

Lot 201 & 202 Goonoo Goonoo Road, Hillvue

Development Application

Transport Impact Assessment

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1 Introduction

1.1 Background and Proposed Modification

Ason Group has been engaged to prepare a Transport Impact Assessment as part of a Development Application to be lodged with Tamworth Regional Council for a bulky goods retail development comprising four tenancies on Lot 201 and Lot 202, Goonoo Goonoo Road, Hillvue.

The site is in the north-west corner of a separately approved subdivision east of Goonoo Goonoo Road (DA2023-0308), as shown in **Figure 1**. The transport report included as part of the DA for the approved subdivision was prepared by Stantec¹ (herein referred to as the Stantec Subdivision Report).



Figure 1: Site Context

Base image source: Nearmap

1.2 Purpose of this Report

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

- existing transport conditions surrounding the site
- summary of the proposal
- suitability of the proposed parking supply, access strategy and overall layout
- traffic generating characteristics of the proposed development
- transport impacts on the surrounding networks
- design review of the proposed site layout.

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¹ Goonoo Goonoo Road, Hillvue Industrial Subdivision, Transport Impact Assessment, Stantec, 26 June 2023.

1.3 References

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

- Goonoo Goonoo Road, Hillvue Industrial Subdivision Transport Impact Assessment, Stantec, dated 26 June 2023.
- Lot 107 Goonoo Goonoo Road, Hillvue Transport Impact Assessment, Stantec, dated 17 April 2023.
- Tamworth Regional Development Control Plan (DCP) 2010.
- Tamworth Regional Local Environmental Plan (LEP) 2010.
- Australian Standard, Parking Facilities, Part 1: Off-Street Car Parking AS2890.1:2004.
- Australian Standard, Parking Facilities, Part 2: Off-Street Commercial Vehicle Facilities AS2890.2:2018.
- Australian Standard, Parking Facilities, Part 6: Off-Street Parking for People with Disabilities AS2890.6:2022.
- Guide to Transport Impact Assessment, 2024, Transport for NSW.
- Guide to Traffic Generating Developments, 2002, Transport for NSW.
- Trip Generation and Parking Generation Surveys report for Bulky Goods stores, Hyder Consulting, dated 19 May 2009.
- Architectural plans for the proposed development prepared by Leffler Simes Architects.



2 Strategic Context

2.1 Goonoo Goonoo Road Upgrades

The NSW Government is committed to upgrading Goonoo Goonoo Road between Jack Smyth Drive and Calala Lane in Tamworth with TfNSW stating that major works should have commenced in December 2024². The upgrade plans to duplicate this section of Goonoo Goonoo Road together with intersection upgrades are shown in **Figure 2** and summarised as follows:

- Calala Lane Intersection Upgrades:
 - Conversion of the roundabout to traffic signals.
 - Addition of one dedicated right-turn lane and one shared right/left turn lane from Calala Lane.
 - Creation of dedicated right and left-turn lanes from Goonoo Goonoo Road into Calala Lane.
- Craigends Lane Intersection Upgrades:
 - Conversion of the T-intersection to a roundabout.
 - Addition of a fourth leg to the roundabout to accommodate future development on the eastern side of Goonoo Goonoo Road (interim intersection layout shown in Figure 3).
- The Ringers Road Intersection Upgrades:
 - Restriction to left-turn out only from The Ringers Road.
 - Addition of a right-turn bay for southbound traffic into The Ringers Road.
- Greg Norman Drive Intersection Upgrades:
 - Creation of a two-stage ('seagull') intersection across Goonoo Goonoo Road into Greg Norman Drive.
 - Retention of the existing egress arrangement from Greg Norman Drive.
- Other Improvements:
 - Installation of a central median to separate oncoming traffic.
 - Enhancement of pedestrian and cycling facilities.
 - Installation of new signage and line marking.
 - Road widening and pavement reconstruction to provide two traffic lanes in each direction, with a central median, from just north of Calala Lane to Jack Smyth Drive.



² transport.nsw.gov.au/system/files/media/documents/2023/



Figure 2: Goonoo Goonoo Road Upgrade

Source: TfNSW, Proposed improvements to Goonoo Goonoo Road (New England Highway) in Tamworth, November 2021





Figure 3: Goonoo Goonoo Road/ Craigends Lane Intersection Layout Source: ADW Johnson, drawing no. RD-2102, issue 1, dated 18 August 2024

2.2 Previous Development Approvals

2.2.1 Goonoo Goonoo Road Subdivision (DA2023-0308)

As mentioned, the site resides in the north-west corner of a separately approved subdivision east of Goonoo Goonoo Road (DA2023-0308). The Stantec Subdivision Report was prepared to accompany the DA for the approved subdivision, with the layout shown in **Figure 4**. The approved subdivision includes two separate road connections along Goonoo Goonoo Road, one to the north at Craigends Lane and the other to the south at Jack Smyth Drive. These intersections form part of the Goonoo Goonoo Road upgrade works detailed in Section 2.1.

The approved subdivision contains 35 lots to be developed as a mixture of bulky goods retail, commercial and light industrial uses with the project expected to be delivered across four separate stages as per the yields detailed in **Table 1**. It is noted that Lots 201 and 202 were approved to be developed for bulky goods uses with the assumption that gross floor area (GFA) would represent 45 per cent of the site area (accounting to 10,378m² GFA of bulky goods uses on Lot 201 and 202).

The traffic modelling completed as part of the Stantec Subdivision Report relied on outputs from the Tamworth Strategic Transport Model (TSTM), which was also developed by Stantec to provide Council with an understanding of the projected growth on the network over the next 20 years.





Figure 4: Goonoo Goonoo Road, Industrial/ Commercial Approved Subdivision Plan Base image source: ADW Johnson, dwg no. 240363-PSK-008-A, rev. A, dated 26 June 2023

TABLE 1: APPROVED SUBDIVISION YIELD SUMMARY				
Stage	Land Use	Site Area (m ²)	GFA (m²)	
Stage 1	Commercial	72,087	32,439	
Stage 2	Bulky Goods/ Light Industrial	159,622	71,830	
Stage 3	Light Industrial	109,712	49,370	
Stage 4	Light Industrial	124,547	56,046	
То	otal	465,968m ²	209,685 m ²	



2.2.2 Lot 207, Goonoo Goonoo Road Subdivision (DA 2023-0354)

Following this, Stantec prepared a transport assessment titled *Lot 107, Goonoo Goonoo Road, Hillvue Transport Impact Assessment* (noting previously the lot was referred to as Lot 107) dated 17 April 2023 (herein referred to as the Stantec Lot 207 Report) to support a DA for construction of a Woolworths supermarket and retail floor space on Lot 207 (immediately south of the site) which was previously considered as bulky goods premises as part of DA 2023-0308 (summarised in Section 2.2.1).

The approved yields are summarised in **Table 2**, with the Woolworths location respective to the site shown in **Figure 5**. Woolworths is currently in the process of submitting a modification to the approved yields to allow for a slightly expanded supermarket footprint, reduced specialty retail and inclusion of direct-to-boot and home delivery services. However, to remain consistent with traffic-based assessments as agreed to date, Ason Group has considered the approved land uses only.

TABLE 2: WOOLWORTHS SITE YIELD SUMMARY

Land Use	Approved Scheme	
Woolworths Supermarket	3,370m ²	
Neighbourhood Business (retail)	2,594m ²	
Total	5,964m ² GLFA	



Figure 5: Woolworths Lot Location

Base image source: Nearmap





3 Existing Conditions

3.1 Site Overview

The site is in Hillvue and is currently zoned as B5 Business Development. It has an approximate 100m frontage to Goonoo Goonoo Road to the west and 250 metres to a future internal road within the broader approved subdivision. The surrounding properties include commercial and bulky good businesses immediately west of the site with low density residential and public recreation further west, south and north of the site. Undeveloped and rural zones are to the east.

The location of the site in the context of the surrounding local environment is shown in Figure 6.



Figure 6: Site Location

Base image source: Nearmap

3.2 Surrounding Road Network

3.2.1 Goonoo Goonoo Road

Goonoo Goonoo Road is a State Road functioning as a sub-arterial road aligned in a north-south direction along the western boundary of the site. Goonoo Goonoo Road is a key road through Tamworth providing a key north-south connection to surrounding towns.

It is a two-way road generally configured with one to two travel lanes in each direction set within an approximately 25-metre-wide carriageway. Informal parking has been observed to occur on the road shoulder. Goonoo Goonoo Road includes a posted speed limit of 60 kilometres per hour.



3.2.2 The Ringers Road

The Ringers Road is a local road aligned in east-west direction, west of the site. It connects with Goonoo Goonoo Road just south of the site. It is an undivided two-way road configured with one traffic lane in each direction, set within a 10-metre-wide carriageway. The Ringers Road primarily provides access to food and beverage, bulky goods and commercial properties. It includes a posted speed limit of 50 kilometres per hour and kerbside parking is permitted on both sides of the road.

3.2.3 Craigends Lane

Craigends Lane is a local road aligned in east-west direction, west of the site. It connects with Goonoo Goonoo Road at the south-west corner of the site. Craigends Lane provides access to a bulky goods premise just west of Goonoo Goonoo Road, however, primarily provides access to residential dwellings further west of the site, terminating shortly thereafter. It is an undivided two-way road configured with one traffic lane in each direction, set within a 10-metre-wide carriageway. A posted speed limit of 50 kilometres per hour is imposed and kerbside parking is permitted on both sides of the road.

