

16-20 Old Castle Hill Road, Castle Hill

Transport Impact Assessment



Stantec Australia Pty Ltd

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Urban Property Group

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1 Introduction

1.1 Background

This report supports a State Significant Development Application and Concurrent Rezoning (SSDA) being lodged with the Department of Planning, Housing and Infrastructure (DPHI) for a residential development including affordable housing at 16-20 Old Castle Hill Road, Castle Hill (the site). The proponent for the SSDA is UPG Castle Corner Pty Ltd (UPG).

State Environmental Planning Policy (Planning Systems) 2022 (Planning Systems SEPP) identifies development which is declared to be State Significant. The site was declared SSD pursuant to State Significant Declaration Order 2025 (No 7) (the Order) issued on 13 May 2025.

A separate 'Early Works' SSDA seeks approval for site establishment, tree removal, bulk excavation, infrastructure services augmentation and ancillary site works. This 'Main Works' SSDA and Concurrent Rezoning seeks approval for the built form aspects of the residential flat building.

The proposal aims to:

- Facilitate transport-oriented development within an area of high amenity, promoting increases to both market and affordable housing supply proximate to public transport, open space, and employment.
- Respond to the housing challenges facing NSW through boosting the delivery of housing in an area of growth.
- Align with the NSW Government's strategic ambitions to deliver 23,300 homes in The Hills by 2029.
- Deliver affordable housing in accordance with the in-fill affordable housing provisions of *State Environmental Planning Policy (Housing) 2021*.
- Deliver a built form that relates to the surrounding context and respects the character of its environs.

Stantec was commissioned by UUPG Castle Corner Pty Ltd to undertake a transport impact assessment (TIA) for the proposed residential development.

1.2 Purpose of this Report

This report sets out an assessment of the anticipated transport implications of the proposed development, including consideration of the following:

- existing traffic and parking conditions surrounding the site
- suitability of the proposed parking in terms of supply (quantum) and layout
- service vehicle requirements
- public transport, pedestrian and bicycle requirements
- the traffic generating characteristics of the proposed development
- suitability of the proposed access arrangements for the site
- the transport impact of the development proposal on the surrounding road network.



1.3 Secretary's Environmental Assessment Requirements (SEARs)

In accordance with section 4.39 of the Environmental Planning & Assessment Act 1979 (EP&A Act), Secretary's Environmental Assessment Requirements (SEARs) for SSD-85238209 has been issued. This report has been prepared to respond to the issued SEARs, as set out below.

9. Transport

- Provide a Transport Impact Assessment (TIA) in accordance with the processes and methodology recommended in the *Guide to Transport 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.

1.4 References

In preparing this report, reference has been made to the following:

- an inspection of the site and its surrounds
- Castle Hill North Precinct Development Control Plan (DCP)
- Draft Castle Hill Precinct Plan
- Guide to Transport Impact Assessment (Transport for NSW, 2024)
- Australian/New Zealand Standard, Parking Facilities (AS 2890)
- traffic and car parking surveys as referenced in the context of this report
- plans for the proposed development prepared by Studio SC, dated 03/12/2025
- other documents and data as referenced in this report.



2 Existing Conditions

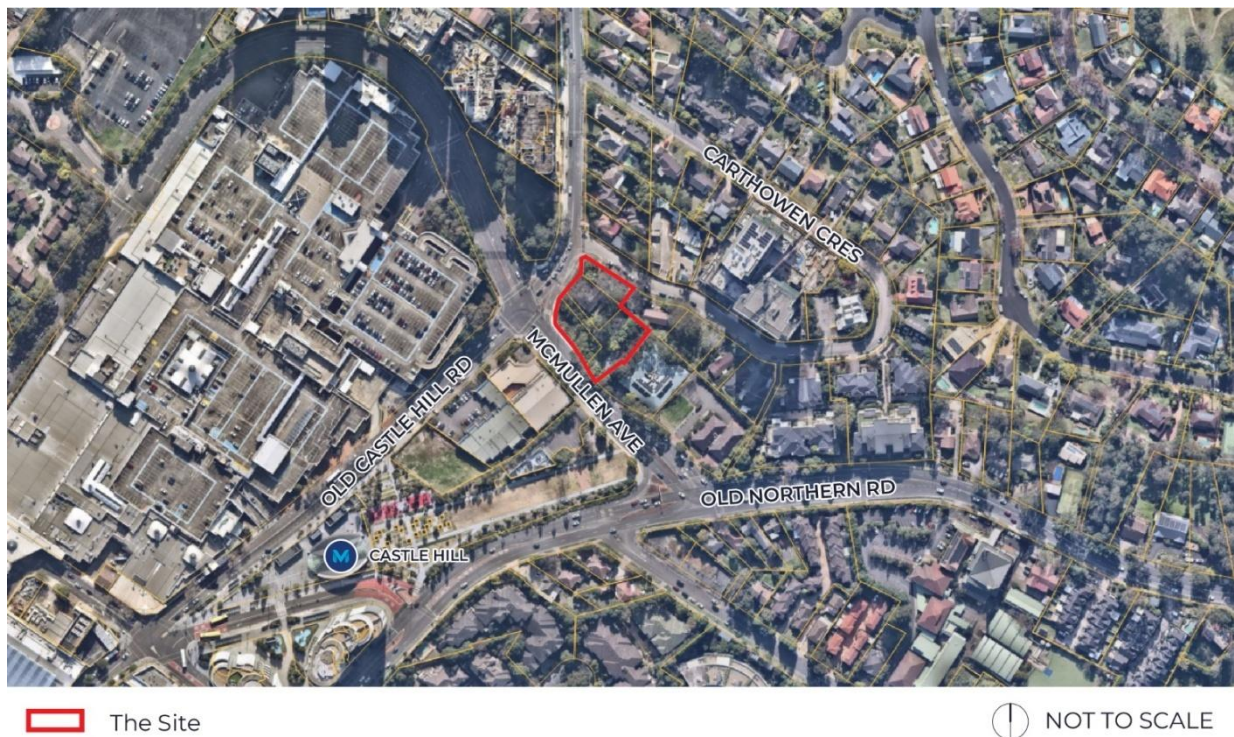
2.1 Site Description

The site is situated at 16-20 Old Castle Hill Road, Castle Hill, within The Hills Local Government Area (LGA). It is well located, being approximately 250m from Castle Hill Metro Station which provides services to Rouse Hill, Macquarie Park, Chatswood and the Sydney CBD. It is equally proximate to Castle Towers shopping centre, a major regional retail hub. The site has ready access to public open space being less than 100m from Arthur Whitling Park and Eric Fenton Reserve.

The site currently contains development comprising two detached residential dwellings located on 18 and 20 Castle Hill Road. There is currently no development on 16 Castle Hill Road. The site as a whole is covered in dense vegetation and has a steep slope upwards from the north-west to the south-east.

A Site Aerial is provided in Figure 2-1, with the surrounding site context illustrated in Figure 2-2 and land zoning map in Figure 2-3.

Figure 2-1: Site Aerial Map



Source: Nearthmap, edits by Colliers Urban Planning



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2 Existing Conditions

Figure 2-2: Surrounding Site Context

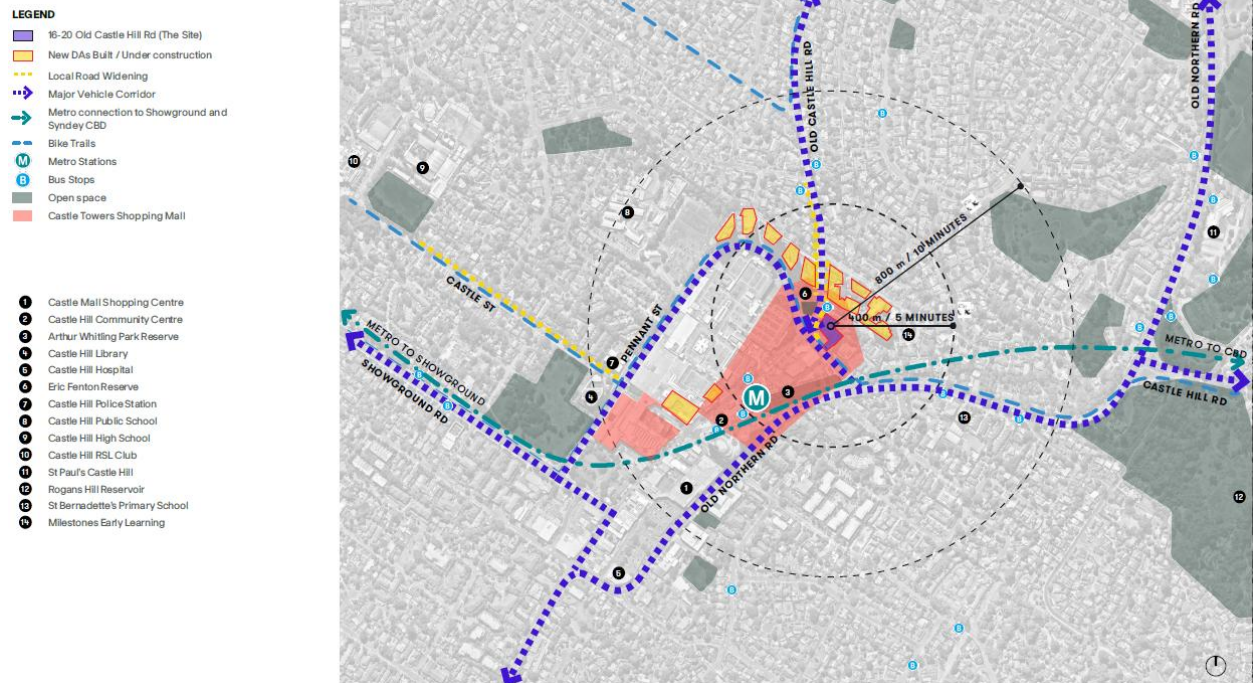
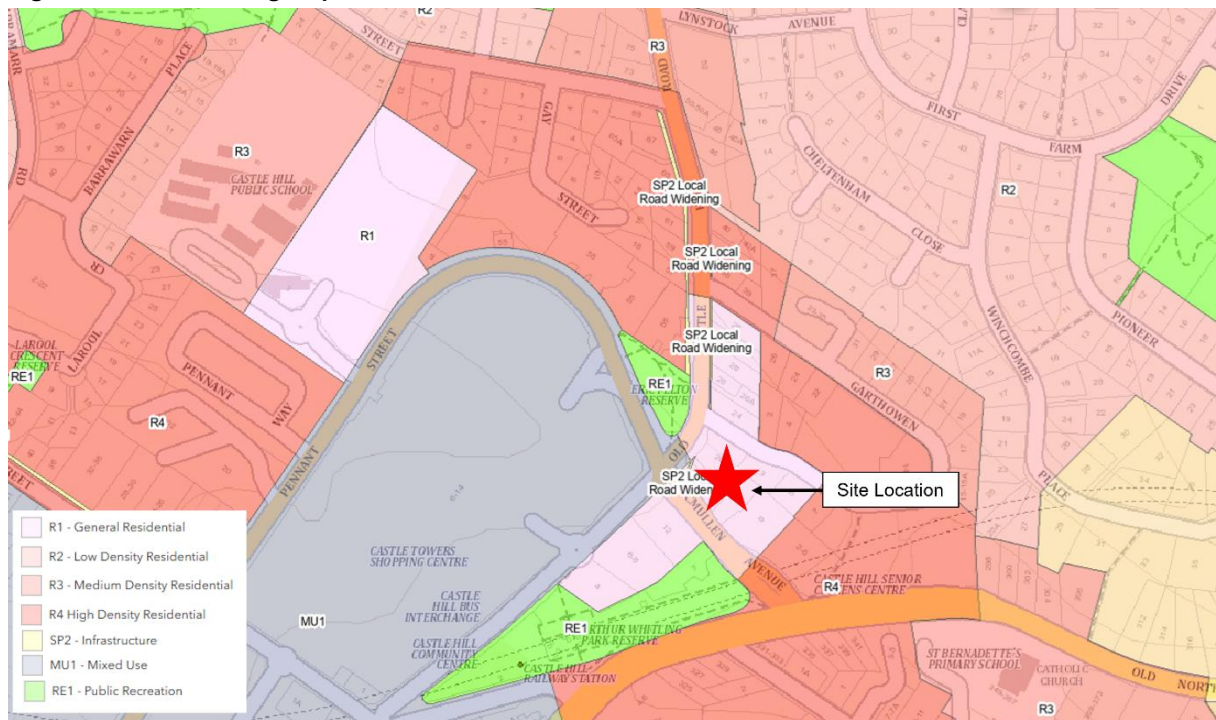


Figure 2-3: Land Zoning Map



2.2 Road Network

Roads are classified according to the functions they perform. The main purpose of defining a road's functional class is to provide a basis for establishing the policies which guide the management of the road according to their intended service or qualities.

In terms of functional road classification, State roads are strategically important as they form the primary network used for the movement of people and goods between regions, and throughout the State. Transport for NSW (TfNSW) is responsible for funding, prioritising and carrying out works on State roads. State roads generally include roads classified as freeways, state highways, and main roads under the Roads Act 1993, and the regulation to manage the road system is stated in the Australian Road Rules.

TfNSW defines four levels in a typical functional road hierarchy, ranked from high mobility and low accessibility to high accessibility and low mobility. These road classes are:

- Arterial Roads – Controlled by TfNSW, typically no limit in flow and designed to carry vehicles long distance between regional centres
- Sub-Arterial Roads – Managed by either Council or TfNSW under a joint agreement. Typically, their operating capacity ranges between 10,000 and 20,000 vehicles per day, and their aim is to carry through traffic between specific areas in a sub region or provide connectivity from arterial road routes (regional links)
- Collector Roads – Provide connectivity between local sites and the sub-arterial road network, and typically carry between 2,000 and 10,000 vehicles per day
- Local Roads – Provide direct access to properties and the collector road system and typically carry between 500 and 4,000 vehicles per day.

2.2.1 Surrounding Roads

2.2.1.1 Old Castle Hill Road

Old Castle Hill Road is classified as a Local Road and in the vicinity of the site is aligned in a north south direction. It is a two-lane two-way road configured with an approximate 8-metre-wide carriageway. In the vicinity of the site, the road includes additional exit lanes and slip lane at the intersection adjacent to the site. The posted speed limit is 50 kilometres per hour, reducing to 40 kilometres per hour through high pedestrian areas. Kerbside parking is permitted subject to time restrictions with clear no stopping and bus signage along sections of the road.



Figure 2-4: Old Castle Hill Road (Facing Southbound)



Source: Google Maps (accessed December 2025)

2.2.1.2 Pennant Street

Pennant Street is classified as a State Road and in the vicinity of the site is aligned in a north south direction. It is a two-lane, two-way road with a posted speed limit of 60 kilometres per hour. No kerbside parking is permitted at any time, indicated by no stopping signs and kerbside markings.

Figure 2-5: Pennant Street (Facing Eastbound)



Source: Google Maps (accessed December 2025)

2.2.1.3 Garthowen Crescent

Garthowen Crescent is classified as a local road and in the vicinity of the site is aligned in a northwest-southeast direction. It is a two-way road configured with one lane in each direction. The posted speed limit is 50 kilometres per hour. Parallel parking spaces are marked and subject to time restrictions. Parking spaces are only available on one side of the road, with no parking signs present on the opposite side.



Figure 2-6: Garthowen Crescent (Facing Westbound)



Source: Google Maps (accessed December 2025)

2.2.1.4 McMullen Ave

McMullen Ave is classified as a state road and in the vicinity of the site is aligned in a northwest-southeast direction. It accommodates two lanes of traffic in each direction, with additional exit lanes and slip lanes in the vicinity of the site. Kerbside parking is not permitted indicated by kerbside markings. The posted speed limit on this road is 60 kilometres per hour.

Figure 2-7: McMullen Avenue (Facing Eastbound)



Source: Google Maps (accessed December 2025)

2.2.1.5 Old Northern Road

Old Northern Road is classified as a state road and in the vicinity of the site is aligned in an east west direction. It is a two-lane, two-way road accommodating additional exit lanes and slip lanes within the vicinity of the site. The posted speed limit is 60 kilometres per hour, reducing to 40 kilometres per hour through school zones and high pedestrian areas. Kerbside parking is not permitted at any time.



Figure 2-8: Old Northern Road (Facing Westbound)



Source: Google Maps (accessed December 2025)

2.3 Intersection Traffic Volumes

Stantec commissioned Matrix Traffic and Transport Data to conduct traffic movement counts at key intersections along the surrounding road network on Tuesday 13 May 2025. The following intersections were surveyed:

- Old Castle Hill Road/McMullen Avenue/Pennant Street (Signalised)
- Old Northern Road/McMullen Avenue (Signalised)
- Old Castle Hill Road/Garthowen Crescent north (Priority Controlled)
- Old Castle Hill Road/Garthowen Crescent south (Priority Controlled)

The weekday network AM peak period was identified to be between 8:00am – 9:00am and the network PM peak period was identified to be between 4:00pm – 5:00pm. The results obtained from the traffic movement counts for the AM and PM peaks are displayed in Figure 9-1 and Figure 9-2 respectively, located in Appendix A.

2.4 Intersection Operation

The operation of the key intersections within the study area has been assessed using SIDRA INTERSECTION¹, a modelling software package which calculates intersection performance.

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¹ Program used under license from Akcelik & Associates Pty Ltd.



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2 Existing Conditions

The commonly used measure of intersection performance, as defined by the RTA, is vehicle delay. SIDRA INTERSECTION determines the average delay that vehicles encounter and provides a measure of the level of service.

Table 2-1 shows the criteria that SIDRA INTERSECTION adopts in assessing the level of service.

Table 2-1: SIDRA INTERSECTION Level of Service Criteria

Level of Service (LOS)	Average Delay per vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
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 crash study required
D	43 to 56	Near capacity	Near capacity, crash study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Table 2-2 presents a summary of the existing operation of the intersection. For intersections with priority or roundabout controls the performance of the worst approach is reported, and the overall performance is reported for signalised intersections. The full intersection results are presented in Appendix F of this report.

Table 2-2: Existing Operating Conditions

Intersection	Control	Peak	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Old Northern Road/McMullen Avenue	Signalised	AM	0.93	34 sec	300m	C
		PM	0.87	29 sec	236m	C
Old Castle Hill Road / McMullen Avenue / Pennant Street	Signalised	AM	0.73	29 sec	200m	C
		PM	0.71	39 sec	177m	C
Old Castle Hill Road / Garthowen Crescent south	Priority Controlled	AM	0.37	0.2 sec	23m	A
		PM	0.28	0.1 sec	0.4m	A
Old Castle Hill Road / Garthowen Crescent north	Priority Controlled	AM	0.37	1 sec	2m	A
		PM	0.30	1 sec	3m	A

On the basis of the above assessment, it is clear that the intersections operate at a satisfactory level of service for both the AM and PM peaks. The priority-controlled intersections, Old Castle Hill Rd/Garthowen Crescent South and Old Castle Hill Rd/Garthowen Crescent North currently operate at a LOS A for both the AM and PM Peak periods, with minimal queuing and delay

As displayed in Table 2-2, in the AM Peak, Old Northern Rd/McMullen Ave and Old Castle Hill Rd/McMullen Ave/Pennant St intersections currently operate at a satisfactory level for both the AM and



PM peak, with LOS C. The highest degree of saturation experienced is that the Old Northern Rd/McMullen Ave, with a DOS of 0.93

2.5 Public Transport

A review of the public transport available in the vicinity of the site is summarised in Table 2-3 and displayed in Figure 2-9. The site is well connected to the existing public transport network; there are a number of bus services that are currently available in proximity to the site. Additionally, the site is approximately 350 metres (6-minute walk) from the Castle Hill Metro Station, providing access to the Metro Northwest and Bankstown Line.

The bus stops within the vicinity of the site that could potentially serve the residential development include:

- Old Castle Hill Rd at Garthowen Cr: Located at site frontage
- Castle Hill Station, Old Castle Hill Rd, Stand E: 190 m
- Castle Hill Station, Old Northern Rd, Stand B: 350m
- Castle Hill Station, Old Northern Rd Stand A: 400m
- Castle Hill Metro: From McMullen Ave Frontage: 350 m.

Table 2-3: Public Transport Provision

Service	Bus Route	Route Description	Off Peak Frequency	Frequency On Peak
	604*	Dural to Parramatta via Castle Hill	60 minutes	Approx. 15 – 30 minutes
	632*	Rouse Hill Station to Pennant Hills via Norwest & Castle Hill	30 minutes	30 minutes
	633*	Rouse Hill to Pennant Hills via Kellyville & Castle Hill	30 minutes	Approx. 15-30 minutes
	662*	Castle Hill to Parramatta via Bella Vista & Northwest Twy	30 - 60 minutes	15-20 minutes
	730	Castle Hill to Blacktown via Norwest & Glenwood	30 – 60 minutes	15 - 30 minutes
	660	Castlewood to Parramatta via Norwest	Approx. 15 – 30 minutes	30 – 60 minutes
Bus	651	Rouse Hill Station to Epping via Castle Hill	20 – 30 minutes	30 minutes
	N92	Tallowong to City Town Hall via Macquarie Park (Night Service)	60 min	-
	610X	Castle Hill to City QVB (Express Service)	10 – 15 minutes	5 -10 minutes
	600	Pennant Hills to Parramatta via Castle Hill	15 – 30 minutes	5 -15 mins
	603	Rouse Hill Station to Parramatta via Glenhaven	60 minutes	15 – 30 minutes
	626	Kellyville to Pennant Hills via Cherrybrook	30 minutes	30 minutes
	612X	Castle Hill to North Sydney (Express Service)		6 – 20 minutes (AM Departures)

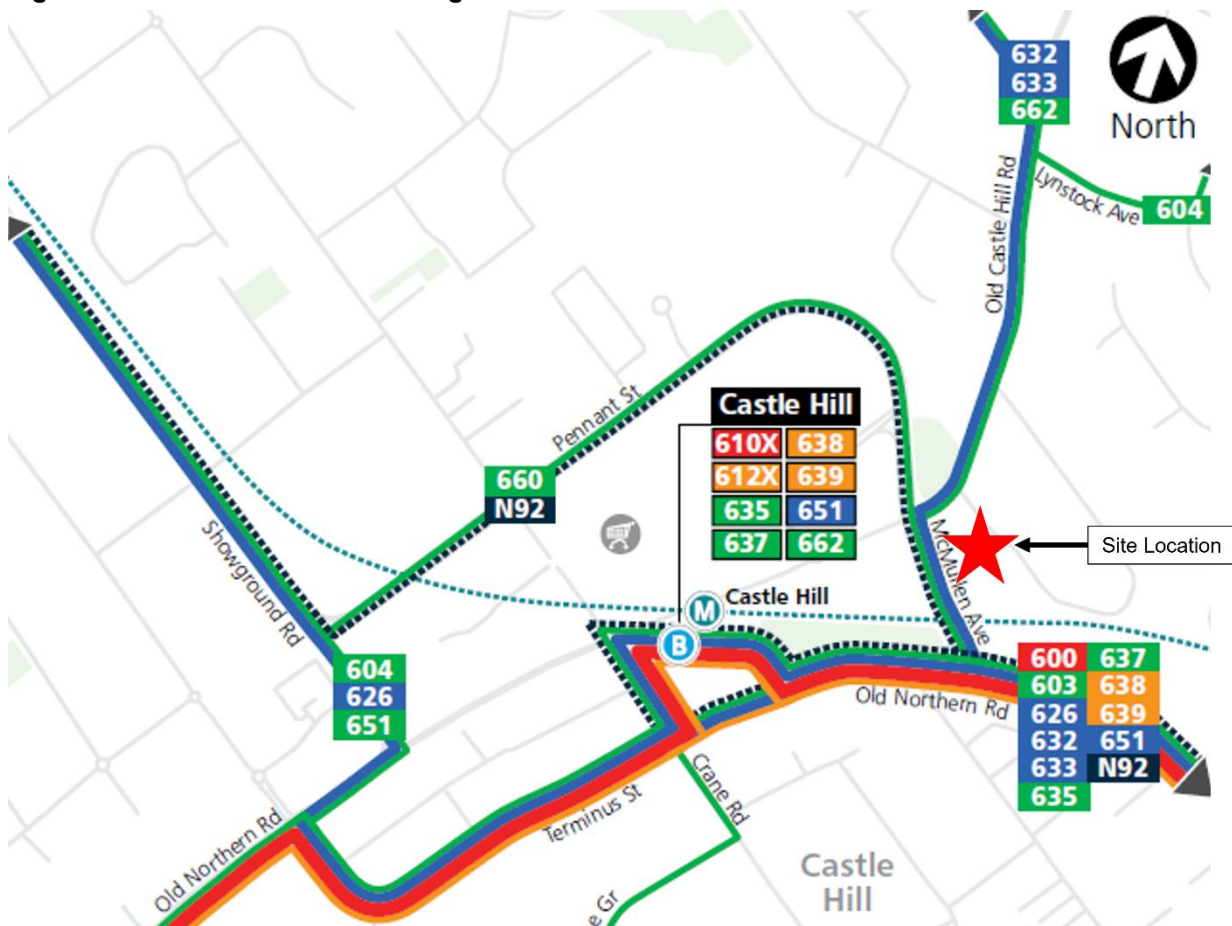


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 2 Existing Conditions

				7 – 30 minutes (PM Arrivals)
635	Castle Hill to Beecroft via West Pennant Hills	30 - 60 minutes	30 minutes	
637	Glenorie to Castle Hill via Galston & Round Corner	60 – 120 minutes (AM Peak/Off Peak)	30 minutes (PM Peak)	
638	Berowra Waters to Castle Hill or Pennant Hills	One trip from castle hill station	-	
639	Maraylya to Dural and Castle Hill via Kenthurst	One trip from castle hill station	-	
651	Rouse Hill Station to Epping via Castle Hill	30 – 50 minutes	20 - 30 minutes	
Metro	Metro Northwest & Bankstown Line	5/10 minutes	4 minutes	

Source: TfNSW Routes and timetables (accessed May 2025)
 *Bus stop location at site frontage

Figure 2-9: Bus Routes surrounding site



Source: Transport NSW (accessed May 2026)

2.6 Walking and Cycling Infrastructure

Within the vicinity of the site there are existing pedestrian footpaths along the surrounding roads identified in Section 2.2.1. The existing footpaths provide pedestrian access to/from the surrounding



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2 Existing Conditions

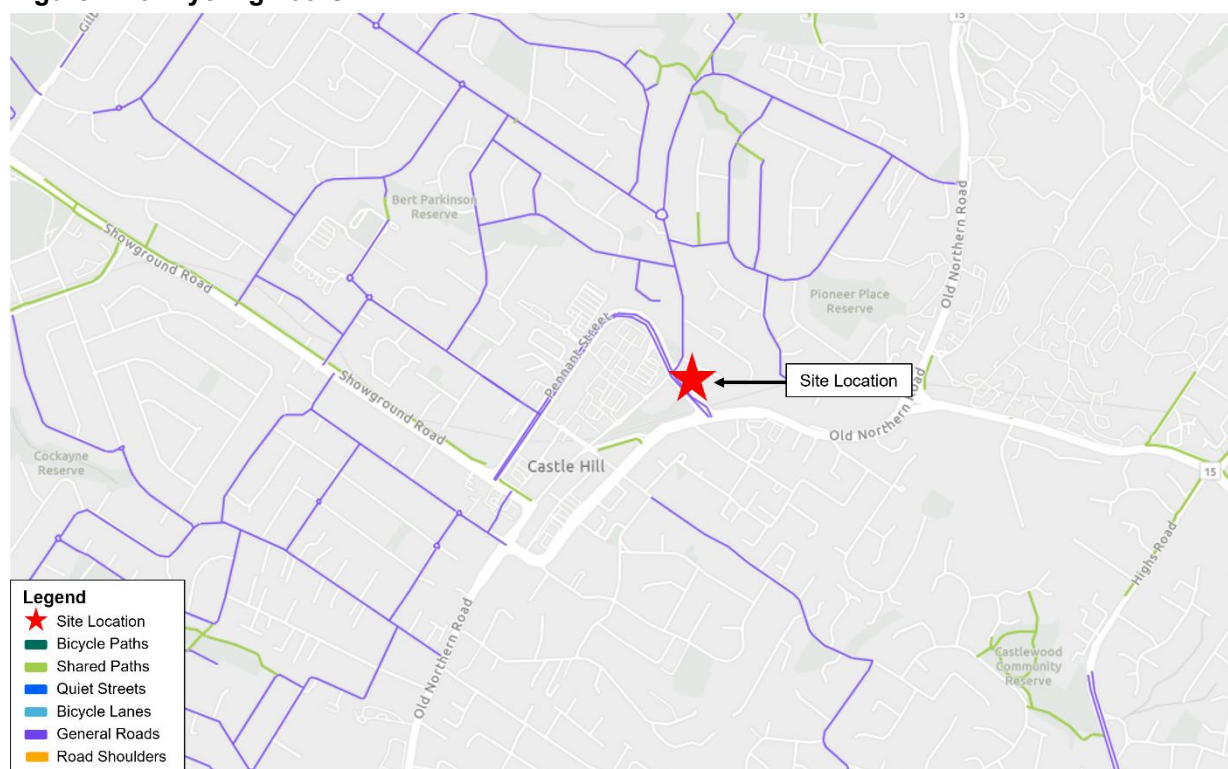
residential and other mixed land use areas. The footpaths also provide pedestrian access from the identified surrounding bus stops and metro station to the site.

Safe pedestrian crossing points are accessible in the vicinity of the site and include signalised crossings and zebra crossings. Within the immediate vicinity of the site, safe crossing points include:

- Old Castle Hill Road / McMullen Avenue / Pennant Street (Signalised & Zebra Crossing)
- Old Northern Road/McMullen Avenue (Signalised & Zebra Crossing)
- Old Castle Hill Rd near Eric Felton St (Zebra Crossing)

Within the vicinity of the site cycling infrastructure is limited and includes either shared paths or general roads as displayed in Figure 2-10.

Figure 2-10: Cycling Paths



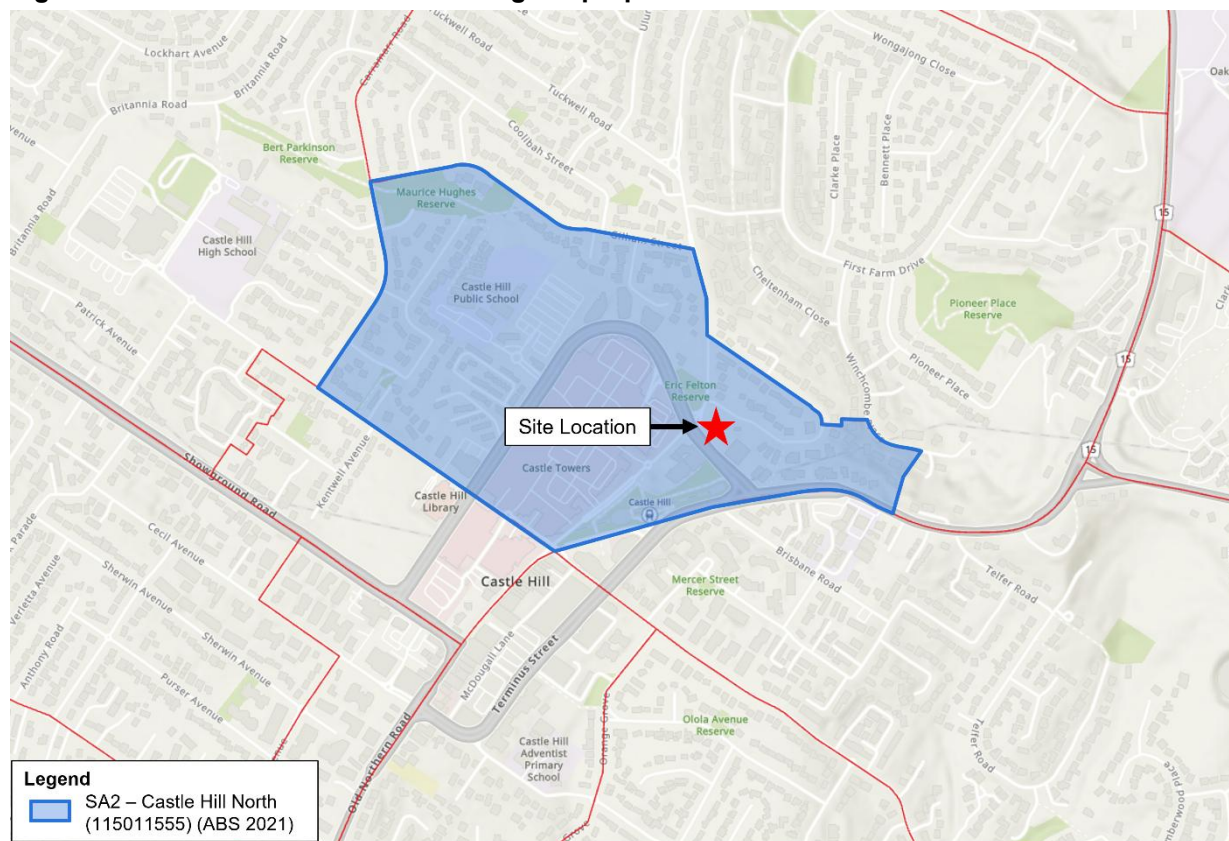
Source: Transport for NSW Cycleway Finder

2.7 Existing Travel Mode Share

Journey to Work (JTW) data has been sourced from the Australian Bureau of Statistics (ABS) 2021 census and provides an idea of existing travel patterns to the development site and surrounding area. details the catchment of census data analyses which corresponds to the ABS 2021 Statistical Area Level 2 (SA2) Region, Castle Hill – North (115011555).



Figure 2-11: Destination Zone containing the proposed site



Source: Australian Bureau of Statistics, Maps

The 2021 mode split for commute to work for residents living in Castle Hill North is shown in Table 2-4

Table 2-4: 2021 Journey to Work Data (Castle Hill – North, 115011555)

Method Of Travel	2021
Train	5.4 %
Bus	2.3 %
Car, as driver	81.6 %
Car, as passenger	5.3 %
Truck	1.3 %
Motorbike/Scooter	0.5 %
Bicycle	0.1 %
Walked only	1.3 %
Other Mode	2.2 %

Source: Australian Bureau of Statistics, 2021 Census Data

The data indicates that cars are the predominant method of travel, accounting for approximately 83 per cent of trips.

It is noted that at the time of the 2021 census, various government regulations and travel restrictions in place at the time, as a result of the Covid-19 pandemic. Due to this, the results from the 2016 census have also been presented. It is expected that the current mode share of the area will be a combination of these two results, given the Castle Hill metro station which was delivered in 2019 would also have a substantial impact on how people travel. The results of the 2016 census are shown in Table 2-5



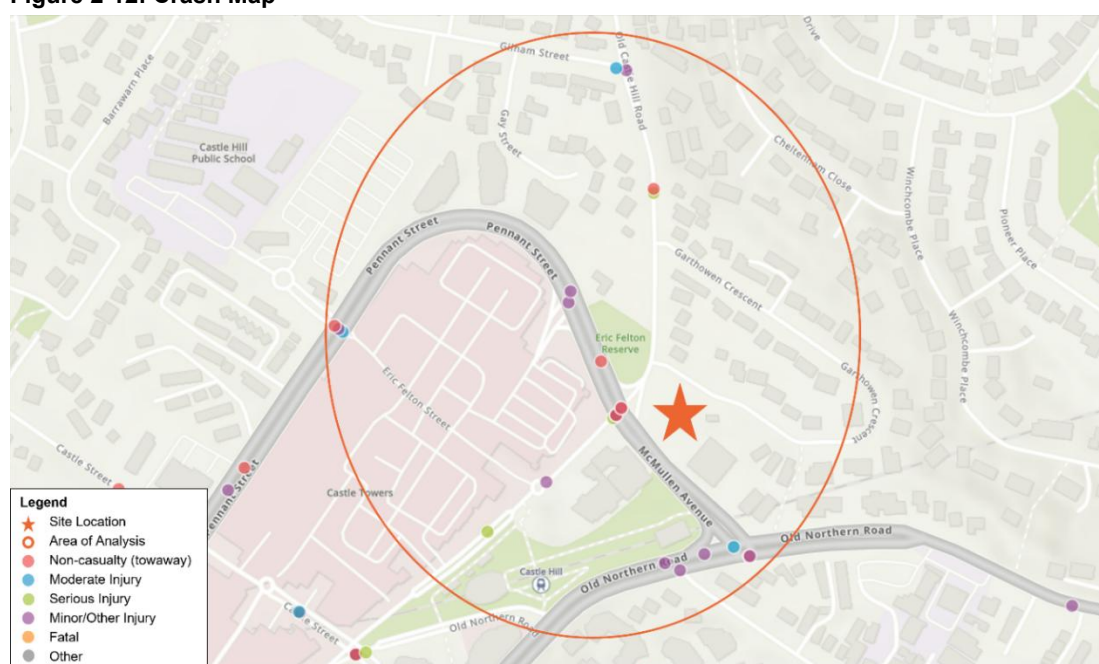
Table 2-5: 2016 Journey to Work Data (Castle Hill – North, 115011555)

Method Of Travel	2016
Train	3.7 %
Bus	14.6 %
Car, as driver	73.3 %
Car, as passenger	4.2 %
Truck	0.5 %
Motorbike/Scooter	0.5 %
Bicycle	0.3 %
Walked only	2.3 %
Other Mode	0.4 %

2.8 Crash History

An analysis of the most recent five-year period of available crash data (2019-2023) has been undertaken based on crash data provided by Transport for NSW. The roads and intersections surrounding the site were considered. The locations and severity of the crashes for the five-year period are shown in Figure 2-12 and summarised in Table 2-6.

Figure 2-12: Crash Map



Source: Interactive Crash Statistics, NSW Government (accessed May 2025)

Table 2-6: Crash Data (2019-2023) Surrounding the Site

Degree of Crash	Number of Crashes	Number of People Injured
Minor/ other Injury	12	13
Moderate injury	4	5
Serious injury	5	9
Fatal injury	-	-
Non-Casualty (Towaway)	8	-
Total	29	27



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2 Existing Conditions

Over the analysed five-year period there were a total of 29 crash incidents occurring within the vicinity of the site. Minor/Other Injury crashes accounted for the majority of the crashes at 41.4% and 27.6% of the incidents were non-casualty (towaway crashes). There were no recorded fatalities within the vicinity of the site for the given five-year period. Majority of the crash incidents occurred in daylight (65.5%) with only 4 incidents occurring in darkness. The most common type of crash was right through crashes (8 crashes) followed by rear end crashes (5 crashes). All the rear end crashes occurred in different locations surrounding the site, whereas seven (7) of the eight (8) right through crashes occurred at the same intersection, at the Old Castle Hill Rd/McMullen Ave/Pennant St intersection, all seven (7) right through crashes at this intersection occurred in daylight ranging from towaway to Serious injury. One of the right through crashes occurred at the Old Northern Rd/McMullen Ave Intersection during darkness.

Overall, 10 crashes occurred at the Old Castle Hill Rd/McMullen Ave/Pennant St intersection and 5 crashes occurred at the Old Northern Rd/McMullen Ave intersection. This analysis highlights that right through crashes at the Old Castle Hill Rd/McMullen Ave/Pennant St intersection is a common crash type. The Old Northern Rd/McMullen Ave intersection exhibited 4 different crash types and does not suggest that there is a trend in crash types at this intersection. No other significant trends have been identified for the vicinity immediately surrounding the site.



3 Development Proposal

3.1 Site Overview

The development site is located on 16-20 Old Castle Hill Road and is in a prominent and strategically positioned parcel of land within The Hills Shire Council. The site is positioned in close proximity to the Castle Hill Metro Station, in addition to retail, commercial, education, residential and open space. The site is positioned on two major street frontages, Old Castle Hill Road and McMullen Avenue, with a third frontage along Garthowen Crescent. The total site area is 3,180 m².

3.2 Land Uses

The proposed development comprises of 371 residential units, with a total of 329 market housing units and 42 affordable housing units with a 135sqm retail tenancy on the ground floor. In addition to the above, 19 of the proposed dwellings will be 'adaptable' dwellings, designed as accessible for people with disabilities.

In total, it is proposed to provide 386 on-site car parking spaces across (6) levels of basement parking. 160 bicycle parking spaces are provided across the basement car park.

The proposed development schedule is outlined in Table 3-1.

Table 3-1: Development Schedule

Land Use		GFA/Dwellings	
Market Residential	1 Bed	82	Dwellings
	2 Bed	187	Dwellings
	3 Bed	56	Dwellings
	4 Bed	4	Dwellings
Sub Total Market Residential Units		329	Dwellings
Affordable Residential	1 Bed	8	Dwellings
	2 Bed	7	Dwellings
	3 Bed	27	Dwellings
	4 Bed		Dwellings
Sub Total Affordable Residential Units		42	Dwellings
Total Residential Units		371	Dwellings
Retail		112	m ² GFA

3.3 Car Parking

The proposed development will provide a total of 386 car parking spaces across six (6) levels of basement parking. Of these there are 36 tandem pairs (72 parking spaces provided in a tandem arrangement) and 20 DDA spaces.

The suitability of the car parking provision and layout is discussed in Section 4 of this report.

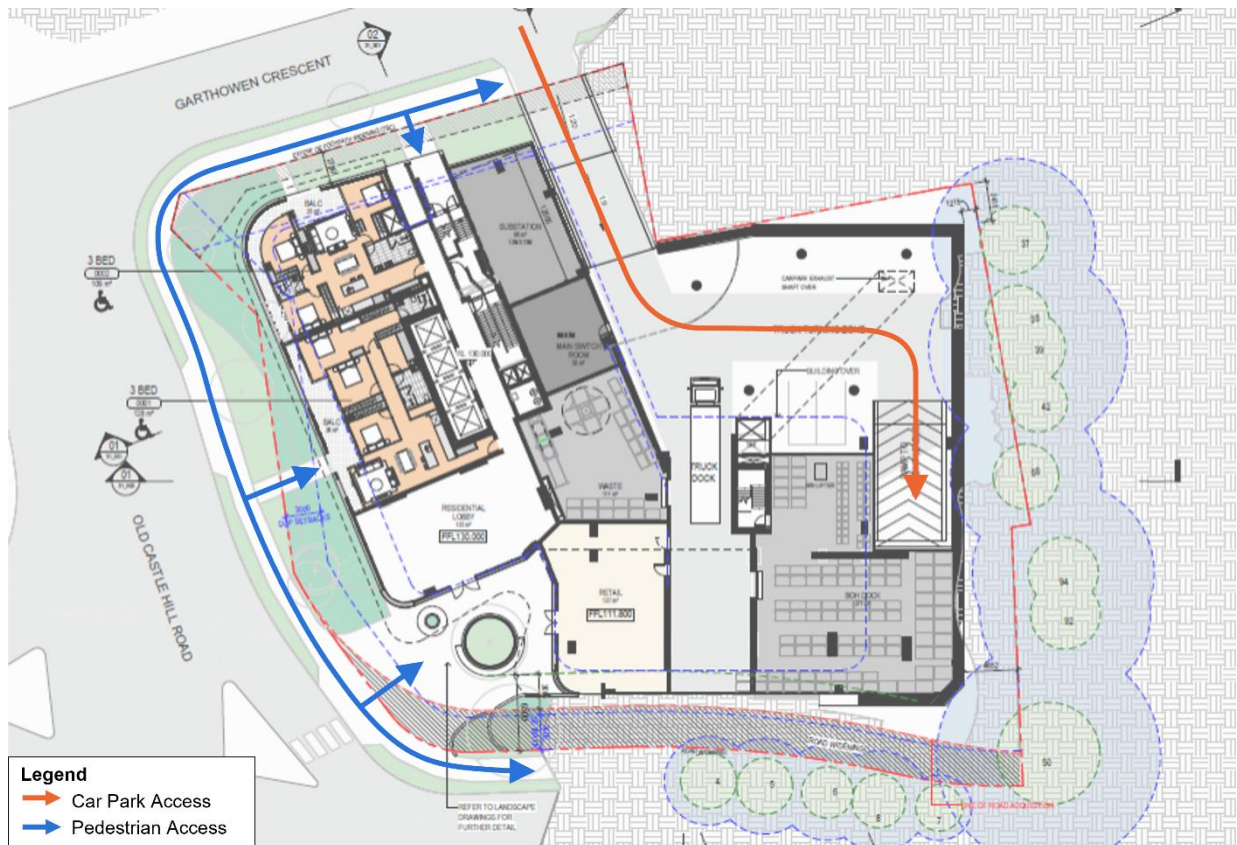


3.4 Proposed Site Access

Vehicle access to the site will be from Garthowen Crescent via a single crossover, providing access to the basement levels and loading dock. A residential lobby is located to the south west of the site on the ground floor, providing pedestrian access to the site.

The proposed site access is illustrated in Figure 3-1.

Figure 3-1: Site Access



Source: Studio SC, GA Plan – Ground Level (AD-DA11_099), Revision D, Dated 03/12/2025

3.5 Pedestrian Facilities

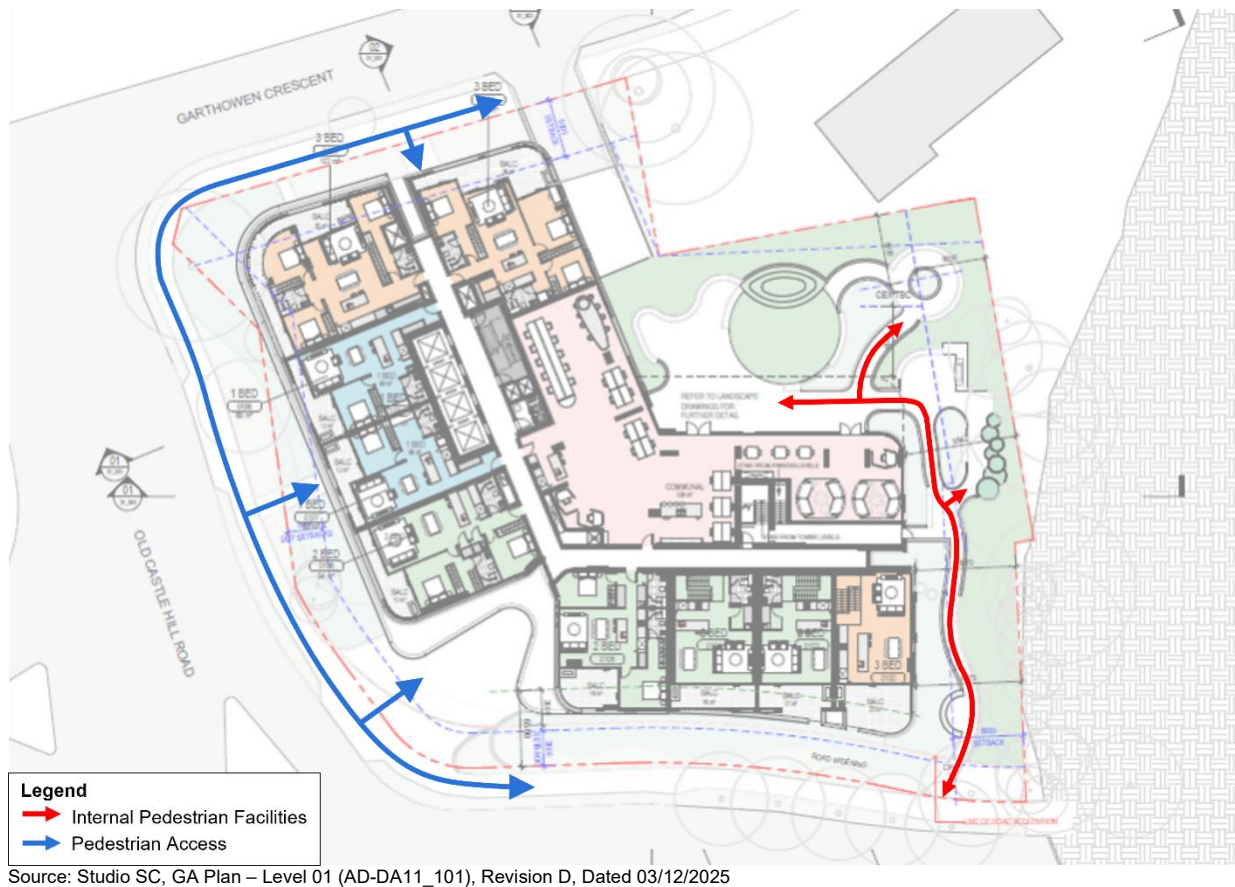
Pedestrian footpaths will be provided surrounding the site, forming key pedestrian links between the site and existing pedestrian facilities. The pedestrian facilities surrounding the site will enable access for users to the surrounding key amenities, including the Castle Hill metro station and other bus services.

Additional pedestrian facilities will be provided within the site boundary, providing internal access for residents and visitors. The pedestrian facilities will contribute to the active frontages for the site and tie in with the landscaping design. Furthermore, the facilities will link the key communal spaces on the site including the proposed the sensory garden, social terrace, Storytime nook and family hub.

The pedestrian access is illustrated in Figure 3-1, with additional internal pedestrian facilities illustrated in Figure 3-2.



Figure 3-2: Pedestrian Facilities



Source: Studio SC, GA Plan – Level 01 (AD-DA11_101), Revision D, Dated 03/12/2025

3.6 Bicycle Facilities

The development includes bicycle parking located in the basement levels. A total of 160 double tier bicycle parking spaces are provided.

The suitability of the bicycle provisions is discussed in Section 5.3 of this report.

