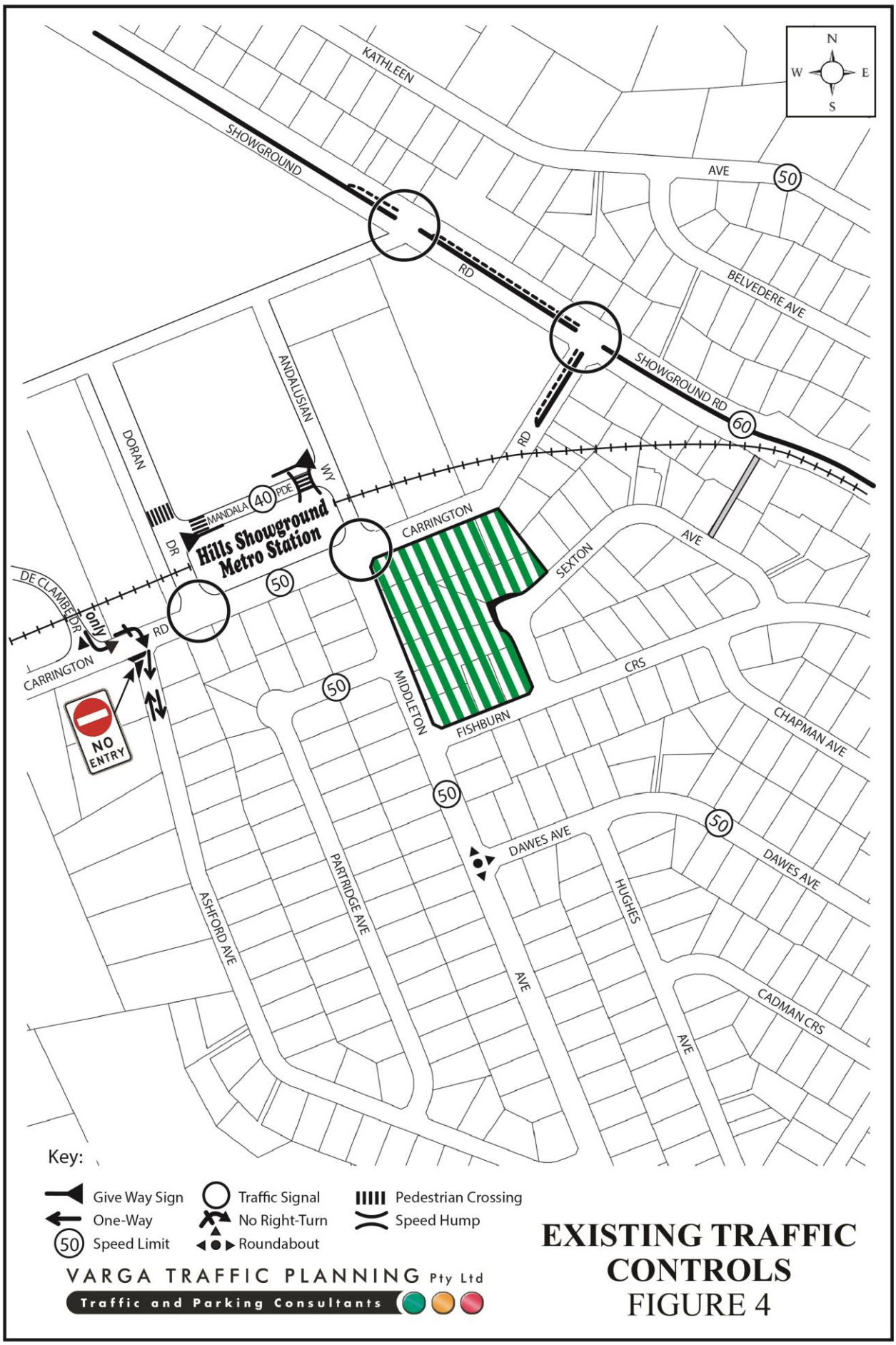
- a ROUNDABOUT in Middleton Avenue where it intersects with Dawes Avenue.

3.4 Existing Sustainable and Public Transport Options

The existing public transport services available in the vicinity of the site are illustrated on Figure 5.

The *Hills Showground Metro Station* is located within approximately 200 metres walking distance from the site servicing the Metro North West & Bankstown Line, operating between Sydenham and Tallawong. Metro services typically operate at 5-minute intervals during commuter peak periods and 10-minute intervals at all other times.

The extension of the Sydney Metro network further to southwest of Sydney is also nearing completion, and will ultimately link Tallawong in the north-west to Bankstown in the south-west via the Sydney CBD. Upon completion commuters will have direct access to Crows Nest and Victoria Cross on the lower north shore, Barangaroo, Martin Place, Gadigal (Pitt Street) and Central in the Sydney CBD, Marrickville, Canterbury, Belmore, Punchbowl and finally Bankstown on the southwest Sydney.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PARTRIDGE AVE
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HUGHES
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CADMAN CRS
Key:
Give Way Sign
One-Way
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Traffic Signal
No Right-Turn
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Pedestrian Crossing
Speed Hump
VARGA TRAFFIC PLANNING Pty Ltd
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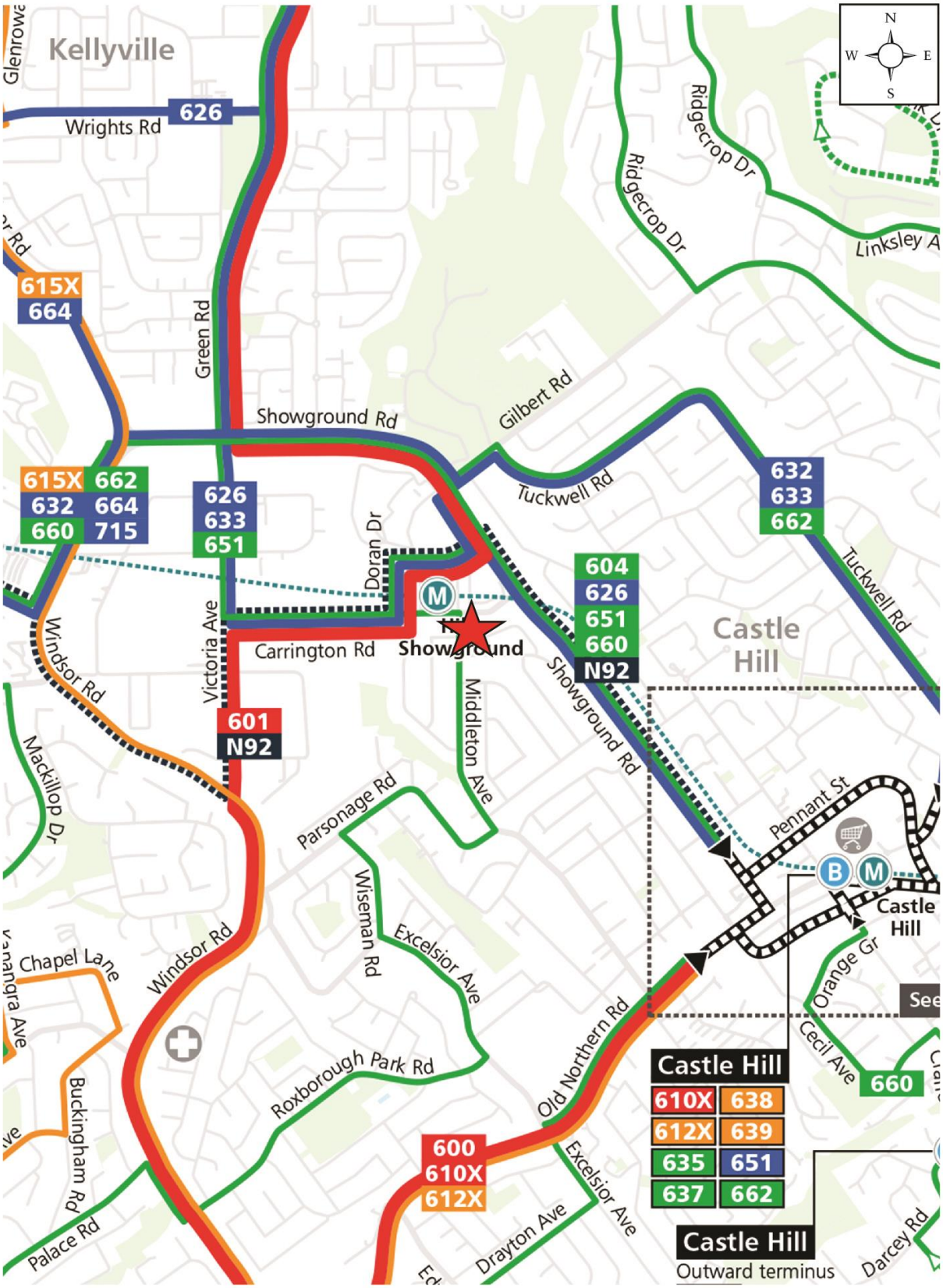
EXISTING TRAFFIC CONTROLS
FIGURE 4



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PUBLIC TRANSPORT
FIGURE 5

In addition to railway services, the site is located within a short walking distance to bus stops located in Middleton Avenue, Carrington Road and Showground Road providing access to the following bus routes:

- route 601 – Rouse Hill Station to Parramatta via Hills Showground
- route 604 – Castle Hill to Parramatta via Winston Hills
- route 626 – Kellyville Station to Pennant Hills via Cherrybrook
- route 633 – Rouse Hill Station to Pennant Hills via Kellyville & Castle Hill
- route 651 – Rouse Hill Station to Epping via Castle Hill
- route 660 – Castlewood to Parramatta
- route 730 – Castle Hill to Blacktown via Norwest & Glenwood

Accordingly, it is clear that the site has excellent connectivity to public transport services including the Sydney Metro service, and is ideally located to encourage a greater use of alternate, and sustainable modes of transport.

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 and comprise:

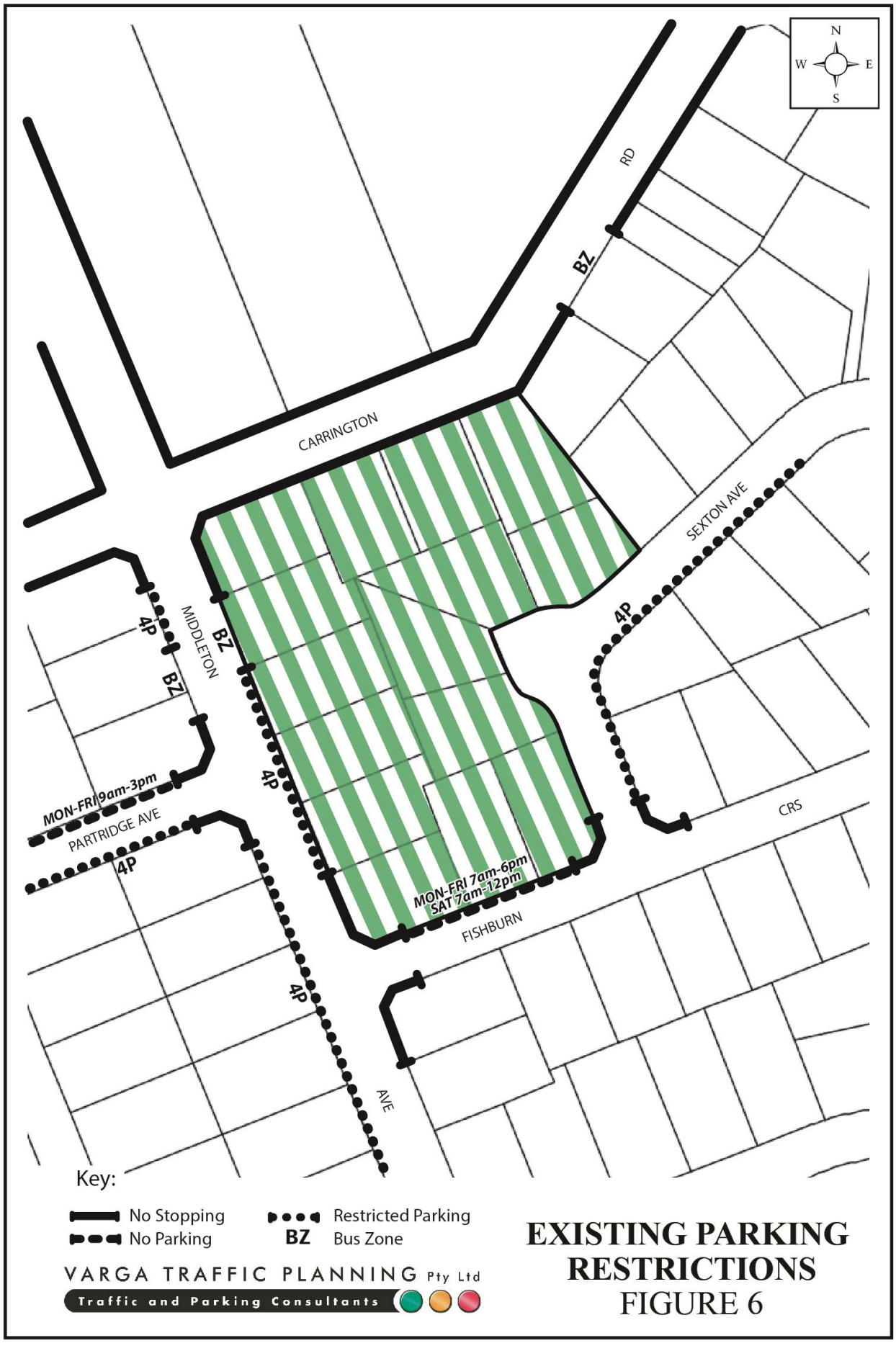
- NO STOPPING restrictions on both sides of Carrington Road including along the site frontage

- NO PARKING restrictions on northern side of Fishburn Crescent along the site frontage

- 4 HOUR PARKING restrictions on southern side of Sexton Avenue and on both sides of Middleton Avenue, including along the Middleton Avenue site frontage

- UNRESTRICTED PARKING permitted elsewhere in the vicinity of the site, including northern side of Sexton Avenue along the site frontage

- BUS ZONES at regular intervals along both sides of Carrington Road and Middleton Avenue.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MIDDLETON
4P
BZ
MON-FRI 9am-3pm
PARTRIDGE AVE
4P
4P
MON-FRI 7am-6pm
SAT 7am-12pm
FISHBURN
CRS
4P
AVE
Key:
No Stopping
No Parking
Restricted Parking
BZ Bus Zone
VARGA TRAFFIC PLANNING Pty Ltd
Traffic and Parking Consultants
EXISTING PARKING RESTRICTIONS
FIGURE 6

3.6 Existing Traffic Conditions

In order to gain an accurate appreciation of the existing traffic conditions on the road network in the vicinity of the site, peak period traffic surveys were undertaken as part of this traffic study on Wednesday 1st May 2024, at the following intersections:

- Carrington Road & Middleton Avenue & Andalusian Way
- Middleton Avenue & Patridge Avenue
- Middleton Avenue & Fishburn Crescent

It is noted that the morning and afternoon "network" peak periods identified by the traffic surveys at the above intersections occurred at different times. Therefore, the "network" peak periods of the Carrington Road / Middleton Avenue / Andalusian Way intersection, 8:00am – 9:00am for the AM peak period and 5:00pm-6:00pm for the PM peak period, have been adopted for the purposes of this assessment.