3.2.4 Jack Smyth Drive

Jack Smyth Drive is a local road aligned in an east-west direction, west of the site. It is a two-way divided road configured with one traffic lane in each direction separated by a seven-metre-wide central median. Jack Smyth Drive intersects with Goonoo Goonoo Road at its eastern extent and will form part of the southern access to the approved subdivision. Currently, Jack Smyth provides access to the residential lots, as well as recreation and sports facilities closer to Goonoo Goonoo Road.

Jack Smyth Drive has a posted speed limit of 40 kilometres per hour and parking is not permitted on either side of the road.

3.3 Public Transport

The site has limited access to public transport networks with a single bus stop located along Goonoo Goonoo Road near Craigends Lane. This bus stop is serviced by the 435 route that runs connecting Tamworth town centre and Tamworth Sports Dome via South Tamworth, with bus services running every 45 to 90 minutes.

The site is also about six kilometres south of Tamworth Station which provides access to rail and additional bus routes. Tamworth Station is on the Regional Trains Network with trains running between Armidale and Central Station (in Sydney) via Tamworth. Services are generally infrequent with one service per day in each direction. Local bus services operate at regular frequencies and service the town centre.

The local bus network relative to the site is shown in Figure 7.





Figure 7: Surrounding Public Transport Network

Base image source: busilinesgroup.com.au/wp-content/uploads/2021/08/tamworth_townmap

3.4 Active Transport

The southern Tamworth area has well-established walking and cycling infrastructure, with footpaths generally provided on one side of each road. A 2.4-metre-wide shared path is located on the western side of Goonoo Goonoo Road, north of Greg Norman Drive, and continues as a similar path on the northern side of Calala Lane.

Council has also released a long-term planned cycleway network map detailing a desire to continue the existing cycleway on Goonoo Goonoo Road and Greg Norman Drive through future residential development areas west of the site.

The surrounding cycling network is shown in Figure 8.





Figure 8: Surrounding Cycling Network

Base image source: Tamworth Regional Council



4 Development Proposal

4.1 Overview

The proposal comprises construction of four bulky goods retail tenancies on Lot 201 and Lot 202, Goonoo Goonoo Road, Hillvue, as summarised in **Table 3** and shown in **Figure 9**.

TABLE 3: YIELD SUMMARY					
Tenancy	Land Use	GFA (m²)			
Tenancy 1		2,090			
Tenancy 2	Dullas Coodo Dotoil	2,000			
Tenancy 3	Bulky Goods Retail	1,540			
Tenancy 4		2,000			
Total 7,630m ²					



Figure 9: Site Layout

Source: Leffler Simes Architects, drawing no. DA020, rev. A, dated 4/2/2025

4.2 Vehicle Access and Parking

Two separate vehicle accesses are proposed along the new road internal to the approved subdivision. The western access will be used exclusively by light vehicles and the eastern access for both light and heavy vehicles.

The proposal includes provision of 244 on-site parking spaces including allocation for staff parking. The loading area adjacent to the northern boundary includes four independent bays suitable for use by 20m articulated vehicles. Generous hardstand areas are also provided for manoeuvring and to allow for all vehicles to turnaround as required. Car parking for dedicated use by staff is also provided along the northern site boundary.



5 Parking Assessment

5.1 Car Parking

5.1.1 Bulky Goods Retail Premises

The car parking requirements for different development types are set out in Tamworth Regional Development Control Plan (DCP) 2010. The rates are provided for specialty retail premises which stipulate a requirement of one space per 45m² GFA.

Considering the above, the parking requirements for the modified scheme based on relevant rates from the DCP 2010 are summarised in **Table 4**.

TABLE 4: DCP PARKING REQUIREMENTS - SPECIALTY RETAIL/ BULKY GOODS				
Tenancy	GFA (m²)	Car Parking Requirement		
Tenancy 1	2,090	46		
Tenancy 2	2,000	44		
Tenancy 3	1,540	34		
Tenancy 4	2,000	44		
	168 spaces			

Table 4 indicates that the development is required to provide a minimum 168 spaces across the site. With plans indicating provision of 244 spaces, this exceeds the requirements detailed in DCP 2010 and ensures adequate parking is provided on-site to meet the anticipated demand.

5.1.2 Allowance for Mixed Uses

It is also important to recognise any such parking impacts associated with a change in larger format retail tenancies and leasing agreements. In this regard, an assessment of the DCP parking requirements has been completed to indicatively consider Tenancy 3 leased to a supermarket operator and Tenancy 4 as a department store.

The DCP details car parking rates for retail premises (greater than 1,000m² GFA) as one space per 16m² GFA. With consideration to Tenancy 1 and 2 as bulky goods, Tenancy 3 as a supermarket and Tenancy 4 as a department store the car parking requirements are presented in **Table 5**.

TABLE 5: DCP PARKING REQUIREMENTS – MIXED USES				
Tenancy	GFA (m²)	DCP Land Use	Car Parking Requirement	
Tenancy 1	2,090	Specialty Retail	46	
Tenancy 2	2,000	Specialty Retail	44	
Tenancy 3	1,540	Retail Premise (>1,000m ² GFA)	96	
Tenancy 4	2,000	Retail Premise (>1,000m ² GFA)	125	
	311 spaces			

Based on the above, the proposed development would be required to provide 311 parking spaces with Tenancy 3 as a supermarket and Tenancy 4 as a department store. It is recognised that DCP 2010 applies a generic parking rate for retail uses greater than 1,000m² GFA which may not be completely applicable for



each retail land use, noting discrepancies between how each operate, customer turnover etc. and could result in an overestimation in parking supply. As such, reference to TfNSW guidelines is important, with the details included below:

- Tenancy 1 and 2 (specialty retail/ bulky goods): As per the TfNSW Guide to Traffic Impact Assessments (GTIA 2024) reference has been made to the Trip Generation and Parking Generation Surveys report for Bulky Goods stores (prepared by Hyder Consulting on behalf of TfNSW). The report recorded parking demand profiles across six survey sites, with an average peak weekend parking demand across all sites of 1.40 spaces per 100m² GFA.
- Tenancy 3 (supermarket): GTIA 2024 contains updated traffic generation rates for small suburban shopping centres however did not include similar updated parking rates due to noticeable variations in the data collected. On this basis, reference to the parking rate of 4.2 spaces per 100m² GLFA as defined in the *Guide to Traffic Generating Developments* 2002 (Guide 2002) is appropriate. This is also consistent with the Transport Report prepared for the adjacent Woolworths site (detailed in Section 2.2.2).
- Tenancy 4 (department store): Similarly, reference has been made to the Guide 2002 which details a
 parking rate of 4 parking spaces per 100m² GLFA.

The corresponding parking requirement with consideration to TfNSW parking rates are detailed in Table 6.

Tenancy	GFA/GLFA (m²) [1]	TfNSW Land Use Car Parking Rate		Car Parking Requirement	
Tenancy 1	2,090			29	
Tenancy 2	2,000	Bulky Goods	1.40 Spaces/ Toom- GFA	28	
Tenancy 3	1,540	Supermarket 4.2 spaces/ 100m ² Gl		65	
Tenancy 4	2,000	Faster Trade Retail 4.0 spaces/ 100m ² GLFA		80	
Total				202 spaces	

TABLE 6: TFNSW PARKING REQUIREMENTS

[1] It is assumed that GFA and GLFA are comparable.

Based on the above, the proposed development would need to provide 202 parking spaces. With the proposal including 244 car parking spaces, such provision is appropriate when considering both DCP 2010 and TfNSW parking rates and would readily accommodate peak parking demand should Tenancy 3 and Tenancy 4 operate as a supermarket and department store, respectively.

With the proposed 244 parking spaces exceeding TfNSW requirements, the DCP 2010 requirement of 311 spaces is considered excessive and not strictly appropriate for this type and size of development.

5.2 Bicycle Parking and End-of-Trip Facilities

DCP 2010 specifies bicycle parking to be provided at a rate of one bicycle space for every 15 car spaces. In this regard, the proposed development is required to provide 16 bicycle racks for use by customers and employees. At least 18 bicycle spaces are provided adjacent to the shop frontages close to the main entrance to ensure ease of use. They are well located to encourage active travel to and from the site, especially for employees. Tenancies should also include employee end of trip facilities, including change rooms with showers and lockers.



5.1 Electric Vehicle Parking

Reference has been made to Clause J9D4 of the National Construction Code (NCC) which stipulates a development should be constructed to support the future installation of a 7kW (32A) Type 2 electric vehicle charge in 10 per cent of car parking spaces associated with a Class 5 of 6 building.

The client is committed to providing adequate electric vehicle charging facilities on-site, with the exact quantum and location of these spaces able to be confirmed as part of design development.

5.2 Loading and Waste Collection Facilities

Given that DCP 2010 does not specify formal requirements for loading and waste collection facilities, the design of the loading and waste collection area have been guided by Ason Group's detailed knowledge understanding of daily operations working on comparable developments.

In this regard, the proposal includes provision of four loading bays positioned adjacent to back of house areas for each tenancy. Each bay can independently accommodate up to 20m articulated vehicles, which are appropriate and will meet the servicing needs of future tenants. Hardstand areas to facilitate vehicle manoeuvring in and out of each bay together with turnaround requirements have also been provided.

Loading management measures would be implemented to ensure safe movement of loading vehicles to and from the loading dock area. It is anticipated that deliveries would occur outside peak operational periods to minimise any such impact on customer activity.

Targeted swept paths detailing vehicle paths of travel to and from the loading area are included in **Appendix A**.