3.7 Loading Areas

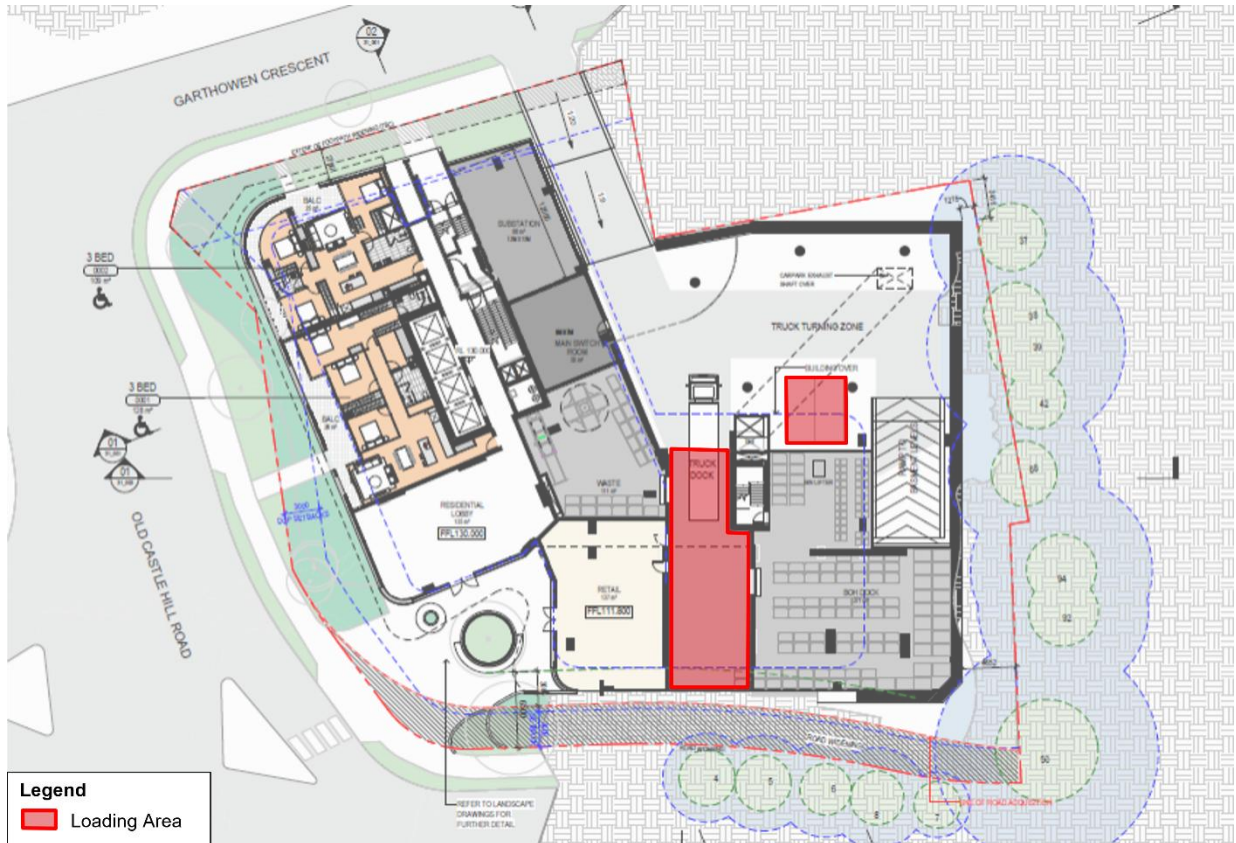
Loading facilities are provided on the ground floor of the development accessible from Garthowen Crescent. The loading dock is located next to the buildings waste collection area and can accommodate vehicles up to and including HRVs. In addition, two car parking spaces are provided on the ground level to be used for moving vans for residents moving in/out.

The loading area is shown in Figure 3-3.



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3 Development Proposal

Figure 3-3: Loading Area



Source: Studio SC, GA Plan – Ground Level (AD-DA11_099), Revision D, Dated 03/12/2025



4 Car Parking

4.1 Car Parking Requirements

The car parking provision requirements for different development types are set out in the Castle Hill North Development Control Plan (DCP). It is noted that this does not include a car parking rate for the retail land use, so this rate was sourced from Part C Section 1 of the Hills Shire DCP.

A review of the car parking requirement rates and the proposed yield results in the maximum statutory parking provisions as summarised in Table 4-1.

Table 4-1: DCP Residential and Retail Car Parking Requirements

Land Use	Description	Yield/GFA	Parking Rate	Parking Requirement
Residential (including affordable housing)	1 Bed	90 dwellings	0.5 space per dwelling (max)	45
	2 Bed	194 dwellings	0.8 space per dwelling (max)	155
	3 Bed	83 dwellings	1.3 space per dwelling (max)	108
	4 Bed	4 dwellings	1.3 space per dwelling (max)	5
	Visitor	371 dwellings	1 visitor space per 5 dwellings (max)	74
Total Residential Requirement				387 (max)
Retail	112	m ² GFA	1 space per 18.5 m ²	6
Total Site Parking Requirement				393

The DCP rates align with the requirements of the Hills LEP for land developed in “Area B” on the floor space ratio map for which the site is located.

In 2023, The Hills Shire Council released for public comment the “Draft Castle Hill Precinct Plan” (hereafter referred to as the Draft Precinct Plan). The Draft Precinct Plan provides a strategic framework to guiding development and infrastructure delivery within the Castle Hill precinct. Whilst the site does not technically sit within the area of applicable bounds of where the Draft Precinct Plans car parking rates apply, the site is immediately abutting “Inner Catchment” area and the rates identified are deemed to be relevant and appropriate to consider in this assessment. The Draft Precinct Plan identifies minimum and maximum rates for retail land uses, and for the purposes of this assessment, these rates have been applied. These requirements are outlined in Table 4-2. Which reduces the car parking requirements to 389 spaces to 392 spaces

Table 4-2: Draft Castle Hill Precinct Plan Car Parking Requirement

Land Use	Description	Yield/GFA	Parking Rate	Parking Requirement
Retail	136	m ² GFA	Minimum 1 space per 60 m ² Maximum 1 space per 30 m ²	2 to 5

The development proposes a total of 387 parking spaces, which is compliant with the DCP parking requirements. Subject to future market analysis and research, the allocation of these car spaces will be determined



It is noted that the site contains 36 tandem pairs (72 parking spaces). Tandem pairs are both to be allocated to the same dwelling.

4.2 Accessible Parking

DCP 2012 requires two per cent of the total parking supply to be accessible for retail car parking. In this regard, there is a requirement to provide one accessible parking space for the retail land use.

Furthermore, the accessible parking provision for adaptable units is generally one accessible parking space per adaptable apartment. The number of adaptable units for the development is 19, therefore the requirement for accessible parking spaces for residential units is 19 adaptable spaces.

20 accessible parking spaces are provided in total, which is considered adequate and complies with the general requirements.

4.3 Motorcycle Parking

For the motorcycle parking requirements, the Hills Shire DCP 2012 states the following:

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

On this basis and considering the provided 387 car parking spaces, 8 motorcycle spaces are required. Such provision would be incorporated as part of future design iterations.

4.4 Bicycle Parking

The Castle Hill North DCP sets out bicycle parking rates and requirements as outlined in Table 4-3.

Table 4-3: Bicycle Parking Requirement

Land Use	Yield/GFA	Bicycle Parking Rate	Bicycle Parking Requirement
Residential	371	1 resident space per 3 apartments	124
		1 visitor space per 12 apartments	31
Retail	136 m ² GFA	1 space per 450 m ² for staff	1
Total Bicycle Parking Requirement			156

A total number of 156 bicycle parking spaces is required based on the rates set out in the Castle Hill North DCP. The development proposes a total of 160 bicycle parking spaces which is adequate and complies with the Council's bicycle parking requirements.

4.5 Loading and Waste Collection Requirements

No specific loading requirement based on the Hills Shire DCP or the Castle Hill North DCP.



Stantec's database of loading demand associated with the proposed uses indicates that retail uses typically receive an average of 1.1 deliveries per day per tenant. With the proposal including one (1) retail tenancies on the ground level the loading demand is estimated to be up to one (1) delivery per day.

The average residential apartment turnover rate is approximately 0.7 per cent of all apartments in any given week. Considering the proposed 371 apartments, it is expected that on average there would be around two to three apartments moving in or out in any week.

Waste collection for residential apartments is expected to occur one to two times a week and waste collection for retail/commercial uses is expected to occur up to three times a week. These vehicle movements would generally occur on a weekday for the residential apartments and throughout the week for the retail/ commercial uses.

In addition, it is generally accepted that 10 per cent of residents purchase groceries via a home delivery service each week. For 371 apartments, this equates to about 37 apartments generating one home delivery per week, representing an average of around five apartments receiving a home delivery service per day.

Considering the above, the proposed development could be expected to generate up to 7 service vehicles per day on a typical weekday, with less activity on weekends. The duration of stay of delivery vehicles and waste collection vehicles is expected to be short and typically less than 20 minutes. Removalist trucks would naturally need longer use of up to two hours, primarily on weekends.

The site proposes to provide three separate loading bays, one primary loading bay, accessible for a 12.5m Heavy Rigid Vehicle (HRV) and two smaller loading bays, accessible via a van. The HRV bay will accommodate the waste collection requirements for the site, as well as any larger residential loading activities. Coordination of these events will be managed by the buildings body corporate. The additional two van loading bays can accommodate smaller sized loading vehicles.

The proposed provision of on-site loading bays is considered appropriate.

4.6 Car Parking Layout Review

The car park layout has been reviewed in detail against the requirements of the Australian Standard for Off Street Parking (AS2890). This assessment will include a review of the following:

- bay and aisle width
- column locations
- circulation roads and ramps
- site access arrangements
- ramp grades
- height clearances
- internal queuing



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4 Car Parking

- parking for persons with disabilities
- bicycle parking
- loading & waste collection.

A review of the design indicates that the proposed car parking, access and loading dock layouts are expected to operate satisfactorily and generally achieves compliance or meets the intent of the AS2890 series. The design review and swept paths are included in Appendix E.

Access to the on-site loading area has been designed to accommodate a 12.5m Heavy Rigid Vehicle (HRV), which is expected to accommodate the spatial requirements for Councils standard waste collection vehicle (confirmed through engagement with council). Appropriate visibility is allowed for between loading vehicles and the basement ramp.

It is noted that the specific location of the roller door is to be finalised during further detailed design to ensure its compliant operation with AS2890.1:2004, allowing vehicles to stop on a 1:20 gradient. This will be controlled by a remote provided to residents. A backup intercom is to be provided for visitors. The system will allow for the gate to automatically open for departing vehicles. Service vehicles such as waste collection will be provided access by the building management / body corporate upon arrival.



5 Traffic Impact Assessment

5.1 Traffic Generation

Traffic generation estimates for the proposal have been sourced from TfNSW's Guide to Transport Impact Assessment, 2024. Due to the location and context of the proposed development, rates for a high-density residential development have been adopted for the purposes of this assessment:

- **High density residential dwellings (high public transport accessibility):**
 - AM Peak 0.19 vehicle trips per dwelling
 - PM Peak 0.15 vehicle trips per dwelling
- **Retail:**
 - AM Peak 1.78 vehicle trips per 100 m² GLFA
 - PM Peak 3.71 vehicle trips per 100 m² GLFA

On the basis of the above, the estimated development traffic generation is summarised in Table 5-1. In all cases an in/out split of 20/80 has been adopted in the AM peak and 80/20 in the PM peak. Note also, for the purpose of traffic generation GFA has been used to estimate the retail traffic generation component, providing a 'worst case' scenario.

Table 5-1: Traffic Generation Estimates

Use	Yield (dwellings/GFA)	AM Peak Hour		PM Peak Hour	
		In	Out	In	Out
Residential	371 dwellings	14	56	45	11
Retail	112m ² GFA	2	0	1	3
Total Trip Generation		16	57	46	14

5.2 Trip Distribution and Assignment

The directional distribution and assignment of traffic generated by the proposed development will be influenced by a number of factors, including the:

- configuration of the arterial road network in the immediate vicinity of the site
- existing operation of intersections providing access between the local and arterial road network
- distribution of households in the vicinity of the site
- surrounding employment centres, retail centres and schools in relation to the site

Having consideration to the above, for the purposes of estimating vehicle movements, the following directional distributions have been assumed:

AM Peak

- Pennant Street: 14% inbound, 22% outbound
- Old Northern Road (West): 25% inbound, 33% outbound
- Old Northern Road (East): 46% inbound, 37% outbound



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- Old Castle Hill Road (North): 15% inbound, 8% outbound

PM Peak

- Pennant Street: 17% inbound, 22% outbound
- Old Northern Road (West): 25% inbound, 30% outbound
- Old Northern Road (East): 50% inbound, 37% outbound
- Old Castle Hill Road (North): 8% inbound, 11% outbound

Based on the above, Figure 5-1 and Figure 5-2 illustrate the assumed trip distribution for the proposed development.

Figure 5-1: AM Trip Distribution

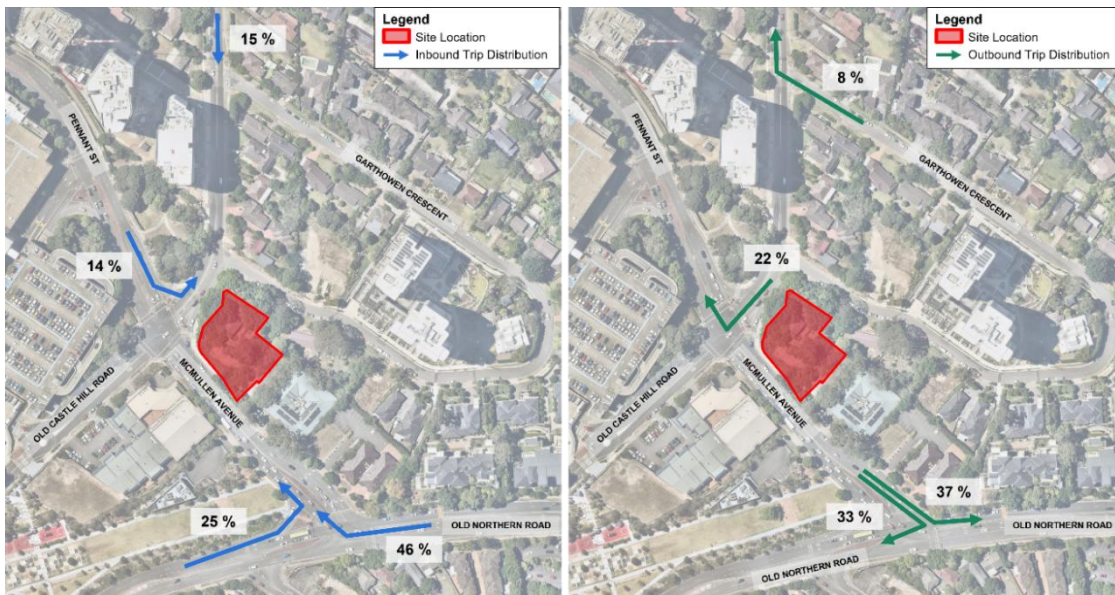
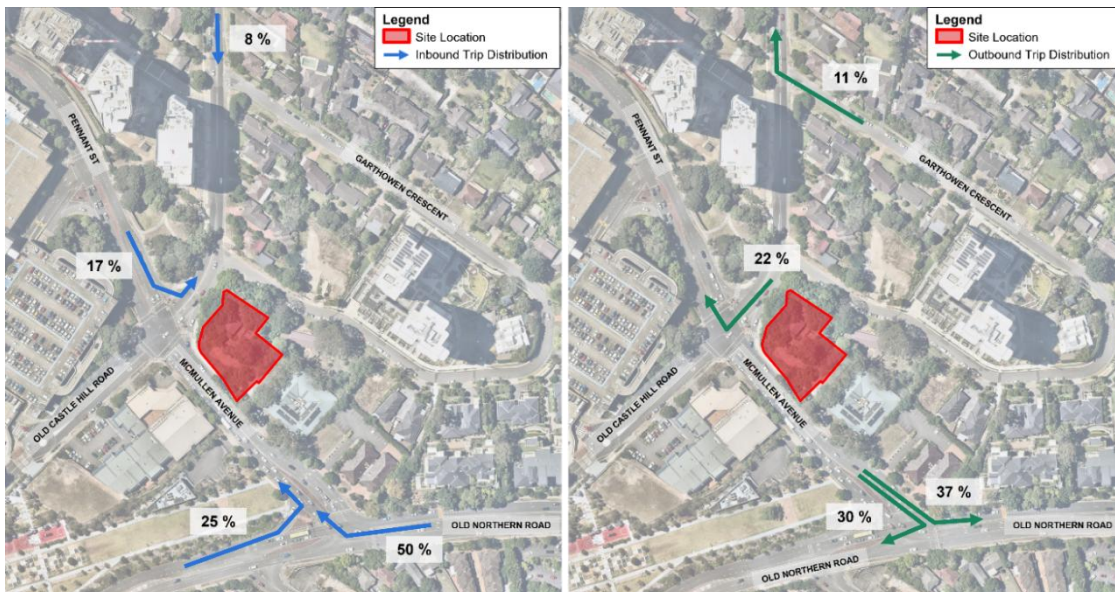


Figure 5-2: PM Trip Distribution



The traffic generation shown in Appendix B.



5.3 Additional Considerations

In undertaking this assessment, Stantec requested to be provided access to the municipal wide “Castle Hill and Norwest Precinct Plans Transport Study Traffic Model” assessment undertaken by Council and TfNSW. Approval was provided Gaurav Singh from Council via a data sharing agreement on 19 June 2025. This allowed the authors of this report to review the modelling outputs to understand the proposed intersection works or road network upgrades that are expected to occur in the surrounding area, alongside the proposed network growth in traffic volumes. This approval is attached in Appendix C.

In addition, through this correspondence, information was provided with regard to intersection upgrade works that are proposed along Old Castle Hill Road by Council. The following summarises the review of this information

5.3.1 Annual Growth Rates

The modelling outputs presented were reviewed to understand the growth in traffic volumes that are expected in the road network surrounding the development site. Total intersection volumes were reviewed for the Old Northern Rd/McMullen Ave intersection and Old Castle Hill Rd/McMullen Ave/Pennant St intersection. This is shown in Table 5-2 below and Appendix D.

Table 5-2: Intersection Traffic Volumes

Intersection	AM Peak Hour			PM Peak Hour		
	2026	2036	Difference	2026	2036	Difference
Old Northern Road / McMullen Avenue	4,663 movements	4,019 movements	-14%	4,691 movements	3,828 movements	-18%
Old Castle Hill Road / McMullen Avenue / Pennant Street	3,464 movements	3,216 movements	-7%	3,401 movements	2,580 movements	-24%

Table 5-2 indicates an overall decrease in traffic volumes were observed from 2026 to 2036 through the identified intersections. This accounts for the intersection works that are identified in the assessment.

For the purposes of this assessment, based on the traffic volumes found in the Council modelling assessment, no growth has been assumed on the road network.

5.3.2 Proposed Road Upgrades

A review of the Council modelling study similarly identified road network upgrades that are to be undertaken at the Old Northern Road / McMullen Avenue intersection and the Old Castle Hill Road/McMullen Avenue/Pennant Street intersection. These primarily consist of extensions to turning lanes road widening works. The results of this review are shown in Appendix D and have been adopted in this assessment

In addition to the works to the signalised intersections, Council also propose to undertake upgrade works to the northern intersection of Old Castle Hill Road / Garthowen Crescent, converting this intersection to a roundabout. The designs for the proposed roundabout were provided by Council and are attached in Appendix D.



5.4 Modelling Approach

SIDRA intersection was used to model the intersections outlined in Section 2.3. The proposed development is proposed to open in 2029, as such five (5) modelling scenarios were assessed, and the models have been developed for the following scenarios:

- **Scenario 1:** Opening Year (2029) without Development
- **Scenario 2:** Opening Year (2029) with Development
- **Scenario 3:** Future Year (2039) with Development
- **Scenario 4:** Future Year (2039) with Development and Mitigation (Intersection Upgrades)

Table 5-3 and Table 5-4 present a summary of the opening year operation of the road network in the immediate surrounds of the site, and Table 5-5 summarising the 10-year horizon. Table 5-6 presents a summary of the 10-year horizon operation of the road network with mitigation, which includes the road network upgrades undertaken. Full results are presented in Appendix F of this report.

Table 5-3: Scenario 1 - Opening Year (2029) Without Development

Intersection	Control	Peak	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Old Northern Road/McMullen Avenue	Signalised	AM	0.93	34 sec	300m	C
		PM	0.87	29 sec	236m	C
Old Castle Hill Road / McMullen Avenue / Pennant Street	Signalised	AM	0.73	29 sec	200m	C
		PM	0.71	39 sec	177m	C
Old Castle Hill Road / Garthowen Crescent south	Priority Controlled	AM	0.37	0.2 sec	23m	A
		PM	0.28	0.1 sec	0.4m	A
Old Castle Hill Road / Garthowen Crescent north	Priority Controlled	AM	0.37	1 sec	2m	A
		PM	0.30	1 sec	3m	A

Table 5-4: Scenario 2 - Opening Year (2029) With Development

Intersection	Control	Peak	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Old Northern Road/McMullen Avenue	Signalised	AM	0.94	35 sec	303m	C
		PM	0.90	31 sec	239m	C
Old Castle Hill Road / McMullen Avenue / Pennant Street	Signalised	AM	0.74	29 sec	203m	C
		PM	0.72	40 sec	182m	C
Old Castle Hill Road / Garthowen Crescent south	Priority Controlled	AM	0.37	1 sec	22m	A
		PM	0.31	0.2 sec	0.8m	A
Old Castle Hill Road / Garthowen Crescent north	Priority Controlled	AM	0.37	1 sec	4m	A
		PM	0.34	1 sec	6m	A



Table 5-5: Scenario 3 - Future Year (2039) With Development

Intersection	Control	Peak	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Old Northern Road/McMullen Avenue	Signalised	AM	0.94	35 sec	303m	C
		PM	0.90	31 sec	239m	C
Old Castle Hill Road / McMullen Avenue / Pennant Street	Signalised	AM	0.74	29 sec	203m	C
		PM	0.72	40 sec	182m	C
Old Castle Hill Road / Garthowen Crescent south	Priority Controlled	AM	0.37	1 sec	22m	A
		PM	0.31	0.2 sec	0.8m	A
Old Castle Hill Road / Garthowen Crescent north	Priority Controlled	AM	0.37	1 sec	4m	A
		PM	0.34	1 sec	6m	A

Table 5-6: Scenario 4 - Future Year (2039) With Development + Mitigation

Intersection	Control	Peak	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Old Northern Road/McMullen Avenue	Signalised	AM	0.85	27 sec	249m	B
		PM	0.84	28 sec	233m	B
Old Castle Hill Road / McMullen Avenue / Pennant Street	Signalised	AM	0.68	26 sec	122m	B
		PM	0.63	33 sec	131m	C
Old Castle Hill Road / Garthowen Crescent south	Priority Controlled	AM	0.38	1 sec	3m	A
		PM	0.31	0.2 sec	1m	A
Old Castle Hill Road / Garthowen Crescent north	Roundabout	AM	0.45	5 sec	28m	A
		PM	0.36	5 sec	22m	A

The results of the above assessment indicate the following:

- Table 5-4 summarises the modelling results for the 2029 opening year with development scenario. Overall, the intersections continue to operate satisfactorily, with minor increases to queuing and delay as a result of the proposed development. It is noted that the results in Table 5-5 are the same as no growth was found to be occurring.
- Table 5-6 presents the results that include the mitigation works provided in the material from Council. It is noted that these works have a material benefit to the operation of the road network, with all intersections operating with improved results
- The results at the two Garthowen Crescent intersections across all scenarios presents minor queuing occurring. It is expected that when queues form that block the southern Garthowen Crescent intersection that courtesy gaps will aid in allowing local traffic to depart.

On the basis of the above assessment, it is clear that the assessed intersections in the surrounding area will continue to operate satisfactorily upon completion of the proposed development.



6 Multimodal Impact Assessment

Person trip rates have been sourced from the TfNSW Guide to Transport Impact Assessment 2024. The following sections summarises the trip generation for the residential component, noting that the retail tenancy will primarily consist of walk-up trade from residents within the development and immediate surrounds.

For high-density residential developments located in areas with high public transport accessibility, the person trip rates are as follows:

- AM peak hour: 0.66 person trips per dwelling
- PM peak hour: 0.56 person trips per dwelling

Based on these rates, the residential component of the development (371 dwellings) is estimated to generate approximately 245 person trips in the morning peak hour and 208 person trips in the afternoon peak hour.

6.1 Public & Active Transport Trips

The morning and afternoon public and active transport trip generation estimates for the proposed development are summarised in Table 6.1 and Table 6.2 below respectively. The mode share split for the residential apartments have been determined with consideration of the 2016 & 2021 census data, as well as the sites location, context and the Castle Hill train station that has been delivered.

Table 6-1: AM peak trip generation estimates (based on mode share)

Travel Mode	Mode Share Percentage				Trips			
	Train	Bus	Walking	Cycling	Train	Bus	Walking	Cycling
Residential	25%	15%	15%	10%	61	37	37	25

Table 6-2: PM peak trip generation estimates (based on mode share)

Travel Mode	Mode Share Percentage				Trips			
	Train	Bus	Walking	Cycling	Train	Bus	Walking	Cycling
Residential	25%	15%	15%	10%	52	31	31	21

The proposed development seeks to improve the footpath provisions on the immediate site frontages, which will provide improved connections to the Castle Hill train station, bus interchange and Castle Towers Shopping Centre.



7 Preliminary Green Travel Plan

7.1 Travel Plan Framework

Transport is a necessary part of life, but it has economic, public health and environmental consequences. The transport sector is one of the fastest growing emissions sectors in Australia and therefore is one of the key opportunities for reducing greenhouse gases. As well as delivering better environmental outcomes, providing a range of travel choices with a focus on walking, cycling and public transport will have major public health benefits and will ensure a strong and prosperous community.

The physical infrastructure being provided as part of the development is only part of the solution. A Green Travel Plan (GTP) will ensure that the transport infrastructure, services and policies both within and external to the site are tailored to the users and co-ordinated to achieve the most sustainable outcome possible.

7.1.1 What is a Green Travel Plan

A GTP is a package of measures aimed at promoting sustainable travel and reducing reliance on the private car. It is not designed to be 'anti-car'; however, it will encourage and support people's aspirations for carrying out their daily business in a more sustainable way. Travel plans can provide both:

- measures which restrict car use (disincentives or 'sticks')
- measures which encourage or support sustainable travel, reduce the need to travel or make travelling more efficient (incentives or 'carrots').

The travel plan would promote the use of transport, other than the private car, for travel to and from the site and promote choices which are more sustainable and environmentally friendly. Indeed, there are a range of "non-car" transport options that are available at the site which have been described in this report.

Given the development's aim to reduce private travel to the site, the implementation of a GTP would be beneficial and will seek to:

- advise residents, staff and visitors on the wider travel choices available to them and encourage use of sustainable travel modes
- aim to reduce congestion on the surrounding road network by causing mode shift from private vehicles, or at the very least encourage higher vehicle occupancy to reduce private vehicle trips.

7.2 Key Objectives

The aim of the GTP is to bring about better transport arrangements for living and working at the site. The key objectives of the Travel Plan are:

- to encourage walking
- to encourage cycling
- to encourage the use of public transport



- to reduce the use of the car, in particular single car occupancy
- where it is necessary to use the car, encourage more efficient use.

It is the intention therefore that the travel plan will deliver the following benefits:

- enable higher public and active travel mode share targets to be achieved
- contribute to greenhouse gas emission reductions and carbon footprint minimisation
- contribute to healthy living for all
- contribute to social equity and reduction in social exclusion
- improve knowledge and contribute to learning.

7.3 Site Specific Measures

A GTP will put in place measures to raise awareness and further influence the travel patterns of people living, working or visiting the site with a view to encouraging modal shift away from cars.

The following potential measures and initiatives could be implemented to encourage more sustainable travel modes:

- Provide a Travel Access Guide (TAG) which would be provided to all residents and staff and publicly available to all visitors. The document would be based on facilities available at the site and include detail on the surrounding public transport services and active transport initiatives. The TAG would be updated as the surrounding transport environment changes
- Providing public transport information boards/ applications to inform residents, staff and visitors of alternative transport options (the format of such information boards would be based upon the TAG)
- Providing a car sharing pod(s) on-site or nearby and promoting the availability of car sharing pods for trips that require the use of private vehicles
- Providing bicycle facilities including secure bicycle parking for staff, bicycle racks/ rails for visitors
- Regularly promoting ride/ walk to workdays
- Providing a regular newsletter to all residents bringing the latest news on sustainable travel initiatives in the area

7.4 Travel Access Guide

A TAG provides information to residents, staff and visitors on how to travel to the site using sustainable transport modes such as walking and public transport. The information is presented visually in the format of a map (or application) showing the site location and nearby transport modes highlighting available pedestrian and cycle routes. The information is usually presented as a brochure (or application) to be included in a welcome pack or on the back of company stationery and business cards.

7.5 Information and Communication

Several opportunities exist to provide residents, staff and visitors with information about nearby transport options. Connecting residents, staff and visitors with information would help to facilitate



journey planning and increase their awareness of convenient and inexpensive transport options which support change in travel behaviour. These include:

- Transport NSW provides bus, train and ferry routes, timetables and journey planning through their Transport Info website:
- Council provides a number of services and a range of information and events to encourage people of all levels of experience to travel by bicycle.

In addition, connecting residents, staff and visitors via social media may provide a platform to informally pilot new programs or create travel-buddy networks and communication.

There is no standard methodology for monitoring the GTP, but it is suggested that it be monitored to ensure that it is achieving the desired benefits and modify it if required. It will not be possible at this stage to state what additional modifications might be made as this will be dependent upon the particular circumstances prevailing at the time.

The GTP should be monitored on a regular basis, e.g., yearly, by carrying out travel surveys. Travel surveys will allow the most effective initiatives of the GTP to be identified, and conversely fewer effective initiatives can be modified or replaced to ensure the best outcomes are achieved. It will clearly be important to understand people's reasons for travelling the way they do: - any barriers to changing their behaviour, and their propensity to change.

To ensure the successful implementation of the GTPs, Travel Plan Coordinators (TPC) should be appointed to ensure the successful implementation of the GTPs. This could be the building manager or a member of the body corporate.

7.6 Summary

The proposal would be able to develop and utilise green travel plans to actively promote increased use of sustainable transport modes. Although it is difficult to predict what measures might be achievable, the above measures provide a framework for the site and implementation of a future travel plan.



8 Preliminary Construction Traffic Management Project (CTMP)

8.1 Overview

This section seeks to provide an overview of the Construction Traffic Management Plan (CTMP) initiatives to be implemented as part of the construction works associated with the proposed development. A detailed CTMP will be prepared in the future by the appointed contractor.

Specifically, this overview CTMP considers the following.

- construction site access arrangements
- anticipated truck volumes during construction stages
- truck routes to/ from the site
- anticipated construction worker numbers
- pedestrian and cyclist access
- site personnel parking
- traffic control measures
- overview of CTMP requirements

This section has been prepared and applies to both the early works SSDA and main works SSDA, and is relevant for when the early works starts through the construction of the main works.

8.2 Principles of Traffic Management

The general principles of traffic management during construction activities are as follows:

- minimise the impact on pedestrian and cyclist movements
- maintain appropriate public transport access
- minimise the loss of on-street parking
- minimise the impact on adjacent and surrounding buildings
- maintain access to/ from adjacent buildings
- restrict construction vehicle movements to designated routes to/ from the site
- manage and control construction vehicle activity near the site
- carry out construction activity in accordance with approved hours of works.

8.3 Site Contact Details

Details of the nominated site contact would be included in the future detailed CTMP prior to the commencement of construction.



8.4 Work Hours

The works will be carried out during Council's typical approved work hours which will be confirmed through the Conditions of consent. Indicative work hours are as follows:

- Weekdays: 7:00am-6:00pm
- Saturdays: 7:00am-6:00pm
- Sundays, public holidays: no work permitted.

Workers would be advised of the approved work hours during induction. Any work outside of the approved work hours would be subject to specific prior approval from the appropriate authorities. Such works may include delivery of cranes, large plant or equipment required on the site that require oversize vehicle access.

8.5 The Site

For the purpose of a preliminary CTMP, the site will be screened appropriately to protect the public, including vehicles, against site activities, dust, dirt and water. It is noted that this is indicative and that the appointed contractor will refine the arrangement plans based on their methodology.

Detailed construction site plans, showing site fencing, vehicle access points, site offices, amenities, tool and material storage areas and the on-street Works Zones (if required) will be included in the detailed CTMP post authority approval, once a contractor is appointed.

8.6 Site Access and Loading

Construction vehicle access for the site will be provided via Garthowen Crescent. This will be confirmed as part of a future detailed CTMP. Should an on-streets work zone be required a separate application will be made to the relevant authorities prior to the commencement of works.

The details of the construction vehicle size that will be used to deliver construction materials will be determined at a later stage when a contractor is engaged and the detailed CTMP has been finalised, however, it is expected to comprise mainly of Medium Rigid Vehicles (MRV) and Heavy Rigid Vehicles (HRV) with infrequent larger deliveries completed by articulated vehicles. As large construction vehicles may interrupt some traffic flows around the site during construction, traffic management measures, including installation of appropriate traffic signage as well as consideration of traffic controllers will be considered to manage any construction vehicle movements and to minimise any safety issues along Garthowen Crescent and any of the surrounding roads.

All loading activities will be undertaken within the site and will be managed by appropriate traffic management procedures, including traffic controllers, where required.

As part of the detailed CTMP, Traffic Guidance Schemes (previously referred to as Traffic Control Plans) will be prepared in accordance with the principles of the Traffic Control at Work Sites manual (TfNSW, 2022). The Traffic Guidance Scheme (TGS) primarily shows where construction signs will be



located at specific locations (such as uncontrolled intersections) along the approved truck routes to warn other road users of the increase in construction vehicle movements.

Access to the neighbouring sites by emergency vehicles on Garthowen Crescent will be maintained at all times. Emergency protocols on the site would include a requirement for site personnel to assist with emergency access from the street. All truck movements to the site and/or incident point would be suspended and cleared.

8.7 Construction Worker Parking Arrangements

The number of construction personnel is unknown at this stage, however, given the accessibility of public transport services near the site, workers will be encouraged to use public transport to get to the site. During site inductions, workers will be informed of the available travel options and will be encouraged to carpool where possible. Appropriate arrangements will be made for any equipment/tool storage and drop-off requirements. A minor amount of car parking demand will be able to be accommodated on-site, which will be closely managed.

8.8 Heavy Vehicle Volumes

The construction vehicle volume is unknown at this stage. A detailed assessment of the potential traffic impacts on the surrounding road network arising from the proposed construction activities will be examined as part of the detailed CTMP with activities and appropriate mitigation and management strategies identified where necessary.

8.9 Construction Vehicle Routes

Truck movements will be restricted to designated routes and confined to the State and Regional roads where possible. Truck routes to/ from the site have been identified with the aim of minimising the impact of construction traffic on local residential roads near the site. Truck drivers will be advised of the designated routes during the site induction.

The directional distribution and assignment of traffic generated by the construction works will be influenced by several factors, particularly the origin/destination of materials, configuration of access points to the site and the surrounding arterial road network.

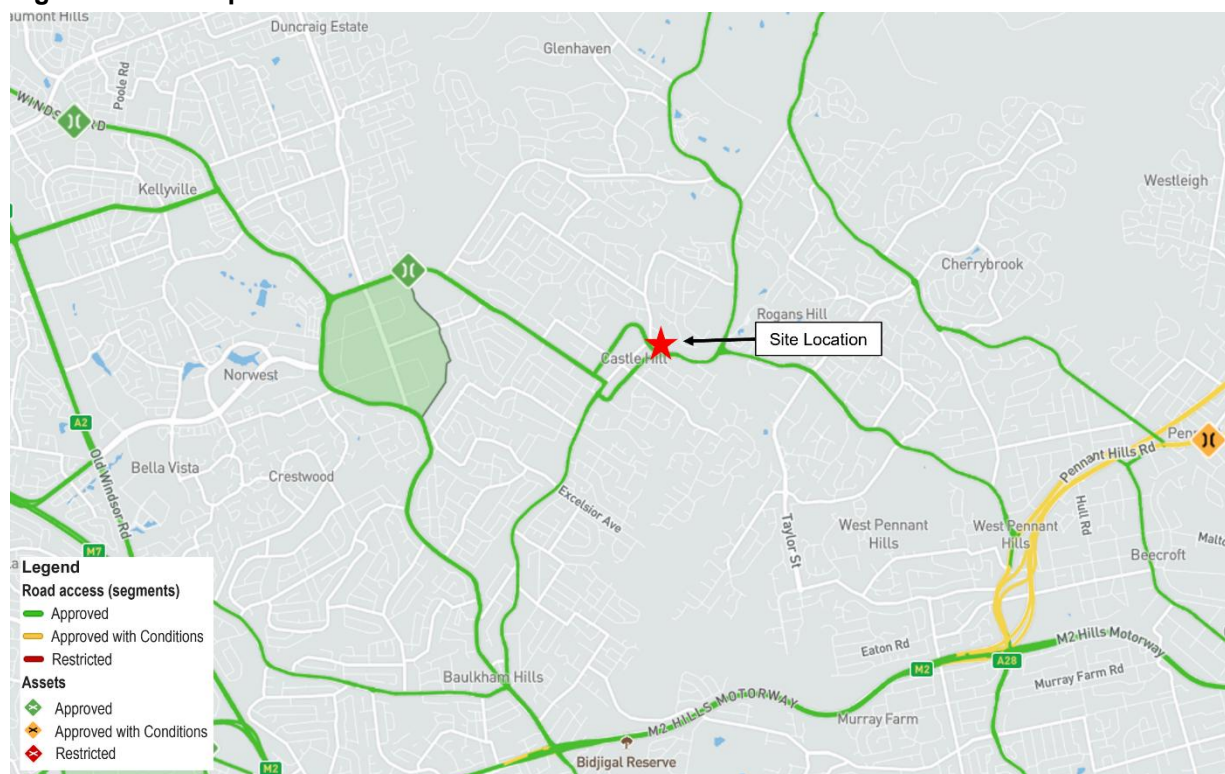
The state roads surrounding the site include:

- Old Northern Road
- Pennant Street
- Showground Road
- Windsor Road
- Castle Hill Road

Figure 8-1 provides a summary of the anticipated construction vehicle routes to/from the site based on the National Heavy Vehicle Regulator, National Network Map. Truck drivers will be advised of the designated truck routes to/from the site.



Figure 8-1: Anticipated Construction Vehicle Routes To/From the Site



Source: NHVR National Network Map, 25/26 m B-double (accessed December 2025)

8.10 Construction Traffic Management

8.10.1 Traffic Guidance Schemes

Detailed information for work site operations is contained in the Traffic Control at Work Sites Technical Manual (TfNSW, 2022). The control of traffic at work sites must be undertaken with reference to SafeWork requirements and any other Workplace Health and Safety manuals.

Traffic Guidance Schemes (also known as Traffic Control Plans), should include the following considerations:

- Construction vehicle activity, including the loading/ unloading of trucks to be conducted within the work site.
- Pedestrians, cyclists and all passing vehicles will maintain priority.
- Clear definition of the work site boundary to be provided by erection of Class A hoardings around the site boundaries.
- All signage will be clean, clearly visible and not obscured.
- All construction vehicle activity will be minimised during peak periods, where possible.

The following will need to be noted when preparing and reading TGSs:

- Location of signs are to be confirmed on-site to ensure appropriate visibility.
- All signs are to be minimum size A.
- All signs are to be Class 1 retroreflective.



- All TGSs are to be implemented in accordance with the latest TfNSW “Traffic Control at Work Sites” manual and Australian Standards AS1742.3:2019.
- All TGSs must be set up by a person holding an “Implement Traffic Management Plans” ticket and the TfNSW Traffic Control at Work Sites Checklist shall be completed prior to implementation.
- The accredited personnel shall implement the approved TGS before any physical work commences and ensure a copy of the TGS is kept on-site. The accredited personnel shall also drive through the site before works begin to ensure that the TGS has been implemented correctly. Any variations made to the plan must be marked on the plan and initialled by the accredited personnel.
- It is the responsibility of the accredited person with a “Prepare Work Zone Traffic Management Plan” ticket to ensure the following:
 - The integrity of all traffic control measures through to the final removal. This includes daily checks of all signs and devices. The corresponding records of checks shall be kept on file for auditing purposes.
 - At all times, and up-to-date copy of the “Traffic Control at Work Sites” manual should be available for reference and implementation as required on-site.
- All workers will be confined to the dedicated works area shown on the plan.
- If the worksite is left unattended, it is the contractor’s duty to ensure that the appropriate measures are taken to provide a safe environment for vehicles and pedestrians.
- All signage is to be clean, clearly visible and not obscured.
- Roadwork signs are to be covered or removed when workers are not on site.
- Traffic controller (T1-34) and Prepare to Stop (T1-18) signs, if required, are to be covered or removed when traffic controllers are not on site.
- All workers must adhere to the applicable safe work distance as described in AS1742.3:2019.
- All distances between signs are to be in accordance with Section 4.3.2 of AS1742.3:2019. However, modifications can be made to suit site conditions.

8.10.2 Pedestrian and Cyclist Impact

Pedestrian volumes along Garthowen Crescent are expected to be minor throughout the day and the impact can be managed appropriately by the spotter who will be stationed at the site access.

Pedestrians may be held for very short periods to ensure safety when trucks are entering or leaving the site but will not be stopped in anticipation or for extended periods. Pedestrians will have right-of-way on the footpath at all times.

The construction activities are not expected to have any adverse impact on the surrounding bicycle network.

8.10.3 Emergency Vehicle Impact

Any emergency vehicles requiring access to the site will do so via Garthowen Crescent. In the event that an emergency vehicle is required to access the site, all construction activities shall be stopped. Traffic controllers shall not, under any circumstances, stop emergency vehicles to allow trucks to enter or leave the site.



8.10.4 Public Transport Impact

The construction activities are not expected to impact existing public transport services near the site.

8.11 Overview of CPTMP Requirements

This chapter provides an overview of the CPTMP initiatives that would be implemented for the demolition and construction of the project. A detailed CPTMP would be prepared by the appointed contract prior to any construction certificate and cover the following additional information:

- Description of construction activities and duration.
- Construction work hours.
- Detailed assessment of construction traffic impacts including any cumulative impacts.
- Details regarding any one-off activities for installation of cranes and other equipment.
- Swept path analysis of heavy vehicle access to the site and Works Zone.
- Detailed assessment of on-street parking impacts.
- Emergency vehicle access.
- Impacts to public transport services.
- Traffic Guidance Scheme(s).
- Contact details of key project personnel.



9 Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

- The proposed development generates a DCP parking requirement of a maximum 394 parking spaces,
- The development includes a proposed supply of 387 car parking spaces and is considered appropriate, meeting the maximum statutory requirement set out in the DCP.
- The proposed parking layout is consistent with the dimensional requirements as set out in the Municipality Planning Scheme and/or AS 2890.
- The development includes a proposed supply of 160 bicycle parking spaces which is considered adequate and complies with the DCP parking requirements, which outlines a requirement of 156 bicycle parking spaces.
- Loading facilities are provided on the ground floor of the development. There are no formal loading requirements outlined in the DCP (Castle Hill North DCP or Hills Shire Council DCP), however, based on the expected uses and frequency of loading activities, the provision of one (1) loading area accessible via a HRV and two (2) van loading bays is expected to be sufficient for the proposed development.
- The site is estimated to generate up to 73 vehicle trips in the AM peak hour, with an estimated 16 vehicle trips inbound and 57 vehicle trips outbound. In the PM peak hour, the site is estimated to generate up to 61 vehicle trips, with an estimated 46 vehicle trips inbound and 15 vehicle trips outbound.
- With regards to the traffic assessment, certain modelling scenarios were assessed within SIDRA Intersection 9.1:
 - » Existing 2025 scenario
 - » Opening Year (2029) without Development
 - » Opening Year (2029) with Development
 - » Future Year (2039) with Development
 - » Future Year (2039) with Development and Mitigation (Intersection Upgrades)
- The SIDRA modelling results indicated that there is adequate capacity in the surrounding road network to cater for the traffic generated by the proposed development noting that future intersection upgrades have been considered for the Future Year 2039 scenario, based on information provided by the Hills Shire Council.
- The future mitigating measures that were assumed to be undertaken by Council / TfNSW consisted of lengthening of turning lanes at the signalised intersections of Old Castle Hill Road / McMullen Avenue / Pennant Street and Old Northern Road/McMullen Avenue as well as the delivery of a roundabout at the northern intersection of Old Castle Hill Road / Garthowen Crescent
- The report includes a preliminary Green Travel Plan (GTP) has been developed and attached in this assessment so that a mode shift can be encouraged from private vehicle use to public and active transport uses.
- The report includes a preliminary Construction Traffic Management Plan (CTMP) for the proposed development, with a detailed CTMP to be prepared in the future by the appointed contractor.







Appendices

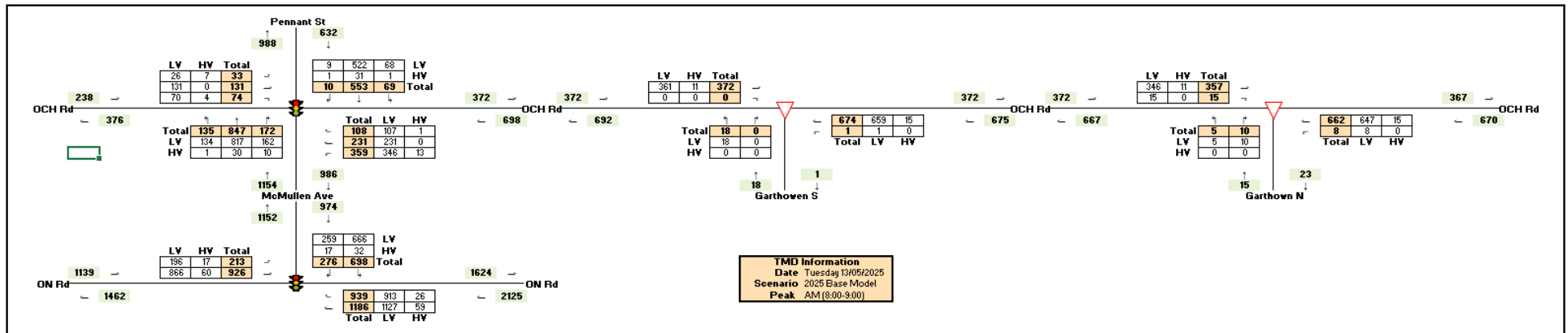


Appendix A Traffic Survey Results



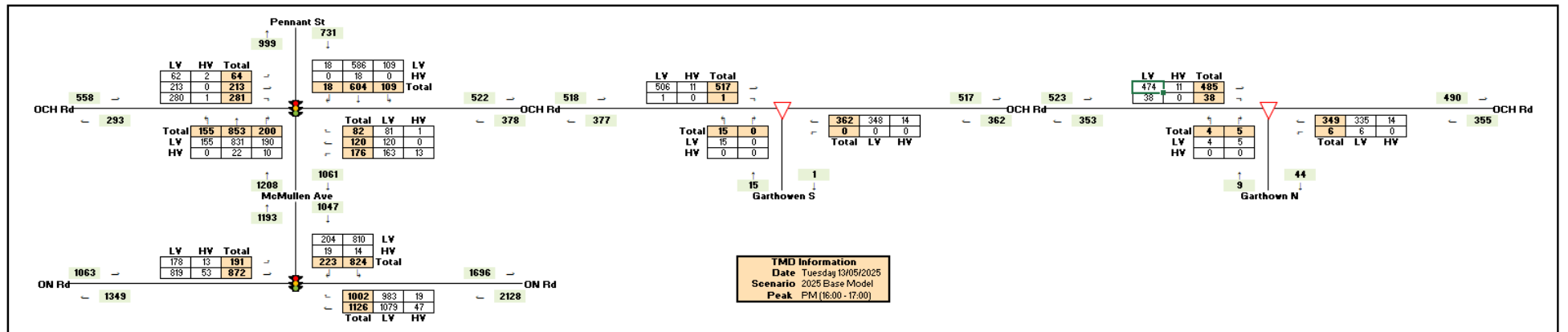
16-20 Old Castle Hill Road, Castle Hill Transport Impact Assessment
 Appendix A Traffic Survey Results

Figure 9-1: Existing AM Peak Hour Traffic Volumes



Source: Traffic Movement Counts (13 May 2025)

Figure 9-2: Existing PM Peak Hour Traffic Volumes



Source: Traffic Movement Counts (13 May 2025)



Appendix B Traffic Generation

16-20 Old Castle Hill Road, Castle Hill Transport Impact Assessment
 Appendix B Traffic Generation

Figure 9-3: AM Peak Hour Traffic Generation

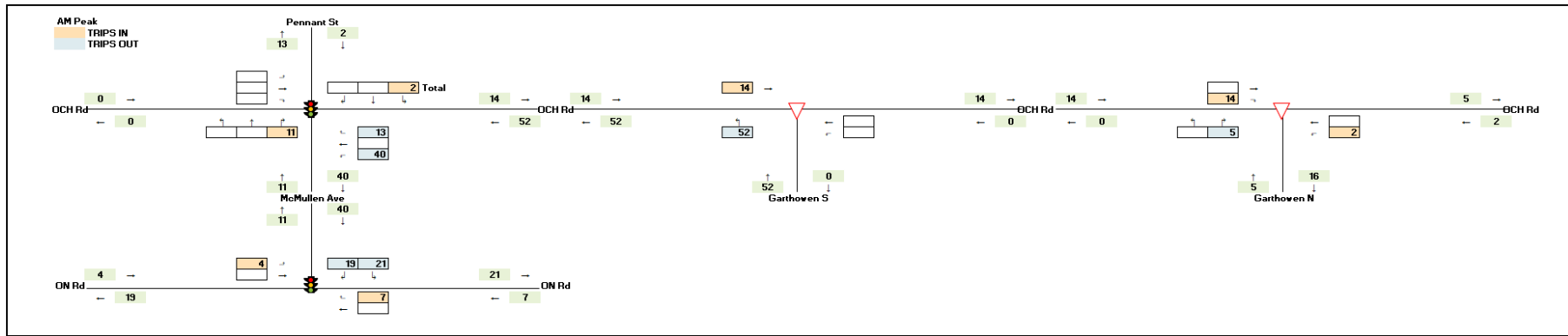
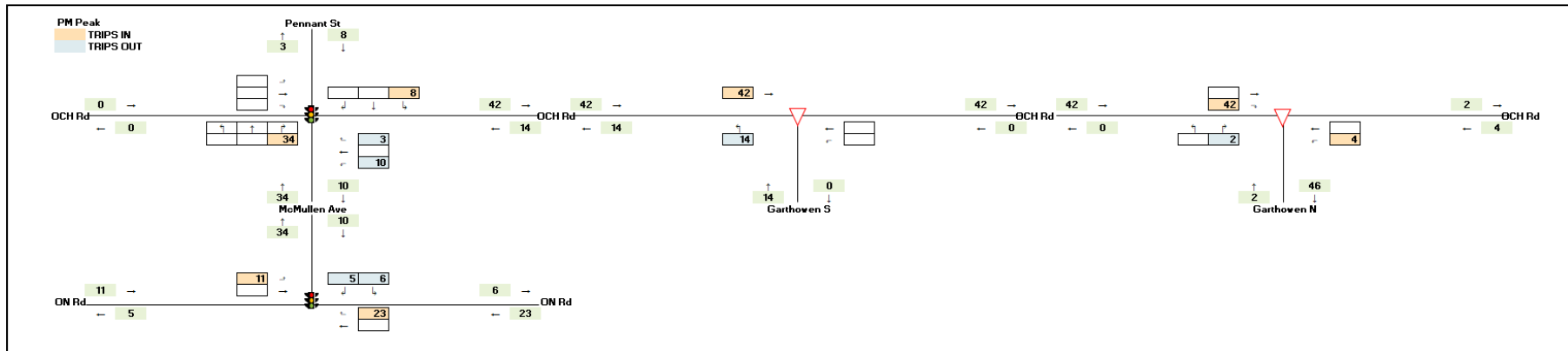


Figure 9-4: PM Peak Hour Traffic Generation



Appendix C The Hills Shire Council Approval to Review Castle Hill and Norwest Precinct Plans Transport Study Traffic Model

Smith, Jordan

From: Gaurav Singh <gsingh@thehills.nsw.gov.au>
Sent: Wednesday, 25 June 2025 10:57 AM
To: Smith, Jordan
Cc: Tony Napoli; Nathan Wu; Hillier, Elise
Subject: RE: Stantec Assessment - 16-20 Old Castle Hill Road, Castle Hill
Attachments: Draft Geometric Layout Plans.pdf

You don't often get email from gsingh@thehills.nsw.gov.au. [Learn why this is important](#)

Hi Jordan,

Thank you for providing the signed data sharing agreement. Please find attached the draft layout plans for following intersections:

- Garthowen Crescent (North) / Old Castle Hill Road
- Garthowen Crescent (South) / Old Castle Hill Road

Please note that the Old Castle Hill Road design is subject to change, as it may require some utility relocations.

