


**Proposed Residential Development
LOT 9 DP1219664, 157 ARAKoon ROAD, SOUTH WEST ROCKS 2431 NSW**

Traffic Engineering Report

Prepared by

**Glen Holdsworth
RPEQ, CPEng, NER
B.Eng.(Civil), M.Eng.Sc.(Highways)
MITE, MPA, AITPM**

Inquiries regarding this report should be directed to Glen Holdsworth at TPS Group on 0419 722451 or at gholdsworth@trafficparking.com.au

Issue Doc.No.	Prepared By	Issue Date	Signature
TPS463Rep1	Glen R Holdsworth (RPEQ)	21 st Dec 2023	

This report has been prepared with an expectation that any review of, and response to the contents of the report will be prepared by, or checked and verified by a person (RPEQ in the case of Qld) having qualifications and experience relevant to those matters to which the report refers.

1. Background

W.B & M.E Walls propose to construct a Residential development containing 225 (approx.) residential dwellings on land in South West Rocks shown in Fig 1.

The proposed development is shown in greater detail in Fig 2.



Fig 1 The Proposed Residential Development

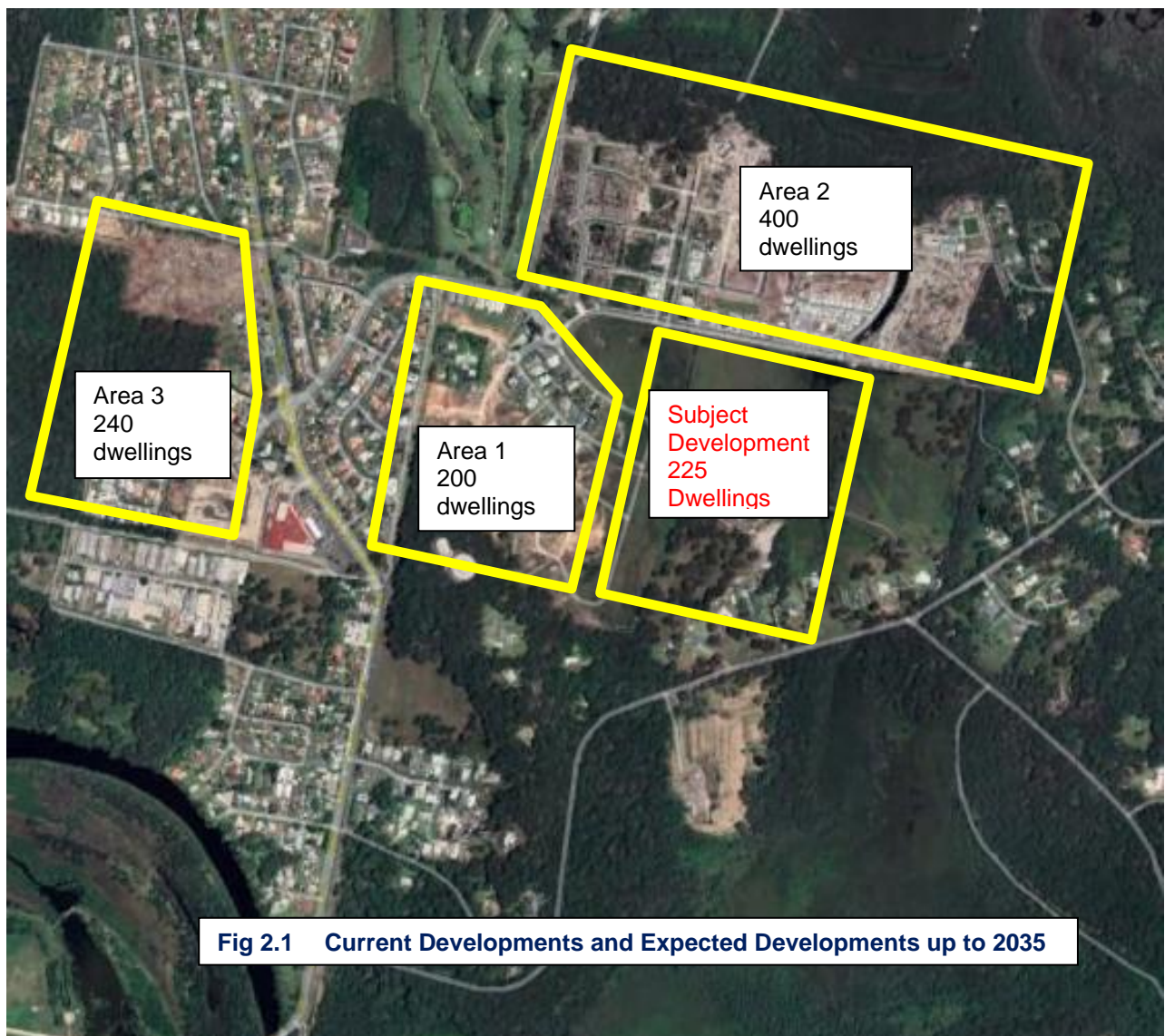


2. Other Abutting Developments Currently Approved or Expected before 2035

Fig 2.1 shows nearby developments which are already constructed and expected to be constructed prior to 2035.