The results of the traffic surveys are reproduced in full in Appendix A, revealing that:

- two-way traffic flows in Carrington Road are typically in the order of 1,420-1,540 vehicles per hour (vph) in the AM and PM peak hours

- two-way traffic flows in Middleton Avenue are typically in the order of 600-640 vph in the AM and PM peak hours

- two-way traffic flows in Andalusian Way are typically in the order of 145-220 vph in the AM and PM peak hours

- two-way traffic flows in Patridge Avenue are typically in the order of 25-35 vph in the AM and PM peak hours

- two-way traffic flows in Patridge Avenue are typically in the order of 65-80 vph in the AM and PM peak hours.

4.0 PROPOSED DEVELOPMENT

4.1 Overview of Proposed Development

The proposed development involves demolition of existing structures on the site to facilitate the construction of multiple residential apartment buildings. A total of 445 apartments (including 25 *in-fill affordable*) are proposed by the amended development proposal as follows:

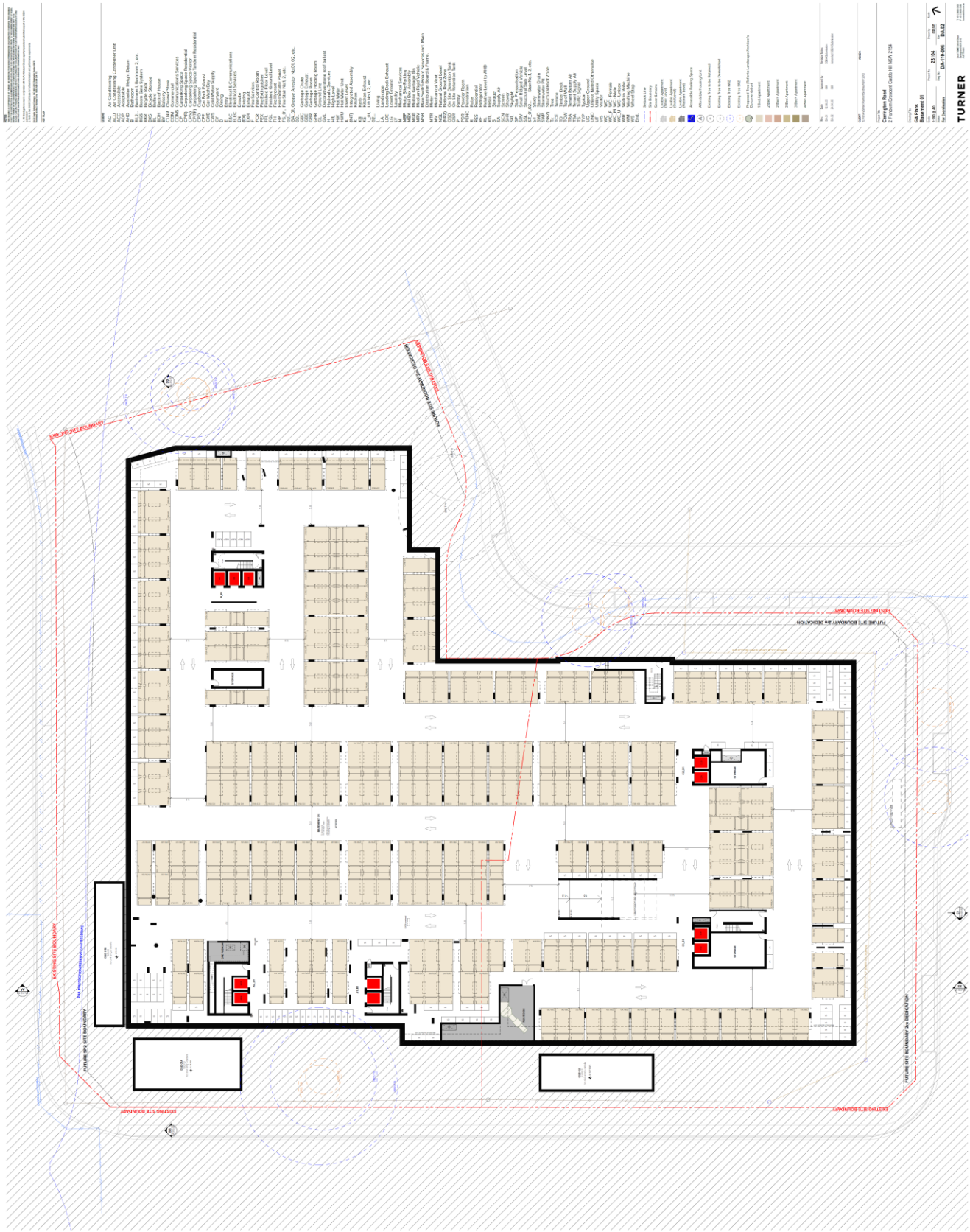
1 bedroom apartments:	54
2 bedroom apartments:	272 (including 18 *affordable* units)
3 bedroom apartments:	83 (including 7 *affordable* units)
4 bedroom apartments:	36
TOTAL APARTMENTS:	**445**

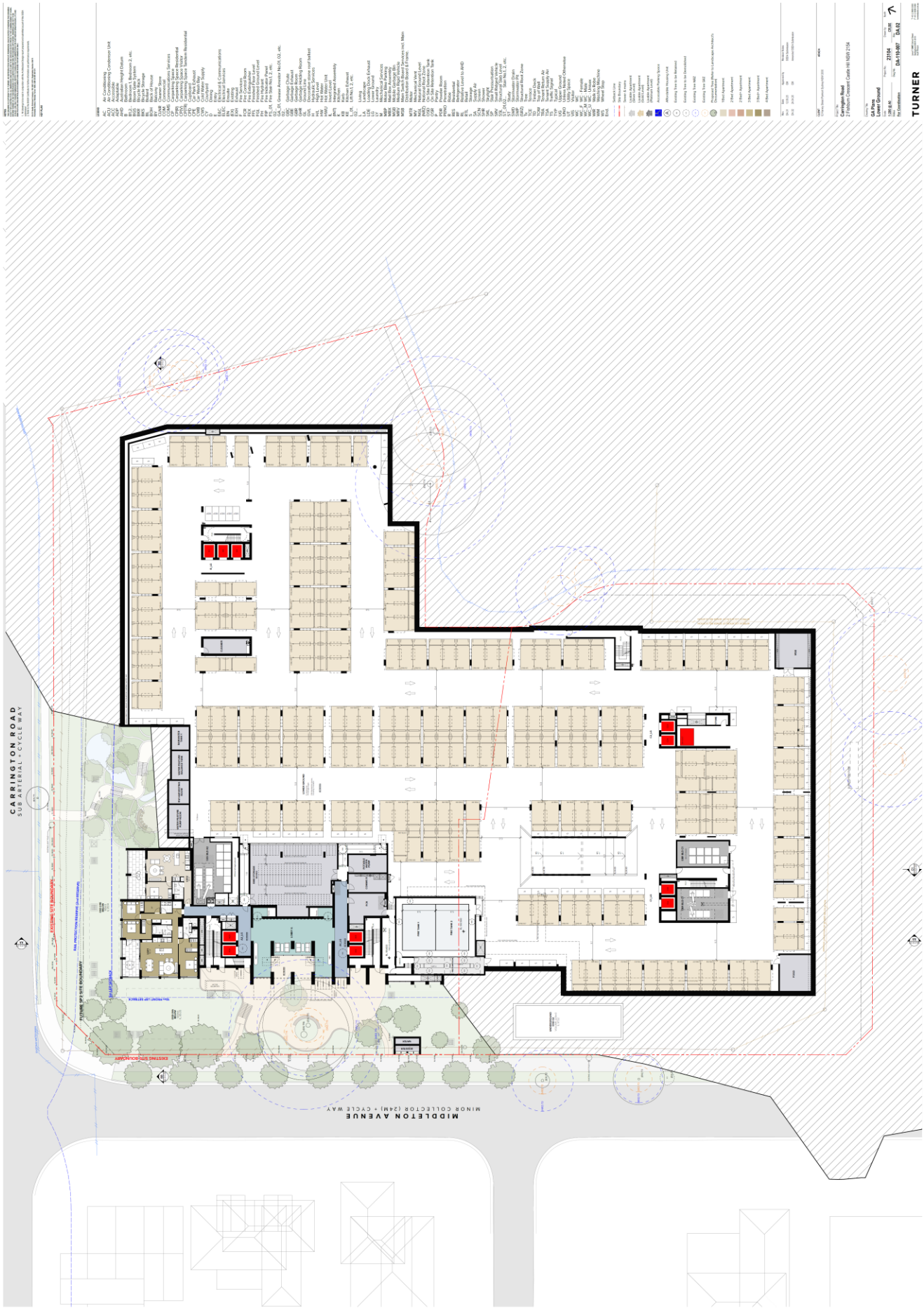
Off-street parking is proposed for a total of 674 cars, 226 bicycles and 15 motorcycles on the site in a lower ground floor parking area and one level of basement parking area in accordance with *SEPP (Housing) 2021* and Council's *Showground Station Precinct DCP* parking requirements.

Vehicular access to the off-street parking area is proposed to be via a combined entry/exit two-way access driveway located in the middle of Fishburn Crescent site frontage.

Loading/servicing for the proposed development is expected to be undertaken by a variety of commercial vehicles up to and including 12.5m long heavy rigid vehicles (HRV trucks). A 12.5m HRV loading zone is proposed on the ground floor, adjacent to the waste store room. Vehicular access to the dedicated loading facilities is to be provided via the abovementioned two-way vehicular access driveway.

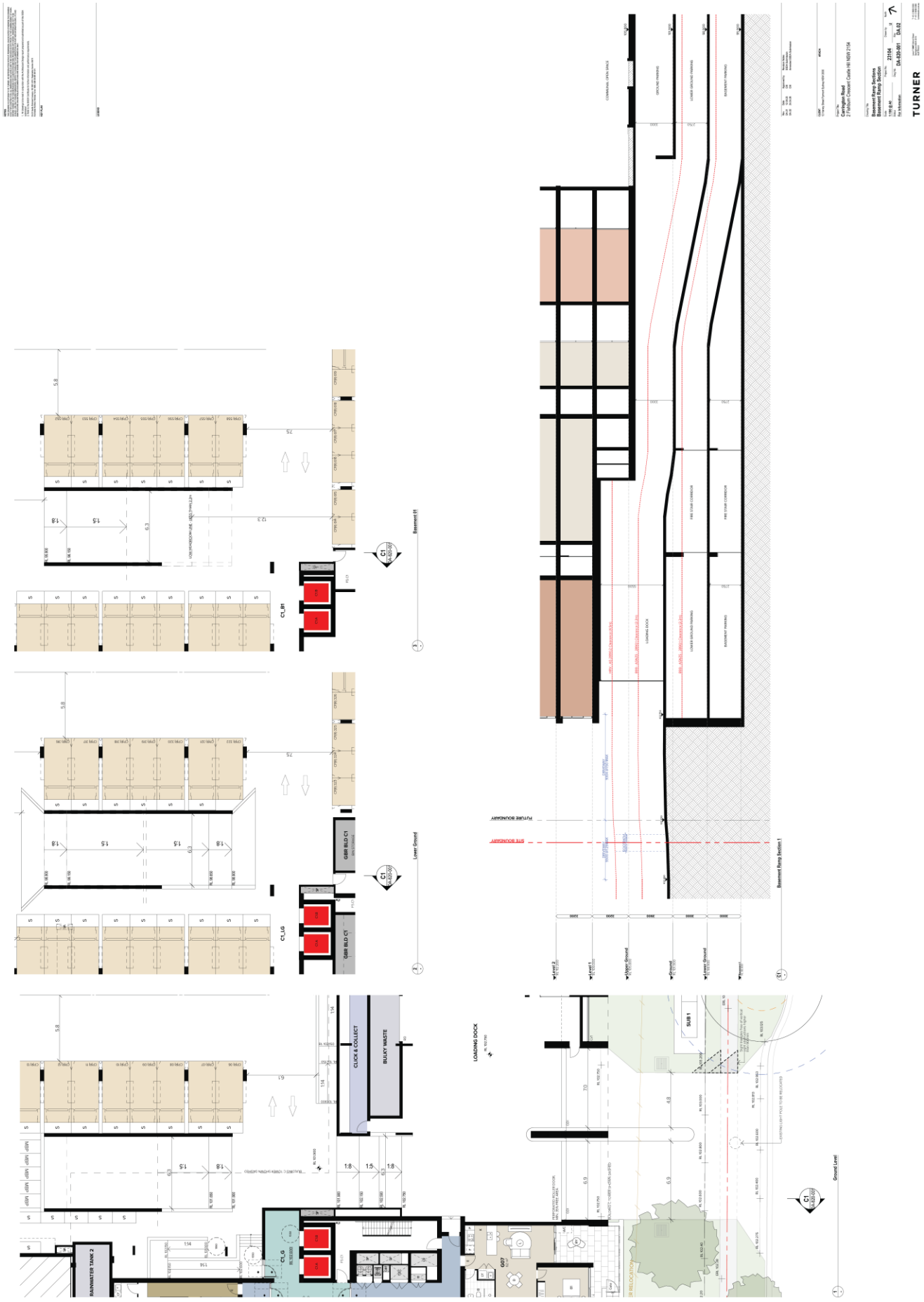
Plans of the proposed development have been prepared by *TURNER* and are reproduced in the following pages.




CARRINGTON ROAD
SUB ARTERIAL + CYCLE WAY
MIDDLETON AVENUE
MINOR COLLECTOR (24M) + CYCLE WAY
TURNER


CARRINGTON ROAD
SUB ARTERIAL + CYCLE WAY
MIDDLETON AVENUE
MINOR COLLECTOR (24M) + CYCLE WAY
FISHBURN CRESCENT
LOCAL STREET (17M)
TURNER


CARRINGTON ROAD
SUB ARTERIAL + CYCLE WAY
FISHBURN CRESCENT
LOCAL STREET (17M)
MIDDLETON AVENUE
MINOR COLLECTOR (24M) + CYCLE WAY
SEATON AVENUE
LOCAL STREET (17M)
PUBLIC THROUGH SITE LINK
DA APPROVED
(10/37/2020/JP)
10 CARRINGTON ROAD
DA APPROVED
(10/37/2020/JP)
24 FISHBURN CRESCENT
(58/2020/JP(A))
EXISTING SITE BOUNDARY
FUTURE SITE BOUNDARY
TURNER


TURNER
Basement Ramp Sections
Basement Ramp Section
Carrington Road
Basement Ramp Section 1
Basement B1
Lower Ground
Ground Level
CLICK & COLLECT
BULKY WASTE
LOADING DOCK
RAINWATER TANK 2
SUB 1
GBR BLD C1
SITE BOUNDARY
FUTURE BOUNDARY

4.2 Projected Traffic Generation Potential

The traffic implications of development proposals primarily concern the effects of the *additional* traffic flows generated as a result of a development and its impact on the operational performance of the adjacent road network, particularly during the morning and afternoon commuter peak periods.