Kind regards,



Gaurav Singh

Senior Transport Planner
61298430314 | +61411075819 | gsingh@thehills.nsw.gov.au
Administration Centre, 3 Columbia Court Norwest NSW 2153
PO Box 7064, NORWEST NSW 2153
www.thehills.nsw.gov.au

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From: Smith, Jordan <jordan.smith@stantec.com>

Sent: Wednesday, 25 June 2025 10:19 AM

To: Gaurav Singh <gsingh@thehills.nsw.gov.au>

Cc: Tony Napoli <anapoli@thehills.nsw.gov.au>; Nathan Wu <nwu@thehills.nsw.gov.au>; Hillier, Elise <Elise.Hillier@stantec.com>

Subject: RE: Stantec Assessment - 16-20 Old Castle Hill Road, Castle Hill

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Thank you for providing the approval Gaurav, and please find attached the signed data sharing agreement.

Thanks and regards,

Jordan Smith

Senior Transport Engineer
BEng (Hons) Civil

Direct: 03 9851 9609

Mobile: 0458 343 772

jordan.smith@stantec.com



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From: Gaurav Singh <gsingh@thehills.nsw.gov.au>

Sent: Thursday, June 19, 2025 9:38 AM

To: Smith, Jordan <jordan.smith@stantec.com>

Cc: Tony Napoli <anapoli@thehills.nsw.gov.au>; Nathan Wu <nwu@thehills.nsw.gov.au>; Hillier, Elise <Elise.Hillier@stantec.com>

Subject: RE: Stantec Assessment - 16-20 Old Castle Hill Road, Castle Hill

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Hi Jordan,

Thank you for your email and for reaching out regarding the assessment of the proposed development site at 16–20 Old Castle Hill Road, Castle Hill.

Council approves your request to review the transport model and its outputs to assist in your assessment specifically in relation to the proposed intersection works and road network upgrades. This includes the improvement measures proposed for the McCullen Avenue / Old Castle Hill Road intersection.

In addition, we request that your assessment also include the following two intersections:

- Garthowen Crescent (North) / Old Castle Hill Road
- Garthowen Crescent (South) / Old Castle Hill Road

A draft layout for these intersections will be provided to you once the data sharing agreement has been signed.

Please feel free to contact me should you have any questions or require further clarification.

Kind regards,



Gaurav Singh

Senior Transport Planner

61298430314 | +61411075819 | gsingh@thehills.nsw.gov.au

Administration Centre, 3 Columbia Court Norwest NSW 2153

PO Box 7064, NORWEST NSW 2153

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From: Smith, Jordan <jordan.smith@stantec.com>
Sent: Wednesday, 18 June 2025 10:36 AM
To: Tony Napoli <anapoli@thehills.nsw.gov.au>
Cc: Hillier, Elise <Elise.Hillier@stantec.com>
Subject: RE: Stantec Assessment - 16-20 Old Castle Hill Road, Castle Hill

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Hi Tony,

Just a polite follow up on this email

Thanks,

Jordan Smith

Senior Transport Engineer



From: Smith, Jordan

Sent: Tuesday, May 20, 2025 3:55 PM

To: anapoli@thehills.nsw.gov.au

Cc: Khan, Bayzid <Bayzid.Khan@stantec.com>; Hillier, Elise <Elise.Hillier@stantec.com>

Subject: Stantec Assessment - 16-20 Old Castle Hill Road, Castle Hill

Hi Tony,

My name is Jordan Smith, I work at Stantec and am currently undertaking an assessment for a proposed development site within the Hills Shire at 16-20 Old Castle Hill Road, Castle Hill. Your details were provided to me to assist in a request for further information to undertake our assessment.

As I am sure you are aware, Stantec have undertaken a municipal wide transport modelling assessment for the Castle Hill area. The model includes this development site and the immediate surrounding intersections. This model proposes a number of external road network upgrades, including upgrades to the McCullen Avenue/Old Castle Road intersection.

I have typed this email to request formal approval from Council for the purposes of assessment of this development site. This approval is requested in order to review the model and outputs to understand the proposed intersection works or road network upgrades, including improvement measures for the McCullen Avenue/Old Castle Road intersection. This will allow us to accurately assess the future conditions.

If you have any further questions, feel free to get into contact.

Jordan Smith

Senior Transport Engineer

BEng (Hons) Civil

Direct: 03 9851 9609

Mobile: 0458 343 772

jordan.smith@stantec.com



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Appendix D Outputs From Castle Hill and Norwest Precinct Plans Transport Study Traffic Model

Figure D - 1 2026 AM Peak Intersection Volumes

19	Old Northern Road / McMullen Avenue	4663	39	C	4452	58	E
23	Old Castle Hill Road / McMullen Avenue / Pennant Street	3464	32	C	3276	70	F

Figure D - 2 2026 PM Peak Intersection Volumes

19	Old Northern Road / McMullen Avenue	4691	41	C	3459	196	F
23	Old Castle Hill Road / McMullen Avenue / Pennant Street	3401	38	C	3356	62	E

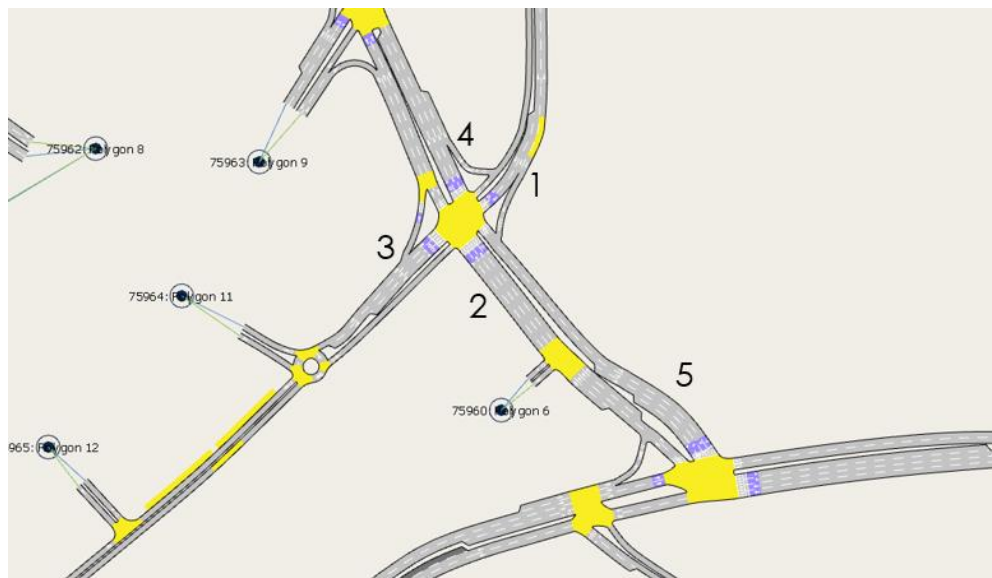
Figure D - 3 2036 AM Peak Intersection Volumes

19	Old Northern Road / McMullen Avenue	4019	48	D	3674	226	F
23	Old Castle Hill Road / McMullen Avenue / Pennant Street	3216	31	C	2526	89	F

Figure D - 4 2036 PM Peak Intersection Volumes

19	Old Northern Road / McMullen Avenue	3828	88	F	2799	426	F
23	Old Castle Hill Road / McMullen Avenue / Pennant Street	2580	78	F	1904	242	F

Figure D - 5 Castle Hill and Norwest Precinct Plans Transport Study Traffic Model Road Network



16-20 Old Castle Hill Road, Castle Hill Transport Impact Assessment

Appendix D Outputs From Castle Hill and Norwest Precinct Plans Transport Study Traffic Model

Table D - 1 Castle Hill and Norwest Precinct Plans Transport Study Traffic Model Turning Lane Lengths

ID	Approach	LT lane (m)	RT lane 1 (m)	RT lane 2 (m)
1	Old Castle Hill Road (NE)	Full	55	-
2	McMullen Avenue (SE)	105	120	-
3	Old Castle Hill Road (SW)	Full	77	50
4	Pennant Street (NW)	40	90	-
5	McMullen Avenue (N)	Full	70	45

Appendix E Design Review

MINIMUM HEIGHT CLEARANCES TO STRUCTURE AND SERVICES SHOULD BE PROVIDED AT;
 4.5m ABOVE SERVICE VEHICLE ACCESS AND LOADING DOCK AREAS
 2.5m ABOVE DISABLED PARKING BAYS (AS2890.6:2022)
 2.2m ABOVE CIRCULATION AISLES AND PARKING SPACES.
 - ADDITIONAL 0.05m-0.1m CLEARANCE IS RECOMMENDED ABOVE CARPARK AREAS, IN DESIGN, TO ENSURE COMPLIANCE IS PROVIDED IN OCCUPATION CERTIFICATION STAGE

WIDEN ROLLER SHUTTER (SOME 300mm) TO ACCOMMODATE INDEPENDENT TWO-WAY PASSING OF CARS AND VEHICLE SWEEP PATHS

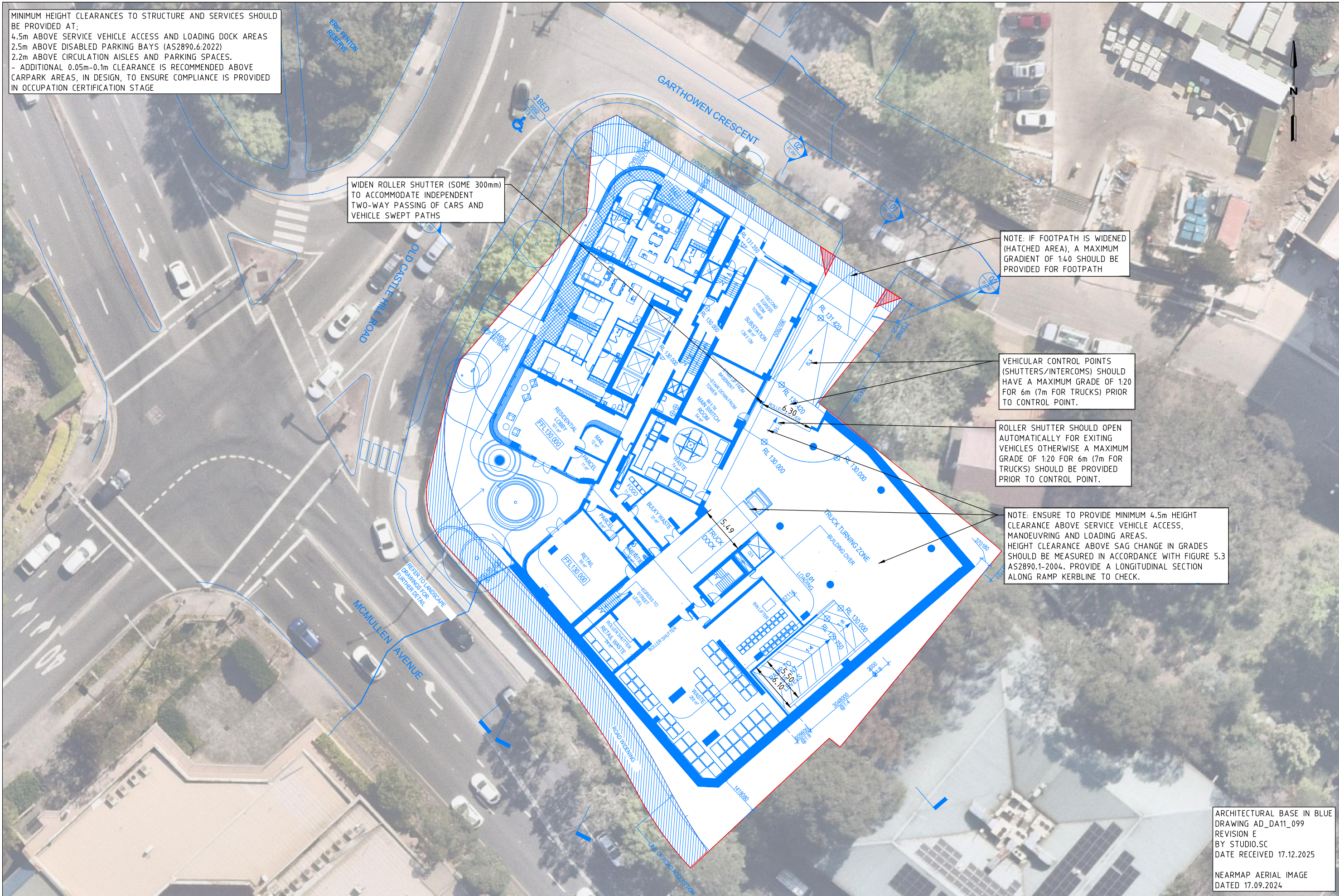
NOTE: IF FOOTPATH IS WIDENED (HATCHED AREA), A MAXIMUM GRADIENT OF 1:40 SHOULD BE PROVIDED FOR FOOTPATH

VEHICULAR CONTROL POINTS (SHUTTERS/INTERCOMMS) SHOULD HAVE A MAXIMUM GRADE OF 1:20 FOR 6m (7m FOR TRUCKS) PRIOR TO CONTROL POINT.

ROLLER SHUTTER SHOULD OPEN AUTOMATICALLY FOR EXITING VEHICLES OTHERWISE A MAXIMUM GRADE OF 1:20 FOR 6m (7m FOR TRUCKS) SHOULD BE PROVIDED PRIOR TO CONTROL POINT.

NOTE: ENSURE TO PROVIDE MINIMUM 4.5m HEIGHT CLEARANCE ABOVE SERVICE VEHICLE ACCESS, MANOEUVRING AND LOADING AREAS. HEIGHT CLEARANCE ABOVE SAG CHANGE IN GRADES SHOULD BE MEASURED IN ACCORDANCE WITH FIGURE 5.3 AS2890.1-2004. PROVIDE A LONGITUDINAL SECTION ALONG RAMP KERBLINE TO CHECK.

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ARCHITECTURAL BASE IN BLUE
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 REVISION E
 BY STUDIO.SC
 DATE RECEIVED 17.12.2025
 NEARMAP AERIAL IMAGE
 DATED 17.09.2024



PRELIMINARY PLAN
 FOR DISCUSSION PURPOSES ONLY
 SUBJECT TO CHANGE WITHOUT
 NOTIFICATION

WARNING
 BEWARE OF UNDERGROUND SERVICES
 THE LOCATIONS OF UNDERGROUND SERVICES ARE
 APPROXIMATE ONLY AND THEIR EXACT POSITION
 SHOULD BE PROVEN ON SITE. NO GUARANTEE IS
 GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

DESIGNED
 M.RIMAC
 APPROVED BY
 J.SMITH

DESIGN CHECK
 J.SMITH

DATE ISSUED
 18 DECEMBER 2025

SCALE
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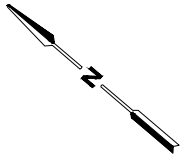
CAD FILE NO.
 300305867-02-P3.DWG

16-20 OLD CASTLE HILL ROAD, CASTLE HILL
 GROUND FLOOR

CAR PARK COMPLIANCE REVIEW

DRAWING NO. 300305867-02-01 SHEET 01 OF 16 ISSUE P3

MINIMUM HEIGHT CLEARANCES TO STRUCTURE AND SERVICES SHOULD BE PROVIDED AT;
 4.5m ABOVE SERVICE VEHICLE ACCESS AND LOADING DOCK AREAS
 2.5m ABOVE DISABLED PARKING BAYS (AS2890.6:2022)
 2.2m ABOVE CIRCULATION AISLES AND PARKING SPACES.
 - ADDITIONAL 0.05m-0.1m CLEARANCE IS RECOMMENDED ABOVE CARPARK AREAS, IN DESIGN, TO ENSURE COMPLIANCE IS PROVIDED IN OCCUPATION CERTIFICATION STAGE



PROVIDE 0.3m CLEARANCE TO STRUCTURE IN THE DOOR OPENING ZONE, AS SHOWN IN THE VEHICLE DESIGN ENVELOPE, FIGURE 5.2 AS2890.1-2004.

RESIDENTIAL PARKING SHOULD BE PROVIDED AS A STANDARD 5.4m LONG BY 2.4m WIDE SPACE. A SMALL CAR SPACE COULD BE CONSIDERED AS A SECOND SPACE FOR A TENANT AND WOULD HAVE TO BE RECORDED AS A SMALL SPACE ON THE CONTRACT OF SALE.

NOTE: ENSURE TO PROVIDE MINIMUM 2.5m HEIGHT CLEARANCE ABOVE ACCESSIBLE PARKING SPACES

TANDEM PARKING SPACES ARE TO BE ALLOCATED TO THE SAME UNIT/TENANT

ADJUST PARKING SPACE 1.01 (AS SHOWN) TO BE CLEAR OF STRUCTURE (WALL).



\\AU2012-NTA\PO1_CIF502\SHARED_PROJECTS\300305867\TECHNICAL_DRAWINGS\300305867-02-P3.DWG PLOTTED BY RIMAC, MARKO ON 18/12/2025 AT 16:19



PRELIMINARY PLAN
 FOR DISCUSSION PURPOSES ONLY
 SUBJECT TO CHANGE WITHOUT
 NOTIFICATION

WARNING
 BEWARE OF UNDERGROUND SERVICES
 THE LOCATIONS OF UNDERGROUND SERVICES ARE
 APPROXIMATE ONLY AND THEIR EXACT POSITION
 SHOULD BE PROVEN ON SITE. NO GUARANTEE IS
 GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

DESIGNED
 M.RIMAC

 APPROVED BY
 J.SMITH

DESIGN CHECK
 J.SMITH

 DATE ISSUED
 18 DECEMBER 2025

SCALE
 A3 0 2 4 8 1400

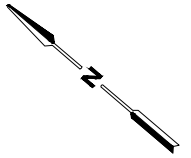
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 300305867-02-P3.DWG

16-20 OLD CASTLE HILL ROAD, CASTLE HILL
 BASEMENT 1

 CAR PARK COMPLIANCE REVIEW
 DRAWING NO. 300305867-02-02 SHEET 02 OF 16 ISSUE P3

ARCHITECTURAL BASE IN BLUE
 DRAWING AD_DA11_098
 REVISION E
 BY STUDIO.SC
 DATE RECEIVED 17.12.2025

MINIMUM HEIGHT CLEARANCES TO STRUCTURE AND SERVICES SHOULD BE PROVIDED AT;
 4.5m ABOVE SERVICE VEHICLE ACCESS AND LOADING DOCK AREAS
 2.5m ABOVE DISABLED PARKING BAYS (AS2890.6:2022)
 2.2m ABOVE CIRCULATION AISLES AND PARKING SPACES.
 - ADDITIONAL 0.05m-0.1m CLEARANCE IS RECOMMENDED ABOVE CARPARK AREAS, IN DESIGN, TO ENSURE COMPLIANCE IS PROVIDED IN OCCUPATION CERTIFICATION STAGE



NOTE: SPEC SHEET INDICATES MINIMUM 2.7m HEIGHT CLEARANCE TO ACCOMMODATE STAGGERED TIERED ARC RACKS FROM FIVE AT HEART

PROVIDE 0.3m CLEARANCE TO STRUCTURE IN THE DOOR OPENING ZONE, AS SHOWN IN THE VEHICLE DESIGN ENVELOPE, FIGURE 5.2 AS2890.1-2004.

RESIDENTIAL PARKING SHOULD BE PROVIDED AS A STANDARD 5.4m LONG BY 2.4m WIDE SPACE. A SMALL CAR SPACE COULD BE CONSIDERED AS A SECOND SPACE FOR A TENANT AND WOULD HAVE TO BE RECORDED AS A SMALL SPACE ON THE CONTRACT OF SALE.

NOTE: ENSURE TO PROVIDE MINIMUM 2.5m HEIGHT CLEARANCE ABOVE ACCESSIBLE PARKING SPACES

TANDEM PARKING SPACES ARE TO BE ALLOCATED TO THE SAME UNIT/TENANT

MODIFY STORAGE CAGES TO BE CLEAR OF THE VEHICLE DESIGN ENVELOPE, FIGURE 5.2 AS2890.1-2004.



\\AU2012-NTA\PO1_CIF502\SHARED_PROJECTS\300305867\TECHNICAL_DRAWINGS\300305867-02-P3.DWG PLOTTED BY RIMAC, MARKO ON 18/12/2025 AT 16:19

ARCHITECTURAL BASE IN BLUE
 DRAWING AD_DA11_097
 REVISION E
 BY STUDIO.SC
 DATE RECEIVED 17.12.2025



PRELIMINARY PLAN
 FOR DISCUSSION PURPOSES ONLY
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WARNING
 BEWARE OF UNDERGROUND SERVICES
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 GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

DESIGNED
 M.RIMAC

 APPROVED BY
 J.SMITH

DESIGN CHECK
 J.SMITH

 DATE ISSUED
 18 DECEMBER 2025

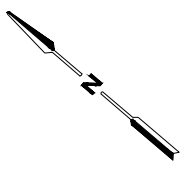
SCALE
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 CAD FILE NO.
 300305867-02-P3.DWG

16-20 OLD CASTLE HILL ROAD, CASTLE HILL
 BASEMENT 2

CAR PARK COMPLIANCE REVIEW
 DRAWING NO. 300305867-02-03 SHEET 03 OF 16 ISSUE P3

MINIMUM HEIGHT CLEARANCES TO STRUCTURE AND SERVICES SHOULD BE PROVIDED AT;
 4.5m ABOVE SERVICE VEHICLE ACCESS AND LOADING DOCK AREAS
 2.5m ABOVE DISABLED PARKING BAYS (AS2890.6:2022)
 2.2m ABOVE CIRCULATION AISLES AND PARKING SPACES.
 - ADDITIONAL 0.05m-0.1m CLEARANCE IS RECOMMENDED ABOVE CARPARK AREAS, IN DESIGN, TO ENSURE COMPLIANCE IS PROVIDED IN OCCUPATION CERTIFICATION STAGE



NOTE: SPEC SHEET INDICATES MINIMUM 2.7m HEIGHT CLEARANCE TO ACCOMMODATE STAGGERED TIERED ARC RACKS FROM FIVE AT HEART

PROVIDE 0.3m CLEARANCE TO STRUCTURE IN THE DOOR OPENING ZONE, AS SHOWN IN THE VEHICLE DESIGN ENVELOPE, FIGURE 5.2 AS2890.1-2004.

TANDEM PARKING SPACES ARE TO BE ALLOCATED TO THE SAME UNIT/TENANT

RESIDENTIAL PARKING SHOULD BE PROVIDED AS A STANDARD 5.4m LONG BY 2.4m WIDE SPACE. A SMALL CAR SPACE COULD BE CONSIDERED AS A SECOND SPACE FOR A TENANT AND WOULD HAVE TO BE RECORDED AS A SMALL SPACE ON THE CONTRACT OF SALE.

NOTE: ENSURE TO PROVIDE MINIMUM 2.5m HEIGHT CLEARANCE ABOVE ACCESSIBLE PARKING SPACES

MODIFY STORAGE CAGES TO BE CLEAR OF THE VEHICLE DESIGN ENVELOPE, FIGURE 5.2 AS2890.1-2004.



\\AU2012-NT\APO1_CIF502\SHARED_PROJECTS\300305867\TECHNICAL_DRAWINGS\300305867-02-P3.DWG PLOTTED BY RIMAC, MARKO ON 18/12/2025 AT 16:19

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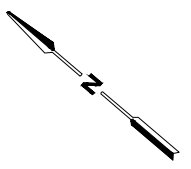
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 CAD FILE NO.
 300305867-02-P3.DWG

16-20 OLD CASTLE HILL ROAD, CASTLE HILL
 BASEMENT 3

 CAR PARK COMPLIANCE REVIEW
 DRAWING NO. 300305867-02-04 SHEET 04 OF 16 ISSUE P3

MINIMUM HEIGHT CLEARANCES TO STRUCTURE AND SERVICES SHOULD BE PROVIDED AT;
 4.5m ABOVE SERVICE VEHICLE ACCESS AND LOADING DOCK AREAS
 2.5m ABOVE DISABLED PARKING BAYS (AS2890.6:2022)
 2.2m ABOVE CIRCULATION AISLES AND PARKING SPACES.
 - ADDITIONAL 0.05m-0.1m CLEARANCE IS RECOMMENDED ABOVE CARPARK AREAS, IN DESIGN, TO ENSURE COMPLIANCE IS PROVIDED IN OCCUPATION CERTIFICATION STAGE



NOTE: SPEC SHEET INDICATES MINIMUM 2.7m HEIGHT CLEARANCE TO ACCOMMODATE STAGGERED TIERED ARC RACKS FROM FIVE AT HEART

PROVIDE 0.3m CLEARANCE TO STRUCTURE IN THE DOOR OPENING ZONE, AS SHOWN IN THE VEHICLE DESIGN ENVELOPE, FIGURE 5.2 AS2890.1-2004.

RESIDENTIAL PARKING SHOULD BE PROVIDED AS A STANDARD 5.4m LONG BY 2.4m WIDE SPACE. A SMALL CAR SPACE COULD BE CONSIDERED AS A SECOND SPACE FOR A TENANT AND WOULD HAVE TO BE RECORDED AS A SMALL SPACE ON THE CONTRACT OF SALE.

NOTE: ENSURE TO PROVIDE MINIMUM 2.5m HEIGHT CLEARANCE ABOVE ACCESSIBLE PARKING SPACES

TANDEM PARKING SPACES ARE TO BE ALLOCATED TO THE SAME UNIT/TENANT

MODIFY STORAGE CAGES TO BE CLEAR OF THE VEHICLE DESIGN ENVELOPE, FIGURE 5.2 AS2890.1-2004.

ADJUST PARKING SPACE 4.01 (AS SHOWN) TO BE CLEAR OF STRUCTURE AND ALIGN WITH ADJACENT SPACES.



\\AU2012-NTAP01_CIF502\SHARED_PROJECTS\300305867\TECHNICAL_DRAWINGS\300305867-02-P3.DWG PLOTTED BY RIMAC, MARKO ON 18/12/2025 AT 16:19



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SCALE
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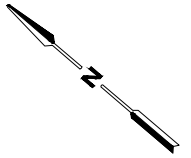
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16-20 OLD CASTLE HILL ROAD, CASTLE HILL
 BASEMENT 4

CAR PARK COMPLIANCE REVIEW
 DRAWING NO. 300305867-02-05 SHEET 05 OF 16 ISSUE P3

ARCHITECTURAL BASE IN BLUE
 DRAWING AD_DA11_095
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 BY STUDIO.SC
 DATE RECEIVED 17.12.2025

MINIMUM HEIGHT CLEARANCES TO STRUCTURE AND SERVICES SHOULD BE PROVIDED AT;
 4.5m ABOVE SERVICE VEHICLE ACCESS AND LOADING DOCK AREAS
 2.5m ABOVE DISABLED PARKING BAYS (AS2890.6:2022)
 2.2m ABOVE CIRCULATION AISLES AND PARKING SPACES.
 - ADDITIONAL 0.05m-0.1m CLEARANCE IS RECOMMENDED ABOVE CARPARK AREAS, IN DESIGN, TO ENSURE COMPLIANCE IS PROVIDED IN OCCUPATION CERTIFICATION STAGE



NOTE: SPEC SHEET INDICATES MINIMUM 2.7m HEIGHT CLEARANCE TO ACCOMMODATE STAGGERED TIERED ARC RACKS FROM FIVE AT HEART

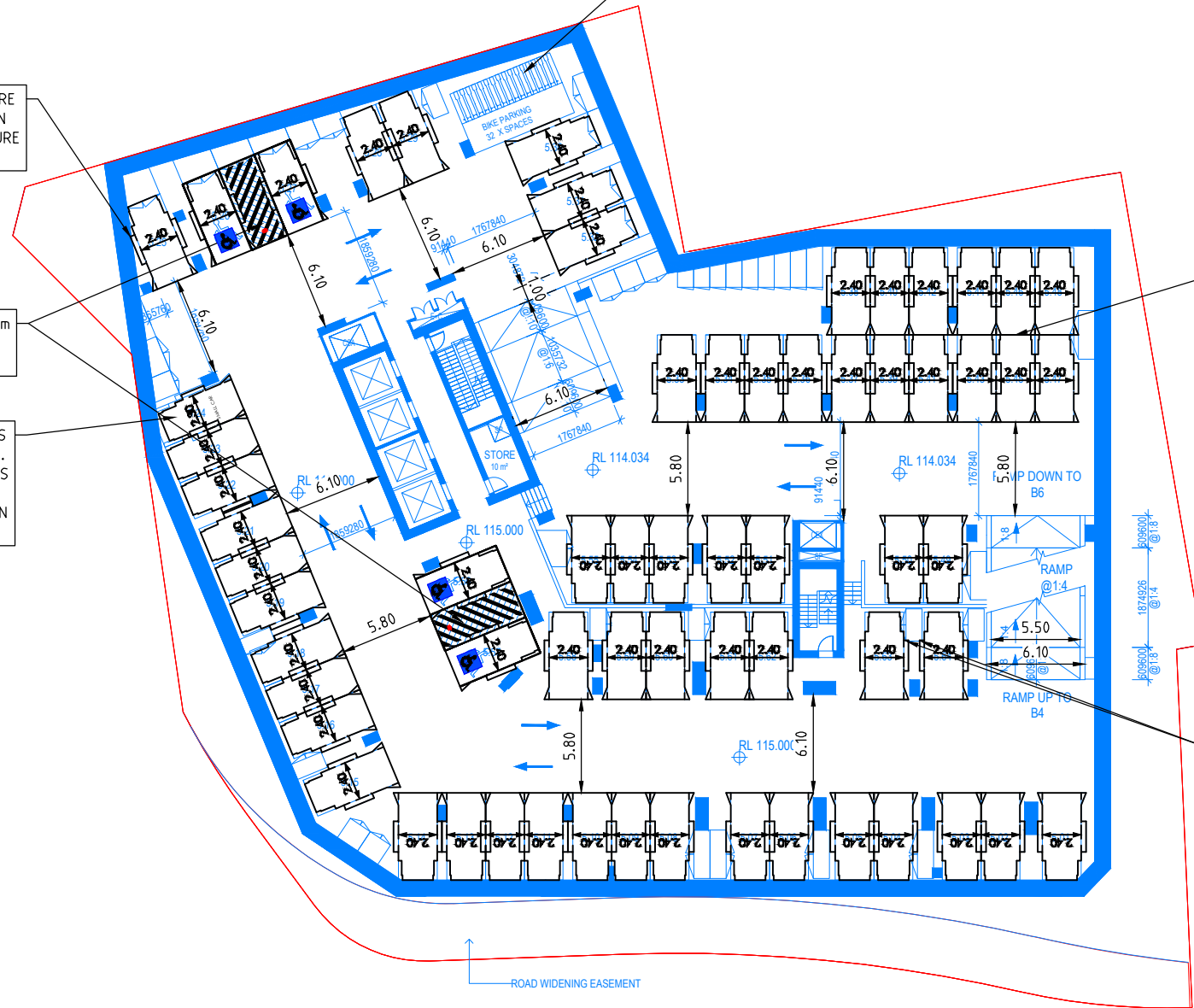
PROVIDE 0.3m CLEARANCE TO STRUCTURE IN THE DOOR OPENING ZONE, AS SHOWN IN THE VEHICLE DESIGN ENVELOPE, FIGURE 5.2 AS2890.1-2004.

NOTE: ENSURE TO PROVIDE MINIMUM 2.5m HEIGHT CLEARANCE ABOVE ACCESSIBLE PARKING SPACES

RESIDENTIAL PARKING SHOULD BE PROVIDED AS A STANDARD 5.4m LONG BY 2.4m WIDE SPACE. A SMALL CAR SPACE COULD BE CONSIDERED AS A SECOND SPACE FOR A TENANT AND WOULD HAVE TO BE RECORDED AS A SMALL SPACE ON THE CONTRACT OF SALE.

TANDEM PARKING SPACES ARE TO BE ALLOCATED TO THE SAME UNIT/TENANT

MODIFY STORAGE CAGES TO BE CLEAR OF THE VEHICLE DESIGN ENVELOPE, FIGURE 5.2 AS2890.1-2004.



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ARCHITECTURAL BASE IN BLUE
 DRAWING AD_DA11_094
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 BY STUDIO.SC
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DESIGNED
 M.RIMAC

 APPROVED BY
 J.SMITH

DESIGN CHECK
 J.SMITH

 DATE ISSUED
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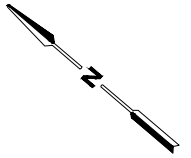
SCALE
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 CAD FILE NO.
 300305867-02-P3.DWG

16-20 OLD CASTLE HILL ROAD, CASTLE HILL
 BASEMENT 5

CAR PARK COMPLIANCE REVIEW
 DRAWING NO. 300305867-02-06 SHEET 06 OF 16 ISSUE P3

MINIMUM HEIGHT CLEARANCES TO STRUCTURE AND SERVICES SHOULD BE PROVIDED AT;
 4.5m ABOVE SERVICE VEHICLE ACCESS AND LOADING DOCK AREAS
 2.5m ABOVE DISABLED PARKING BAYS (AS2890.6:2022)
 2.2m ABOVE CIRCULATION AISLES AND PARKING SPACES.
 - ADDITIONAL 0.05m-0.1m CLEARANCE IS RECOMMENDED ABOVE CARPARK AREAS, IN DESIGN, TO ENSURE COMPLIANCE IS PROVIDED IN OCCUPATION CERTIFICATION STAGE



NOTE: SPEC SHEET INDICATES MINIMUM 2.7m HEIGHT CLEARANCE TO ACCOMMODATE STAGGERED TIERED ARC RACKS FROM FIVE AT HEART

NOTE: ENSURE TO PROVIDE MINIMUM 2.5m HEIGHT CLEARANCE ABOVE ACCESSIBLE PARKING SPACES

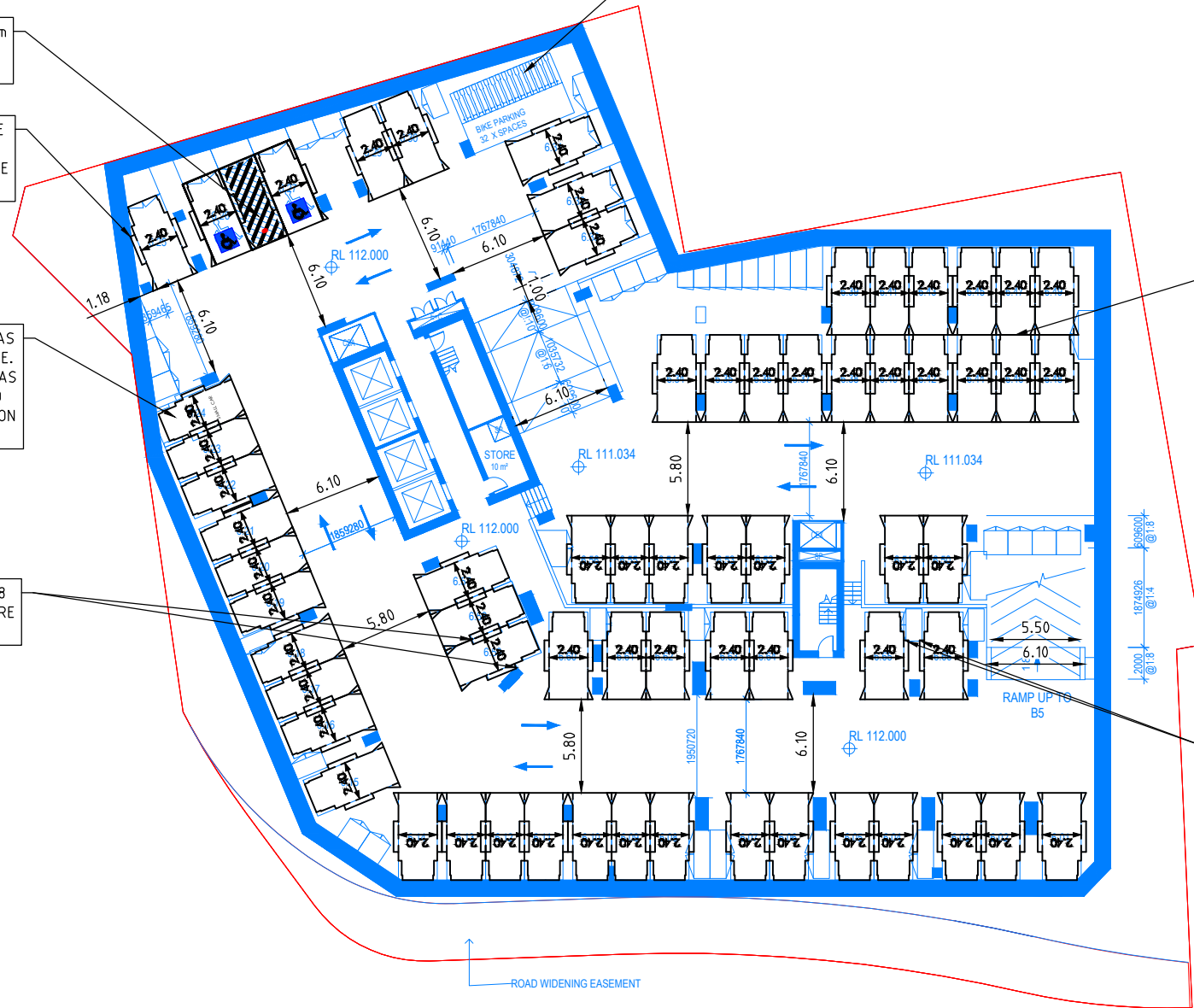
PROVIDE 0.3m CLEARANCE TO STRUCTURE IN THE DOOR OPENING ZONE, AS SHOWN IN THE VEHICLE DESIGN ENVELOPE, FIGURE 5.2 AS2890.1-2004.

RESIDENTIAL PARKING SHOULD BE PROVIDED AS A STANDARD 5.4m LONG BY 2.4m WIDE SPACE. A SMALL CAR SPACE COULD BE CONSIDERED AS A SECOND SPACE FOR A TENANT AND WOULD HAVE TO BE RECORDED AS A SMALL SPACE ON THE CONTRACT OF SALE.

ADJUST PARKING SPACES 6.59 AND 6.58 (AS SHOWN) TO BE CLEAR OF STRUCTURE AND ALIGN WITH SPACE 6.57.

TANDEM PARKING SPACES ARE TO BE ALLOCATED TO THE SAME UNIT/TENANT

MODIFY STORAGE CAGES TO BE CLEAR OF THE VEHICLE DESIGN ENVELOPE, FIGURE 5.2 AS2890.1-2004.



