

Morriset Bulky Goods Development **56, 66, and 76 Mandalong Road, Morisset** **Traffic Impact Assessment**

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1.0 Introduction

This report has been prepared for Winarch Capital ('Winarch') to accompany a Development Application to Lake Macquarie City Council for proposed bulky goods, hardware retail, commercial retail shops, and takeaway food and drink premises on a consolidated site 56, 66, and 76 Mandalong Road, Morisset (Figure 1).

An existing consent (DA 1960/2011) was granted in 2014 for part of the site (66 and 76 Mandalong Road) to develop a bulky goods complex comprising 9,280m² GFA. The approved vehicle access involves an extension to the Gimberts Road (northern) approach at the Mandalong Road, Gimberts Road, and Gateway Boulevard roundabout.

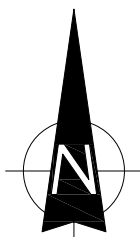
That site is now consolidated with 56 Mandalong Road, and the proposal involves an extended bulky goods development scheme, a hardware store, a supermarket, commercial retail units, restaurant/cafe and takeaway food and drinks premises. It is proposed to retain the approved access arrangement at the Mandalong Road/Gimberts Road roundabout. A part of the existing Old Mandalong Road that fronts the site is proposed to be deleted. A new left-in and left-out only access is proposed to be provided at Mandalong Road near the eastern site boundary to facilitate better traffic flow through the site (and in keeping with the Lake Macquarie DCP Part 12 – Precinct Area Plan Gimberts Road).

The purpose of this report is to:

- ❖ describe the site, its context, and the proposed development elements
- ❖ describe the road network serving the site and the prevailing traffic conditions
- ❖ assess the potential traffic implications of the proposed developments
- ❖ assess the proposed access and internal circulation arrangements
- ❖ assess the adequacy of the proposed parking and servicing provisions



LEGEND



LOCATION

FIG 1

2.0 Proposed Development Scheme

2.1 Site, Context and Existing Circumstances

The consolidated site (Figure 2) is Lot 2 DP 529914, Lots 11 and 12 DP 777034, located at 56, 66, and 76 Mandalong Road, Morisset. It occupies an irregularly-shaped area of some 13ha and has a 451m wide frontage to the northern side of Old Mandalong Road.

The site comprises a number of rural dwellings with associated outbuildings at present. The surrounding land uses include:

- ❖ the industrial precinct to the south, including the Morisset Mega Market and a Bunnings Warehouse
- ❖ the retail/commercial uses in the Town Centre further east, including the local railway station and surrounding residential development

Existing vehicle accesses for the site are provided at Old Mandalong Road.

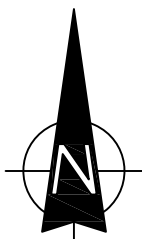
2.2 Approved Developments

An existing consent (DA 1960/2011) was granted in 2014 for part of the site (66 and 76 Mandalong Road) to develop an isolated bulky goods complex comprising 9,280m² GFA with 254 car parking spaces. The approved vehicle access involves an extension to Gimberts Road (northern leg) at the Mandalong Road/ Gimberts Road/ Gateway Boulevard roundabout.

Details of the approved development scheme are provided on the stamped plans in Appendix A.



LEGEND



SITE

FIG 2

2.3 Proposed Developments

The site will now include an additional lot '56 Mandalong Road' and the proposed development scheme will involve:

Bulky Goods (or specialised retail)	9,515m ² GFA
Hardware store	12,120m ² GFA (8,770m ² NLA)
Supermarket ¹	1,800m ² GFA
Takeaway food and drink (x 2)	510m ² GFA
Restaurants/Café ¹	500m ² GFA
Retail (commercial) ¹	1,800m ² GFA

The proposed vehicle access at the Mandalong Rd RAB will be constructed with the approved arrangement. The Gimberts Road-Old Mandalong Road connection is proposed to be deleted, while a left-in and left-out only access is proposed at Mandalong Road near the site's eastern boundary. The onsite car parking quantum will be increased from 245 to 761 spaces.

Details of the proposed development scheme are provided on the plans that accompany the Development Application and are reproduced in Appendix B.

¹ These land uses are currently not permissible on the site and are being proposed as additional permitted uses. Refer to the project's Statement of Environmental Effect for more information.

3.0 Existing Road Network and Traffic Conditions

3.1 Existing Road Network

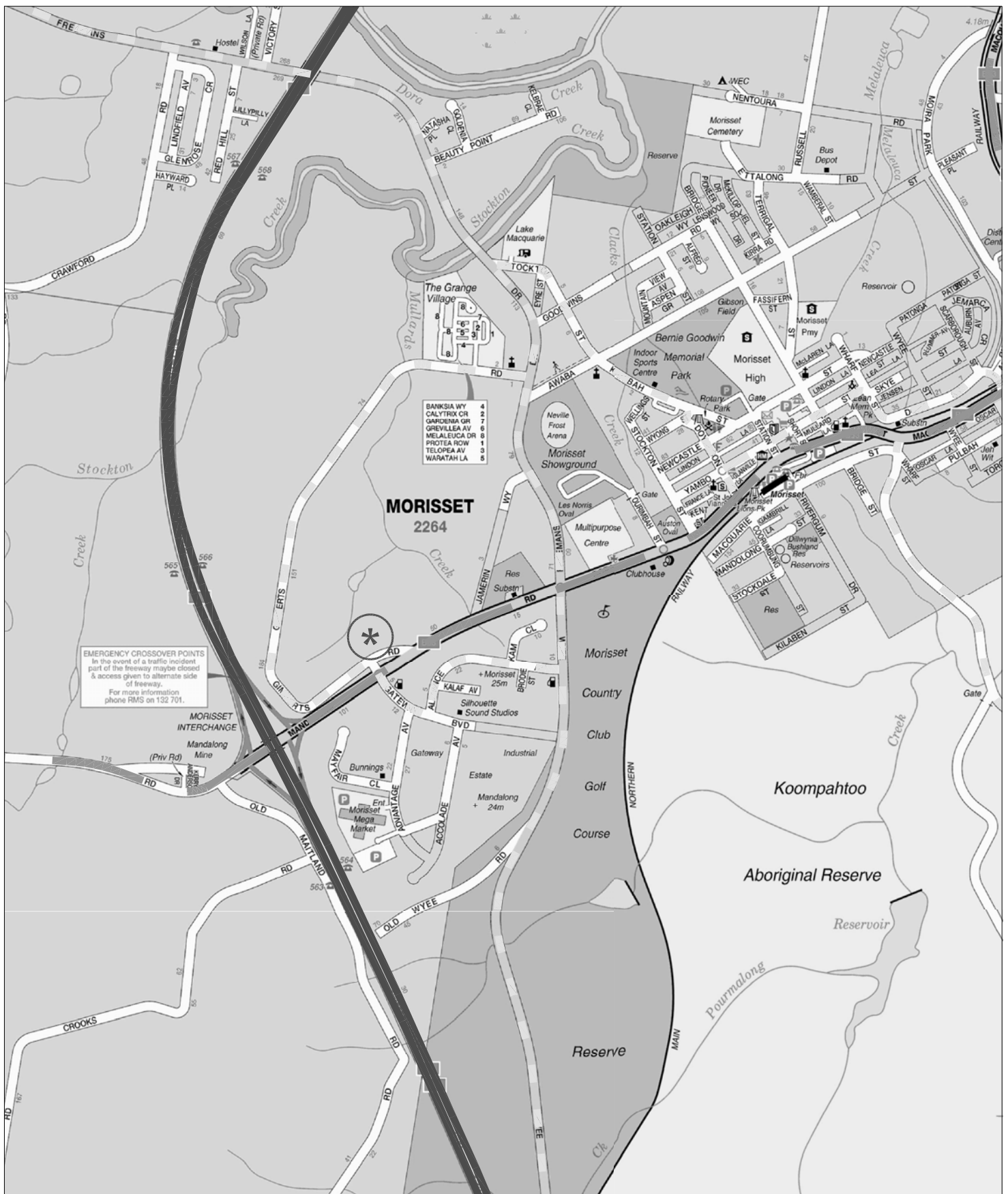
The existing road network serving the site (Figure 3) comprises:

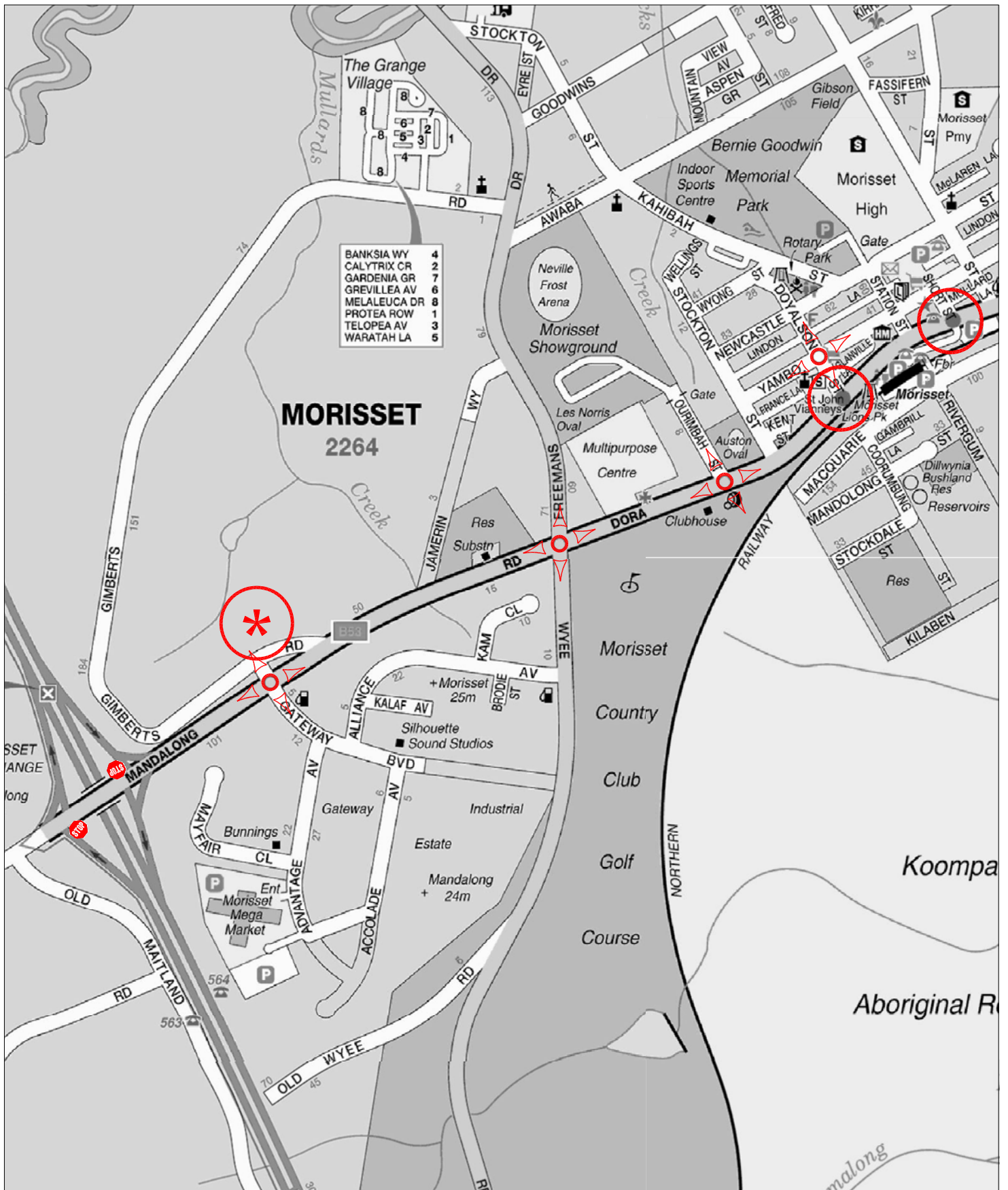
- ❖ *M1 Pacific Motorway* – a State Highway and part of the National Route connecting between Sydney and Brisbane
- ❖ *Mandalong Road/Dora Street/Macquarie Street* – a State Road and sub-arterial route being part of the link running along the western side of the Lake between the M1 and the Newcastle Link Road at Wallsend
- ❖ *Wyee Road/Freemans Drive* – a collector route that connects Doyalson and Cessnock
- ❖ The system of collector road routes which includes:
 - *Gateway Boulevard/Alliance Avenue* running through the industrial area to the south
 - *Gimberts Road* connecting between Mandalong Road and Freemans Drive
 - *Stockton Street/Kahibah Street*, which connect between Freemans Drive and Dora Street

3.2 Existing Traffic Controls

The existing traffic controls on the road network near the site (Figure 4) comprise:

- ❖ The stop priority controlled M1 on/off ramps
- ❖ the roundabout at the Mandalong Road, Gateway Boulevard and Gimberts Road intersection
- ❖ the roundabout at the Mandalong Road, Dora Street, Wyee Road and Freemans Drive intersection





- ❖ the roundabout at the Dora Street, Ourimbah Road and Golf Course Access intersection
- ❖ the traffic control signals at the Dora Street and Doyalson Street intersection
- ❖ the speed restrictions along the road fronting the site, being:
 - 60 kmph on Mandalong Road/ Dora Street
 - 60 kmph on Freemans Drive/ Wyee Road increasing to 90 kmph further south

3.3 Existing Traffic Conditions

An indication of traffic conditions on the road system servicing the site is provided by data published by the RMS and available traffic survey data. The data published by RMS is expressed in terms of Annual Average Daily Traffic, and based on the available data, the most recently published AADT data indicates the following traffic circumstances:

	AADT
M1 South of Wyee	25,000
Wyee Road, south of Mandalong Road	9,500
Dora Street, east of Wyee Road	16,000
Macquarie Street @ Dora Creek	6,500

The peak traffic flows at the Mandalong Road, Gateway Boulevard, and Gimberts Road roundabout are provided by surveys undertaken in 2019.

The 2019 traffic flows have been projected to 2021 using a conservative annual background growth rate of 2%. The 2021 projected background traffic flows provided in Section 5.3 of this report provide a basis for a SIDRA modelling assessment of the 'existing' traffic operation.

The assessment outcome which is reproduced in Appendix C found that the roundabout will operate with a Level of Service (LOS) A in the PM peak and Saturday midday peak in 2021. The relevant SIDRA model results are summarised below.

PM Peak

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	270	10.0	0.224	5.5	LOS A	1.1	8.6	0.52	0.65	0.52	52.5
2	T1	25	4.0	0.155	5.5	LOS A	0.7	5.3	0.51	0.71	0.51	37.5
3	R2	141	5.0	0.155	10.1	LOS A	0.7	5.3	0.51	0.71	0.51	52.0
3u	U	1	0.0	0.155	12.1	LOS A	0.7	5.3	0.51	0.71	0.51	53.1
Approach		437	8.0	0.224	7.0	LOS A	1.1	8.6	0.51	0.67	0.51	51.6
East: Mandalong Road												
4	L2	161	3.7	0.538	9.0	LOS A	3.7	26.9	0.68	0.80	0.76	51.5
5	T1	467	6.0	0.538	9.3	LOS A	3.7	26.9	0.68	0.81	0.77	51.8
6	R2	15	6.7	0.538	14.2	LOS A	3.7	26.9	0.69	0.82	0.78	31.2
6u	U	1	0.0	0.538	16.3	LOS B	3.7	26.9	0.69	0.82	0.78	53.3
Approach		644	5.4	0.538	9.4	LOS A	3.7	26.9	0.68	0.81	0.77	51.2
North: Gimberts Road												
7	L2	16	0.0	0.208	18.3	LOS B	0.8	7.6	0.79	0.90	0.79	37.7
8	T1	11	0.0	0.208	18.7	LOS B	0.8	7.6	0.79	0.90	0.79	38.8
9	R2	10	0.0	0.208	22.9	LOS B	0.8	7.6	0.79	0.90	0.79	36.1
9u	U	1	0.0	0.208	25.0	LOS B	0.8	7.6	0.79	0.90	0.79	8.7
Approach		38	0.0	0.208	19.8	LOS B	0.8	7.6	0.79	0.90	0.79	36.9
West: Mandalong Road												
10	L2	46	2.2	0.325	6.1	LOS A	1.7	12.3	0.46	0.58	0.46	34.5
11	T1	601	4.5	0.659	6.1	LOS A	5.8	42.9	0.57	0.63	0.58	52.9
12	R2	273	11.0	0.659	10.9	LOS A	5.8	42.9	0.62	0.65	0.63	51.9
12u	U	2	0.0	0.659	12.7	LOS A	5.8	42.9	0.62	0.65	0.63	52.7
Approach		922	6.3	0.659	7.5	LOS A	5.8	42.9	0.58	0.63	0.59	51.9
All Vehicles		2041	6.3	0.659	8.2	LOS A	5.8	42.9	0.60	0.70	0.63	51.4

Saturday Peak

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	122	22.1	0.127	5.9	LOS A	0.5	4.5	0.46	0.63	0.46	52.3
2	T1	15	6.7	0.153	5.1	LOS A	0.7	5.2	0.43	0.68	0.43	37.4
3	R2	192	3.6	0.153	9.7	LOS A	0.7	5.2	0.43	0.68	0.43	52.0
3u	U	3	0.0	0.153	11.7	LOS A	0.7	5.2	0.43	0.68	0.43	53.0
Approach		332	10.5	0.153	8.1	LOS A	0.7	5.2	0.44	0.66	0.44	51.5
East: Mandalong Road												
4	L2	201	3.0	0.399	5.9	LOS A	2.2	16.2	0.44	0.57	0.44	53.5
5	T1	377	7.4	0.399	6.0	LOS A	2.2	16.2	0.45	0.57	0.45	54.0
6	R2	15	6.7	0.399	10.7	LOS A	2.2	16.5	0.45	0.56	0.45	32.5
6u	U	1	0.0	0.399	12.7	LOS A	2.2	16.5	0.45	0.56	0.45	55.5
Approach		594	5.9	0.399	6.1	LOS A	2.2	16.5	0.45	0.57	0.45	53.3
North: Gimberts Road												
7	L2	18	0.0	0.173	12.2	LOS A	0.6	6.4	0.66	0.84	0.66	42.4
8	T1	17	0.0	0.173	12.6	LOS A	0.6	6.4	0.66	0.84	0.66	43.8
9	R2	13	0.0	0.173	16.8	LOS B	0.6	6.4	0.66	0.84	0.66	41.4
9u	U	1	0.0	0.173	18.9	LOS B	0.6	6.4	0.66	0.84	0.66	9.9
Approach		49	0.0	0.173	13.7	LOS A	0.6	6.4	0.66	0.84	0.66	42.0
West: Mandalong Road												
10	L2	17	5.9	0.188	6.3	LOS A	0.9	6.4	0.44	0.57	0.44	34.5
11	T1	375	7.2	0.381	5.8	LOS A	2.2	16.8	0.46	0.60	0.46	53.5
12	R2	100	30.0	0.381	10.7	LOS A	2.2	16.8	0.48	0.61	0.48	52.1
12u	U	3	0.0	0.381	12.3	LOS A	2.2	16.8	0.48	0.61	0.48	53.8
Approach		495	11.7	0.381	6.9	LOS A	2.2	16.8	0.47	0.60	0.47	52.7
All Vehicles		1470	8.7	0.399	7.1	LOS A	2.2	16.8	0.46	0.61	0.46	52.4

3.4 Existing Transport Services

The principal public transport service in the area is provided by the rail services accessed via the Morisset Railway Station some 1.8 km to the east. The rail services provide frequent connections to Gosford, Sydney, Newcastle, and beyond with 40 services per day in each direction, generally at 20-minute intervals (more frequent in the peak periods).

The nearest bus stops are located some 300m to the south at Gateway Boulevard. The local bus service (route 280) provides interconnection between the site, Cooranbong, and the local railway station.

4.0 Traffic Generation

4.1 Approved Basis for Assessment

Consultants 'Better Transport Futures' (BTF) prepared a Traffic Impact Assessment (TIA) that accompanied the now approved Bulky Goods development scheme in 2011.

The BTF TIA adopted the following traffic generation rates:

PM peak	2.5 vtpm per 100m ² GFA
Saturday midday peak	6.6 vtpm per 100m ² GFA

On this basis, it assessed the now approved scheme of 9,280m² to have a traffic generation outcome expressed in terms of vehicle trips per hour (vtpm) as follows:

PM peak	232 vtpm
Saturday midday peak	612 vtpm

The BTF TIA applied a conservative 'passing trade/linked trip' factor of 10% in its assessment. Based on the above, the development's net additional traffic are calculated as:

PM peak	209 vtpm
Saturday midday peak	551 vtpm

4.2 Current Proposal

Bulky Goods

The proposed bulky goods elements will involve 9,515m² GFA, an addition of 235m² GFA over the approved scheme.