The relevance of considering developments up to 2035 is based on a design year, being approximately 10 years following the substantial completion of the development. This is a recognized design year period for assessing traffic engineering and transport related requirements and impacts of the proposed development.

The extent of developments shown in Fig 2.1 is based on developments which are expected to have a significant effect on roads and intersections which will also be impacted by the subject development.



3. Council Road Planning

3.1 South West Rocks Structure Plan (2023)

The 2023 structure plan assumes that population growth in South West Rocks will occur at a compound average annual rate of 2.2% over the next period to 2041. This is expected to add a further 1582 dwellings across the period 2020-2041, representing a 1.9% per annum increase in dwelling numbers. The proposed development represents nearly 15% of that increase in dwellings. However, the residential developments shown in Fig 2.1 represent at least approximately 50% of residential development anticipated to occur in South West Rocks in the period between 2020 and 2041.

Assuming a reasonable increase in car ownership and personal mobility over that period, it can be expected that overall annual compound growth on traffic generation through South West Rocks will be in the order of no more than 2.5% per annum.

Fig 3.1 shows the proposed Road Structure shown in the Structure Plan, depicting Arakoon Rd as a Local Connection and Gregory Rd as a Regional Connection.

Fig 3.2 shows the “Opportunities” shown in the Structure Plan. We particularly highlight the probable future link (No.8) between Athena Pde and Phillip Dr.

The above “Road Structure” and “Opportunities” and other matters described in the Structure Plan have provided the basis for making a traffic engineering assessment of the proposed development impacts and requirements in the context of the future configuration and function of the affected road network.