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ARCHITECTURAL BASE IN BLUE
 DRAWING AD_DA11_093
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DESIGNED
 M.RIMAC

 APPROVED BY
 J.SMITH

DESIGN CHECK
 J.SMITH

 DATE ISSUED
 18 DECEMBER 2025

SCALE
 A3 0 2 4 8 1400

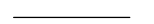



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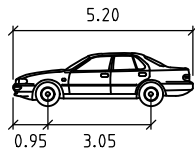
16-20 OLD CASTLE HILL ROAD, CASTLE HILL
 BASEMENT 6

CAR PARK COMPLIANCE REVIEW

DRAWING NO. 300305867-02-07 SHEET 07 OF 16 ISSUE P3

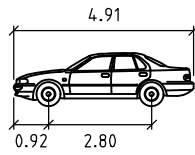
SWEPT PATH KEY

-  VEHICLE CENTRE LINE
 -  VEHICLE TYRE PATH
 -  VEHICLE BODY PATH
 -  300mm CLEARANCE FROM VEHICLE BODY
- ASSUMED SPEED 5km/h



B99

Width	: 1.94
Track	: 1.84
Lock to Lock Time	: 6.0
Steering Angle	: 33.9



B85

Width	: 1.87
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.1



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DESIGN CHECK
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DATE ISSUED
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CAD FILE NO.
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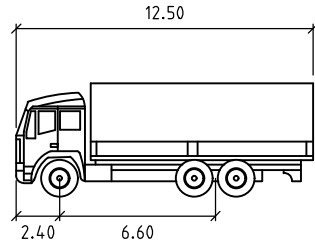
16-20 OLD CASTLE HILL ROAD, CASTLE HILL
GROUND FLOOR

VEHICLE SWEEP PATH ASSESSMENT

DRAWING NO. 300305867-02-08 SHEET 08 OF 16 ISSUE P3

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 600mm CLEARANCE FROM VEHICLE BODY
- ASSUMED SPEED 5km/h



HRV

Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 35.2



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PRELIMINARY PLAN
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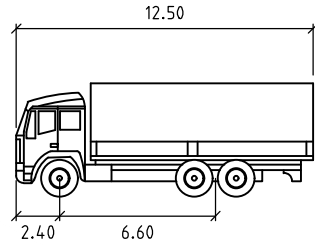
SCALE
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CAD FILE NO.
300305867-02-P3.DWG

16-20 OLD CASTLE HILL ROAD, CASTLE HILL
GROUND FLOOR
LOADING DOCK
VEHICLE SWEEP PATH ASSESSMENT
DRAWING NO. 300305867-02-09 SHEET 09 OF 16 ISSUE P3

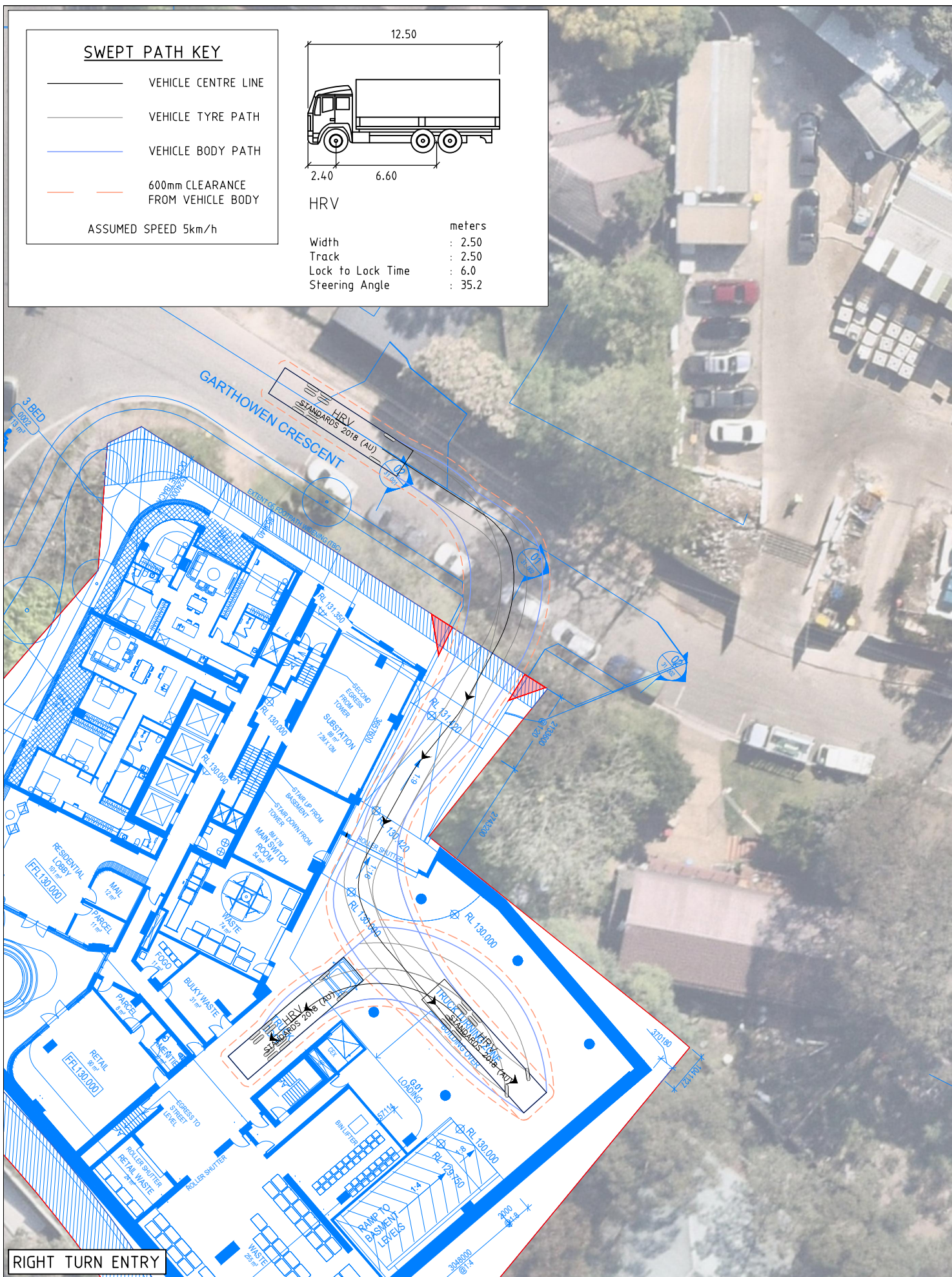
SWEPT PATH KEY

-  VEHICLE CENTRE LINE
 -  VEHICLE TYRE PATH
 -  VEHICLE BODY PATH
 -  600mm CLEARANCE FROM VEHICLE BODY
- ASSUMED SPEED 5km/h



HRV

Width	: 2.50	meters
Track	: 2.50	
Lock to Lock Time	: 6.0	
Steering Angle	: 35.2	



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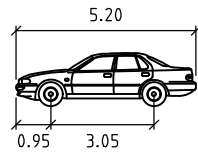
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16-20 OLD CASTLE HILL ROAD, CASTLE HILL
GROUND FLOOR
LOADING DOCK
VEHICLE SWEEP PATH ASSESSMENT

DRAWING NO. 300305867-02-10 SHEET 10 OF 16 ISSUE P3

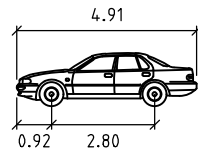
SWEPT PATH KEY

- VEHICLE CENTRE LINE
 - VEHICLE TYRE PATH
 - VEHICLE BODY PATH
 - 300mm CLEARANCE FROM VEHICLE BODY
- ASSUMED SPEED 5km/h



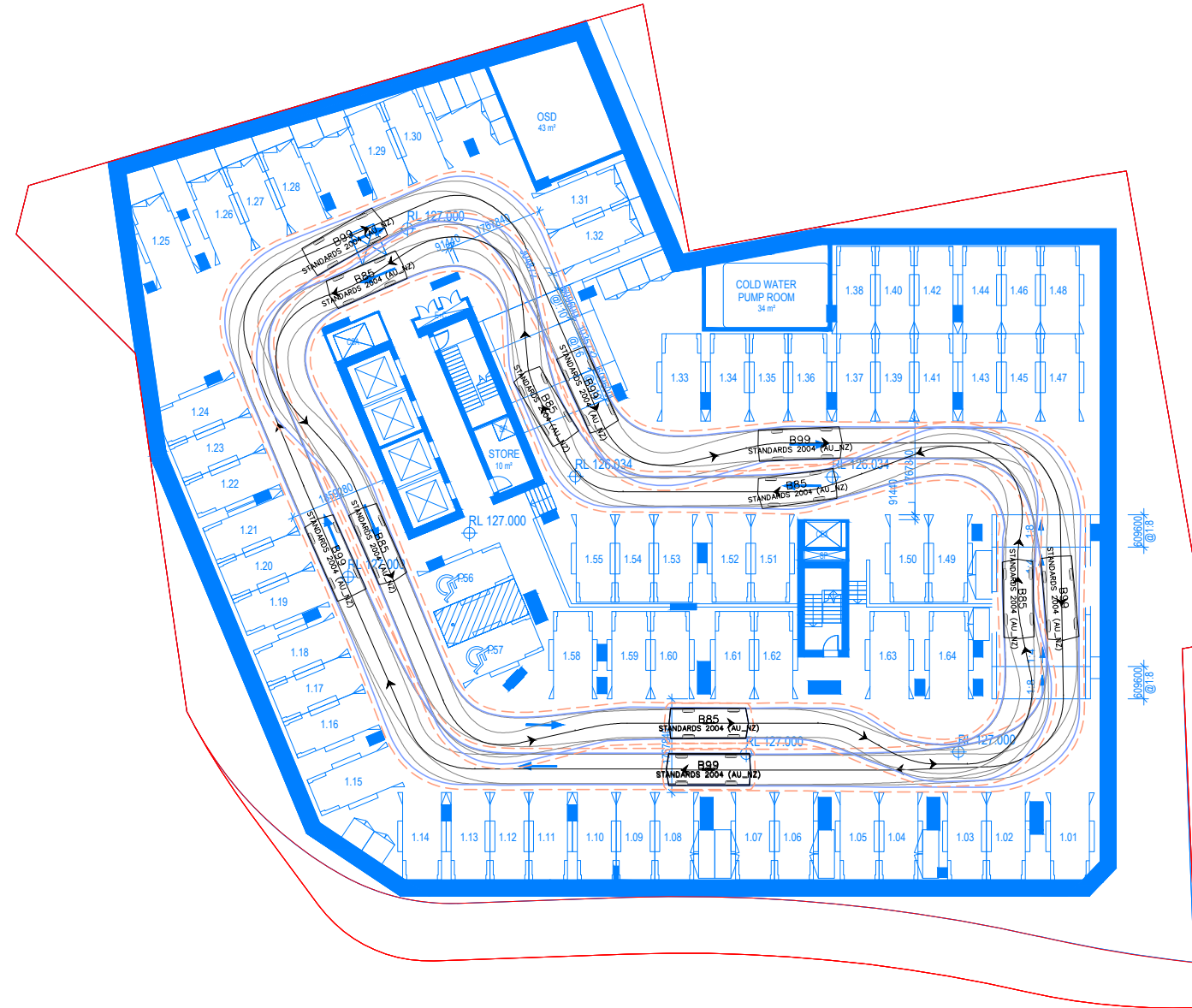
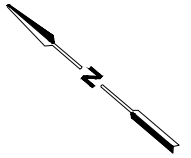
B99

Width : 1.94 meters
Track : 1.84 meters
Lock to Lock Time : 6.0 seconds
Steering Angle : 33.9 degrees



B85

Width : 1.87 meters
Track : 1.77 meters
Lock to Lock Time : 6.0 seconds
Steering Angle : 34.1 degrees



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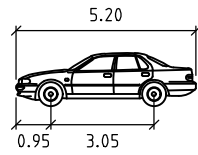
16-20 OLD CASTLE HILL ROAD, CASTLE HILL
BASEMENT 1

VEHICLE SWEEP PATH ASSESSMENT

DRAWING NO. 300305867-02-11 SHEET 11 OF 16 ISSUE P3

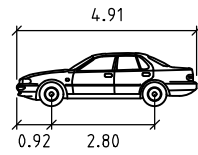
SWEPT PATH KEY

- VEHICLE CENTRE LINE
 - VEHICLE TYRE PATH
 - VEHICLE BODY PATH
 - 300mm CLEARANCE FROM VEHICLE BODY
- ASSUMED SPEED 5km/h



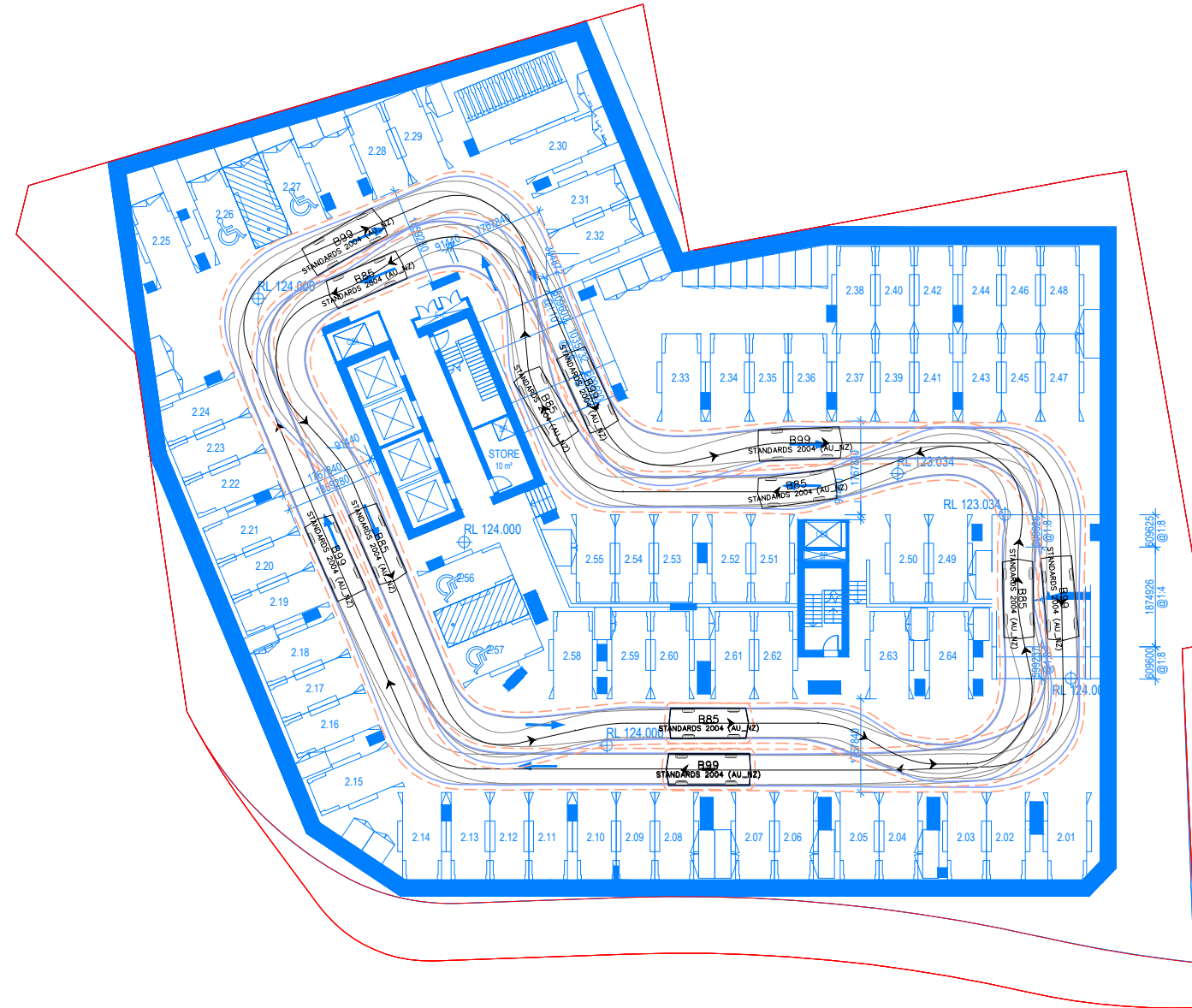
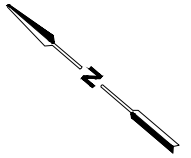
B99

Width : 1.94 meters
Track : 1.84 meters
Lock to Lock Time : 6.0
Steering Angle : 33.9



B85

Width : 1.87 meters
Track : 1.77 meters
Lock to Lock Time : 6.0
Steering Angle : 34.1



\\AU2012-NTA\PO1_CIF502\SHARED_PROJECTS\300305867\TECHNICAL_DRAWINGS\300305867-02-P3.DWG PLOTTED BY RIMAC, MARKO ON 18/12/2025 AT 16:19



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SCALE
A3 0 2 4 8 1400

CAD FILE NO.
300305867-02-P3.DWG





16-20 OLD CASTLE HILL ROAD, CASTLE HILL
BASEMENT 2

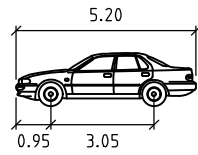
VEHICLE SWEEP PATH ASSESSMENT

DRAWING NO. 300305867-02-12 SHEET 12 OF 16

ISSUE P3

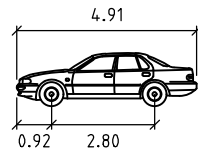
SWEPT PATH KEY

-  VEHICLE CENTRE LINE
 -  VEHICLE TYRE PATH
 -  VEHICLE BODY PATH
 -  300mm CLEARANCE FROM VEHICLE BODY
- ASSUMED SPEED 5km/h



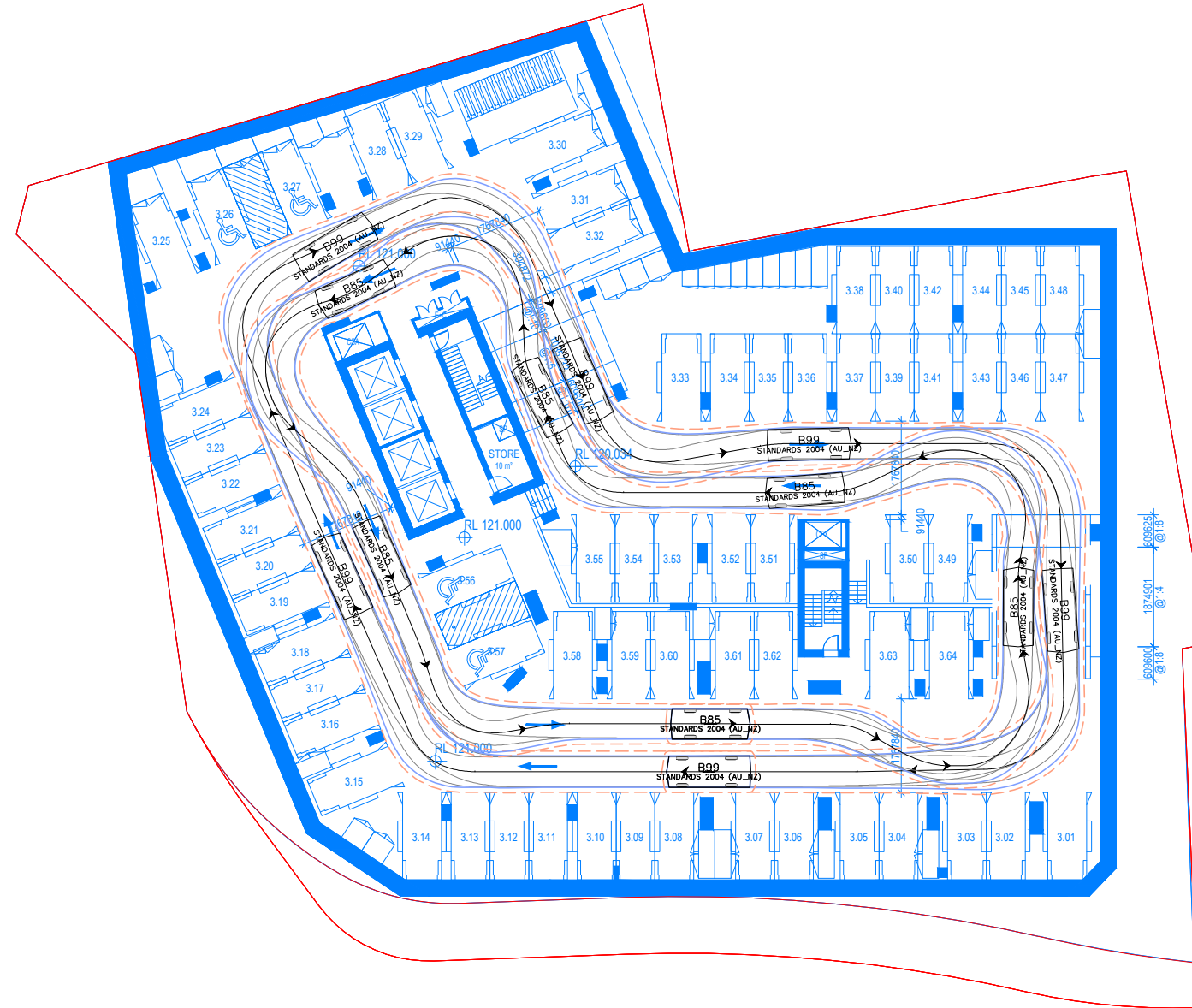
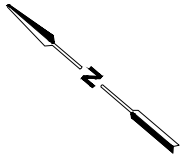
B99

Width : 1.94 meters
Track : 1.84 meters
Lock to Lock Time : 6.0
Steering Angle : 33.9



B85

Width : 1.87 meters
Track : 1.77 meters
Lock to Lock Time : 6.0
Steering Angle : 34.1



\\AU2012-NTA\PO1_CIF502\SHARED_PROJECTS\300305867\TECHNICAL_DRAWINGS\300305867-02-P3.DWG PLOTTED BY RIMAC, MARKO ON 18/12/2025 AT 16:19



PRELIMINARY PLAN

FOR DISCUSSION PURPOSES ONLY
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NOTIFICATION

WARNING

BWARE OF UNDERGROUND SERVICES
THE LOCATIONS OF UNDERGROUND SERVICES ARE
APPROXIMATE ONLY AND THEIR EXACT POSITION
SHOULD BE PROVEN ON SITE. NO GUARANTEE IS
GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

DESIGNED
M.RIMAC

APPROVED BY
J.SMITH

DESIGN CHECK
J.SMITH

DATE ISSUED
18 DECEMBER 2025

SCALE
A3 0 2 4 8 1400





CAD FILE NO.
300305867-02-P3.DWG

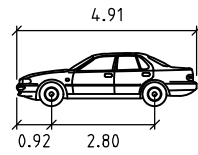
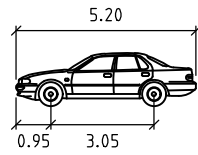
16-20 OLD CASTLE HILL ROAD, CASTLE HILL
BASEMENT 3

VEHICLE SWEEP PATH ASSESSMENT

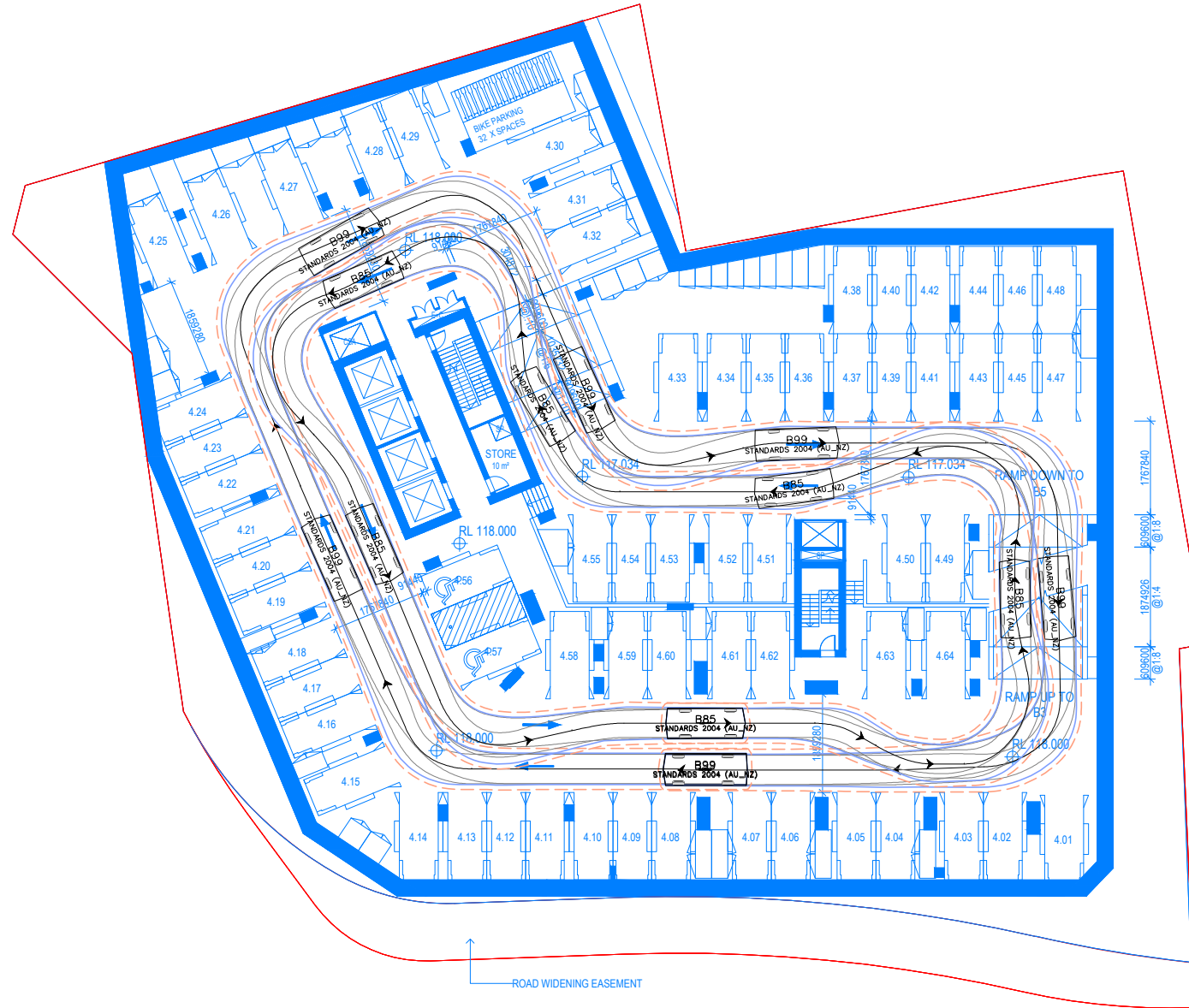
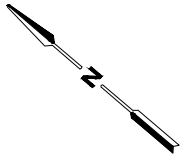
DRAWING NO. 300305867-02-13 SHEET 13 OF 16 ISSUE P3

SWEPT PATH KEY

-  VEHICLE CENTRE LINE
 -  VEHICLE TYRE PATH
 -  VEHICLE BODY PATH
 -  300mm CLEARANCE FROM VEHICLE BODY
- ASSUMED SPEED 5km/h



B99		B85	
	metres		metres
Width	: 1.94	Width	: 1.87
Track	: 1.84	Track	: 1.77
Lock to Lock Time	: 6.0	Lock to Lock Time	: 6.0
Steering Angle	: 33.9	Steering Angle	: 34.1



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J.SMITH

DESIGN CHECK
J.SMITH

DATE ISSUED
18 DECEMBER 2025

SCALE
A3  1:400





CAD FILE NO.
300305867-02-P3.DWG

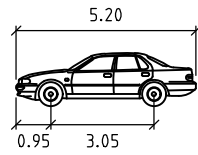
16-20 OLD CASTLE HILL ROAD, CASTLE HILL
BASEMENT 4

VEHICLE SWEEP PATH ASSESSMENT

DRAWING NO. 300305867-02-14 SHEET 14 OF 16 ISSUE P3

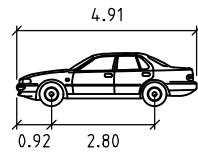
SWEPT PATH KEY

-  VEHICLE CENTRE LINE
 -  VEHICLE TYRE PATH
 -  VEHICLE BODY PATH
 -  300mm CLEARANCE FROM VEHICLE BODY
- ASSUMED SPEED 5km/h



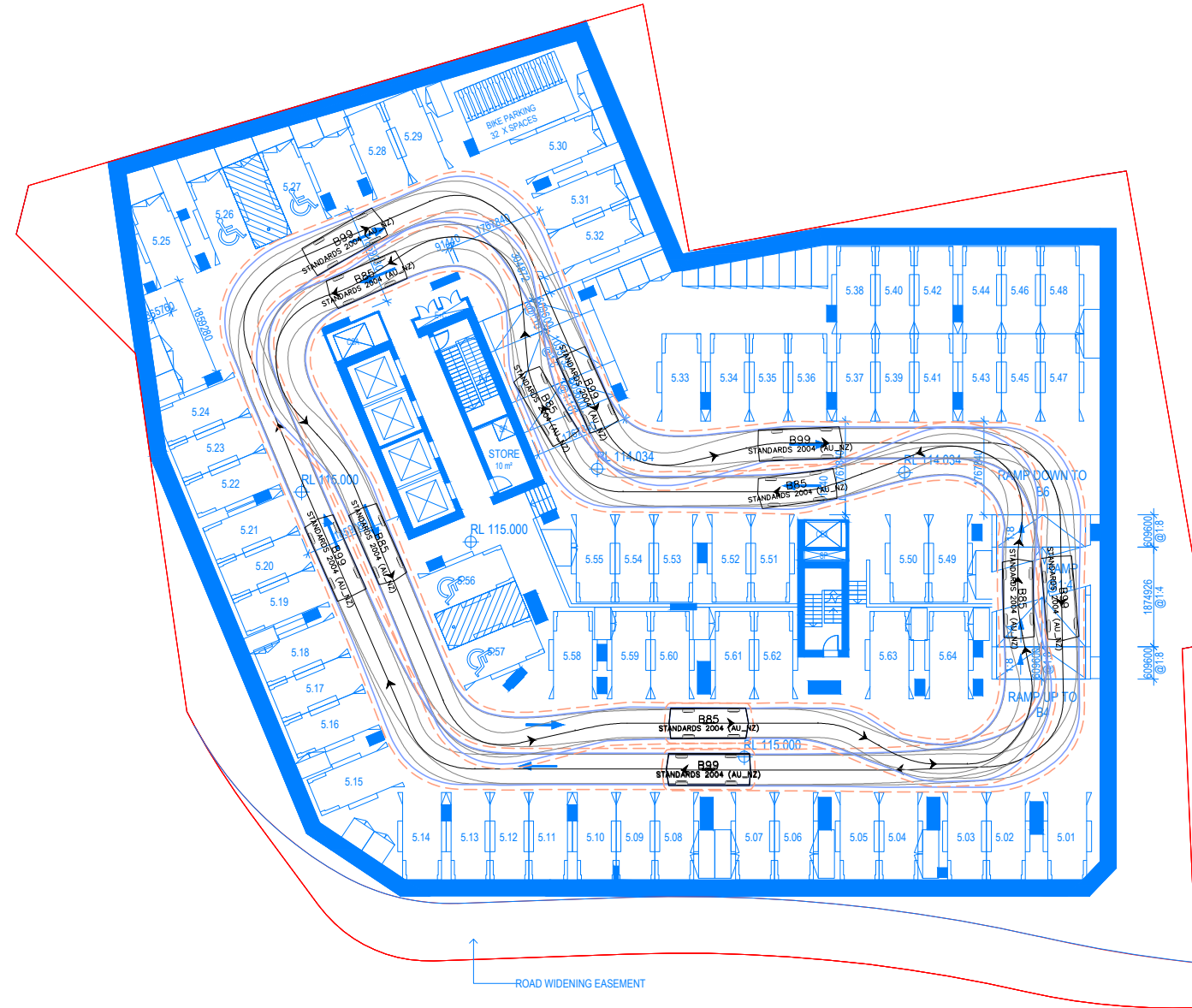
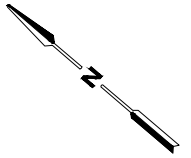
B99

Width	: 1.94	meters
Track	: 1.84	meters
Lock to Lock Time	: 6.0	seconds
Steering Angle	: 33.9	degrees



B85

Width	: 1.87	meters
Track	: 1.77	meters
Lock to Lock Time	: 6.0	seconds
Steering Angle	: 34.1	degrees



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PRELIMINARY PLAN
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DESIGNED
M.RIMAC

APPROVED BY
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DESIGN CHECK
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18 DECEMBER 2025

SCALE
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CAD FILE NO.
300305867-02-P3.DWG

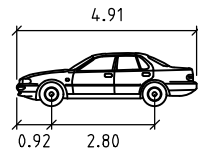
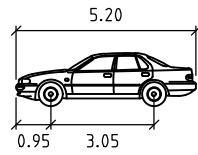
16-20 OLD CASTLE HILL ROAD, CASTLE HILL
BASEMENT 5

VEHICLE SWEEP PATH ASSESSMENT

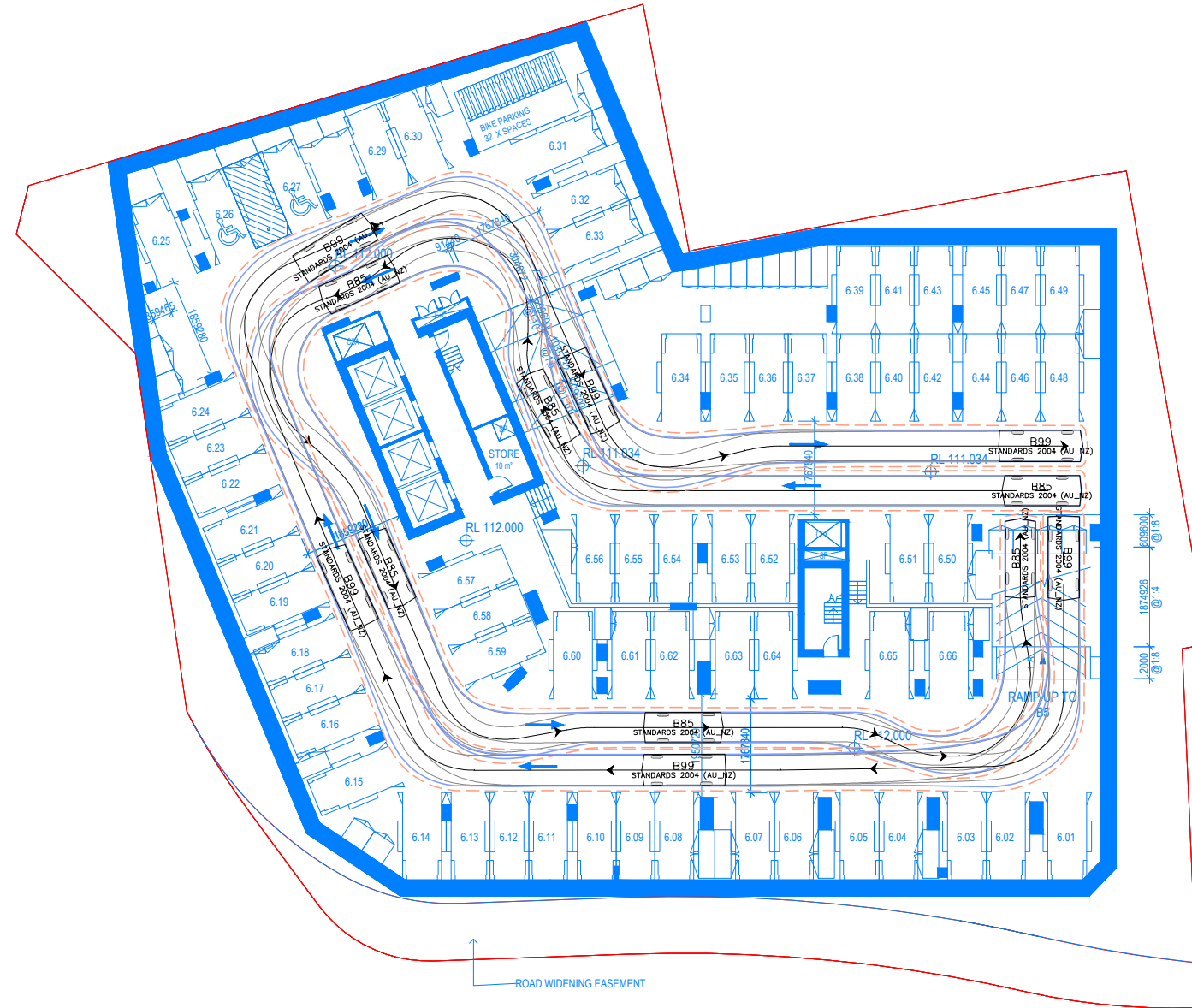
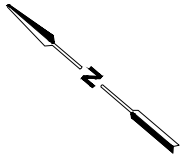
DRAWING NO. 300305867-02-15 SHEET 15 OF 16 ISSUE P3

SWEPT PATH KEY

-  VEHICLE CENTRE LINE
 -  VEHICLE TYRE PATH
 -  VEHICLE BODY PATH
 -  300mm CLEARANCE FROM VEHICLE BODY
- ASSUMED SPEED 5km/h



B99		B85	
	metres		metres
Width	: 1.94	Width	: 1.87
Track	: 1.84	Track	: 1.77
Lock to Lock Time	: 6.0	Lock to Lock Time	: 6.0
Steering Angle	: 33.9	Steering Angle	: 34.1



\\AU2012-NTA\PO1_CIF502\SHARED_PROJECTS\300305867\TECHNICAL_DRAWINGS\300305867-02-P3.DWG PLOTTED BY RIMAC, MARKO ON 18/12/2025 AT 16:19



PRELIMINARY PLAN

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M.RIMAC

APPROVED BY
J.SMITH

DESIGN CHECK
J.SMITH

DATE ISSUED
18 DECEMBER 2025

SCALE
A3  1:400

CAD FILE NO.
300305867-02-P3.DWG

16-20 OLD CASTLE HILL ROAD, CASTLE HILL
BASEMENT 6

VEHICLE SWEEP PATH ASSESSMENT

DRAWING NO. 300305867-02-16 SHEET 16 OF 16 ISSUE P3

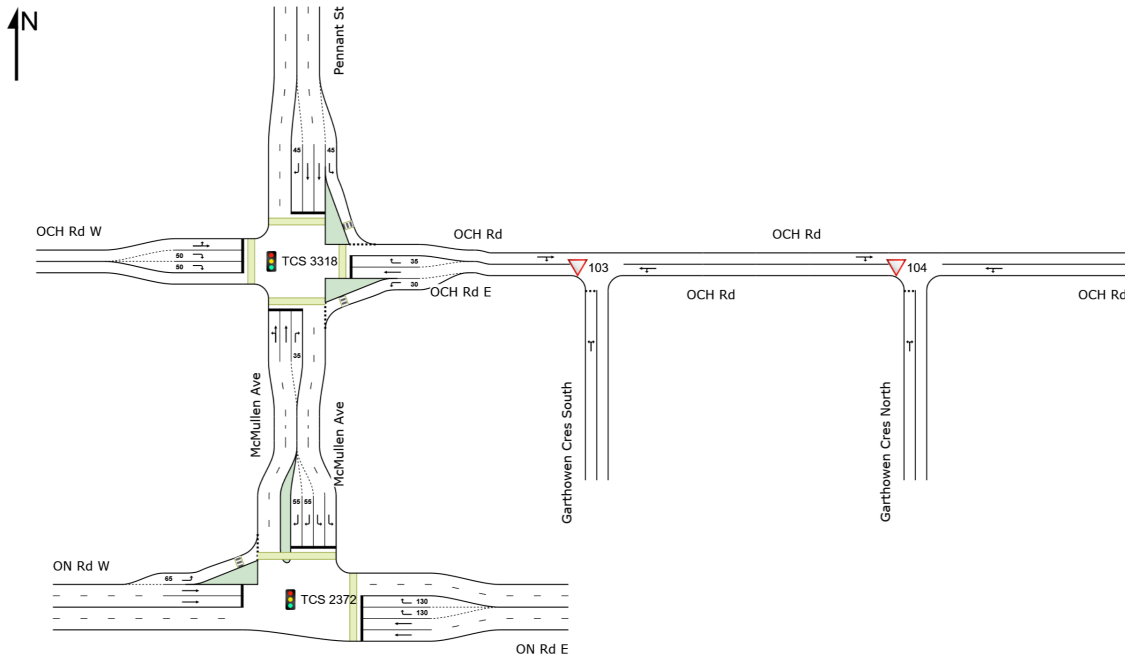
Appendix F SIDRA Outputs

NETWORK LAYOUT

Network: N101 [Existing_2025_AM (Network Folder: Existing_2025)]

New Network
Network Category: (None)

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



SITES IN NETWORK		
Site ID	CCG ID	Site Name
TCS 2372	NA	Old Northern Road/McMullen Avenue AM
TCS 3318	NA	Old Castle Hill Road/McMullen Avenue/Pennant Street AM
▽103	NA	Old Castle Hill Road/Garthowen Crescent South AM
▽104	NA	Old Castle Hill Road/Garthowen Crescent North AM

LANE SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue AM (Site Folder: Existing_2025_AM)]

Network: N101 [Existing_2025_AM (Network Folder: Existing_2025)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	[Total HV]	%	[Total HV]	%						[Veh]	[Dist]				
East: ON Rd E															
Lane 1	624	5.0	624	5.0	1424	0.438	100	6.2	LOS A	14.2	103.6	Full	205	0.0	0.0
Lane 2	624	5.0	624	5.0	1424	0.438	100	6.2	LOS A	14.2	103.6	Full	205	0.0	12.6 ⁸
Lane 3	403	2.8	403	2.8	434	0.928	100	54.5	LOS D	23.2	166.0	Short	130	-31.1 ^{N3}	NA
Lane 4	585	2.8	585	2.8	630	0.928	100	47.5	LOS D	31.1	223.0	Short	130	0.0	NA
Approach	2237	4.0	2237	4.0		0.928		25.7	LOS B	31.1	223.0				
North: McMullen Ave															
Lane 1	367	4.6	367	4.6	1065	0.345	100	14.7	LOS B	7.0	50.9	Full	150	0.0	0.0
Lane 2	367	4.6	367	4.6	1065	0.345	100	14.6	LOS B	6.9	50.6	Full	150	0.0	0.0
Lane 3	145	6.2	145	6.2	274	0.531	100	46.6	LOS D	7.3	54.0	Short	55	0.0	NA
Lane 4	145	6.2	145	6.2	274	0.531	100	46.6	LOS D	7.3	54.0	Short	55	0.0	NA
Approach	1025	5.0	1025	5.0		0.531		23.7	LOS B	7.3	54.0				
West: ON Rd W															
Lane 1	224	8.0	224	8.0	869	0.258	100	16.4	LOS B	6.1	45.4	Short	65	-18.4 ^{N3}	NA
Lane 2	430	6.5	430	6.5	466 ¹	0.923	100	67.5	LOS E	30.8	227.2	Full	190	0.0	21.2
Lane 3	545	6.5	545	6.5	590	0.923	100	67.4	LOS E	40.6	299.6	Full	190	0.0	46.8
Approach	1199	6.8	1199	6.8		0.923		57.9	LOS E	40.6	299.6				
Intersection	4461	5.0	4461	5.0		0.928		33.9	LOS C	40.6	299.6				

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

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

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

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

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

¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

⁸ Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

^{N3} Capacity Adjustment due to downstream lane blockage determined by the program.

Approach Lane Flows (veh/h)										
East: ON Rd E										
Mov. From E To Exit:	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
	W	N								
Lane 1	624	-	624	5.0	1424	0.438	100	NA	NA	
Lane 2	624	-	624	5.0	1424	0.438	100	NA	NA	
Lane 3	-	403	403	2.8	434	0.928	100	54.7	2	
Lane 4	-	585	585	2.8	630	0.928	100	54.7	3	
Approach	1248	988	2237	4.0		0.928				
North: McMullen Ave										
Mov.	L2	R2	Total	%HV		Deg.	Lane	Prob.	Ov.	

From N To Exit:	E	W			Cap. veh/h	Satn v/c	Util. %	SL Ov. %	Lane No.
Lane 1	367	-	367	4.6	1065	0.345	100	NA	NA
Lane 2	367	-	367	4.6	1065	0.345	100	NA	NA
Lane 3	-	145	145	6.2	274	0.531	100	3.3	2
Lane 4	-	145	145	6.2	274	0.531	100	3.3	3
Approach	735	291	1025	5.0		0.531			
West: ON Rd W									
Mov. From W To Exit:	L2	T1	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
	N	E							
Lane 1	224	-	224	8.0	869	0.258	100	0.0	2
Lane 2	-	430	430	6.5	466 ¹	0.923	100	NA	NA
Lane 3	-	545	545	6.5	590	0.923	100	NA	NA
Approach	224	975	1199	6.8		0.923			
Total %HV Deg. Satn (v/c)									
Intersection	4461	5.0		0.928					

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis												
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Capacity Flow Rate veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec		
East Exit: ON Rd E												
Merge Type: Not Applied												
Full Length Lane	1										Merge Analysis not applied.	
Full Length Lane	2										Merge Analysis not applied.	
North Exit: McMullen Ave												
Merge Type: Not Applied												
Full Length Lane	1										Merge Analysis not applied.	
Full Length Lane	2										Merge Analysis not applied.	
West Exit: ON Rd W												
Merge Type: Not Applied												
Full Length Lane	1										Merge Analysis not applied.	
Full Length Lane	2										Merge Analysis not applied.	

PHASING SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue AM (Site Folder: Existing_2025_AM)]

Network: N101 [Existing_2025_AM (Network Folder: Existing_2025)]

New Site
 Site Category: (None)
 Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
 Phase Times determined by the program
 Downstream lane blockage effects included in determining phase times
 Phase Sequence: TCS2372 Scats - Import
 Reference Phase: Phase A
 Input Phase Sequence: A, B, C, D
 Output Phase Sequence: A, B, C, D

Phase Timing Summary












Phase	A	B	C	D
Phase Change Time (sec)	0	47	78	104
Green Time (sec)	41	25	20	20
Phase Time (sec)	47	31	26	26
Phase Split	36%	24%	20%	20%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
 VAR: Variable Phase

	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class (MC) Running		Undetected Movement
	Mixed Running & Stopped MCs		Continuous Movement
	Other Movement Class (MC) Stopped		Phase Transition Applied

LANE SUMMARY

Site: TCS 3318 [Old Castle Hill Road/McMullen Avenue/
Pennant Street AM (Site Folder: Existing_2025_AM)]

Network: N101
[Existing_2025_AM (Network
Folder: Existing_2025)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total	HV]	[Total	HV]						[Veh	Dist]				
	veh/h	%	veh/h	%	veh/h	v/c	%	sec			m	m	%	%	
South: McMullen Ave															
Lane 1	592	2.9	592	2.9	806	0.734	100	30.7	LOS C	27.9	199.8	Full	150	0.0	31.1
Lane 2	442	3.5	442	3.5	602 ¹	0.734	100	26.2	LOS B	17.6	126.6	Full	150	0.0	0.0
Lane 3	181	5.8	181	5.8	392	0.461	100	25.3	LOS B	6.6	48.5	Short	35	0.0	NA
Approach	1215	3.6	1215	3.6		0.734		28.3	LOS B	27.9	199.8				
East: OCH Rd E															
Lane 1	378	3.6	378	3.6	1238	0.305	100	6.4	LOS A	5.3	38.2	Short	30	0.0	NA
Lane 2	243	0.0	243	0.0	355 ¹	0.685	100	50.1	LOS D	10.5 ^{N4}	73.4 ^{N4}	Full	45	0.0	50.0
Lane 3	114	0.9	114	0.9	187	0.607	100	41.8	LOS C	5.2	36.8	Short	35	0.0	NA
Approach	735	2.0	735	2.0		0.685		26.3	LOS B	10.5	73.4				
North: Pennant St															
Lane 1	73	1.4	73	1.4	1170	0.062	100	7.8	LOS A	0.7	5.0	Short	45	0.0	NA
Lane 2	289	5.6	289	5.6	760 ¹	0.380	100	27.1	LOS B	12.3	90.3	Full	110	0.0	0.0
Lane 3	293	5.6	293	5.6	773 ¹	0.380	100	27.2	LOS B	12.5	92.1	Full	110	0.0	0.0
Lane 4	11	10.0	11	10.0	235	0.045	100	26.9	LOS B	0.3	2.4	Short	45	0.0	NA
Approach	665	5.2	665	5.2		0.380		25.1	LOS B	12.5	92.1				
West: OCH Rd W															
Lane 1	173	4.3	173	4.3	352	0.490	100	49.1	LOS D	9.5	68.6	Full	80	0.0	0.0
Lane 2	39	5.4	39	5.4	193	0.202	100	61.8	LOS E	2.3	16.9	Short	50	0.0	NA
Lane 3	39	5.4	39	5.4	193	0.202	100	61.8	LOS E	2.3	16.9	Short	50	0.0	NA
Approach	251	4.6	251	4.6		0.490		53.0	LOS D	9.5	68.6				
Intersection	2865	3.6	2865	3.6		0.734		29.2	LOS C	27.9	199.8				

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

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

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

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

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

¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

^{N4} Average back of queue has been restricted to the available queue storage space.

Approach Lane Flows (veh/h)											
South: McMullen Ave											
Mov. From S To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util.	Prob. SL %	Ov. Lane No.	
	W	N	E								
Lane 1	142	450	-	592	2.9	806	0.734	100	NA	NA	
Lane 2	-	442	-	442	3.5	602 ¹	0.734	100	NA	NA	
Lane 3	-	-	181	181	5.8	392	0.461	100	34.7	2	

Approach	142	892	181	1215	3.6		0.734			
East: OCH Rd E										
Mov. From E To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
	S	W	N							
Lane 1	378	-	-	378	3.6	1238	0.305	100	27.0	2
Lane 2	-	243	-	243	0.0	355 ¹	0.685	100	NA	NA
Lane 3	-	-	114	114	0.9	187	0.607	100	9.6	2
Approach	378	243	114	735	2.0		0.685			
North: Pennant St										
Mov. From N To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
	E	S	W							
Lane 1	73	-	-	73	1.4	1170	0.062	100	0.0	2
Lane 2	-	289	-	289	5.6	760 ¹	0.380	100	NA	NA
Lane 3	-	293	-	293	5.6	773 ¹	0.380	100	NA	NA
Lane 4	-	-	11	11	10.0	235	0.045	100	0.0	3
Approach	73	582	11	665	5.2		0.380			
West: OCH Rd W										
Mov. From W To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
	N	E	S							
Lane 1	35	138	-	173	4.3	352	0.490	100	NA	NA
Lane 2	-	-	39	39	5.4	193	0.202	100	0.0	1
Lane 3	-	-	39	39	5.4	193	0.202	100	0.0	2
Approach	35	138	78	251	4.6		0.490			
Total %HV Deg. Satn (v/c)										
Intersection	2865	3.6		0.734						

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate % veh/h	pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Capacity Flow Rate veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: McMullen Ave											
Merge Type: Not Applied											
Full Length Lane	1		Merge Analysis not applied.								
Full Length Lane	2		Merge Analysis not applied.								
East Exit: OCH Rd E											
Merge Type: Not Applied											
Full Length Lane	1		Merge Analysis not applied.								
North Exit: Pennant St											
Merge Type: Not Applied											
Full Length Lane	1		Merge Analysis not applied.								
Full Length Lane	2		Merge Analysis not applied.								
West Exit: OCH Rd W											
Merge Type: Not Applied											
Full Length Lane	1		Merge Analysis not applied.								

PHASING SUMMARY

Site: TCS 3318 [Old Castle Hill Road/McMullen Avenue/
Pennant Street AM (Site Folder: Existing_2025_AM)]

Network: N101
[Existing_2025_AM (Network
Folder: Existing_2025)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog

Phase Times determined by the program

Downstream lane blockage effects included in determining phase times

Phase Sequence: TCS3318 SCATS - Partial

Reference Phase: Phase A

Input Phase Sequence: A, D, D1*, D2*, E, F1*, F2*, G, G1*, G2*

Output Phase Sequence: A, D, D2*, E, F1*, G

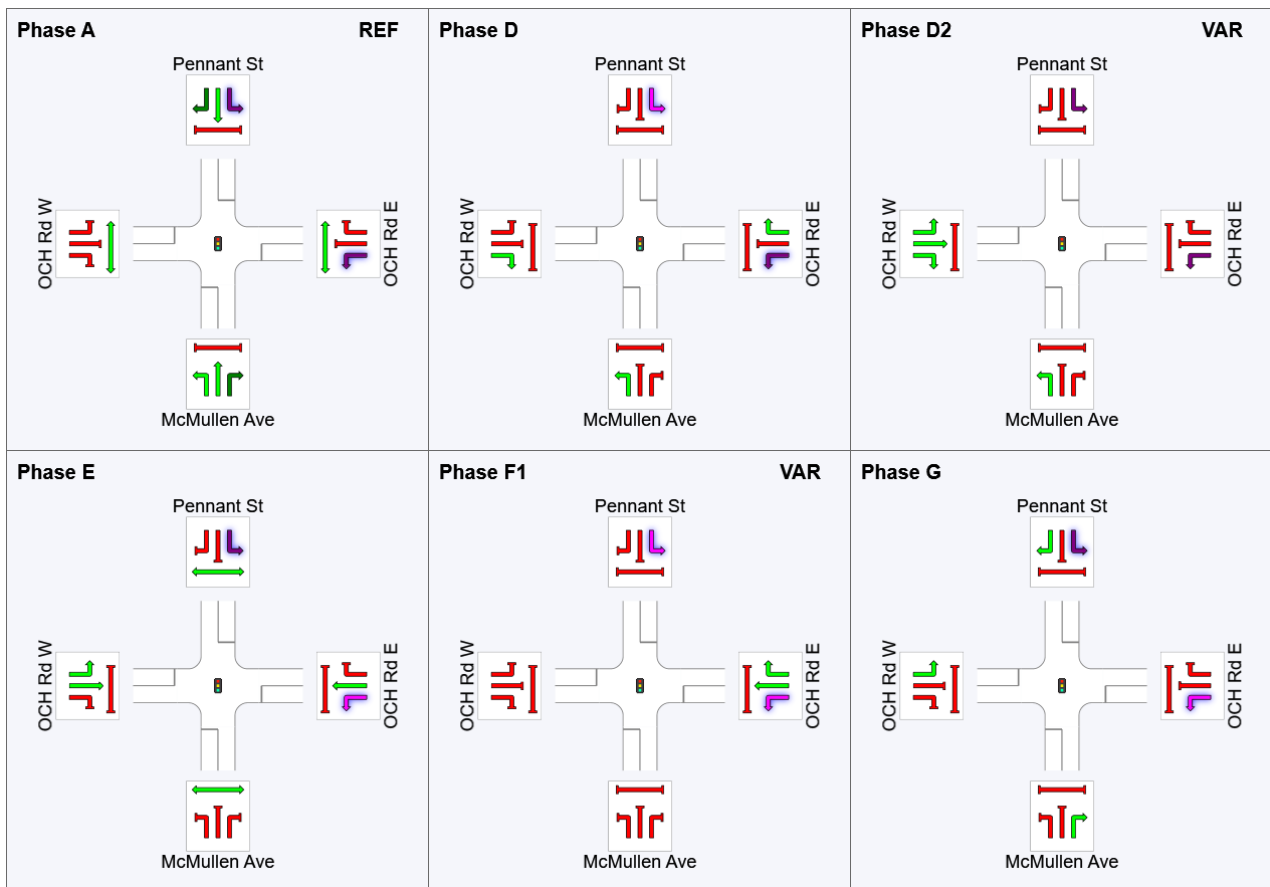
(* Variable Phase)

Phase Timing Summary

Phase	A	D	D2	E	F1	G
Phase Change Time (sec)	60	121	3	11	33	45
Green Time (sec)	55	6	2	16	6	9
Phase Time (sec)	61	12	8	22	12	15
Phase Split	47%	9%	6%	17%	9%	12%











See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class (MC) Running		Undetected Movement
	Mixed Running & Stopped MCs		Continuous Movement
	Other Movement Class (MC) Stopped		Phase Transition Applied

LANE SUMMARY

Site: 103 [Old Castle Hill Road/Garthowen Crescent South AM (Site Folder: Existing_2025_AM)]

Network: N101 [Existing_2025_AM (Network Folder: Existing_2025)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	[Total veh/h]	[HV %]	[Total veh/h]	[HV %]						[Veh]	[Dist m]				
South: Garthowen Cres South															
Lane 1	20	0.0	20	0.0	363	0.055	100	9.1	LOS A	0.1 ^{N5}	0.6 ^{N5}	Full	500	-48.6 ^{N3}	0.0
Approach	20	0.0	20	0.0		0.055		9.1	LOS A	0.1	0.6				
East: OCH Rd															
Lane 1	711	2.2	711	2.2	1922	0.370	100	0.0	LOS A	3.2 ^{N5}	22.7 ^{N5}	Full	115	0.0	0.0
Approach	711	2.2	711	2.2		0.370		0.0	NA	3.2	22.7				
West: OCH Rd															
Lane 1	393	2.9	393	2.9	1906	0.206	100	0.0	LOS A	0.0	0.1	Full	45	0.0	0.0
Approach	393	2.9	393	2.9		0.206		0.0	NA	0.0	0.1				
Intersection	1123	2.4	1123	2.4		0.370		0.2	NA	3.2	22.7				

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

Lane LOS values are based on average delay per lane.