The BTF TIA was undertaken in 2011, and its traffic generation rates were based on the RTA Guide to Traffic Generating Developments (2002), which relied on surveys

undertaken in the 1990s. In August 2013, the RMS published findings of an updated traffic generation study for Bulky Goods retail developments in the Sydney metropolitan and NSW regional areas (TDT 2013/04a – relevant extract reproduced below).

APPENDIX G2 – BULKY GOODS RETAIL –TRIP GENERATION									
Trips/ 100m ² GFA	Sydney Metropolitan Area BG1 to BG3			Non-Metropolitan Area BG4 to BG6			All Survey Sites BG1 to BG6		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Weekdays									
Person-based Trips									
- Site Peak Hour	2.42	7.00	4.33	2.64	7.83	4.69	2.42	7.83	4.51
- Vehicle Network AM Peak	Network AM peak is outside of opening hours								
- Vehicle Network PM Peak	1.33	2.03	1.68	1.72	4.58	2.99	1.33	4.58	2.46
Daily Total Person Trips	15.88	36.33	24.52	19.41	49.92	30.38	15.88	49.92	27.45
Vehicle-based Trips									
- Site Peak Hour	1.42	4.33	2.44	1.96	4.75	2.92	1.42	4.75	2.68
- Network AM Peak	Network AM peak is outside of opening hours								
- Network PM Peak	0.81	1.21	1.01	1.12	2.25	1.51	0.81	2.25	1.31
Daily Total LV Trips	10.16	22.17	14.69	10.00	26.58	17.16	10.00	26.58	15.92
Daily Total HV Trips	0.00	3.00	1.07	0.20	2.33	0.92	0.00	3.00	1.00
Daily Total Vehicle Trips	10.37	25.17	15.76	10.24	28.92	18.08	10.24	28.92	16.92
Peak Parking Accumulation	0.65	3.17	1.57	0.41	2.00	1.03	0.41	3.17	1.30
Weekend									
Person-based Trips									
- Site Peak Hour	4.63	11.83	7.90	5.59	14.17	8.67	4.63	14.17	8.28
- Vehicle Network Peak	3.81	4.92	4.36	3.12	8.33	5.49	3.12	8.33	4.92
Daily Total Person Trips	25.09	39.40	33.72	23.94	70.83	42.37	23.94	70.83	38.05
Vehicle-based Trips									
- Site Peak Hour	2.23	6.17	3.75	2.76	5.67	3.94	2.23	6.17	3.85
- Vehicle Network Peak	1.70	2.83	2.24	1.35	4.00	2.72	1.35	4.00	2.48
Daily Total LV Trips	11.42	19.83	16.05	10.47	33.67	20.81	10.47	33.67	18.43
Daily Total HV Trips	0.00	0.33	0.11	0.03	0.50	0.22	0.00	0.50	0.16
Daily Total Vehicle Trips	11.42	20.17	16.16	10.59	34.17	21.02	10.59	34.17	18.59
Peak Parking Accumulation	0.91	2.17	1.57	0.35	2.25	1.15	0.35	2.25	1.36
Weekend / Weekdays %									
Person-based Trips									
- Site Peak Hour	191.3%	242.9%	259.9%	180.7%	181.8%	183.8%	235.2%	181.8%	199.9%
Daily Total Person Trips	158.0%	108.4%	137.5%	123.3%	141.9%	139.5%	150.7%	141.9%	138.6%
Vehicle-based Trips									
- Site Peak Hour	157.4%	142.3%	154.0%	141.3%	119.3%	135.0%	157.4%	129.8%	143.6%
Daily Total LV Trips	112.4%	89.5%	109.3%	104.7%	126.6%	121.2%	104.7%	126.6%	115.7%
Daily Total HV Trips	0.0%	11.1%	10.4%	16.7%	21.4%	23.5%	0.0%	16.7%	16.5%
Daily Total Vehicle Trips	110.1%	80.1%	102.6%	103.4%	118.2%	116.3%	103.4%	118.2%	109.9%
Peak Parking Accumulation	139.3%	68.4%	99.9%	85.7%	112.5%	111.5%	85.7%	71.1%	104.5%

Source: Trip Generation and Parking Generation Surveys, Bulky Goods/Hardware Stores, Analysis Report, Hyder Consulting for the NSW Roads and Traffic Authority, May 2009, p20

Source: RMS

The Study relied on more recent surveys undertaken in 2009 and found that the AM peak period does not coincide with bulky goods retail's opening hours. The PM peak and Saturday midday peak were identified as the most critical assessment periods. The Study reveals average traffic generation rates of 1.51 vtpm per 100m² in the PM peak and 2.72 vtpm per 100m² in the Saturday midday peak for regional centers.

Adopting the updated RMS rates would indicate the following traffic generation outcome for the proposed Bulky Goods:

PM peak	144 vtpm
Saturday midday peak	260 vtpm

In 2012, the Australian Road Research Board (ARRB) published its research findings

of the effects of passing and linked trips in home improvement warehouse (bulky goods development) and supermarkets. An extract of that publication which is reproduced in Appendix D reveals the following passing/linked trip proportions for bulky goods and supermarkets:

Bulky Goods	34% - 40%
Supermarket	40%

Passing trip and linked trips being described as:

1. Passing trip (also known as drop in trip) - traffic movements that are already in the network passing the retail frontage and 'drop in' to the site; and
2. Linked trip - traffic movements that are already visiting a store in the site that visits a second/third store out of need/convenience.

Intuitively, the more stores there are in a particular development site, the higher the discounting effect. The BTF TIA adopted a 10% rate as the proposal was a single bulky goods development, which is isolated.

The proposal is a significantly more integrated development site with multiple complementary uses. Nevertheless, the assessment will apply a conservative rate of 20% as opposed to that published by the ARRB. On this basis, the bulky goods net traffic generation is projected as:

PM peak	115 vtp
Saturday midday peak	208 vtp

Hardware Retail

The same RMS Study (TDT 2013/04a) also published updated traffic generation rates for hardware stores in the Sydney Metropolitan and NSW Regional areas (extract reproduced below).

APPENDIX H2 – HARDWARE AND BUILDING SUPPLIES – TRIP GENERATION									
Trips/ 100m ² GFA	Sydney Metropolitan Area HW1 to HW5			Non-Metropolitan Area HW6 to HW9			All Survey Sites HW1 to HW9		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Weekdays									
Person-based Trips									
- Site Peak Hour	4.00	5.77	5.06	3.95	6.40	5.49	3.95	6.40	5.25
- Vehicle Network AM Peak	0.65	2.72	2.01	1.28	4.75	2.97	0.65	4.75	2.43
- Vehicle Network PM Peak	2.48	4.89	3.50	2.79	4.65	3.78	2.48	4.89	3.63
Daily Total Person Trips	32.88	53.26	42.42	29.22	43.40	38.34	29.22	53.26	40.61
Vehicle-based Trips									
- Site Peak Hour	3.15	4.67	4.03	2.74	5.60	4.41	2.74	5.60	4.20
- Network AM Peak	0.60	2.22	1.68	1.09	3.88	2.50	0.60	3.88	2.05
- Network PM Peak	2.05	3.56	2.70	1.99	3.80	3.03	1.99	3.80	2.85
Daily Total LV Trips	25.21	38.25	30.59	20.66	35.90	30.30	20.66	38.25	30.46
Daily Total HV Trips	0.99	6.17	2.40	0.69	2.25	1.49	0.69	6.17	2.00
Daily Total Vehicle Trips	26.80	39.75	32.99	21.35	38.15	31.79	21.35	39.75	32.46
Peak Parking Accumulation	0.78	1.67	1.16	1.05	1.90	1.48	0.78	1.90	1.30
Weekend									
Person-based Trips									
- Site Peak Hour	6.83	10.54	9.11	7.43	9.20	8.11	6.83	10.54	8.66
- Vehicle Network Peak	6.00	10.44	8.59	6.67	8.70	7.53	6.00	10.44	8.12
Daily Total Person Trips	36.94	74.39	59.25	40.17	49.90	44.66	36.94	74.39	52.76
Vehicle-based Trips									
- Site Peak Hour	4.28	6.69	5.91	4.49	6.17	5.28	4.28	6.69	5.63
- Vehicle Network Peak	3.61	6.33	5.33	4.28	5.33	4.92	3.61	6.33	5.15
Daily Total LV Trips	22.00	48.78	38.42	28.24	32.20	30.68	22.00	48.78	34.98
Daily Total HV Trips	0.13	0.89	0.52	0.00	0.25	0.13	0.00	0.89	0.35
Daily Total Vehicle Trips	22.89	49.05	38.94	28.39	32.45	30.81	22.89	49.05	35.33
Peak Parking Accumulation	1.50	2.59	2.00	1.45	2.81	1.82	1.45	2.81	1.92
Weekend/Weekdays %									
Person-based Trips									
- Site Peak Hour	170.7%	213.6%	245.4%	238.6%	187.1%	199.1%	241.9%	213.6%	224.0%
Daily Total Person Trips	112.4%	139.7%	139.7%	137.5%	115.0%	116.5%	126.4%	139.7%	129.9%
Vehicle-based Trips									
- Site Peak Hour	136.0%	143.4%	146.9%	163.7%	110.1%	119.8%	155.9%	119.5%	134.2%
Daily Total LV Trips	87.3%	127.5%	125.6%	136.7%	89.7%	101.3%	106.5%	127.5%	114.8%
Daily Total HV Trips	12.7%	14.4%	21.7%	0.0%	11.1%	8.6%	0.0%	14.4%	17.4%
Daily Total Vehicle Trips	85.4%	123.4%	118.0%	133.0%	85.1%	96.9%	107.2%	123.4%	108.8%
Peak Parking Accumulation	192.9%	155.3%	171.9%	138.7%	148.0%	122.9%	186.4%	148.0%	147.2%

Source: Trip Generation and Parking Generation Surveys, Bulky Goods/Hardware Stores, Analysis Report, Hyder Consulting for the NSW Roads and Traffic Authority, May 2009, p16

Source: RMS

Applying the above highlighted 'network peak' rates to the proposed hardware store (12,155m²) would indicate the following traffic generation outcome:

PM peak	368 vtp/h
Saturday midday peak	598 vtp/h

Similarly, a conservative passing/linked trip rate of 20% will be applied in this context and the net traffic generation associated with the proposed hardware retail store is projected as:

PM peak	294 vtp/h
Saturday midday peak	479 vtp/h

Takeaway Food and Drink premises

The peak traffic generation outcome for drive-through takeaway food and drink premises are provided in the RTA Guide to Traffic Generating Developments (2002). The Guideline found substantially different peak traffic generation outcome between McDonald's and KFC, with the average traffic movements indicated as follows:

McDonald's	180 vtp
KFC	100 vtp

The discrepancy is understood to be primarily associated with McDonald's dominant share in the fast-food retail market.

It has been advised that proposed takeaway food and drink premises will not be associated with McDonald's. This is because a McDonald's restaurant has long been established at the corner of Mandalong Road and Ourimbah Road further east and nearer to the Town Centre. Therefore, it is appropriate to adopt the KFC's traffic generation rate i.e., 100 vtp. The RMS Guideline indicates a passing trade factor of at least 50% for fast-food retail, highlighting a significant proportion of custom by motorists passing the road frontage. The assessment will instead adopt a more conservative rate 30%. There will also be an apparent 'linked trip' effect associated with the fast food component being a convenience for patrons who are already 'shopping' in the site. Applying a similar 20% rate would therefore reveal the following net traffic generation outcome:

100 vtp x 2 units	=	200 vtp
200 vtp less		
30% passing (-60)		
20% linked (-40)	=	100 vtp

Therefore:

PM peak	100 vtp
Saturday midday peak	100 vtp

Restaurant/Cafés

The proposed restaurant and café floor space will involve 500m² GFA and their peak traffic generation outcome is provided in the RTA Guide to Traffic Generating Developments (2002), which indicates an evening peak rate of 5 vtp per 100m². Application of the RMS rate would indicate a peak traffic generation outcome of:

PM peak	25 vtp
Saturday peak	25 vtp

There will be limited passing trade associated with restaurants/cafes however there will be a smaller proportion of linked trip associated with this use. The assessment will adopt a 10% rate to provide a conservative basis, thus indicating:

PM peak	23 vtp
Saturday peak	23 vtp

Commercial Retail

The proposed commercial retail floor space will involve 1,800m² GFA and their peak traffic generation outcome is also provided in the RTA Guide to Traffic Generating Developments (2002), which indicates an evening peak rate of 2 vtp per 100m². Application of the RMS rate would indicate a peak traffic generation outcome of:

PM peak	36 vtp
Saturday peak	36 vtp

Similarly, there will be limited passing trade associated with restaurants however there will be a smaller proportion of linked trip associated with this use. The assessment will also adopt a 10% rate to provide a conservative basis, thus indicating:

PM peak	33 vtp
Saturday peak	33 vtp

Supermarket Retail

The proposed supermarket retail floor space will involve 1,800m² GFA. The RTA Guide to Traffic Generating Developments (2002) provides a peak traffic generation outcome for Thursday and Saturday peaks, as follows:

$$\begin{aligned}\text{Thursday} &= 155 \times 1,800\text{m}^2/1,000 \\ &= 279 \text{ vtp}\end{aligned}$$

$$\begin{aligned}\text{Saturday} &= 147 \times 1,800\text{m}^2/1,000 \\ &= 265 \text{ vtpH}\end{aligned}$$

While the ARRB findings indicate a passing/linked trip proportion of 40% for supermarket retail, the assessment will adopt a more conservative 20% instead.

Therefore, the supermarket's net traffic generation is projected as follows:

PM peak	223 vtpH
Saturday peak	212 vtpH

Overall Traffic Generation

Based on the above, the development's net traffic generation outcome is:

	PM peak	Saturday midday peak
Bulky Goods Retail	115 vtpH	208 vtpH
Hardware Retail	294 vtpH	479 vtpH
Takeaway Food	100 vtpH	100 vtpH
Restaurant/cafés	23 vtpH	23 vtpH
Commercial Retail	33 vtpH	33 vtpH
Supermarket Retail	194 vtpH	265 vtpH
Total	759 vtpH	1,108 vtpH

5.0 Traffic Impact Assessment

5.1 Approved Scheme's Assessment Basis

The BTF TIA used SIDRA to assess the impact of the proposal's traffic on the operational performance of the Mandalong Road, Gimberts Road, and Gateway Boulevard roundabout. The assessment found that the roundabout could accommodate the scheme's traffic generation with no undue difficulty. It further concluded that the roundabout could continue to operate satisfactorily 10 years following the development (2021).

5.2 Proposal's Assessment

The BTF TIA assumed a traffic distribution of:

East	75%
West	25%

The BTF assessment in 2011 did not account for the now relatively large and established commercial catchment further south at Gateway Boulevard. For this reason, it is proposed to allocate 10% to/from the south via Gateway Boulevard.

Thus, the proposed traffic distribution assumed in this assessment is:

East	65%
West	25%
South	10%

Because the proposed land uses will continue to be predominantly retail-based, the proposal's in:out traffic distribution will be on a 1:1 basis, consistent with the approved assessment.

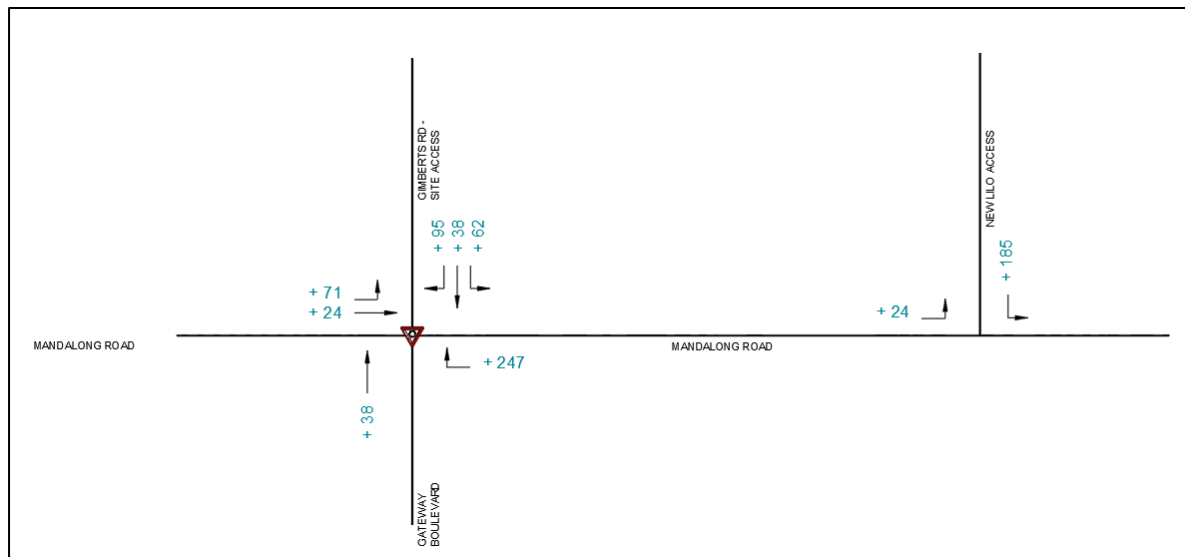
With the addition of a new left-in and left-out 'option' on the site's eastern part, it is reasonable to assume that most of the eastbound departing customers will use the

new access to head east. For this assessment, it is proposed to distribute 75% of the eastbound egress traffic to the new access.

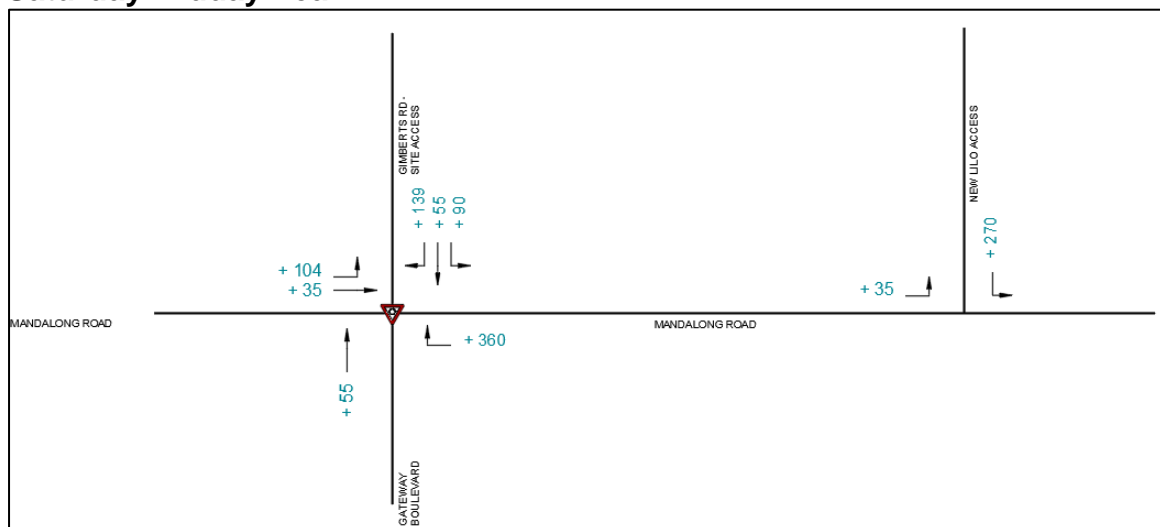
The 'left-in' provision at the new access is intended to provide an alternative access point for the development's customers, particularly those headed for the site's eastern parts. The assessment proposes to distribute 25% of the eastbound entry movements onto the new access.