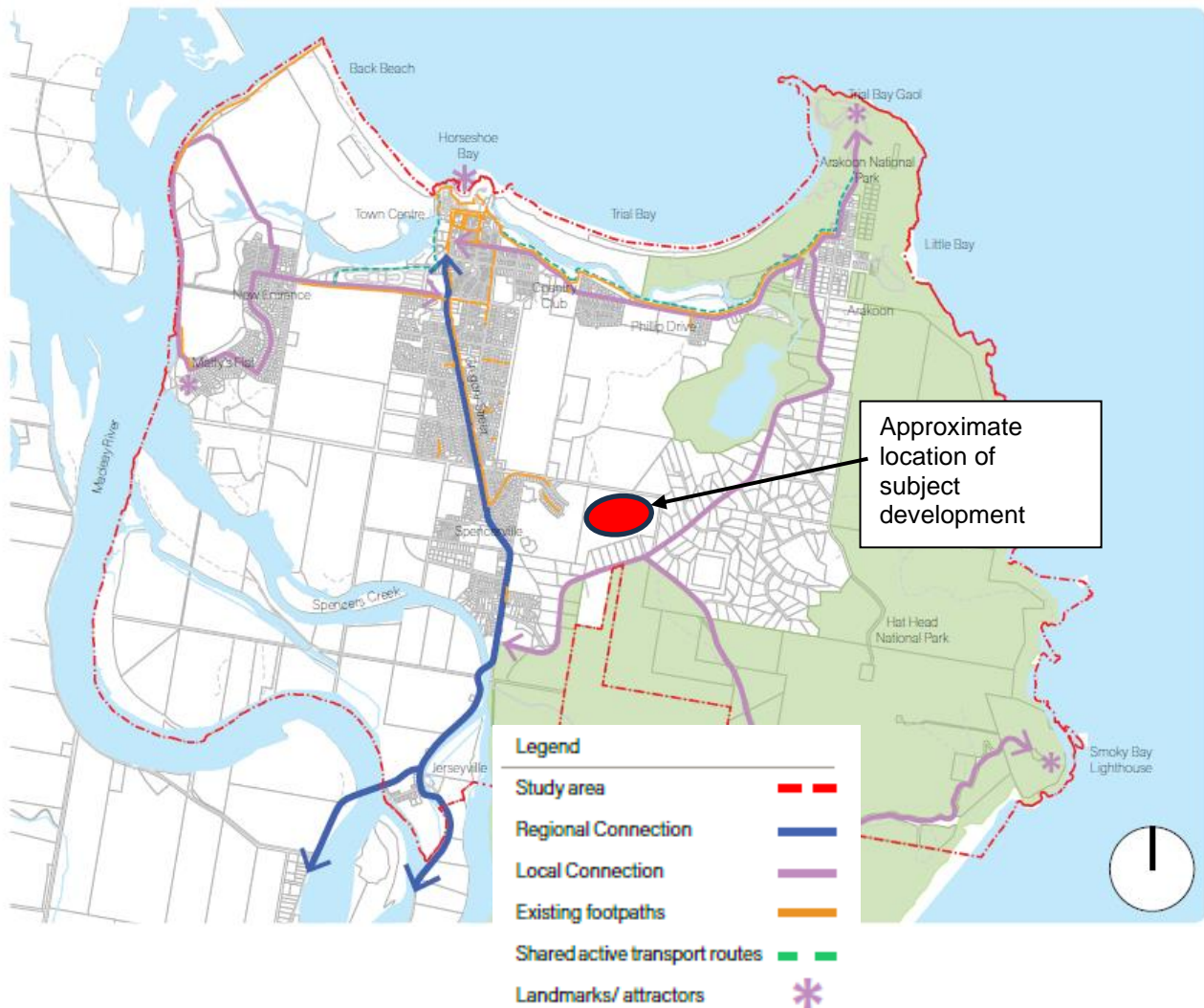


Fig 3.1 The Structure Plan Description of the Future Major Road Network

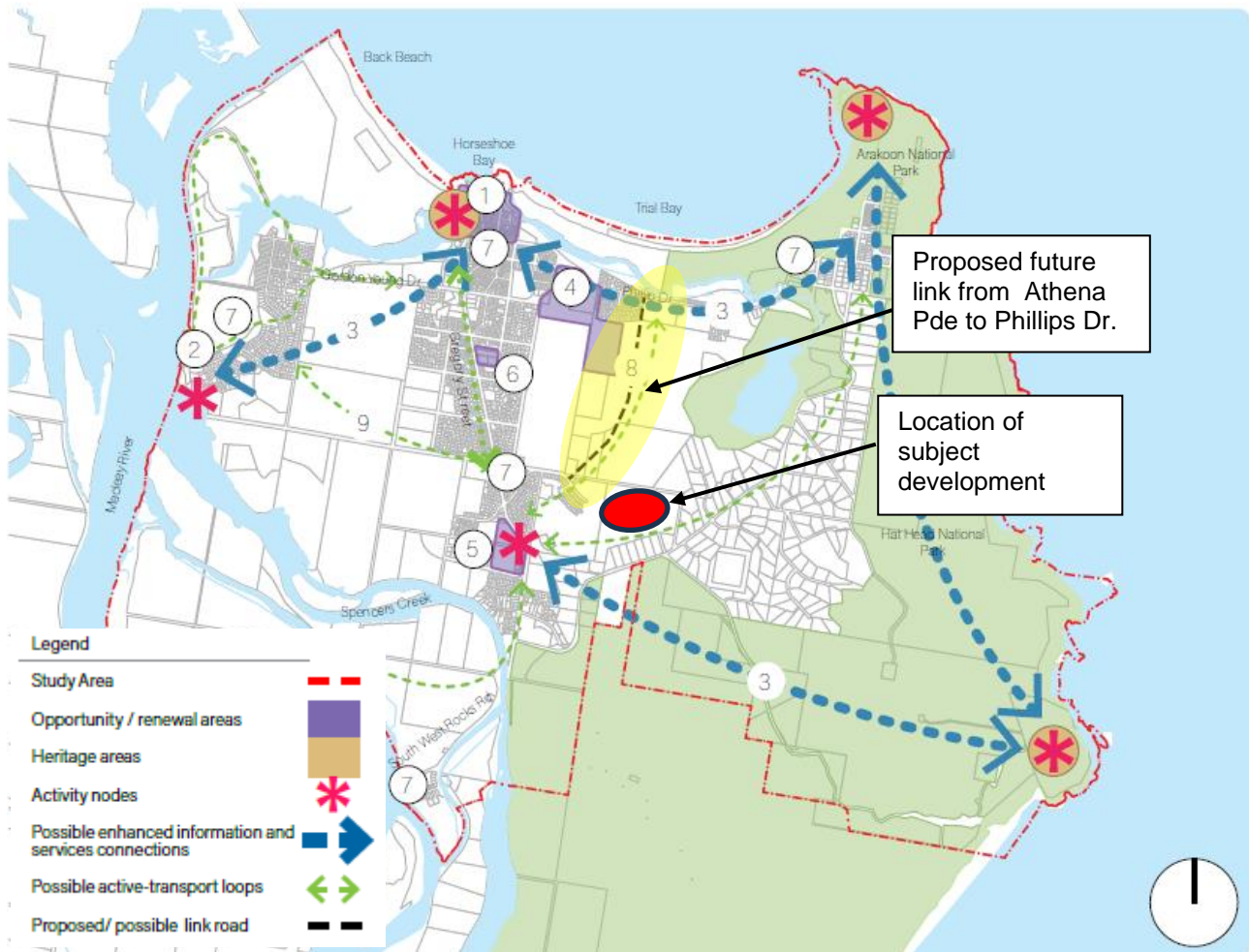


Fig 3.2 The Proposed Development in the Context of Future Roads, Transport Network and Development Nodes

4. Current Traffic Volumes