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.

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

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

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

^{N3} Capacity Adjustment due to downstream lane blockage determined by the program.

^{N5} Continuous Lane results determined by Back of Queue values of downstream lanes (proportional to lane movement flows).

Approach Lane Flows (veh/h)										
South: Garthowen Cres South										
Mov. From S To Exit:	L2	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	19	1	20	0.0	363	0.055	100	NA	NA	
Approach	19	1	20	0.0		0.055				
East: OCH Rd										
Mov. From E To Exit:	L2	T1	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	1	709	711	2.2	1922	0.370	100	NA	NA	
Approach	1	709	711	2.2		0.370				
West: OCH Rd										
Mov. From W To Exit:	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	392	1	393	2.9	1906	0.206	100	NA	NA	
Approach	392	1	393	2.9		0.206				

	Total	%HV	Deg.Satn (v/c)
Intersection	1123	2.4	0.370

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Garthowen Cres South Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
East Exit: OCH Rd Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
West Exit: OCH Rd Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									

LANE SUMMARY

Site: 104 [Old Castle Hill Road/Garthowen Crescent North AM
(Site Folder: Existing_2025_AM)]

Network: N101
[Existing_2025_AM (Network Folder: Existing_2025)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance															
	DEMAND FLOWS [Total HV] veh/h %		ARRIVAL FLOWS [Total HV] veh/h %		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh Dist] m		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Garthowen Cres North															
Lane 1	16	0.0	16	0.0	430	0.037	100	12.0	LOS A	0.1	0.8	Full	500	0.0	0.0
Approach	16	0.0	16	0.0		0.037		12.0	LOS A	0.1	0.8				
East: OCH Rd															
Lane 1	705	2.2	705	2.2	1921	0.367	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	705	2.2	705	2.2		0.367		0.2	NA	0.0	0.0				
West: OCH Rd															
Lane 1	392	3.0	392	3.0	1809	0.216	100	0.7	LOS A	0.3	1.9	Full	115	0.0	0.0
Approach	392	3.0	392	3.0		0.216		0.7	NA	0.3	1.9				
Intersection	1113	2.5	1113	2.5		0.367		0.6	NA	0.3	1.9				

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

Lane LOS values are based on average delay per lane.

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.

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

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

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

Approach Lane Flows (veh/h)										
South: Garthowen Cres North										
Mov.	L2	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From S To Exit:	W	E			veh/h	v/c	%	%		
Lane 1	5	11	16	0.0	430	0.037	100	NA	NA	
Approach	5	11	16	0.0		0.037				
East: OCH Rd										
Mov.	L2	T1	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From E To Exit:	S	W			veh/h	v/c	%	%		
Lane 1	8	697	705	2.2	1921	0.367	100	NA	NA	
Approach	8	697	705	2.2		0.367				
West: OCH Rd										
Mov.	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From W To Exit:	E	S			veh/h	v/c	%	%		
Lane 1	376	16	392	3.0	1809	0.216	100	NA	NA	
Approach	376	16	392	3.0		0.216				
Total %HV Deg. Satn (v/c)										

Intersection 1113 2.5 0.367

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Garthowen Cres North Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
East Exit: OCH Rd Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
West Exit: OCH Rd Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									

LANE SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue PM (Site Folder: Existing_2025_PM)]

Network: N101 [Existing_2025_PM (Network Folder: Existing_2025)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total	HV]	[Total	HV]						[Veh	Dist]				
	veh/h	%	veh/h	%	veh/h	v/c	%	sec			m	m	%	%	
East: ON Rd E															
Lane 1	593	4.2	593	4.2	1475	0.402	100	4.9	LOS A	11.9	86.1	Full	205	0.0	0.0
Lane 2	593	4.2	593	4.2	1475	0.402	100	4.9	LOS A	11.9	86.1	Full	205	0.0	0.0
Lane 3	469	1.9	469	1.9	542	0.865	100	38.2	LOS C	21.8	154.9	Short	130	-19.9 ^{N3}	NA
Lane 4	586	1.9	586	1.9	677	0.865	100	35.5	LOS C	25.9	184.5	Short	130	0.0	NA
Approach	2240	3.1	2240	3.1		0.865		19.9	LOS B	25.9	184.5				
North: McMullen Ave															
Lane 1	434	1.7	434	1.7	1087	0.399	100	15.6	LOS B	10.9	77.5	Full	150	0.0	0.0
Lane 2	434	1.7	434	1.7	1087	0.399	100	15.2	LOS B	10.6	75.1	Full	150	0.0	0.0
Lane 3	117	8.5	117	8.5	229	0.513	100	62.5	LOS E	7.0	52.9	Short	55	0.0	NA
Lane 4	117	8.5	117	8.5	229	0.513	100	62.5	LOS E	7.0	52.9	Short	55	0.0	NA
Approach	1102	3.2	1102	3.2		0.513		25.4	LOS B	10.9	77.5				
West: ON Rd W															
Lane 1	201	6.8	201	6.8	935	0.215	100	29.2	LOS C	5.1	37.8	Short	65	-11.0 ^{N3}	NA
Lane 2	417	6.1	417	6.1	492 ¹	0.847	100	66.0	LOS E	27.1	199.2	Full	190	0.0	9.3
Lane 3	501	6.1	501	6.1	592	0.847	100	50.5	LOS D	32.0	235.8	Full	190	0.0	24.6
Approach	1119	6.2	1119	6.2		0.847		52.4	LOS D	32.0	235.8				
Intersection	4461	3.9	4461	3.9		0.865		29.4	LOS C	32.0	235.8				

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

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

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

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

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

¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

^{N3} Capacity Adjustment due to downstream lane blockage determined by the program.

Approach Lane Flows (veh/h)										
East: ON Rd E										
Mov.	T1	R2	Total	%HV	Cap.	Deg.	Lane	Prob.	Ov.	
From E					veh/h	Satn	Util.	SL	Ov.	Lane
To Exit:	W	N				v/c	%	%	%	No.
Lane 1	593	-	593	4.2	1475	0.402	100	NA	NA	
Lane 2	593	-	593	4.2	1475	0.402	100	NA	NA	
Lane 3	-	469	469	1.9	542	0.865	100	37.0		2
Lane 4	-	586	586	1.9	677	0.865	100	37.0		3
Approach	1185	1055	2240	3.1		0.865				
North: McMullen Ave										
Mov.	L2	R2	Total	%HV	Deg.	Lane	Prob.	Ov.		

From N To Exit:	E	W			Cap. veh/h	Satn v/c	Util. %	SL Ov. %	Lane No.
Lane 1	434	-	434	1.7	1087	0.399	100	NA	NA
Lane 2	434	-	434	1.7	1087	0.399	100	NA	NA
Lane 3	-	117	117	8.5	229	0.513	100	1.5	2
Lane 4	-	117	117	8.5	229	0.513	100	1.5	3
Approach	867	235	1102	3.2		0.513			
West: ON Rd W									
Mov. From W To Exit:	L2	T1	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
	N	E							
Lane 1	201	-	201	6.8	935	0.215	100	0.0	2
Lane 2	-	417	417	6.1	492 ¹	0.847	100	NA	NA
Lane 3	-	501	501	6.1	592	0.847	100	NA	NA
Approach	201	918	1119	6.2		0.847			
Total %HV Deg.Satn (v/c)									
Intersection	4461	3.9		0.865					

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis												
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Capacity Flow Rate veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec		
East Exit: ON Rd E												
Merge Type: Not Applied												
Full Length Lane	1										Merge Analysis not applied.	
Full Length Lane	2										Merge Analysis not applied.	
North Exit: McMullen Ave												
Merge Type: Not Applied												
Full Length Lane	1										Merge Analysis not applied.	
Full Length Lane	2										Merge Analysis not applied.	
West Exit: ON Rd W												
Merge Type: Not Applied												
Full Length Lane	1										Merge Analysis not applied.	
Full Length Lane	2										Merge Analysis not applied.	

PHASING SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue PM (Site Folder: Existing_2025_PM)]

Network: N101 [Existing_2025_PM (Network Folder: Existing_2025)]

New Site
 Site Category: (None)
 Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
 Phase Times determined by the program
 Downstream lane blockage effects included in determining phase times
 Phase Sequence: TCS2372 Scats - Import
 Reference Phase: Phase A
 Input Phase Sequence: A, B, C, D
 Output Phase Sequence: A, B, C, D

Phase Timing Summary

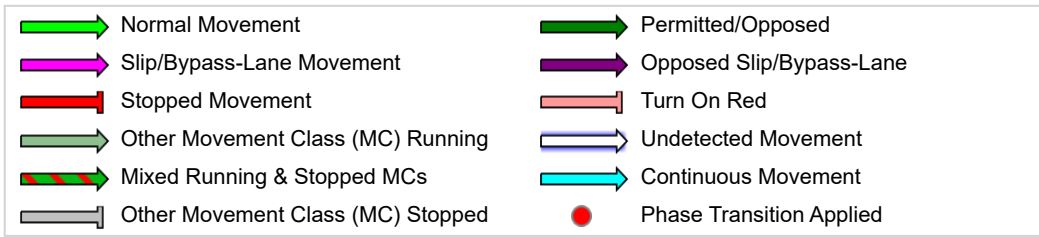
Phase	A	B	C	D
Phase Change Time (sec)	0	47	81	104
Green Time (sec)	41	28	17	20
Phase Time (sec)	47	34	23	26
Phase Split	36%	26%	18%	20%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
 VAR: Variable Phase



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Project: \\au2012-ntap01_cifs02\shared_projects\300305867\technical\modelling\251208_5867_16_20_ochr-JS.sip9

LANE SUMMARY

Site: TCS 3318 [Old Castle Hill Road/McMullen Avenue/
Pennant Street PM (Site Folder: Existing_2025_PM)]

Network: N101
[Existing_2025_PM (Network
Folder: Existing_2025)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total	HV]	[Total	HV]						[Veh	Dist]				
	veh/h	%	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: McMullen Ave															
Lane 1	630	1.9	630	1.9	882	0.714	100	21.5	LOS B	24.9	177.1	Full	150	0.0	20.0
Lane 2	431	2.6	431	2.6	604 ¹	0.714	100	27.8	LOS B	16.2	116.0	Full	150	0.0	0.0
Lane 3	211	5.0	211	5.0	500	0.421	100	33.7	LOS C	6.7	48.7	Short	35	0.0	NA
Approach	1272	2.6	1272	2.6		0.714		25.6	LOS B	24.9	177.1				
East: OCH Rd E															
Lane 1	185	7.4	185	7.4	1115	0.166	100	9.5	LOS A	3.5	26.1	Short	30	0.0	NA
Lane 2	126	0.0	126	0.0	270	0.468	100	57.7	LOS E	7.5	52.7	Full	45	0.0	19.3
Lane 3	86	1.2	86	1.2	127	0.677	100	71.8	LOS F	5.7	40.4	Short	35	0.0	NA
Approach	398	3.7	398	3.7		0.677		38.3	LOS C	7.5	52.7				
North: Pennant St															
Lane 1	115	0.0	115	0.0	1032	0.111	100	22.0	LOS B	1.7	12.1	Short	45	0.0	NA
Lane 2	302	3.0	302	3.0	500 ¹	0.605	100	55.5	LOS D	16.4	117.4	Full	110	0.0	10.9
Lane 3	333	3.0	333	3.0	551 ¹	0.605	100	58.4	LOS E	18.0	129.5	Full	110	0.0	19.8
Lane 4	19	0.0	19	0.0	338	0.056	100	40.7	LOS C	0.6	4.1	Short	45	0.0	NA
Approach	769	2.5	769	2.5		0.605		51.4	LOS D	18.0	129.5				
West: OCH Rd W															
Lane 1	292	0.7	292	0.7	426 ¹	0.685	100	58.5	LOS E	16.8	118.1	Full	80	0.0	40.6
Lane 2	148	0.4	148	0.4	242	0.611	100	51.1	LOS D	6.9	48.6	Short	50	0.0	NA
Lane 3	148	0.4	148	0.4	242	0.611	100	40.7	LOS C	6.9	48.6	Short	50	0.0	NA
Approach	587	0.5	587	0.5		0.685		52.2	LOS D	16.8	118.1				
Intersection	3026	2.3	3026	2.3		0.714		39.0	LOS C	24.9	177.1				

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

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

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

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

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

¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Approach Lane Flows (veh/h)										
South: McMullen Ave										
Mov. From S To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
	W	N	E							
Lane 1	163	467	-	630	1.9	882	0.714	100	NA	NA
Lane 2	-	431	-	431	2.6	604 ¹	0.714	100	NA	NA
Lane 3	-	-	211	211	5.0	500	0.421	100	35.0	2

Approach	163	898	211	1272	2.6		0.714				
East: OCH Rd E											
Mov. From E To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
	S	W	N								
Lane 1	185	-	-	185	7.4	1115	0.166	100	0.0	2	
Lane 2	-	126	-	126	0.0	270	0.468	100	NA	NA	
Lane 3	-	-	86	86	1.2	127	0.677	100	18.1	2	
Approach	185	126	86	398	3.7		0.677				
North: Pennant St											
Mov. From N To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
	E	S	W								
Lane 1	115	-	-	115	0.0	1032	0.111	100	0.0	2	
Lane 2	-	302	-	302	3.0	500 ¹	0.605	100	NA	NA	
Lane 3	-	333	-	333	3.0	551 ¹	0.605	100	NA	NA	
Lane 4	-	-	19	19	0.0	338	0.056	100	0.0	3	
Approach	115	636	19	769	2.5		0.605				
West: OCH Rd W											
Mov. From W To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
	N	E	S								
Lane 1	67	224	-	292	0.7	426 ¹	0.685	100	NA	NA	
Lane 2	-	-	148	148	0.4	242	0.611	100	2.4	1	
Lane 3	-	-	148	148	0.4	242	0.611	100	2.4	2	
Approach	67	224	296	587	0.5		0.685				
Total %HV Deg. Satn (v/c)											
Intersection	3026	2.3		0.714							

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Capacity Flow Rate veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec	
South Exit: McMullen Ave											
Merge Type: Not Applied											
Full Length Lane	1		Merge Analysis not applied.								
Full Length Lane	2		Merge Analysis not applied.								
East Exit: OCH Rd E											
Merge Type: Not Applied											
Full Length Lane	1		Merge Analysis not applied.								
North Exit: Pennant St											
Merge Type: Not Applied											
Full Length Lane	1		Merge Analysis not applied.								
Full Length Lane	2		Merge Analysis not applied.								
West Exit: OCH Rd W											
Merge Type: Not Applied											
Full Length Lane	1		Merge Analysis not applied.								

PHASING SUMMARY

Site: TCS 3318 [Old Castle Hill Road/McMullen Avenue/
Pennant Street PM (Site Folder: Existing_2025_PM)]

Network: N101
[Existing_2025_PM (Network
Folder: Existing_2025)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog

Phase Times determined by the program

Downstream lane blockage effects included in determining phase times

Phase Sequence: TCS3318 SCATS

Reference Phase: Phase A

Input Phase Sequence: A, D, D1*, D2*, E, F1*, F2*, G, G1*, G2*

Output Phase Sequence: A, D, E, F2*, G, G2*

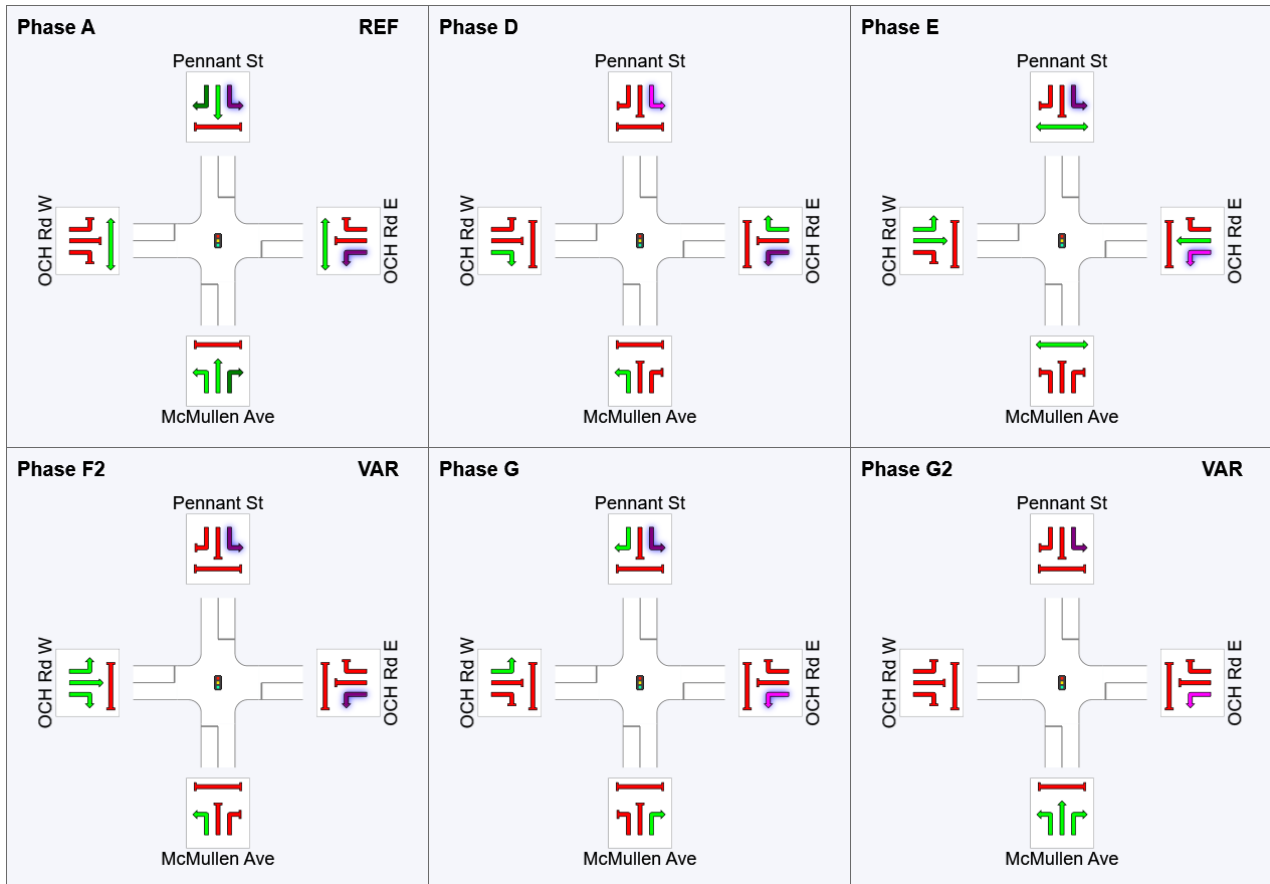
(* Variable Phase)

Phase Timing Summary

Phase	A	D	E	F2	G	G2
Phase Change Time (sec)	81	126	11	35	49	61
Green Time (sec)	39	9	18	8	6	14
Phase Time (sec)	45	15	24	14	12	20
Phase Split	35%	12%	18%	11%	9%	15%

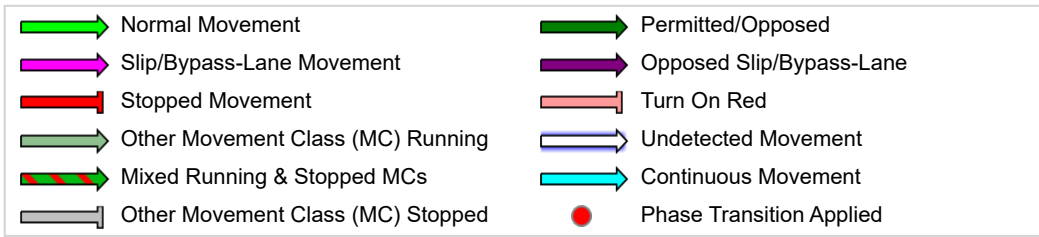
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase



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Project: \\au2012-ntap01_cifs02\shared_projects\300305867\technical\modelling\251208_5867_16_20_ochr-JS.sip9

LANE SUMMARY

Site: 103 [Old Castle Hill Road / Garthowen Crescent South PM (Site Folder: Existing_2025_PM)]

Network: N101 [Existing_2025_PM (Network Folder: Existing_2025)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total	HV]	[Total	HV]	veh/h	v/c	%	sec		[Veh	Dist]		m	%	%
	veh/h	%	veh/h	%	veh/h	v/c	%	sec		[Veh	Dist]		m	%	%
South: Garthowen Cres South															
Lane 1	17	0.0	17	0.0	865	0.019	100	7.1	LOS A	0.1	0.4	Full	500	-18.3 ^{N3}	0.0
Approach	17	0.0	17	0.0		0.019		7.1	LOS A	0.1	0.4				
East: OCH Rd															
Lane 1	382	3.9	382	3.9	1536	0.249	100	0.0	LOS A	0.0	0.0	Full	115	-19.2 ^{N3}	0.0
Approach	382	3.9	382	3.9		0.249		0.0	NA	0.0	0.0				
West: OCH Rd															
Lane 1	545	2.1	545	2.1	1921	0.284	100	0.0	LOS A	0.0	0.1	Full	45	0.0	0.0
Approach	545	2.1	545	2.1		0.284		0.0	NA	0.0	0.1				
Intersection	944	2.8	944	2.8		0.284		0.1	NA	0.1	0.4				

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

Lane LOS values are based on average delay per lane.

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.

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

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

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

^{N3} Capacity Adjustment due to downstream lane blockage determined by the program.

Approach Lane Flows (veh/h)										
South: Garthowen Cres South										
Mov.	L2	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Ov. Lane	
From S	W	E			veh/h	v/c	%	%	No.	
To Exit:										
Lane 1	16	1	17	0.0	865	0.019	100	NA	NA	
Approach	16	1	17	0.0		0.019				
East: OCH Rd										
Mov.	L2	T1	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Ov. Lane	
From E	S	W			veh/h	v/c	%	%	No.	
To Exit:										
Lane 1	1	381	382	3.9	1536	0.249	100	NA	NA	
Approach	1	381	382	3.9		0.249				
West: OCH Rd										
Mov.	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Ov. Lane	
From W	E	S			veh/h	v/c	%	%	No.	
To Exit:										
Lane 1	544	1	545	2.1	1921	0.284	100	NA	NA	
Approach	544	1	545	2.1		0.284				

	Total	%HV	Deg.Satn (v/c)
Intersection	944	2.8	0.284

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Garthowen Cres South Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
East Exit: OCH Rd Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
West Exit: OCH Rd Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									

LANE SUMMARY

Site: 104 [Old Castle Hill Road / Garthowen Crescent North
PM (Site Folder: Existing_2025_PM)]

Network: N101
[Existing_2025_PM (Network Folder: Existing_2025)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total	HV]	[Total	HV]	veh/h	v/c	%	sec		[Veh	Dist]		m	%	%
South: Garthowen Cres North															
Lane 1	9	0.0	9	0.0	636	0.015	100	9.1	LOS A	0.0	0.3	Full	500	0.0	0.0
Approach	9	0.0	9	0.0		0.015		9.1	LOS A	0.0	0.3				
East: OCH Rd															
Lane 1	374	3.9	374	3.9	1900	0.197	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	374	3.9	374	3.9		0.197		0.1	NA	0.0	0.0				
West: OCH Rd															
Lane 1	551	2.1	551	2.1	1845	0.298	100	0.7	LOS A	0.4	2.8	Full	115	0.0	0.0
Approach	551	2.1	551	2.1		0.298		0.7	NA	0.4	2.8				
Intersection	934	2.8	934	2.8		0.298		0.6	NA	0.4	2.8				

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

Lane LOS values are based on average delay per lane.

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.

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

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

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

Approach Lane Flows (veh/h)										
South: Garthowen Cres North										
Mov.	L2	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From S	W	E			veh/h	v/c	%	%		
To Exit:										
Lane 1	4	5	9	0.0	636	0.015	100	NA	NA	
Approach	4	5	9	0.0		0.015				
East: OCH Rd										
Mov.	L2	T1	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From E	S	W			veh/h	v/c	%	%		
To Exit:										
Lane 1	6	367	374	3.9	1900	0.197	100	NA	NA	
Approach	6	367	374	3.9		0.197				
West: OCH Rd										
Mov.	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From W	E	S			veh/h	v/c	%	%		
To Exit:										
Lane 1	511	40	551	2.1	1845	0.298	100	NA	NA	
Approach	511	40	551	2.1		0.298				
Total %HV Deg. Satn (v/c)										

Intersection	934	2.8	0.298
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Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

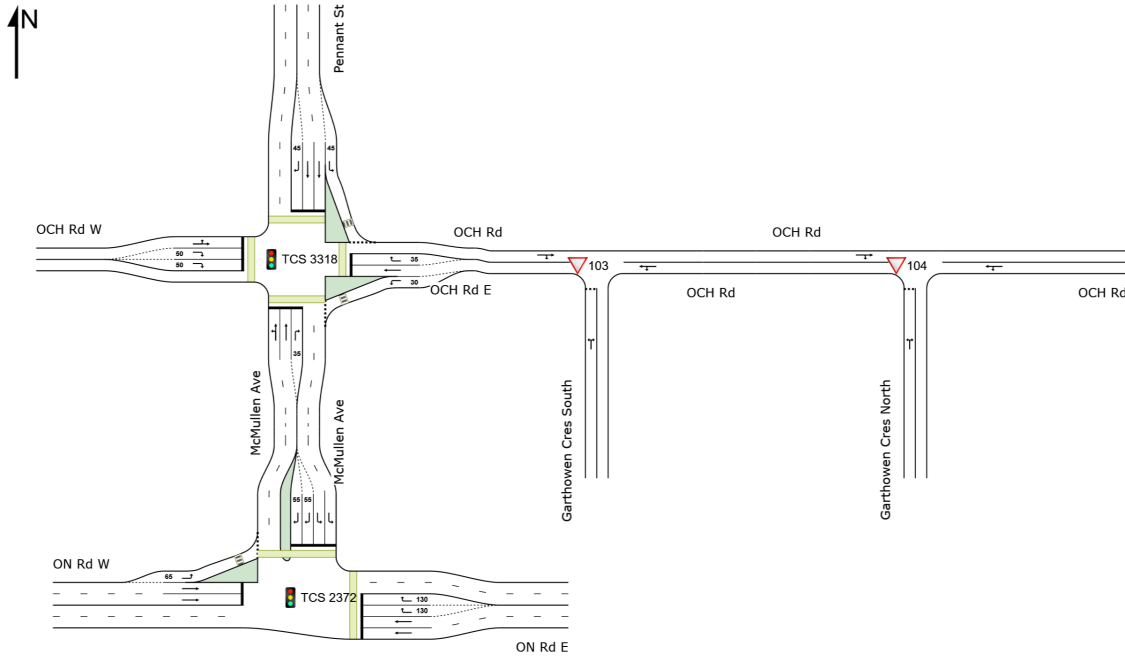
Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Garthowen Cres North											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
East Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
West Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									

NETWORK LAYOUT

Network: N101 [Opening_2029_without_development_AM
(Network Folder: Opening_2029_without_development)]

New Network
Network Category: (None)

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



SITES IN NETWORK		
Site ID	CCG ID	Site Name
TCS 2372	NA	Old Northern Road/McMullen Avenue AM
TCS 3318	NA	Old Castle Hill Road/McMullen Avenue/Pennant Street AM
▽103	NA	Old Castle Hill Road/Garthowen Crescent South AM
▽104	NA	Old Castle Hill Road/Garthowen Crescent North AM

LANE SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue AM (Site Folder: Opening_2029_wo_dev_AM)]

Network: N101 [Opening_2029_without_development_AM (Network Folder: Opening_2029_without_development)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h]	[HV %]	[Total veh/h]	[HV %]	veh/h	v/c	%	sec		[Veh]	[Dist]		m	%	%
East: ON Rd E															
Lane 1	624	5.0	624	5.0	1424	0.438	100	6.2	LOS A	14.2	103.6	Full	205	0.0	0.0
Lane 2	624	5.0	624	5.0	1424	0.438	100	6.2	LOS A	14.2	103.6	Full	205	0.0	12.6 ⁸
Lane 3	403	2.8	403	2.8	434	0.928	100	54.5	LOS D	23.2	166.0	Short	130	-31.1 ^{N3}	NA
Lane 4	585	2.8	585	2.8	630	0.928	100	47.5	LOS D	31.1	223.0	Short	130	0.0	NA
Approach	2237	4.0	2237	4.0		0.928		25.7	LOS B	31.1	223.0				
North: McMullen Ave															
Lane 1	367	4.6	367	4.6	1065	0.345	100	14.7	LOS B	7.0	50.9	Full	150	0.0	0.0
Lane 2	367	4.6	367	4.6	1065	0.345	100	14.6	LOS B	6.9	50.6	Full	150	0.0	0.0
Lane 3	145	6.2	145	6.2	274	0.531	100	46.6	LOS D	7.3	54.0	Short	55	0.0	NA
Lane 4	145	6.2	145	6.2	274	0.531	100	46.6	LOS D	7.3	54.0	Short	55	0.0	NA
Approach	1025	5.0	1025	5.0		0.531		23.7	LOS B	7.3	54.0				
West: ON Rd W															
Lane 1	224	8.0	224	8.0	869	0.258	100	16.4	LOS B	6.1	45.4	Short	65	-18.4 ^{N3}	NA
Lane 2	430	6.5	430	6.5	466 ¹	0.923	100	67.5	LOS E	30.8	227.2	Full	190	0.0	21.2
Lane 3	545	6.5	545	6.5	590	0.923	100	67.4	LOS E	40.6	299.6	Full	190	0.0	46.8
Approach	1199	6.8	1199	6.8		0.923		57.9	LOS E	40.6	299.6				
Intersection	4461	5.0	4461	5.0		0.928		33.9	LOS C	40.6	299.6				

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

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

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

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

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

¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

⁸ Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

^{N3} Capacity Adjustment due to downstream lane blockage determined by the program.

Approach Lane Flows (veh/h)										
East: ON Rd E										
Mov.	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL Ov.	Ov. Lane No.	
From E To Exit:	W	N			veh/h	v/c	%	%		
Lane 1	624	-	624	5.0	1424	0.438	100	NA	NA	
Lane 2	624	-	624	5.0	1424	0.438	100	NA	NA	
Lane 3	-	403	403	2.8	434	0.928	100	54.7	2	
Lane 4	-	585	585	2.8	630	0.928	100	54.7	3	

Approach	1248	988	2237	4.0		0.928				
North: McMullen Ave										
Mov. From N To Exit:	L2	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
	E	W								
Lane 1	367	-	367	4.6	1065	0.345	100	NA	NA	
Lane 2	367	-	367	4.6	1065	0.345	100	NA	NA	
Lane 3	-	145	145	6.2	274	0.531	100	3.3	2	
Lane 4	-	145	145	6.2	274	0.531	100	3.3	3	
Approach	735	291	1025	5.0		0.531				
West: ON Rd W										
Mov. From W To Exit:	L2	T1	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
	N	E								
Lane 1	224	-	224	8.0	869	0.258	100	0.0	2	
Lane 2	-	430	430	6.5	466 ¹	0.923	100	NA	NA	
Lane 3	-	545	545	6.5	590	0.923	100	NA	NA	
Approach	224	975	1199	6.8		0.923				
Total %HV Deg. Satn (v/c)										
Intersection	4461	5.0		0.928						

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

- 1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis												
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate % veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Capacity Flow Rate veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec		
East Exit: ON Rd E												
Merge Type: Not Applied												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
North Exit: McMullen Ave												
Merge Type: Not Applied												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
West Exit: ON Rd W												
Merge Type: Not Applied												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										

PHASING SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue AM (Site Folder: Opening_2029_wo_dev_AM)]

Network: N101 [Opening_2029_without_development_AM (Network Folder: Opening_2029_without_development)]

New Site
 Site Category: (None)
 Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
 Phase Times determined by the program
 Downstream lane blockage effects included in determining phase times
 Phase Sequence: TCS2372 Scats - Import
 Reference Phase: Phase A
 Input Phase Sequence: A, B, C, D
 Output Phase Sequence: A, B, C, D

Phase Timing Summary











Phase	A	B	C	D
Phase Change Time (sec)	0	47	78	104
Green Time (sec)	41	25	20	20
Phase Time (sec)	47	31	26	26
Phase Split	36%	24%	20%	20%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
 VAR: Variable Phase

	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class (MC) Running		Undetected Movement
	Mixed Running & Stopped MCs		Continuous Movement
	Other Movement Class (MC) Stopped		Phase Transition Applied

LANE SUMMARY

Site: TCS 3318 [Old Castle Hill Road/McMullen Avenue/
Pennant Street AM (Site Folder: Opening_2029_wo_dev_AM)]

Network: N101
[Opening_2029_without_develo
pment_AM (Network Folder:
Opening_2029_without_develop
ment)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	[Total veh/h	[HV %	[Total veh/h	[HV %						[Veh	[Dist] m				
South: McMullen Ave															
Lane 1	592	2.9	592	2.9	806	0.734	100	30.7	LOS C	27.9	199.8	Full	150	0.0	31.1
Lane 2	442	3.5	442	3.5	602 ¹	0.734	100	26.2	LOS B	17.6	126.6	Full	150	0.0	0.0
Lane 3	181	5.8	181	5.8	392	0.461	100	25.3	LOS B	6.6	48.5	Short	35	0.0	NA
Approach	1215	3.6	1215	3.6		0.734		28.3	LOS B	27.9	199.8				
East: OCH Rd E															
Lane 1	378	3.6	378	3.6	1238	0.305	100	6.4	LOS A	5.3	38.2	Short	30	0.0	NA
Lane 2	243	0.0	243	0.0	355 ¹	0.685	100	50.1	LOS D	10.5 ^{N4}	73.4 ^{N4}	Full	45	0.0	50.0
Lane 3	114	0.9	114	0.9	187	0.607	100	41.8	LOS C	5.2	36.8	Short	35	0.0	NA
Approach	735	2.0	735	2.0		0.685		26.3	LOS B	10.5	73.4				
North: Pennant St															
Lane 1	73	1.4	73	1.4	1170	0.062	100	7.8	LOS A	0.7	5.0	Short	45	0.0	NA
Lane 2	289	5.6	289	5.6	760 ¹	0.380	100	27.1	LOS B	12.3	90.3	Full	110	0.0	0.0
Lane 3	293	5.6	293	5.6	773 ¹	0.380	100	27.2	LOS B	12.5	92.1	Full	110	0.0	0.0
Lane 4	11	10.0	11	10.0	235	0.045	100	26.9	LOS B	0.3	2.4	Short	45	0.0	NA
Approach	665	5.2	665	5.2		0.380		25.1	LOS B	12.5	92.1				
West: OCH Rd W															
Lane 1	173	4.3	173	4.3	352	0.490	100	49.1	LOS D	9.5	68.6	Full	80	0.0	0.0
Lane 2	39	5.4	39	5.4	193	0.202	100	61.8	LOS E	2.3	16.9	Short	50	0.0	NA
Lane 3	39	5.4	39	5.4	193	0.202	100	61.8	LOS E	2.3	16.9	Short	50	0.0	NA
Approach	251	4.6	251	4.6		0.490		53.0	LOS D	9.5	68.6				
Intersectio n	2865	3.6	2865	3.6		0.734		29.2	LOS C	27.9	199.8				

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

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

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

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

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

¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

^{N4} Average back of queue has been restricted to the available queue storage space.

Approach Lane Flows (veh/h)											
South: McMullen Ave											
Mov. From S To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
Lane 1	142	450	-	592	2.9	806	0.734	100	NA	NA	

Lane 2	-	442	-	442	3.5	602 ¹	0.734	100	NA	NA
Lane 3	-	-	181	181	5.8	392	0.461	100	34.7	2
Approach	142	892	181	1215	3.6		0.734			
East: OCH Rd E										
Mov. From E To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	378	-	-	378	3.6	1238	0.305	100	27.0	2
Lane 2	-	243	-	243	0.0	355 ¹	0.685	100	NA	NA
Lane 3	-	-	114	114	0.9	187	0.607	100	9.6	2
Approach	378	243	114	735	2.0		0.685			
North: Pennant St										
Mov. From N To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	73	-	-	73	1.4	1170	0.062	100	0.0	2
Lane 2	-	289	-	289	5.6	760 ¹	0.380	100	NA	NA
Lane 3	-	293	-	293	5.6	773 ¹	0.380	100	NA	NA
Lane 4	-	-	11	11	10.0	235	0.045	100	0.0	3
Approach	73	582	11	665	5.2		0.380			
West: OCH Rd W										
Mov. From W To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	35	138	-	173	4.3	352	0.490	100	NA	NA
Lane 2	-	-	39	39	5.4	193	0.202	100	0.0	1
Lane 3	-	-	39	39	5.4	193	0.202	100	0.0	2
Approach	35	138	78	251	4.6		0.490			
Total %HV Deg. Satn (v/c)										
Intersection	2865	3.6		0.734						

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap sec	Follow-up Headway sec	Lane Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec	
South Exit: McMullen Ave											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									
East Exit: OCH Rd E											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
North Exit: Pennant St											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									
West Exit: OCH Rd W											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									

PHASING SUMMARY

Site: TCS 3318 [Old Castle Hill Road/McMullen Avenue/
Pennant Street AM (Site Folder: Opening_2029_wo_dev_AM)]

Network: N101
[Opening_2029_without_development_AM (Network Folder:
Opening_2029_without_development)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog

Phase Times determined by the program

Downstream lane blockage effects included in determining phase times

Phase Sequence: TCS3318 SCATS - Partial

Reference Phase: Phase A

Input Phase Sequence: A, D, D1*, D2*, E, F1*, F2*, G, G1*, G2*

Output Phase Sequence: A, D, D2*, E, F1*, G

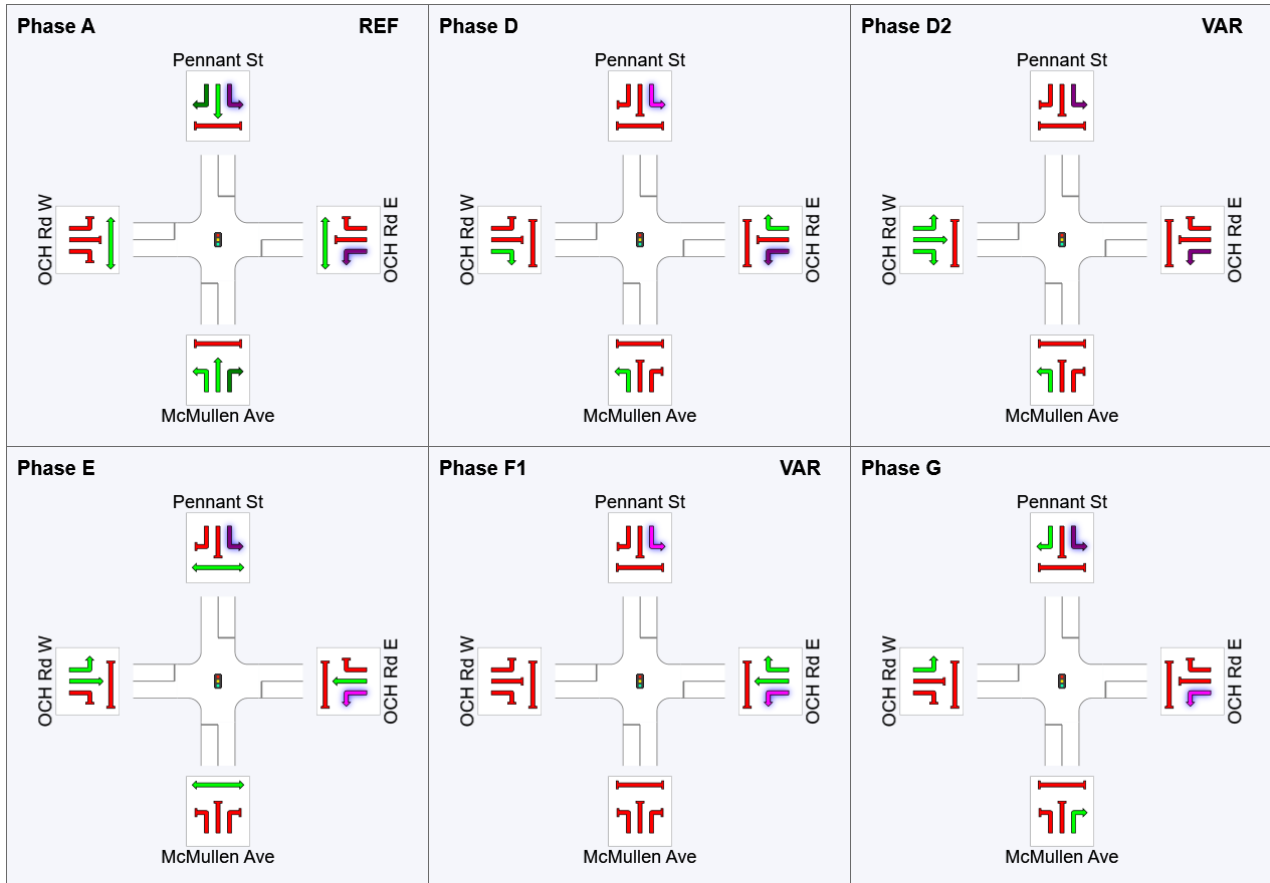
(* Variable Phase)

Phase Timing Summary

Phase	A	D	D2	E	F1	G
Phase Change Time (sec)	60	121	3	11	33	45
Green Time (sec)	55	6	2	16	6	9
Phase Time (sec)	61	12	8	22	12	15
Phase Split	47%	9%	6%	17%	9%	12%











See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class (MC) Running		Undetected Movement
	Mixed Running & Stopped MCs		Continuous Movement
	Other Movement Class (MC) Stopped		Phase Transition Applied

Lane 1	392	1	393	2.9	1906	0.206	100	NA	NA
Approach	392	1	393	2.9		0.206			
Total %HV Deg.Satn (v/c)									
Intersection	1123	2.4		0.370					

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis												
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Garthowen Cres South												
Merge Type: Not Applied												
Full Length Lane	1	Merge Analysis not applied.										
East Exit: OCH Rd												
Merge Type: Not Applied												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: OCH Rd												
Merge Type: Not Applied												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 104 [Old Castle Hill Road/Garthowen Crescent North AM
 (Site Folder: Opening_2029_wo_dev_AM)]

Network: N101
 [Opening_2029_without_development_AM (Network Folder:
 Opening_2029_without_development)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h	[HV %	[Total veh/h	[HV %	veh/h	v/c	%	sec		[Veh	[Dist] m		m	%	%
South: Garthowen Cres North															
Lane 1	16	0.0	16	0.0	430	0.037	100	12.0	LOS A	0.1	0.8	Full	500	0.0	0.0
Approach	16	0.0	16	0.0		0.037		12.0	LOS A	0.1	0.8				
East: OCH Rd															
Lane 1	705	2.2	705	2.2	1921	0.367	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	705	2.2	705	2.2		0.367		0.2	NA	0.0	0.0				
West: OCH Rd															
Lane 1	392	3.0	392	3.0	1809	0.216	100	0.7	LOS A	0.3	1.9	Full	115	0.0	0.0
Approach	392	3.0	392	3.0		0.216		0.7	NA	0.3	1.9				
Intersection	1113	2.5	1113	2.5		0.367		0.6	NA	0.3	1.9				

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

Lane LOS values are based on average delay per lane.

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.

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

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

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

Approach Lane Flows (veh/h)										
South: Garthowen Cres North										
Mov.	L2	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From S To Exit:	W	E			veh/h	v/c	%	%		
Lane 1	5	11	16	0.0	430	0.037	100	NA	NA	
Approach	5	11	16	0.0		0.037				
East: OCH Rd										
Mov.	L2	T1	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From E To Exit:	S	W			veh/h	v/c	%	%		
Lane 1	8	697	705	2.2	1921	0.367	100	NA	NA	
Approach	8	697	705	2.2		0.367				
West: OCH Rd										
Mov.	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From W To Exit:	E	S			veh/h	v/c	%	%		
Lane 1	376	16	392	3.0	1809	0.216	100	NA	NA	

Approach	376	16	392	3.0	0.216
Total %HV Deg.Satn (v/c)					
Intersection	1113	2.5	0.367		

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Garthowen Cres North											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
East Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
West Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									

LANE SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue PM (Site Folder: Opening_2029_wo_dev_PM)]

Network: N101 [Opening_2029_without_development_PM (Network Folder: Opening_2029_without_development)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h	[HV %	[Total veh/h	[HV %	veh/h	v/c	%	sec		[Veh	[Dist] m		m	%	%
East: ON Rd E															
Lane 1	593	4.2	593	4.2	1475	0.402	100	4.9	LOS A	11.9	86.1	Full	205	0.0	0.0
Lane 2	593	4.2	593	4.2	1475	0.402	100	4.9	LOS A	11.9	86.1	Full	205	0.0	0.0
Lane 3	469	1.9	469	1.9	542	0.865	100	38.2	LOS C	21.8	154.9	Short	130	-19.9 ^{N3}	NA
Lane 4	586	1.9	586	1.9	677	0.865	100	35.5	LOS C	25.9	184.5	Short	130	0.0	NA
Approach	2240	3.1	2240	3.1		0.865		19.9	LOS B	25.9	184.5				
North: McMullen Ave															
Lane 1	434	1.7	434	1.7	1087	0.399	100	15.6	LOS B	10.9	77.5	Full	150	0.0	0.0
Lane 2	434	1.7	434	1.7	1087	0.399	100	15.2	LOS B	10.6	75.1	Full	150	0.0	0.0
Lane 3	117	8.5	117	8.5	229	0.513	100	62.5	LOS E	7.0	52.9	Short	55	0.0	NA
Lane 4	117	8.5	117	8.5	229	0.513	100	62.5	LOS E	7.0	52.9	Short	55	0.0	NA
Approach	1102	3.2	1102	3.2		0.513		25.4	LOS B	10.9	77.5				
West: ON Rd W															
Lane 1	201	6.8	201	6.8	935	0.215	100	29.2	LOS C	5.1	37.8	Short	65	-11.0 ^{N3}	NA
Lane 2	417	6.1	417	6.1	492 ¹	0.847	100	66.0	LOS E	27.1	199.2	Full	190	0.0	9.3
Lane 3	501	6.1	501	6.1	592	0.847	100	50.5	LOS D	32.0	235.8	Full	190	0.0	24.6
Approach	1119	6.2	1119	6.2		0.847		52.4	LOS D	32.0	235.8				
Intersection	4461	3.9	4461	3.9		0.865		29.4	LOS C	32.0	235.8				

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

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

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

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

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

¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

^{N3} Capacity Adjustment due to downstream lane blockage determined by the program.

Approach Lane Flows (veh/h)										
East: ON Rd E										
Mov. From E To Exit:	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	593	-	593	4.2	1475	0.402	100	NA	NA	
Lane 2	593	-	593	4.2	1475	0.402	100	NA	NA	
Lane 3	-	469	469	1.9	542	0.865	100	37.0	2	
Lane 4	-	586	586	1.9	677	0.865	100	37.0	3	
Approach	1185	1055	2240	3.1		0.865				

North: McMullen Ave										
Mov. From N To Exit:	L2	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
	E	W								
Lane 1	434	-	434	1.7	1087	0.399	100	NA	NA	
Lane 2	434	-	434	1.7	1087	0.399	100	NA	NA	
Lane 3	-	117	117	8.5	229	0.513	100	1.5	2	
Lane 4	-	117	117	8.5	229	0.513	100	1.5	3	
Approach	867	235	1102	3.2		0.513				
West: ON Rd W										
Mov. From W To Exit:	L2	T1	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
	N	E								
Lane 1	201	-	201	6.8	935	0.215	100	0.0	2	
Lane 2	-	417	417	6.1	492 ¹	0.847	100	NA	NA	
Lane 3	-	501	501	6.1	592	0.847	100	NA	NA	
Approach	201	918	1119	6.2		0.847				
Total		%HV Deg. Satn (v/c)								
Intersection	4461	3.9	0.865							

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis												
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec	
East Exit: ON Rd E												
Merge Type: Not Applied												
Full Length Lane	1		Merge Analysis not applied.									
Full Length Lane	2		Merge Analysis not applied.									
North Exit: McMullen Ave												
Merge Type: Not Applied												
Full Length Lane	1		Merge Analysis not applied.									
Full Length Lane	2		Merge Analysis not applied.									
West Exit: ON Rd W												
Merge Type: Not Applied												
Full Length Lane	1		Merge Analysis not applied.									
Full Length Lane	2		Merge Analysis not applied.									