An indication of the traffic generation potential of the development proposal is provided by reference to the Transport for New South Wales's publication *Guide to Transport Impact Assessment, Chapter 5 – Land use Trip Generation (Version 1.1, 2024).*

The TfNSW *Guide* is based on extensive surveys of a wide range of land uses and nominate the following traffic generation rates which are applicable to the development proposal:

High Density Residential Flat Dwellings (High public transport accessibility in Sydney)

AM Peak:	0.66 person trips per dwelling
PM Peak:	0.56 person trips per dwelling

Mode Share Summary for High Density Residential (Sydney)

Car:	37%

Average Vehicle Occupancy (Sydney)

AM Peak:	1.2 persons per vehicle trip
PM Peak:	1.3 persons per vehicle trip

For a more conservative assessment of the proposed development however, the vehicle occupancy rate has been assumed to be *1 person per vehicle trip* for both AM and PM commuter peak periods.

Application of the above traffic generation rates to the 445 residential apartment units as outlined in the development proposal yields a traffic generation potential of approximately 109 vehicle trips per hour (vph) during the AM commuter peak period and approximately 92 vph during the PM commuter peak period, as set out below:

Projected Future Traffic Generation Potential

	AM	PM
Residential (445 apartments):	108.7 vph	92.2 vph
TOTAL TRAFFIC GENERATION POTENTIAL:	**108.7 vph**	**92.2 vph**

That projected future traffic generation potential should however, be offset or *discounted* by the volume of traffic which could reasonably be expected to be generated by the previous uses of the site, in order to determine the *nett increase (or decrease)* in traffic generation potential expected to occur as a consequence of the development proposal.

The TfNSW *Guide* nominates the following traffic generation rates which are applicable to the previously existing development:

Low Density Residential Dwellings (Sydney)

AM: 0.68 peak hour vehicle trips per dwelling

PM: 0.77 peak hour vehicle trips per dwelling

Application of the above traffic generation rates to the previously existing development on site yields a traffic generation potential of approximately 10 vph during the weekday AM peak period, and approximately 12 vph during the PM peak period, as set out below:

Previously Existing Development Traffic Generation Potential

	AM	PM
Residential (15 dwellings):	10.2 vph	11.6 vph
TOTAL TRAFFIC GENERATION POTENTIAL:	**10.2 vph**	**11.6 vph**

Accordingly, it is likely that the development proposal will result in a *nett increase* in the traffic generation potential of the site of approximately 99 vph during the AM commuter peak period, and approximately 81 vph during the PM commuter peak period, as set out below:

Projected Nett Increase in Peak Hour Traffic Generation Potential of the Site as a Consequence of the Development Proposal

	AM	PM
Projected Future Traffic Generation Potential:	108.7 vph	92.2 vph
Less Previously Existing Traffic Generation Potential:	-10.2 vph	-11.6 vph
NETT INCREASE IN TRAFFIC GENERATION POTENTIAL:	**98.5 vph**	**80.6 vph**

That projected increase in the traffic generation potential of the site as a consequence of the development proposal is consistent with the *Transit Oriented Development* zoning objectives of the *Showground Station Precinct*, and will not have any unacceptable traffic implications in terms of road network capacity, as demonstrated by 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 11 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 3 intersections surrounding the development proposal, taking into account the abovementioned projected future traffic generation potential of the site of 109 vph and 92 vph during AM and PM peak periods respectively, are summarised in the table below.

Table 2: Network Performance

Intersection	Key Indicators	Existing AM Traffic Demand	Projected AM Traffic Demand	Existing PM Traffic Demand	Projected PM Traffic Demand
Carrington Rd & Middleton Ave & Andalusian Way	LoS	B	B	B	B
	DoS	0.538	0.612	0.558	0.611
	Delay	27.0	28.5	28.4	28.5
Middleton Ave & Patridge Ave	LoS	A	A	A	A
	DoS	0.252	0.241	0.257	0.294
	Delay	0.4	0.4	0.3	0.2
Middleton Ave & Fishburn Cres	LoS	A	A	A	A
	DoS	0.204	0.208	0.186	0.202
	Delay	0.9	1.9	0.6	1.5

LoS = Levels of Service

DoS = Degree of Saturation

AVD = Total average vehicle delay (seconds per vehicle)

The detailed SIDRA *movements summaries*, including pedestrian movement capacity analyses for all intersections, are reproduced in full in Appendix B.

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* (less than 2 seconds), if any, increases in average vehicle and pedestrian movement delays as a consequence of the development proposal.

On the above basis, it is clear that the surrounding road network will continue to operate at satisfactory *Levels of Service,* 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.*

4.4 Off-street Parking Assessment

Off-Street Car Parking Provisions

As the development provides *in-fill affordable housing* in accordance with *SEPP (Housing) 2021 Division 1 In-fill affordable housing*, the off-street parking rates applicable to the development proposal are specified in the *State Environmental Planning Policy (Housing) 2021* in the following terms:

Division 1 In-fill affordable housing

19 Non-discretionary development standards–the Act, s 4.15

(1) The object of this section is to identify development standards for particular matters relating to residential development under this division that, if complied with, prevent the consent authority from requiring more onerous standards for the matters.

(2) The following are non-discretionary development standards in relation to the residential development to which this division applies–

(e) the following number of parking spaces for dwellings used for affordable housing–
  (i) for each dwelling containing 1 bedroom–at least 0.4 parking spaces,
  (ii) for each dwelling containing 2 bedrooms–at least 0.5 parking spaces,
  (iii) for each dwelling containing at least 3 bedrooms–at least 1 parking space,

(f) the following number of parking spaces for dwellings not used for affordable housing–
  (i) for each dwelling containing 1 bedroom–at least 0.5 parking spaces,
  (ii) for each dwelling containing 2 bedrooms–at least 1 parking space,
  (iii) for each dwelling containing at least 3 bedrooms–at least 1.5 parking spaces,

Application of the above parking rates to the 445 residential apartments outlined in the development proposal yields a total off-street car parking requirement of 465 spaces as set out below:

Affordable Dwellings (SEPP 2021)	**Required**
2-bedroom (18 dwellings):	9.0 spaces
3-bedroom (7 dwellings):	7.0 spaces
Standard Dwellings (SEPP 2021)	
1-bedroom (54 dwellings):	27.0 spaces
2-bedroom (254 dwellings):	254.0 spaces
3-bedroom (76 dwellings):	114.0 spaces
4-bedroom (36 dwellings):	54.0 spaces
TOTAL PARKING REQUIRED:	**465.0 spaces**

The proposed development makes provision for a total of 674 off-street car parking spaces, comprising 629 residential spaces and 45 visitor spaces, thereby satisfying the *SEPP (Housing) 2021* requirements.

The geometric design layout of the proposed car parking facilities has been designed to comply with the relevant requirements specified in the Standards Australia publication *Parking Facilities Part 1 - Off-Street Car Parking AS2890.1:2004* and *Parking Facilities Part 6 - Off-Street Parking for People with Disabilities AS2890.6:2009* in respect of parking bay dimensions, aisle & driveway widths, and manoeuvring requirements.

Other Off-Street Parking Provisions

The off-street motorcycle and bicycle parking requirements applicable to the development proposal are specified in *The Hills Development Control Plan 2012, Part D, Section 19 – Showground Station Precinct* document and in *The Hills Development Control Plan 2012, Part C, Section 1 – Parking* document in the following terms:

Table 13 Bicycle Parking Rates

Residential flat buildings:	1 resident space per 3 apartments. 1 visitor space per 12 apartments.

2.4 Motorcycle Parking

a) Motorcycle parking is to be provided for all developments with on-site parking of more than 50 car parking spaces, at a rate of 1 motorcycle parking space for every 50 car spaces or part thereof.

Application of the above motorcycle and bicycle parking rates to the 445 apartments outlined in the development proposal yields an off-street motorcycle parking requirement of 14 spaces, and an off-street bicycle parking requirement of 185 spaces as set out below:

Bicycle	
Residential (445 dwellings):	148.3 spaces
Visitor (445 dwellings):	37.1 spaces
Total:	**185.4 spaces**
Motorcycle (674 car spaces):	13.5 spaces
Total:	**13.5 spaces**

The proposed development makes provision for a total of 15 motorcycle parking spaces and 226 bicycle parking spaces, thereby satisfying the Council's DCP parking requirements.

4.5 Loading/Servicing Provisions

The proposed development is expected to be serviced by a variety of commercial vehicles up to and including 12.5m long HRV trucks. A loading zone is to be located on the ground level adjacent to the waste collection room to accommodate a 12.5m long HRV truck.

The geometric design layout of the proposed loading facilities has 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 - 2002* in respect of loading dock dimensions, overhead clearances and service area requirements for HRV trucks.

4.6 Swept Turning Path Analysis

The vehicular access arrangements have been designed to accommodate the swept turning path requirements of the B99 and B85 design vehicles 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, as demonstrated by the *swept turning path* diagrams reproduced in Appendix C.

The geometric design layout of the proposed vehicular access driveways and internal manoeuvring areas were designed to accommodate the swept turning path requirements of vehicles up to and including 12.5m long Heavy Rigid Vehicles (HRV trucks).

A number of *swept turning path* diagrams have been prepared to assess the turning and manoeuvring requirements of 12.5m long HRV trucks using the *Autodesk Vehicle Tracking 2022* program in accordance with the Standards Australia publication *2890.2-2022*. The *swept turning path* diagrams are reproduced in Appendix C, confirming that these 12.5m long HRV trucks will be able to enter and exit the site in a forward direction at all times, and will be able to manoeuvre within the site without difficulty.

5.0 CONCLUSIONS & RECOMMENDATIONS

This revised 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 TfNSW *Guide*, to accompany an Environmental Impact Statement to the *NSW Department of Planning, Infrastructure and Environment* for a proposed residential development.

The parking requirements of the proposed development have been designed in accordance with *SEPP (Housing) 2021*, *The Hills LEP 2019, The Hills DCP 2012*, and the *Urban Design Guidelines*.

The proposed provision of 674 car parking spaces, 15 motorcycle parking spaces and 226 bicycle parking spaces are considered sufficient to satisfy the anticipated *actual* parking likely to be generated by the development to ensure its viability.

It is clear that the site has excellent connectivity to public transport services including the Sydney Metro service, and is ideally located to encourage a greater use of alternate, and sustainable modes of transport.

Extensive traffic surveys and SIDRA modelling were also undertaken at the following intersections in 2024:

- Carrington Road & Middleton Avenue & Andalusian Way
- Middleton Avenue & Patridge Avenue
- Middleton Avenue & Fishburn Crescent

The SIDRA analysis confirmed that the surrounding road network will continue to operate at satisfactory *Levels of Service,* and that the proposed development will not result in any unacceptable traffic implications in terms of road network capacity.

In particular, the SIDRA capacity analysis has confirmed that no new road improvements or intersection upgrades will be required as a consequence of the development proposal.

In terms of the geometric design of the vehicular access, parking and loading facilities, the proposed layout has 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.

Accordingly, it is clear that the proposed development will not have any unacceptable traffic or parking implications, and is therefore recommended for approval.

APPPENDIX A

TRAFFIC SURVEY DATA

TRANS TRAFFIC SURVEY

TURNING MOVEMENT SURVEY

trafficsurvey.com.au

Intersection of Carrington Rd and Andalusian Way, Castle Hill

GPS -33.727833, 150.966170

Date:	Wed 01/05/24
Weather:	Overcast
Suburban:	Castle Hill
Customer:	Varga

North:	Andalusian Way
East:	Carrington Rd
South:	Middleton Ave
West:	Carrington Rd

Survey Period	AM:	6:30 AM-9:30 AM
	PM:	3:30 PM-6:30 PM
Traffic Peak	AM:	8:00 AM-9:00 AM
	PM:	5:00 PM-6:00 PM

All Vehicles

Time		North Approach Andalusian Way				East Approach Carrington Rd				South Approach Middleton Ave				West Approach Carrington Rd				Hourly Total	
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	Hour	Peak
6:30	6:45	0	5	0	0	0	2	46	9	0	7	14	15	0	14	33	3	747	
6:45	7:00	0	0	2	0	0	2	64	8	0	8	17	13	0	15	33	6	895	
7:00	7:15	0	3	2	2	0	2	68	11	0	2	21	17	0	15	42	7	1082	
7:15	7:30	0	7	5	1	0	6	98	14	0	7	13	22	0	24	39	3	1243	
7:30	7:45	0	11	8	6	0	4	100	19	0	15	16	26	0	29	57	5	1375	
7:45	8:00	0	14	7	4	0	1	122	20	0	20	15	43	0	25	73	11	1476	
8:00	8:15	0	16	14	4	0	3	113	19	0	27	15	41	0	32	59	10	1489	Peak
8:15	8:30	0	6	4	3	0	1	141	29	0	36	14	27	0	31	76	3	1450	
8:30	8:45	0	5	4	3	0	3	152	31	0	55	12	42	0	34	56	0	1374	
8:45	9:00	0	11	3	2	0	1	159	29	0	27	5	48	0	13	69	1		
9:00	9:15	0	10	8	3	0	1	130	24	0	14	8	30	0	17	63	6		
9:15	9:30	0	8	6	5	0	0	106	28	0	16	11	26	0	30	58	1		
15:30	15:45	0	19	9	5	0	3	142	20	0	24	13	39	0	23	105	12	1656	
15:45	16:00	0	14	8	3	0	3	157	28	0	22	18	45	0	33	94	3	1625	
16:00	16:15	0	8	11	2	0	0	142	18	0	19	11	31	0	31	140	5	1590	
16:15	16:30	0	5	5	3	0	1	113	26	0	22	15	28	0	36	136	6	1585	
16:30	16:45	0	12	5	4	0	0	102	21	0	23	9	29	0	39	133	6	1612	
16:45	17:00	0	7	7	4	0	2	98	21	0	24	14	33	0	31	152	0	1630	
17:00	17:15	0	8	15	9	0	4	81	20	0	32	10	42	0	49	140	3	1668	Peak
17:15	17:30	0	6	9	5	0	1	137	21	0	31	13	37	0	29	132	2	1601	
17:30	17:45	0	19	11	3	0	1	104	22	0	55	31	21	0	30	96	8	1536	
17:45	18:00	0	13	7	4	0	2	122	19	0	60	32	21	0	22	126	3		
18:00	18:15	0	10	4	3	0	2	88	14	0	23	18	27	0	28	125	4		
18:15	18:30	0	5	7	3	0	2	91	11	0	26	16	22	0	27	140	8		