Based on the above 'parameters', the projected development traffic for the PM peak and Saturday midday peak are indicated as follows:

PM Peak



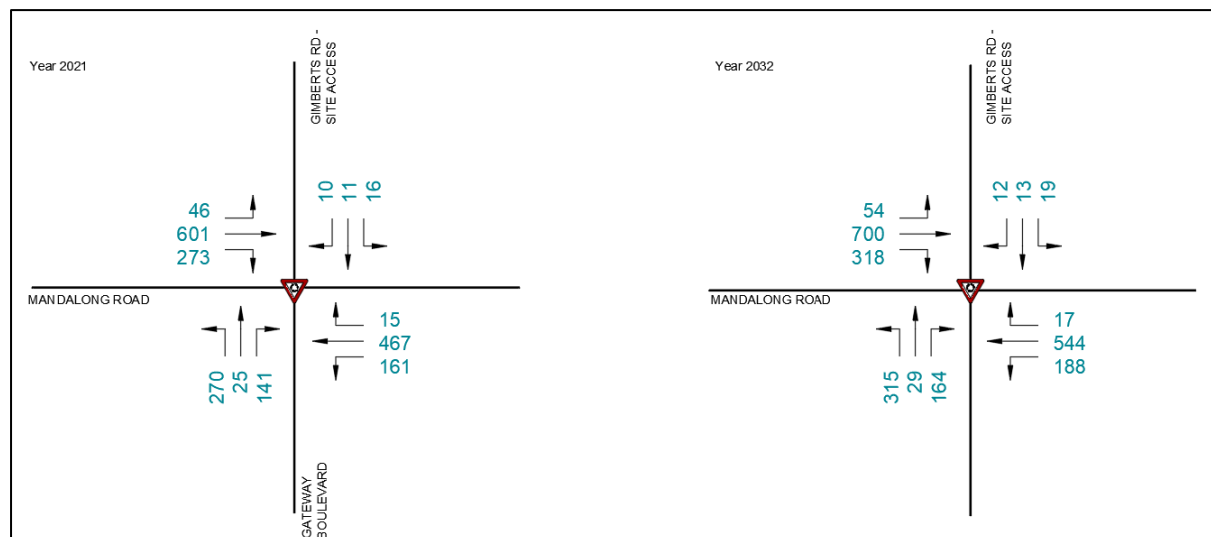
Saturday Midday Peak



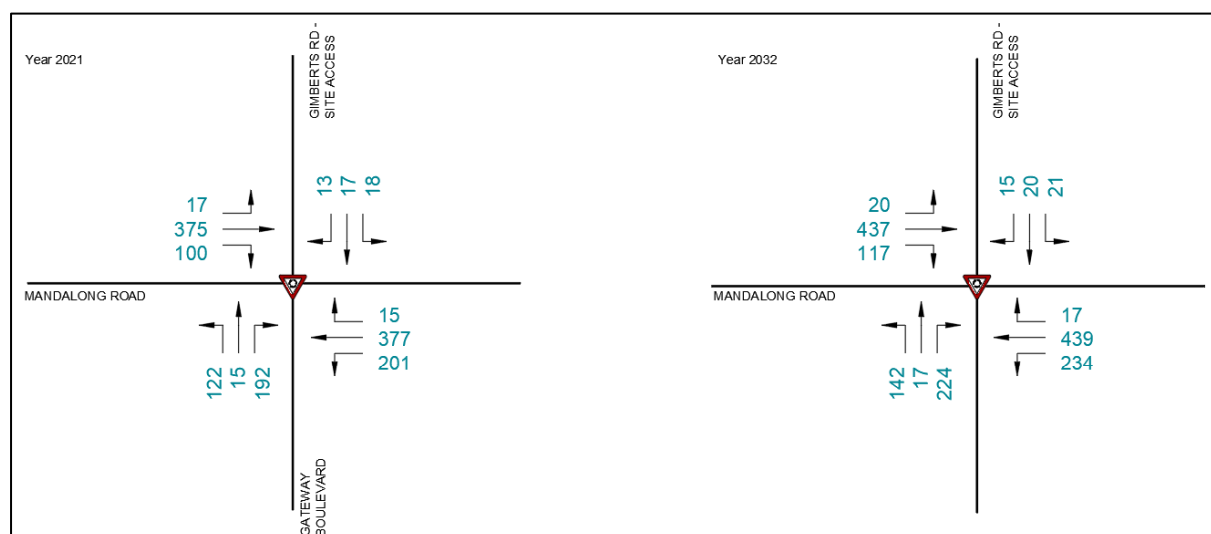
5.3 Background Traffic

There is no other significant development that is under construction at the time of this assessment. The Better Transport Futures TIA adopted an annual growth rate of 3% in 2011, while the more recently (2020) assessed and approved Cedar Mill development scheme adopted 1.5%. It is proposed to assume 2% as a suitably balanced and conservative basis for this assessment. On this basis, the 2021 and 2032 background traffic volumes at the Mandalong Road/ Gimberts Road/ Gateway Boulevard roundabout are:

PM Peak



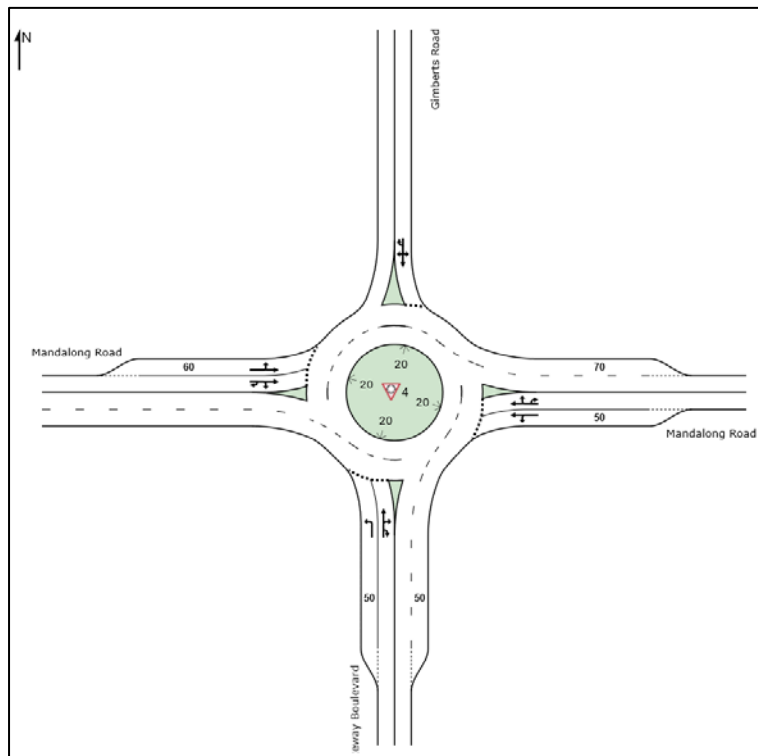
Saturday Midday Peak



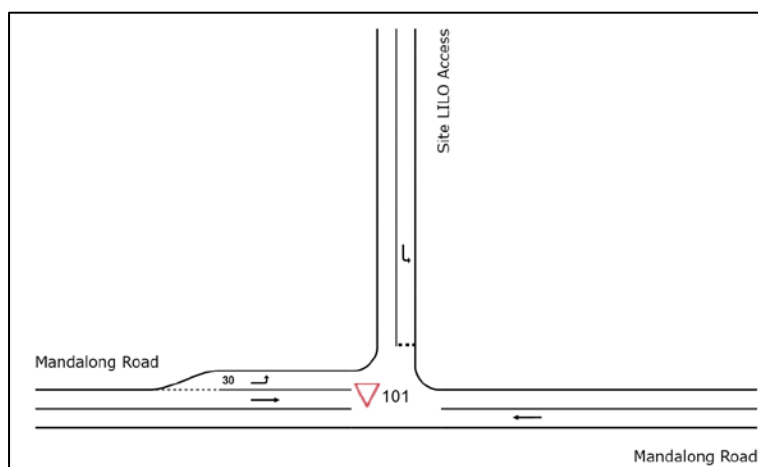
5.4 SIDRA Modelling

The study assessed the proposal's impact on the operational performance of the Mandalong Road/ Gimberts Road/ Gateway Boulevard roundabout and the eastern left-in and left-out access for the years 2021 and 20232.

The existing roundabout layout is indicated below:



And the proposed eastern access layout is shown below:



5.5 SIDRA Assessment Outcome 2021 – Background Traffic

The operational performance for the roundabout under the 2021 PM peak and Saturday midday peak's background traffic is indicated below.

PM Peak

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	270	10.0	0.224	5.5	LOS A	1.1	8.6	0.52	0.65	0.52	52.5
2	T1	25	4.0	0.155	5.5	LOS A	0.7	5.3	0.51	0.71	0.51	37.5
3	R2	141	5.0	0.155	10.1	LOS A	0.7	5.3	0.51	0.71	0.51	52.0
3u	U	1	0.0	0.155	12.1	LOS A	0.7	5.3	0.51	0.71	0.51	53.1
Approach		437	8.0	0.224	7.0	LOS A	1.1	8.6	0.51	0.67	0.51	51.6
East: Mandalong Road												
4	L2	161	3.7	0.538	9.0	LOS A	3.7	26.9	0.68	0.80	0.76	51.5
5	T1	467	6.0	0.538	9.3	LOS A	3.7	26.9	0.68	0.81	0.77	51.8
6	R2	15	6.7	0.538	14.2	LOS A	3.7	26.9	0.69	0.82	0.78	31.2
6u	U	1	0.0	0.538	16.3	LOS B	3.7	26.9	0.69	0.82	0.78	53.3
Approach		644	5.4	0.538	9.4	LOS A	3.7	26.9	0.68	0.81	0.77	51.2
North: Gimberts Road												
7	L2	16	0.0	0.208	18.3	LOS B	0.8	7.6	0.79	0.90	0.79	37.7
8	T1	11	0.0	0.208	18.7	LOS B	0.8	7.6	0.79	0.90	0.79	38.8
9	R2	10	0.0	0.208	22.9	LOS B	0.8	7.6	0.79	0.90	0.79	36.1
9u	U	1	0.0	0.208	25.0	LOS B	0.8	7.6	0.79	0.90	0.79	8.7
Approach		38	0.0	0.208	19.8	LOS B	0.8	7.6	0.79	0.90	0.79	36.9
West: Mandalong Road												
10	L2	46	2.2	0.325	6.1	LOS A	1.7	12.3	0.46	0.58	0.46	34.5
11	T1	601	4.5	0.659	6.1	LOS A	5.8	42.9	0.57	0.63	0.58	52.9
12	R2	273	11.0	0.659	10.9	LOS A	5.8	42.9	0.62	0.65	0.63	51.9
12u	U	2	0.0	0.659	12.7	LOS A	5.8	42.9	0.62	0.65	0.63	52.7
Approach		922	6.3	0.659	7.5	LOS A	5.8	42.9	0.58	0.63	0.59	51.9
All Vehicles		2041	6.3	0.659	8.2	LOS A	5.8	42.9	0.60	0.70	0.63	51.4

Saturday Peak

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	122	22.1	0.127	5.9	LOS A	0.5	4.5	0.46	0.63	0.46	52.3
2	T1	15	6.7	0.153	5.1	LOS A	0.7	5.2	0.43	0.68	0.43	37.4
3	R2	192	3.6	0.153	9.7	LOS A	0.7	5.2	0.43	0.68	0.43	52.0
3u	U	3	0.0	0.153	11.7	LOS A	0.7	5.2	0.43	0.68	0.43	53.0
Approach		332	10.5	0.153	8.1	LOS A	0.7	5.2	0.44	0.66	0.44	51.5
East: Mandalong Road												
4	L2	201	3.0	0.399	5.9	LOS A	2.2	16.2	0.44	0.57	0.44	53.5
5	T1	377	7.4	0.399	6.0	LOS A	2.2	16.2	0.45	0.57	0.45	54.0
6	R2	15	6.7	0.399	10.7	LOS A	2.2	16.5	0.45	0.56	0.45	32.5
6u	U	1	0.0	0.399	12.7	LOS A	2.2	16.5	0.45	0.56	0.45	55.5
Approach		594	5.9	0.399	6.1	LOS A	2.2	16.5	0.45	0.57	0.45	53.3
North: Gimberts Road												
7	L2	18	0.0	0.173	12.2	LOS A	0.6	6.4	0.66	0.84	0.66	42.4
8	T1	17	0.0	0.173	12.6	LOS A	0.6	6.4	0.66	0.84	0.66	43.8
9	R2	13	0.0	0.173	16.8	LOS B	0.6	6.4	0.66	0.84	0.66	41.4
9u	U	1	0.0	0.173	18.9	LOS B	0.6	6.4	0.66	0.84	0.66	9.9
Approach		49	0.0	0.173	13.7	LOS A	0.6	6.4	0.66	0.84	0.66	42.0
West: Mandalong Road												
10	L2	17	5.9	0.188	6.3	LOS A	0.9	6.4	0.44	0.57	0.44	34.5
11	T1	375	7.2	0.381	5.8	LOS A	2.2	16.8	0.46	0.60	0.46	53.5
12	R2	100	30.0	0.381	10.7	LOS A	2.2	16.8	0.48	0.61	0.48	52.1
12u	U	3	0.0	0.381	12.3	LOS A	2.2	16.8	0.48	0.61	0.48	53.8
Approach		495	11.7	0.381	6.9	LOS A	2.2	16.8	0.47	0.60	0.47	52.7
All Vehicles		1470	8.7	0.399	7.1	LOS A	2.2	16.8	0.46	0.61	0.46	52.4

The roundabout operates with satisfactory LOS under the 2021 background traffic.

The assessment found that the single lane Gimberts Road approach will not accommodate the 2021 background plus development traffic demand. See below.

PM peak

Site: 4 [3 MANDALONG/GATEWAY WD PM - 2021 BASE + DEV]

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	270	10.0	0.276	6.1	LOS A	1.5	11.7	0.69	0.72	0.69	52.0
2	T1	63	1.6	0.228	6.1	LOS A	1.2	8.7	0.67	0.78	0.67	37.4
3	R2	141	5.0	0.228	10.8	LOS A	1.2	8.7	0.67	0.78	0.67	51.9
3u	U	1	0.0	0.228	12.7	LOS A	1.2	8.7	0.67	0.78	0.67	53.0
Approach		475	7.4	0.276	7.5	LOS A	1.5	11.7	0.68	0.75	0.68	50.3
East: Mandalong Road												
4	L2	161	3.7	0.829	18.6	LOS B	10.6	77.3	0.96	1.19	1.50	45.4
5	T1	467	6.0	0.829	19.1	LOS B	10.6	77.3	0.96	1.20	1.51	44.5
6	R2	262	0.4	0.829	24.7	LOS B	10.2	73.0	0.96	1.20	1.53	26.4
6u	U	1	0.0	0.829	26.8	LOS B	10.2	73.0	0.96	1.20	1.53	44.9
Approach		891	3.9	0.829	20.7	LOS B	10.6	77.3	0.96	1.20	1.52	39.1
North: Gimberts Road												
7	L2	78	0.0	1.509	492.9	LOS F	57.4	573.6	1.00	3.81	9.79	3.9
8	T1	40	0.0	1.509	403.3	LOS F	57.4	573.6	1.00	3.81	0.70	3.0
9	R2	105	0.0	1.509	497.6	LOS F	57.4	573.6	1.00	3.81	9.79	3.3
9u	U	1	0.0	1.509	499.6	LOS F	57.4	573.6	1.00	3.81	9.79	0.9
Approach		233	0.0	1.509	495.1	LOS F	57.4	573.6	1.00	3.81	9.79	3.6
West: Mandalong Road												
10	L2	117	0.9	0.485	9.6	LOS A	2.5	18.0	0.68	0.86	0.77	32.4
11	T1	625	4.3	0.941	19.1	LOS B	18.6	137.7	0.93	1.32	1.81	44.4
12	R2	273	11.0	0.941	26.4	LOS B	18.6	137.7	1.00	1.44	2.08	42.6
12u	U	2	0.0	0.941	28.2	LOS B	18.6	137.7	1.00	1.44	2.08	42.2
Approach		1017	5.7	0.941	20.0	LOS B	18.6	137.7	0.92	1.30	1.76	42.9
All Vehicles		2616	4.9	1.509	60.3	LOS E	57.4	573.6	0.90	1.39	2.20	26.5

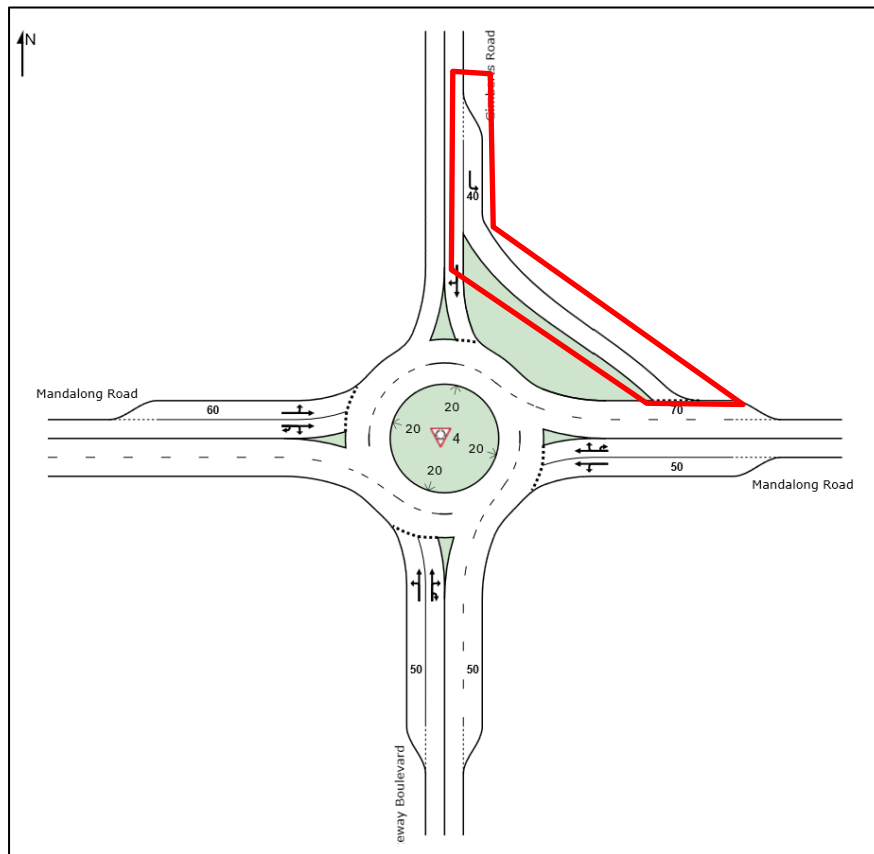
Saturday Peak

Site: 4 [4 MANDALONG/GATEWAY WD SAT - 2021 BASE + DEV]

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	122	22.1	0.194	7.7	LOS A	0.9	7.5	0.68	0.84	0.68	51.2
2	T1	70	1.4	0.256	6.0	LOS A	1.5	10.5	0.69	0.78	0.69	37.2
3	R2	192	3.6	0.256	10.7	LOS A	1.5	10.5	0.69	0.78	0.69	51.8
3u	U	3	0.0	0.256	12.7	LOS A	1.5	10.5	0.69	0.78	0.69	52.8
Approach		387	9.0	0.256	8.9	LOS A	1.5	10.5	0.69	0.80	0.69	49.4
East: Mandalong Road												
4	L2	201	3.0	0.773	13.4	LOS A	8.9	65.6	0.87	1.00	1.16	48.6
5	T1	377	7.4	0.773	13.6	LOS A	8.9	65.6	0.87	1.01	1.17	48.1
6	R2	375	0.3	0.773	19.0	LOS B	8.7	61.9	0.88	1.05	1.19	28.1
6u	U	1	0.0	0.773	21.1	LOS B	8.7	61.9	0.88	1.05	1.19	47.7
Approach		954	3.7	0.773	15.7	LOS B	8.9	65.6	0.88	1.02	1.18	40.0
North: Gimberts Road												
7	L2	108	0.0	1.309	309.7	LOS F	59.3	593.2	1.00	3.99	9.58	6.0
8	T1	72	0.0	1.309	310.1	LOS F	59.3	593.2	1.00	3.99	9.58	6.0
9	R2	152	0.0	1.309	314.3	LOS F	59.3	593.2	1.00	3.99	9.58	5.1
9u	U	1	0.0	1.309	316.4	LOS F	59.3	593.2	1.00	3.99	9.58	1.4
Approach		333	0.0	1.309	311.9	LOS F	59.3	593.2	1.00	3.99	9.58	5.6
West: Mandalong Road												
10	L2	121	0.8	0.333	9.3	LOS A	1.5	10.6	0.67	0.83	0.69	32.5
11	T1	410	6.6	0.675	10.3	LOS A	5.2	39.7	0.79	0.98	1.03	50.5
12	R2	100	30.0	0.675	15.8	LOS B	5.2	39.7	0.81	1.00	1.07	49.4
12u	U	3	0.0	0.675	16.9	LOS B	5.2	39.7	0.81	1.00	1.07	50.6
Approach		634	9.1	0.675	11.0	LOS A	5.2	39.7	0.77	0.96	0.97	47.6
All Vehicles		2308	5.5	1.309	56.0	LOS D	59.3	593.2	0.83	1.39	2.25	26.4

To overcome the capacity constraint, it is initially proposed to provide a left-turn slip lane on the Gimberts Road approach. This is illustrated below.



A reassessment revealed that the upgraded roundabout will be able to accommodate the 2021 background and development Saturday peak traffic demand; however, the northern approach will still fail under the PM peak traffic demand. See below.