PHASING SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue PM (Site Folder: Opening_2029_wo_dev_PM)]

Network: N101 [Opening_2029_without_development_PM (Network Folder: Opening_2029_without_development)]

New Site
 Site Category: (None)
 Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
 Phase Times determined by the program
 Downstream lane blockage effects included in determining phase times
 Phase Sequence: TCS2372 Scats - Import
 Reference Phase: Phase A
 Input Phase Sequence: A, B, C, D
 Output Phase Sequence: A, B, C, D

Phase Timing Summary










Phase	A	B	C	D
Phase Change Time (sec)	0	47	81	104
Green Time (sec)	41	28	17	20
Phase Time (sec)	47	34	23	26
Phase Split	36%	26%	18%	20%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
 VAR: Variable Phase

	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class (MC) Running		Undetected Movement
	Mixed Running & Stopped MCs		Continuous Movement
	Other Movement Class (MC) Stopped		Phase Transition Applied

LANE SUMMARY

Site: TCS 3318 [Old Castle Hill Road/McMullen Avenue/
Pennant Street PM (Site Folder: Opening_2029_wo_dev_PM)]

Network: N101
[Opening_2029_without_development_PM (Network Folder:
Opening_2029_without_development)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h	[HV %	[Total veh/h	[HV %	veh/h	v/c	%	sec		[Veh	[Dist] m		m	%	%
South: McMullen Ave															
Lane 1	630	1.9	630	1.9	882	0.714	100	21.5	LOS B	24.9	177.1	Full	150	0.0	20.0
Lane 2	431	2.6	431	2.6	604 ¹	0.714	100	27.8	LOS B	16.2	116.0	Full	150	0.0	0.0
Lane 3	211	5.0	211	5.0	500	0.421	100	33.7	LOS C	6.7	48.7	Short	35	0.0	NA
Approach	1272	2.6	1272	2.6		0.714		25.6	LOS B	24.9	177.1				
East: OCH Rd E															
Lane 1	185	7.4	185	7.4	1115	0.166	100	9.5	LOS A	3.5	26.1	Short	30	0.0	NA
Lane 2	126	0.0	126	0.0	270	0.468	100	57.7	LOS E	7.5	52.7	Full	45	0.0	19.3
Lane 3	86	1.2	86	1.2	127	0.677	100	71.8	LOS F	5.7	40.4	Short	35	0.0	NA
Approach	398	3.7	398	3.7		0.677		38.3	LOS C	7.5	52.7				
North: Pennant St															
Lane 1	115	0.0	115	0.0	1032	0.111	100	22.0	LOS B	1.7	12.1	Short	45	0.0	NA
Lane 2	302	3.0	302	3.0	500 ¹	0.605	100	55.5	LOS D	16.4	117.4	Full	110	0.0	10.9
Lane 3	333	3.0	333	3.0	551 ¹	0.605	100	58.4	LOS E	18.0	129.5	Full	110	0.0	19.8
Lane 4	19	0.0	19	0.0	338	0.056	100	40.7	LOS C	0.6	4.1	Short	45	0.0	NA
Approach	769	2.5	769	2.5		0.605		51.4	LOS D	18.0	129.5				
West: OCH Rd W															
Lane 1	292	0.7	292	0.7	426 ¹	0.685	100	58.5	LOS E	16.8	118.1	Full	80	0.0	40.6
Lane 2	148	0.4	148	0.4	242	0.611	100	51.1	LOS D	6.9	48.6	Short	50	0.0	NA
Lane 3	148	0.4	148	0.4	242	0.611	100	40.7	LOS C	6.9	48.6	Short	50	0.0	NA
Approach	587	0.5	587	0.5		0.685		52.2	LOS D	16.8	118.1				
Intersection	3026	2.3	3026	2.3		0.714		39.0	LOS C	24.9	177.1				

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

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

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

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

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

¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Approach Lane Flows (veh/h)											
South: McMullen Ave											
Mov. From S To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	163	467	-	630	1.9	882	0.714	100	NA	NA	
Lane 2	-	431	-	431	2.6	604 ¹	0.714	100	NA	NA	

Lane 3	-	-	211	211	5.0	500	0.421	100	35.0	2
Approach	163	898	211	1272	2.6		0.714			
East: OCH Rd E										
Mov. From E To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	185	-	-	185	7.4	1115	0.166	100	0.0	2
Lane 2	-	126	-	126	0.0	270	0.468	100	NA	NA
Lane 3	-	-	86	86	1.2	127	0.677	100	18.1	2
Approach	185	126	86	398	3.7		0.677			
North: Pennant St										
Mov. From N To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	115	-	-	115	0.0	1032	0.111	100	0.0	2
Lane 2	-	302	-	302	3.0	500 ¹	0.605	100	NA	NA
Lane 3	-	333	-	333	3.0	551 ¹	0.605	100	NA	NA
Lane 4	-	-	19	19	0.0	338	0.056	100	0.0	3
Approach	115	636	19	769	2.5		0.605			
West: OCH Rd W										
Mov. From W To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	67	224	-	292	0.7	426 ¹	0.685	100	NA	NA
Lane 2	-	-	148	148	0.4	242	0.611	100	2.4	1
Lane 3	-	-	148	148	0.4	242	0.611	100	2.4	2
Approach	67	224	296	587	0.5		0.685			
Total %HV Deg. Satn (v/c)										
Intersection	3026	2.3					0.714			

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate % veh/h	Critical Gap sec	Follow-up Headway sec	Lane Capacity Flow Rate veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec	
South Exit: McMullen Ave Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									
East Exit: OCH Rd E Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
North Exit: Pennant St Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									
West Exit: OCH Rd W Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									

PHASING SUMMARY

Site: TCS 3318 [Old Castle Hill Road/McMullen Avenue/
Pennant Street PM (Site Folder: Opening_2029_wo_dev_PM)]

Network: N101
[Opening_2029_without_development_PM (Network Folder:
Opening_2029_without_development)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog

Phase Times determined by the program

Downstream lane blockage effects included in determining phase times

Phase Sequence: TCS3318 SCATS

Reference Phase: Phase A

Input Phase Sequence: A, D, D1*, D2*, E, F1*, F2*, G, G1*, G2*

Output Phase Sequence: A, D, E, F2*, G, G2*

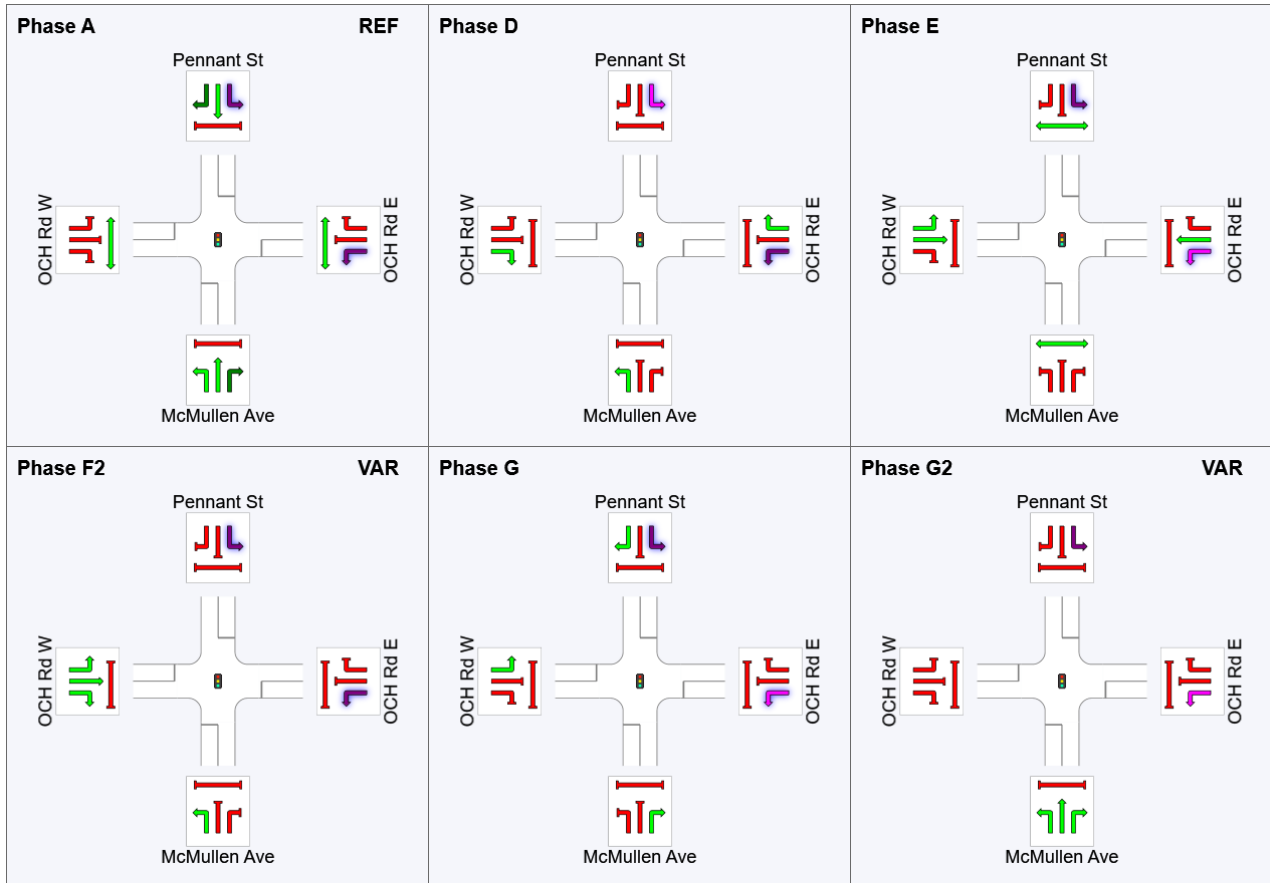
(* Variable Phase)

Phase Timing Summary

Phase	A	D	E	F2	G	G2
Phase Change Time (sec)	81	126	11	35	49	61
Green Time (sec)	39	9	18	8	6	14
Phase Time (sec)	45	15	24	14	12	20
Phase Split	35%	12%	18%	11%	9%	15%

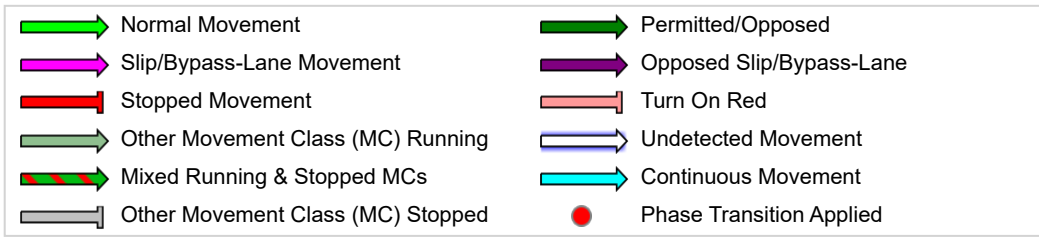
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase



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Organisation: STANTEC NEW ZEALAND | Licence: NETWORK / Enterprise | Processed: Wednesday, 10 December 2025 11:39:05 AM
 Project: \\au2012-ntap01_cifs02\shared_projects\300305867\technical\modelling\251208_5867_16_20_ochr-JS.sip9

LANE SUMMARY

Site: 103 [Old Castle Hill Road / Garthowen Crescent South PM (Site Folder: Opening_2029_wo_dev_PM)]

Network: N101 [Opening_2029_without_development_PM (Network Folder: Opening_2029_without_development)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h	[HV %	[Total veh/h	[HV %	veh/h	v/c	%	sec		[Veh	[Dist] m		m	%	%
South: Garthowen Cres South															
Lane 1	17	0.0	17	0.0	865	0.019	100	7.1	LOS A	0.1	0.4	Full	500	-18.3 ^{N3}	0.0
Approach	17	0.0	17	0.0		0.019		7.1	LOS A	0.1	0.4				
East: OCH Rd															
Lane 1	382	3.9	382	3.9	1536	0.249	100	0.0	LOS A	0.0	0.0	Full	115	-19.2 ^{N3}	0.0
Approach	382	3.9	382	3.9		0.249		0.0	NA	0.0	0.0				
West: OCH Rd															
Lane 1	545	2.1	545	2.1	1921	0.284	100	0.0	LOS A	0.0	0.1	Full	45	0.0	0.0
Approach	545	2.1	545	2.1		0.284		0.0	NA	0.0	0.1				
Intersection	944	2.8	944	2.8		0.284		0.1	NA	0.1	0.4				

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

Lane LOS values are based on average delay per lane.

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.

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

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

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

^{N3} Capacity Adjustment due to downstream lane blockage determined by the program.

Approach Lane Flows (veh/h)										
South: Garthowen Cres South										
Mov. From S To Exit:	L2	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
	W	E								
Lane 1	16	1	17	0.0	865	0.019	100	NA	NA	
Approach	16	1	17	0.0		0.019				
East: OCH Rd										
Mov. From E To Exit:	L2	T1	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
	S	W								
Lane 1	1	381	382	3.9	1536	0.249	100	NA	NA	
Approach	1	381	382	3.9		0.249				
West: OCH Rd										
Mov. From W To Exit:	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
	E	S								
Lane 1	544	1	545	2.1	1921	0.284	100	NA	NA	

Approach	544	1	545	2.1	0.284
Total %HV Deg.Satn (v/c)					
Intersection	944	2.8		0.284	

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Garthowen Cres South											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
East Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
West Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									

LANE SUMMARY

Site: 104 [Old Castle Hill Road / Garthowen Crescent North PM (Site Folder: Opening_2029_wo_dev_PM)]

Network: N101 [Opening_2029_without_development_PM (Network Folder: Opening_2029_without_development)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Lane Use and Performance															
	DEMAND FLOWS [Total HV]		ARRIVAL FLOWS [Total HV]		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh Dist]		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Garthowen Cres North															
Lane 1	9	0.0	9	0.0	636	0.015	100	9.1	LOS A	0.0	0.3	Full	500	0.0	0.0
Approach	9	0.0	9	0.0		0.015		9.1	LOS A	0.0	0.3				
East: OCH Rd															
Lane 1	374	3.9	374	3.9	1900	0.197	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	374	3.9	374	3.9		0.197		0.1	NA	0.0	0.0				
West: OCH Rd															
Lane 1	551	2.1	551	2.1	1845	0.298	100	0.7	LOS A	0.4	2.8	Full	115	0.0	0.0
Approach	551	2.1	551	2.1		0.298		0.7	NA	0.4	2.8				
Intersection	934	2.8	934	2.8		0.298		0.6	NA	0.4	2.8				

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

Lane LOS values are based on average delay per lane.

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.

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

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

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

Approach Lane Flows (veh/h)										
South: Garthowen Cres North										
Mov. From S To Exit:	L2	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
Lane 1	4	5	9	0.0	636	0.015	100	NA	NA	
Approach	4	5	9	0.0		0.015				
East: OCH Rd										
Mov. From E To Exit:	L2	T1	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
Lane 1	6	367	374	3.9	1900	0.197	100	NA	NA	
Approach	6	367	374	3.9		0.197				
West: OCH Rd										
Mov. From W To Exit:	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
Lane 1	511	40	551	2.1	1845	0.298	100	NA	NA	

Approach	511	40	551	2.1	0.298
Total %HV Deg.Satn (v/c)					
Intersection	934	2.8		0.298	

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

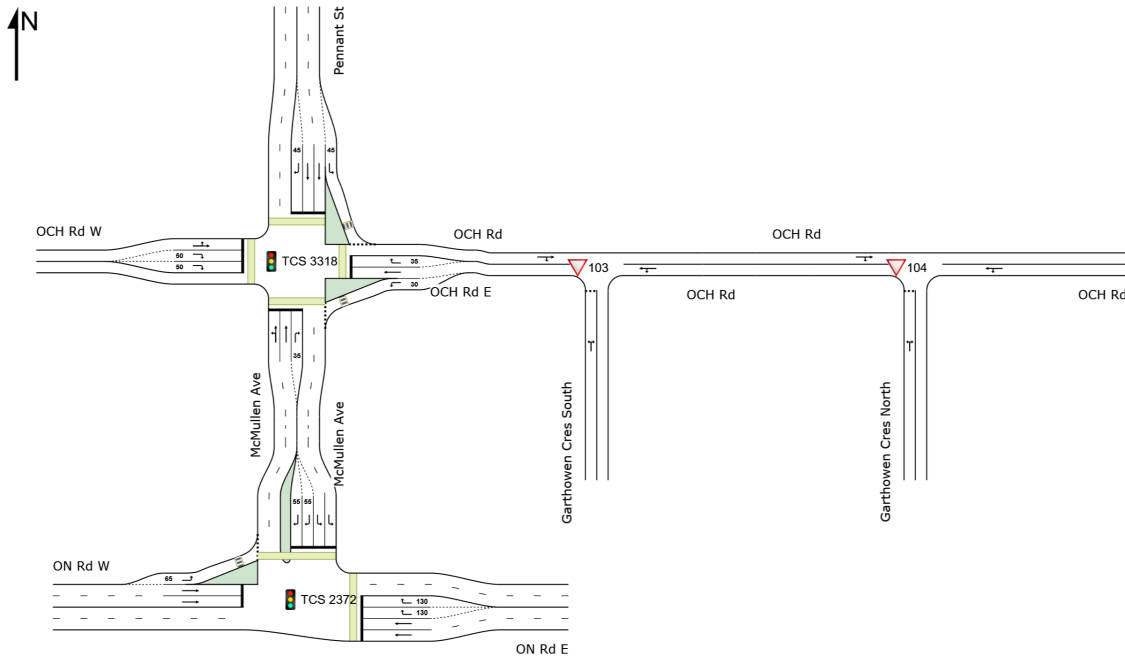
Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap sec	Follow-up Headway sec	Lane Capacity Flow Rate veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec	
South Exit: Garthowen Cres North											
Merge Type: Not Applied											
Full Length Lane	1										Merge Analysis not applied.
East Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1										Merge Analysis not applied.
West Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1										Merge Analysis not applied.

NETWORK LAYOUT

Network: N101 [Opening_2029_with_dev_AM (Network Folder: Opening_2029_with_development)]

New Network
Network Category: (None)

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



SITES IN NETWORK		
Site ID	CCG ID	Site Name
TCS 2372	NA	Old Northern Road/McMullen Avenue AM
TCS 3318	NA	Old Castle Hill Road/McMullen Avenue/Pennant Street AM
▽103	NA	Old Castle Hill Road/Garthowen Crescent South AM
▽104	NA	Old Castle Hill Road/Garthowen Crescent North AM

LANE SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue AM (Site Folder: Opening_2029_with_dev_AM)]

Network: N101 [Opening_2029_with_dev_AM (Network Folder: Opening_2029_with_development)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	[Total veh/h	HV %	[Total veh/h	HV %						[Veh	Dist] m				
East: ON Rd E															
Lane 1	624	5.0	624	5.0	1424	0.438	100	6.2	LOS A	14.2	103.6	Full	205	0.0	0.0
Lane 2	624	5.0	624	5.0	1424	0.438	100	6.2	LOS A	14.2	103.6	Full	205	0.0	18.5 ⁸
Lane 3	401	2.7	401	2.7	425	0.944	100	60.9	LOS E	24.2	173.5	Short	130	-32.6 ^{N3}	NA
Lane 4	595	2.7	595	2.7	631	0.944	100	53.0	LOS D	33.2	237.8	Short	130	0.0	NA
Approach	2244	4.0	2244	4.0		0.944		28.3	LOS B	33.2	237.8				
North: McMullen Ave															
Lane 1	378	4.5	378	4.5	1066	0.355	100	15.3	LOS B	7.7	55.9	Full	150	0.0	0.0
Lane 2	378	4.5	378	4.5	1066	0.355	100	14.7	LOS B	7.2	52.6	Full	150	0.0	0.0
Lane 3	155	5.8	155	5.8	274	0.566	100	46.9	LOS D	8.0	58.5	Short	55	0.0	NA
Lane 4	155	5.8	155	5.8	274	0.566	100	46.9	LOS D	8.0	58.5	Short	55	0.0	NA
Approach	1067	4.8	1067	4.8		0.566		24.3	LOS B	8.0	58.5				
West: ON Rd W															
Lane 1	228	7.8	228	7.8	852	0.268	100	17.0	LOS B	6.3	47.4	Short	65	-19.8 ^{N3}	NA
Lane 2	428	6.5	428	6.5	462 ¹	0.926	100	68.4	LOS E	30.8	227.7	Full	190	0.0	21.4
Lane 3	547	6.5	547	6.5	590	0.926	100	68.3	LOS E	41.0	302.8	Full	190	0.0	47.8
Approach	1203	6.7	1203	6.7		0.926		58.6	LOS E	41.0	302.8				
Intersection	4515	4.9	4515	4.9		0.944		35.4	LOS C	41.0	302.8				

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

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

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

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

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

¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

⁸ Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

^{N3} Capacity Adjustment due to downstream lane blockage determined by the program.

Approach Lane Flows (veh/h)										
East: ON Rd E										
Mov. From E To Exit:	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
	W	N								
Lane 1	624	-	624	5.0	1424	0.438	100	NA	NA	
Lane 2	624	-	624	5.0	1424	0.438	100	NA	NA	
Lane 3	-	401	401	2.7	425	0.944	100	60.8	2	
Lane 4	-	595	595	2.7	631	0.944	100	60.8	3	

Approach	1248	996	2244	4.0		0.944				
North: McMullen Ave										
Mov. From N To Exit:	L2	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
	E	W								
Lane 1	378	-	378	4.5	1066	0.355	100	NA	NA	
Lane 2	378	-	378	4.5	1066	0.355	100	NA	NA	
Lane 3	-	155	155	5.8	274	0.566	100	10.5	2	
Lane 4	-	155	155	5.8	274	0.566	100	10.5	3	
Approach	757	311	1067	4.8		0.566				
West: ON Rd W										
Mov. From W To Exit:	L2	T1	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
	N	E								
Lane 1	228	-	228	7.8	852	0.268	100	0.0	2	
Lane 2	-	428	428	6.5	462 ¹	0.926	100	NA	NA	
Lane 3	-	547	547	6.5	590	0.926	100	NA	NA	
Approach	228	975	1203	6.7		0.926				
Total %HV Deg. Satn (v/c)										
Intersection	4515	4.9		0.944						

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

- 1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Capacity Flow Rate veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec	
East Exit: ON Rd E											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									
North Exit: McMullen Ave											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									
West Exit: ON Rd W											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									

PHASING SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue AM (Site Folder: Opening_2029_with_dev_AM)]

Network: N101 [Opening_2029_with_dev_AM (Network Folder: Opening_2029_with_development)]

New Site
 Site Category: (None)
 Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

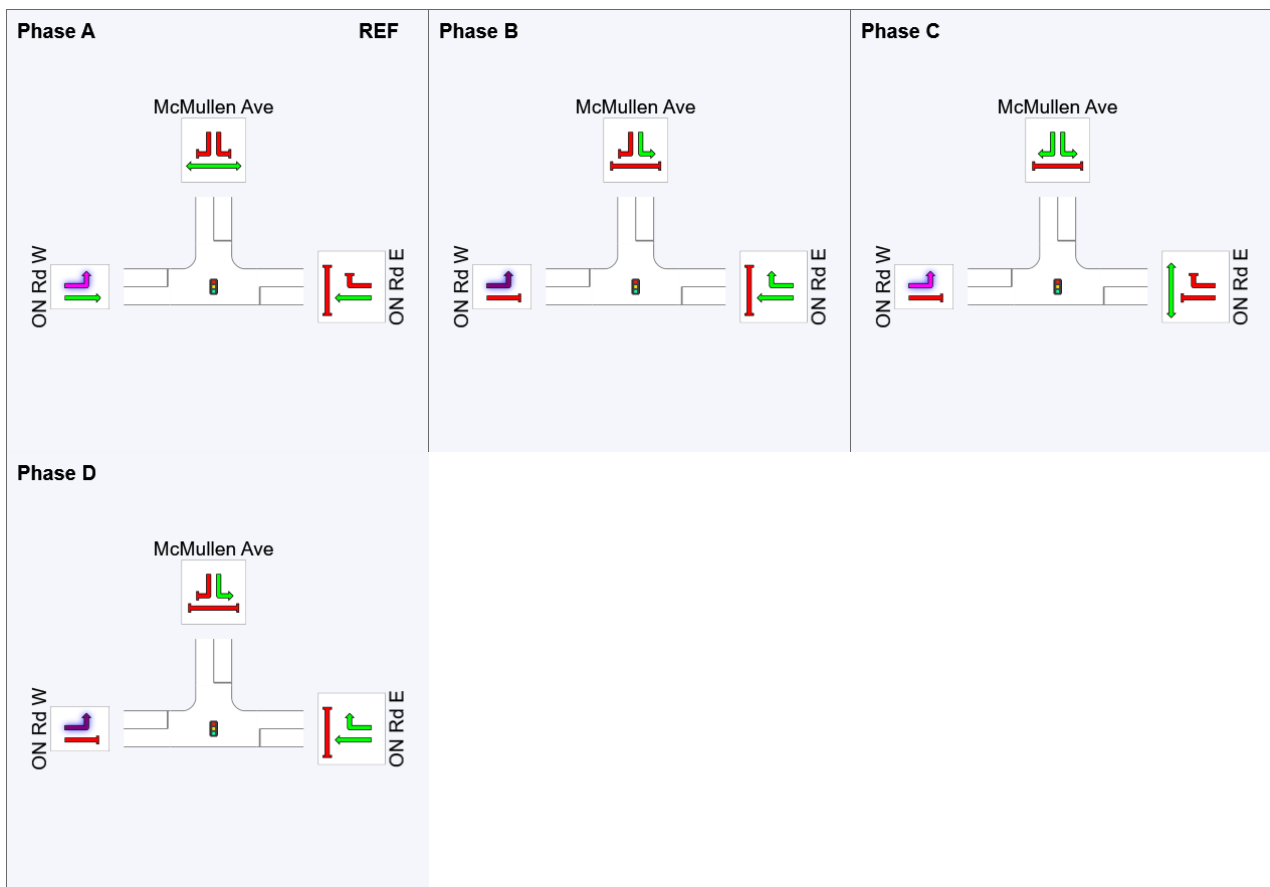
Timings based on settings in the Network Timing dialog
 Phase Times determined by the program
 Downstream lane blockage effects included in determining phase times
 Phase Sequence: TCS2372 Scats - Import
 Reference Phase: Phase A
 Input Phase Sequence: A, B, C, D
 Output Phase Sequence: A, B, C, D

Phase Timing Summary












Phase	A	B	C	D
Phase Change Time (sec)	0	47	78	104
Green Time (sec)	41	25	20	20
Phase Time (sec)	47	31	26	26
Phase Split	36%	24%	20%	20%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
 VAR: Variable Phase

	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class (MC) Running		Undetected Movement
	Mixed Running & Stopped MCs		Continuous Movement
	Other Movement Class (MC) Stopped		Phase Transition Applied

LANE SUMMARY

Site: TCS 3318 [Old Castle Hill Road/McMullen Avenue/
Pennant Street AM (Site Folder: Opening_2029_with_dev_AM)]

Network: N101
[Opening_2029_with_dev_AM
(Network Folder:
Opening_2029_with_development)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total	HV]	[Total	HV]	veh/h	v/c	%	sec		[Veh	Dist]		m	%	%
	veh/h	%	veh/h	%	veh/h	v/c	%	sec		Dist]	m		m	%	%
South: McMullen Ave															
Lane 1	596	2.9	596	2.9	806	0.739	100	31.1	LOS C	28.3	203.1	Full	150	0.0	32.6
Lane 2	437	3.5	437	3.5	592 ¹	0.739	100	26.4	LOS B	17.4	125.8	Full	150	0.0	0.0
Lane 3	193	5.5	193	5.5	393	0.490	100	25.5	LOS B	7.1	51.7	Short	35	0.0	NA
Approach	1226	3.5	1226	3.5		0.739		28.5	LOS C	28.3	203.1				
East: OCH Rd E															
Lane 1	420	3.3	420	3.3	1241	0.339	100	6.6	LOS A	6.1	43.9	Short	30	0.0	NA
Lane 2	243	0.0	243	0.0	347 ¹	0.701	100	50.5	LOS D	10.5 ^{N4}	73.4 ^{N4}	Full	45	0.0	50.0
Lane 3	127	0.8	127	0.8	187	0.679	100	42.8	LOS D	6.0	42.1	Short	35	0.0	NA
Approach	791	1.9	791	1.9		0.701		25.9	LOS B	10.5	73.4				
North: Pennant St															
Lane 1	75	1.4	75	1.4	1157	0.065	100	8.0	LOS A	0.8	5.4	Short	45	0.0	NA
Lane 2	289	5.6	289	5.6	759 ¹	0.380	100	27.1	LOS B	12.3	90.3	Full	110	0.0	0.0
Lane 3	294	5.6	294	5.6	773 ¹	0.380	100	27.2	LOS B	12.6	92.1	Full	110	0.0	0.0
Lane 4	11	10.0	11	10.0	234	0.045	100	27.2	LOS B	0.3	2.4	Short	45	0.0	NA
Approach	667	5.2	667	5.2		0.380		25.0	LOS B	12.6	92.1				
West: OCH Rd W															
Lane 1	173	4.3	173	4.3	352	0.490	100	49.1	LOS D	9.5	68.6	Full	80	0.0	0.0
Lane 2	39	5.4	39	5.4	193	0.202	100	61.8	LOS E	2.3	16.9	Short	50	0.0	NA
Lane 3	39	5.4	39	5.4	193	0.202	100	61.8	LOS E	2.3	16.9	Short	50	0.0	NA
Approach	251	4.6	251	4.6		0.490		53.0	LOS D	9.5	68.6				
Intersection	2935	3.6	2935	3.6		0.739		29.1	LOS C	28.3	203.1				

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

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

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

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

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

¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

^{N4} Average back of queue has been restricted to the available queue storage space.

Approach Lane Flows (veh/h)											
South: McMullen Ave											
Mov. From S To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util.	Prob. SL %	Ov. Lane No.	
	W	N	E								
Lane 1	142	454	-	596	2.9	806	0.739	100	NA	NA	

Lane 2	-	437	-	437	3.5	592 ¹	0.739	100	NA	NA
Lane 3	-	-	193	193	5.5	393	0.490	100	40.7	2
Approach	142	892	193	1226	3.5		0.739			
East: OCH Rd E										
Mov. From E To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	420	-	-	420	3.3	1241	0.339	100	39.7	2
Lane 2	-	243	-	243	0.0	347 ¹	0.701	100	NA	NA
Lane 3	-	-	127	127	0.8	187	0.679	100	21.8	2
Approach	420	243	127	791	1.9		0.701			
North: Pennant St										
Mov. From N To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	75	-	-	75	1.4	1157	0.065	100	0.0	2
Lane 2	-	289	-	289	5.6	759 ¹	0.380	100	NA	NA
Lane 3	-	294	-	294	5.6	773 ¹	0.380	100	NA	NA
Lane 4	-	-	11	11	10.0	234	0.045	100	0.0	3
Approach	75	582	11	667	5.2		0.380			
West: OCH Rd W										
Mov. From W To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	35	138	-	173	4.3	352	0.490	100	NA	NA
Lane 2	-	-	39	39	5.4	193	0.202	100	0.0	1
Lane 3	-	-	39	39	5.4	193	0.202	100	0.0	2
Approach	35	138	78	251	4.6		0.490			
Total %HV Deg. Satn (v/c)										
Intersection	2935	3.6					0.739			

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap sec	Follow-up Headway sec	Lane Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec	
South Exit: McMullen Ave											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									
East Exit: OCH Rd E											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
North Exit: Pennant St											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									
West Exit: OCH Rd W											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									

PHASING SUMMARY

Site: TCS 3318 [Old Castle Hill Road/McMullen Avenue/
Pennant Street AM (Site Folder: Opening_2029_with_dev_AM)]

Network: N101
[Opening_2029_with_dev_AM
(Network Folder:
Opening_2029_with_developme
nt)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog

Phase Times determined by the program

Downstream lane blockage effects included in determining phase times

Phase Sequence: TCS3318 SCATS - Partial

Reference Phase: Phase A

Input Phase Sequence: A, D, D1*, D2*, E, F1*, F2*, G, G1*, G2*

Output Phase Sequence: A, D, D2*, E, F1*, G

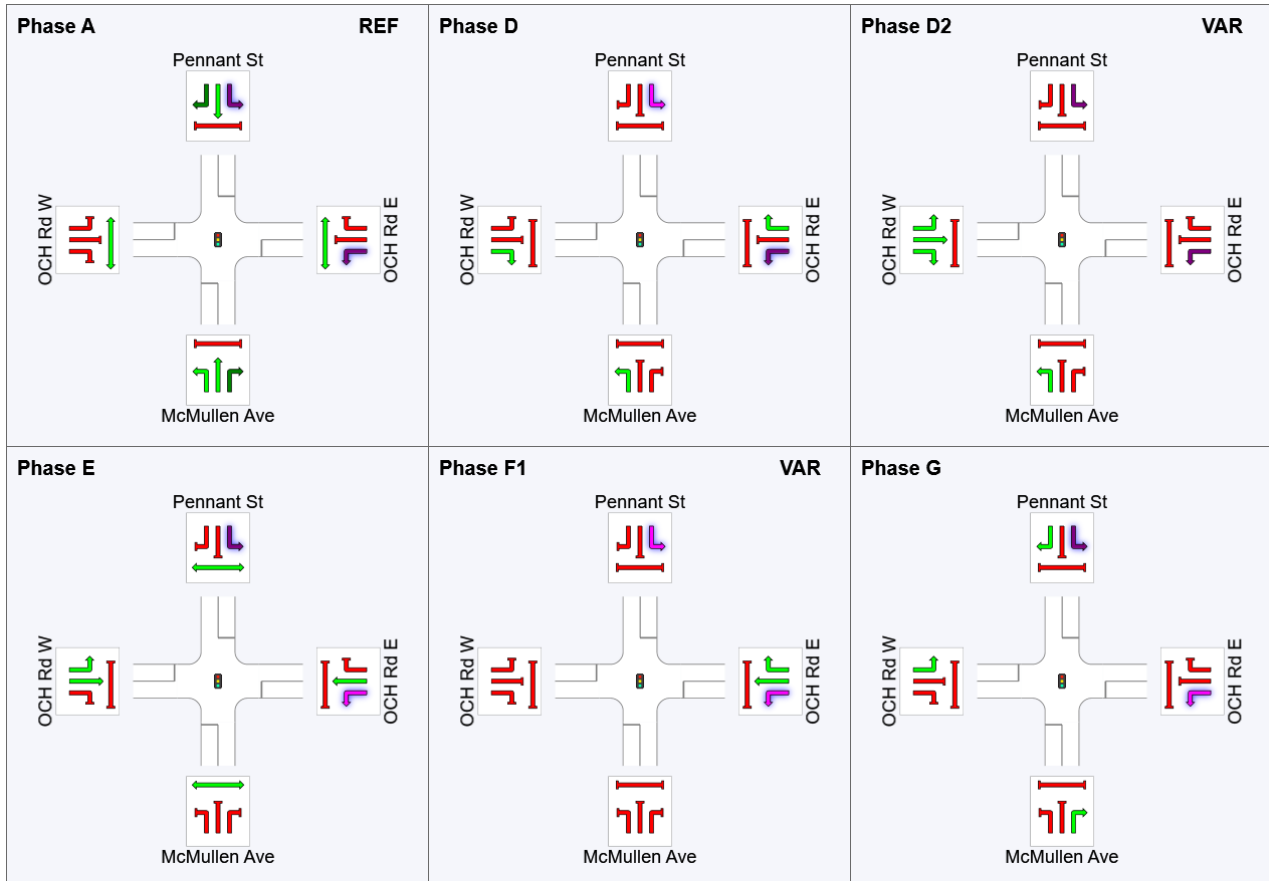
(* Variable Phase)

Phase Timing Summary

Phase	A	D	D2	E	F1	G
Phase Change Time (sec)	60	121	3	11	33	45
Green Time (sec)	55	6	2	16	6	9
Phase Time (sec)	61	12	8	22	12	15
Phase Split	47%	9%	6%	17%	9%	12%











See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class (MC) Running		Undetected Movement
	Mixed Running & Stopped MCs		Continuous Movement
	Other Movement Class (MC) Stopped		Phase Transition Applied

Lane 1	406	1	407	2.8	1907	0.214	100	NA	NA
Approach	406	1	407	2.8		0.214			
Total %HV Deg.Satn (v/c)									
Intersection	1193	2.3		0.370					

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis												
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Garthowen Cres South												
Merge Type: Not Applied												
Full Length Lane	1	Merge Analysis not applied.										
East Exit: OCH Rd												
Merge Type: Not Applied												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: OCH Rd												
Merge Type: Not Applied												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 104 [Old Castle Hill Road/Garthowen Crescent North AM
 (Site Folder: Opening_2029_with_dev_AM)]

Network: N101
 [Opening_2029_with_dev_AM
 (Network Folder:
 Opening_2029_with_development)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h	[HV %	[Total veh/h	[HV %	veh/h	v/c	%	sec		[Veh	[Dist] m		m	%	%
South: Garthowen Cres North															
Lane 1	21	0.0	21	0.0	400	0.053	100	12.7	LOS A	0.2	1.1	Full	500	0.0	0.0
Approach	21	0.0	21	0.0		0.053		12.7	LOS A	0.2	1.1				
East: OCH Rd															
Lane 1	707	2.2	707	2.2	1921	0.368	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	707	2.2	707	2.2		0.368		0.2	NA	0.0	0.0				
West: OCH Rd															
Lane 1	406	2.8	406	2.8	1728	0.235	100	1.4	LOS A	0.5	3.7	Full	115	0.0	0.0
Approach	406	2.8	406	2.8		0.235		1.4	NA	0.5	3.7				
Intersection	1135	2.4	1135	2.4		0.368		0.9	NA	0.5	3.7				

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

Lane LOS values are based on average delay per lane.

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.

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

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

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

Approach Lane Flows (veh/h)										
South: Garthowen Cres North										
Mov.	L2	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From S To Exit:	W	E			veh/h	v/c	%	%		
Lane 1	5	16	21	0.0	400	0.053	100	NA	NA	
Approach	5	16	21	0.0		0.053				
East: OCH Rd										
Mov.	L2	T1	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From E To Exit:	S	W			veh/h	v/c	%	%		
Lane 1	11	697	707	2.2	1921	0.368	100	NA	NA	
Approach	11	697	707	2.2		0.368				
West: OCH Rd										
Mov.	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From W To Exit:	E	S			veh/h	v/c	%	%		
Lane 1	376	31	406	2.8	1728	0.235	100	NA	NA	

Approach	376	31	406	2.8	0.235
Total %HV Deg.Satn (v/c)					
Intersection	1135	2.4	0.368		

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Garthowen Cres North											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
East Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
West Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									

LANE SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue PM (Site Folder: Opening_2029_with_dev_PM)]

Network: N101 [Opening_2029_with_dev_PM (Network Folder: Opening_2029_with_development)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h]	[HV %]	[Total veh/h]	[HV %]	veh/h	v/c	%	sec		[Veh]	[Dist] m		m	%	%
East: ON Rd E															
Lane 1	593	4.2	593	4.2	1475	0.402	100	4.9	LOS A	11.9	86.1	Full	205	0.0	0.0
Lane 2	593	4.2	593	4.2	1475	0.402	100	4.9	LOS A	11.9	86.1	Full	205	0.0	6.6 ⁸
Lane 3	470	1.9	470	1.9	523	0.899	100	44.6	LOS D	23.9	170.2	Short	130	-22.7 ^{N3}	NA
Lane 4	609	1.9	609	1.9	677	0.899	100	40.7	LOS C	29.3	208.6	Short	130	0.0	NA
Approach	2264	3.1	2264	3.1		0.899		22.8	LOS B	29.3	208.6				
North: McMullen Ave															
Lane 1	437	1.7	437	1.7	1087	0.402	100	15.6	LOS B	11.1	78.6	Full	150	0.0	0.0
Lane 2	437	1.7	437	1.7	1087	0.402	100	15.2	LOS B	10.7	76.0	Full	150	0.0	0.0
Lane 3	120	8.3	120	8.3	229	0.523	100	65.5	LOS E	7.4	55.4	Short	55	0.0	NA
Lane 4	120	8.3	120	8.3	229	0.523	100	65.5	LOS E	7.4	55.4	Short	55	0.0	NA
Approach	1114	3.1	1114	3.1		0.523		26.2	LOS B	11.1	78.6				
West: ON Rd W															
Lane 1	213	6.4	213	6.4	903	0.235	100	29.9	LOS C	5.7	42.1	Short	65	-13.4 ^{N3}	NA
Lane 2	413	6.1	413	6.1	485 ¹	0.853	100	66.5	LOS E	27.1	199.6	Full	190	0.0	9.4
Lane 3	504	6.1	504	6.1	592	0.853	100	51.1	LOS D	32.5	239.1	Full	190	0.0	25.9
Approach	1131	6.1	1131	6.1		0.853		52.7	LOS D	32.5	239.1				
Intersection	4508	3.9	4508	3.9		0.899		31.1	LOS C	32.5	239.1				

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

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

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

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

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

¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

⁸ Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

^{N3} Capacity Adjustment due to downstream lane blockage determined by the program.

Approach Lane Flows (veh/h)										
East: ON Rd E										
Mov. From E To Exit:	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
Lane 1	593	-	593	4.2	1475	0.402	100	NA	NA	
Lane 2	593	-	593	4.2	1475	0.402	100	NA	NA	
Lane 3	-	470	470	1.9	523	0.899	100	48.4	2	
Lane 4	-	609	609	1.9	677	0.899	100	48.4	3	

Approach	1185	1079	2264	3.1		0.899				
North: McMullen Ave										
Mov. From N To Exit:	L2	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
	E	W								
Lane 1	437	-	437	1.7	1087	0.402	100	NA	NA	
Lane 2	437	-	437	1.7	1087	0.402	100	NA	NA	
Lane 3	-	120	120	8.3	229	0.523	100	5.7	2	
Lane 4	-	120	120	8.3	229	0.523	100	5.7	3	
Approach	874	240	1114	3.1		0.523				
West: ON Rd W										
Mov. From W To Exit:	L2	T1	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
	N	E								
Lane 1	213	-	213	6.4	903	0.235	100	0.0	2	
Lane 2	-	413	413	6.1	485 ¹	0.853	100	NA	NA	
Lane 3	-	504	504	6.1	592	0.853	100	NA	NA	
Approach	213	918	1131	6.1		0.853				
Total %HV Deg. Satn (v/c)										
Intersection	4508	3.9		0.899						

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

- 1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Capacity Flow Rate veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec	
East Exit: ON Rd E											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									
North Exit: McMullen Ave											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									
West Exit: ON Rd W											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									

PHASING SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue PM (Site Folder: Opening_2029_with_dev_PM)]

Network: N101 [Opening_2029_with_dev_PM (Network Folder: Opening_2029_with_development)]

New Site
 Site Category: (None)
 Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

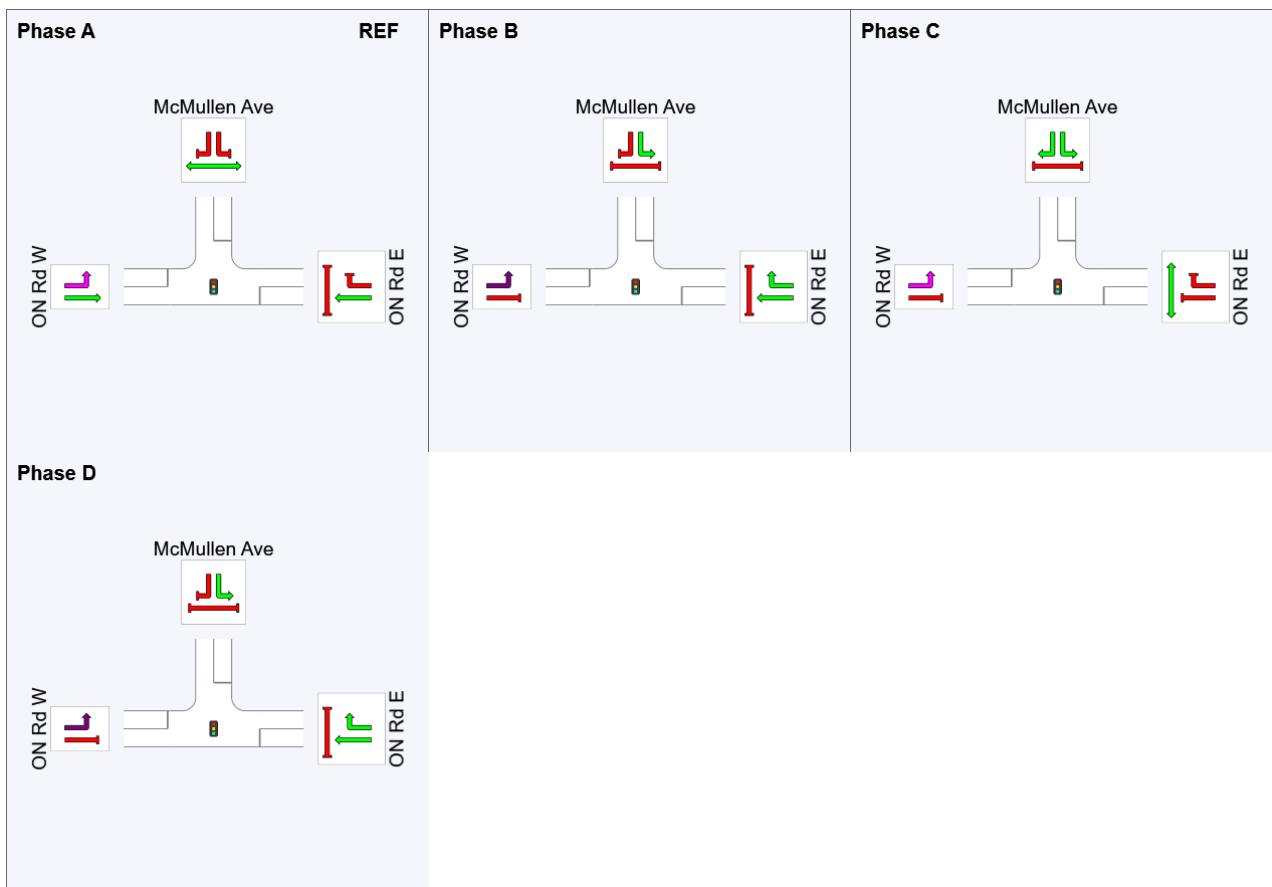
Timings based on settings in the Network Timing dialog
 Phase Times determined by the program
 Downstream lane blockage effects included in determining phase times
 Phase Sequence: TCS2372 Scats - Import
 Reference Phase: Phase A
 Input Phase Sequence: A, B, C, D
 Output Phase Sequence: A, B, C, D

Phase Timing Summary

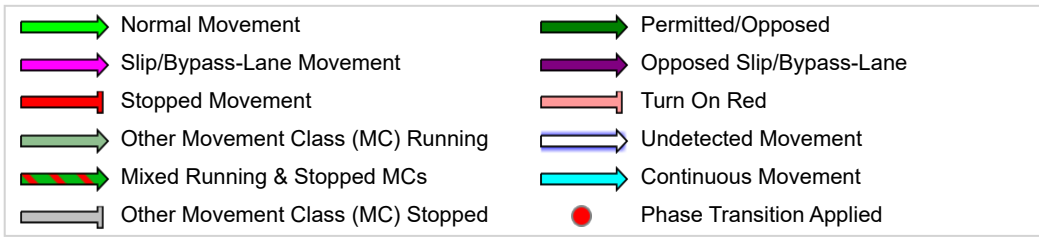
Phase	A	B	C	D
Phase Change Time (sec)	0	47	81	104
Green Time (sec)	41	28	17	20
Phase Time (sec)	47	34	23	26
Phase Split	36%	26%	18%	20%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
 VAR: Variable Phase



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Project: \\au2012-ntap01_cifs02\shared_projects\300305867\technical\modelling\251208_5867_16_20_ochr-JS.sip9

LANE SUMMARY

Site: TCS 3318 [Old Castle Hill Road/McMullen Avenue/
Pennant Street PM (Site Folder: Opening_2029_with_dev_PM)]

Network: N101
[Opening_2029_with_dev_PM
(Network Folder:
Opening_2029_with_development)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h	[HV %	[Total veh/h	[HV %	veh/h	v/c	%	sec		[Veh	[Dist] m		m	%	%
South: McMullen Ave															
Lane 1	639	1.9	639	1.9	882	0.724	100	21.7	LOS B	25.6	182.1	Full	150	0.0	22.6
Lane 2	422	2.6	422	2.6	583 ¹	0.724	100	27.5	LOS B	15.9	114.0	Full	150	0.0	0.0
Lane 3	246	4.3	246	4.3	517	0.477	100	32.6	LOS C	7.7	56.1	Short	35	0.0	NA
Approach	1307	2.6	1307	2.6		0.724		25.6	LOS B	25.6	182.1				
East: OCH Rd E															
Lane 1	196	7.0	196	7.0	1116	0.176	100	9.8	LOS A	3.8	28.5	Short	30	0.0	NA
Lane 2	126	0.0	126	0.0	270	0.468	100	57.7	LOS E	7.5	52.7	Full	45	0.0	19.3
Lane 3	89	1.2	89	1.2	128	0.702	100	72.2	LOS F	6.0	42.1	Short	35	0.0	NA
Approach	412	3.6	412	3.6		0.702		38.1	LOS C	7.5	52.7				
North: Pennant St															
Lane 1	123	0.0	123	0.0	996	0.124	100	23.8	LOS B	2.0	14.0	Short	45	0.0	NA
Lane 2	301	3.0	301	3.0	469 ¹	0.641	100	58.6	LOS E	16.7	119.7	Full	110	0.0	12.7
Lane 3	335	3.0	335	3.0	522 ¹	0.641	100	61.8	LOS E	18.6	133.4	Full	110	0.0	22.5
Lane 4	19	0.0	19	0.0	335	0.057	100	42.3	LOS C	0.6	4.1	Short	45	0.0	NA
Approach	778	2.4	778	2.4		0.641		54.1	LOS D	18.6	133.4				
West: OCH Rd W															
Lane 1	292	0.7	292	0.7	426 ¹	0.685	100	58.5	LOS E	16.8	118.1	Full	80	0.0	40.6
Lane 2	148	0.4	148	0.4	242	0.611	100	51.1	LOS D	6.9	48.6	Short	50	0.0	NA
Lane 3	148	0.4	148	0.4	242	0.611	100	40.7	LOS C	6.9	48.6	Short	50	0.0	NA
Approach	587	0.5	587	0.5		0.685		52.2	LOS D	16.8	118.1				
Intersection	3084	2.3	3084	2.3		0.724		39.5	LOS C	25.6	182.1				

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

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

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

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

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

¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Approach Lane Flows (veh/h)										
South: McMullen Ave										
Mov. From S To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	163	476	-	639	1.9	882	0.724	100	NA	NA
Lane 2	-	422	-	422	2.6	583 ¹	0.724	100	NA	NA

Lane 3	-	-	246	246	4.3	517	0.477	100	48.3	2
Approach	163	898	246	1307	2.6		0.724			
East: OCH Rd E										
Mov. From E To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	196	-	-	196	7.0	1116	0.176	100	0.3	2
Lane 2	-	126	-	126	0.0	270	0.468	100	NA	NA
Lane 3	-	-	89	89	1.2	128	0.702	100	21.8	2
Approach	196	126	89	412	3.6		0.702			
North: Pennant St										
Mov. From N To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	123	-	-	123	0.0	996	0.124	100	0.0	2
Lane 2	-	301	-	301	3.0	469 ¹	0.641	100	NA	NA
Lane 3	-	335	-	335	3.0	522 ¹	0.641	100	NA	NA
Lane 4	-	-	19	19	0.0	335	0.057	100	0.0	3
Approach	123	636	19	778	2.4		0.641			
West: OCH Rd W										
Mov. From W To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	67	224	-	292	0.7	426 ¹	0.685	100	NA	NA
Lane 2	-	-	148	148	0.4	242	0.611	100	2.4	1
Lane 3	-	-	148	148	0.4	242	0.611	100	2.4	2
Approach	67	224	296	587	0.5		0.685			
Total %HV Deg. Satn (v/c)										
Intersection	3084	2.3		0.724						

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Capacity Flow Rate veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec	
South Exit: McMullen Ave											
Merge Type: Not Applied											
Full Length Lane	1		Merge Analysis not applied.								
Full Length Lane	2		Merge Analysis not applied.								
East Exit: OCH Rd E											
Merge Type: Not Applied											
Full Length Lane	1		Merge Analysis not applied.								
North Exit: Pennant St											
Merge Type: Not Applied											
Full Length Lane	1		Merge Analysis not applied.								
Full Length Lane	2		Merge Analysis not applied.								
West Exit: OCH Rd W											
Merge Type: Not Applied											
Full Length Lane	1		Merge Analysis not applied.								