6 Traffic Assessment

6.1 Overview

In assessing the likely traffic impact of the proposed development on the surrounding road network, reference has been made to previous transport assessments and SIDRA modelling completed by Stantec.

Ason Group has relied on the methodology and assumptions adopted by Stantec, with any further assumptions detailed below.

6.2 Previous Traffic Assessments

6.2.1 Goonoo Goonoo Road Subdivision

As discussed, the site resides in the north-west corner of a separately approved subdivision east of Goonoo Goonoo Road (DA2023-0308). The Stantec Subdivision Report was prepared to accompany the DA for the approved subdivision, as discussed at Section 2.2.1. The approved subdivision includes two separate road connections along Goonoo Goonoo Road, one to the north at Craigends Lane and the other to the south at Jack Smyth Drive.

The approved subdivision contains 35 lots to be developed as a mixture of bulky goods retail, commercial and light industrial uses with the project expected to be delivered across four separate stages as per the yields detailed in **Table 1**. Traffic generation rates for the proposed subdivision were sourced from the Guide 2002 and the Technical Direction: Updated Traffic Surveys (TDT 2013/04a), and defined as follows:

- Bulky Goods: 1.51 vehicle trips per 100m² GFA in the PM peak with a 50 per cent reduction factor applied to the AM peak hour.
- Commercial: 1.6 vehicle trips per 100m² GFA in the AM peak hour and 1.2 vehicle trips per 100m² in the AM peak hour.
- Light Industrial: 0.63 vehicle trips per 100m² GFA in the AM peak hour and 0.64 vehicle trips per 100m² in the AM peak hour.

On this basis the traffic generation estimates for the subdivision are reproduced in Table 7.

TABLE 7. AFFROVED SUBDIVISION TIELD SUMMART						
Stage	Land Use	GFA (m²)	Traffic Generation Rate (veh trip/ 100m ²)		Traffic Volumes (veh trips/ hour)	
			АМ	РМ	АМ	РМ
Stage 1	Commercial	32,440	1.60	1.20	519	389
Stage 2	Bulky Goods	45,788	0.75	1.51	343	691
	Light Industrial	26,042			164	167
Stage 3	Light Industrial	49,370	0.63	0.64	311	316
Stage 4	Light Industrial	56,046			353	358
Total					1,690	1,921

TABLE 7: APPROVED SUBDIVISION YIELD SUMMARY



The assessment adopted the following assumptions:

- The traffic modelling relied on outputs from the Tamworth Strategic Transport Model (TSTM), which was also developed by Stantec to provide Council with an understanding of the projected growth on the network over the next 20 years and into the future.
- Light vehicles comprised 89 per cent of vehicle trips with heavy vehicle comprising the remaining trips.
- Directional distributions of:
 - North: 70 per cent
 - West: 10 per cent via Greg Norman Drive and five per cent via Jack Smyth Drive
 - South: 15 per cent.
- It is assumed that 60 per cent of all vehicles would use the Goonoo Goonoo Road/ Craigends Lane
 intersection to access the subdivision, with the remainder using the Goonoo Goonoo Road/ Jack Smyth
 Drive intersection.
- An 80 per cent inbound and 20 per cent outbound split for the commercial and industrial land uses and a 50:50 split for the bulky goods in the AM peak, reversed in the PM.

6.2.2 Lot 207, Goonoo Goonoo Road Subdivision (DA 2023-0354)

Following this, Stantec prepared a transport assessment to support the Lot 207 DA which included construction of a Woolworths supermarket and retail floor space on Lot 207 (immediately south of the site), which was previously considered as a bulky goods premise as part of DA 2023-0308.

Traffic generation rates for the proposed subdivision were sourced from the Guide 2002 and the TDT 2013/04a, and defined as follows:

- Supermarket: 13.8 vehicle trips per 100m² GLFA during the PM peak hour, with a 50 per cent reduction factor applied to the AM peak hour.
- Neighbourhood Business: 5.6 vehicle trips per 100m² GLFA during the PM peak hour, with a 50 per cent reduction factor applied to the AM peak hour.

On this basis the traffic generation estimates for the Lot 207 Woolworths development are detailed in **Table** 8.

Land Use	GLFA (m ²)	Traffic Gene (veh trip	eration Rate / 100m²)	Traffic Volumes (veh trips/ hour)							
		AM PM		AM	PM						
Woolworths Supermarket	3,370m ²	6.9	13.8	233	465						
Neighbourhood Business (retail)	2,594m ²	2.8	5.6	73	145						
			Total	306	610						

TABLE 8: LOT 207 TRAFFIC VOLUMES

To remain consistent with the extensive traffic modelling completed as part of other TfNSW and Council studies in the immediate vicinity (most notably the TSTM completed by Stantec), this assessment has similarly considered the traffic impacts during the weekday AM and PM road network peaks. Weekend traffic impacts were not assessed. The assessment was generally consistent with the assumptions adopted as part of the subdivision, noting the following differences:

• To account for the location of the site within the subdivision, it was expected that a larger proportion of traffic would arrive and depart the site via the Goonoo Goonoo Road/ Craigends Lane roundabout. On



this basis, this assessment assumed 80 per cent of traffic using this intersection on arrival and departure with 20 per cent using Jack Smyth Drive.

• A 50 per cent inbound and 50 per cent outbound split for retail uses in each peak hour.

6.3 Traffic Generation & Distribution

Traffic generation rates as well as broader directional distributions to/ from the site for the proposal are consistent with those adopted as part the previous traffic assessments. With the proposal comprising construction of four bulky goods retail tenancies on Lot 201 and Lot 202, traffic generation rates of 1.51 vehicle trips per 100m² GFA in the PM peak (with a 50 per cent reduction factor in the AM peak hour) have been adopted.

The traffic volume estimates for the site are summarised in **Table 9**, which also considers the net change in traffic volumes to those considered for the site as part of the Stantec Subdivision Report (detailed in Section 2.2.1, which estimated the site would contain 10,378m² GFA of bulky goods uses).

Development Application	Land Use	GFA (m ²)	Traffic G Rate (veh t	eneration rip/ 100m²)	Traffic Volumes (veh trips/ hour)		
			AM	PM	AM	РМ	
Proposal		7,630			57	115	
Approved Lot 201 & 202 Goonoo Goonoo Subdivision (DA2023-0308)	Bulky Goods	10,378	0.75	1.51	78	157	
	<u>.</u>		1	let Change	-21	-42	

TABLE 9: LOT 201 AND 202 NET TRAFFIC VOLUMES (BULKY GOODS RETAIL)

Table 9 indicates that the site would result in a net decrease in traffic volumes of 21 vehicle trips in the AM peak hour and 42 vehicle trips in the PM peak hour from those estimated for the site as part of the Stantec Subdivision Report.

As mentioned, it is acknowledged that larger format retail premises can be subject to change in operators due to tenancy leasing agreements. As such and similar to the parking assessment in Section 5.1.2, the traffic volumes detailed in **Table 9** have been updated to consider Tenancy 3 as a supermarket and Tenancy 4 as a department store, with the resultant traffic volumes included in **Table 10**.

It is also important to recognise the complementary nature of the land uses that will ultimately make up the approved subdivision. With the approved subdivision incorporating significant commercial and light industrial land uses, many employees would visit the bulky goods and/ or retail and supermarket land uses, mostly during the weekday afternoon peak. To accurately reflect such activity, a 15 per cent reduction has been applied to the traffic model.



Development Application	Land Use	GFA	Traffic Ge Rate (veh tr	neration ip/ 100m ²)	Traffic Volumes (veh trips/ hour)					
		(m²)	AM	РМ	AM	РМ				
	Bulky Goods	4,090	0.75	1.51	31	62				
	Supermarket	1,540	6.9	13.8	106	213				
Proposal (future mixed land uses)	Department Store	2,000	1.2	2.3	23	46				
		Sub-Total	160	321						
		reduction)	136	273						
Approved Lot 201 & 202 Goonoo Goonoo Subdivision (DA2023-0308)	Bulky Goods 10,378		0.75	1.51	78	157				
			N	let Change	+58	+116				

TABLE 10: LOT 201 AND 202 NET TRAFFIC VOLUMES (MIXED USES)

6.4 Traffic Impact

The operation of the study intersections along Goonoo Goonoo Road at Craigends Lane and Jack Smyth Drive have been assessed using SIDRA. The Lot 207 SIDRA model has been relied on as a basis for this assessment. The 2040 future scenario has been considered which is consistent with the assessment completed as part of the Lot 207 traffic assessment.

The modelling scenarios are summarised in **Table 11**. The Goonoo Goonoo Road intersection layouts at Craigends Lane and Jack Smyth Drive are shown in **Figure 10** and **Figure 11**, respectively and are similarly consistent with traffic assessments completed by Stantec.

TABLE 11: TRAFFIC MODELLING SCENARIO

		Included Developments								
Year	Scenario	Goonoo Goonoo Road Subdivision	Lot 207 Woolworths [1]	Lot 201/202 (Bulky Goods) [2]	Lot 201/202 (Mixed Uses) [2]					
	1	\checkmark	\checkmark							
2040	2	\checkmark	\checkmark	\checkmark						
	3	\checkmark	\checkmark		\checkmark					

[1] Minor updates were made to the Woolworths distributions to more accurately reflect how vehicles will approach and depart the site. Lot 207 was considered as bulky goods as part of the Stantec Subdivision Report. This land use has been removed from the model to avoid any overestimation in traffic volumes, with Lot 207 volumes added separately to consider the changed land uses (now a Woolworths supermarket).