TTM Conducted traffic volume surveys between 6am and 7pm on Wednesday 6th April 2020. The results of these surveys for peak hours are shown in Fig 4.1 below. Peak periods in the primary road network occurred between 8:45 – 9:45 am and 15:00 – 16:00 pm.

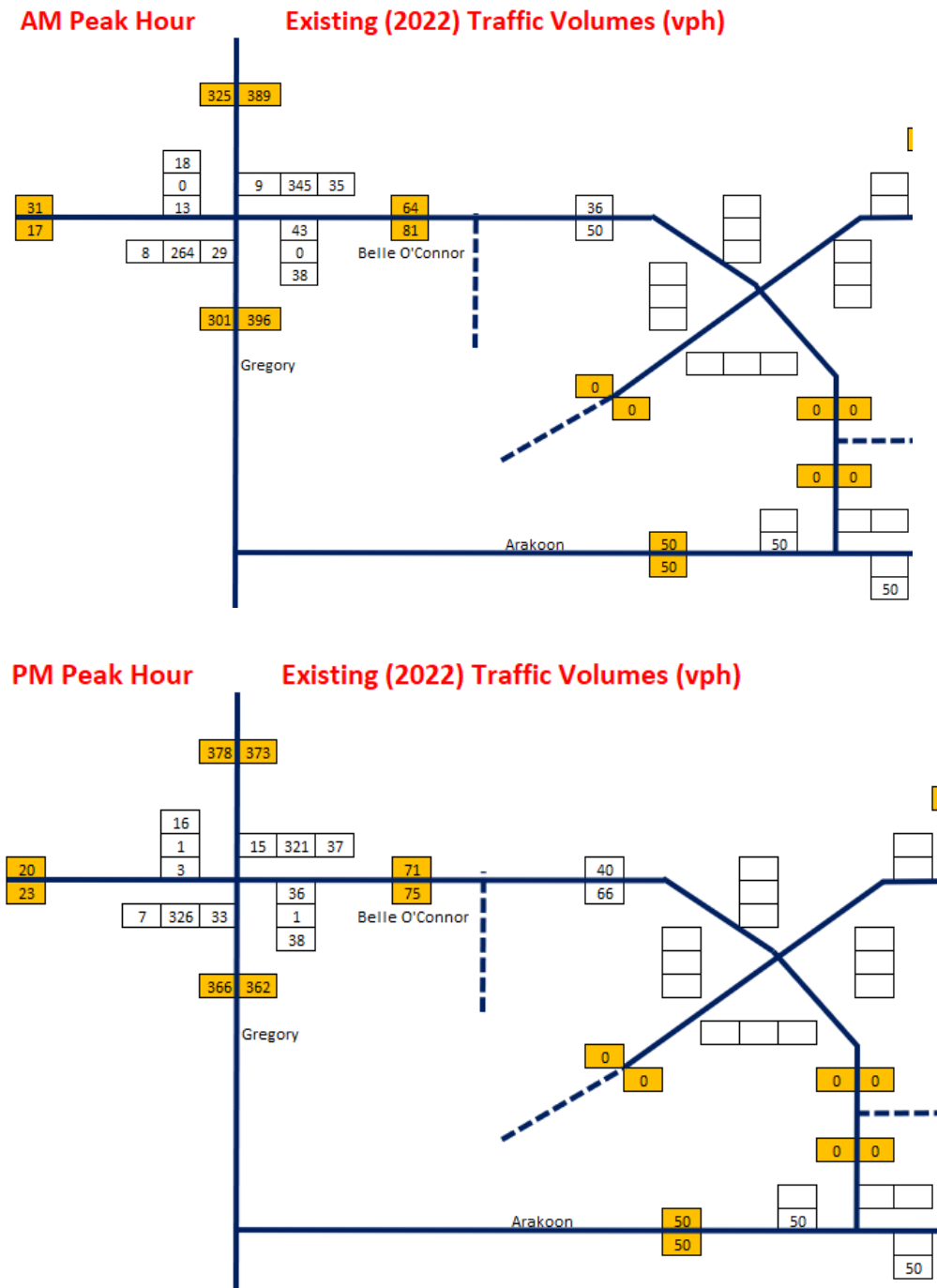


Fig 4.1 Surveys Peak Hour Traffic Volumes (Wed 6 April 2020)