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Project: \\au2012-ntap01_cifs02\shared_projects\300305867\technical\modelling\251208_5867_16_20_ochr-JS.sip9

PHASING SUMMARY

Site: TCS 3318 [Old Castle Hill Road/McMullen Avenue/
Pennant Street PM (Site Folder: Opening_2029_with_dev_PM)]

Network: N101
[Opening_2029_with_dev_PM
(Network Folder:
Opening_2029_with_developme
nt)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog

Phase Times determined by the program

Downstream lane blockage effects included in determining phase times

Phase Sequence: TCS3318 SCATS

Reference Phase: Phase A

Input Phase Sequence: A, D, D1*, D2*, E, F1*, F2*, G, G1*, G2*

Output Phase Sequence: A, D, E, F2*, G, G2*

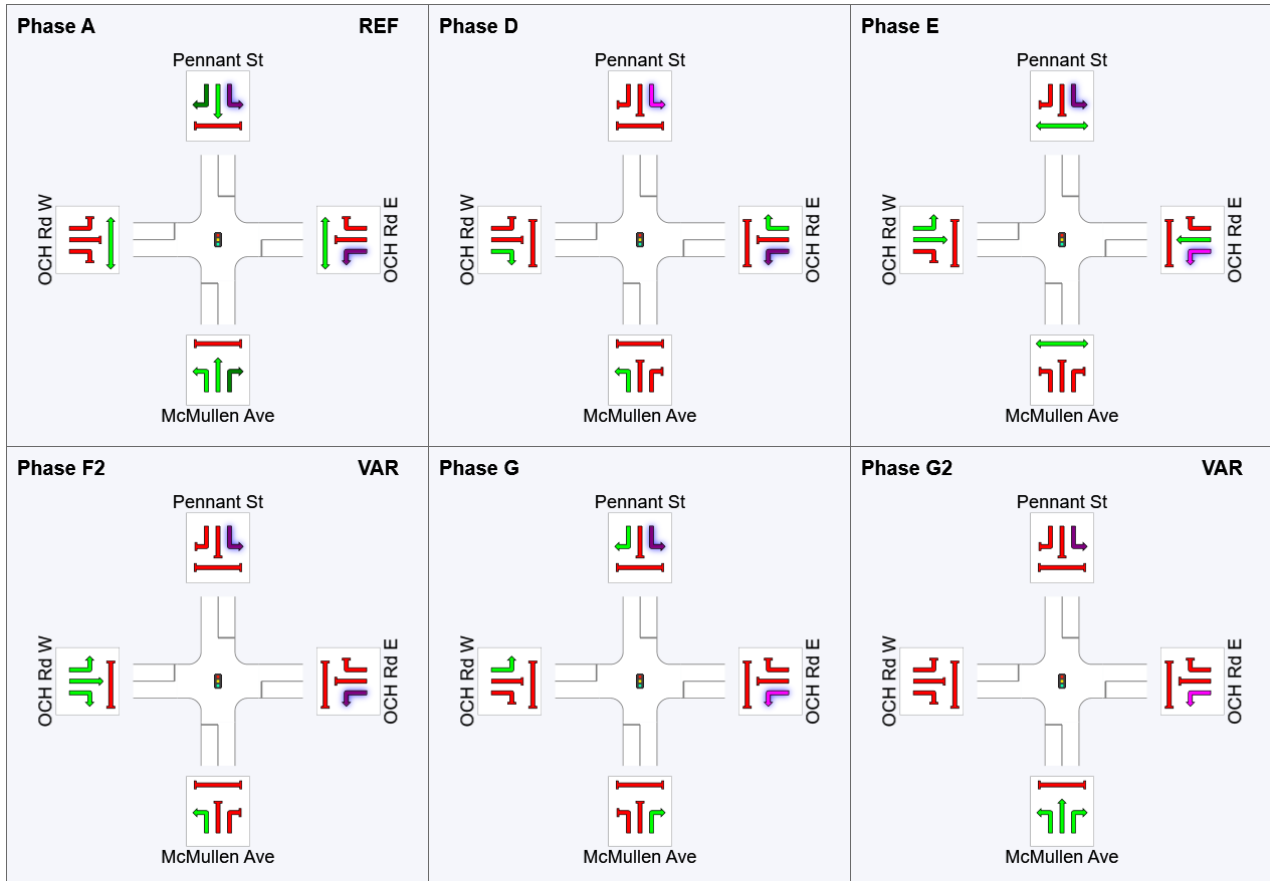
(* Variable Phase)

Phase Timing Summary

Phase	A	D	E	F2	G	G2
Phase Change Time (sec)	83	126	11	35	49	61
Green Time (sec)	37	9	18	8	6	16
Phase Time (sec)	43	15	24	14	12	22
Phase Split	33%	12%	18%	11%	9%	17%

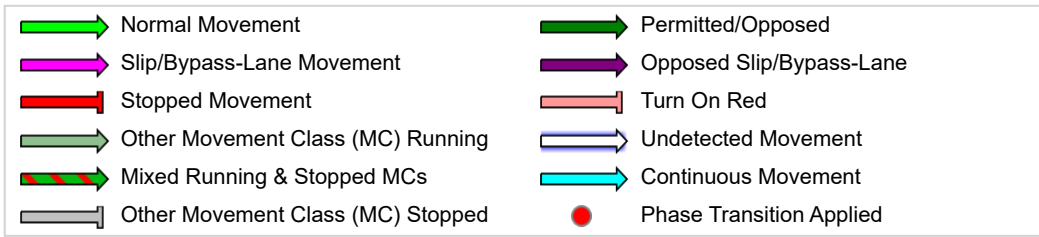
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase



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Project: \\au2012-ntap01_cifs02\shared_projects\300305867\technical\modelling\251208_5867_16_20_ochr-JS.sip9

LANE SUMMARY

Site: 103 [Old Castle Hill Road / Garthowen Crescent South PM (Site Folder: Opening_2029_with_dev_PM)]

Network: N101 [Opening_2029_with_dev_PM (Network Folder: Opening_2029_with_development)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h]	[HV %]	[Total veh/h]	[HV %]	veh/h	v/c	%	sec		[Veh]	[Dist]		m	%	%
South: Garthowen Cres South															
Lane 1	32	0.0	32	0.0	885	0.036	100	7.0	LOS A	0.1	0.8	Full	500	-18.8 ^{N3}	0.0
Approach	32	0.0	32	0.0		0.036		7.0	LOS A	0.1	0.8				
East: OCH Rd															
Lane 1	382	3.9	382	3.9	1536	0.249	100	0.0	LOS A	0.0	0.0	Full	115	-19.2 ^{N3}	0.0
Approach	382	3.9	382	3.9		0.249		0.0	NA	0.0	0.0				
West: OCH Rd															
Lane 1	589	2.0	589	2.0	1923	0.306	100	0.0	LOS A	0.0	0.1	Full	45	0.0	0.0
Approach	589	2.0	589	2.0		0.306		0.0	NA	0.0	0.1				
Intersection	1003	2.6	1003	2.6		0.306		0.2	NA	0.1	0.8				

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

Lane LOS values are based on average delay per lane.

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.

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

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

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

^{N3} Capacity Adjustment due to downstream lane blockage determined by the program.

Approach Lane Flows (veh/h)										
South: Garthowen Cres South										
Mov. From S To Exit:	L2	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
Lane 1	31	1	32	0.0	885	0.036	100	NA	NA	
Approach	31	1	32	0.0		0.036				
East: OCH Rd										
Mov. From E To Exit:	L2	T1	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
Lane 1	1	381	382	3.9	1536	0.249	100	NA	NA	
Approach	1	381	382	3.9		0.249				
West: OCH Rd										
Mov. From W To Exit:	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
Lane 1	588	1	589	2.0	1923	0.306	100	NA	NA	

Approach	588	1	589	2.0	0.306
Total %HV Deg.Satn (v/c)					
Intersection	1003	2.6		0.306	

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Garthowen Cres South											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
East Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
West Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									

LANE SUMMARY

Site: 104 [Old Castle Hill Road / Garthowen Crescent North
PM (Site Folder: Opening_2029_with_dev_PM)]

Network: N101
[Opening_2029_with_dev_PM
(Network Folder:
Opening_2029_with_development)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h	[HV %	[Total veh/h	[HV %	veh/h	v/c	%	sec		[Veh	[Dist] m		m	%	%
South: Garthowen Cres North															
Lane 1	12	0.0	12	0.0	563	0.021	100	9.8	LOS A	0.1	0.5	Full	500	0.0	0.0
Approach	12	0.0	12	0.0		0.021		9.8	LOS A	0.1	0.5				
East: OCH Rd															
Lane 1	378	3.9	378	3.9	1899	0.199	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	378	3.9	378	3.9		0.199		0.2	NA	0.0	0.0				
West: OCH Rd															
Lane 1	595	1.9	595	1.9	1776	0.335	100	1.4	LOS A	0.8	5.8	Full	115	0.0	0.0
Approach	595	1.9	595	1.9		0.335		1.4	NA	0.8	5.8				
Intersection	984	2.7	984	2.7		0.335		1.0	NA	0.8	5.8				

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

Lane LOS values are based on average delay per lane.

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.

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

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

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

Approach Lane Flows (veh/h)										
South: Garthowen Cres North										
Mov.	L2	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From S To Exit:	W	E			veh/h	v/c	%	%		
Lane 1	4	7	12	0.0	563	0.021	100	NA	NA	
Approach	4	7	12	0.0		0.021				
East: OCH Rd										
Mov.	L2	T1	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From E To Exit:	S	W			veh/h	v/c	%	%		
Lane 1	11	367	378	3.9	1899	0.199	100	NA	NA	
Approach	11	367	378	3.9		0.199				
West: OCH Rd										
Mov.	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From W To Exit:	E	S			veh/h	v/c	%	%		
Lane 1	511	84	595	1.9	1776	0.335	100	NA	NA	

Approach	511	84	595	1.9	0.335
Total %HV Deg.Satn (v/c)					
Intersection	984	2.7		0.335	

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

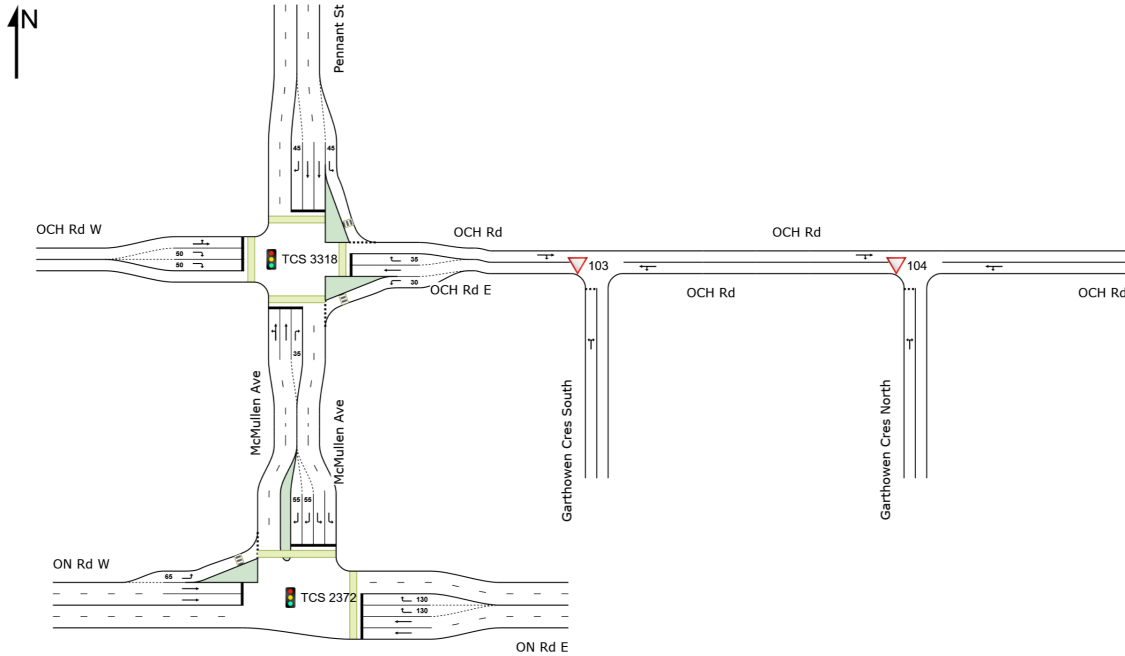
Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Capacity Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Garthowen Cres North											
Merge Type: Not Applied											
Full Length Lane	1		Merge Analysis not applied.								
East Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1		Merge Analysis not applied.								
West Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1		Merge Analysis not applied.								

NETWORK LAYOUT

Network: N101 [Future_2039_with_development_AM
(Network Folder: Future_2039_with_development)]

New Network
Network Category: (None)

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



SITES IN NETWORK		
Site ID	CCG ID	Site Name
TCS 2372	NA	Old Northern Road/McMullen Avenue AM
TCS 3318	NA	Old Castle Hill Road/McMullen Avenue/Pennant Street AM
▽103	NA	Old Castle Hill Road/Garthowen Crescent South AM
▽104	NA	Old Castle Hill Road/Garthowen Crescent North AM

LANE SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue AM (Site Folder: Future_2039_with_dev_AM)]

Network: N101 [Future_2039_with_development_AM (Network Folder: Future_2039_with_development)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	[Total veh/h	[HV %	[Total veh/h	[HV %						[Veh	[Dist] m				
East: ON Rd E															
Lane 1	624	5.0	624	5.0	1424	0.438	100	6.2	LOS A	14.2	103.6	Full	205	0.0	0.0
Lane 2	624	5.0	624	5.0	1424	0.438	100	6.2	LOS A	14.2	103.6	Full	205	0.0	18.5 ⁸
Lane 3	401	2.7	401	2.7	425	0.944	100	60.9	LOS E	24.2	173.5	Short	130	-32.6 ^{N3}	NA
Lane 4	595	2.7	595	2.7	631	0.944	100	53.0	LOS D	33.2	237.8	Short	130	0.0	NA
Approach	2244	4.0	2244	4.0		0.944		28.3	LOS B	33.2	237.8				
North: McMullen Ave															
Lane 1	378	4.5	378	4.5	1066	0.355	100	15.3	LOS B	7.7	55.9	Full	150	0.0	0.0
Lane 2	378	4.5	378	4.5	1066	0.355	100	14.7	LOS B	7.2	52.6	Full	150	0.0	0.0
Lane 3	155	5.8	155	5.8	274	0.566	100	46.9	LOS D	8.0	58.5	Short	55	0.0	NA
Lane 4	155	5.8	155	5.8	274	0.566	100	46.9	LOS D	8.0	58.5	Short	55	0.0	NA
Approach	1067	4.8	1067	4.8		0.566		24.3	LOS B	8.0	58.5				
West: ON Rd W															
Lane 1	228	7.8	228	7.8	852	0.268	100	17.0	LOS B	6.3	47.4	Short	65	-19.8 ^{N3}	NA
Lane 2	428	6.5	428	6.5	462 ¹	0.926	100	68.4	LOS E	30.8	227.7	Full	190	0.0	21.4
Lane 3	547	6.5	547	6.5	590	0.926	100	68.3	LOS E	41.0	302.8	Full	190	0.0	47.8
Approach	1203	6.7	1203	6.7		0.926		58.6	LOS E	41.0	302.8				
Intersection	4515	4.9	4515	4.9		0.944		35.4	LOS C	41.0	302.8				

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

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

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

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

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

¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

⁸ Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

^{N3} Capacity Adjustment due to downstream lane blockage determined by the program.

Approach Lane Flows (veh/h)										
East: ON Rd E										
Mov. From E To Exit:	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
	W	N								
Lane 1	624	-	624	5.0	1424	0.438	100	NA	NA	
Lane 2	624	-	624	5.0	1424	0.438	100	NA	NA	
Lane 3	-	401	401	2.7	425	0.944	100	60.8	2	
Lane 4	-	595	595	2.7	631	0.944	100	60.8	3	

Approach	1248	996	2244	4.0		0.944				
North: McMullen Ave										
Mov. From N To Exit:	L2	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
	E	W								
Lane 1	378	-	378	4.5	1066	0.355	100	NA	NA	
Lane 2	378	-	378	4.5	1066	0.355	100	NA	NA	
Lane 3	-	155	155	5.8	274	0.566	100	10.5	2	
Lane 4	-	155	155	5.8	274	0.566	100	10.5	3	
Approach	757	311	1067	4.8		0.566				
West: ON Rd W										
Mov. From W To Exit:	L2	T1	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
	N	E								
Lane 1	228	-	228	7.8	852	0.268	100	0.0	2	
Lane 2	-	428	428	6.5	462 ¹	0.926	100	NA	NA	
Lane 3	-	547	547	6.5	590	0.926	100	NA	NA	
Approach	228	975	1203	6.7		0.926				
Total %HV Deg. Satn (v/c)										
Intersection	4515	4.9		0.944						

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

- 1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Capacity Flow Rate veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec	
East Exit: ON Rd E											
Merge Type: Not Applied											
Full Length Lane	1										Merge Analysis not applied.
Full Length Lane	2										Merge Analysis not applied.
North Exit: McMullen Ave											
Merge Type: Not Applied											
Full Length Lane	1										Merge Analysis not applied.
Full Length Lane	2										Merge Analysis not applied.
West Exit: ON Rd W											
Merge Type: Not Applied											
Full Length Lane	1										Merge Analysis not applied.
Full Length Lane	2										Merge Analysis not applied.

PHASING SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue AM (Site Folder: Future_2039_with_dev_AM)]

Network: N101 [Future_2039_with_developmen t_AM (Network Folder: Future_2039_with_development)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog

Phase Times determined by the program

Downstream lane blockage effects included in determining phase times

Phase Sequence: TCS2372 Scats - Import

Reference Phase: Phase A

Input Phase Sequence: A, B, C, D

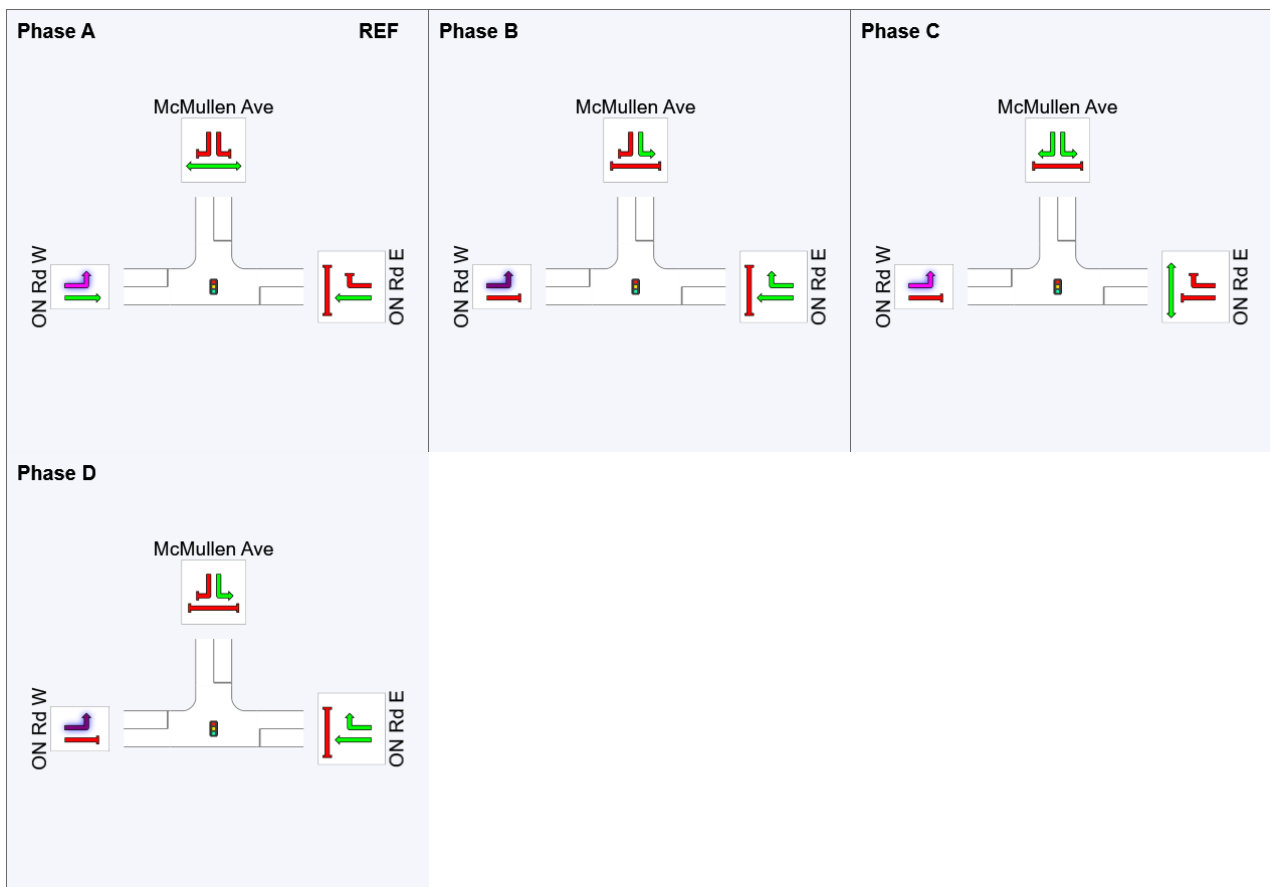
Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	47	78	104
Green Time (sec)	41	25	20	20
Phase Time (sec)	47	31	26	26
Phase Split	36%	24%	20%	20%











See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class (MC) Running		Undetected Movement
	Mixed Running & Stopped MCs		Continuous Movement
	Other Movement Class (MC) Stopped		Phase Transition Applied

LANE SUMMARY

Site: TCS 3318 [Old Castle Hill Road/McMullen Avenue/
Pennant Street AM (Site Folder: Future_2039_with_dev_AM)]

Network: N101
[Future_2039_with_developmen
t_AM (Network Folder:
Future_2039_with_development
)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	[Total veh/h	[HV %	[Total veh/h	[HV %						[Veh	[Dist] m				
South: McMullen Ave															
Lane 1	596	2.9	596	2.9	806	0.739	100	31.1	LOS C	28.3	203.1	Full	150	0.0	32.6
Lane 2	437	3.5	437	3.5	592 ¹	0.739	100	26.4	LOS B	17.4	125.8	Full	150	0.0	0.0
Lane 3	193	5.5	193	5.5	393	0.490	100	25.5	LOS B	7.1	51.7	Short	35	0.0	NA
Approach	1226	3.5	1226	3.5		0.739		28.5	LOS C	28.3	203.1				
East: OCH Rd E															
Lane 1	420	3.3	420	3.3	1241	0.339	100	6.6	LOS A	6.1	43.9	Short	30	0.0	NA
Lane 2	243	0.0	243	0.0	347 ¹	0.701	100	50.5	LOS D	10.5 ^{N4}	73.4 ^{N4}	Full	45	0.0	50.0
Lane 3	127	0.8	127	0.8	187	0.679	100	42.8	LOS D	6.0	42.1	Short	35	0.0	NA
Approach	791	1.9	791	1.9		0.701		25.9	LOS B	10.5	73.4				
North: Pennant St															
Lane 1	75	1.4	75	1.4	1157	0.065	100	8.0	LOS A	0.8	5.4	Short	45	0.0	NA
Lane 2	289	5.6	289	5.6	759 ¹	0.380	100	27.1	LOS B	12.3	90.3	Full	110	0.0	0.0
Lane 3	294	5.6	294	5.6	773 ¹	0.380	100	27.2	LOS B	12.6	92.1	Full	110	0.0	0.0
Lane 4	11	10.0	11	10.0	234	0.045	100	27.2	LOS B	0.3	2.4	Short	45	0.0	NA
Approach	667	5.2	667	5.2		0.380		25.0	LOS B	12.6	92.1				
West: OCH Rd W															
Lane 1	173	4.3	173	4.3	352	0.490	100	49.1	LOS D	9.5	68.6	Full	80	0.0	0.0
Lane 2	39	5.4	39	5.4	193	0.202	100	61.8	LOS E	2.3	16.9	Short	50	0.0	NA
Lane 3	39	5.4	39	5.4	193	0.202	100	61.8	LOS E	2.3	16.9	Short	50	0.0	NA
Approach	251	4.6	251	4.6		0.490		53.0	LOS D	9.5	68.6				
Intersectio n	2935	3.6	2935	3.6		0.739		29.1	LOS C	28.3	203.1				

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

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

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

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

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

¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

^{N4} Average back of queue has been restricted to the available queue storage space.

Approach Lane Flows (veh/h)											
South: McMullen Ave											
Mov. From S To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
Lane 1	142	454	-	596	2.9	806	0.739	100	NA	NA	

Lane 2	-	437	-	437	3.5	592 ¹	0.739	100	NA	NA
Lane 3	-	-	193	193	5.5	393	0.490	100	40.7	2
Approach	142	892	193	1226	3.5		0.739			
East: OCH Rd E										
Mov. From E To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	420	-	-	420	3.3	1241	0.339	100	39.7	2
Lane 2	-	243	-	243	0.0	347 ¹	0.701	100	NA	NA
Lane 3	-	-	127	127	0.8	187	0.679	100	21.8	2
Approach	420	243	127	791	1.9		0.701			
North: Pennant St										
Mov. From N To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	75	-	-	75	1.4	1157	0.065	100	0.0	2
Lane 2	-	289	-	289	5.6	759 ¹	0.380	100	NA	NA
Lane 3	-	294	-	294	5.6	773 ¹	0.380	100	NA	NA
Lane 4	-	-	11	11	10.0	234	0.045	100	0.0	3
Approach	75	582	11	667	5.2		0.380			
West: OCH Rd W										
Mov. From W To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	35	138	-	173	4.3	352	0.490	100	NA	NA
Lane 2	-	-	39	39	5.4	193	0.202	100	0.0	1
Lane 3	-	-	39	39	5.4	193	0.202	100	0.0	2
Approach	35	138	78	251	4.6		0.490			
Total %HV Deg. Satn (v/c)										
Intersection	2935	3.6					0.739			

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap sec	Follow-up Headway sec	Lane Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec	
South Exit: McMullen Ave											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									
East Exit: OCH Rd E											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
North Exit: Pennant St											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									
West Exit: OCH Rd W											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									

PHASING SUMMARY

Site: TCS 3318 [Old Castle Hill Road/McMullen Avenue/
Pennant Street AM (Site Folder: Future_2039_with_dev_AM)]

Network: N101
[Future_2039_with_developmen
t_AM (Network Folder:
Future_2039_with_development
)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog

Phase Times determined by the program

Downstream lane blockage effects included in determining phase times

Phase Sequence: TCS3318 SCATS - Partial

Reference Phase: Phase A

Input Phase Sequence: A, D, D1*, D2*, E, F1*, F2*, G, G1*, G2*

Output Phase Sequence: A, D, D2*, E, F1*, G

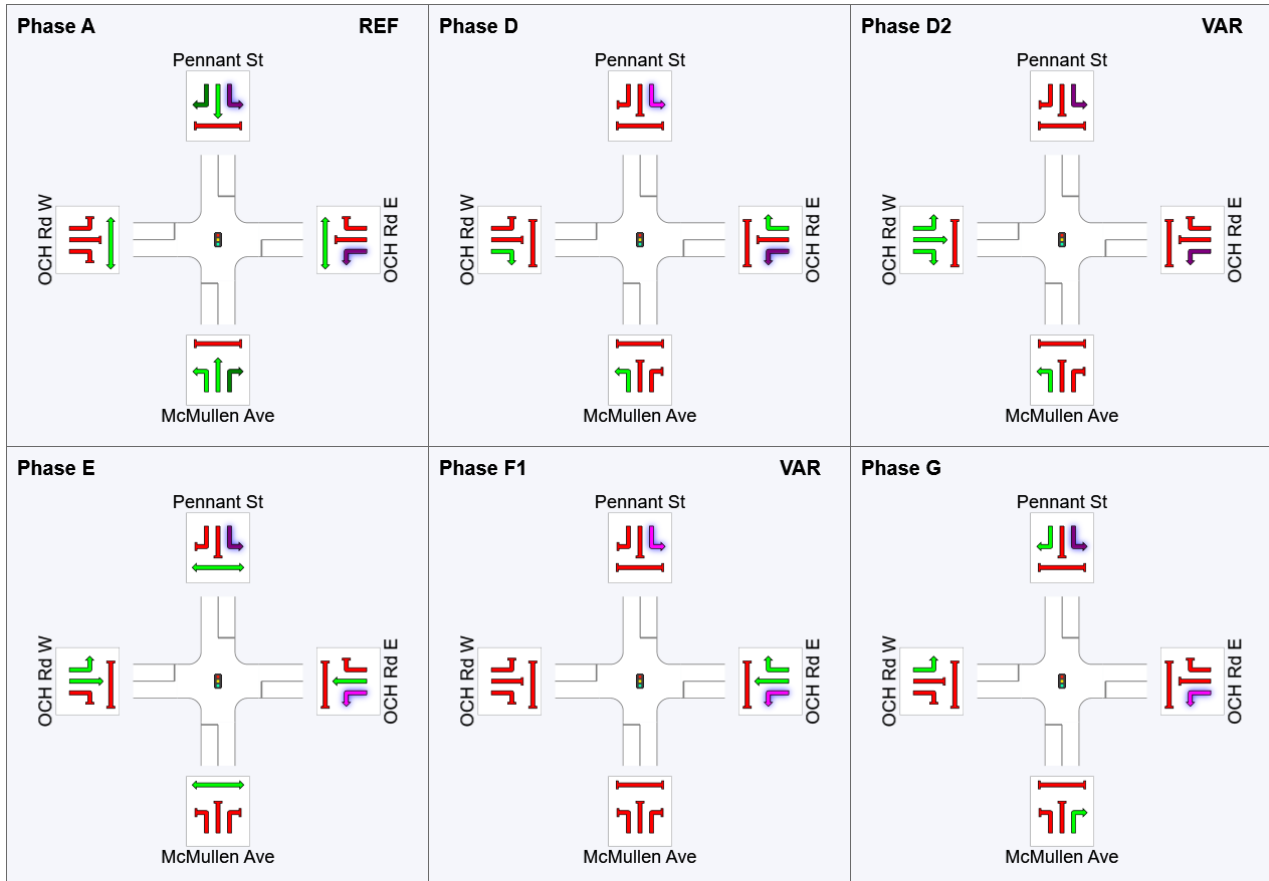
(* Variable Phase)

Phase Timing Summary

Phase	A	D	D2	E	F1	G
Phase Change Time (sec)	60	121	3	11	33	45
Green Time (sec)	55	6	2	16	6	9
Phase Time (sec)	61	12	8	22	12	15
Phase Split	47%	9%	6%	17%	9%	12%













See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class (MC) Running		Undetected Movement
	Mixed Running & Stopped MCs		Continuous Movement
	Other Movement Class (MC) Stopped		Phase Transition Applied

Lane 1	406	1	407	2.8	1907	0.214	100	NA	NA
Approach	406	1	407	2.8		0.214			
Total %HV Deg.Satn (v/c)									
Intersection	1193	2.3		0.370					

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis												
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Garthowen Cres South												
Merge Type: Not Applied												
Full Length Lane	1	Merge Analysis not applied.										
East Exit: OCH Rd												
Merge Type: Not Applied												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: OCH Rd												
Merge Type: Not Applied												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 104 [Old Castle Hill Road/Garthowen Crescent North AM
(Site Folder: Future_2039_with_dev_AM)]

Network: N101
[Future_2039_with_developmen
t_AM (Network Folder:
Future_2039_with_development
)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h]	[HV %]	[Total veh/h]	[HV %]	veh/h	v/c	%	sec		[Veh]	[Dist]		m	%	%
South: Garthowen Cres North															
Lane 1	21	0.0	21	0.0	400	0.053	100	12.7	LOS A	0.2	1.1	Full	500	0.0	0.0
Approach	21	0.0	21	0.0		0.053		12.7	LOS A	0.2	1.1				
East: OCH Rd															
Lane 1	707	2.2	707	2.2	1921	0.368	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	707	2.2	707	2.2		0.368		0.2	NA	0.0	0.0				
West: OCH Rd															
Lane 1	406	2.8	406	2.8	1728	0.235	100	1.4	LOS A	0.5	3.7	Full	115	0.0	0.0
Approach	406	2.8	406	2.8		0.235		1.4	NA	0.5	3.7				
Intersection	1135	2.4	1135	2.4		0.368		0.9	NA	0.5	3.7				

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

Lane LOS values are based on average delay per lane.

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.

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

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

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

Approach Lane Flows (veh/h)										
South: Garthowen Cres North										
Mov.	L2	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From S To Exit:	W	E			veh/h	v/c	%	%		
Lane 1	5	16	21	0.0	400	0.053	100	NA	NA	
Approach	5	16	21	0.0		0.053				
East: OCH Rd										
Mov.	L2	T1	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From E To Exit:	S	W			veh/h	v/c	%	%		
Lane 1	11	697	707	2.2	1921	0.368	100	NA	NA	
Approach	11	697	707	2.2		0.368				
West: OCH Rd										
Mov.	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From W To Exit:	E	S			veh/h	v/c	%	%		
Lane 1	376	31	406	2.8	1728	0.235	100	NA	NA	

Approach	376	31	406	2.8	0.235
Total %HV Deg.Satn (v/c)					
Intersection	1135	2.4	0.368		

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Garthowen Cres North											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
East Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
West Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									

LANE SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue PM (Site Folder: Future_2039_with_dev_PM)]

Network: N101 [Future_2039_with_development_PM (Network Folder: Future_2039_with_development)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h]	[HV %]	[Total veh/h]	[HV %]	veh/h	v/c	%	sec		[Veh]	[Dist]		m	%	%
East: ON Rd E															
Lane 1	593	4.2	593	4.2	1475	0.402	100	4.9	LOS A	11.9	86.1	Full	205	0.0	0.0
Lane 2	593	4.2	593	4.2	1475	0.402	100	4.9	LOS A	11.9	86.1	Full	205	0.0	6.6 ⁸
Lane 3	470	1.9	470	1.9	523	0.899	100	44.6	LOS D	23.9	170.2	Short	130	-22.7 ^{N3}	NA
Lane 4	609	1.9	609	1.9	677	0.899	100	40.7	LOS C	29.3	208.6	Short	130	0.0	NA
Approach	2264	3.1	2264	3.1		0.899		22.8	LOS B	29.3	208.6				
North: McMullen Ave															
Lane 1	437	1.7	437	1.7	1087	0.402	100	15.6	LOS B	11.1	78.6	Full	150	0.0	0.0
Lane 2	437	1.7	437	1.7	1087	0.402	100	15.2	LOS B	10.7	76.0	Full	150	0.0	0.0
Lane 3	120	8.3	120	8.3	229	0.523	100	65.5	LOS E	7.4	55.4	Short	55	0.0	NA
Lane 4	120	8.3	120	8.3	229	0.523	100	65.5	LOS E	7.4	55.4	Short	55	0.0	NA
Approach	1114	3.1	1114	3.1		0.523		26.2	LOS B	11.1	78.6				
West: ON Rd W															
Lane 1	213	6.4	213	6.4	903	0.235	100	29.9	LOS C	5.7	42.1	Short	65	-13.4 ^{N3}	NA
Lane 2	413	6.1	413	6.1	485 ¹	0.853	100	66.5	LOS E	27.1	199.6	Full	190	0.0	9.4
Lane 3	504	6.1	504	6.1	592	0.853	100	51.1	LOS D	32.5	239.1	Full	190	0.0	25.9
Approach	1131	6.1	1131	6.1		0.853		52.7	LOS D	32.5	239.1				
Intersection	4508	3.9	4508	3.9		0.899		31.1	LOS C	32.5	239.1				

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

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

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

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

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

¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

⁸ Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

^{N3} Capacity Adjustment due to downstream lane blockage determined by the program.

Approach Lane Flows (veh/h)										
East: ON Rd E										
Mov.	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL Ov.	Ov. Lane No.	
From E To Exit:	W	N			veh/h	v/c	%	%		
Lane 1	593	-	593	4.2	1475	0.402	100	NA	NA	
Lane 2	593	-	593	4.2	1475	0.402	100	NA	NA	
Lane 3	-	470	470	1.9	523	0.899	100	48.4	2	
Lane 4	-	609	609	1.9	677	0.899	100	48.4	3	

Approach	1185	1079	2264	3.1		0.899				
North: McMullen Ave										
Mov. From N To Exit:	L2	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
	E	W								
Lane 1	437	-	437	1.7	1087	0.402	100	NA	NA	
Lane 2	437	-	437	1.7	1087	0.402	100	NA	NA	
Lane 3	-	120	120	8.3	229	0.523	100	5.7	2	
Lane 4	-	120	120	8.3	229	0.523	100	5.7	3	
Approach	874	240	1114	3.1		0.523				
West: ON Rd W										
Mov. From W To Exit:	L2	T1	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
	N	E								
Lane 1	213	-	213	6.4	903	0.235	100	0.0	2	
Lane 2	-	413	413	6.1	485 ¹	0.853	100	NA	NA	
Lane 3	-	504	504	6.1	592	0.853	100	NA	NA	
Approach	213	918	1131	6.1		0.853				
Total %HV Deg. Satn (v/c)										
Intersection	4508	3.9		0.899						

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

- 1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Capacity Flow Rate veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec	
East Exit: ON Rd E											
Merge Type: Not Applied											
Full Length Lane	1										Merge Analysis not applied.
Full Length Lane	2										Merge Analysis not applied.
North Exit: McMullen Ave											
Merge Type: Not Applied											
Full Length Lane	1										Merge Analysis not applied.
Full Length Lane	2										Merge Analysis not applied.
West Exit: ON Rd W											
Merge Type: Not Applied											
Full Length Lane	1										Merge Analysis not applied.
Full Length Lane	2										Merge Analysis not applied.

PHASING SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue PM (Site Folder: Future_2039_with_dev_PM)]

Network: N101 [Future_2039_with_development_PM (Network Folder: Future_2039_with_development)]

New Site
 Site Category: (None)
 Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
 Phase Times determined by the program
 Downstream lane blockage effects included in determining phase times
 Phase Sequence: TCS2372 Scats - Import
 Reference Phase: Phase A
 Input Phase Sequence: A, B, C, D
 Output Phase Sequence: A, B, C, D

Phase Timing Summary












Phase	A	B	C	D
Phase Change Time (sec)	0	47	81	104
Green Time (sec)	41	28	17	20
Phase Time (sec)	47	34	23	26
Phase Split	36%	26%	18%	20%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
 VAR: Variable Phase

	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class (MC) Running		Undetected Movement
	Mixed Running & Stopped MCs		Continuous Movement
	Other Movement Class (MC) Stopped		Phase Transition Applied

LANE SUMMARY

Site: TCS 3318 [Old Castle Hill Road/McMullen Avenue/
Pennant Street PM (Site Folder: Future_2039_with_dev_PM)]

Network: N101
[Future_2039_with_developmen
t_PM (Network Folder:
Future_2039_with_development
)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h]	[HV %]	[Total veh/h]	[HV %]	veh/h	v/c	%	sec		[Veh]	[Dist]		m	%	%
South: McMullen Ave															
Lane 1	639	1.9	639	1.9	882	0.724	100	21.7	LOS B	25.6	182.1	Full	150	0.0	22.6
Lane 2	422	2.6	422	2.6	583 ¹	0.724	100	27.5	LOS B	15.9	114.0	Full	150	0.0	0.0
Lane 3	246	4.3	246	4.3	517	0.477	100	32.6	LOS C	7.7	56.1	Short	35	0.0	NA
Approach	1307	2.6	1307	2.6		0.724		25.6	LOS B	25.6	182.1				
East: OCH Rd E															
Lane 1	196	7.0	196	7.0	1116	0.176	100	9.8	LOS A	3.8	28.5	Short	30	0.0	NA
Lane 2	126	0.0	126	0.0	270	0.468	100	57.7	LOS E	7.5	52.7	Full	45	0.0	19.3
Lane 3	89	1.2	89	1.2	128	0.702	100	72.2	LOS F	6.0	42.1	Short	35	0.0	NA
Approach	412	3.6	412	3.6		0.702		38.1	LOS C	7.5	52.7				
North: Pennant St															
Lane 1	123	0.0	123	0.0	996	0.124	100	23.8	LOS B	2.0	14.0	Short	45	0.0	NA
Lane 2	301	3.0	301	3.0	469 ¹	0.641	100	58.6	LOS E	16.7	119.7	Full	110	0.0	12.7
Lane 3	335	3.0	335	3.0	522 ¹	0.641	100	61.8	LOS E	18.6	133.4	Full	110	0.0	22.5
Lane 4	19	0.0	19	0.0	335	0.057	100	42.3	LOS C	0.6	4.1	Short	45	0.0	NA
Approach	778	2.4	778	2.4		0.641		54.1	LOS D	18.6	133.4				
West: OCH Rd W															
Lane 1	292	0.7	292	0.7	426 ¹	0.685	100	58.5	LOS E	16.8	118.1	Full	80	0.0	40.6
Lane 2	148	0.4	148	0.4	242	0.611	100	51.1	LOS D	6.9	48.6	Short	50	0.0	NA
Lane 3	148	0.4	148	0.4	242	0.611	100	40.7	LOS C	6.9	48.6	Short	50	0.0	NA
Approach	587	0.5	587	0.5		0.685		52.2	LOS D	16.8	118.1				
Intersectio n	3084	2.3	3084	2.3		0.724		39.5	LOS C	25.6	182.1				

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

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

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

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

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

¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Approach Lane Flows (veh/h)										
South: McMullen Ave										
Mov. From S To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	163	476	-	639	1.9	882	0.724	100	NA	NA
Lane 2	-	422	-	422	2.6	583 ¹	0.724	100	NA	NA

Lane 3	-	-	246	246	4.3	517	0.477	100	48.3	2
Approach	163	898	246	1307	2.6		0.724			
East: OCH Rd E										
Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	196	-	-	196	7.0	1116	0.176	100	0.3	2
Lane 2	-	126	-	126	0.0	270	0.468	100	NA	NA
Lane 3	-	-	89	89	1.2	128	0.702	100	21.8	2
Approach	196	126	89	412	3.6		0.702			
North: Pennant St										
Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	123	-	-	123	0.0	996	0.124	100	0.0	2
Lane 2	-	301	-	301	3.0	469 ¹	0.641	100	NA	NA
Lane 3	-	335	-	335	3.0	522 ¹	0.641	100	NA	NA
Lane 4	-	-	19	19	0.0	335	0.057	100	0.0	3
Approach	123	636	19	778	2.4		0.641			
West: OCH Rd W										
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	67	224	-	292	0.7	426 ¹	0.685	100	NA	NA
Lane 2	-	-	148	148	0.4	242	0.611	100	2.4	1
Lane 3	-	-	148	148	0.4	242	0.611	100	2.4	2
Approach	67	224	296	587	0.5		0.685			
Total %HV Deg. Satn (v/c)										
Intersection	3084	2.3		0.724						

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Capacity Flow Rate veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec	
South Exit: McMullen Ave Merge Type: Not Applied											
	Full Length Lane	1	Merge Analysis not applied.								
	Full Length Lane	2	Merge Analysis not applied.								
East Exit: OCH Rd E Merge Type: Not Applied											
	Full Length Lane	1	Merge Analysis not applied.								
North Exit: Pennant St Merge Type: Not Applied											
	Full Length Lane	1	Merge Analysis not applied.								
	Full Length Lane	2	Merge Analysis not applied.								
West Exit: OCH Rd W Merge Type: Not Applied											
	Full Length Lane	1	Merge Analysis not applied.								