[2] Lot 201 and 202 were already considered as bulky goods as part of the Stantec Subdivision Report. This land use has been removed from the model to avoid overestimation in traffic volumes, with Lot 201 and 202 volumes added separately to consider the changed land uses.





Figure 10: Goonoo Goonoo Road/ Craigends Lane Roundabout Configuration

Source: SIDRA



Figure 11: Goonoo Goonoo Road/ Jack Smyth Drive Roundabout Configuration

Source: SIDRA



With consideration to the estimated traffic generation and distribution, the post development intersection operation has been modelled through the study intersections to confirm if there are any such traffic related impacts. The SIDRA results are summarised in **Table 12** to **Table 14** for each scenario, with outputs collated in **Appendix B**.

TABLE 12: 2040 FUTURE INTERSECTION OPERATION – SCENARIO 1										
Intersection	Peak	DoS	AVD (sec)	Average Queue	LoS					
Goonoo Goonoo Road/	AM	0.22	15	3	В					
Craigends Lane	PM	1.03	64	99	E					
Goonoo Goonoo Road/	AM	0.05	11	1	А					
Jack Smyth Drive	PM	0.66	21	22	В					

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IADLE IJ; 2040	FUIUKE	INTERSECTION	UPERATION -	JUENARIU Z

Intersection	Peak	DoS	AVD (sec)	Average Queue	LoS
Goonoo Goonoo Road/	AM	0.21	15	3	В
Craigends Lane	PM	1.01	54	86	D
Goonoo Goonoo Road/	AM	0.05	11	1	А
Jack Smyth Drive	PM	0.65	20	21	В

TABLE 14: 2040 FUTURE INTERSECTION OPERATION – SCENARIO 3										
Intersection	Peak	DoS	AVD (sec)	Average Queue	LoS					
Goonoo Goonoo Road/	AM	0.22	15	3	В					
Craigends Lane	PM	1.08	96	139	F					
Goonoo Goonoo Road/	AM	0.05	11	1	А					
Jack Smyth Drive	PM	0.71	23	65	В					

The results detailed above indicate the following:

- Under Scenario 1 considering approved development traffic only the Goonoo Goonoo Road/ Craigends Lane intersection would operate satisfactorily with spare capacity during the AM peak hour. During the PM peak hour, the intersection would reach capacity due in part to delays for northbound Goonoo Goonoo Road traffic with the 'worst' movement operating at LoS E. The Jack Smyth Drive roundabout would operate well during both peak periods at LoS A/B.
- As detailed in **Table 9**, the proposal results in a net decrease in traffic volumes compared to those considered as part of the subdivision DA. As such, Scenario 2 results in slightly improved intersection operation compared to Scenario 1 with the Craigends Lane roundabout still operating at capacity during the PM peak hour, though with improvements to average delay and LoS.
- When considering Tenancy 3 as a supermarket and Tenancy 4 as a department store, the proposal would have a minor impact on the operation of the surrounding intersections with only minor changes to the DoS and LoS when compared with Scenario 1.

It is noted that the previous transport assessment completed by Stantec did not consider any reduction factors to account for 'internal' trips and complimentary uses within the broader subdivision. They also did not consider the variation in peaks across the commercial, light industrial and bulky goods uses which would not always coincide. On this basis, the overall subdivision traffic assessment and modelling is considered conservatively high.



The updated traffic assessment is also reliant on the accuracy of background growth rates and traffic volumes estimated as part of the Tamworth Strategic Transport Model, which is understood to have been developed in 2011 with updates, recalibration and validation completed in 2017 and 2021. While the TSTM was updated to ensure accuracy at the time, it is naturally expected that the model may not have captured recent changes to planning in the Tamworth region. More recent modelling is also understood to have been completed by TfNSW as part of the Goonoo Goonoo Road upgrade project.

Nonetheless, the traffic modelling indicates that the development (both under the bulky goods scheme and mixed-use scheme) would have minor impacts of the operation of the surrounding key intersections.



7 Site Layout and Design

The proposed at-grade car park has been designed in accordance with the requirements of relevant Australian Standards. Both site accesses along the future internal subdivision road ensures independent access for light vehicles with full turning movements at each. The two-way circulation aisles will ensure efficient travel paths through the at-grade car park and allow for convenient parking close to each tenancy.

The car park has been designed as a Class 3A facility with minimum car space dimensions of 2.6 metres wide and 5.4 metres long with 6.6-metre-wide to 7.0-metre-wide circulation aisles throughout. All accessible spaces are designed to be minimum 2.4 metres wide with an adjacent shared area (with central bollard) with the same dimensions, in accordance with AS2890.6:2022. All parking spaces allow for adequate clearance to any structures.

Pedestrian paths of travel are provided through the car park to link with the main entrances and footpaths along the new road to the south. The car park itself also incorporates linemarked pedestrian crossings to maintain safety. In combination, they ensure good permeability and connectivity throughout.

The dedicated loading docks at the rear of the site are accessed via the shared western access. All vehicles would manoeuvre independently and as necessary within each dock area. The largest vehicle requiring access will be an Australian Standard 20m long articulated vehicle with vehicle swept paths confirming appropriate layouts. Where full independent movements around corners are not possible, convex mirrors and signage will reinforce priority and maintain sightlines. Basic dock management measures will be in place with deliveries to occur outside peak customer periods to minimise any such overlap of demand.

Swept paths of all key vehicle movements have been completed and are included in Appendix A.



8 Conclusion

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

- This transport impact assessment has been prepared as part of the proposed bulky goods retail development at Lot 201 and 202, Goonoo Road, Hillvue. The proposal seeks to construct four tenancies comprising 7,630m² GFA.
- The proposal generates a DCP car parking requirement of 168 parking spaces when considering the site as entirely bulky goods. The site proposes 244 car parking spaces and therefore exceeds DCP 2010 requirements.
- The proposal includes dedicated loading dock facilities for each tenancy. These loading areas have been designed to accommodate up to a 20m articulated vehicle with adequate turnaround and manoeuvring area to ensure independent dock access.
- Under the scenario where Tenancy 3 and Tenancy 4 are constructed as a supermarket and department store respectively, the proposal would generate a DCP car parking requirement of 311 car parking spaces. When referencing applicable TfNSW rates, the proposal would require 202 spaces. With the proposal including 244 spaces, such provision is appropriate.
- The proposal is required to provide 16 bicycle parking spaces in accordance with DCP 2010. With 18 bicycle spaces provided adjacent to the shop frontages close to the main entrance this exceeds DCP requirements and would encourage active travel to and from the site, especially for employees.
- The proposal is expected to generate less traffic than that previously assessed as part of the subdivision or marginally more traffic when considering mixed tenancies. With background growth to 2040 and all traffic associated with the approved subdivision and Woolworths site to the south, the minor additional traffic associated with the proposed development has been added to the detailed modelling already completed to ensure an appropriate and robust approach to future traffic.
- The previous SIDRA modelling has been relied on to ensure consistency and to allow for updates to accurately reflect the minor changes associated with the proposed land uses. The Craigends Lane roundabout during the AM peak hour and Jack Smyth Drive roundabout during both peaks would operate well, with spare capacity in 2040. The Craigends Lane roundabout would operate at capacity in the PM peak regardless of the development type on the subject site. The additional proposed development traffic volumes (under both a bulky goods scheme and mixed retail scheme) would have a minor impact on the operation of the study intersections in 2040.
- All site access driveways and at-grade car park have been designed in accordance with relevant Australian Standards and allow for independent movement by 99th percentile vehicles throughout. All service vehicles up to 20m articulated vehicles can enter and exit the site in a forward direction and manoeuvre as required.
- The at-grade car park has been designed as a Class 3A facility with car space dimensions and aisle widths meeting or exceeding relevant Australian Standards.



Appendix A. Vehicle Swept Paths

25 | P2942r01v01 DA_ Lot 201 & 202, Goonoo Goonoo Road, Hillvue - Transport Impact Assessment







PLOT DATE: 6/02/2025 4:54:09 PM | CAD REFERENCE: C:\Users\Connor Hoang\OneDrive - Ason Group\ACTIVE PROJECTS\2942 - Lot 201 & 202; Goonoo Goonoo Road, Tarrworth\Projects\Design\AC2942_01_v04.dwg | Connor Hoang









Appendix B. SIDRA Outputs

26 | P2942r01v01 DA_ Lot 201 & 202, Goonoo Goonoo Road, Hillvue - Transport Impact Assessment



V Site: 101 [2040 - Goonoo Goonoo Rd & Craigends Ln - AM (Site Folder: 2040 w Woolworths Approved DA + Approved Subdivision)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