Peak Time		North Approach Andalusian Way				East Approach Carrington Rd				South Approach Middleton Ave				West Approach Carrington Rd				Peak total
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	
8:00	9:00	0	38	25	12	0	8	565	108	0	145	46	158	0	110	260	14	1489
17:00	18:00	0	46	42	21	0	8	444	82	0	178	86	121	0	130	494	16	1668

Pedestrians Crossing

Time		pproach Andaluc		pproach Carringt		Approach Middle		Approach Carring		ourly To
Period Star	Period End	estbour	astboun	outhbou	orthbou	estbour	astbour	outhbou	orthbou	
6:30	6:45	1	15	0	0	1	0	1	7	91
6:45	7:00	4	3	0	0	1	0	3	9	105
7:00	7:15	2	1	0	0	2	0	0	11	124
7:15	7:30	4	2	0	0	5	0	1	18	146
7:30	7:45	12	1	0	0	4	0	1	21	160
7:45	8:00	10	2	0	0	4	0	1	22	149
8:00	8:15	8	0	0	0	6	0	3	21	130
8:15	8:30	11	1	0	0	5	1	3	23	114
8:30	8:45	3	0	0	0	10	0	0	15	83
8:45	9:00	4	2	0	0	3	0	0	11	
9:00	9:15	4	2	0	0	3	0	1	12	
9:15	9:30	5	0	0	0	0	0	2	6	
15:30	15:45	1	5	0	0	0	3	10	4	83
15:45	16:00	0	3	0	0	0	0	12	4	77
16:00	16:15	2	6	0	0	0	3	13	4	81
16:15	16:30	1	5	0	0	0	0	5	2	72
16:30	16:45	1	4	0	0	0	3	7	2	83
16:45	17:00	0	5	0	0	2	2	12	2	100
17:00	17:15	1	4	0	0	0	2	9	3	101
17:15	17:30	3	5	0	0	0	4	10	2	96
17:30	17:45	0	3	0	0	1	7	20	3	100
17:45	18:00	0	5	0	0	1	3	14	1	
18:00	18:15	1	3	0	0	0	1	9	0	
18:15	18:30	1	3	0	0	1	7	13	3	

Peak Time		pproach Andaluc		pproach Carringt		Approach Middle		Approach Carring		Peak hour
Period Star	Period End	estbour	astboun	outhbou	orthbou	estbour	astbour	outhbou	orthbou	
8:00	9:00	26	3	0	0	24	1	6	70	130
17:00	18:00	4	17	0	0	2	16	53	9	101

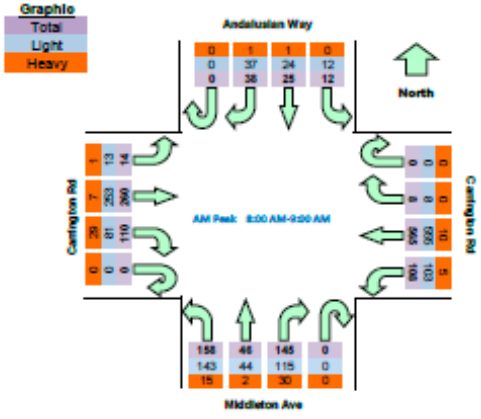
Note: Site sketch is for illustrating traffic flows. Direction is indicative only, drawing is not to scale and not an exact streets configuration.

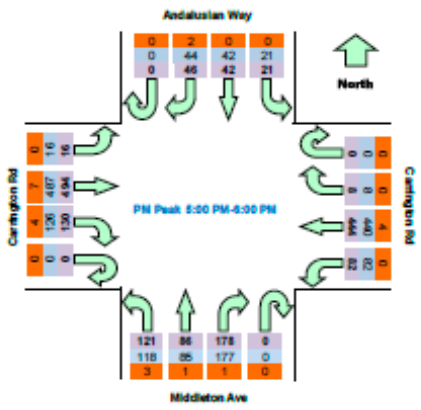
Graphic

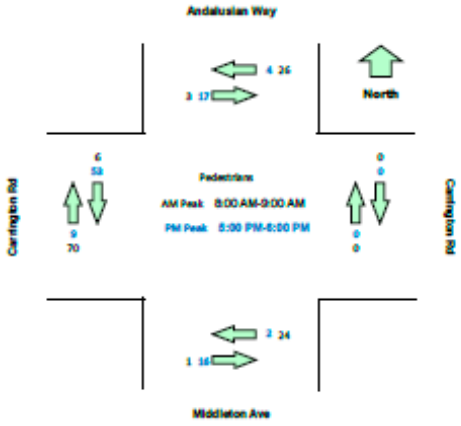
Total

Light

Heavy







Light Vehicles

Time		North Approach Andalusian Way				East Approach Carrington Rd				South Approach Middleton Ave				West Approach Carrington Rd			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
6:30	6:45	0	5	0	0	0	2	44	8	0	7	13	14	0	13	32	2
6:45	7:00	0	0	2	0	0	2	63	7	0	8	17	12	0	12	31	6
7:00	7:15	0	3	2	1	0	2	66	11	0	2	21	15	0	14	38	6
7:15	7:30	0	7	5	1	0	6	96	13	0	7	13	20	0	19	36	3
7:30	7:45	0	11	7	6	0	4	95	19	0	13	16	23	0	12	57	4
7:45	8:00	0	13	7	4	0	1	122	19	0	13	13	40	0	20	72	10
8:00	8:15	0	16	13	4	0	3	109	18	0	19	14	33	0	21	57	9
8:15	8:30	0	6	4	3	0	1	140	27	0	27	13	26	0	21	76	3
8:30	8:45	0	5	4	3	0	3	150	30	0	50	12	40	0	26	55	0
8:45	9:00	0	10	3	2	0	1	156	28	0	19	5	44	0	13	65	1
9:00	9:15	0	9	8	3	0	1	128	24	0	11	8	27	0	14	59	6
9:15	9:30	0	7	5	5	0	0	104	24	0	14	10	24	0	27	53	1
15:30	15:45	0	18	9	4	0	3	142	17	0	21	13	37	0	22	104	12
15:45	16:00	0	13	8	3	0	3	150	28	0	22	18	41	0	32	94	3
16:00	16:15	0	8	11	2	0	0	142	18	0	18	11	30	0	30	138	5
16:15	16:30	0	5	5	3	0	1	112	26	0	21	15	28	0	35	136	5
16:30	16:45	0	11	5	4	0	0	101	21	0	22	9	28	0	39	132	6
16:45	17:00	0	7	7	4	0	2	95	21	0	24	14	31	0	30	151	0
17:00	17:15	0	8	15	9	0	4	79	20	0	32	9	41	0	48	139	3
17:15	17:30	0	5	9	5	0	1	136	21	0	30	13	36	0	28	131	2
17:30	17:45	0	18	11	3	0	1	103	22	0	55	31	20	0	29	93	8
17:45	18:00	0	13	7	4	0	2	122	19	0	60	32	21	0	21	124	3
18:00	18:15	0	10	4	3	0	2	88	14	0	23	18	27	0	27	124	4
18:15	18:30	0	5	7	3	0	2	91	11	0	26	16	20	0	26	139	8

Peak Time		North Approach Andalusian Way				East Approach Carrington Rd				South Approach Middleton Ave				West Approach Carrington Rd				Peak
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	total
8:00	9:00	0	37	24	12	0	8	555	103	0	115	44	143	0	81	253	13	1388
17:00	18:00	0	44	42	21	0	8	440	82	0	177	85	118	0	126	487	16	1646

Heavy Vehicles

Time		North Approach Andalusian Way				East Approach Carrington Rd				South Approach Middleton Ave				West Approach Carrington Rd			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
6:30	6:45	0	0	0	0	0	0	2	1	0	0	1	1	0	1	1	1
6:45	7:00	0	0	0	0	0	0	1	1	0	0	0	1	0	3	2	0
7:00	7:15	0	0	0	1	0	0	2	0	0	0	0	2	0	1	4	1
7:15	7:30	0	0	0	0	0	0	2	1	0	0	0	2	0	5	3	0
7:30	7:45	0	0	1	0	0	0	5	0	0	2	0	3	0	17	0	1
7:45	8:00	0	1	0	0	0	0	0	1	0	7	2	3	0	5	1	1
8:00	8:15	0	0	1	0	0	0	4	1	0	8	1	8	0	11	2	1
8:15	8:30	0	0	0	0	0	0	1	2	0	9	1	1	0	10	0	0
8:30	8:45	0	0	0	0	0	0	2	1	0	5	0	2	0	8	1	0
8:45	9:00	0	1	0	0	0	0	3	1	0	8	0	4	0	0	4	0
9:00	9:15	0	1	0	0	0	0	2	0	0	3	0	3	0	3	4	0
9:15	9:30	0	1	1	0	0	0	2	4	0	2	1	2	0	3	5	0
15:30	15:45	0	1	0	1	0	0	0	3	0	3	0	2	0	1	1	0
15:45	16:00	0	1	0	0	0	0	7	0	0	0	0	4	0	1	0	0
16:00	16:15	0	0	0	0	0	0	0	0	0	1	0	1	0	1	2	0
16:15	16:30	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	1
16:30	16:45	0	1	0	0	0	0	1	0	0	1	0	1	0	0	1	0
16:45	17:00	0	0	0	0	0	0	3	0	0	0	0	2	0	1	1	0
17:00	17:15	0	0	0	0	0	0	2	0	0	0	1	1	0	1	1	0
17:15	17:30	0	1	0	0	0	0	1	0	0	1	0	1	0	1	1	0
17:30	17:45	0	1	0	0	0	0	1	0	0	0	0	1	0	1	3	0
17:45	18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0
18:00	18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
18:15	18:30	0	0	0	0	0	0	0	0	0	0	0	2	0	1	1	0

Peak Time		North Approach Andalusian Way				East Approach Carrington Rd				South Approach Middleton Ave				West Approach Carrington Rd				Peak
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	total
8:00	9:00	0	1	1	0	0	0	10	5	0	30	2	15	0	29	7	1	101
17:00	18:00	0	2	0	0	0	0	4	0	0	1	1	3	0	4	7	0	22

TRANS TRAFFIC SURVEY

TURNING MOVEMENT SURVEY

trafficsurvey.com.au

Intersection of Partridge Ave and Middleton Ave, Castle I

GPS -33.726592, 150.986496

Date:	Wed 01/05/24
Weather:	Overcast
Suburban:	Castle Hill
Customer:	Varga

North:	Middleton Ave
East:	N/A
South:	Middleton Ave
West:	Partridge Ave

Survey	AM:	6:30 AM-9:30 AM
Period	PM:	3:30 PM-6:30 PM
Traffic	AM:	7:45 AM-8:45 AM
Peak	PM:	5:00 PM-6:00 PM

All Vehicles

Time		orth Approach Middleton A			uth Approach Middleton A			ect Approach Partridge A			Hourly Total	
Period Start	Period End	U	R	SB	U	NB	L	U	R	L	Hour	Peak
6:30	6:45	0	5	18	0	34	3	0	0	4	284	
6:45	7:00	0	8	17	0	34	3	0	0	2	336	
7:00	7:15	0	3	25	0	39	0	0	0	1	401	
7:15	7:30	0	2	41	0	42	1	0	1	1	481	
7:30	7:45	0	1	55	0	54	2	0	1	3	534	
7:45	8:00	0	3	49	0	74	1	0	0	2	598	Peak
8:00	8:15	0	3	62	0	80	1	0	0	2	594	
8:15	8:30	0	6	56	0	79	0	0	0	0	545	
8:30	8:45	0	4	64	0	102	2	0	2	6	518	
8:45	9:00	1	2	43	1	74	1	0	0	3		
9:00	9:15	1	5	43	0	48	1	0	0	1		
9:15	9:30	0	3	59	0	50	0	0	0	2		
15:30	15:45	2	2	48	0	69	0	0	0	7	537	
15:45	16:00	0	2	65	0	79	0	0	0	2	535	
16:00	16:15	0	5	57	1	59	1	0	0	4	516	
16:15	16:30	0	4	63	0	61	1	0	2	3	559	
16:30	16:45	1	2	60	0	60	1	0	1	1	563	
16:45	17:00	0	5	56	0	64	0	0	0	4	605	
17:00	17:15	1	1	82	0	82	0	0	0	4	636	Peak
17:15	17:30	0	4	55	0	77	0	0	0	2	579	
17:30	17:45	1	2	59	0	104	0	0	0	2	550	
17:45	18:00	0	2	44	0	109	0	0	1	4		
18:00	18:15	0	1	45	0	66	0	0	0	1		
18:15	18:30	0	0	46	0	58	0	0	0	5		

Peak Time		orth Approach Middleton A			uth Approach Middleton A			ect Approach Partridge A			Peak total
Period Start	Period End	U	R	SB	U	NB	L	U	R	L	
7:45	8:45	0	16	231	0	335	4	0	2	10	598
17:00	18:00	2	9	240	0	372	0	0	1	12	636

Pedestrians Crossing

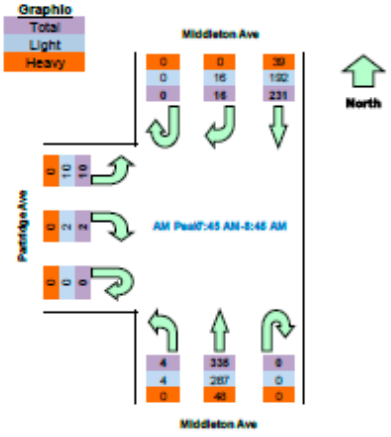
Time		Approach Middlet		Approach Middlet		Approach Partrid		ourly To
Period Start	Period End	estbour	astboun	estbour	astboun	outhbou	orthbou	
6:30	6:45	1	0	0	0	0	2	20
6:45	7:00	0	1	1	0	1	3	32
7:00	7:15	3	0	0	0	0	1	45
7:15	7:30	3	0	1	0	0	3	52
7:30	7:45	7	0	0	0	1	7	61
7:45	8:00	3	1	3	0	1	11	53
8:00	8:15	2	0	2	0	1	6	42
8:15	8:30	10	0	1	0	2	3	37
8:30	8:45	0	0	1	1	0	5	24
8:45	9:00	0	1	2	0	0	5	
9:00	9:15	4	0	0	0	1	1	
9:15	9:30	1	0	0	0	0	2	
15:30	15:45	2	4	0	1	5	0	36
15:45	16:00	0	2	0	2	7	2	31
16:00	16:15	0	0	0	0	2	2	21
16:15	16:30	0	0	0	0	5	2	26
16:30	16:45	0	3	2	0	1	1	22
16:45	17:00	0	1	0	0	2	0	35
17:00	17:15	0	2	0	0	3	4	37
17:15	17:30	1	2	0	0	0	0	32
17:30	17:45	2	4	0	0	13	1	33
17:45	18:00	0	0	0	1	4	0	
18:00	18:15	0	1	0	0	3	0	
18:15	18:30	0	1	0	0	3	0	

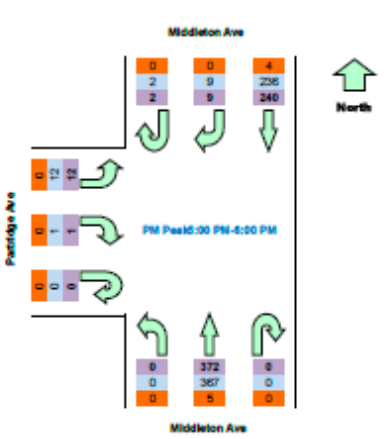
Peak Time		Approach Middlet		Approach Middlet		Approach Partrid		Peak total
Period Start	Period End	estbour	astboun	estbour	astboun	outhbou	orthbou	
7:45	8:45	15	1	7	1	4	25	53
17:00	18:00	3	8	0	1	20	5	37

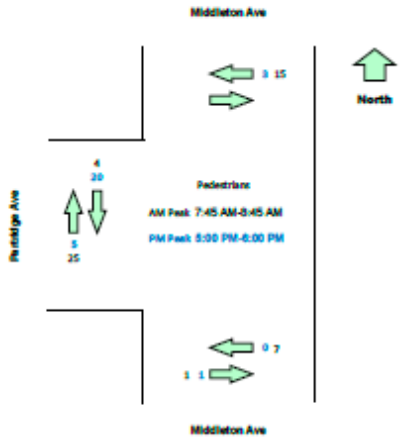
Note: Site sketch is for illustrating traffic flows. Direction is indicative only, drawing is not to scale and not an exact streets configuration.