PM Peak

Site: 4 [5 MANDALONG/GATEWAY WD PM - 2021 BASE + DEV - LT SLIP]

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn vic	Average Delay sec	Level of Service	85% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	270	10.0	0.283	6.2	LOS A	1.6	12.2	0.71	0.74	0.71	51.9
2	T1	63	1.6	0.235	6.2	LOS A	1.3	9.1	0.69	0.79	0.69	37.3
3	R2	141	5.0	0.235	11.0	LOS A	1.3	9.1	0.69	0.79	0.69	51.9
3u	U	1	0.0	0.235	12.8	LOS A	1.3	9.1	0.69	0.79	0.69	53.0
Approach		475	7.4	0.283	7.7	LOS A	1.6	12.2	0.70	0.76	0.70	50.2
East: Mandalong Road												
4	L2	161	3.7	0.871	23.6	LOS B	12.5	91.3	1.00	1.30	1.79	42.8
5	T1	467	8.0	0.871	24.2	LOS B	12.5	91.3	1.00	1.30	1.80	41.7
6	R2	262	0.4	0.871	30.1	LOS C	12.0	85.6	1.00	1.31	1.82	24.7
6u	U	1	0.0	0.871	32.2	LOS C	12.0	85.6	1.00	1.31	1.82	42.2
Approach		891	3.9	0.871	25.8	LOS B	12.5	91.3	1.00	1.30	1.80	36.7
North: Gimberts Road												
7	L2	78	0.0	0.333	15.1	LOS B	1.4	13.9	0.76	0.90	0.84	40.8
8	T1	49	0.0	1.004	104.2	LOS F	11.3	112.9	1.00	1.71	3.22	15.1
9	R2	105	0.0	1.004	108.5	LOS F	11.3	112.9	1.00	1.71	3.22	13.1
9u	U	1	0.0	1.004	110.6	LOS F	11.3	112.9	1.00	1.71	3.22	3.7
Approach		233	0.0	1.004	76.3	LOS F	11.3	112.9	0.92	1.44	2.42	17.8
West: Mandalong Road												
10	L2	117	0.9	0.466	9.6	LOS A	2.5	18.1	0.68	0.86	0.78	32.4
11	T1	625	4.3	0.944	19.4	LOS B	19.0	140.3	0.93	1.33	1.83	44.2
12	R2	273	11.0	0.944	26.9	LOS B	19.0	140.3	1.00	1.45	2.11	42.4
12u	U	2	0.0	0.944	28.6	LOS C	19.0	140.3	1.00	1.45	2.11	42.0
Approach		1017	5.7	0.944	20.3	LOS B	19.0	140.3	0.92	1.31	1.79	42.7
All Vehicles		2616	4.9	1.004	24.9	LOS B	19.0	140.3	0.91	1.22	1.65	38.6

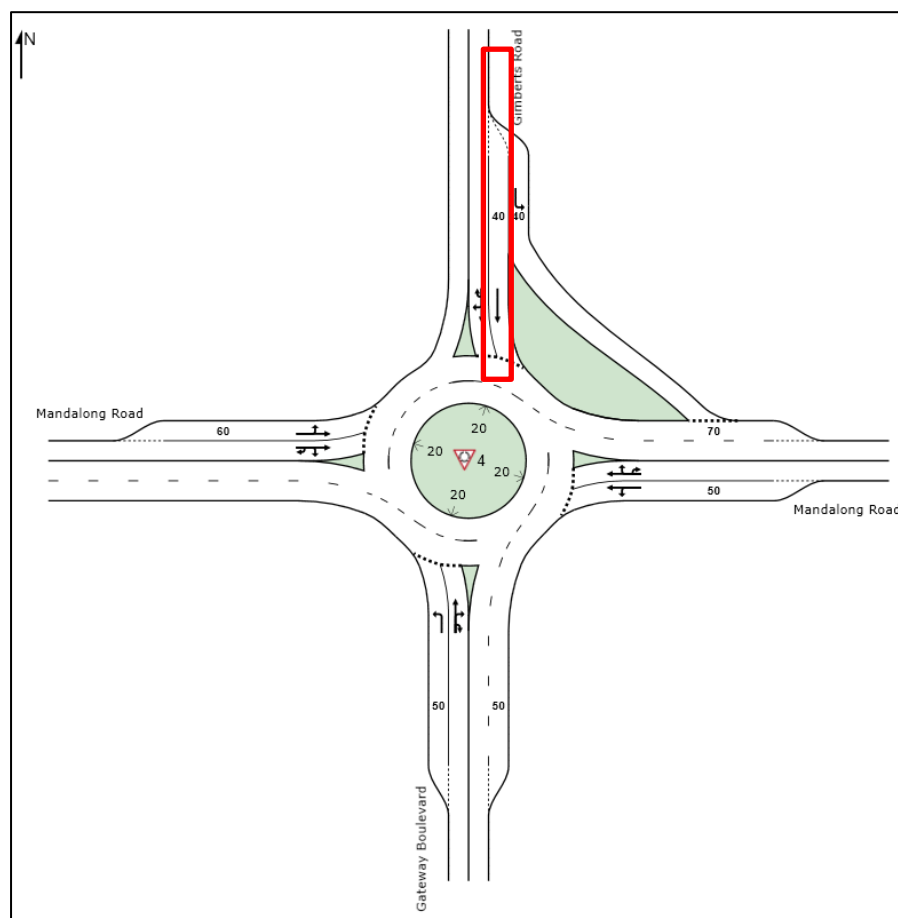
Saturday Peak

Site: 4 [6 MANDALONG/GATEWAY WD SAT - 2021 BASE + DEV - LT SLIP]

Mandalong Rd and Gateway Blvd
Site Category: Monrisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	122	22.1	0.201	7.8	LOS A	1.0	8.0	0.70	0.85	0.70	51.1
2	T1	70	1.4	0.264	6.1	LOS A	1.6	11.2	0.72	0.79	0.72	37.2
3	R2	192	3.6	0.264	10.8	LOS A	1.6	11.2	0.72	0.79	0.72	51.7
3u	U	3	0.0	0.264	12.8	LOS A	1.6	11.2	0.72	0.79	0.72	52.7
Approach		387	9.0	0.264	9.0	LOS A	1.6	11.2	0.71	0.81	0.71	49.3
East: Mandalong Road												
4	L2	201	3.0	0.821	16.8	LOS B	10.7	78.2	0.95	1.14	1.40	46.5
5	T1	377	7.4	0.821	17.1	LOS B	10.7	78.2	0.95	1.15	1.41	45.8
6	R2	375	0.3	0.821	22.8	LOS B	10.3	73.3	0.95	1.18	1.43	26.8
6u	U	1	0.0	0.821	24.9	LOS B	10.3	73.3	0.95	1.18	1.43	45.5
Approach		954	3.7	0.821	19.3	LOS B	10.7	78.2	0.95	1.16	1.42	38.2
North: Gimberts Road												
7	L2	108	0.0	0.362	13.0	LOS A	1.6	16.2	0.71	0.87	0.80	42.6
8	T1	72	0.0	0.886	44.3	LOS D	8.6	85.6	0.94	1.41	2.18	26.1
9	R2	152	0.0	0.886	48.6	LOS D	8.6	85.6	0.94	1.41	2.18	23.4
9u	U	1	0.0	0.886	50.7	LOS D	8.6	85.6	0.94	1.41	2.18	6.4
Approach		333	0.0	0.886	36.1	LOS C	8.6	85.6	0.87	1.24	1.73	28.4
West: Mandalong Road												
10	L2	121	0.8	0.335	9.3	LOS A	1.5	10.8	0.67	0.84	0.70	32.4
11	T1	410	6.6	0.680	10.4	LOS A	5.3	40.5	0.80	0.99	1.04	50.5
12	R2	100	30.0	0.680	15.8	LOS B	5.3	40.5	0.81	1.00	1.08	49.3
12u	U	3	0.0	0.680	17.0	LOS B	5.3	40.5	0.81	1.00	1.08	50.6
Approach		634	9.1	0.680	11.1	LOS A	5.3	40.5	0.78	0.96	0.98	47.5
All Vehicles		2308	5.5	0.886	17.7	LOS B	10.7	85.6	0.85	1.06	1.23	40.9

In view of the above findings, a further 'upgrade' is introduced to the Gimberts Road approach i.e the addition of a southbound lane; as follows:



A reassessment of the proposed upgraded layout indicates an overall satisfactory operation in both assessment periods, as follows:

PM Peak

Site: 4 [7 MANDALONG/GATEWAY WD PM - 2021 BASE + DEV - LT SLIP + WIDEN 1 LANE]

Mandalong Rd and Gateway Blvd
Site Category: Minor
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Total veh/h	Demand Flow HV %	Des Sat v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop Queue	Effective Stop Rate	Aver No Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	270	10.0	0.281	6.2	LOS A	1.6	12.0	0.70	0.74	0.70	51.9
2	T1	63	1.6	0.233	6.2	LOS A	1.2	9.0	0.68	0.79	0.68	37.4
3	R2	141	5.0	0.233	11.0	LOS A	1.2	9.0	0.68	0.79	0.68	51.9
3u	U	1	0.0	0.233	12.8	LOS A	1.2	9.0	0.68	0.79	0.68	53.0
Approach		475	7.4	0.281	7.6	LOS A	1.6	12.0	0.69	0.76	0.69	50.2
East: Mandalong Road												
4	L2	161	3.7	0.856	20.4	LOS B	10.9	79.4	0.97	1.24	1.64	44.5
5	T1	467	6.0	0.856	20.9	LOS B	10.9	79.4	0.97	1.24	1.66	43.4
6	R2	262	0.4	0.856	26.8	LOS B	10.5	74.8	0.96	1.25	1.68	25.7
6u	U	1	0.0	0.856	28.9	LOS C	10.5	74.8	0.96	1.25	1.68	43.8
Approach		891	3.9	0.856	22.6	LOS B	10.9	79.4	0.97	1.24	1.66	38.2
North: Gimberts Road												
7	L2	78	0.0	0.333	15.3	LOS B	1.4	13.9	0.76	0.90	0.85	40.5
8	T1	49	0.0	0.718	22.9	LOS B	3.9	38.9	0.85	0.94	0.96	36.6
9	R2	105	0.0	0.718	43.0	LOS D	3.9	38.9	0.93	1.16	1.49	25.0
9u	U	1	0.0	0.718	45.1	LOS D	3.9	38.9	0.93	1.16	1.49	7.0
Approach		233	0.0	0.718	29.5	LOS C	3.9	38.9	0.86	1.03	1.16	31.4
West: Mandalong Road												
10	L2	117	0.9	0.479	10.6	LOS A	3.0	21.2	0.72	0.89	0.83	31.9
11	T1	625	4.3	0.970	29.4	LOS C	27.8	205.7	0.94	1.51	2.26	39.1
12	R2	273	11.0	0.970	39.5	LOS C	27.8	205.7	1.00	1.69	2.66	36.6
12u	U	2	0.0	0.970	41.2	LOS C	27.8	205.7	1.00	1.69	2.66	35.7
Approach		1017	5.7	0.970	30.0	LOS C	27.8	205.7	0.93	1.49	2.20	37.0
All Vehicles		2616	4.9	0.970	23.4	LOS B	27.8	205.7	0.89	1.23	1.65	39.4

Saturday Peak

Site: 4 [7 MANDALONG/GATEWAY WD PM - 2021 BASE + DEV - LT SLIP + WIDEN 1 LANE]

Mandalong Rd and Gateway Blvd
Site Category: Minor
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Total veh/h	Demand Flow HV %	Des Sat v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop Queue	Effective Stop Rate	Aver No Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	270	10.0	0.281	6.2	LOS A	1.6	12.0	0.70	0.74	0.70	51.9
2	T1	63	1.6	0.233	6.2	LOS A	1.2	9.0	0.68	0.79	0.68	37.4
3	R2	141	5.0	0.233	11.0	LOS A	1.2	9.0	0.68	0.79	0.68	51.9
3u	U	1	0.0	0.233	12.8	LOS A	1.2	9.0	0.68	0.79	0.68	53.0
Approach		475	7.4	0.281	7.6	LOS A	1.6	12.0	0.69	0.76	0.69	50.2
East: Mandalong Road												
4	L2	161	3.7	0.856	20.4	LOS B	10.9	79.4	0.97	1.24	1.64	44.5
5	T1	467	6.0	0.856	20.9	LOS B	10.9	79.4	0.97	1.24	1.66	43.4
6	R2	262	0.4	0.856	26.8	LOS B	10.5	74.8	0.96	1.25	1.68	25.7
6u	U	1	0.0	0.856	28.9	LOS C	10.5	74.8	0.96	1.25	1.68	43.8
Approach		891	3.9	0.856	22.6	LOS B	10.9	79.4	0.97	1.24	1.66	38.2
North: Gimberts Road												
7	L2	78	0.0	0.333	15.3	LOS B	1.4	13.9	0.76	0.90	0.85	40.5
8	T1	49	0.0	0.718	22.9	LOS B	3.9	38.9	0.85	0.94	0.96	36.6
9	R2	105	0.0	0.718	43.0	LOS D	3.9	38.9	0.93	1.16	1.49	25.0
9u	U	1	0.0	0.718	45.1	LOS D	3.9	38.9	0.93	1.16	1.49	7.0
Approach		233	0.0	0.718	29.5	LOS C	3.9	38.9	0.86	1.03	1.16	31.4
West: Mandalong Road												
10	L2	117	0.9	0.479	10.6	LOS A	3.0	21.2	0.72	0.89	0.83	31.9
11	T1	625	4.3	0.970	29.4	LOS C	27.8	205.7	0.94	1.51	2.26	39.1
12	R2	273	11.0	0.970	39.5	LOS C	27.8	205.7	1.00	1.69	2.66	36.6
12u	U	2	0.0	0.970	41.2	LOS C	27.8	205.7	1.00	1.69	2.66	35.7
Approach		1017	5.7	0.970	30.0	LOS C	27.8	205.7	0.93	1.49	2.20	37.8
All Vehicles		2616	4.9	0.970	23.4	LOS B	27.8	205.7	0.89	1.23	1.65	39.4

It is noted that a new T-intersection will be provided on Gimberts Road to connect with Gimberts Road West at a location approximately 50m north of Mandalong Road. Because the assessment reveals 95th percentile queue distances of some 40m on the Gimberts Road approach (refer to above tables), it is apparent that the approaching traffic will not likely block turning movements to/from the new road connection. Nevertheless, it is beneficial to incorporate a 'KEEP CLEAR' delineation at the intersection to prevent any temporary queues (5th percentile) from blocking access to the new road connection.

An assessment of the new left-in and left-out access revealed a satisfactory operation in 2021. See below.

PM Peak

Site: 101 [9 EASTERN ACCESS PM 2021 - BASE + DEV]

New Site
Site Category: (None)
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Mandalong Road												
5	T1	816	2.0	0.424	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		816	2.0	0.424	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
North: Site LILO Access												
7	L2	185	2.0	0.304	11.5	LOS A	1.3	9.1	0.70	0.91	0.84	49.3
Approach		185	2.0	0.304	11.5	LOS A	1.3	9.1	0.70	0.91	0.84	49.3
West: Mandalong Road												
10	L2	24	2.0	0.013	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	52.0
11	T1	818	2.0	0.425	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		842	2.0	0.425	0.2	NA	0.0	0.0	0.00	0.02	0.00	59.6
All Vehicles		1843	2.0	0.425	1.3	NA	1.3	9.1	0.07	0.10	0.08	58.2

Saturday Peak

Site: 101 [10 EASTERN ACCESS SAT 2021 - BASE +DEV]

New Site
Site Category: (None)
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Mandalong Road												
5	T1	872	2.0	0.453	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		872	2.0	0.453	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
North: Site LILO Access												
7	L2	270	2.0	0.355	10.2	LOS A	1.7	12.2	0.64	0.90	0.81	50.1
Approach		270	2.0	0.355	10.2	LOS A	1.7	12.2	0.64	0.90	0.81	50.1
West: Mandalong Road												
10	L2	35	2.0	0.019	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	52.0
11	T1	682	2.0	0.354	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		717	2.0	0.354	0.3	NA	0.0	0.0	0.00	0.03	0.00	59.5
All Vehicles		1859	2.0	0.453	1.6	NA	1.7	12.2	0.09	0.14	0.12	57.7

5.6 SIDRA Assessment Outcome 2032

The assessment found that the existing roundabout will operate satisfactorily under the 2032 background traffic demand. See below.

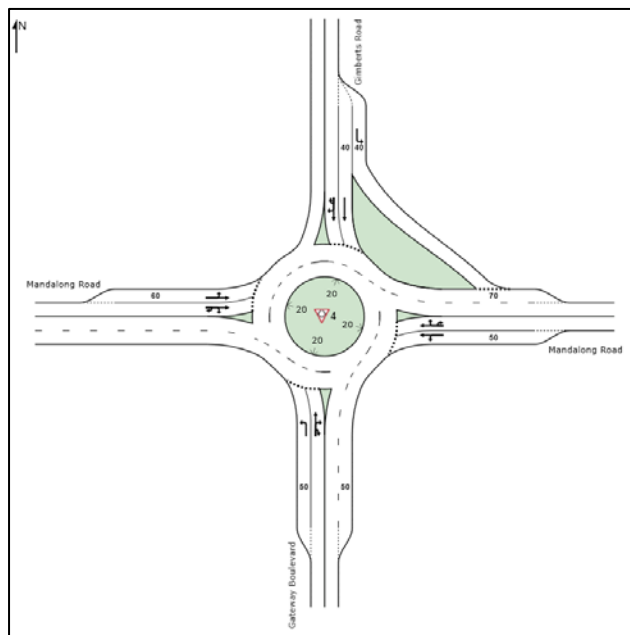
PM Peak

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	315	8.6	0.273	5.7	LOS A	1.5	11.1	0.59	0.67	0.59	52.4
2	T1	29	3.4	0.192	5.7	LOS A	0.9	6.9	0.57	0.74	0.57	37.3
3	R2	164	4.3	0.192	10.4	LOS A	0.9	6.9	0.57	0.74	0.57	51.8
3u	U	1	0.0	0.192	12.3	LOS A	0.9	6.9	0.57	0.74	0.57	52.9
Approach		509	6.9	0.273	7.2	LOS A	1.5	11.1	0.58	0.70	0.58	51.4
East: Mandalong Road												
4	L2	188	3.2	0.673	12.1	LOS A	6.0	43.4	0.82	0.97	1.04	49.3
5	T1	544	5.1	0.673	12.6	LOS A	6.0	43.4	0.82	0.98	1.05	49.3
6	R2	17	5.9	0.673	17.6	LOS B	5.8	42.8	0.82	0.99	1.06	29.7
6u	U	1	0.0	0.673	19.7	LOS B	5.8	42.8	0.82	0.99	1.06	50.8
Approach		750	4.7	0.673	12.6	LOS A	6.0	43.4	0.82	0.98	1.04	48.9
North: Gimberts Road												
7	L2	19	0.0	0.324	25.1	LOS B	1.3	12.5	0.86	0.97	0.98	33.5
8	T1	13	0.0	0.324	25.5	LOS B	1.3	12.5	0.86	0.97	0.98	34.4
9	R2	12	0.0	0.324	29.8	LOS C	1.3	12.5	0.86	0.97	0.98	31.6
9u	U	1	0.0	0.324	31.9	LOS C	1.3	12.5	0.86	0.97	0.98	7.7
Approach		45	0.0	0.324	26.6	LOS B	1.3	12.5	0.86	0.97	0.98	32.7
West: Mandalong Road												
10	L2	54	1.9	0.390	6.6	LOS A	2.2	15.5	0.52	0.62	0.52	34.2
11	T1	700	3.9	0.791	8.0	LOS A	10.6	78.1	0.73	0.74	0.81	51.8
12	R2	318	9.4	0.791	13.4	LOS A	10.6	78.1	0.82	0.79	0.94	50.7
12u	U	2	0.0	0.791	15.3	LOS B	10.6	78.1	0.82	0.79	0.94	51.2
Approach		1074	5.4	0.791	9.6	LOS A	10.6	78.1	0.74	0.75	0.84	50.8
All Vehicles		2378	5.4	0.791	10.4	LOS A	10.6	78.1	0.73	0.81	0.85	50.0

Saturday Peak

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	142	19.0	0.151	6.0	LOS A	0.7	5.4	0.50	0.66	0.50	52.3
2	T1	17	5.9	0.184	5.3	LOS A	0.9	6.5	0.48	0.70	0.48	37.3
3	R2	224	3.1	0.184	9.8	LOS A	0.9	6.5	0.48	0.70	0.48	51.8
3u	U	3	0.0	0.184	11.9	LOS A	0.9	6.5	0.48	0.70	0.48	52.8
Approach		386	9.1	0.184	8.3	LOS A	0.9	6.5	0.49	0.68	0.49	51.4
East: Mandalong Road												
4	L2	234	2.6	0.478	6.3	LOS A	2.9	21.1	0.51	0.62	0.51	53.3
5	T1	439	6.4	0.478	6.4	LOS A	2.9	21.1	0.52	0.61	0.52	53.6
6	R2	17	5.9	0.478	11.2	LOS A	2.9	21.3	0.53	0.61	0.53	32.3
6u	U	1	0.0	0.478	13.2	LOS A	2.9	21.3	0.53	0.61	0.53	55.1
Approach		691	5.1	0.478	6.5	LOS A	2.9	21.3	0.52	0.61	0.52	53.0
North: Gimberts Road												
7	L2	21	0.0	0.232	14.3	LOS A	0.9	8.6	0.72	0.86	0.72	40.7
8	T1	20	0.0	0.232	14.7	LOS B	0.9	8.6	0.72	0.86	0.72	42.0
9	R2	15	0.0	0.232	18.9	LOS B	0.9	8.6	0.72	0.86	0.72	39.5
9u	U	1	0.0	0.232	21.0	LOS B	0.9	8.6	0.72	0.86	0.72	9.5
Approach		57	0.0	0.232	15.7	LOS B	0.9	8.6	0.72	0.86	0.72	40.3
West: Mandalong Road												
10	L2	20	5.0	0.226	6.7	LOS A	1.1	7.8	0.49	0.61	0.49	34.3
11	T1	437	6.2	0.459	6.2	LOS A	2.8	21.7	0.53	0.63	0.53	53.2
12	R2	117	25.6	0.459	11.1	LOS A	2.8	21.7	0.55	0.64	0.55	51.9
12u	U	3	0.0	0.459	12.7	LOS A	2.8	21.7	0.55	0.64	0.55	53.4
Approach		577	10.1	0.459	7.3	LOS A	2.8	21.7	0.53	0.64	0.53	52.4
All Vehicles		1711	7.5	0.478	7.5	LOS A	2.9	21.7	0.52	0.64	0.52	52.1

The basis for the post-development assessment for 2032 is the 2021 upgraded intersection which is reproduced below.