5. Estimated Future 2035 Generation

Estimated future peak hour traffic generation for developments shown in Fig 2.1 are shown in Table 5.1.

The traffic generation rates shown in Table 5.1 are based on surveys described in Section 4. These are slightly lower than would normally apply in suburban areas which do not include significant numbers of tourism generation and associated traffic. However, we believe that the adopted rates are appropriate for the South West Rocks traffic environment. In any event, as is evidenced later in this report, even if generation rates of 10 vph/dwelling were to be chosen, it will have no significant effect on the conclusions and findings from this reported assessment.

Table 5.1

Estimated Peak Hour Traffic Generation

Area	Dwellings	AM Peak Hour				PM Peak Hour			
		Rate	In	Out	Tot	Rate	In	Out	Tot
1	200	0.80	56	104	160	0.70	91	49	140
2	400	0.80	112	208	320	0.70	182	98	280
3	240	0.80	67	125	192	0.70	109	59	168
Subject	225	0.80	63	117	180	0.70	102	55	158

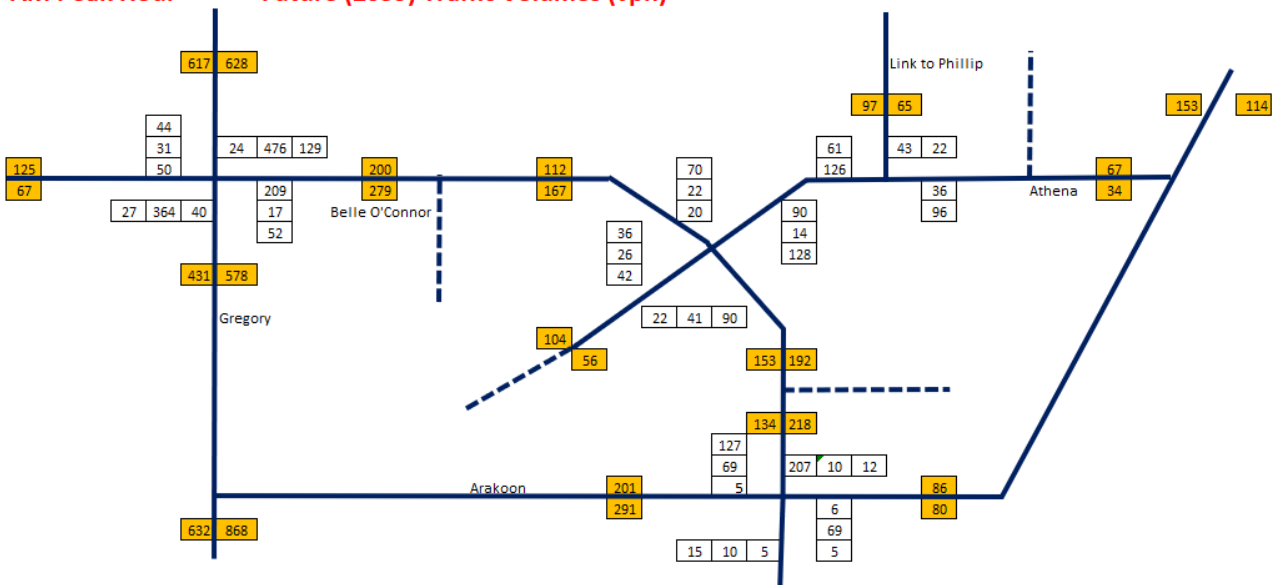
6. Estimated 2035 Peak Hour Traffic

Fig 6.1 shows estimates 2035 peak hour traffic volumes assuming that all developments (including the subject development) shown in Fig 2,1 were to be completed in 2035.

The estimates assume the following.

- The traffic generation rates and estimates shown in Fig 5.1.
- Compound annual growth of 2.5% in traffic movements other than the developments shown in Fig 2.1.
- New road link between Athena Pde and Phillips Dr and the extension of Athena Pde to Arakoon Dr.
- The connection of Belle O'Connor Dr to Arakoon at Lighthouse Rd intersection.
- Development traffic distributions as shown in Fig 6.2 based on surveyed traffic movements and consideration of future developments shown in the Structure Plan.