Graphic

Total
Light
Heavy







Light Vehicles

Time		orth Approach Middleton A			uth Approach Middleton A			est Approach Partridge A		
Period Start	Period End	U	R	SB	U	NB	L	U	R	L
6:30	6:45	0	5	16	0	32	3	0	0	4
6:45	7:00	0	8	13	0	33	3	0	0	2
7:00	7:15	0	3	24	0	37	0	0	0	1
7:15	7:30	0	2	35	0	40	1	0	1	1
7:30	7:45	0	1	37	0	49	2	0	1	3
7:45	8:00	0	3	43	0	62	1	0	0	2
8:00	8:15	0	3	49	0	63	1	0	0	2
8:15	8:30	0	6	45	0	68	0	0	0	0
8:30	8:45	0	4	55	0	94	2	0	2	6
8:45	9:00	1	2	41	1	63	1	0	0	3
9:00	9:15	1	5	40	0	42	1	0	0	1
9:15	9:30	0	2	52	0	46	0	0	0	1
15:30	15:45	2	2	44	0	63	0	0	0	7
15:45	16:00	0	2	64	0	76	0	0	0	2
16:00	16:15	0	5	56	1	57	1	0	0	4
16:15	16:30	0	4	62	0	60	1	0	2	3
16:30	16:45	1	2	60	0	58	1	0	1	1
16:45	17:00	0	5	55	0	62	0	0	0	4
17:00	17:15	1	1	81	0	80	0	0	0	4
17:15	17:30	0	4	54	0	75	0	0	0	2
17:30	17:45	1	2	58	0	103	0	0	0	2
17:45	18:00	0	2	43	0	109	0	0	1	4
18:00	18:15	0	1	44	0	66	0	0	0	1
18:15	18:30	0	0	45	0	56	0	0	0	5

Peak Time		orth Approach Middleton A			uth Approach Middleton A			est Approach Partridge A			Peak
Period Start	Period End	U	R	SB	U	NB	L	U	R	L	total
7:45	8:45	0	16	192	0	287	4	0	2	10	511
17:00	18:00	2	9	236	0	367	0	0	1	12	627

Heavy Vehicles

Time		orth Approach Middleton A			uth Approach Middleton A			est Approach Partridge A		
Period Start	Period End	U	R	SB	U	NB	L	U	R	L
6:30	6:45	0	0	2	0	2	0	0	0	0
6:45	7:00	0	0	4	0	1	0	0	0	0
7:00	7:15	0	0	1	0	2	0	0	0	0
7:15	7:30	0	0	6	0	2	0	0	0	0
7:30	7:45	0	0	18	0	5	0	0	0	0
7:45	8:00	0	0	6	0	12	0	0	0	0
8:00	8:15	0	0	13	0	17	0	0	0	0
8:15	8:30	0	0	11	0	11	0	0	0	0
8:30	8:45	0	0	9	0	8	0	0	0	0
8:45	9:00	0	0	2	0	11	0	0	0	0
9:00	9:15	0	0	3	0	6	0	0	0	0
9:15	9:30	0	1	7	0	4	0	0	0	1
15:30	15:45	0	0	4	0	6	0	0	0	0
15:45	16:00	0	0	1	0	3	0	0	0	0
16:00	16:15	0	0	1	0	2	0	0	0	0
16:15	16:30	0	0	1	0	1	0	0	0	0
16:30	16:45	0	0	0	0	2	0	0	0	0
16:45	17:00	0	0	1	0	2	0	0	0	0
17:00	17:15	0	0	1	0	2	0	0	0	0
17:15	17:30	0	0	1	0	2	0	0	0	0
17:30	17:45	0	0	1	0	1	0	0	0	0
17:45	18:00	0	0	1	0	0	0	0	0	0
18:00	18:15	0	0	1	0	0	0	0	0	0
18:15	18:30	0	0	1	0	2	0	0	0	0

Peak Time		orth Approach Middleton A			uth Approach Middleton A			est Approach Partridge A			Peak
Period Start	Period End	U	R	SB	U	NB	L	U	R	L	total
7:45	8:45	0	0	39	0	48	0	0	0	0	87
17:00	18:00	0	0	4	0	5	0	0	0	0	9

TRANS TRAFFIC SURVEY

TURNING MOVEMENT SURVEY

trafficsurvey.com.au

Intersection of Middleton Ave and Fishburn Cres, Castle

GPS -33.729204, 150.966776

Date:	Wed 01/05/24
Weather:	Overcast
Suburban:	Castle Hill
Customer:	Varga

North:	Middleton Ave
East:	Fishburn Cres
South:	Middleton Ave
West:	N/A

Survey Period	AM:	6:30 AM-9:30 AM
	PM:	3:30 PM-6:30 PM
Traffic Peak	AM:	7:45 AM-8:45 AM
	PM:	5:00 PM-6:00 PM

All Vehicles

Time		orth Approach Middleton A			act Approach Fishburn Cr			outh Approach Middleton A			Hourly Total	
Period Start	Period End	U	SB	L	U	R	L	U	R	NB	Hour	Peak
6:30	6:45	0	14	4	0	2	0	0	8	37	283	
6:45	7:00	0	10	7	0	3	1	0	3	32	338	
7:00	7:15	0	23	3	0	4	1	0	5	36	412	
7:15	7:30	0	37	5	0	3	2	0	3	40	486	
7:30	7:45	0	36	21	0	4	1	1	4	53	537	
7:45	8:00	0	46	4	0	3	3	0	2	72	592	Peak
8:00	8:15	0	45	17	0	4	0	0	3	77	586	
8:15	8:30	0	48	8	0	5	2	0	3	75	534	
8:30	8:45	0	50	16	0	5	1	1	4	98	506	
8:45	9:00	0	39	5	0	5	1	0	3	71		
9:00	9:15	0	39	3	0	6	2	0	1	43		
9:15	9:30	0	43	17	0	2	1	0	2	48		
15:30	15:45	0	41	7	0	8	2	1	0	61	520	
15:45	16:00	0	58	6	0	6	3	0	1	71	529	
16:00	16:15	0	52	6	0	5	1	0	1	58	513	
16:15	16:30	0	57	9	0	7	3	0	1	55	556	
16:30	16:45	0	54	7	0	8	4	1	1	54	559	
16:45	17:00	0	50	6	0	4	6	0	4	59	596	
17:00	17:15	1	72	9	0	6	3	0	0	75	626	Peak
17:15	17:30	0	53	2	0	7	3	0	1	69	574	
17:30	17:45	0	51	8	0	10	2	0	1	94	541	
17:45	18:00	0	41	4	0	5	2	1	2	104		
18:00	18:15	0	39	6	0	7	1	0	2	59		
18:15	18:30	0	42	4	0	6	0	0	0	50		

Peak Time		orth Approach Middleton A			act Approach Fishburn Cr			outh Approach Middleton A			Peak total
Period Start	Period End	U	SB	L	U	R	L	U	R	NB	
7:45	8:45	0	189	45	0	17	6	1	12	322	592
17:00	18:00	1	217	23	0	28	10	1	4	342	626

Pedestrians Crossing

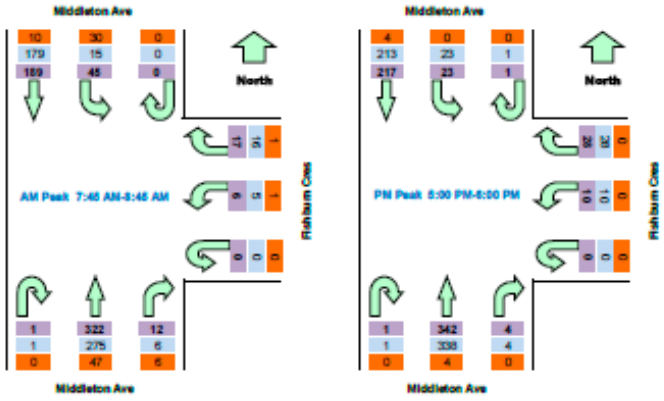
Time		Approach Middlet		Approach Fishbur		Approach Middle		ourly To
Period Start	Period End	Vestbour	Eastboun	orthbou	outhbou	Vestbour	Eastboun	
6:30	6:45	1	0	9	1	0	0	55
6:45	7:00	0	0	8	1	0	0	67
7:00	7:15	0	0	9	0	2	0	81
7:15	7:30	0	0	22	2	0	0	91
7:30	7:45	0	0	19	4	0	0	99
7:45	8:00	0	0	22	1	0	0	92
8:00	8:15	0	0	18	1	2	0	76
8:15	8:30	0	0	29	3	0	0	62
8:30	8:45	0	0	14	2	0	0	35
8:45	9:00	0	0	6	1	0	0	
9:00	9:15	0	0	7	0	0	0	
9:15	9:30	0	0	3	2	0	0	
15:30	15:45	0	0	2	8	0	0	33
15:45	16:00	0	0	2	8	0	0	36
16:00	16:15	0	0	0	5	1	0	35
16:15	16:30	0	0	1	5	0	1	36
16:30	16:45	0	0	3	10	0	0	37
16:45	17:00	0	0	3	6	0	0	40
17:00	17:15	0	0	0	7	0	0	46
17:15	17:30	0	0	2	6	0	0	49
17:30	17:45	0	0	1	15	0	0	56
17:45	18:00	0	0	0	15	0	0	
18:00	18:15	0	0	0	10	0	0	
18:15	18:30	0	0	4	11	0	0	

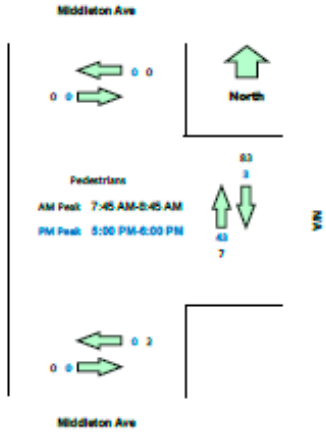
Peak Time		Approach Middlet		Approach Fishbur		Approach Middle		Peak total
Period Start	Period End	Vestbour	Eastboun	orthbou	outhbou	Vestbour	Eastboun	
7:45	8:45	0	0	83	7	2	0	92
17:00	18:00	0	0	3	43	0	0	46

Note: Site sketch is for illustrating traffic flows. Direction is indicative only, drawing is not to scale and not an exact streets configuration.

Graphic

Total
Light
Heavy





Light Vehicles

Time		orth Approach Middleton A			ast Approach Fichburn Cr			outh Approach Middleton A		
Period Start	Period End	U	SB	L	U	R	L	U	R	NB
6:30	6:45	0	12	4	0	2	0	0	8	35
6:45	7:00	0	9	4	0	3	1	0	3	31
7:00	7:15	0	22	3	0	3	1	0	5	34
7:15	7:30	0	31	5	0	3	2	0	3	38
7:30	7:45	0	33	6	0	3	1	1	3	49
7:45	8:00	0	41	2	0	3	3	0	2	60
8:00	8:15	0	44	5	0	4	0	0	1	60
8:15	8:30	0	44	1	0	5	1	0	1	64
8:30	8:45	0	50	7	0	4	1	1	2	91
8:45	9:00	0	38	4	0	4	0	0	0	61
9:00	9:15	0	37	3	0	6	1	0	0	37
9:15	9:30	0	40	13	0	2	1	0	1	44
15:30	15:45	0	39	5	0	8	2	1	0	55
15:45	16:00	0	57	6	0	6	3	0	1	68
16:00	16:15	0	51	6	0	4	1	0	1	57
16:15	16:30	0	56	9	0	7	3	0	1	54
16:30	16:45	0	54	7	0	7	4	1	1	53
16:45	17:00	0	49	6	0	4	6	0	4	57
17:00	17:15	1	71	9	0	6	3	0	0	73
17:15	17:30	0	52	2	0	7	3	0	1	68
17:30	17:45	0	50	8	0	10	2	0	1	93
17:45	18:00	0	40	4	0	5	2	1	2	104
18:00	18:15	0	38	6	0	7	1	0	2	59
18:15	18:30	0	41	4	0	6	0	0	0	48

Peak Time		orth Approach Middleton A			ast Approach Fichburn Cr			outh Approach Middleton A			Peak
Period Start	Period End	U	SB	L	U	R	L	U	R	NB	total
7:45	8:45	0	179	15	0	16	5	1	6	275	497
17:00	18:00	1	213	23	0	28	10	1	4	338	618

Heavy Vehicles

Time		orth Approach Middleton A			ast Approach Fichburn Cr			outh Approach Middleton A		
Period Start	Period End	U	SB	L	U	R	L	U	R	NB
6:30	6:45	0	2	0	0	0	0	0	0	2
6:45	7:00	0	1	3	0	0	0	0	0	1
7:00	7:15	0	1	0	0	1	0	0	0	2
7:15	7:30	0	6	0	0	0	0	0	0	2
7:30	7:45	0	3	15	0	1	0	0	1	4
7:45	8:00	0	5	2	0	0	0	0	0	12
8:00	8:15	0	1	12	0	0	0	0	2	17
8:15	8:30	0	4	7	0	0	1	0	2	11
8:30	8:45	0	0	9	0	1	0	0	2	7
8:45	9:00	0	1	1	0	1	1	0	3	10
9:00	9:15	0	2	0	0	0	1	0	1	6
9:15	9:30	0	3	4	0	0	0	0	1	4
15:30	15:45	0	2	2	0	0	0	0	0	6
15:45	16:00	0	1	0	0	0	0	0	0	3
16:00	16:15	0	1	0	0	1	0	0	0	1
16:15	16:30	0	1	0	0	0	0	0	0	1
16:30	16:45	0	0	0	0	1	0	0	0	1
16:45	17:00	0	1	0	0	0	0	0	0	2
17:00	17:15	0	1	0	0	0	0	0	0	2
17:15	17:30	0	1	0	0	0	0	0	0	1
17:30	17:45	0	1	0	0	0	0	0	0	1
17:45	18:00	0	1	0	0	0	0	0	0	0
18:00	18:15	0	1	0	0	0	0	0	0	0
18:15	18:30	0	1	0	0	0	0	0	0	2