The assessment found that the Gimberts Road approach will accommodate the development traffic satisfactorily; however, the west approach (Mandalong Road) will fail in the PM peak due to the high growth of the eastbound background traffic. The upgraded intersection can accommodate the Saturday development traffic with no undue difficulty. See below.

PM Peak

Site: 4 [MAND RAB PM 2032 - BASE + DEV - WIDEN 1 LANE + LT SLIP]

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Req Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop Queued	Effective Stop Rate	Aver No Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	315	8.6	0.342	6.5	LOS A	2.1	15.4	0.76	0.76	0.76	51.8
2	T1	67	1.5	0.283	6.5	LOS A	1.6	11.4	0.73	0.83	0.73	37.2
3	R2	164	4.3	0.283	11.2	LOS A	1.6	11.4	0.73	0.83	0.73	51.7
3u	U	1	0.0	0.283	13.1	LOS A	1.6	11.4	0.73	0.83	0.73	52.8
Approach		547	6.4	0.342	7.9	LOS A	2.1	15.4	0.75	0.79	0.75	50.2
East: Mandalong Road												
4	L2	188	3.2	0.970	39.8	LOS C	21.0	152.6	1.00	1.64	2.70	36.1
5	T1	544	5.1	0.970	40.9	LOS C	21.0	152.6	1.00	1.64	2.72	34.5
6	R2	264	0.4	0.970	47.4	LOS D	19.9	142.1	1.00	1.63	2.74	20.6
6u	U	1	0.0	0.970	49.5	LOS D	19.9	142.1	1.00	1.63	2.74	35.4
Approach		997	3.5	0.970	42.4	LOS C	21.0	152.6	1.00	1.64	2.72	31.0
North: Gimberts Road												
7	L2	81	0.0	0.375	17.1	LOS B	1.6	15.8	0.79	0.93	0.92	39.1
8	T1	51	0.0	0.811	26.7	LOS B	4.8	47.6	0.87	0.98	1.05	34.2
9	R2	107	0.0	0.811	56.1	LOS D	4.8	47.6	0.96	1.24	1.77	21.1
9u	U	1	0.0	0.811	58.2	LOS E	4.8	47.6	0.96	1.24	1.77	5.9
Approach		240	0.0	0.811	36.7	LOS C	4.8	47.6	0.88	1.08	1.33	28.1
West: Mandalong Road												
10	L2	125	0.8	0.560	12.3	LOS A	4.0	28.3	0.78	0.95	0.97	30.9
11	T1	724	3.7	1.134	112.8	LOS F	86.8	637.7	0.95	3.14	6.13	19.8
12	R2	318	9.4	1.134	147.2	LOS F	86.8	637.7	1.00	3.78	7.65	16.8
12u	U	2	0.0	1.134	149.0	LOS F	86.8	637.7	1.00	3.78	7.65	15.6
Approach		1169	5.0	1.134	111.5	LOS F	86.8	637.7	0.94	3.08	6.00	19.2
All Vehicles		2953	4.3	1.134	62.9	LOS E	86.8	637.7	0.92	2.01	3.54	26.2

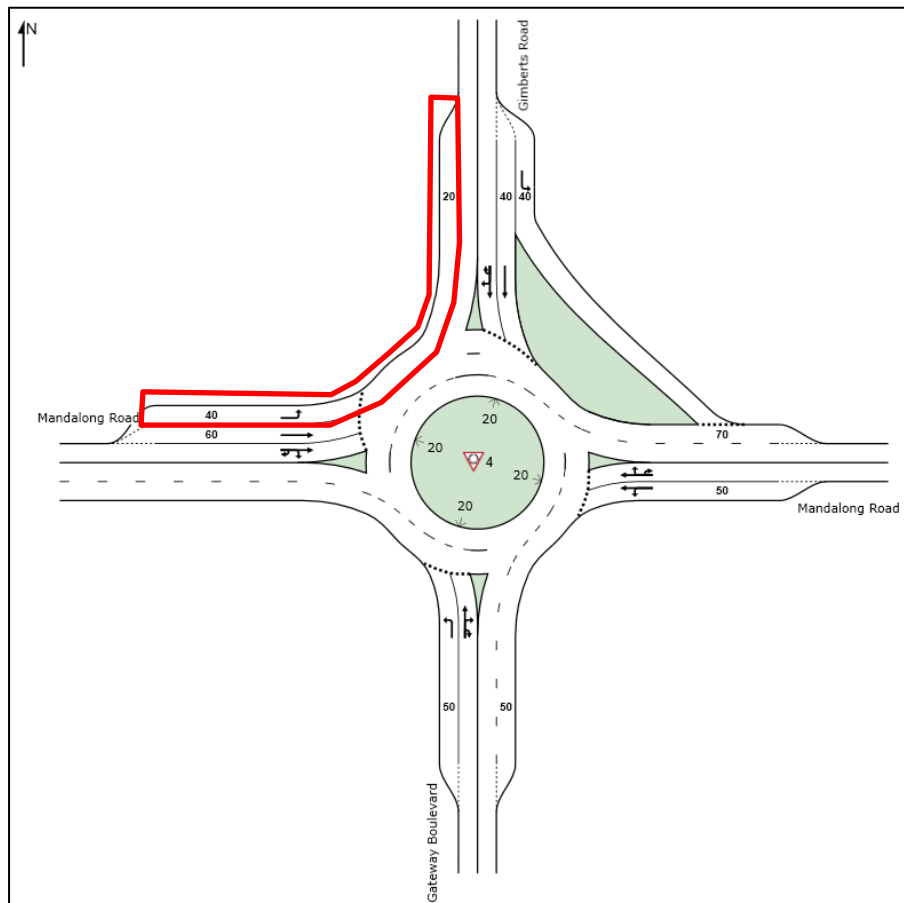
Saturday Peak

Site: 4 [14 MAND RAB SAT 2032 - BASE + DEV - WIDEN 1 LANE + LT SLIP]

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	142	19.0	0.239	7.9	LOS A	1.2	9.8	0.74	0.87	0.74	51.1
2	T1	72	1.4	0.314	6.3	LOS A	1.9	13.9	0.77	0.82	0.77	37.0
3	R2	224	3.1	0.314	11.0	LOS A	1.9	13.9	0.77	0.82	0.77	51.5
3u	U	1	0.0	0.314	13.0	LOS A	1.9	13.9	0.77	0.82	0.77	52.5
Approach		439	8.0	0.314	9.3	LOS A	1.9	13.9	0.76	0.83	0.76	49.3
East: Mandalong Road												
4	L2	234	2.6	0.905	22.8	LOS B	14.9	108.9	1.00	1.33	1.82	43.2
5	T1	439	6.4	0.905	23.3	LOS B	14.9	108.9	1.00	1.33	1.84	42.1
6	R2	377	0.3	0.905	29.4	LOS C	14.4	102.6	1.00	1.34	1.87	24.8
6u	U	1	0.0	0.905	31.5	LOS C	14.4	102.6	1.00	1.34	1.87	42.3
Approach		1051	3.3	0.905	25.4	LOS B	14.9	108.9	1.00	1.33	1.85	35.9
North: Gimberts Road												
7	L2	111	0.0	0.428	16.2	LOS B	2.0	20.2	0.78	0.93	0.93	39.7
8	T1	75	0.0	0.767	19.1	LOS B	5.1	51.1	0.79	0.92	0.94	39.1
9	R2	154	0.0	0.767	38.4	LOS C	5.1	51.1	0.91	1.20	1.60	26.7
9u	U	1	0.0	0.767	40.5	LOS C	5.1	51.1	0.91	1.20	1.60	7.4
Approach		341	0.0	0.767	26.9	LOS B	5.1	51.1	0.84	1.05	1.23	32.8
West: Mandalong Road												
10	L2	124	0.8	0.418	12.3	LOS A	2.4	17.4	0.77	0.92	0.88	30.7
11	T1	472	5.7	0.847	21.1	LOS B	12.2	93.0	0.97	1.28	1.72	43.5
12	R2	117	25.6	0.847	27.7	LOS B	12.2	93.0	1.00	1.33	1.85	42.1
12u	U	2	0.0	0.847	28.9	LOS C	12.2	93.0	1.00	1.33	1.85	42.1
Approach		715	8.1	0.847	20.7	LOS B	12.2	93.0	0.94	1.22	1.60	41.6
All Vehicles		2546	5.0	0.905	21.5	LOS B	14.9	108.9	0.92	1.18	1.51	39.3

To overcome the capacity constraint, a left turn lane is proposed on the west approach Mandalong Road as follows:



A reassessment of the 2032 development traffic indicates a satisfactory operation for both assessment periods, as follows.

PM Peak

Site: 4 [15 MAND RAB PM 2032 - BASE + DEV - WIDEN 1 LANE (N) + LT SLIP (N) + WIDEN 1 LANE (W)]

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	H/V %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	315	8.6	0.343	6.4	LOS A	2.0	15.4	0.75	0.76	0.75	51.9
2	T1	67	1.5	0.283	6.5	LOS A	1.6	11.3	0.73	0.82	0.73	37.2
3	R2	164	4.3	0.283	11.2	LOS A	1.6	11.3	0.73	0.82	0.73	51.7
3u	U	1	0.0	0.283	13.1	LOS A	1.6	11.3	0.73	0.82	0.73	52.8
Approach		547	6.4	0.343	7.9	LOS A	2.0	15.4	0.74	0.79	0.74	50.2
East: Mandalong Road												
4	L2	188	3.2	1.007	56.9	LOS E	27.0	196.2	1.00	1.92	3.51	30.9
5	T1	544	5.1	1.007	58.1	LOS E	27.0	196.2	1.00	1.91	3.51	29.3
6	R2	264	0.4	1.007	64.8	LOS E	25.2	180.0	1.00	1.89	3.51	17.6
6u	U	1	0.0	1.007	66.9	LOS E	25.2	180.0	1.00	1.89	3.51	30.4
Approach		997	3.5	1.007	59.6	LOS E	27.0	196.2	1.00	1.91	3.51	26.4
North: Gimberts Road												
7	L2	81	0.0	0.306	11.4	LOS A	1.1	10.7	0.71	0.87	0.77	43.9
8	T1	51	0.0	0.625	15.4	LOS B	2.6	26.0	0.81	0.91	0.88	42.0
9	R2	107	0.0	0.625	26.1	LOS B	2.6	26.0	0.89	1.06	1.21	32.6
9u	U	1	0.0	0.625	28.2	LOS B	2.6	26.0	0.89	1.06	1.21	8.9
Approach		240	0.0	0.625	18.9	LOS B	2.6	26.0	0.81	0.96	0.99	37.9
West: Mandalong Road												
10	L2	125	0.8	0.200	8.0	LOS A	1.0	6.8	0.60	0.75	0.60	44.2
11	T1	724	3.7	0.816	11.4	LOS A	12.0	88.4	0.85	0.98	1.14	49.5
12	R2	318	9.4	0.816	18.2	LOS B	12.0	88.4	0.96	1.11	1.40	47.4
12u	U	2	0.0	0.816	20.0	LOS B	12.0	88.4	0.96	1.11	1.40	47.5
Approach		1169	5.0	0.816	12.9	LOS A	12.0	88.4	0.85	0.99	1.15	48.6
All Vehicles		2953	4.3	1.007	28.2	LOS B	27.0	196.2	0.88	1.26	1.86	37.6

Saturday Peak

Site: 4 [16 MAND RAB SAT 2032 - BASE + DEV - WIDEN 1 LANE (N) + LT SLIP (N) + WIDEN 1 LANE (W)]

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	H/V %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	142	19.0	0.239	7.9	LOS A	1.2	9.8	0.74	0.87	0.74	51.1
2	T1	72	1.4	0.314	6.3	LOS A	1.9	13.9	0.77	0.82	0.77	37.0
	R2	224	3.1	0.314	11.0	LOS A	1.9	13.9	0.77	0.82	0.77	51.5
3u	U	1	0.0	0.314	13.0	LOS A	1.9	13.9	0.77	0.82	0.77	52.5
Approach		439	8.0	0.314	9.3	LOS A	1.9	13.9	0.76	0.83	0.76	49.3
East: Mandalong Road												
4	L2	234	2.6	0.899	22.0	LOS B	14.4	105.0	1.00	1.31	1.79	43.6
5	T1	439	6.4	0.899	22.5	LOS B	14.4	105.0	1.00	1.32	1.80	42.6
6	R2	377	0.3	0.899	28.6	LOS C	13.9	99.1	1.00	1.32	1.84	25.0
6u	U	1	0.0	0.899	30.7	LOS C	13.9	99.1	1.00	1.32	1.84	42.7
Approach		1051	3.3	0.899	24.6	LOS B	14.4	105.0	1.00	1.32	1.81	36.3
North: Gimberts Road												
7	L2	111	0.0	0.337	10.1	LOS A	1.2	12.4	0.64	0.83	0.71	45.2
8	T1	75	0.0	0.505	10.5	LOS A	2.4	24.1	0.67	0.82	0.70	46.5
9	R2	154	0.0	0.505	18.4	LOS B	2.4	24.1	0.78	1.01	1.02	37.9
9u	U	1	0.0	0.505	20.5	LOS B	2.4	24.1	0.78	1.01	1.02	10.2
Approach		341	0.0	0.505	14.0	LOS A	2.4	24.1	0.71	0.91	0.85	42.0
West: Mandalong Road												
10	L2	124	0.8	0.222	9.3	LOS A	1.2	8.2	0.70	0.82	0.70	42.8
11	T1	472	5.7	0.548	9.6	LOS A	4.6	35.4	0.80	0.90	0.91	51.1
12	R2	117	25.6	0.548	15.1	LOS B	4.6	35.4	0.84	0.95	1.00	49.7
12u	U	2	0.0	0.548	16.5	LOS B	4.6	35.4	0.84	0.95	1.00	50.8
Approach		715	8.1	0.548	10.5	LOS A	4.6	35.4	0.79	0.90	0.89	50.0
All Vehicles		2546	5.0	0.899	16.6	LOS B	14.4	105.0	0.86	1.06	1.24	42.4

The assessment also found that the proposed left-in and left-out access will operate satisfactorily under full development traffic in 2032. See below.

PM Peak

Site: 101 [17 Eastern Access PM 2032 - BASE + DEV]

New Site
Site Category: (None)
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	Flows HV %	Deq. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Mandalong Road												
5	T1	922	2.0	0.479	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		922	2.0	0.479	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
North: Site LILLO Access												
7	L2	185	2.0	0.385	14.4	LOS A	1.6	11.6	0.79	0.98	1.04	47.4
Approach		185	2.0	0.385	14.4	LOS A	1.6	11.6	0.79	0.98	1.04	47.4
West: Mandalong Road												
10	L2	24	2.0	0.013	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	52.0
11	T1	943	2.0	0.490	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach		967	2.0	0.490	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.6
All Vehicles		2074	2.0	0.490	1.4	NA	1.6	11.6	0.07	0.09	0.09	58.0

Saturday Peak

Site: 101 [18 Eastern Access SAT 2032 - BASE + DEV]

New Site
Site Category: (None)
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	Flows HV %	Deq. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Mandalong Road												
5	T1	969	2.0	0.503	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach		969	2.0	0.503	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.8
North: Site LILLO Access												
7	L2	270	2.0	0.414	11.9	LOS A	2.0	14.5	0.72	0.96	0.98	49.0
Approach		270	2.0	0.414	11.9	LOS A	2.0	14.5	0.72	0.96	0.98	49.0
West: Mandalong Road												
10	L2	35	2.0	0.019	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	52.0
11	T1	779	2.0	0.405	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		814	2.0	0.405	0.3	NA	0.0	0.0	0.00	0.02	0.00	59.5
All Vehicles		2053	2.0	0.503	1.7	NA	2.0	14.5	0.09	0.14	0.13	57.6

5.8 Overall Findings

The assessment found that:

- ❖ the most critical peak period is the weekday PM peak
- ❖ the roundabout will need to be further improved with a widened southbound lane plus a left-turn slip lane 40m long on the Gimberts Road approach to accommodate full development by 2021
- ❖ the upgraded roundabout will need to be further improved with an eastbound left turn lane 40m long on the Mandalong Road (west) approach to accommodate full development by 2032.

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- ❖ the eastern left-in and left-out access will perform satisfactorily in 2021 and 2032

6.0 Parking

Car parking requirement for the proposed uses are provided in the Lake Macquarie City Council DCP Part 5 (2014) as follows:

Car Parking

Bulky Goods Retail	2 spaces; plus 1 space per 40m ² GFA
Landscape/Garden ²	1 space per 50m ² NLA
Takeaway Food/Drink	1 space per 25m ² GFA
Restaurants/Cafés	1 space per 25m ² GFA
Neighbourhood shop ³	1 space per 25m ² GFA

Bicycle Parking

Employees	1 space per 20 car spaces provided
Staff Amenity	1 personal locker per 2 employees
	1 change room (1,000-5,000m ² GFA)
	Separate (M/F) change room (> 5,000m ² GFA)

Motorcycle Parking

General	1 space per 20 car spaces provided
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Application of the above criteria would indicate the following development requirements:

Car Parking

Bulky Goods Retail	9,515m ² GFA	240 spaces
Hardware Retail	8,770m ² NLA	176 spaces

² The DCP does not provide a hardware retail rate. The Landscape and Garden Supplies rate has been adopted for hardware retail in the context of this proposal.

³ The DCP does not provide commercial shop and supermarket parking rates. The neighbourhood shop rate has been adopted for the retail uses in this assessment.

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Takeaway food/drink	510m ² GFA	20 spaces
Restaurants/Cafés	500m ² GFA	20 spaces
Commercial Retail	1,800m ² GFA	72 spaces
Supermarket Retail	1,800m ² GFA	72 spaces
Total		600 spaces (minimum)

Bicycle Parking

Employees	30 spaces (minimum)
Staff Amenity	Facilities to be provided by tenants ⁴

Motorcycle Parking

General	35 spaces (minimum)
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It is proposed to provide 761 car parking spaces onsite, in satisfaction of the DCP criteria. An appropriate quantum of bicycle and motorcycle parking spaces will also be allocated in the car park to comply with the relevant DCP requirements.

⁴ Details to be finalised upon confirmation of tenancy type and staffing level.

7.0 Access, Traffic Circulation, Pedestrians Connectivity

7.1 Access

The proposed vehicle access provisions for the development elements will involve:

1. the currently approved access arrangement via the Mandalong road/Gateway Boulevard roundabout; and
2. a new left-in and left-out only access at Mandalong Road near the eastern site boundary, with an appropriate deceleration lane provided in the approach lane.

A new 'T-intersection' will be established at Gimberts Road connecting with Gimberts Road West to provide access to the future Gimberts Road West Industrial Precinct.

The section of Old Mandalong Road fronting the site and east of Gimberts Road will be demolished and reinstated to provide a formalised shared path.

It is acknowledged that the proposed new left-in and left-out access will depart from the DCP's (Part 12) specification for a left-out only arrangement. The left-in provision has been incorporated in this proposal to provide a convenient alternative entry point for customers who are headed for the site's eastern parts.

Details of the proposed access arrangement are provided on the plans in Appendix B.

7.2 Traffic Circulation & Servicing

The adequacy of all proposed internal roads and their associated circulation provisions will be assessed by Civil Engineers Northrop.

7.3 Pedestrian & Public Transport Connectivity

The proposal will involve constructing and establishing a 2m wide footpath spanning the entire site frontage, and there will be internal connecting points to the bulky goods

premises. Internal pedestrian paths will also be provided connecting the site's frontage, the onsite car park, and shop entries.

The proposed network of pedestrian pathways will also have connection to a new bus shelter which is to be established at a location northeast of the Mandalong Road/Gimberts Road roundabout. The proposed facility will provide safe and direct connectivity for staff and visitors between the local railway station and the site's facilities.