AM Peak Hour Future (2035) Traffic Volumes (vph)



PM Peak Hour Future (2035) Traffic Volumes (vph)

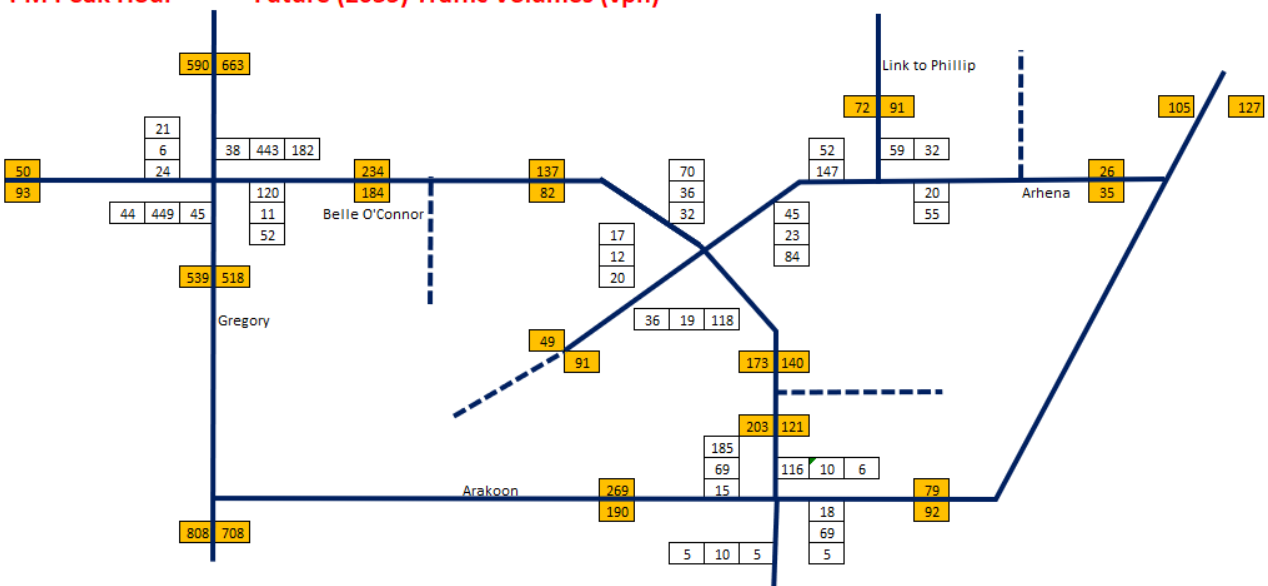


Fig 6.1 Estimated 2035 Peak Hour Traffic Volumes (April 2035)