Peak Time		orth Approach Middleton A			ast Approach Fichburn Cr			outh Approach Middleton A			Peak
Period Start	Period End	U	SB	L	U	R	L	U	R	NB	total
7:45	8:45	0	10	30	0	1	1	0	6	47	95
17:00	18:00	0	4	0	0	0	0	0	0	4	8

APPPENDIX B

SIDRA MOVEMENT SUMMARIES

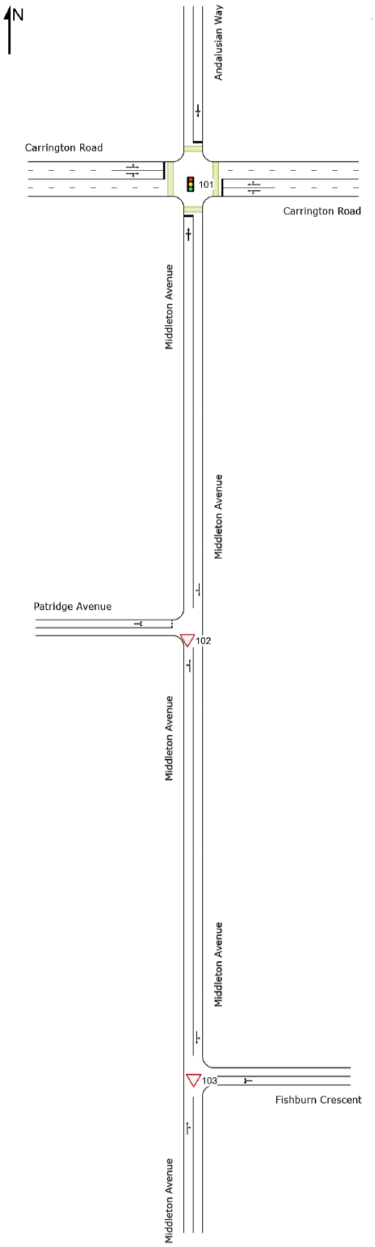
NETWORK LAYOUT

Network: [N101] AM Network (Existing)

New Network

Network Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
101	NA	AM Peak Carrington Rd & Middleton Ave & Andalusian Way
▽102	NA	AM Peak Middleton Ave & Patridge Ave
▽103	NA	AM Peak Middleton Ave & Fishburn Cres

MOVEMENT SUMMARY

Site: [101] AM Peak Carrington Rd & Middleton Ave & Andalusian Way (Existing)

Network: [N101] AM Network (Existing)

Output produced by SIDRA INTERSECTION Version: 11.0.2

16 Carrington Rd, CastleHill
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120.0 seconds (Site User-Given Cycle Time)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: Middleton Avenue															
1	L2	All MCs	166	9.5	166	9.5	0.538	30.9	LOS C	9.7	75.5	0.79	0.79	0.79	17.3
2	T1	All MCs	48	4.3	48	4.3	0.538	26.2	LOS B	9.7	75.5	0.79	0.79	0.79	18.7
3	R2	All MCs	153	20.7	153	20.7	* 0.538	32.2	LOS C	9.7	75.5	0.79	0.79	0.79	22.1
Approach			367	13.5	367	13.5	0.538	30.8	LOS C	9.7	75.5	0.79	0.79	0.79	19.7
East: Carrington Road															
4	L2	All MCs	114	4.6	114	4.6	0.417	27.7	LOS B	8.5	61.2	0.72	0.67	0.72	22.2
5	T1	All MCs	595	1.8	595	1.8	0.417	23.3	LOS B	8.5	61.2	0.72	0.65	0.72	27.6
6	R2	All MCs	8	0.0	8	0.0	0.417	37.1	LOS C	8.5	60.7	0.72	0.63	0.72	27.0
Approach			717	2.2	717	2.2	0.417	24.2	LOS B	8.5	61.2	0.72	0.65	0.72	26.8
North: Andalusian Way															
7	L2	All MCs	13	0.0	13	0.0	0.146	27.6	LOS B	1.9	13.4	0.70	0.67	0.70	24.5
8	T1	All MCs	26	4.0	26	4.0	0.146	23.1	LOS B	1.9	13.4	0.70	0.67	0.70	14.2
9	R2	All MCs	40	2.6	40	2.6	0.146	35.4	LOS C	1.9	13.4	0.70	0.67	0.70	20.3
Approach			79	2.7	79	2.7	0.146	30.0	LOS C	1.9	13.4	0.70	0.67	0.70	19.4
West: Carrington Road															
10	L2	All MCs	15	7.1	15	7.1	0.329	26.6	LOS B	6.5	46.7	0.68	0.59	0.68	23.4
11	T1	All MCs	274	2.7	274	2.7	0.329	22.0	LOS B	6.5	46.7	0.68	0.59	0.68	28.6
12	R2	All MCs	116	26.4	116	26.4	* 0.538	41.7	LOS C	3.5	30.4	0.86	0.80	0.86	10.5
Approach			404	9.6	404	9.6	0.538	27.8	LOS B	6.5	46.7	0.73	0.65	0.73	23.1
All Vehicles			1567	6.8	1567	6.8	0.538	27.0	LOS B	9.7	75.5	0.74	0.69	0.74	23.8

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Qued	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec

South: Middleton Avenue										
P1	Full	26	54.2	LOS E	0.1	0.1	0.95	0.95	208.1	200.0	0.96
East: Carrington Road										
P2	Full	1	54.2	LOS E	0.0	0.0	0.95	0.95	208.0	200.0	0.96
North: Andalusian Way										
P3	Full	31	54.2	LOS E	0.1	0.1	0.95	0.95	208.1	200.0	0.96
West: Carrington Road										
P4	Full	80	54.3	LOS E	0.3	0.3	0.95	0.95	208.2	200.0	0.96
All Pedestrians		138	54.3	LOS E	0.3	0.3	0.95	0.95	208.1	200.0	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: [102] AM Peak Middleton Ave & Patridge Ave (Existing)
Network: [N101] AM Network (Existing)
Output produced by SIDRA INTERSECTION Version: 11.0.2

16 Carrington Rd, CastleHill
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: Middleton Avenue															
1	L2	All MCs	4	0.0	4	0.0	0.252	4.6	LOS A	0.0	0.0	0.00	0.01	0.00	47.7
2	T1	All MCs	353	14.0	353	14.0	0.252	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.3
Approach			357	13.9	357	13.9	0.252	0.1	NA	0.0	0.0	0.00	0.01	0.00	49.2
North: Middleton Avenue															
8	T1	All MCs	237	15.6	237	15.6	0.144	0.1	LOS A	0.0	0.4	0.05	0.07	0.05	46.4
9	R2	All MCs	16	0.0	16	0.0	0.144	6.1	LOS A	0.0	0.4	0.05	0.07	0.05	47.0
Approach			253	14.6	253	14.6	0.144	0.5	NA	0.0	0.4	0.05	0.07	0.05	46.6
West: Patridge Avenue															
10	L2	All MCs	12	0.0	12	0.0	0.016	5.8	LOS A	0.0	0.1	0.41	0.58	0.41	42.8
12	R2	All MCs	2	0.0	2	0.0	0.016	7.3	LOS A	0.0	0.1	0.41	0.58	0.41	42.8
Approach			14	0.0	14	0.0	0.016	6.0	LOS A	0.0	0.1	0.41	0.58	0.41	42.8
All Vehicles			623	13.9	623	13.9	0.252	0.4	NA	0.0	0.4	0.03	0.05	0.03	47.2

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [103] AM Peak Middleton Ave & Fishburn Cres (Existing)
Network: [N101] AM Network (Existing)
Output produced by SIDRA INTERSECTION Version: 11.0.2

16 Carrington Rd, CastleHill
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: Middleton Avenue															
8	T1	All MCs	338	14.0	338	14.0	0.204	0.1	LOS A	0.1	0.6	0.05	0.06	0.05	48.2
9	R2	All MCs	14	69.2	14	69.2	0.204	7.2	LOS A	0.1	0.6	0.05	0.06	0.05	42.6
Approach			352	16.2	352	16.2	0.204	0.4	NA	0.1	0.6	0.05	0.06	0.05	47.5
East: Fishburn Crescent															
10	L2	All MCs	4	50.0	4	50.0	0.035	6.0	LOS A	0.0	0.4	0.46	0.65	0.46	34.1
12	R2	All MCs	20	10.5	20	10.5	0.035	7.9	LOS A	0.0	0.4	0.46	0.65	0.46	35.5
Approach			24	17.4	24	17.4	0.035	7.6	LOS A	0.0	0.4	0.46	0.65	0.46	35.1
North: Middleton Avenue															
1	L2	All MCs	48	63.0	48	63.0	0.136	4.7	LOS A	0.0	0.0	0.00	0.10	0.00	42.9
2	T1	All MCs	192	3.3	192	3.3	0.136	0.0	LOS A	0.0	0.0	0.00	0.10	0.00	48.4
Approach			240	15.4	240	15.4	0.136	0.9	NA	0.0	0.0	0.00	0.10	0.00	46.6
All Vehicles			616	15.9	616	15.9	0.204	0.9	NA	0.1	0.6	0.05	0.10	0.05	46.0

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

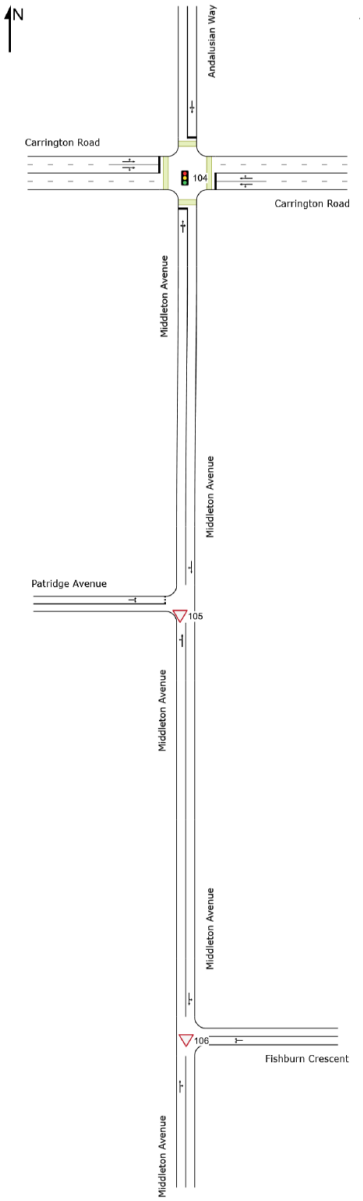
NETWORK LAYOUT

Network: [N102] PM Network (Existing)

New Network

Network Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
104	NA	PM Peak Carrington Rd & Middleton Ave & Andalusian Way
105	NA	PM Peak Middleton Ave & Patridge Ave
106	NA	PM Peak Middleton Ave & Fishburn Cres

MOVEMENT SUMMARY

Site: [104] PM Peak Carrington Rd & Middleton Ave & Andalusian Way (Existing)

Network: [N102] PM Network (Existing)

Output produced by SIDRA INTERSECTION Version: 11.0.2

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16 Carrington Rd, CastleHill
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120.0 seconds (Site User-Given Cycle Time)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: Middleton Avenue															
1	L2	All MCs	127	2.5	127	2.5	0.556	30.1	LOS C	10.7	75.7	0.79	0.79	0.79	17.7
2	T1	All MCs	91	1.2	91	1.2	0.556	25.5	LOS B	10.7	75.7	0.79	0.79	0.79	19.0
3	R2	All MCs	187	0.6	187	0.6	* 0.556	32.2	LOS C	10.7	75.7	0.79	0.79	0.79	22.5
Approach			405	1.3	405	1.3	0.556	30.0	LOS C	10.7	75.7	0.79	0.79	0.79	20.4
East: Carrington Road															
4	L2	All MCs	86	0.0	86	0.0	0.344	27.7	LOS B	6.8	47.9	0.70	0.65	0.70	22.2
5	T1	All MCs	467	0.9	467	0.9	0.344	24.2	LOS B	6.8	47.9	0.72	0.64	0.72	27.0
6	R2	All MCs	8	0.0	8	0.0	0.344	49.0	LOS D	6.5	46.0	0.73	0.63	0.73	26.1
Approach			562	0.7	562	0.7	0.344	25.1	LOS B	6.8	47.9	0.71	0.64	0.71	26.4
North: Andalusian Way															
7	L2	All MCs	22	0.0	22	0.0	0.192	27.2	LOS B	2.7	19.2	0.70	0.67	0.70	25.1
8	T1	All MCs	44	0.0	44	0.0	0.192	22.6	LOS B	2.7	19.2	0.70	0.67	0.70	14.7
9	R2	All MCs	48	4.3	48	4.3	0.192	34.8	LOS C	2.7	19.2	0.70	0.67	0.70	20.8
Approach			115	1.8	115	1.8	0.192	28.6	LOS C	2.7	19.2	0.70	0.67	0.70	19.9
West: Carrington Road															
10	L2	All MCs	17	0.0	17	0.0	0.558	30.7	LOS C	12.6	89.0	0.79	0.71	0.79	21.7
11	T1	All MCs	520	1.4	520	1.4	0.558	26.2	LOS B	12.6	89.0	0.80	0.72	0.80	25.8
12	R2	All MCs	137	3.1	137	3.1	* 0.558	44.9	LOS D	5.8	41.7	0.87	0.79	0.87	10.9
Approach			674	1.7	674	1.7	0.558	30.1	LOS C	12.6	89.0	0.82	0.73	0.82	23.0
All Vehicles			1756	1.3	1756	1.3	0.558	28.4	LOS B	12.6	89.0	0.77	0.71	0.77	23.3

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Qued	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec

South: Middleton Avenue										
P1 Full	26	54.2	LOS E	0.1	0.1	0.95	0.95	208.1	200.0	0.96
East: Carrington Road										
P2 Full	1	54.2	LOS E	0.0	0.0	0.95	0.95	208.0	200.0	0.96
North: Andalusian Way										
P3 Full	31	54.2	LOS E	0.1	0.1	0.95	0.95	208.1	200.0	0.96
West: Carrington Road										
P4 Full	80	54.3	LOS E	0.3	0.3	0.95	0.95	208.2	200.0	0.96
All Pedestrians	138	54.3	LOS E	0.3	0.3	0.95	0.95	208.1	200.0	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: [105] PM Peak Middleton Ave & Patridge Ave (Existing)
Network: [N102] PM Network (Existing)
Output produced by SIDRA INTERSECTION Version: 11.0.2