Details of the proposed pedestrian paths and internal bus shelter are indicated on the architectural plans in Appendix B.

7.0 Conclusion

This report documents an assessment of the proposed extended development scheme on a consolidated site 56, 66, and 76 Mandalong Road, Morisset. The assessment has established the following:

- ❖ The approved development scheme involves a bulky goods premises some 9,280m² GFA with 254 car spaces.
- ❖ The approved development scheme was assessed to generate 232 vtp/h in the weekday PM peak and 612 vtp/h in the Saturday midday peak.
- ❖ The proposal will involve an extended development outcome involving larger bulky goods (9,515m²), a new hardware store (12,120m² GFA / 8,775m² NLA), two takeaway food and drink premises (510m²), restaurant and café (500m²), commercial retail shops (1,800m²), and a supermarket (1,800m²).
- ❖ The extended proposal will terminate the section of Old Mandalong Road fronting the site and reinstate it with shared paths.
- ❖ The proposal will provide a T-intersection at the intersection of Gimberts Road and Gimberts Road West at a location some 50m north of the existing Mandalong Road/ Gimberts Road/ Gateway Boulevard roundabout.
- ❖ As a result of the extended site area and increased development yield, the proposal will generate 759 vtp/h and 1,108 vtp/h in the PM peak and Saturday peak respectively.
- ❖ The SIDRA assessment finds that the existing Mandalong Road/ Gateway Boulevard/ Gimberts Road roundabout will operate satisfactorily under the 2021 and 2032 background traffic demand.

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- ❖ The Gimberts Road approach (northern leg) of the roundabout will not accommodate the development and background traffic in 2021; the addition of a southbound through and left-turn slip lane on this leg will alleviate the capacity constraint.
- ❖ The proposed left-in and left out access on the eastern part of the site will operate satisfactorily in 2021 and 2032.
- ❖ The upgraded roundabout intersection will require a further addition of a left turn lane on the west approach Mandalong Road to accommodate the 2032 development traffic demand satisfactorily.
- ❖ The proposed car parking provision will satisfy the DCP criteria.
- ❖ The proposal will involve a new internal bus shelter to improve the site's overall connectivity with the road network and local public transport services.
- ❖ The proposed pedestrian footpath and its associated connectivity are adequate.

Appendix A

Stamped Development Plans

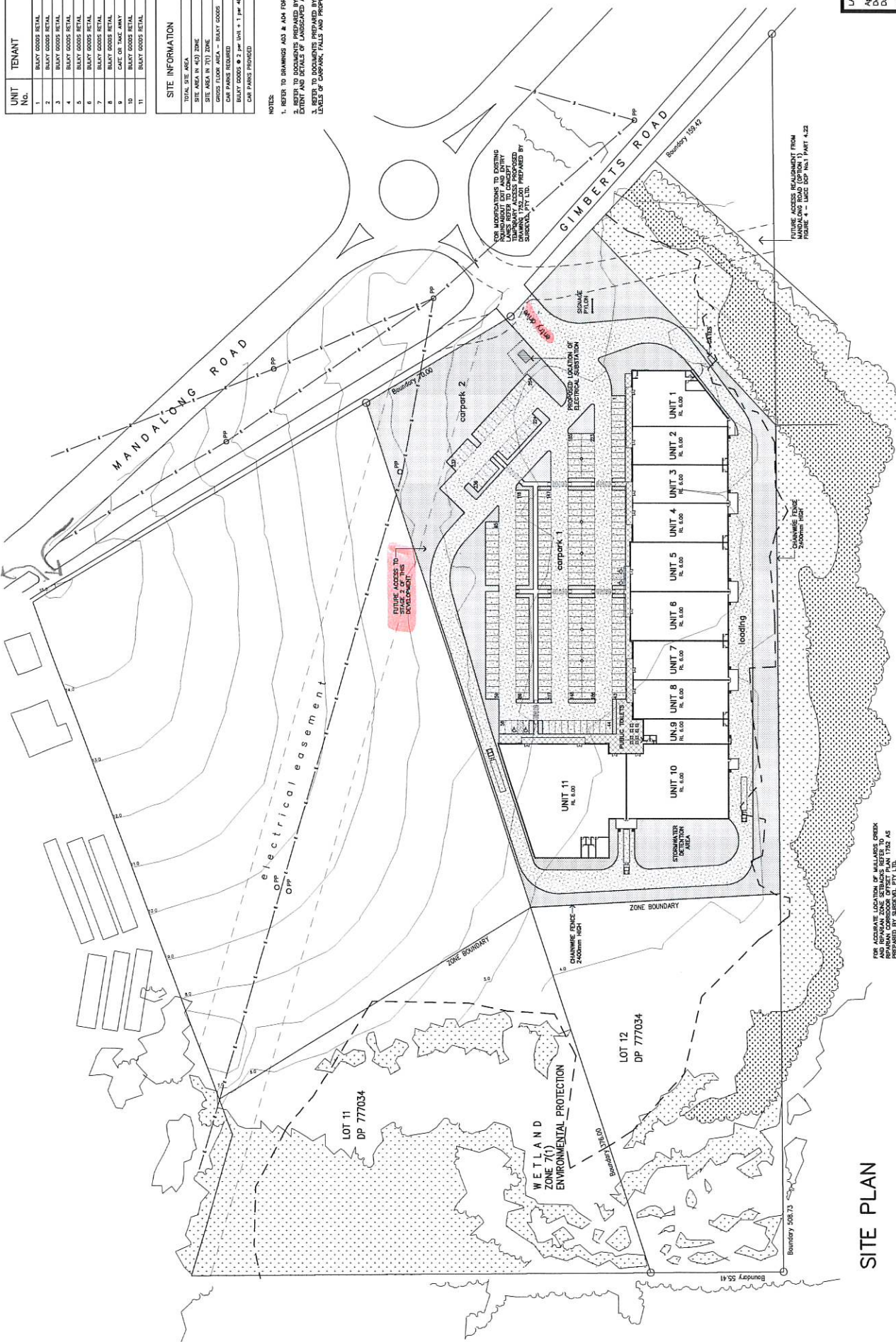


UNIT No.	TENANT	NET LETTABLE AREA sqm
1	BULKY GOODS RETAIL	750
2	BULKY GOODS RETAIL	630
3	BULKY GOODS RETAIL	630
4	BULKY GOODS RETAIL	630
5	BULKY GOODS RETAIL	630
6	BULKY GOODS RETAIL	630
7	BULKY GOODS RETAIL	630
8	BULKY GOODS RETAIL	630
9	CARE ON TRUCK JAWY	340
10	BULKY GOODS RETAIL	1260
11	BULKY GOODS RETAIL	1950

SITE INFORMATION	
TOTAL SITE AREA	51,624 sq metres
SITE AREA IN 4(3) ZONE	20,700 sq metres
SITE AREA IN 3(1) ZONE	15,605 sq metres
GROSS FLOOR AREA - BULKY GOODS	12,240 sq metres
CAR PARKING REQUIRED	
BULKY GOODS @ 2 per Unit = 1 per 40 sq m	254 spaces
CAR PARKING PROVIDED	254 spaces

NOTES:

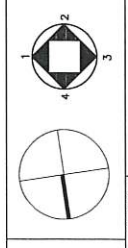
1. REFER TO DRAWINGS A03 & A04 FOR DETAIL FLOOR AND SITE PLANS.
2. REFER TO DOCUMENTS PREPARED BY LANDSCAPE ARCHITECT FOR FUTURE ACCESS TO DEVELOPMENT.
3. REFER TO DOCUMENTS PREPARED BY LANDSCAPE ARCHITECT FOR FUTURE ACCESS TO DEVELOPMENT.
4. REFER TO DOCUMENTS PREPARED BY LANDSCAPE ARCHITECT FOR FUTURE ACCESS TO DEVELOPMENT.
5. REFER TO DOCUMENTS PREPARED BY LANDSCAPE ARCHITECT FOR FUTURE ACCESS TO DEVELOPMENT.
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11. REFER TO DOCUMENTS PREPARED BY LANDSCAPE ARCHITECT FOR FUTURE ACCESS TO DEVELOPMENT.



SITE PLAN

No.	REVISION	CHECKED	DATE
1	REVISION		11/02/2013
2	REVISION		12/02/2013
3	DEVELOPMENT APPLICATION		24/12/2011
4	AMENDED DEVELOPMENT APPLICATION		13/12/2011
5	AMENDED DEVELOPMENT APPLICATION		08/08/2012

All dimensions are in millimetres unless otherwise shown. All levels are in metres to AHD unless otherwise noted. Work to figured dimensions. Do not scale from drawings. Check all dimensions on site and report any discrepancies to the client prior to construction. This drawing is to read in conjunction with the total documentation package.



33 Scott Street
Melbourne VIC 3000
P 03 9246 4333
F 03 9246 4333



MORISSET SUPERCENTRE
LOT 12 DP 777034
MANDALONG ROAD, MORISSET

SITE PLAN
F3 SUPERCENTRE Pty Ltd

DATE	12/02/2013
PROJECT No.	534
SCALE	1:750 at A1
NO. OF SHEETS	2 of 6
SHEET No.	A02

LAKE MACQUARIE CITY COUNCIL
Approved plans for
Development Consent No. DA119802011/A
Date of Approval: 19/02/2015
NOT FOR CONSTRUCTION

LEGEND:

- PAVING
- PAVING CONCRETE PAVING
- LANDSCAPE AREA
- REFER TO LANDSCAPE ARCHITECT'S DOCUMENTATION

LAKE MASQUARIE CITY COUNCIL

Approved plans for

Development Consent No: DA/1960/2011/A

Date of Approval: 19/02/2015

NOT FOR CONSTRUCTION

LOT 11
DP 777034

BUILDING 2

UNIT 11
1990sqm

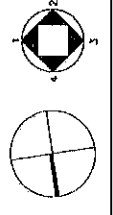
1:1000

loading dock

loading dock

All dimensions are in millimetres unless otherwise shown.
All levels are in metres to AOD unless otherwise noted.
Check all dimensions on site and report any discrepancies to Shadous Smith Architects prior to construction or fabrication of any item.
Check all dimensions on site and report any discrepancies to Shadous Smith Architects prior to construction or fabrication of any item.
Check all dimensions on site and report any discrepancies to Shadous Smith Architects prior to construction or fabrication of any item.

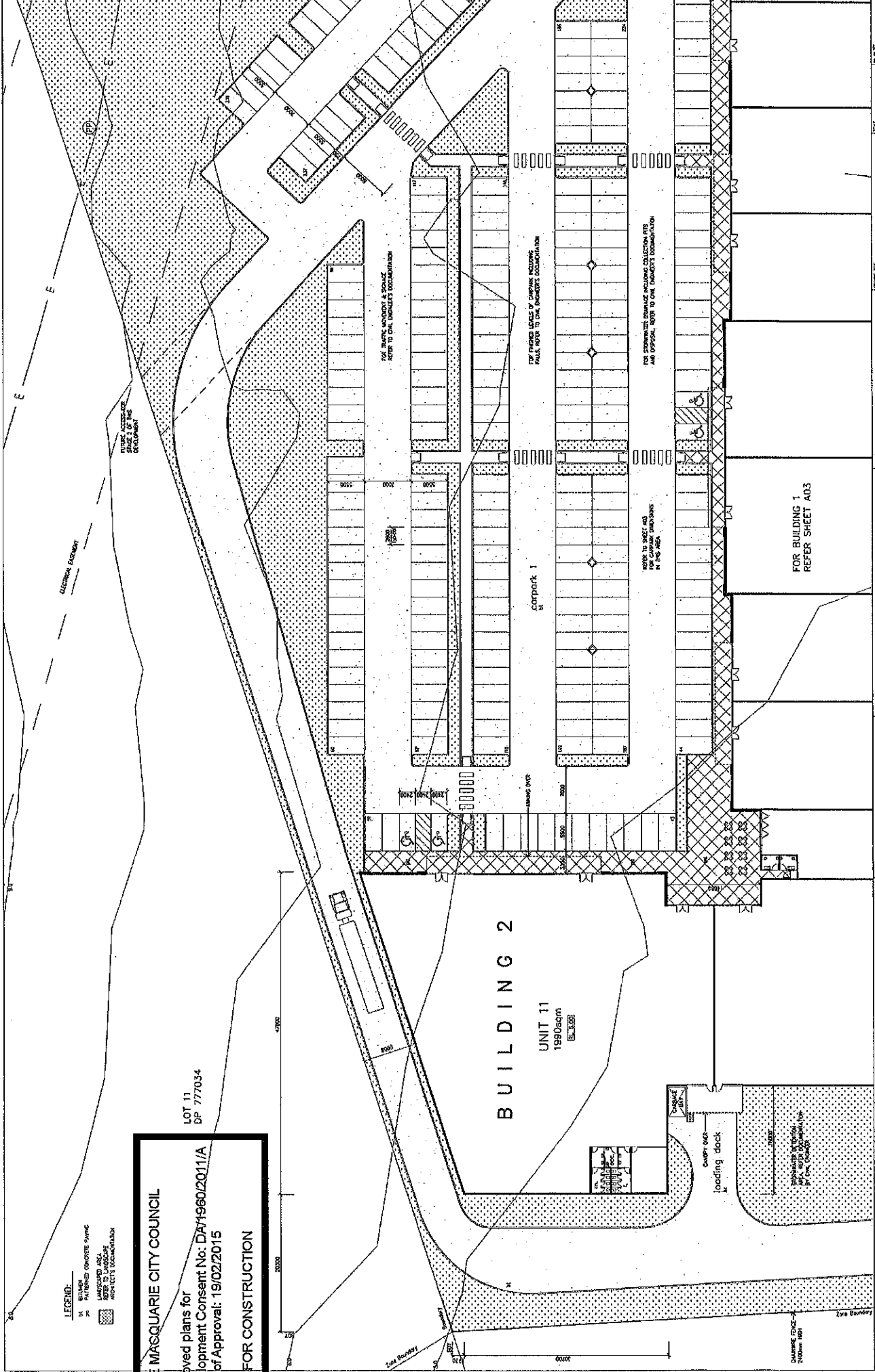
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1	ISSUED FOR PRELIMINARY APPROVAL	H.B.2015	11/03/2015
2	FOR CONSTRUCTION	J.B.2015	20/09/2015
3	FOR PRELIMINARY APPROVAL	H.B.2015	11/03/2015
4	FOR PRELIMINARY APPROVAL	H.B.2015	11/03/2015



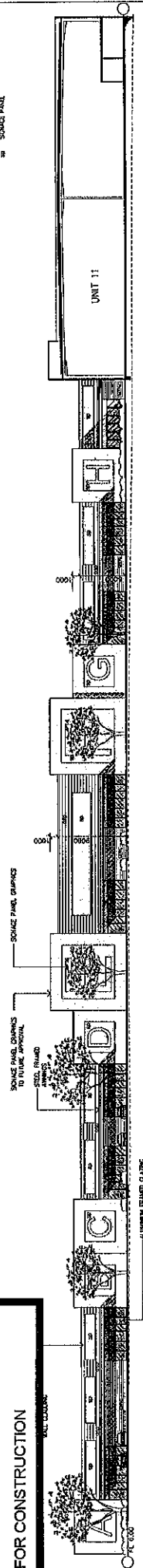
MORRISSET SUPERCENTRE
LOT 12 DP 777034
MANDALONG ROAD, MORRISSET

FLOOR PLAN
PART 2

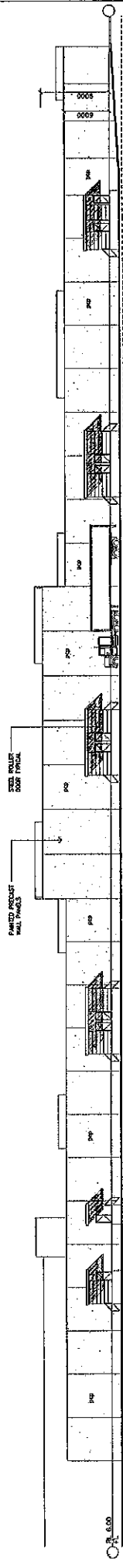
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7
15/03/2015
F3 SUPERCENTRE Pty Ltd
A04
4 of 6



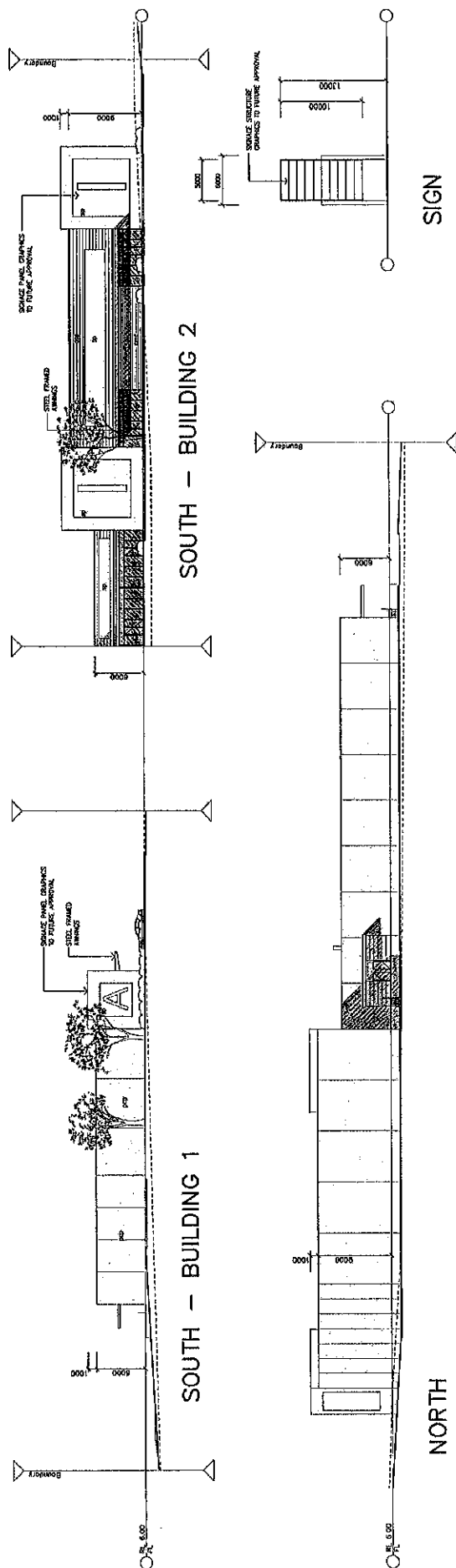
NOT FOR CONSTRUCTION



EAST



WEST



NORTH

<p>All dimensions are in millimetres unless otherwise shown. All reads are in metres to AHD unless otherwise noted. Work to agreed dimensions. Do not add from drawings. On completion of work, please return drawings to Shinduck Smith Architects prior to construction or indication of any form of completion in conjunction with the final documentation package.</p>		<p>DATE</p>		<p>CHECKED</p>		<p>REVISION</p>	
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		14/03/2013				<p>2. APPROVED FOR CONSTRUCTION</p>	
		28/03/2013				<p>3. APPROVED FOR CONSTRUCTION</p>	
		21/03/2013				<p>4. APPROVED FOR CONSTRUCTION</p>	
		15/03/2013				<p>5. APPROVED FOR CONSTRUCTION</p>	
		04/04/2013				<p>6. APPROVED FOR CONSTRUCTION</p>	
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						<p>70. APPROVED FOR CONSTRUCTION</p>	
						<p>71. APPROVED FOR CONSTRUCTION</p>	

Appendix B

Proposed Development Plans



Appendix C

SIDRA Model Results



MOVEMENT SUMMARY

 **Site: 4 [1 MAND RAB WD PM - 2021 BASE]**

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	270	10.0	0.224	5.5	LOS A	1.1	8.6	0.52	0.65	0.52	52.5
2	T1	25	4.0	0.155	5.5	LOS A	0.7	5.3	0.51	0.71	0.51	37.5
3	R2	141	5.0	0.155	10.1	LOS A	0.7	5.3	0.51	0.71	0.51	52.0
3u	U	1	0.0	0.155	12.1	LOS A	0.7	5.3	0.51	0.71	0.51	53.1
Approach		437	8.0	0.224	7.0	LOS A	1.1	8.6	0.51	0.67	0.51	51.6
East: Mandalong Road												
4	L2	161	3.7	0.538	9.0	LOS A	3.7	26.9	0.68	0.80	0.76	51.5
5	T1	467	6.0	0.538	9.3	LOS A	3.7	26.9	0.68	0.81	0.77	51.8
6	R2	15	6.7	0.538	14.2	LOS A	3.7	26.9	0.69	0.82	0.78	31.2
6u	U	1	0.0	0.538	16.3	LOS B	3.7	26.9	0.69	0.82	0.78	53.3
Approach		644	5.4	0.538	9.4	LOS A	3.7	26.9	0.68	0.81	0.77	51.2
North: Gimberts Road												
7	L2	16	0.0	0.208	18.3	LOS B	0.8	7.6	0.79	0.90	0.79	37.7
8	T1	11	0.0	0.208	18.7	LOS B	0.8	7.6	0.79	0.90	0.79	38.8
9	R2	10	0.0	0.208	22.9	LOS B	0.8	7.6	0.79	0.90	0.79	36.1
9u	U	1	0.0	0.208	25.0	LOS B	0.8	7.6	0.79	0.90	0.79	8.7
Approach		38	0.0	0.208	19.8	LOS B	0.8	7.6	0.79	0.90	0.79	36.9
West: Mandalong Road												
10	L2	46	2.2	0.325	6.1	LOS A	1.7	12.3	0.46	0.58	0.46	34.5
11	T1	601	4.5	0.659	6.1	LOS A	5.8	42.9	0.57	0.63	0.58	52.9
12	R2	273	11.0	0.659	10.9	LOS A	5.8	42.9	0.62	0.65	0.63	51.9
12u	U	2	0.0	0.659	12.7	LOS A	5.8	42.9	0.62	0.65	0.63	52.7
Approach		922	6.3	0.659	7.5	LOS A	5.8	42.9	0.58	0.63	0.59	51.9
All Vehicles		2041	6.3	0.659	8.2	LOS A	5.8	42.9	0.60	0.70	0.63	51.4