PHASING SUMMARY

Site: TCS 3318 [Old Castle Hill Road/McMullen Avenue/
Pennant Street PM (Site Folder: Future_2039_with_dev_PM)]

Network: N101
[Future_2039_with_developmen
t_PM (Network Folder:
Future_2039_with_development
)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog

Phase Times determined by the program

Downstream lane blockage effects included in determining phase times

Phase Sequence: TCS3318 SCATS

Reference Phase: Phase A

Input Phase Sequence: A, D, D1*, D2*, E, F1*, F2*, G, G1*, G2*

Output Phase Sequence: A, D, E, F2*, G, G2*

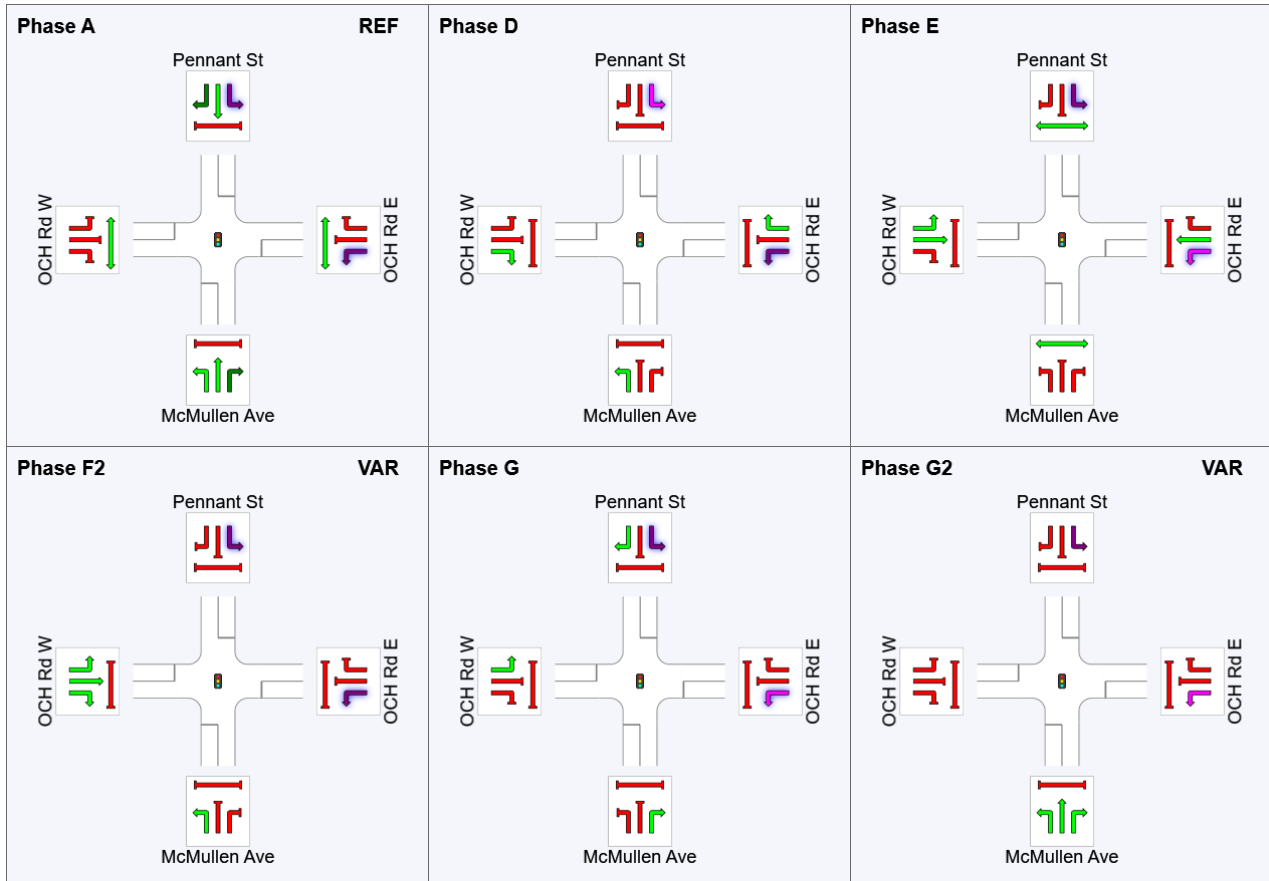
(* Variable Phase)

Phase Timing Summary

Phase	A	D	E	F2	G	G2
Phase Change Time (sec)	83	126	11	35	49	61
Green Time (sec)	37	9	18	8	6	16
Phase Time (sec)	43	15	24	14	12	22
Phase Split	33%	12%	18%	11%	9%	17%








See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class (MC) Running		Undetected Movement
	Mixed Running & Stopped MCs		Continuous Movement
	Other Movement Class (MC) Stopped		Phase Transition Applied

LANE SUMMARY

Site: 103 [Old Castle Hill Road / Garthowen Crescent South PM (Site Folder: Future_2039_with_dev_PM)]

Network: N101 [Future_2039_with_development_PM (Network Folder: Future_2039_with_development)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h]	[HV %]	[Total veh/h]	[HV %]	veh/h	v/c	%	sec		[Veh]	[Dist]		m	%	%
South: Garthowen Cres South															
Lane 1	32	0.0	32	0.0	885	0.036	100	7.0	LOS A	0.1	0.8	Full	500	-18.8 ^{N3}	0.0
Approach	32	0.0	32	0.0		0.036		7.0	LOS A	0.1	0.8				
East: OCH Rd															
Lane 1	382	3.9	382	3.9	1536	0.249	100	0.0	LOS A	0.0	0.0	Full	115	-19.2 ^{N3}	0.0
Approach	382	3.9	382	3.9		0.249		0.0	NA	0.0	0.0				
West: OCH Rd															
Lane 1	589	2.0	589	2.0	1923	0.306	100	0.0	LOS A	0.0	0.1	Full	45	0.0	0.0
Approach	589	2.0	589	2.0		0.306		0.0	NA	0.0	0.1				
Intersection	1003	2.6	1003	2.6		0.306		0.2	NA	0.1	0.8				

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

Lane LOS values are based on average delay per lane.

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.

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

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

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

^{N3} Capacity Adjustment due to downstream lane blockage determined by the program.

Approach Lane Flows (veh/h)										
South: Garthowen Cres South										
Mov. From S To Exit:	L2	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
	W	E								
Lane 1	31	1	32	0.0	885	0.036	100	NA	NA	
Approach	31	1	32	0.0		0.036				
East: OCH Rd										
Mov. From E To Exit:	L2	T1	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
	S	W								
Lane 1	1	381	382	3.9	1536	0.249	100	NA	NA	
Approach	1	381	382	3.9		0.249				
West: OCH Rd										
Mov. From W To Exit:	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
	E	S								
Lane 1	588	1	589	2.0	1923	0.306	100	NA	NA	

Approach	588	1	589	2.0	0.306
Total %HV Deg.Satn (v/c)					
Intersection	1003	2.6		0.306	

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap sec	Follow-up Headway sec	Lane Capacity Flow Rate veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec	
South Exit: Garthowen Cres South											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
East Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
West Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									

LANE SUMMARY

Site: 104 [Old Castle Hill Road / Garthowen Crescent North PM (Site Folder: Future_2039_with_dev_PM)]

Network: N101 [Future_2039_with_development_PM (Network Folder: Future_2039_with_development)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h]	[HV %]	[Total veh/h]	[HV %]	veh/h	v/c	%	sec		[Veh]	[Dist]		m	%	%
South: Garthowen Cres North															
Lane 1	12	0.0	12	0.0	563	0.021	100	9.8	LOS A	0.1	0.5	Full	500	0.0	0.0
Approach	12	0.0	12	0.0		0.021		9.8	LOS A	0.1	0.5				
East: OCH Rd															
Lane 1	378	3.9	378	3.9	1899	0.199	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	378	3.9	378	3.9		0.199		0.2	NA	0.0	0.0				
West: OCH Rd															
Lane 1	595	1.9	595	1.9	1776	0.335	100	1.4	LOS A	0.8	5.8	Full	115	0.0	0.0
Approach	595	1.9	595	1.9		0.335		1.4	NA	0.8	5.8				
Intersection	984	2.7	984	2.7		0.335		1.0	NA	0.8	5.8				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab). Lane LOS values are based on average delay per lane. Minor Road Approach LOS values are based on average delay for all lanes. NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes. Delay Model: SIDRA Standard (Geometric Delay is included). Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D). HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)										
South: Garthowen Cres North										
Mov. From S To Exit:	L2	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
	W	E								
Lane 1	4	7	12	0.0	563	0.021	100	NA	NA	
Approach	4	7	12	0.0		0.021				
East: OCH Rd										
Mov. From E To Exit:	L2	T1	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
	S	W								
Lane 1	11	367	378	3.9	1899	0.199	100	NA	NA	
Approach	11	367	378	3.9		0.199				
West: OCH Rd										
Mov. From W To Exit:	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
	E	S								
Lane 1	511	84	595	1.9	1776	0.335	100	NA	NA	

Approach	511	84	595	1.9	0.335
Total %HV Deg.Satn (v/c)					
Intersection	984	2.7	0.335		

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

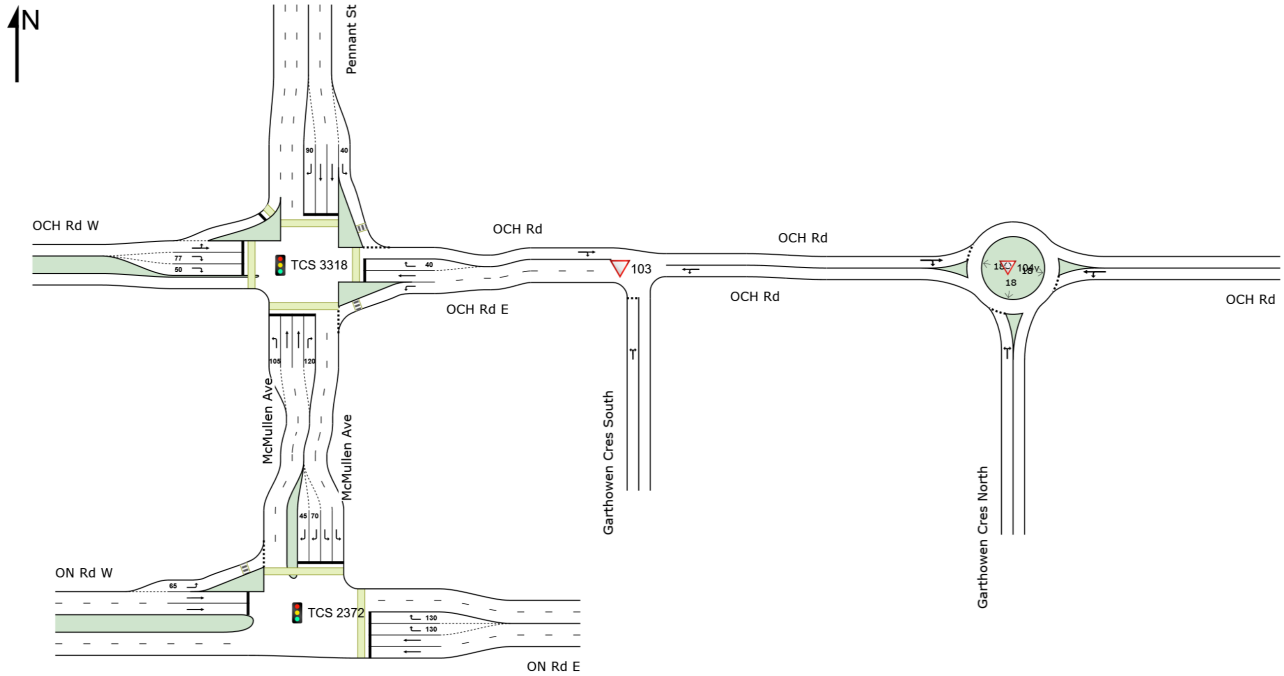
Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Garthowen Cres North											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
East Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
West Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									

NETWORK LAYOUT

Network: N101 [Future_2039_with_dev+mit_AM (Network Folder: Future_2039_with_development+mitigation)]

New Network
Network Category: (None)

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



SITES IN NETWORK		
Site ID	CCG ID	Site Name
TCS 2372	NA	Old Northern Road/McMullen Avenue AM
TCS 3318	NA	Old Castle Hill Road/McMullen Avenue/Pennant Street AM
103	NA	Old Castle Hill Road/Garthowen Crescent South AM
104v	NA	Old Castle Hill Road/Garthowen Crescent North AM

LANE SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue AM (Site Folder: Future_2039_with_dev+miti_AM)]

Network: N101 [Future_2039_with_dev+mit_AM (Network Folder: Future_2039_with_development+mitigation)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h	[HV %	[Total veh/h	[HV %	veh/h	v/c	%	sec		[Veh	[Dist] m		m	%	%
East: ON Rd E															
Lane 1	624	5.0	624	5.0	1424	0.438	100	6.2	LOS A	14.2	103.6	Full	205	0.0	0.0
Lane 2	624	5.0	624	5.0	1424	0.438	100	6.2	LOS A	14.2	103.6	Full	205	0.0	0.0
Lane 3	498	2.7	498	2.7	588	0.846	100	33.8	LOS C	21.8	156.0	Short	130	0.0	NA
Lane 4	498	2.7	498	2.7	588	0.846	100	33.8	LOS C	21.8	156.0	Short	130	0.0	NA
Approach	2244	4.0	2244	4.0		0.846		18.4	LOS B	21.8	156.0				
North: McMullen Ave															
Lane 1	378	4.5	378	4.5	1025	0.369	100	17.1	LOS B	8.6	62.7	Full	150	0.0	0.0
Lane 2	378	4.5	378	4.5	1025	0.369	100	16.8	LOS B	8.5	61.4	Full	150	0.0	0.0
Lane 3	155	5.8	155	5.8	274	0.566	100	46.4	LOS D	7.9	58.1	Short	70	0.0	NA
Lane 4	155	5.8	155	5.8	274	0.566	100	46.4	LOS D	7.9	58.1	Short	45	0.0	NA
Approach	1067	4.8	1067	4.8		0.566		25.5	LOS B	8.6	62.7				
West: ON Rd W															
Lane 1	228	7.8	228	7.8	1126	0.203	100	13.2	LOS A	5.1	37.9	Short	65	0.0	NA
Lane 2	441	6.5	441	6.5	523 ¹	0.843	100	49.9	LOS D	26.7	197.5	Full	190	0.0	8.5
Lane 3	534	6.5	534	6.5	633	0.843	100	50.9	LOS D	33.7	249.3	Full	190	0.0	29.7
Approach	1203	6.7	1203	6.7		0.843		43.4	LOS D	33.7	249.3				
Intersection	4515	4.9	4515	4.9		0.846		26.8	LOS B	33.7	249.3				

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

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

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

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

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

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Approach Lane Flows (veh/h)										
East: ON Rd E										
Mov. From E To Exit:	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
	W	N								
Lane 1	624	-	624	5.0	1424	0.438	100	NA	NA	
Lane 2	624	-	624	5.0	1424	0.438	100	NA	NA	
Lane 3	-	498	498	2.7	588	0.846	100	21.5	2	
Lane 4	-	498	498	2.7	588	0.846	100	21.5	3	
Approach	1248	996	2244	4.0		0.846				
North: McMullen Ave										

Mov. From N To Exit:	L2	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
	E	W							
Lane 1	378	-	378	4.5	1025	0.369	100	NA	NA
Lane 2	378	-	378	4.5	1025	0.369	100	NA	NA
Lane 3	-	155	155	5.8	274	0.566	100	0.0	2
Lane 4	-	155	155	5.8	274	0.566	100	28.3	3
Approach	757	311	1067	4.8		0.566			
West: ON Rd W									
Mov. From W To Exit:	L2	T1	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
	N	E							
Lane 1	228	-	228	7.8	1126	0.203	100	0.0	2
Lane 2	-	441	441	6.5	523 ¹	0.843	100	NA	NA
Lane 3	-	534	534	6.5	633	0.843	100	NA	NA
Approach	228	975	1203	6.7		0.843			
Total %HV Deg. Satn (v/c)									
Intersection	4515	4.9		0.846					

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis												
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Lane Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec	
East Exit: ON Rd E												
Merge Type: Not Applied												
Full Length Lane	1											
Full Length Lane	2											
North Exit: McMullen Ave												
Merge Type: Not Applied												
Full Length Lane	1											
Full Length Lane	2											
West Exit: ON Rd W												
Merge Type: Not Applied												
Full Length Lane	1											
Full Length Lane	2											

PHASING SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue AM (Site Folder: Future_2039_with_dev+miti_AM)]

Network: N101
 [Future_2039_with_dev+mit_AM
 (Network Folder:
 Future_2039_with_development
 +mitigation)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog

Phase Times determined by the program

Downstream lane blockage effects included in determining phase times

Phase Sequence: TCS2372 Scats - Import

Reference Phase: Phase A

Input Phase Sequence: A, B, C, D

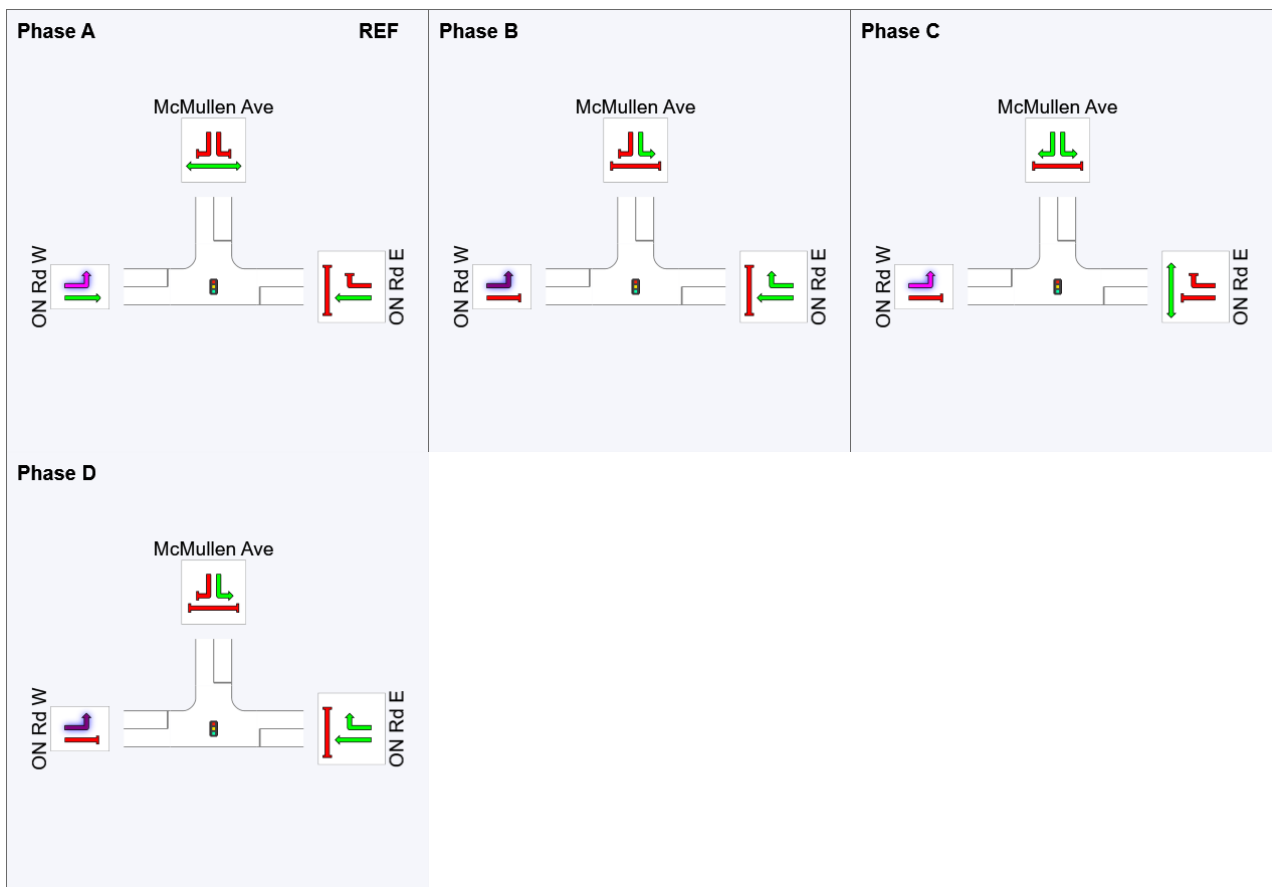
Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	50	78	104
Green Time (sec)	44	22	20	20
Phase Time (sec)	50	28	26	26
Phase Split	38%	22%	20%	20%













See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class (MC) Running		Undetected Movement
	Mixed Running & Stopped MCs		Continuous Movement
	Other Movement Class (MC) Stopped		Phase Transition Applied

Lane 1	142	-	-	142	0.7	1023	0.139	100	0.0	2
Lane 2	-	446	-	446	3.5	806	0.553	100	NA	NA
Lane 3	-	446	-	446	3.5	806	0.553	100	NA	NA
Lane 4	-	-	193	193	5.5	389	0.495	100	0.0	3
Approach	142	892	193	1226	3.5		0.553			
East: OCH Rd E										
Mov. From E To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	420	-	-	420	3.3	1233	0.341	100	NA	NA
Lane 2	-	243	-	243	0.0	375 ¹	0.648	100	NA	NA
Lane 3	-	-	127	127	0.8	187	0.679	100	9.7	2
Approach	420	243	127	791	1.9		0.679			
North: Pennant St										
Mov. From N To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	75	-	-	75	1.4	1187	0.063	100	0.0	2
Lane 2	-	281	-	281	5.6	742 ¹	0.378	100	NA	NA
Lane 3	-	301	-	301	5.6	796	0.378	100	NA	NA
Lane 4	-	-	11	11	10.0	278	0.038	100	0.0	3
Approach	75	582	11	667	5.2		0.378			
West: OCH Rd W										
Mov. From W To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	35	138	-	173	4.3	373	0.463	100	NA	NA
Lane 2	-	-	39	39	5.4	165	0.236	100	0.0	1
Lane 3	-	-	39	39	5.4	165	0.236	100	0.0	2
Approach	35	138	78	251	4.6		0.463			
Total %HV Deg. Satn (v/c)										
Intersection	2935	3.6		0.679						

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis												
	Exit Lane Number	Short Lane Length	Percent Opng in Lane	Opposing Flow Rate	Critical Gap	Follow-up Headway	Lane Capacity	Capacity Flow Rate	Deg. Satn	Min. Delay	Merge Delay	
		m	%	veh/h	pcu/h	sec	veh/h	veh/h	v/c	sec	sec	
South Exit: McMullen Ave												
Merge Type: Not Applied												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
East Exit: OCH Rd E												
Merge Type: Not Applied												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Pennant St												
Merge Type: Not Applied												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
West Exit: OCH Rd W												

Merge Type: **Not Applied**

Full Length Lane	1	Merge Analysis not applied.
------------------	---	-----------------------------

PHASING SUMMARY

Site: TCS 3318 [Old Castle Hill Road/McMullen Avenue/
Pennant Street AM (Site Folder: Future_2039_with_dev
+miti_AM)]

Network: N101
[Future_2039_with_dev+mit_AM
(Network Folder:
Future_2039_with_development
+mitigation)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Phase Sequence: TCS3318 SCATS - Partial
Reference Phase: Phase A
Input Phase Sequence: A, D, D1*, D2*, E, F1*, F2*, G, G1*, G2*
Output Phase Sequence: A, D, D2*, E, F1*, G
(* Variable Phase)

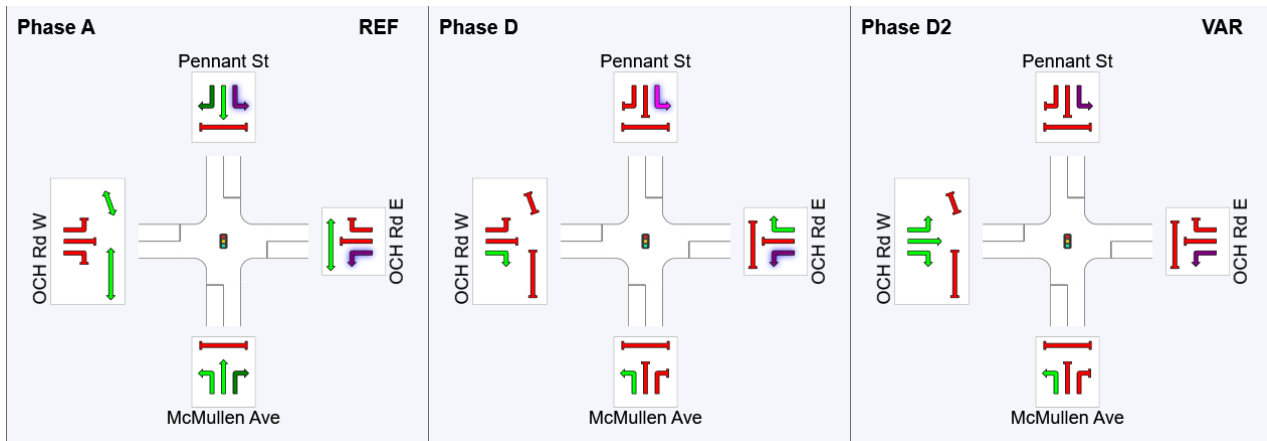
Phase Timing Summary

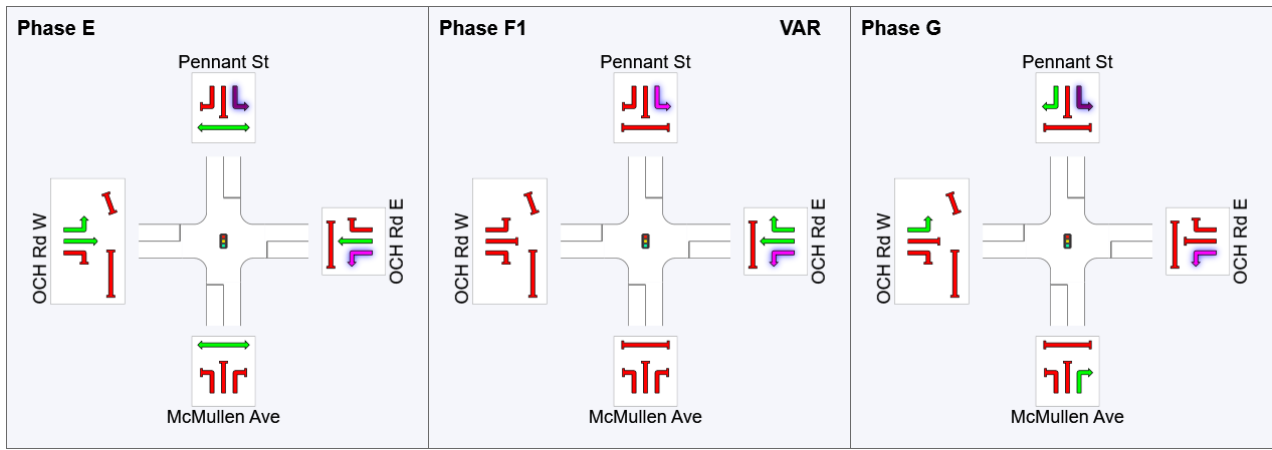
Phase	A	D	D2	E	F1	G
Phase Change Time (sec)	63	124	6	12	36	48
Green Time (sec)	55	6	***	18	6	9
Phase Time (sec)	61	12	6	24	12	15
Phase Split	47%	9%	5%	18%	9%	12%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

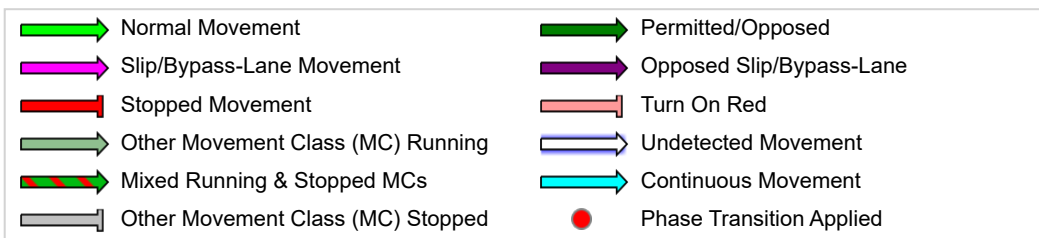
*** No green time has been calculated for this phase because the next phase starts during its intergreen time. This occurs with overlap phasing where there is no single movement connecting this phase to the next, or where the only such movement is a dummy movement with zero minimum green time specified. If a green time is required for this phase, specify a dummy movement with a non-zero minimum green time.

Output Phase Sequence





REF: Reference Phase
 VAR: Variable Phase



LANE SUMMARY

Site: 103 [Old Castle Hill Road/Garthowen Crescent South AM (Site Folder: Future_2039_with_dev+miti_AM)]

Network: N101 [Future_2039_with_dev+mit_AM (Network Folder: Future_2039_with_development+mitigation)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h]	[HV %]	[Total veh/h]	[HV %]	veh/h	v/c	%	sec		[Veh]	[Dist]		m	%	%
South: Garthowen Cres South															
Lane 1	75	0.0	75	0.0	710	0.105	100	9.2	LOS A	0.4	2.6	Full	500	-3.0 ^{N3}	0.0
Approach	75	0.0	75	0.0		0.105		9.2	LOS A	0.4	2.6				
East: OCH Rd															
Lane 1	711	2.2	711	2.2	1863	0.381	100	0.0	LOS A	0.0	0.0	Full	115	-3.1 ^{N3}	0.0
Approach	711	2.2	711	2.2		0.381		0.0	NA	0.0	0.0				
West: OCH Rd															
Lane 1	407	2.8	407	2.8	1907	0.214	100	0.0	LOS A	0.0	0.1	Full	45	0.0	0.0
Approach	407	2.8	407	2.8		0.214		0.0	NA	0.0	0.1				
Intersection	1193	2.3	1193	2.3		0.381		0.6	NA	0.4	2.6				

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

Lane LOS values are based on average delay per lane.

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.

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

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

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

^{N3} Capacity Adjustment due to downstream lane blockage determined by the program.

Approach Lane Flows (veh/h)										
South: Garthowen Cres South										
Mov. From S To Exit:	L2	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
	W	E								
Lane 1	74	1	75	0.0	710	0.105	100	NA	NA	
Approach	74	1	75	0.0		0.105				
East: OCH Rd										
Mov. From E To Exit:	L2	T1	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
	S	W								
Lane 1	1	709	711	2.2	1863	0.381	100	NA	NA	
Approach	1	709	711	2.2		0.381				
West: OCH Rd										
Mov. From W To Exit:	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
	E	S								
Lane 1	406	1	407	2.8	1907	0.214	100	NA	NA	

Approach	406	1	407	2.8	0.214
Total %HV Deg.Satn (v/c)					
Intersection	1193	2.3	0.381		

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Garthowen Cres South											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
East Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
West Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									

LANE SUMMARY

Site: 104v [Old Castle Hill Road/Garthowen Crescent North AM (Site Folder: Future_2039_with_dev+miti_AM)]

Network: N101 [Future_2039_with_dev+mit_AM (Network Folder: Future_2039_with_development+mitigation)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance															
	DEMAND FLOWS [Total HV]		ARRIVAL FLOWS [Total HV]		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh Dist]		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	%	veh/h	v/c	%	sec					m	%	%
South: Garthowen Cres North															
Lane 1 ^d	21	0.0	21	0.0	737	0.029	100	12.0	LOS A	0.2	1.2	Full	500	0.0	0.0
Approach	21	0.0	21	0.0		0.029		12.0	LOS A	0.2	1.2				
East: OCH Rd															
Lane 1 ^d	707	2.2	707	2.2	1562	0.453	100	4.5	LOS A	3.9	28.0	Full	500	0.0	0.0
Approach	707	2.2	707	2.2		0.453		4.5	LOS A	3.9	28.0				
West: OCH Rd															
Lane 1 ^d	406	2.8	406	2.8	1584	0.257	100	4.7	LOS A	2.1	14.9	Full	115	0.0	0.0
Approach	406	2.8	406	2.8		0.257		4.7	LOS A	2.1	14.9				
Intersection	1135	2.4	1135	2.4		0.453		4.7	LOS A	3.9	28.0				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)										
South: Garthowen Cres North										
Mov. From S To Exit:	L2	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	5	16	21	0.0	737	0.029	100	NA	NA	
Approach	5	16	21	0.0		0.029				
East: OCH Rd										
Mov. From E To Exit:	L2	T1	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	11	697	707	2.2	1562	0.453	100	NA	NA	
Approach	11	697	707	2.2		0.453				
West: OCH Rd										
Mov. From W To Exit:	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	376	31	406	2.8	1584	0.257	100	NA	NA	

Approach	376	31	406	2.8	0.257
Total %HV Deg.Satn (v/c)					
Intersection	1135	2.4	0.453		

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Garthowen Cres North											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
East Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
West Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									

LANE SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue PM (Site Folder: Future_2039_with_dev+miti_PM)]

Network: N101 [Future_2039_with_dev+mit_PM (Network Folder: Future_2039_with_development+mitigation)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h]	[HV %]	[Total veh/h]	[HV %]	veh/h	v/c	%	sec		[Veh]	[Dist]		m	%	%
East: ON Rd E															
Lane 1	593	4.2	593	4.2	1475	0.402	100	4.9	LOS A	11.9	86.1	Full	205	0.0	0.0
Lane 2	593	4.2	593	4.2	1475	0.402	100	4.9	LOS A	11.9	86.1	Full	205	0.0	0.0
Lane 3	539	1.9	539	1.9	677	0.797	100	29.2	LOS C	20.9	148.7	Short	130	0.0	NA
Lane 4	539	1.9	539	1.9	677	0.797	100	29.2	LOS C	20.9	148.7	Short	130	0.0	NA
Approach	2264	3.1	2264	3.1		0.797		16.5	LOS B	20.9	148.7				
North: McMullen Ave															
Lane 1	437	1.7	437	1.7	1087	0.402	100	18.0	LOS B	12.9	91.3	Full	150	0.0	0.0
Lane 2	437	1.7	437	1.7	1087	0.402	100	17.0	LOS B	12.1	86.1	Full	150	0.0	0.0
Lane 3	120	8.3	120	8.3	229	0.523	100	54.3	LOS D	6.6	49.9	Short	70	0.0	NA
Lane 4	120	8.3	120	8.3	229	0.523	100	54.3	LOS D	6.6	49.9	Short	45	0.0	NA
Approach	1114	3.1	1114	3.1		0.523		25.5	LOS B	12.9	91.3				
West: ON Rd W															
Lane 1	213	6.4	213	6.4	1071	0.199	100	27.9	LOS B	4.9	36.0	Short	65	0.0	NA
Lane 2	419	6.1	419	6.1	497 ¹	0.843	100	65.8	LOS E	27.0	199.0	Full	190	0.0	9.2
Lane 3	499	6.1	499	6.1	592	0.843	100	50.1	LOS D	31.7	233.4	Full	190	0.0	23.7
Approach	1131	6.1	1131	6.1		0.843		51.7	LOS D	31.7	233.4				
Intersection	4508	3.9	4508	3.9		0.843		27.5	LOS B	31.7	233.4				

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

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

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

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

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

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Approach Lane Flows (veh/h)										
East: ON Rd E										
Mov. From E To Exit:	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
	W	N								
Lane 1	593	-	593	4.2	1475	0.402	100	NA	NA	
Lane 2	593	-	593	4.2	1475	0.402	100	NA	NA	
Lane 3	-	539	539	1.9	677	0.797	100	17.2	2	
Lane 4	-	539	539	1.9	677	0.797	100	17.2	3	
Approach	1185	1079	2264	3.1		0.797				
North: McMullen Ave										

Mov. From N To Exit:	L2	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
	E	W							
Lane 1	437	-	437	1.7	1087	0.402	100	NA	NA
Lane 2	437	-	437	1.7	1087	0.402	100	NA	NA
Lane 3	-	120	120	8.3	229	0.523	100	0.0	2
Lane 4	-	120	120	8.3	229	0.523	100	14.3	3
Approach	874	240	1114	3.1		0.523			
West: ON Rd W									
Mov. From W To Exit:	L2	T1	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
	N	E							
Lane 1	213	-	213	6.4	1071	0.199	100	0.0	2
Lane 2	-	419	419	6.1	497 ¹	0.843	100	NA	NA
Lane 3	-	499	499	6.1	592	0.843	100	NA	NA
Approach	213	918	1131	6.1		0.843			
Total %HV Deg. Satn (v/c)									
Intersection	4508	3.9		0.843					

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis												
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Lane Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec	
East Exit: ON Rd E												
Merge Type: Not Applied												
Full Length Lane	1											
Full Length Lane	2											
North Exit: McMullen Ave												
Merge Type: Not Applied												
Full Length Lane	1											
Full Length Lane	2											
West Exit: ON Rd W												
Merge Type: Not Applied												
Full Length Lane	1											
Full Length Lane	2											

PHASING SUMMARY

Site: TCS 2372 [Old Northern Road/McMullen Avenue PM (Site Folder: Future_2039_with_dev+miti_PM)]

Network: N101
 [Future_2039_with_dev+mit_PM
 (Network Folder:
 Future_2039_with_development
 +mitigation)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog

Phase Times determined by the program

Downstream lane blockage effects included in determining phase times

Phase Sequence: TCS2372 Scats - Import

Reference Phase: Phase A

Input Phase Sequence: A, B, C, D

Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	47	81	104
Green Time (sec)	41	28	17	20
Phase Time (sec)	47	34	23	26
Phase Split	36%	26%	18%	20%











See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class (MC) Running		Undetected Movement
	Mixed Running & Stopped MCs		Continuous Movement
	Other Movement Class (MC) Stopped		Phase Transition Applied

LANE SUMMARY

Site: TCS 3318 [Old Castle Hill Road/McMullen Avenue/
Pennant Street PM (Site Folder: Future_2039_with_dev
+miti_PM)]

Network: N101
[Future_2039_with_dev+mit_PM
(Network Folder:
Future_2039_with_development
+mitigation)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Lane Use and Performance															
	DEMAND FLOWS		ARRIVAL FLOWS		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	[Total veh/h	HV %	[Total veh/h	HV %						[Veh	Dist] m				
South: McMullen Ave															
Lane 1	163	0.0	163	0.0	1029	0.159	100	8.6	LOS A	1.2	8.1	Short	105	0.0	NA
Lane 2	449	2.6	449	2.6	723	0.621	100	22.1	LOS B	18.3	131.1	Full	150	0.0	0.0
Lane 3	449	2.6	449	2.6	723	0.621	100	22.1	LOS B	18.3	131.1	Full	150	0.0	0.0
Lane 4	246	4.3	246	4.3	443	0.556	100	29.3	LOS C	9.2	66.4	Short	120	0.0	NA
Approach	1307	2.6	1307	2.6		0.621		21.8	LOS B	18.3	131.1				
East: OCH Rd E															
Lane 1	196	7.0	196	7.0	1076	0.182	100	9.0	LOS A	3.6	26.8	Full	45	0.0	0.0
Lane 2	126	0.0	126	0.0	345	0.366	100	52.2	LOS D	7.1	49.8	Full	45	0.0	14.2
Lane 3	89	1.2	89	1.2	142	0.632	100	70.0	LOS E	5.8	41.2	Short	40	0.0	NA
Approach	412	3.6	412	3.6		0.632		35.5	LOS C	7.1	49.8				
North: Pennant St															
Lane 1	123	0.0	123	0.0	956	0.129	100	19.7	LOS B	2.0	13.8	Short	40	0.0	NA
Lane 2	294	3.0	294	3.0	622 ¹	0.473	100	43.3	LOS D	14.0	100.6	Full	110	0.0	0.0
Lane 3	341	3.0	341	3.0	721	0.473	100	34.4	LOS C	16.3	116.8	Full	110	0.0	10.4
Lane 4	19	0.0	19	0.0	388	0.049	100	22.6	LOS B	0.5	3.8	Short	90	0.0	NA
Approach	778	2.4	778	2.4		0.473		35.1	LOS C	16.3	116.8				
West: OCH Rd W															
Lane 1	292	0.7	292	0.7	475	0.614	100	47.0	LOS D	16.4	115.6	Full	80	0.0	38.6
Lane 2	148	0.4	148	0.4	242	0.611	100	62.3	LOS E	9.1	63.9	Short	77	0.0	NA
Lane 3	148	0.4	148	0.4	242	0.611	100	62.3	LOS E	9.1	63.9	Short	50	0.0	NA
Approach	587	0.5	587	0.5		0.614		54.7	LOS D	16.4	115.6				
Intersectio n	3084	2.3	3084	2.3		0.632		33.3	LOS C	18.3	131.1				

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

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

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

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

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

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Approach Lane Flows (veh/h)											
South: McMullen Ave											
Mov. From S To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL %	Ov. Lane No.	
	W	N	E								
Lane 1	163	-	-	163	0.0	1029	0.159	100	0.0	2	

Lane 2	-	449	-	449	2.6	723	0.621	100	NA	NA
Lane 3	-	449	-	449	2.6	723	0.621	100	NA	NA
Lane 4	-	-	246	246	4.3	443	0.556	100	0.0	3
Approach	163	898	246	1307	2.6		0.621			
East: OCH Rd E										
Mov. From E To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	196	-	-	196	7.0	1076	0.182	100	NA	NA
Lane 2	-	126	-	126	0.0	345	0.366	100	NA	NA
Lane 3	-	-	89	89	1.2	142	0.632	100	7.6	2
Approach	196	126	89	412	3.6		0.632			
North: Pennant St										
Mov. From N To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	123	-	-	123	0.0	956	0.129	100	0.0	2
Lane 2	-	294	-	294	3.0	622 ¹	0.473	100	NA	NA
Lane 3	-	341	-	341	3.0	721	0.473	100	NA	NA
Lane 4	-	-	19	19	0.0	388	0.049	100	0.0	3
Approach	123	636	19	778	2.4		0.473			
West: OCH Rd W										
Mov. From W To Exit:	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	67	224	-	292	0.7	475	0.614	100	NA	NA
Lane 2	-	-	148	148	0.4	242	0.611	100	0.0	1
Lane 3	-	-	148	148	0.4	242	0.611	100	27.3	2
Approach	67	224	296	587	0.5		0.614			
Total %HV Deg. Satn (v/c)										
Intersection	3084	2.3		0.632						

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis												
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap sec	Follow-up Headway sec	Lane Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec		
South Exit: McMullen Ave												
Merge Type: Not Applied												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
East Exit: OCH Rd E												
Merge Type: Not Applied												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Pennant St												
Merge Type: Not Applied												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
West Exit: OCH Rd W												
Merge Type: Not Applied												

Full Length Lane 1 Merge Analysis not applied.

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Project: \\au2012-ntap01_cifs02\shared_projects\300305867\technical\modelling\251208_5867_16_20_ochr-JS.sip9

PHASING SUMMARY

Site: TCS 3318 [Old Castle Hill Road/McMullen Avenue/
Pennant Street PM (Site Folder: Future_2039_with_dev
+miti_PM)]

Network: N101
[Future_2039_with_dev+mit_PM
(Network Folder:
Future_2039_with_development
+mitigation)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog

Phase Times determined by the program

Downstream lane blockage effects included in determining phase times

Phase Sequence: TCS3318 SCATS

Reference Phase: Phase A

Input Phase Sequence: A, D, D1*, D2*, E, F1*, F2*, G, G1*, G2*

Output Phase Sequence: A, D, D2*, E, G

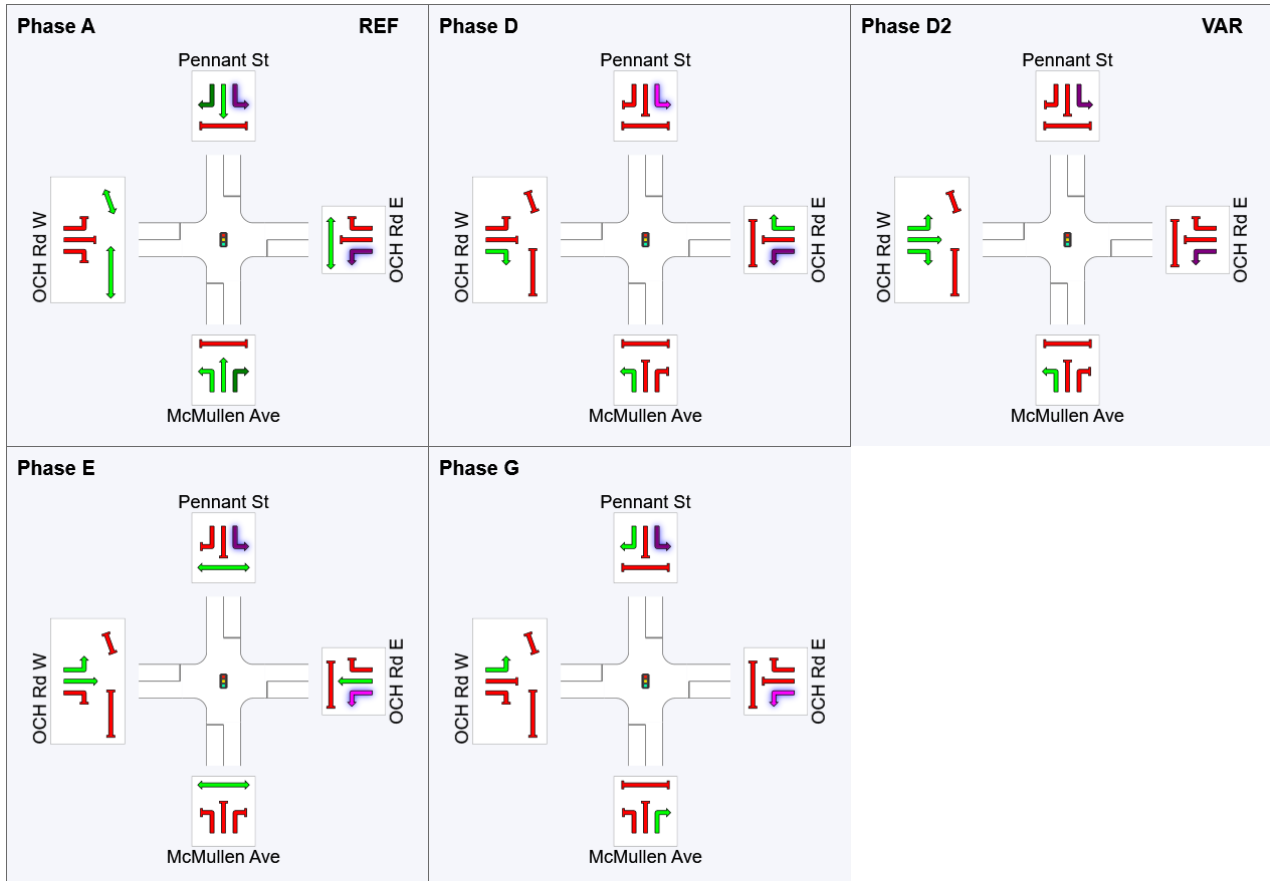
(* Variable Phase)

Phase Timing Summary

Phase	A	D	D2	E	G
Phase Change Time (sec)	61	116	2	9	38
Green Time (sec)	49	10	1	23	17
Phase Time (sec)	55	16	7	29	23
Phase Split	42%	12%	5%	22%	18%











See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class (MC) Running		Undetected Movement
	Mixed Running & Stopped MCs		Continuous Movement
	Other Movement Class (MC) Stopped		Phase Transition Applied

LANE SUMMARY

Site: 103 [Old Castle Hill Road / Garthowen Crescent South PM (Site Folder: Future_2039_with_dev+miti_PM)]

Network: N101 [Future_2039_with_dev+mit_PM (Network Folder: Future_2039_with_development+mitigation)]

New Site
 Site Category: (None)
 Give-Way (Two-Way)

Lane Use and Performance																
	DEMAND FLOWS		ARRIVAL FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.	
	[Total veh/h]	[HV %]	[Total veh/h]	[HV %]	veh/h	v/c	%	sec		[Veh]	[Dist]		m	%	%	
South: Garthowen Cres South																
Lane 1	32	0.0	32	0.0	1089	0.029	100	7.0	LOS A	0.1	0.8	Full	500	0.0	0.0	
Approach	32	0.0	32	0.0		0.029		7.0	LOS A	0.1	0.8					
East: OCH Rd																
Lane 1	382	3.9	382	3.9	1902	0.201	100	0.0	LOS A	0.0	0.0	Full	115	0.0	0.0	
Approach	382	3.9	382	3.9		0.201		0.0	NA	0.0	0.0					
West: OCH Rd																
Lane 1	589	2.0	589	2.0	1923	0.306	100	0.0	LOS A	0.0	0.1	Full	45	0.0	0.0	
Approach	589	2.0	589	2.0		0.306		0.0	NA	0.0	0.1					
Intersection	1003	2.6	1003	2.6		0.306		0.2	NA	0.1	0.8					

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
 Lane LOS values are based on average delay per lane.
 Minor Road Approach LOS values are based on average delay for all lanes.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
 Delay Model: SIDRA Standard (Geometric Delay is included).
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)										
South: Garthowen Cres South										
Mov.	L2	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From S To Exit:	W	E			veh/h	v/c	%	%		
Lane 1	31	1	32	0.0	1089	0.029	100	NA	NA	
Approach	31	1	32	0.0		0.029				
East: OCH Rd										
Mov.	L2	T1	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From E To Exit:	S	W			veh/h	v/c	%	%		
Lane 1	1	381	382	3.9	1902	0.201	100	NA	NA	
Approach	1	381	382	3.9		0.201				
West: OCH Rd										
Mov.	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL	Prob. Ov.	Ov. Lane No.
From W To Exit:	E	S			veh/h	v/c	%	%		
Lane 1	588	1	589	2.0	1923	0.306	100	NA	NA	

Approach	588	1	589	2.0	0.306
Total %HV Deg.Satn (v/c)					
Intersection	1003	2.6		0.306	

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Garthowen Cres South											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
East Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
West Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									

LANE SUMMARY

Site: 104v [Old Castle Hill Road/Garthowen Crescent North PM (Site Folder: Future_2039_with_dev+miti_PM)]

Network: N101 [Future_2039_with_dev+mit_PM (Network Folder: Future_2039_with_development+mitigation)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance															
	DEMAND FLOWS [Total HV]		ARRIVAL FLOWS [Total HV]		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh Dist]		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Garthowen Cres North															
Lane 1 ^d	12	0.0	12	0.0	976	0.012	100	8.9	LOS A	0.1	0.5	Full	500	0.0	0.0
Approach	12	0.0	12	0.0		0.012		8.9	LOS A	0.1	0.5				
East: OCH Rd															
Lane 1 ^d	378	3.9	378	3.9	1346	0.281	100	4.8	LOS A	1.9	13.7	Full	500	0.0	0.0
Approach	378	3.9	378	3.9		0.281		4.8	LOS A	1.9	13.7				
West: OCH Rd															
Lane 1 ^d	595	1.9	595	1.9	1677	0.355	100	4.9	LOS A	3.1	22.1	Full	115	0.0	0.0
Approach	595	1.9	595	1.9		0.355		4.9	LOS A	3.1	22.1				
Intersection	984	2.7	984	2.7		0.355		4.9	LOS A	3.1	22.1				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)										
South: Garthowen Cres North										
Mov. From S To Exit:	L2	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	4	7	12	0.0	976	0.012	100	NA	NA	
Approach	4	7	12	0.0		0.012				
East: OCH Rd										
Mov. From E To Exit:	L2	T1	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	11	367	378	3.9	1346	0.281	100	NA	NA	
Approach	11	367	378	3.9		0.281				
West: OCH Rd										
Mov. From W To Exit:	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	511	84	595	1.9	1677	0.355	100	NA	NA	

Approach	511	84	595	1.9	0.355
Total %HV Deg.Satn (v/c)					
Intersection	984	2.7	0.355		

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane % veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Garthowen Cres North											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
East Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									
West Exit: OCH Rd											
Merge Type: Not Applied											
Full Length Lane	1	Merge Analysis not applied.									

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