16 Carrington Rd, CastleHill
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: Middleton Avenue															
1	L2	All MCs	1	0.0	1	0.0	0.257	4.6	LOS A	0.0	0.0	0.00	0.00	0.00	47.7
2	T1	All MCs	392	1.3	392	1.3	0.257	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.7
Approach			393	1.3	393	1.3	0.257	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.7
North: Middleton Avenue															
8	T1	All MCs	253	1.7	253	1.7	0.137	0.1	LOS A	0.0	0.2	0.03	0.04	0.03	47.9
9	R2	All MCs	9	0.0	9	0.0	0.137	6.1	LOS A	0.0	0.2	0.03	0.04	0.03	47.3
Approach			262	1.6	262	1.6	0.137	0.3	NA	0.0	0.2	0.03	0.04	0.03	47.8
West: Patridge Avenue															
10	L2	All MCs	13	0.0	13	0.0	0.016	5.9	LOS A	0.0	0.1	0.42	0.57	0.42	42.8
12	R2	All MCs	1	0.0	1	0.0	0.016	7.4	LOS A	0.0	0.1	0.42	0.57	0.42	42.8
Approach			14	0.0	14	0.0	0.016	6.0	LOS A	0.0	0.1	0.42	0.57	0.42	42.8
All Vehicles			668	1.4	668	1.4	0.257	0.3	NA	0.0	0.2	0.02	0.03	0.02	48.1

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [106] PM Peak Middleton Ave & Fishburn Cres (Existing)
Network: [N102] PM Network (Existing)
Output produced by SIDRA INTERSECTION Version: 11.0.2

16 Carrington Rd, CastleHill
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: Middleton Avenue															
8	T1	All MCs	360	1.2	360	1.2	0.186	0.0	LOS A	0.0	0.1	0.01	0.01	0.01	49.4
9	R2	All MCs	4	0.0	4	0.0	0.186	4.8	LOS A	0.0	0.1	0.01	0.01	0.01	45.9
Approach			364	1.2	364	1.2	0.186	0.1	NA	0.0	0.1	0.01	0.01	0.01	49.2
East: Fishburn Crescent															
10	L2	All MCs	11	0.0	11	0.0	0.049	5.3	LOS A	0.1	0.5	0.44	0.64	0.44	37.2
12	R2	All MCs	29	0.0	29	0.0	0.049	7.4	LOS A	0.1	0.5	0.44	0.64	0.44	36.3
Approach			40	0.0	40	0.0	0.049	6.8	LOS A	0.1	0.5	0.44	0.64	0.44	36.6
North: Middleton Avenue															
1	L2	All MCs	24	0.0	24	0.0	0.130	4.6	LOS A	0.0	0.0	0.00	0.05	0.00	45.4
2	T1	All MCs	228	1.8	228	1.8	0.130	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	48.3
Approach			253	1.7	253	1.7	0.130	0.4	NA	0.0	0.0	0.00	0.05	0.00	47.8
All Vehicles			657	1.3	657	1.3	0.186	0.6	NA	0.1	0.5	0.03	0.06	0.03	46.8

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

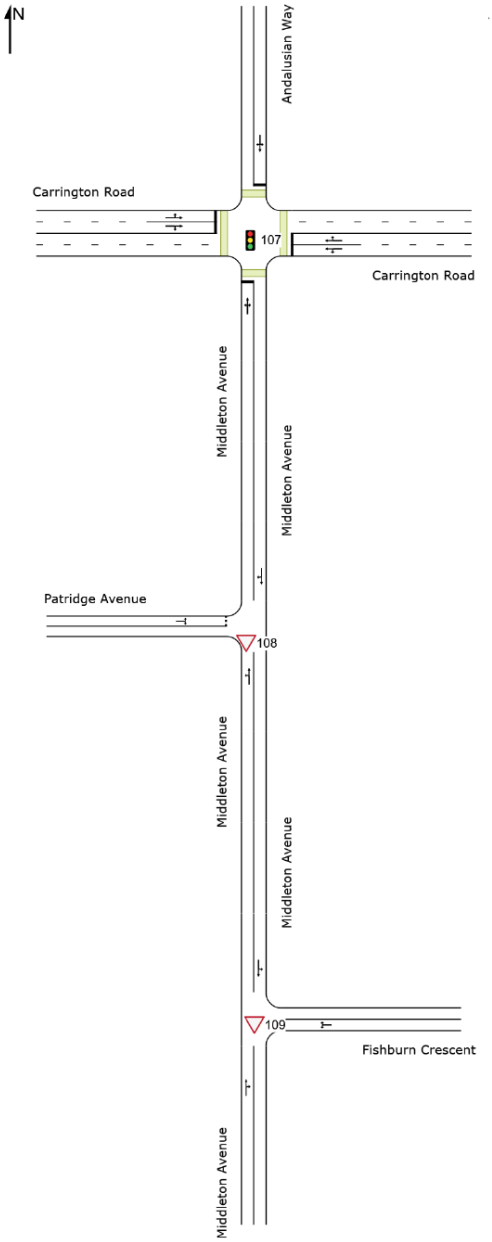
NETWORK LAYOUT

Network: [N103] AM Peak (Proposed)

New Network

Network Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
107	NA	AM Peak Carrington Rd & Middleton Ave & Andalusian Way
108	NA	AM Peak Middleton Ave & Patridge Ave
109	NA	AM Peak Middleton Ave & Fishburn Cres

MOVEMENT SUMMARY

Site: [107] AM Peak Carrington Rd & Middleton Ave & Andalusian Way (Proposed)

Network: [N103] AM Peak (Proposed)

Output produced by SIDRA INTERSECTION Version: 11.0.2

16 Carrington Rd, CastleHill
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120.0 seconds (Site User-Given Cycle Time)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: Middleton Avenue															
1	L2	All MCs	199	7.9	199	7.9	0.612	30.6	LOS C	11.7	90.0	0.81	0.81	0.81	17.4
2	T1	All MCs	48	4.3	48	4.3	0.612	25.9	LOS B	11.7	90.0	0.81	0.81	0.81	18.8
3	R2	All MCs	193	16.4	193	16.4	* 0.612	32.0	LOS C	11.7	90.0	0.81	0.81	0.81	22.2
Approach			440	11.2	440	11.2	0.612	30.7	LOS C	11.7	90.0	0.81	0.81	0.81	19.8
East: Carrington Road															
4	L2	All MCs	123	4.3	123	4.3	0.440	29.4	LOS C	9.0	64.4	0.74	0.69	0.74	21.3
5	T1	All MCs	595	1.8	595	1.8	0.440	25.1	LOS B	9.0	64.4	0.75	0.67	0.75	26.7
6	R2	All MCs	8	0.0	8	0.0	0.440	39.6	LOS C	9.0	63.9	0.75	0.66	0.75	26.2
Approach			726	2.2	726	2.2	0.440	26.0	LOS B	9.0	64.4	0.75	0.68	0.75	25.9
North: Andalusian Way															
7	L2	All MCs	13	0.0	13	0.0	0.147	26.7	LOS B	1.9	13.4	0.70	0.67	0.70	24.6
8	T1	All MCs	26	4.0	26	4.0	0.147	22.1	LOS B	1.9	13.4	0.70	0.67	0.70	14.3
9	R2	All MCs	40	2.6	40	2.6	0.147	35.8	LOS C	1.9	13.4	0.70	0.67	0.70	20.4
Approach			79	2.7	79	2.7	0.147	29.8	LOS C	1.9	13.4	0.70	0.67	0.70	19.5
West: Carrington Road															
10	L2	All MCs	15	7.1	15	7.1	0.343	28.2	LOS B	6.7	48.3	0.70	0.61	0.70	22.6
11	T1	All MCs	274	2.7	274	2.7	0.343	23.5	LOS B	6.7	48.3	0.70	0.61	0.70	27.7
12	R2	All MCs	124	24.6	124	24.6	* 0.612	45.6	LOS D	4.0	34.2	0.91	0.83	0.93	9.8
Approach			413	9.4	413	9.4	0.612	30.4	LOS C	6.7	48.3	0.76	0.68	0.77	21.9
All Vehicles			1658	6.4	1658	6.4	0.612	28.5	LOS B	11.7	90.0	0.77	0.71	0.77	23.0

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Qued	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec

South: Middleton Avenue										
P1	Full	26	54.2	LOS E	0.1	0.1	0.95	0.95	208.1	200.0	0.96
East: Carrington Road										
P2	Full	1	54.2	LOS E	0.0	0.0	0.95	0.95	208.0	200.0	0.96
North: Andalusian Way										
P3	Full	31	54.2	LOS E	0.1	0.1	0.95	0.95	208.1	200.0	0.96
West: Carrington Road										
P4	Full	80	54.3	LOS E	0.3	0.3	0.95	0.95	208.2	200.0	0.96
All Pedestrians		138	54.3	LOS E	0.3	0.3	0.95	0.95	208.1	200.0	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: [108] AM Peak Middleton Ave & Patridge Ave (Proposed)
Network: [N103] AM Peak (Proposed)
Output produced by SIDRA INTERSECTION Version: 11.0.2

16 Carrington Rd, CastleHill
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: Middleton Avenue															
1	L2	All MCs	4	0.0	4	0.0	0.241	4.6	LOS A	0.1	1.1	0.00	0.01	0.00	47.7
2	T1	All MCs	425	11.6	425	11.6	0.241	0.0	LOS A	0.1	1.1	0.00	0.01	0.00	49.5
Approach			429	11.5	429	11.5	0.241	0.1	NA	0.1	1.1	0.00	0.01	0.00	49.3
North: Middleton Avenue															
8	T1	All MCs	255	14.5	255	14.5	0.154	0.2	LOS A	0.1	0.4	0.06	0.08	0.06	46.2
9	R2	All MCs	16	0.0	16	0.0	0.154	6.5	LOS A	0.1	0.4	0.06	0.08	0.06	47.0
Approach			271	13.6	271	13.6	0.154	0.5	NA	0.1	0.4	0.06	0.08	0.06	46.4
West: Patridge Avenue															
10	L2	All MCs	12	0.0	12	0.0	0.020	6.1	LOS A	0.0	0.1	0.46	0.61	0.46	42.6
12	R2	All MCs	2	0.0	2	0.0	0.020	7.9	LOS A	0.0	0.1	0.46	0.61	0.46	42.6
Approach			14	0.0	14	0.0	0.020	6.4	LOS A	0.0	0.1	0.46	0.61	0.46	42.6
All Vehicles			714	12.1	714	12.1	0.241	0.4	NA	0.1	1.1	0.03	0.04	0.03	47.3

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [109] AM Peak Middleton Ave & Fishburn Cres
(Proposed)

Network: [N103] AM Peak (Proposed)

Output produced by SIDRA INTERSECTION Version: 11.0.2

16 Carrington Rd, CastleHill
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Queued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: Middleton Avenue															
8	T1	All MCs	338	14.0	338	14.0	0.208	0.2	LOS A	0.1	0.7	0.07	0.07	0.07	47.4
9	R2	All MCs	19	50.0	19	50.0	0.208	6.9	LOS A	0.1	0.7	0.07	0.07	0.07	43.2
Approach			357	15.9	357	15.9	0.208	0.5	NA	0.1	0.7	0.07	0.07	0.07	46.7
East: Fishburn Crescent															
10	L2	All MCs	24	8.7	24	8.7	0.154	5.4	LOS A	0.2	1.5	0.48	0.69	0.48	36.2
12	R2	All MCs	93	2.3	93	2.3	0.154	7.9	LOS A	0.2	1.5	0.48	0.69	0.48	35.5
Approach			117	3.6	117	3.6	0.154	7.4	LOS A	0.2	1.5	0.48	0.69	0.48	35.7
North: Middleton Avenue															
1	L2	All MCs	66	46.0	66	46.0	0.146	4.6	LOS A	0.0	0.0	0.00	0.13	0.00	43.0
2	T1	All MCs	192	3.3	192	3.3	0.146	0.0	LOS A	0.0	0.0	0.00	0.13	0.00	47.3
Approach			258	14.3	258	14.3	0.146	1.2	NA	0.0	0.0	0.00	0.13	0.00	45.6
All Vehicles			732	13.4	732	13.4	0.208	1.9	NA	0.2	1.5	0.11	0.19	0.11	43.0

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

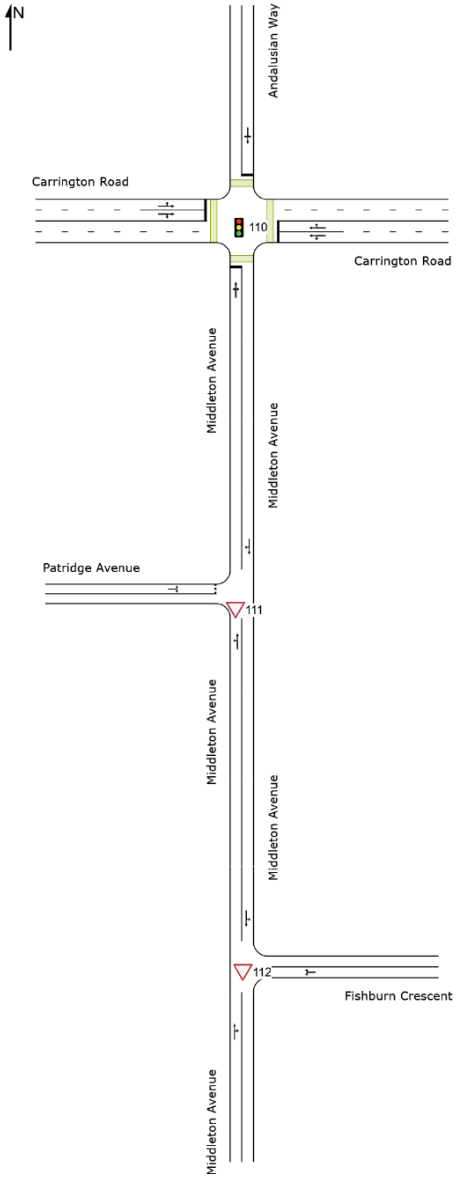
NETWORK LAYOUT

Network: [N104] PM Peak (Proposed)

New Network

Network Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
110	NA	PM Peak Carrington Rd & Middleton Ave & Andalusian Way
▽111	NA	PM Peak Middleton Ave & Patridge Ave
▽112	NA	PM Peak Middleton Ave & Fishburn Cres

MOVEMENT SUMMARY

Site: [110] PM Peak Carrington Rd & Middleton Ave & Andalusian Way (Proposed)

Network: [N104] PM Peak (Proposed)