PM peak Site Category: (None) Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Dem Fl [Total veh/h	nand lows HV] %	Ar Fl [Total I veh/h	rival ows HV] %_	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Q [Veh. veh	Back Of ueue Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South	: Goo	noo Goon	oo Rd ((S)											
1	L2	All MCs	5	0.0	5	0.0	0.671	7.0	LOS A	2.4	18.5	0.69	0.66	0.76	51.3
2	T1	All MCs	1151	11.8	1151	11.8	0.671	7.5	LOS A	2.4	18.5	0.69	0.68	0.77	51.7
3	R2	All MCs	259	6.5	259	6.5	0.671	11.6	LOS A	2.4	18.2	0.70	0.71	0.78	49.9
Appro	ach		1415	10.8	1415	10.8	0.671	8.2	LOS A	2.4	18.5	0.69	0.69	0.77	51.4
East:	New F	Road (E)													
4	L2	All MCs	108	4.9	108	4.9	0.276	8.1	LOS A	0.6	4.6	0.74	0.77	0.74	50.1
5	T1	All MCs	1	0.0	1	0.0	0.276	7.8	LOS A	0.6	4.6	0.74	0.77	0.74	50.7
6	R2	All MCs	264	8.0	264	8.0	0.276	12.6	LOS A	0.6	4.6	0.74	0.80	0.74	49.2
Appro	ach		374	7.0	374	7.0	0.276	11.3	LOS A	0.6	4.6	0.74	0.79	0.74	49.4
North:	Goor	noo Goon	oo Rd ((N)											
7	L2	All MCs	628	10.6	628 ⁻	10.6	0.660	7.3	LOS A	2.6	20.0	0.67	0.68	0.71	51.9
8	T1	All MCs	834	11.8	834	11.8	0.660	8.1	LOS A	2.6	20.0	0.69	0.70	0.76	52.0
9	R2	All MCs	29	7.1	29	7.1	0.660	12.2	LOS A	2.6	19.9	0.70	0.70	0.77	51.1
Appro	ach		1492	11.2	1492	11.2	0.660	7.8	LOS A	2.6	20.0	0.68	0.69	0.74	51.9
West:	Craig	ends Ln (W)												
10	L2	All MCs	62	6.8	62	6.8	0.216	10.6	LOS A	0.4	2.8	0.78	0.90	0.78	49.5
11	T1	All MCs	1	0.0	1	0.0	0.216	10.4	LOS A	0.4	2.8	0.78	0.90	0.78	49.4
12	R2	All MCs	23	4.5	23	4.5	0.216	14.8	LOS B	0.4	2.8	0.78	0.90	0.78	48.5
Appro	ach		86	6.1	86	6.1	0.216	11.8	LOS A	0.4	2.8	0.78	0.90	0.78	49.3
All Ve	hicles		3366	10.4	3366	10.4	0.671	8.5	LOS A	2.6	20.0	0.70	0.71	0.75	51.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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

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

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V Site: 101 [2040 - Goonoo Goonoo Rd & Craigends Ln - PM (Site Folder: 2040 w Woolworths Approved DA + Approved Subdivision)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

PM peak Site Category: (None) Roundabout

Vehicle Movement Performance															
Mov	Turn	Mov	Dem	nand	Ar	rival	Deg.	Aver.	Level of	Aver. E	Back Of	Prop.	Eff.	Aver.	Aver.
U		Class	H Total	IOWS	Fl Total	IOWS H\/1	Satn	Delay	Service	Qu [\/eh	eue Dist 1	Que	Stop Rate	NO. 01 Cycles	Speed
			veh/h	%	veh/h	%	v/c	sec		veh	m		Tate	Cycles	km/h
South	: Gool	noo Goon	oo Rd	(S)											
1	L2	All MCs	14	7.7	14	7.7	1.030	57.5	LOS E	14.1	108.3	1.00	2.36	4.59	30.4
2	T1	All MCs	1269	11.7	1269	11.7	1.030	58.7	LOS E	14.1	108.3	1.00	2.33	4.57	31.3
3	R2	All MCs	167	4.4	167	4.4	1.030	63.7	LOS E	13.0	98.5	1.00	2.29	4.54	29.6
Appro	ach		1451	10.8	1451	10.8	1.030	59.3	LOS E	14.1	108.3	1.00	2.33	4.56	31.1
East:	New F	Road (E)													
4	L2	All MCs	301	5.6	301	5.6	0.788	15.5	LOS B	3.3	24.5	0.94	1.11	1.53	45.5
5	T1	All MCs	1	0.0	1	0.0	0.788	15.1	LOS B	3.3	24.5	0.94	1.11	1.53	46.0
6	R2	All MCs	733	9.5	733	9.5	0.788	20.9	LOS B	3.3	24.5	0.93	1.13	1.54	44.7
Appro	ach		1035	8.3	1035	8.3	0.788	19.3	LOS B	3.3	24.5	0.93	1.12	1.54	44.9
North:	Goor	noo Goon	oo Rd ((N)											
7	L2	All MCs	400	6.8	400	6.8	0.575	5.7	LOS A	2.1	16.1	0.54	0.56	0.54	52.4
8	T1	All MCs	1003	11.5	1003	11.5	0.575	6.0	LOS A	2.1	16.1	0.55	0.56	0.55	52.5
9	R2	All MCs	41	5.1	41	5.1	0.575	10.0	LOS A	2.0	15.5	0.57	0.56	0.57	51.7
Appro	ach		1444	10.0	1444	10.0	0.575	6.0	LOS A	2.1	16.1	0.55	0.56	0.55	52.5
West:	Craig	ends Ln ('	W)												
10	L2	All MCs	43	4.9	43	4.9	0.182	14.6	LOS B	0.3	2.5	0.86	0.93	0.86	47.5
11	T1	All MCs	1	0.0	1	0.0	0.182	14.4	LOS A	0.3	2.5	0.86	0.93	0.86	47.2
12	R2	All MCs	6	0.0	6	0.0	0.182	18.5	LOS B	0.3	2.5	0.86	0.93	0.86	46.6
Appro	ach		51	4.2	51	4.2	0.182	15.1	LOS B	0.3	2.5	0.86	0.93	0.86	47.4
All Ve	hicles		3980	9.8	3980	9.8	1.030	29.0	LOS C	14.1	108.3	0.82	1.35	2.27	40.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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

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

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V Site: 101 [2040 - Goonoo Goonoo Rd & Jack Smyth Dr - AM (Site Folder: 2040 w Woolworths Approved DA + Approved Subdivision)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

PM peak Site Category: (None) Roundabout

Vehic	Vehicle Movement Performance												
Mov ID	Turn	Mov Class	Demand Flows [Total HV] veh/h <u>%</u>	Arrival Flows [Total HV] veh/h <u>%</u>	Deg. Satn v/c	Aver. Delay se <u>c</u>	Level of Service	Aver. B Que [Veh. veh	ack Of eue Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South	: Goo	noo Goor	ioo Rd (S)										
1	L2	All MCs	14 7.7	14 7.7	0.301	5.3	LOS A	0.8	6.2	0.43	0.47	0.43	52.3
2	T1	All MCs	662 12.1	662 12.1	0.301	5.5	LOS A	0.8	6.2	0.44	0.49	0.44	52.5
3	R2	All MCs	84 13.8	84 13.8	0.301	10.0	LOS A	0.8	6.0	0.45	0.53	0.45	51.1
Appro	ach		760 12.2	760 12.2	0.301	6.0	LOS A	0.8	6.2	0.44	0.50	0.44	52.3
East:	New F	Road (E)											
4	L2	All MCs	32 13.3	32 13.3	0.052	8.3	LOS A	0.1	0.7	0.50	0.63	0.50	51.5
5	T1	All MCs	9 0.0	9 0.0	0.162	6.0	LOS A	0.3	2.6	0.49	0.65	0.49	50.5
6	R2	All MCs	158 9.3	158 9.3	0.162	10.5	LOS A	0.3	2.6	0.49	0.65	0.49	49.4
Appro	ach		199 9.5	199 9.5	0.162	10.0	LOS A	0.3	2.6	0.49	0.65	0.49	49.8
North:	Goor	noo Goon	oo Rd (N)										
7	L2	All MCs	429 10.3	429 10.3	0.294	5.0	LOS A	0.7	5.3	0.30	0.51	0.30	53.0
8	T1	All MCs	351 11.7	351 11.7	0.295	5.2	LOS A	0.7	5.2	0.32	0.47	0.32	53.1
9	R2	All MCs	19 0.0	19 0.0	0.295	9.3	LOS A	0.7	5.2	0.32	0.47	0.32	52.5
Appro	ach		799 10.7	799 10.7	0.295	5.2	LOS A	0.7	5.3	0.31	0.49	0.31	53.0
West:	Jack	Smyth Dr	ive (W)										
10	L2	All MCs	42 0.0	42 0.0	0.049	6.6	LOS A	0.1	0.6	0.57	0.70	0.57	52.4
11	T1	All MCs	24 0.0	24 0.0	0.049	7.1	LOS A	0.1	0.5	0.58	0.73	0.58	51.5
12	R2	All MCs	12 0.0	12 0.0	0.049	11.4	LOS A	0.1	0.5	0.58	0.73	0.58	50.7
Appro	ach		78 0.0	78 0.0	0.049	7.5	LOS A	0.1	0.6	0.58	0.71	0.58	51.9
All Ve	hicles		1836 10.7	1836 10.7	0.301	6.1	LOS A	0.8	6.2	0.39	0.52	0.39	52.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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

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

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V Site: 101 [2040 - Goonoo Goonoo Rd & Jack Smyth Dr - PM (Site Folder: 2040 w Woolworths Approved DA + Approved Subdivision)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