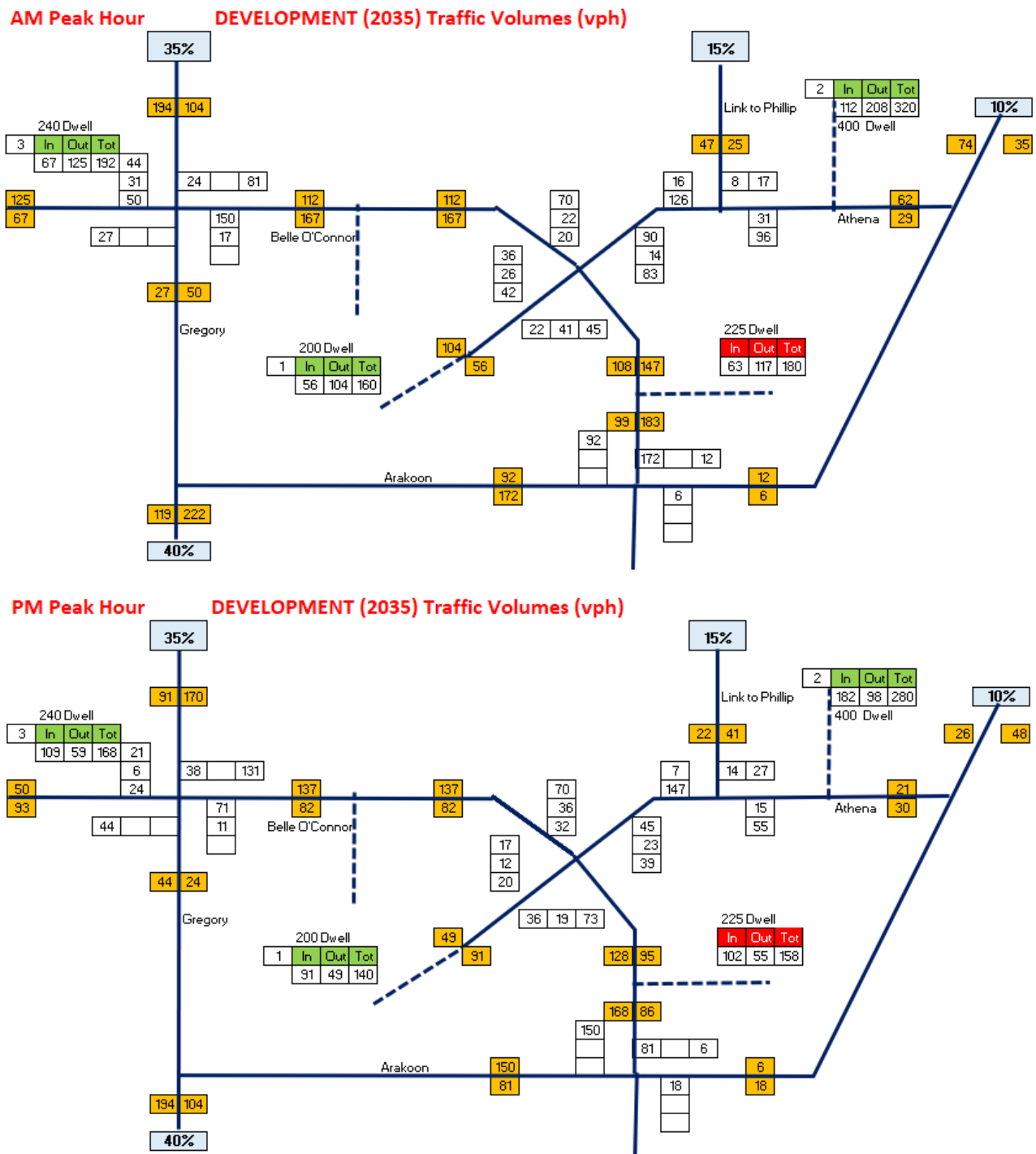


Fig 6.2 Assumed Development Traffic Distribution in 2035

7. Estimated 2035 Peak Hour Intersection Operations

7.1 The Future Management of the Arakoon / Lighthouse / Belle O'Connor Intersection

The proposed development plan shows Belle O'Connor Street intersecting with Arakoon Drive opposite Lighthouse Rd in the form of a T- Intersection.

In view of 2035 traffic volumes at the intersection not being high enough to satisfy the installation of traffic signals, it has been assumed that a roundabout will need to be installed that the future intersection when the Belle O'Connor Street extension to Arakoon Road is constructed.

7.2 Estimated Future (2035) Intersection Operations

Estimated peak hour intersection operations which directly service the proposed development and assumed intersection treatments are shown in Fig 7.1.

Detailed outputs from SIDRA 9.1 software are contained in attachments.

The estimates indicate that there will be considerable capacity in road intersections to accommodate the proposed development in addition to the other extensive developments (shown in Fig 2.1) which are occurring, or which are likely to occur in the location in the period to 2035.

Even if adopted traffic generation rates and other assumptions would have been more conservative than those described at the top of Section 6, the estimates shown in Table 7.1 would not have varied to such an extent as to suggest that the road network and intersections would not operate satisfactory in 2035.

Table 7.1
Estimated 2035 Peak Hour Intersection Operations

Intersection	Type	AM Peak Hr		PM Peak Hr	
		DoS %	Max Delay (sec)	DoS %	Max Delay (sec)
Gregory / Belle Oconnor	Single Lane Roundabout	50%	10	50%	9
Belle Oconnor / Burrawong	Single Lane Roundabout	20%	7	15%	7
Arakoon / Lighthouse	Single Lane Roundabout	20%	8	20%	8

Note : A Degree of Saturation (DoS) of 75% for unsignalized intersections and a maximum delay of 32 seconds on intersection approaches are generally considered to represent the point at which intersection improvements are warranted.

8. Intersection Management

The estimates shown in Table 7.1 show that intersection degrees of saturation (DoS) for directly affected intersections will be less than or equal to 50% and maximum delays in intersection approaches will be in the order of 10 seconds, considerably lower than 75% (DoS) and 32 seconds (Delay) associated with a LoS “D” limit. These estimates include the operation of a future roundabout at the Arakoon Rd / Lighthouse Rd intersection.

The above estimates demonstrate that all intersections which will directly service the proposed development will operate satisfactorily in 2035, including consideration of the effects of locality wide traffic growth and other developments expected to occur in the location.