Output produced by SIDRA INTERSECTION Version: 11.0.2

16 Carrington Rd, CastleHill
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120.0 seconds (Site User-Given Cycle Time)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: Middleton Avenue															
1	L2	All MCs	138	2.3	138	2.3	0.611	32.6	LOS C	11.9	83.9	0.84	0.81	0.84	16.8
2	T1	All MCs	91	1.2	91	1.2	0.611	28.0	LOS B	11.9	83.9	0.84	0.81	0.84	18.0
3	R2	All MCs	197	0.5	197	0.5	* 0.611	35.0	LOS C	11.9	83.9	0.84	0.81	0.84	21.5
Approach			425	1.2	425	1.2	0.611	32.7	LOS C	11.9	83.9	0.84	0.81	0.84	19.4
East: Carrington Road															
4	L2	All MCs	126	0.0	126	0.0	0.353	26.2	LOS B	7.1	50.0	0.68	0.66	0.68	22.8
5	T1	All MCs	467	0.9	467	0.9	0.353	22.9	LOS B	7.1	50.0	0.70	0.64	0.70	27.5
6	R2	All MCs	8	0.0	8	0.0	0.353	50.3	LOS D	6.8	48.3	0.72	0.62	0.72	26.6
Approach			602	0.7	602	0.7	0.353	24.0	LOS B	7.1	50.0	0.70	0.64	0.70	26.7
North: Andalusian Way															
7	L2	All MCs	22	0.0	22	0.0	0.208	29.4	LOS C	2.8	20.2	0.73	0.69	0.73	24.0
8	T1	All MCs	44	0.0	44	0.0	0.208	24.8	LOS B	2.8	20.2	0.73	0.69	0.73	13.8
9	R2	All MCs	48	4.3	48	4.3	0.208	38.3	LOS C	2.8	20.2	0.73	0.69	0.73	19.7
Approach			115	1.8	115	1.8	0.208	31.4	LOS C	2.8	20.2	0.73	0.69	0.73	18.8
West: Carrington Road															
10	L2	All MCs	17	0.0	17	0.0	0.595	29.6	LOS C	14.0	99.5	0.79	0.71	0.79	22.2
11	T1	All MCs	520	1.4	520	1.4	0.595	25.1	LOS B	14.0	99.5	0.79	0.71	0.79	27.0
12	R2	All MCs	178	2.4	178	2.4	* 0.611	41.7	LOS C	5.5	39.3	0.89	0.82	0.89	10.5
Approach			715	1.6	715	1.6	0.611	29.3	LOS C	14.0	99.5	0.82	0.74	0.82	22.9
All Vehicles			1857	1.2	1857	1.2	0.611	28.5	LOS B	14.0	99.5	0.78	0.72	0.78	23.0

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Qued	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec

South: Middleton Avenue											
P1	Full	26	54.2	LOS E	0.1	0.1	0.95	0.95	208.1	200.0	0.96
East: Carrington Road											
P2	Full	1	54.2	LOS E	0.0	0.0	0.95	0.95	208.0	200.0	0.96
North: Andalusian Way											
P3	Full	31	54.2	LOS E	0.1	0.1	0.95	0.95	208.1	200.0	0.96
West: Carrington Road											
P4	Full	80	54.3	LOS E	0.3	0.3	0.95	0.95	208.2	200.0	0.96
All Pedestrians		138	54.3	LOS E	0.3	0.3	0.95	0.95	208.1	200.0	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: [111] PM Peak Middleton Ave & Patridge Ave (Proposed)
Network: [N104] PM Peak (Proposed)
Output produced by SIDRA INTERSECTION Version: 11.0.2

16 Carrington Rd, CastleHill
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: Middleton Avenue															
1	L2	All MCs	1	0.0	1	0.0	0.294	4.6	LOS A	0.0	0.0	0.00	0.00	0.00	47.7
2	T1	All MCs	412	1.3	412	1.3	0.294	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.7
Approach			413	1.3	413	1.3	0.294	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.7
North: Middleton Avenue															
8	T1	All MCs	334	1.3	334	1.3	0.178	0.1	LOS A	0.0	0.2	0.03	0.04	0.03	48.3
9	R2	All MCs	9	0.0	9	0.0	0.178	6.3	LOS A	0.0	0.2	0.03	0.04	0.03	47.3
Approach			343	1.2	343	1.2	0.178	0.2	NA	0.0	0.2	0.03	0.04	0.03	48.2
West: Patridge Avenue															
10	L2	All MCs	13	0.0	13	0.0	0.018	6.0	LOS A	0.0	0.1	0.43	0.59	0.43	42.7
12	R2	All MCs	1	0.0	1	0.0	0.018	7.9	LOS A	0.0	0.1	0.43	0.59	0.43	42.7
Approach			14	0.0	14	0.0	0.018	6.1	LOS A	0.0	0.1	0.43	0.59	0.43	42.7
All Vehicles			769	1.2	769	1.2	0.294	0.2	NA	0.0	0.2	0.02	0.03	0.02	48.2

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: [112] PM Peak Middleton Ave & Fishburn Cres (Proposed)

Network: [N104] PM Peak (Proposed)

Output produced by SIDRA INTERSECTION Version: 11.0.2

16 Carrington Rd, CastleHill
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: Middleton Avenue															
8	T1	All MCs	360	1.2	360	1.2	0.202	0.1	LOS A	0.1	0.6	0.07	0.08	0.07	46.5
9	R2	All MCs	24	0.0	24	0.0	0.202	5.9	LOS A	0.1	0.6	0.07	0.08	0.07	45.1
Approach			384	1.1	384	1.1	0.202	0.5	NA	0.1	0.6	0.07	0.08	0.07	46.3
East: Fishburn Crescent															
10	L2	All MCs	16	0.0	16	0.0	0.086	5.3	LOS A	0.1	0.8	0.47	0.68	0.47	36.7
12	R2	All MCs	49	0.0	49	0.0	0.086	7.9	LOS A	0.1	0.8	0.47	0.68	0.47	35.7
Approach			65	0.0	65	0.0	0.086	7.3	LOS A	0.1	0.8	0.47	0.68	0.47	36.0
North: Middleton Avenue															
1	L2	All MCs	105	0.0	105	0.0	0.173	4.6	LOS A	0.0	0.0	0.00	0.17	0.00	43.7
2	T1	All MCs	228	1.8	228	1.8	0.173	0.0	LOS A	0.0	0.0	0.00	0.17	0.00	44.9
Approach			334	1.3	334	1.3	0.173	1.4	NA	0.0	0.0	0.00	0.17	0.00	44.4
All Vehicles			783	1.1	783	1.1	0.202	1.5	NA	0.1	0.8	0.07	0.17	0.07	43.7

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

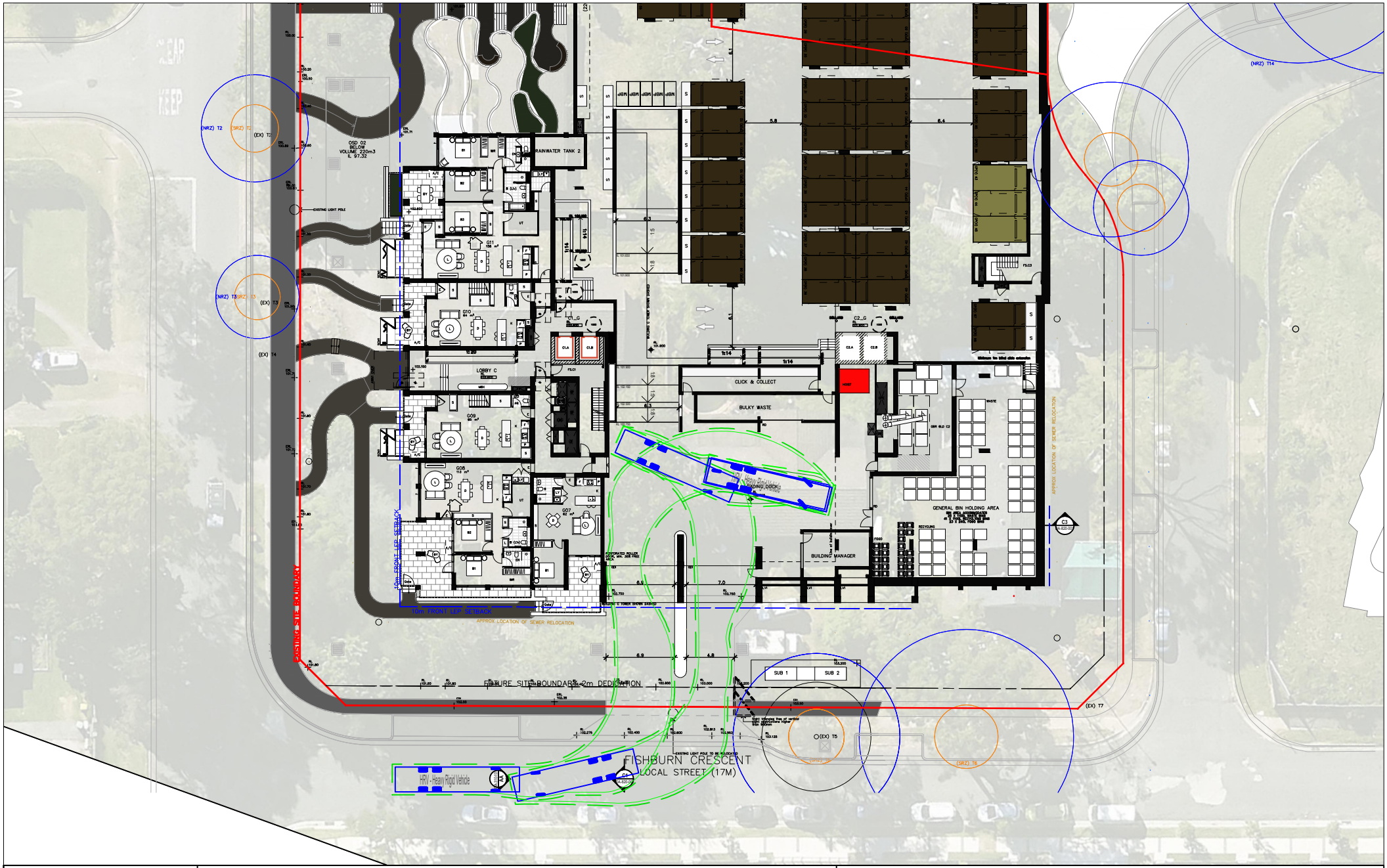
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

APPPENDIX C

SWEPT TURNING PATH DIAGRAMS



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PROJECT
RESIDENTIAL DEVELOPMENT

N

DRAWING TITLE
GF_HRV_Entry & Exit

1:500 @ A4

ADDRESS
2 Fishburn Crs,
Castle Hill

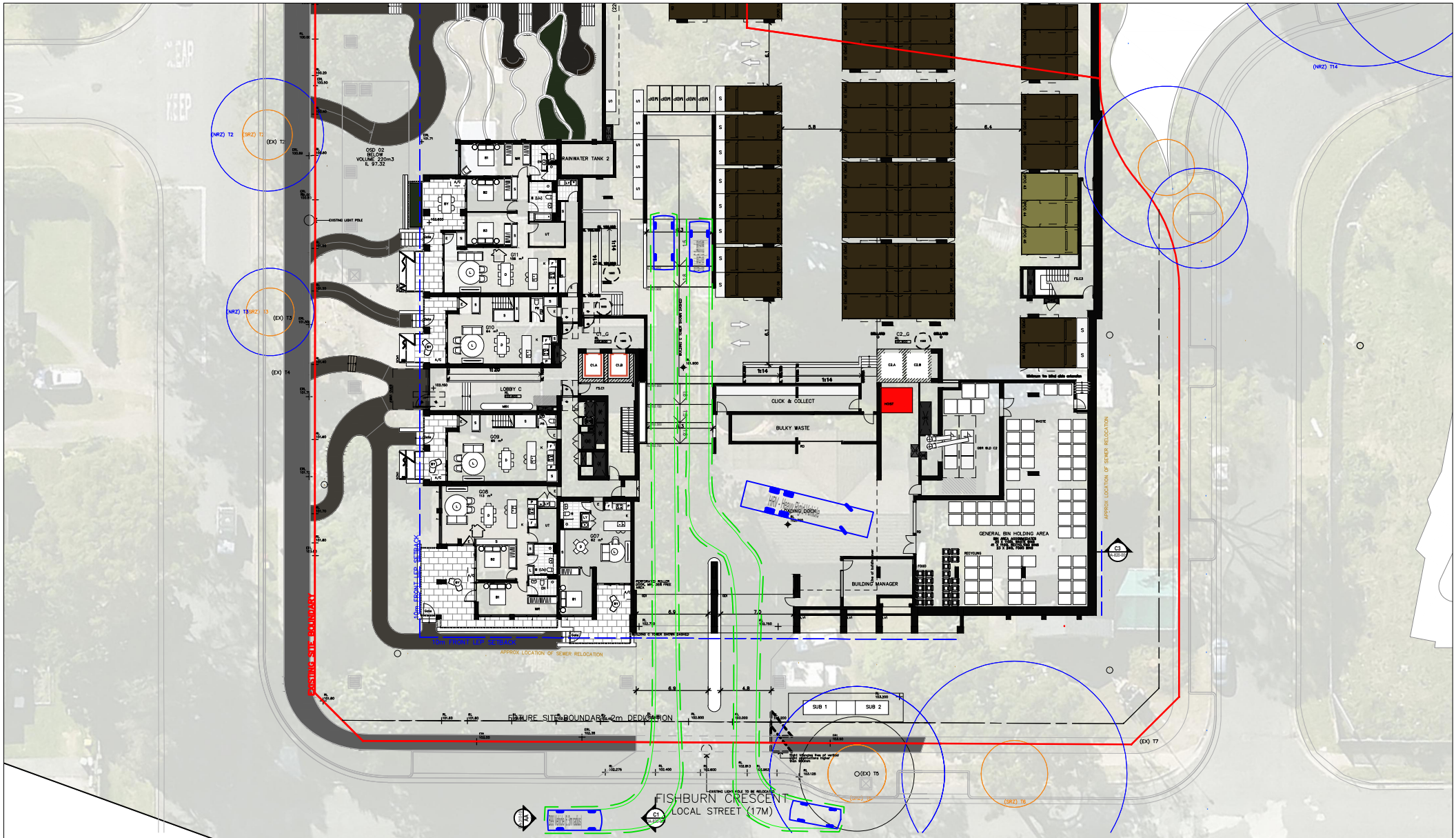
PROJECT NO.
23513

DATE DRAWN
2026-4-28

REVIEWED
RV

PREPARED
MN

VARGA TRAFFIC PLANNING Pty Ltd
Transport, Traffic and Parking Consultants



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PROJECT
RESIDENTIAL DEVELOPMENT

N

DRAWING TITLE
GF_B99&B85_Passing

1:500 @ A4

ADDRESS
2 Fishburn Crs,
Castle Hill

PROJECT NO.
23513

DATE DRAWN
2026-4-28

REVIEWED
RV

PREPARED
MN

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