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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Project: T:\WORK20\20340 - CNR MANDALONG RD AND GATEWAY BOULEVARD, MORRISSET\MODEL\Morrisset Network 2021 21062021.sip8

MOVEMENT SUMMARY

 **Site: 4 [2 MAND RAB WD SAT - 2021 BASE]**

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	122	22.1	0.127	5.9	LOS A	0.5	4.5	0.46	0.63	0.46	52.3
2	T1	15	6.7	0.153	5.1	LOS A	0.7	5.2	0.43	0.68	0.43	37.4
3	R2	192	3.6	0.153	9.7	LOS A	0.7	5.2	0.43	0.68	0.43	52.0
3u	U	3	0.0	0.153	11.7	LOS A	0.7	5.2	0.43	0.68	0.43	53.0
Approach		332	10.5	0.153	8.1	LOS A	0.7	5.2	0.44	0.66	0.44	51.5
East: Mandalong Road												
4	L2	201	3.0	0.399	5.9	LOS A	2.2	16.2	0.44	0.57	0.44	53.5
5	T1	377	7.4	0.399	6.0	LOS A	2.2	16.2	0.45	0.57	0.45	54.0
6	R2	15	6.7	0.399	10.7	LOS A	2.2	16.5	0.45	0.56	0.45	32.5
6u	U	1	0.0	0.399	12.7	LOS A	2.2	16.5	0.45	0.56	0.45	55.5
Approach		594	5.9	0.399	6.1	LOS A	2.2	16.5	0.45	0.57	0.45	53.3
North: Gimberts Road												
7	L2	18	0.0	0.173	12.2	LOS A	0.6	6.4	0.66	0.84	0.66	42.4
8	T1	17	0.0	0.173	12.6	LOS A	0.6	6.4	0.66	0.84	0.66	43.8
9	R2	13	0.0	0.173	16.8	LOS B	0.6	6.4	0.66	0.84	0.66	41.4
9u	U	1	0.0	0.173	18.9	LOS B	0.6	6.4	0.66	0.84	0.66	9.9
Approach		49	0.0	0.173	13.7	LOS A	0.6	6.4	0.66	0.84	0.66	42.0
West: Mandalong Road												
10	L2	17	5.9	0.188	6.3	LOS A	0.9	6.4	0.44	0.57	0.44	34.5
11	T1	375	7.2	0.381	5.8	LOS A	2.2	16.8	0.46	0.60	0.46	53.5
12	R2	100	30.0	0.381	10.7	LOS A	2.2	16.8	0.48	0.61	0.48	52.1
12u	U	3	0.0	0.381	12.3	LOS A	2.2	16.8	0.48	0.61	0.48	53.8
Approach		495	11.7	0.381	6.9	LOS A	2.2	16.8	0.47	0.60	0.47	52.7
All Vehicles		1470	8.7	0.399	7.1	LOS A	2.2	16.8	0.46	0.61	0.46	52.4

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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21062021.sip8

MOVEMENT SUMMARY

 **Site: 4 [3 MAND RAB WD PM - 2021 BASE + DEV]**

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	270	10.0	0.276	6.1	LOS A	1.5	11.7	0.69	0.72	0.69	52.0
2	T1	63	1.6	0.228	6.1	LOS A	1.2	8.7	0.67	0.78	0.67	37.4
3	R2	141	5.0	0.228	10.8	LOS A	1.2	8.7	0.67	0.78	0.67	51.9
3u	U	1	0.0	0.228	12.7	LOS A	1.2	8.7	0.67	0.78	0.67	53.0
Approach		475	7.4	0.276	7.5	LOS A	1.5	11.7	0.68	0.75	0.68	50.3
East: Mandalong Road												
4	L2	161	3.7	0.829	18.6	LOS B	10.6	77.3	0.96	1.19	1.50	45.4
5	T1	467	6.0	0.829	19.1	LOS B	10.6	77.3	0.96	1.20	1.51	44.5
6	R2	262	0.4	0.829	24.7	LOS B	10.2	73.0	0.96	1.20	1.53	26.4
6u	U	1	0.0	0.829	26.8	LOS B	10.2	73.0	0.96	1.20	1.53	44.9
Approach		891	3.9	0.829	20.7	LOS B	10.6	77.3	0.96	1.20	1.52	39.1
North: Gimberts Road												
7	L2	78	0.0	1.509	492.9	LOS F	57.4	573.6	1.00	3.81	9.79	3.9
8	T1	49	0.0	1.509	493.3	LOS F	57.4	573.6	1.00	3.81	9.79	3.9
9	R2	105	0.0	1.509	497.6	LOS F	57.4	573.6	1.00	3.81	9.79	3.3
9u	U	1	0.0	1.509	499.6	LOS F	57.4	573.6	1.00	3.81	9.79	0.9
Approach		233	0.0	1.509	495.1	LOS F	57.4	573.6	1.00	3.81	9.79	3.6
West: Mandalong Road												
10	L2	117	0.9	0.465	9.6	LOS A	2.5	18.0	0.68	0.86	0.77	32.4
11	T1	625	4.3	0.941	19.1	LOS B	18.6	137.7	0.93	1.32	1.81	44.4
12	R2	273	11.0	0.941	26.4	LOS B	18.6	137.7	1.00	1.44	2.08	42.6
12u	U	2	0.0	0.941	28.2	LOS B	18.6	137.7	1.00	1.44	2.08	42.2
Approach		1017	5.7	0.941	20.0	LOS B	18.6	137.7	0.92	1.30	1.76	42.9
All Vehicles		2616	4.9	1.509	60.3	LOS E	57.4	573.6	0.90	1.39	2.20	26.5

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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21062021.sip8

MOVEMENT SUMMARY

 **Site: 4 [4 MAND RAB WD SAT - 2021 BASE + DEV]**

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	122	22.1	0.194	7.7	LOS A	0.9	7.5	0.68	0.84	0.68	51.2
2	T1	70	1.4	0.256	6.0	LOS A	1.5	10.5	0.69	0.78	0.69	37.2
3	R2	192	3.6	0.256	10.7	LOS A	1.5	10.5	0.69	0.78	0.69	51.8
3u	U	3	0.0	0.256	12.7	LOS A	1.5	10.5	0.69	0.78	0.69	52.8
Approach		387	9.0	0.256	8.9	LOS A	1.5	10.5	0.69	0.80	0.69	49.4
East: Mandalong Road												
4	L2	201	3.0	0.773	13.4	LOS A	8.9	65.6	0.87	1.00	1.16	48.6
5	T1	377	7.4	0.773	13.6	LOS A	8.9	65.6	0.87	1.01	1.17	48.1
6	R2	375	0.3	0.773	19.0	LOS B	8.7	61.9	0.88	1.05	1.19	28.1
6u	U	1	0.0	0.773	21.1	LOS B	8.7	61.9	0.88	1.05	1.19	47.7
Approach		954	3.7	0.773	15.7	LOS B	8.9	65.6	0.88	1.02	1.18	40.0
North: Gimberts Road												
7	L2	108	0.0	1.309	309.7	LOS F	59.3	593.2	1.00	3.99	9.58	6.0
8	T1	72	0.0	1.309	310.1	LOS F	59.3	593.2	1.00	3.99	9.58	6.0
9	R2	152	0.0	1.309	314.3	LOS F	59.3	593.2	1.00	3.99	9.58	5.1
9u	U	1	0.0	1.309	316.4	LOS F	59.3	593.2	1.00	3.99	9.58	1.4
Approach		333	0.0	1.309	311.9	LOS F	59.3	593.2	1.00	3.99	9.58	5.6
West: Mandalong Road												
10	L2	121	0.8	0.333	9.3	LOS A	1.5	10.6	0.67	0.83	0.69	32.5
11	T1	410	6.6	0.675	10.3	LOS A	5.2	39.7	0.79	0.98	1.03	50.5
12	R2	100	30.0	0.675	15.8	LOS B	5.2	39.7	0.81	1.00	1.07	49.4
12u	U	3	0.0	0.675	16.9	LOS B	5.2	39.7	0.81	1.00	1.07	50.6
Approach		634	9.1	0.675	11.0	LOS A	5.2	39.7	0.77	0.96	0.97	47.6
All Vehicles		2308	5.5	1.309	56.0	LOS D	59.3	593.2	0.83	1.39	2.25	26.4

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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MOVEMENT SUMMARY

 **Site: 4 [5 MAND RAB WD PM - 2021 BASE + DEV - LT SLIP]**

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	270	10.0	0.283	6.2	LOS A	1.6	12.2	0.71	0.74	0.71	51.9
2	T1	63	1.6	0.235	6.2	LOS A	1.3	9.1	0.69	0.79	0.69	37.3
3	R2	141	5.0	0.235	11.0	LOS A	1.3	9.1	0.69	0.79	0.69	51.9
3u	U	1	0.0	0.235	12.8	LOS A	1.3	9.1	0.69	0.79	0.69	53.0
Approach		475	7.4	0.283	7.7	LOS A	1.6	12.2	0.70	0.76	0.70	50.2
East: Mandalong Road												
4	L2	161	3.7	0.871	23.6	LOS B	12.5	91.3	1.00	1.30	1.79	42.8
5	T1	467	6.0	0.871	24.2	LOS B	12.5	91.3	1.00	1.30	1.80	41.7
6	R2	262	0.4	0.871	30.1	LOS C	12.0	85.6	1.00	1.31	1.82	24.7
6u	U	1	0.0	0.871	32.2	LOS C	12.0	85.6	1.00	1.31	1.82	42.2
Approach		891	3.9	0.871	25.8	LOS B	12.5	91.3	1.00	1.30	1.80	36.7
North: Gimberts Road												
7	L2	78	0.0	0.333	15.1	LOS B	1.4	13.9	0.76	0.90	0.84	40.8
8	T1	49	0.0	1.004	104.2	LOS F	11.3	112.9	1.00	1.71	3.22	15.1
9	R2	105	0.0	1.004	108.5	LOS F	11.3	112.9	1.00	1.71	3.22	13.1
9u	U	1	0.0	1.004	110.6	LOS F	11.3	112.9	1.00	1.71	3.22	3.7
Approach		233	0.0	1.004	76.3	LOS F	11.3	112.9	0.92	1.44	2.42	17.8
West: Mandalong Road												
10	L2	117	0.9	0.466	9.6	LOS A	2.5	18.1	0.68	0.86	0.78	32.4
11	T1	625	4.3	0.944	19.4	LOS B	19.0	140.3	0.93	1.33	1.83	44.2
12	R2	273	11.0	0.944	26.9	LOS B	19.0	140.3	1.00	1.45	2.11	42.4
12u	U	2	0.0	0.944	28.6	LOS C	19.0	140.3	1.00	1.45	2.11	42.0
Approach		1017	5.7	0.944	20.3	LOS B	19.0	140.3	0.92	1.31	1.79	42.7
All Vehicles		2616	4.9	1.004	24.9	LOS B	19.0	140.3	0.91	1.22	1.65	38.6

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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MOVEMENT SUMMARY

 **Site: 4 [6 MAND RAB WD SAT - 2021 BASE + DEV - LT SLIP]**

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	122	22.1	0.201	7.8	LOS A	1.0	8.0	0.70	0.85	0.70	51.1
2	T1	70	1.4	0.264	6.1	LOS A	1.6	11.2	0.72	0.79	0.72	37.2
3	R2	192	3.6	0.264	10.8	LOS A	1.6	11.2	0.72	0.79	0.72	51.7
3u	U	3	0.0	0.264	12.8	LOS A	1.6	11.2	0.72	0.79	0.72	52.7
Approach		387	9.0	0.264	9.0	LOS A	1.6	11.2	0.71	0.81	0.71	49.3
East: Mandalong Road												
4	L2	201	3.0	0.821	16.8	LOS B	10.7	78.2	0.95	1.14	1.40	46.5
5	T1	377	7.4	0.821	17.1	LOS B	10.7	78.2	0.95	1.15	1.41	45.8
6	R2	375	0.3	0.821	22.8	LOS B	10.3	73.3	0.95	1.18	1.43	26.8
6u	U	1	0.0	0.821	24.9	LOS B	10.3	73.3	0.95	1.18	1.43	45.5
Approach		954	3.7	0.821	19.3	LOS B	10.7	78.2	0.95	1.16	1.42	38.2
North: Gimberts Road												
7	L2	108	0.0	0.362	13.0	LOS A	1.6	16.2	0.71	0.87	0.80	42.6
8	T1	72	0.0	0.886	44.3	LOS D	8.6	85.6	0.94	1.41	2.18	26.1
9	R2	152	0.0	0.886	48.6	LOS D	8.6	85.6	0.94	1.41	2.18	23.4
9u	U	1	0.0	0.886	50.7	LOS D	8.6	85.6	0.94	1.41	2.18	6.4
Approach		333	0.0	0.886	36.1	LOS C	8.6	85.6	0.87	1.24	1.73	28.4
West: Mandalong Road												
10	L2	121	0.8	0.335	9.3	LOS A	1.5	10.8	0.67	0.84	0.70	32.4
11	T1	410	6.6	0.680	10.4	LOS A	5.3	40.5	0.80	0.99	1.04	50.5
12	R2	100	30.0	0.680	15.8	LOS B	5.3	40.5	0.81	1.00	1.08	49.3
12u	U	3	0.0	0.680	17.0	LOS B	5.3	40.5	0.81	1.00	1.08	50.6
Approach		634	9.1	0.680	11.1	LOS A	5.3	40.5	0.78	0.96	0.98	47.5
All Vehicles		2308	5.5	0.886	17.7	LOS B	10.7	85.6	0.85	1.06	1.23	40.9

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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MOVEMENT SUMMARY

 **Site: 4 [7 MAND RAB WD PM - 2021 BASE + DEV - LT SLIP + WIDEN 1 LANE]**

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	270	10.0	0.281	6.2	LOS A	1.6	12.0	0.70	0.74	0.70	51.9
2	T1	63	1.6	0.233	6.2	LOS A	1.2	9.0	0.68	0.79	0.68	37.4
3	R2	141	5.0	0.233	11.0	LOS A	1.2	9.0	0.68	0.79	0.68	51.9
3u	U	1	0.0	0.233	12.8	LOS A	1.2	9.0	0.68	0.79	0.68	53.0
Approach		475	7.4	0.281	7.6	LOS A	1.6	12.0	0.69	0.76	0.69	50.2
East: Mandalong Road												
4	L2	161	3.7	0.856	20.4	LOS B	10.9	79.4	0.97	1.24	1.64	44.5
5	T1	467	6.0	0.856	20.9	LOS B	10.9	79.4	0.97	1.24	1.66	43.4
6	R2	262	0.4	0.856	26.8	LOS B	10.5	74.8	0.96	1.25	1.68	25.7
6u	U	1	0.0	0.856	28.9	LOS C	10.5	74.8	0.96	1.25	1.68	43.8
Approach		891	3.9	0.856	22.6	LOS B	10.9	79.4	0.97	1.24	1.66	38.2
North: Gimberts Road												
7	L2	78	0.0	0.333	15.3	LOS B	1.4	13.9	0.76	0.90	0.85	40.5
8	T1	49	0.0	0.718	22.9	LOS B	3.9	38.9	0.85	0.94	0.96	36.6
9	R2	105	0.0	0.718	43.0	LOS D	3.9	38.9	0.93	1.16	1.49	25.0
9u	U	1	0.0	0.718	45.1	LOS D	3.9	38.9	0.93	1.16	1.49	7.0
Approach		233	0.0	0.718	29.5	LOS C	3.9	38.9	0.86	1.03	1.16	31.4
West: Mandalong Road												
10	L2	117	0.9	0.479	10.6	LOS A	3.0	21.2	0.72	0.89	0.83	31.9
11	T1	625	4.3	0.970	29.4	LOS C	27.8	205.7	0.94	1.51	2.26	39.1
12	R2	273	11.0	0.970	39.5	LOS C	27.8	205.7	1.00	1.69	2.66	36.6
12u	U	2	0.0	0.970	41.2	LOS C	27.8	205.7	1.00	1.69	2.66	35.7
Approach		1017	5.7	0.970	30.0	LOS C	27.8	205.7	0.93	1.49	2.20	37.8
All Vehicles		2616	4.9	0.970	23.4	LOS B	27.8	205.7	0.89	1.23	1.65	39.4

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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MOVEMENT SUMMARY

 **Site: 4 [8 MAND RAB WD SAT - 2021 BASE + DEV - LT SLIP + WIDEN 1 LANE]**

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	122	22.1	0.199	7.8	LOS A	0.9	7.8	0.69	0.85	0.69	51.1
2	T1	70	1.4	0.261	6.1	LOS A	1.5	10.9	0.71	0.79	0.71	37.2
3	R2	192	3.6	0.261	10.8	LOS A	1.5	10.9	0.71	0.79	0.71	51.7
3u	U	3	0.0	0.261	12.8	LOS A	1.5	10.9	0.71	0.79	0.71	52.8
Approach		387	9.0	0.261	9.0	LOS A	1.5	10.9	0.70	0.81	0.70	49.3
East: Mandalong Road												
4	L2	201	3.0	0.806	15.1	LOS B	9.3	68.3	0.90	1.11	1.30	47.5
5	T1	377	7.4	0.806	15.3	LOS B	9.3	68.3	0.90	1.11	1.31	47.0
6	R2	375	0.3	0.806	21.0	LOS B	9.1	64.4	0.90	1.13	1.34	27.4
6u	U	1	0.0	0.806	23.0	LOS B	9.1	64.4	0.90	1.13	1.34	46.5
Approach		954	3.7	0.806	17.5	LOS B	9.3	68.3	0.90	1.12	1.32	39.1
North: Gimberts Road												
7	L2	108	0.0	0.366	13.3	LOS A	1.7	16.5	0.72	0.88	0.81	42.2
8	T1	72	0.0	0.642	15.0	LOS B	3.8	37.9	0.73	0.86	0.78	42.4
9	R2	152	0.0	0.642	27.7	LOS B	3.8	37.9	0.84	1.09	1.25	31.7
9u	U	1	0.0	0.642	29.8	LOS C	3.8	37.9	0.84	1.09	1.25	8.7
Approach		333	0.0	0.642	20.3	LOS B	3.8	37.9	0.78	0.97	1.01	36.9
West: Mandalong Road												
10	L2	121	0.8	0.357	10.9	LOS A	1.9	13.6	0.74	0.87	0.77	31.5
11	T1	410	6.6	0.723	14.6	LOS B	7.6	58.1	0.90	1.10	1.28	47.5
12	R2	100	30.0	0.723	20.4	LOS B	7.6	58.1	0.92	1.13	1.34	46.3
12u	U	3	0.0	0.723	21.5	LOS B	7.6	58.1	0.92	1.13	1.34	47.0
Approach		634	9.1	0.723	14.8	LOS B	7.6	58.1	0.87	1.06	1.19	44.9
All Vehicles		2308	5.5	0.806	15.7	LOS B	9.3	68.3	0.84	1.03	1.14	42.1

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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MOVEMENT SUMMARY

▽ Site: 101 [9 EASTERN ACCESS PM 2021 - BASE + DEV]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Mandalong Road												
5	T1	816	2.0	0.424	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		816	2.0	0.424	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
North: Site LILO Access												
7	L2	185	2.0	0.304	11.5	LOS A	1.3	9.1	0.70	0.91	0.84	49.3
Approach		185	2.0	0.304	11.5	LOS A	1.3	9.1	0.70	0.91	0.84	49.3
West: Mandalong Road												
10	L2	24	2.0	0.013	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	52.0
11	T1	818	2.0	0.425	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		842	2.0	0.425	0.2	NA	0.0	0.0	0.00	0.02	0.00	59.6
All Vehicles		1843	2.0	0.425	1.3	NA	1.3	9.1	0.07	0.10	0.08	58.2