PM peak Site Category: (None) Roundabout

Vehic	Vehicle Movement Performance												
Mov ID	Turn	Mov Class	Demand Flows [Total HV]	Arrival Flows [Total HV]	Deg. Satn	Aver. Delay	Level of Service	Aver. E Qu [Veh.	Back Of eue Dist]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
South	: Goo	noo Goor	ioo Rd (S)		V/C	300		VCII					KITI/TT
1	L2	All MCs	20 5.3	20 5.3	0.365	7.3	LOS A	1.2	8.8	0.79	0.65	0.79	50.9
2	T1	All MCs	567 11.5	567 11.5	0.365	7.8	LOS A	1.2	8.8	0.79	0.67	0.79	51.0
3	R2	All MCs	42 10.0	42 10.0	0.365	12.5	LOS A	1.0	8.1	0.79	0.69	0.79	50.0
Appro	ach		629 11.2	629 11.2	0.365	8.1	LOS A	1.2	8.8	0.79	0.67	0.79	51.0
East:	New F	Road (E)											
4	L2	All MCs	91 12.8	91 12.8	0.208	15.8	LOS B	0.4	3.2	0.74	0.78	0.74	48.2
5	T1	All MCs	26 0.0	26 0.0	0.663	15.8	LOS B	3.0	22.3	0.94	0.99	1.38	44.7
6	R2	All MCs	465 9.7	465 9.7	0.663	20.6	LOS B	3.0	22.3	0.94	0.99	1.38	43.9
Appro	ach		582 9.8	582 9.8	0.663	19.6	LOS B	3.0	22.3	0.91	0.96	1.28	44.5
North:	Goor	100 Goon	oo Rd (N)										
7	L2	All MCs	216 8.3	216 8.3	0.247	5.0	LOS A	0.6	4.2	0.26	0.48	0.26	53.1
8	T1	All MCs	876 11.8	876 11.8	0.552	5.2	LOS A	2.0	15.0	0.32	0.45	0.32	53.1
9	R2	All MCs	47 0.0	47 0.0	0.552	9.1	LOS A	2.0	15.0	0.32	0.45	0.32	52.5
Appro	ach		1139 10.6	1139 10.6	0.552	5.3	LOS A	2.0	15.0	0.31	0.46	0.31	53.1
West:	Jack	Smyth Dr	ive (W)										
10	L2	All MCs	27 0.0	27 0.0	0.045	8.1	LOS A	0.1	0.6	0.67	0.76	0.67	51.4
11	T1	All MCs	12 0.0	12 0.0	0.046	7.5	LOS A	0.1	0.6	0.67	0.77	0.67	50.4
12	R2	All MCs	21 5.0	21 5.0	0.046	12.0	LOS A	0.1	0.6	0.67	0.77	0.67	49.5
Appro	ach		60 1.8	60 1.8	0.046	9.4	LOS A	0.1	0.6	0.67	0.77	0.67	50.5
All Ve	hicles		2411 10.3	2411 10.3	0.663	9.6	LOS A	3.0	22.3	0.59	0.64	0.68	50.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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

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

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Output produced by SIDRA INTERSECTION Version: 9.1.6.228

PM peak Site Category: (None) Roundabout

Vehic	le M	ovement	Perfo	rma	nce										
Mov ID	Turn	Mov Class	Dem Fl [Total	nand lows HV]	Arri Flc [Total H	ival ows IV]	Deg. Satn	Aver. Delay	Level of Service	Aver. Qi [Veh.	Back Of ueue Dist]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
South	: Goo	noo Goon	oo Rd (70 (S)	ven/n	70	v/C	Sec	_	ven	111	_	_	_	K111/11
1	L2	All MCs	5	0.0	5	0.0	0.666	6.9	LOS A	2.4	18.2	0.68	0.66	0.75	51.3
2	T1	All MCs	1147	11.8	1147 1	1.8	0.666	7.4	LOS A	2.4	18.2	0.68	0.67	0.76	51.7
3	R2	All MCs	258	6.5	258	6.5	0.666	11.5	LOS A	2.4	17.8	0.69	0.70	0.77	50.0
Appro	ach		1411	10.8	1411 1	0.8	0.666	8.1	LOS A	2.4	18.2	0.68	0.68	0.76	51.4
East:	New F	Road (E)													
4	L2	All MCs	107	4.9	107	4.9	0.269	8.0	LOS A	0.6	4.4	0.73	0.77	0.73	50.1
5	T1	All MCs	1	0.0	1	0.0	0.269	7.8	LOS A	0.6	4.4	0.73	0.77	0.73	50.7
6	R2	All MCs	260	7.3	260	7.3	0.269	12.5	LOS A	0.6	4.4	0.73	0.79	0.73	49.3
Appro	ach		368	6.6	368	6.6	0.269	11.2	LOS A	0.6	4.4	0.73	0.79	0.73	49.5
North:	Goor	noo Goon	oo Rd ((N)											
7	L2	All MCs	624	10.3	624 1	0.3	0.655	7.2	LOS A	2.6	19.6	0.67	0.68	0.70	52.0
8	T1	All MCs	831	11.7	831 1	1.7	0.655	8.0	LOS A	2.6	19.6	0.69	0.69	0.75	52.0
9	R2	All MCs	29	7.1	29	7.1	0.655	12.1	LOS A	2.5	19.5	0.69	0.70	0.76	51.2
Appro	ach		1484	11.0	1484 1	1.0	0.655	7.8	LOS A	2.6	19.6	0.68	0.69	0.73	52.0
West:	Craig	ends Ln (W)												
10	L2	All MCs	62	6.8	62	6.8	0.214	10.6	LOS A	0.4	2.8	0.78	0.90	0.78	49.6
11	T1	All MCs	1	0.0	1	0.0	0.214	10.4	LOS A	0.4	2.8	0.78	0.90	0.78	49.4
12	R2	All MCs	23	4.5	23	4.5	0.214	14.8	LOS B	0.4	2.8	0.78	0.90	0.78	48.6
Appro	ach		86	6.1	86	6.1	0.214	11.7	LOS A	0.4	2.8	0.78	0.90	0.78	49.3
All Ve	hicles		3349	10.3	3349 1	0.3	0.666	8.4	LOS A	2.6	19.6	0.69	0.70	0.74	51.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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

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

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V Site: 101 [2040 - Goonoo Goonoo Rd & Craigends Ln - PM (Site Folder: 2040 w Woolworths Approved DA + Approved Subdivision + Site Volumes (Bulky Goods))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

PM peak Site Category: (None) Roundabout

Vehic	le M	ovement	Perfo	rma	nce										
Mov ID	Turn	Mov Class	Dem F	nand Iows	Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. I Qu	Back Of ieue	Prop. Que	Eff. Stop	Aver. No. of	Aver. Speed
			[Total veh/h	HV] %_	[Total veh/h	HV] %_		sec		[Veh. veh	Dist] m		Rate	Cycles	km/h
South	: Goo	noo Goon	oo Rd	(S)											
1	L2	All MCs	14	7.7	14	7.7	1.014	48.2	LOS D	12.3	94.2	1.00	2.14	4.01	33.0
2	T1	All MCs	1264	11.5	1264	11.5	1.014	49.4	LOS D	12.3	94.2	1.00	2.13	4.00	33.8
3	R2	All MCs	163	3.9	163	3.9	1.014	54.4	LOS D	11.4	86.3	1.00	2.10	4.00	32.0
Appro	ach		1441	10.6	1441	10.6	1.014	49.9	LOS D	12.3	94.2	1.00	2.12	4.00	33.6
East:	New F	Road (E)													
4	L2	All MCs	297	5.3	297	5.3	0.770	14.6	LOS B	3.1	22.8	0.93	1.08	1.46	45.9
5	T1	All MCs	1	0.0	1	0.0	0.770	14.3	LOS A	3.1	22.8	0.93	1.08	1.46	46.5
6	R2	All MCs	722	8.9	722	8.9	0.770	20.0	LOS B	3.1	22.8	0.92	1.10	1.47	45.1
Appro	ach		1020	7.8	1020	7.8	0.770	18.4	LOS B	3.1	22.8	0.92	1.09	1.47	45.4
North:	Goor	noo Goon	oo Rd ((N)											
7	L2	All MCs	389	5.7	389	5.7	0.565	5.7	LOS A	2.1	15.6	0.53	0.55	0.53	52.4
8	T1	All MCs	998	11.3	998	11.3	0.565	5.9	LOS A	2.1	15.6	0.54	0.55	0.54	52.6
9	R2	All MCs	41	5.1	41	5.1	0.565	10.0	LOS A	2.0	15.1	0.56	0.56	0.56	51.8
Appro	ach		1428	9.6	1428	9.6	0.565	6.0	LOS A	2.1	15.6	0.54	0.55	0.54	52.5
West:	Craig	ends Ln (W)												
10	L2	All MCs	43	4.9	43	4.9	0.182	14.5	LOS B	0.3	2.5	0.86	0.93	0.86	47.6
11	T1	All MCs	1	0.0	1	0.0	0.182	14.3	LOS A	0.3	2.5	0.86	0.93	0.86	47.3
12	R2	All MCs	6	0.0	6	0.0	0.182	18.4	LOS B	0.3	2.5	0.86	0.93	0.86	46.6
Appro	ach		51	4.2	51	4.2	0.182	15.0	LOS B	0.3	2.5	0.86	0.93	0.86	47.5
All Ve	hicles		3940	9.5	3940	9.5	1.014	25.4	LOS B	12.3	94.2	0.81	1.27	2.05	42.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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

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

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V Site: 101 [2040 - Goonoo Goonoo Rd & Jack Smyth Dr - AM (Site Folder: 2040 w Woolworths Approved DA + Approved Subdivision + Site Volumes (Bulky Goods))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

PM peak Site Category: (None) Roundabout

Vehicle Movement Performance													
Mov ID	Turn	Mov Class	Demand Flows [Total HV]	Arrival Flows [Total HV]	Deg. Satn	Aver. Delay	Level of Service	Aver. B Que [Veh.	ack Of eue Dist]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
South	· Goo	noo Goor	veh/h %	veh/h %	V/C	sec	_	veh	m	_	_	_	km/h
1	12	All MCs	14 7 7	14 7 7	0 299	53	LOSA	0.8	61	0 42	0 47	0 42	52.3
2	 T1	All MCs	662 12 1	662 12 1	0.299	5.4		0.8	6.1	0.43	0.49	0.43	52.5
3	R2		82 12 8	82 12 8	0.200	0.4 Q Q		0.0	5.9	0.40	0.52	0.40	51.2
Appro	ach	Airwoo	758 12.1	758 12.1	0.299	5.9	LOSA	0.8	6.1	0.43	0.49	0.43	52.4
East:	New F	Koad (E)											
4	L2	All MCs	29 10.7	29 10.7	0.047	8.2	LOS A	0.1	0.6	0.50	0.62	0.50	51.7
5	T1	All MCs	8 0.0	8 0.0	0.158	6.0	LOS A	0.3	2.5	0.49	0.65	0.49	50.5
6	R2	All MCs	155 8.8	155 8.8	0.158	10.5	LOS A	0.3	2.5	0.49	0.65	0.49	49.4
Appro	ach		193 8.7	193 8.7	0.158	10.0	LOS A	0.3	2.5	0.49	0.65	0.49	49.8
North:	Goor	noo Goon	oo Rd (N)										
7	L2	All MCs	426 10.1	426 10.1	0.291	5.0	LOS A	0.7	5.2	0.29	0.51	0.29	53.0
8	T1	All MCs	351 11.7	351 11.7	0.294	5.2	LOS A	0.7	5.2	0.31	0.47	0.31	53.1
9	R2	All MCs	19 0.0	19 0.0	0.294	9.3	LOS A	0.7	5.2	0.31	0.47	0.31	52.6
Appro	ach		796 10.6	796 10.6	0.294	5.2	LOS A	0.7	5.2	0.30	0.49	0.30	53.0
West:	Jack	Smyth Dr	ive (W)										
10	L2	All MCs	42 0.0	42 0.0	0.049	6.6	LOS A	0.1	0.6	0.57	0.70	0.57	52.4
11	T1	All MCs	23 0.0	23 0.0	0.047	7.1	LOS A	0.1	0.5	0.58	0.73	0.58	51.5
12	R2	All MCs	12 0.0	12 0.0	0.047	11.4	LOS A	0.1	0.5	0.58	0.73	0.58	50.7
Appro	ach		77 0.0	77 0.0	0.049	7.5	LOS A	0.1	0.6	0.57	0.71	0.57	51.9
All Ve	hicles		1823 10.6	1823 10.6	0.299	6.1	LOS A	0.8	6.1	0.39	0.52	0.39	52.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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

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

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V Site: 101 [2040 - Goonoo Goonoo Rd & Jack Smyth Dr - PM (Site Folder: 2040 w Woolworths Approved DA + Approved Subdivision + Site Volumes (Bulky Goods))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

PM peak Site Category: (None) Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Dem Fl [Total I	and ows HV]	Arr Flo [Total F	rival ows HV]	Deg. Satn	Aver. Delay	Level of Service	Aver. Q [Veh.	Back Of ueue Dist]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
South	: Goo	noo Goor	ioo Rd ((S)	ven/m	70	V/C	SEC		ven	111	_	_	_	KI11/11
1	L2	All MCs	20	5.3	20	5.3	0.358	7.2	LOS A	1.1	8.6	0.78	0.65	0.78	50.9
2	T1	All MCs	565	11.4	565 1	11.4	0.358	7.7	LOS A	1.1	8.6	0.78	0.66	0.78	51.1
3	R2	All MCs	40	7.9	40	7.9	0.358	12.4	LOS A	1.0	7.8	0.78	0.69	0.78	50.1
Appro	ach		625 ⁻	10.9	625 1	0.9	0.358	8.0	LOS A	1.1	8.6	0.78	0.67	0.78	51.0
East:	New F	Road (E)													
4	L2	All MCs	88	11.9	88 1	11.9	0.200	15.5	LOS B	0.4	3.1	0.73	0.78	0.73	48.3
5	T1	All MCs	26	0.0	26	0.0	0.647	15.1	LOS B	2.8	21.0	0.93	0.97	1.33	45.1
6	R2	All MCs	459	9.4	459	9.4	0.647	19.9	LOS B	2.8	21.0	0.93	0.97	1.33	44.2
Appro	ach		574	9.4	574	9.4	0.647	19.0	LOS B	2.8	21.0	0.90	0.94	1.24	44.8
North:	Goor	100 Goon	oo Rd (l	N)											
7	L2	All MCs	209	7.5	209	7.5	0.244	5.0	LOS A	0.6	4.2	0.25	0.48	0.25	53.2
8	T1	All MCs	874	11.7	874 1	11.7	0.545	5.2	LOS A	1.9	14.6	0.31	0.45	0.31	53.1
9	R2	All MCs	47	0.0	47	0.0	0.545	9.1	LOS A	1.9	14.6	0.31	0.45	0.31	52.5
Appro	ach		1131 ⁻	10.4	1131 1	0.4	0.545	5.3	LOS A	1.9	14.6	0.30	0.46	0.30	53.1
West:	Jack	Smyth Dr	ive (W)												
10	L2	All MCs	27	0.0	27	0.0	0.045	8.1	LOS A	0.1	0.6	0.67	0.76	0.67	51.5
11	T1	All MCs	12	0.0	12	0.0	0.046	7.5	LOS A	0.1	0.6	0.67	0.77	0.67	50.4
12	R2	All MCs	21	5.0	21	5.0	0.046	12.0	LOS A	0.1	0.6	0.67	0.77	0.67	49.5
Appro	ach		60	1.8	60	1.8	0.046	9.3	LOS A	0.1	0.6	0.67	0.76	0.67	50.6
All Ve	hicles		2389	10.1	2389 1	0.1	0.647	9.4	LOS A	2.8	21.0	0.58	0.64	0.66	50.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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

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

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V Site: 101 [2040 - Goonoo Goonoo Rd & Craigends Ln - AM (Site Folder: 2040 w Woolworths Approved DA + Approved Subdivision + Site Volumes (Mixed Uses))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

PM peak Site Category: (None) Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Dem Fl [Total	nand lows HV]	Arr Flo [Total H	ival ows IV]	Deg. Satn	Aver. Delay	Level of Service	Aver. Q [Veh.	Back Of ueue Dist]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
Cauth	Cas		veh/h	% (C)	veh/h	%	v/c	sec	_	veh	m	_	_	_	km/h
South	: G00	noo Goon	00 Ra ((5)	_										
1	L2	All MCs	5	0.0	5	0.0	0.684	7.3	LOSA	2.5	19.4	0.71	0.68	0.80	51.2
2	T1	All MCs	1159	11.6	1159 1	11.6	0.684	7.7	LOS A	2.5	19.4	0.71	0.70	0.80	51.6
3	R2	All MCs	265	6.3	265	6.3	0.684	11.8	LOS A	2.5	19.0	0.72	0.73	0.82	49.8
Appro	ach		1429	10.6	1429 1	0.6	0.684	8.5	LOS A	2.5	19.4	0.71	0.70	0.81	51.3
East:	New F	Road (E)													
4	L2	All MCs	115	4.6	115	4.6	0.291	8.1	LOS A	0.7	4.8	0.75	0.77	0.75	50.0
5	T1	All MCs	1	0.0	1	0.0	0.291	7.9	LOS A	0.7	4.8	0.75	0.77	0.75	50.7
6	R2	All MCs	277	6.8	277	6.8	0.291	12.6	LOS A	0.7	4.8	0.75	0.80	0.75	49.2
Appro	ach		393	6.2	393	6.2	0.291	11.3	LOS A	0.7	4.8	0.75	0.79	0.75	49.4
North:	Goor	noo Goon	oo Rd ((N)											
7	L2	All MCs	641	10.0	641 1	0.0	0.673	7.5	LOS A	2.8	21.2	0.69	0.70	0.74	51.9
8	T1	All MCs	842	11.6	842 1	11.6	0.673	8.3	LOS A	2.8	21.2	0.71	0.72	0.79	51.9
9	R2	All MCs	29	7.1	29	7.1	0.673	12.5	LOS A	2.7	21.0	0.71	0.72	0.80	51.1
Appro	ach		1513	10.8	1513 1	0.8	0.673	8.1	LOS A	2.8	21.2	0.70	0.71	0.77	51.9
West:	Craig	ends Ln (W)												
10	L2	All MCs	62	6.8	62	6.8	0.221	10.8	LOS A	0.4	2.9	0.79	0.91	0.79	49.4
11	T1	All MCs	1	0.0	1	0.0	0.221	10.6	LOS A	0.4	2.9	0.79	0.91	0.79	49.3
12	R2	All MCs	23	4.5	23	4.5	0.221	15.0	LOS B	0.4	2.9	0.79	0.91	0.79	48.4
Appro	ach		86	6.1	86	6.1	0.221	11.9	LOS A	0.4	2.9	0.79	0.91	0.79	49.2
All Ve	hicles		3421	10.1	3421 1	0.1	0.684	8.7	LOS A	2.8	21.2	0.71	0.72	0.78	51.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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

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

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V Site: 101 [2040 - Goonoo Goonoo Rd & Craigends Ln - PM (Site Folder: 2040 w Woolworths Approved DA + Approved Subdivision + Site Volumes (Mixed Uses))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