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

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

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

NA: 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 movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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MOVEMENT SUMMARY

▽ Site: 101 [10 EASTERN ACCESS SAT 2021 - BASE +DEV]

New Site
Site Category: (None)
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Mandalong Road												
5	T1	872	2.0	0.453	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		872	2.0	0.453	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
North: Site LILO Access												
7	L2	270	2.0	0.355	10.2	LOS A	1.7	12.2	0.64	0.90	0.81	50.1
Approach		270	2.0	0.355	10.2	LOS A	1.7	12.2	0.64	0.90	0.81	50.1
West: Mandalong Road												
10	L2	35	2.0	0.019	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	52.0
11	T1	682	2.0	0.354	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		717	2.0	0.354	0.3	NA	0.0	0.0	0.00	0.03	0.00	59.5
All Vehicles		1859	2.0	0.453	1.6	NA	1.7	12.2	0.09	0.14	0.12	57.7

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

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

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

NA: 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 movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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Project: T:\WORK20\20340 - CNR MANDALONG RD AND GATEWAY BOULEVARD, MORRISSET\MODEL\Morriset Network 2021 21062021.sip8

MOVEMENT SUMMARY

 **Site: 4 [11 MAND RAB PM - 2032 - BASE]**

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	315	8.6	0.273	5.7	LOS A	1.5	11.1	0.59	0.67	0.59	52.4
2	T1	29	3.4	0.192	5.7	LOS A	0.9	6.9	0.57	0.74	0.57	37.3
3	R2	164	4.3	0.192	10.4	LOS A	0.9	6.9	0.57	0.74	0.57	51.8
3u	U	1	0.0	0.192	12.3	LOS A	0.9	6.9	0.57	0.74	0.57	52.9
Approach		509	6.9	0.273	7.2	LOS A	1.5	11.1	0.58	0.70	0.58	51.4
East: Mandalong Road												
4	L2	188	3.2	0.673	12.1	LOS A	6.0	43.4	0.82	0.97	1.04	49.3
5	T1	544	5.1	0.673	12.6	LOS A	6.0	43.4	0.82	0.98	1.05	49.3
6	R2	17	5.9	0.673	17.6	LOS B	5.8	42.8	0.82	0.99	1.06	29.7
6u	U	1	0.0	0.673	19.7	LOS B	5.8	42.8	0.82	0.99	1.06	50.8
Approach		750	4.7	0.673	12.6	LOS A	6.0	43.4	0.82	0.98	1.04	48.9
North: Gimberts Road												
7	L2	19	0.0	0.324	25.1	LOS B	1.3	12.5	0.86	0.97	0.98	33.5
8	T1	13	0.0	0.324	25.5	LOS B	1.3	12.5	0.86	0.97	0.98	34.4
9	R2	12	0.0	0.324	29.8	LOS C	1.3	12.5	0.86	0.97	0.98	31.6
9u	U	1	0.0	0.324	31.9	LOS C	1.3	12.5	0.86	0.97	0.98	7.7
Approach		45	0.0	0.324	26.6	LOS B	1.3	12.5	0.86	0.97	0.98	32.7
West: Mandalong Road												
10	L2	54	1.9	0.390	6.6	LOS A	2.2	15.5	0.52	0.62	0.52	34.2
11	T1	700	3.9	0.791	8.0	LOS A	10.6	78.1	0.73	0.74	0.81	51.8
12	R2	318	9.4	0.791	13.4	LOS A	10.6	78.1	0.82	0.79	0.94	50.7
12u	U	2	0.0	0.791	15.3	LOS B	10.6	78.1	0.82	0.79	0.94	51.2
Approach		1074	5.4	0.791	9.6	LOS A	10.6	78.1	0.74	0.75	0.84	50.8
All Vehicles		2378	5.4	0.791	10.4	LOS A	10.6	78.1	0.73	0.81	0.85	50.0

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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Project: T:\WORK20\20340 - CNR MANDALONG RD AND GATEWAY BOULEVARD, MORRISSET\MODEL\Morriset Network 2032
22062021.sip8

MOVEMENT SUMMARY

 **Site: 4 [12 MAND RAB SAT MD - 2032 - BASE]**

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	142	19.0	0.151	6.0	LOS A	0.7	5.4	0.50	0.66	0.50	52.3
2	T1	17	5.9	0.184	5.3	LOS A	0.9	6.5	0.48	0.70	0.48	37.3
3	R2	224	3.1	0.184	9.8	LOS A	0.9	6.5	0.48	0.70	0.48	51.8
3u	U	3	0.0	0.184	11.9	LOS A	0.9	6.5	0.48	0.70	0.48	52.8
Approach		386	9.1	0.184	8.3	LOS A	0.9	6.5	0.49	0.68	0.49	51.4
East: Mandalong Road												
4	L2	234	2.6	0.478	6.3	LOS A	2.9	21.1	0.51	0.62	0.51	53.3
5	T1	439	6.4	0.478	6.4	LOS A	2.9	21.1	0.52	0.61	0.52	53.6
6	R2	17	5.9	0.478	11.2	LOS A	2.9	21.3	0.53	0.61	0.53	32.3
6u	U	1	0.0	0.478	13.2	LOS A	2.9	21.3	0.53	0.61	0.53	55.1
Approach		691	5.1	0.478	6.5	LOS A	2.9	21.3	0.52	0.61	0.52	53.0
North: Gimberts Road												
7	L2	21	0.0	0.232	14.3	LOS A	0.9	8.6	0.72	0.86	0.72	40.7
8	T1	20	0.0	0.232	14.7	LOS B	0.9	8.6	0.72	0.86	0.72	42.0
9	R2	15	0.0	0.232	18.9	LOS B	0.9	8.6	0.72	0.86	0.72	39.5
9u	U	1	0.0	0.232	21.0	LOS B	0.9	8.6	0.72	0.86	0.72	9.5
Approach		57	0.0	0.232	15.7	LOS B	0.9	8.6	0.72	0.86	0.72	40.3
West: Mandalong Road												
10	L2	20	5.0	0.226	6.7	LOS A	1.1	7.8	0.49	0.61	0.49	34.3
11	T1	437	6.2	0.459	6.2	LOS A	2.8	21.7	0.53	0.63	0.53	53.2
12	R2	117	25.6	0.459	11.1	LOS A	2.8	21.7	0.55	0.64	0.55	51.9
12u	U	3	0.0	0.459	12.7	LOS A	2.8	21.7	0.55	0.64	0.55	53.4
Approach		577	10.1	0.459	7.3	LOS A	2.8	21.7	0.53	0.64	0.53	52.4
All Vehicles		1711	7.5	0.478	7.5	LOS A	2.9	21.7	0.52	0.64	0.52	52.1

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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Project: T:\WORK20\20340 - CNR MANDALONG RD AND GATEWAY BOULEVARD, MORRISSET\MODEL\Morrisset Network 2032 22062021.sip8

MOVEMENT SUMMARY

 **Site: 4 [13 MAND RAB PM 2032 - BASE + DEV - WIDEN 1 LANE + LT SLIP]**

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	315	8.6	0.342	6.5	LOS A	2.1	15.4	0.76	0.76	0.76	51.8
2	T1	67	1.5	0.283	6.5	LOS A	1.6	11.4	0.73	0.83	0.73	37.2
3	R2	164	4.3	0.283	11.2	LOS A	1.6	11.4	0.73	0.83	0.73	51.7
3u	U	1	0.0	0.283	13.1	LOS A	1.6	11.4	0.73	0.83	0.73	52.8
Approach		547	6.4	0.342	7.9	LOS A	2.1	15.4	0.75	0.79	0.75	50.2
East: Mandalong Road												
4	L2	188	3.2	0.970	39.8	LOS C	21.0	152.6	1.00	1.64	2.70	36.1
5	T1	544	5.1	0.970	40.9	LOS C	21.0	152.6	1.00	1.64	2.72	34.5
6	R2	264	0.4	0.970	47.4	LOS D	19.9	142.1	1.00	1.63	2.74	20.6
6u	U	1	0.0	0.970	49.5	LOS D	19.9	142.1	1.00	1.63	2.74	35.4
Approach		997	3.5	0.970	42.4	LOS C	21.0	152.6	1.00	1.64	2.72	31.0
North: Gimberts Road												
7	L2	81	0.0	0.375	17.1	LOS B	1.6	15.8	0.79	0.93	0.92	39.1
8	T1	51	0.0	0.811	26.7	LOS B	4.8	47.6	0.87	0.98	1.05	34.2
9	R2	107	0.0	0.811	56.1	LOS D	4.8	47.6	0.96	1.24	1.77	21.1
9u	U	1	0.0	0.811	58.2	LOS E	4.8	47.6	0.96	1.24	1.77	5.9
Approach		240	0.0	0.811	36.7	LOS C	4.8	47.6	0.88	1.08	1.33	28.1
West: Mandalong Road												
10	L2	125	0.8	0.560	12.3	LOS A	4.0	28.3	0.78	0.95	0.97	30.9
11	T1	724	3.7	1.134	112.8	LOS F	86.8	637.7	0.95	3.14	6.13	19.8
12	R2	318	9.4	1.134	147.2	LOS F	86.8	637.7	1.00	3.78	7.65	16.8
12u	U	2	0.0	1.134	149.0	LOS F	86.8	637.7	1.00	3.78	7.65	15.6
Approach		1169	5.0	1.134	111.5	LOS F	86.8	637.7	0.94	3.08	6.00	19.2
All Vehicles		2953	4.3	1.134	62.9	LOS E	86.8	637.7	0.92	2.01	3.54	26.2

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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Project: T:\WORK20\20340 - CNR MANDALONG RD AND GATEWAY BOULEVARD, MORRISSET\MODEL\Morrisset Network 2032
22062021.sip8

MOVEMENT SUMMARY

 **Site: 4 [14 MAND RAB SAT 2032 - BASE + DEV - WIDEN 1 LANE + LT SLIP]**

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	142	19.0	0.239	7.9	LOS A	1.2	9.8	0.74	0.87	0.74	51.1
2	T1	72	1.4	0.314	6.3	LOS A	1.9	13.9	0.77	0.82	0.77	37.0
3	R2	224	3.1	0.314	11.0	LOS A	1.9	13.9	0.77	0.82	0.77	51.5
3u	U	1	0.0	0.314	13.0	LOS A	1.9	13.9	0.77	0.82	0.77	52.5
Approach		439	8.0	0.314	9.3	LOS A	1.9	13.9	0.76	0.83	0.76	49.3
East: Mandalong Road												
4	L2	234	2.6	0.905	22.8	LOS B	14.9	108.9	1.00	1.33	1.82	43.2
5	T1	439	6.4	0.905	23.3	LOS B	14.9	108.9	1.00	1.33	1.84	42.1
6	R2	377	0.3	0.905	29.4	LOS C	14.4	102.6	1.00	1.34	1.87	24.8
6u	U	1	0.0	0.905	31.5	LOS C	14.4	102.6	1.00	1.34	1.87	42.3
Approach		1051	3.3	0.905	25.4	LOS B	14.9	108.9	1.00	1.33	1.85	35.9
North: Gimberts Road												
7	L2	111	0.0	0.428	16.2	LOS B	2.0	20.2	0.76	0.93	0.93	39.7
8	T1	75	0.0	0.767	19.1	LOS B	5.1	51.1	0.79	0.92	0.94	39.1
9	R2	154	0.0	0.767	38.4	LOS C	5.1	51.1	0.91	1.20	1.60	26.7
9u	U	1	0.0	0.767	40.5	LOS C	5.1	51.1	0.91	1.20	1.60	7.4
Approach		341	0.0	0.767	26.9	LOS B	5.1	51.1	0.84	1.05	1.23	32.8
West: Mandalong Road												
10	L2	124	0.8	0.418	12.3	LOS A	2.4	17.4	0.77	0.92	0.88	30.7
11	T1	472	5.7	0.847	21.1	LOS B	12.2	93.0	0.97	1.28	1.72	43.5
12	R2	117	25.6	0.847	27.7	LOS B	12.2	93.0	1.00	1.33	1.85	42.1
12u	U	2	0.0	0.847	28.9	LOS C	12.2	93.0	1.00	1.33	1.85	42.1
Approach		715	8.1	0.847	20.7	LOS B	12.2	93.0	0.94	1.22	1.60	41.6
All Vehicles		2546	5.0	0.905	21.5	LOS B	14.9	108.9	0.92	1.18	1.51	39.3

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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22062021.sip8

MOVEMENT SUMMARY

 **Site: 4 [15 MAND RAB PM 2032 - BASE + DEV - WIDEN 1 LANE (N) + LT SLIP (N) + WIDEN 1 LANE (W)]**

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	315	8.6	0.343	6.4	LOS A	2.0	15.4	0.75	0.76	0.75	51.8
2	T1	67	1.5	0.283	6.5	LOS A	1.6	11.3	0.73	0.82	0.73	37.2
3	R2	164	4.3	0.283	11.2	LOS A	1.6	11.3	0.73	0.82	0.73	51.7
3u	U	1	0.0	0.283	13.1	LOS A	1.6	11.3	0.73	0.82	0.73	52.8
Approach		547	6.4	0.343	7.9	LOS A	2.0	15.4	0.74	0.79	0.74	50.2
East: Mandalong Road												
4	L2	188	3.2	1.007	56.9	LOS E	27.0	196.2	1.00	1.92	3.51	30.9
5	T1	544	5.1	1.007	58.1	LOS E	27.0	196.2	1.00	1.91	3.51	29.3
6	R2	264	0.4	1.007	64.8	LOS E	25.2	180.0	1.00	1.89	3.51	17.6
6u	U	1	0.0	1.007	66.9	LOS E	25.2	180.0	1.00	1.89	3.51	30.4
Approach		997	3.5	1.007	59.6	LOS E	27.0	196.2	1.00	1.91	3.51	26.4
North: Gimberts Road												
7	L2	81	0.0	0.306	11.4	LOS A	1.1	10.7	0.71	0.87	0.77	43.9
8	T1	51	0.0	0.625	15.4	LOS B	2.6	26.0	0.81	0.91	0.88	42.0
9	R2	107	0.0	0.625	26.1	LOS B	2.6	26.0	0.89	1.06	1.21	32.6
9u	U	1	0.0	0.625	28.2	LOS B	2.6	26.0	0.89	1.06	1.21	8.9
Approach		240	0.0	0.625	18.9	LOS B	2.6	26.0	0.81	0.96	0.99	37.9
West: Mandalong Road												
10	L2	125	0.8	0.200	8.0	LOS A	1.0	6.8	0.60	0.75	0.60	44.2
11	T1	724	3.7	0.816	11.4	LOS A	12.0	88.4	0.85	0.98	1.14	49.5
12	R2	318	9.4	0.816	18.2	LOS B	12.0	88.4	0.96	1.11	1.40	47.4
12u	U	2	0.0	0.816	20.0	LOS B	12.0	88.4	0.96	1.11	1.40	47.5
Approach		1169	5.0	0.816	12.9	LOS A	12.0	88.4	0.85	0.99	1.15	48.6
All Vehicles		2953	4.3	1.007	28.2	LOS B	27.0	196.2	0.88	1.26	1.86	37.6

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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Project: T:\WORK20\20340 - CNR MANDALONG RD AND GATEWAY BOULEVARD, MORRISSET\MODEL\Morrisset Network 2032
22062021.sip8

MOVEMENT SUMMARY

 **Site: 4 [16 MAND RAB SAT 2032 - BASE + DEV - WIDEN 1 LANE (N) + LT SLIP (N) + WIDEN 1 LANE (W)]**

Mandalong Rd and Gateway Blvd
Site Category: Morisset
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gateway Boulevard												
1	L2	142	19.0	0.239	7.9	LOS A	1.2	9.8	0.74	0.87	0.74	51.1
2	T1	72	1.4	0.314	6.3	LOS A	1.9	13.9	0.77	0.82	0.77	37.0
3	R2	224	3.1	0.314	11.0	LOS A	1.9	13.9	0.77	0.82	0.77	51.5
3u	U	1	0.0	0.314	13.0	LOS A	1.9	13.9	0.77	0.82	0.77	52.5
Approach		439	8.0	0.314	9.3	LOS A	1.9	13.9	0.76	0.83	0.76	49.3
East: Mandalong Road												
4	L2	234	2.6	0.899	22.0	LOS B	14.4	105.0	1.00	1.31	1.79	43.6
5	T1	439	6.4	0.899	22.5	LOS B	14.4	105.0	1.00	1.32	1.80	42.6
6	R2	377	0.3	0.899	28.6	LOS C	13.9	99.1	1.00	1.32	1.84	25.0
6u	U	1	0.0	0.899	30.7	LOS C	13.9	99.1	1.00	1.32	1.84	42.7
Approach		1051	3.3	0.899	24.6	LOS B	14.4	105.0	1.00	1.32	1.81	36.3
North: Gimberts Road												
7	L2	111	0.0	0.337	10.1	LOS A	1.2	12.4	0.64	0.83	0.71	45.2
8	T1	75	0.0	0.565	10.5	LOS A	2.4	24.1	0.67	0.82	0.70	46.5
9	R2	154	0.0	0.565	18.4	LOS B	2.4	24.1	0.78	1.01	1.02	37.9
9u	U	1	0.0	0.565	20.5	LOS B	2.4	24.1	0.78	1.01	1.02	10.2
Approach		341	0.0	0.565	14.0	LOS A	2.4	24.1	0.71	0.91	0.85	42.0
West: Mandalong Road												
10	L2	124	0.8	0.222	9.3	LOS A	1.2	8.2	0.70	0.82	0.70	42.8
11	T1	472	5.7	0.548	9.6	LOS A	4.6	35.4	0.80	0.90	0.91	51.1
12	R2	117	25.6	0.548	15.1	LOS B	4.6	35.4	0.84	0.95	1.00	49.7
12u	U	2	0.0	0.548	16.5	LOS B	4.6	35.4	0.84	0.95	1.00	50.8
Approach		715	8.1	0.548	10.5	LOS A	4.6	35.4	0.79	0.90	0.89	50.0
All Vehicles		2546	5.0	0.899	16.6	LOS B	14.4	105.0	0.86	1.06	1.24	42.4

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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Project: T:\WORK20\20340 - CNR MANDALONG RD AND GATEWAY BOULEVARD, MORRISSET\MODEL\Morrisset Network 2032

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Appendix D

ARRB Publication Extract



SUPERMARKET AND HOME IMPROVEMENT RESULTS COMPARED

The lack of data pertaining to the trip type proportion estimates for non-supermarket large-format retail developments has meant that it is common practice to apply supermarket trip type proportions to other forms of large-format retail.

The surveys undertaken at the supermarket and home improvement warehouse reveal similar proportions for primary, pass-by and link diverted trips as can be seen in Figure 10. However, despite this similarity, there is not enough evidence to confidently say that these activities should be treated as one general large-format retail activity.

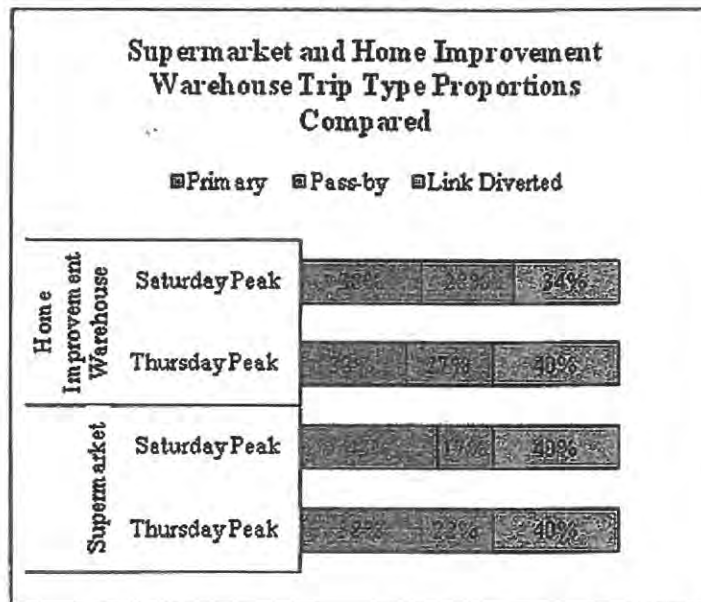


Figure 10: Surveyed trip type proportions for the supermarket and home improvement warehouse compared

CONCLUSIONS AND RECOMMENDATIONS

Given the results of the surveys, it is concluded that a higher proportion of pass-by and link diverted trips are generated by supermarket and home improvement warehouse developments than previously assumed in industry. This means that the effect of the developments surveyed on the surrounding road network is likely to be less than was estimated in the individual traffic impact assessments.

It is also concluded that through the comparison of the measured data to the international trip type proportion data, it is inappropriate to apply the supermarket proportion estimates of ITE (1991, 2008) and TRICS (1995) to a New Zealand based supermarket development. This would likely lead to an overestimate of primary trips.