PM peak Site Category: (None) Roundabout

Vehic	le M	ovement	Perfo	rma	nce										
Mov ID	Turn	⁻urn Mov Demar Class Flow [Total HV		nand Iows H\/ 1	nd Arrival ws Flows V1 [Total HV]		Deg. Aver. Satn Delay		Level of Service	Aver. E Qu	Back Of eue Dist 1	Prop. Que	Eff. Stop Rate	Aver. No. of	Aver. Speed
			veh/h	%	veh/h	~~	v/c	sec		veh	m		Tate	Cycles	km/h
South	: Goo	noo Goon	oo Rd	(S)											
1	L2	All MCs	14	7.7	14	7.7	1.076	90.6	LOS F	20.3	155.9	1.00	3.07	6.50	24.0
2	T1	All MCs	1287	11.3	1287	11.3	1.076	91.5	LOS F	20.3	155.9	1.00	3.01	6.43	24.9
3	R2	All MCs	179	3.5	179	3.5	1.076	96.3	LOS F	18.4	139.4	1.00	2.93	6.32	23.5
Appro	ach		1480	10.4	1480	10.4	1.076	92.1	LOS F	20.3	155.9	1.00	3.00	6.42	24.7
East:	New F	Road (E)													
4	L2	All MCs	313	5.1	313	5.1	0.829	17.5	LOS B	3.8	28.4	0.96	1.18	1.71	44.3
5	T1	All MCs	1	0.0	1	0.0	0.829	17.2	LOS B	3.8	28.4	0.96	1.18	1.71	44.8
6	R2	All MCs	757	8.5	757	8.5	0.829	23.1	LOS B	3.8	28.4	0.96	1.19	1.72	43.6
Appro	ach		1071	7.5	1071	7.5	0.829	21.5	LOS B	3.8	28.4	0.96	1.19	1.72	43.8
North:	Goor	noo Goon	oo Rd ((N)											
7	L2	All MCs	424	5.2	424	5.2	0.591	5.7	LOS A	2.2	16.8	0.55	0.56	0.55	52.4
8	T1	All MCs	1021	11.1	1021	11.1	0.591	6.0	LOS A	2.2	16.8	0.57	0.56	0.57	52.5
9	R2	All MCs	41	5.1	41	5.1	0.591	10.1	LOS A	2.1	16.2	0.58	0.57	0.58	51.7
Appro	ach		1486	9.2	1486	9.2	0.591	6.1	LOS A	2.2	16.8	0.56	0.56	0.56	52.4
West:	Craig	ends Ln (W)												
10	L2	All MCs	43	4.9	43	4.9	0.181	14.4	LOS A	0.3	2.4	0.86	0.93	0.86	47.6
11	T1	All MCs	1	0.0	1	0.0	0.181	14.2	LOS A	0.3	2.4	0.86	0.93	0.86	47.3
12	R2	All MCs	6	0.0	6	0.0	0.181	18.3	LOS B	0.3	2.4	0.86	0.93	0.86	46.7
Appro	ach		51	4.2	51	4.2	0.181	14.9	LOS B	0.3	2.4	0.86	0.93	0.86	47.5
All Ve	hicles		4087	9.1	4087	9.1	1.076	41.4	LOS C	20.3	155.9	0.83	1.61	2.99	35.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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

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

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V Site: 101 [2040 - Goonoo Goonoo Rd & Jack Smyth Dr - AM (Site Folder: 2040 w Woolworths Approved DA + Approved Subdivision + Site Volumes (Mixed Uses))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

PM peak Site Category: (None) Roundabout

Vehicle Movement Performance													
Mov ID	Turn	Mov Class	Demano Flows [Total HV	Arrival Flows [[Total HV]	Deg. Satn	Aver. Delay	Level of Service	Aver. E Qu [Veh.	Back Of eue Dist]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h %	veh/h %	v/c	sec		veh	m				km/h
South	: Goo	noo Goor	100 Rd (S)										
1	L2	All MCs	14 7.7	′ 14 7.7	0.305	5.4	LOS A	0.8	6.3	0.44	0.48	0.44	52.2
2	T1	All MCs	665 12.0	665 12.0	0.305	5.5	LOS A	0.8	6.3	0.45	0.50	0.45	52.4
3	R2	All MCs	85 12.3	85 12.3	0.305	10.0	LOS A	0.8	6.1	0.46	0.53	0.46	51.1
Appro	ach		764 12.0	764 12.0	0.305	6.0	LOS A	0.8	6.3	0.45	0.50	0.45	52.3
East:	New F	Road (E)											
4	L2	All MCs	33 9.7	33 9.7	0.052	8.2	LOS A	0.1	0.7	0.50	0.62	0.50	51.7
5	T1	All MCs	9 0.0	9 0.0	0.171	6.1	LOS A	0.4	2.8	0.50	0.65	0.50	50.5
6	R2	All MCs	167 8.2	167 8.2	0.171	10.5	LOS A	0.4	2.8	0.50	0.65	0.50	49.5
Appro	ach		209 8.0	209 8.0	0.171	10.0	LOS A	0.4	2.8	0.50	0.65	0.50	49.8
North:	Goor	noo Goon	oo Rd (N)										
7	L2	All MCs	439 9.8	439 9.8	0.300	5.0	LOS A	0.7	5.4	0.30	0.51	0.30	53.0
8	T1	All MCs	354 11.6	354 11.6	0.299	5.2	LOS A	0.7	5.3	0.32	0.48	0.32	53.1
9	R2	All MCs	20 0.0	20 0.0	0.299	9.3	LOS A	0.7	5.3	0.32	0.48	0.32	52.5
Appro	ach		813 10.4	813 10.4	0.300	5.2	LOS A	0.7	5.4	0.31	0.49	0.31	53.0
West:	Jack	Smyth Dr	ive (W)										
10	L2	All MCs	43 0.0	43 0.0	0.051	6.7	LOS A	0.1	0.6	0.58	0.70	0.58	52.4
11	T1	All MCs	24 0.0	24 0.0	0.049	7.2	LOS A	0.1	0.5	0.59	0.73	0.59	51.5
12	R2	All MCs	12 0.0	12 0.0	0.049	11.4	LOS A	0.1	0.5	0.59	0.73	0.59	50.7
Appro	ach		79 0.0	79 0.0	0.051	7.5	LOS A	0.1	0.6	0.58	0.72	0.58	51.9
All Ve	hicles		1865 10.3	1865 10.3	0.305	6.2	LOS A	0.8	6.3	0.40	0.52	0.40	52.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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

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

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V Site: 101 [2040 - Goonoo Goonoo Rd & Jack Smyth Dr - PM (Site Folder: 2040 w Woolworths Approved DA + Approved Subdivision + Site Volumes (Mixed Uses))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

PM peak Site Category: (None) Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Dem Fl [Total	nand Iows HV <u>1</u>	Ar Fl [Tota <u>l]</u>	rival ows HV]_	Deg. Satn	Aver. Delay	Level of Service	Aver. C [V <u>eh.</u>	. Back Of lueue Dis <u>t 1</u>	Prop. Que	Eff. Stop Rate	Aver. No. of Cycle <u>s</u>	Aver. Speed
			veh/h	%	veh/h	%	v/c	sec		veh	m			- ,	km/h
South	: Goo	noo Goon	ioo Rd ((S)											
1	L2	All MCs	20	5.3	20	5.3	0.381	7.5	LOS A	1.2	9.4	0.82	0.67	0.82	50.8
2	T1	All MCs	573	11.2	573	11.2	0.381	8.0	LOS A	1.2	9.4	0.82	0.68	0.82	50.9
3	R2	All MCs	45	7.0	45	7.0	0.381	12.6	LOS A	1.1	8.5	0.82	0.70	0.82	49.9
Appro	ach		638	10.7	638	10.7	0.381	8.3	LOS A	1.2	9.4	0.82	0.68	0.82	50.9
East:	New F	Road (E)													
4	L2	All MCs	94	11.2	94	11.2	0.216	16.1	LOS B	0.4	3.4	0.75	0.79	0.75	48.0
5	T1	All MCs	28	0.0	28	0.0	0.705	18.0	LOS B	3.5	26.3	0.97	1.04	1.52	43.6
6	R2	All MCs	486	8.9	486	8.9	0.705	22.7	LOS B	3.5	26.3	0.97	1.04	1.52	42.8
Appro	ach		608	8.8	608	8.8	0.705	21.5	LOS B	3.5	26.3	0.94	1.00	1.40	43.6
North	Goor	noo Goon	oo Rd ((N)											
7	L2	All MCs	237	6.7	237	6.7	0.254	5.0	LOS A	0.6	4.3	0.27	0.49	0.27	53.1
8	T1	All MCs	881	11.6	881	11.6	0.567	5.2	LOS A	2.1	15.8	0.33	0.46	0.33	53.0
9	R2	All MCs	49	0.0	49	0.0	0.567	9.1	LOS A	2.1	15.8	0.34	0.45	0.34	52.4
Appro	ach		1167	10.1	1167 ⁻	10.1	0.567	5.3	LOS A	2.1	15.8	0.32	0.46	0.32	53.0
West:	Jack	Smyth Dr	ive (W)												
10	L2	All MCs	29	0.0	29	0.0	0.050	8.3	LOS A	0.1	0.6	0.68	0.77	0.68	51.3
11	T1	All MCs	14	0.0	14	0.0	0.050	7.6	LOS A	0.1	0.7	0.68	0.78	0.68	50.4
12	R2	All MCs	21	5.0	21	5.0	0.050	12.1	LOS A	0.1	0.7	0.68	0.78	0.68	49.5
Appro	ach		64	1.6	64	1.6	0.050	9.4	LOS A	0.1	0.7	0.68	0.78	0.68	50.5
All Ve	hicles		2478	9.7	2478	9.7	0.705	10.2	LOS A	3.5	26.3	0.61	0.66	0.72	49.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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