8.1 Arakoon Rd / Lighthouse Dr Roundabout

The most appropriate form of short and long term intersection is a roundabout having similar geometry as current exists at the Gregory Street / Belle O'Connor Drive roundabout. That is, having an outside diameter of approximately 32m with 8.0m circulating lanes.

The recommended roundabout should be constructed as part of constructing the extension of Belle O'Connor Street to Arakoon Drive.

The roundabout design should be a matter of discussion between the Applicant and Council regarding the sharing of funding of the intersection treatment. This recommendation is based on the extent to which the intersection will also service current and future developments other than the proposed development, including servicing traffic movements to/from the proposed future Athena Pde – Phillips Dr road link.

Future traffic Estimates shown in Figs 6.1 and 6.2 indicate that in 2035 the proposed development will contribute approximately 32% of traffic to roundabout peak hour traffic volumes (ie. 165 / 515 avg across peak hours = 32%).

9. Conclusions / Recommendations

a. Road Network and Intersection Operations

The estimates described in this report demonstrate that the proposed development can be satisfactorily incorporated into the road network and associated intersections directly affected by the development in the period to 2035. This conclusion includes consideration regarding general traffic growth and considerable other residential developments occurring or yet to occur in the location, and having regard to the future road network described in the Structure Plan.

b. Arakoon / Lighthouse / Belle O'Connor Intersection

TPS recommends that the Arakoon Dr / Lighthouse Dr / Belle O'Connor Dr intersection should be constructed as a roundabout having similar dimensions to those existing at the Gregory Street / Belle O'Connor Dr intersection. The roundabout should be constructed as part of constructing the extension of Belle O'Connor Street to Arakoon Drive.

The roundabout funding should be a matter of discussion between the Applicant and Council regarding the sharing of funding of the intersection treatment. This recommendation is based on the extent to which the intersection will also service current and future developments other than the proposed development, including servicing traffic movements to/from the proposed future Athena Pde – Phillips Dr link. Future traffic Estimates shown in Figs 6.1 and 6.2 indicate that in 2035 the proposed development will contribute approximately 32% of traffic to roundabout peak hour traffic volumes (ie. 165 / 515 avg across peak hours = 32%).

Subject to the above recommendation 9(b), we are of the opinion that the proposed development should be approved with respect to traffic engineering considerations.



Attachments

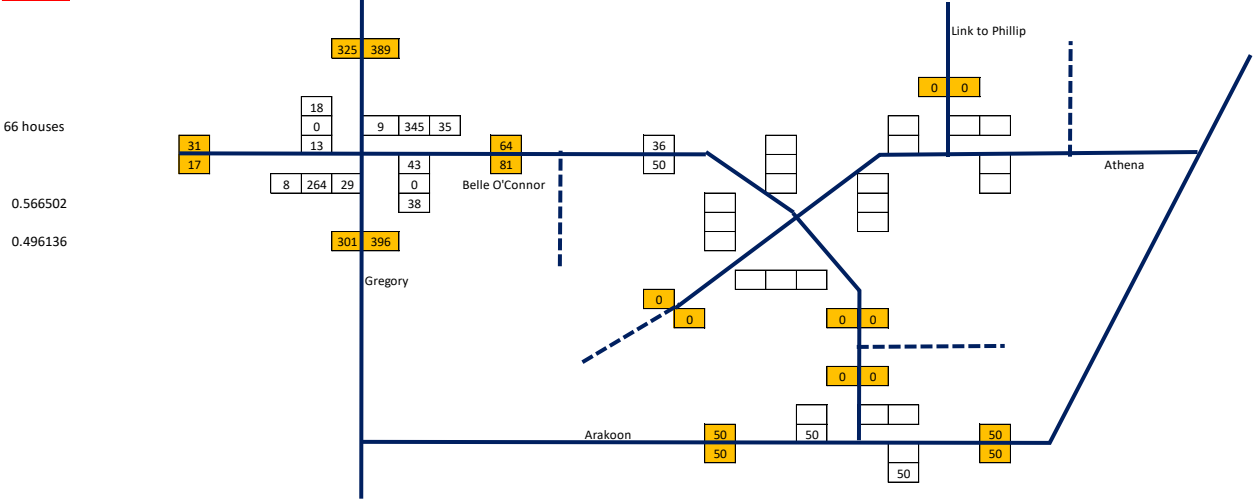
Current Peak Hour Intersection Volumes

Future Peak Hour Intersection Volumes

SIDRA 9.1 Peak Hour Intersection Estimates

2022

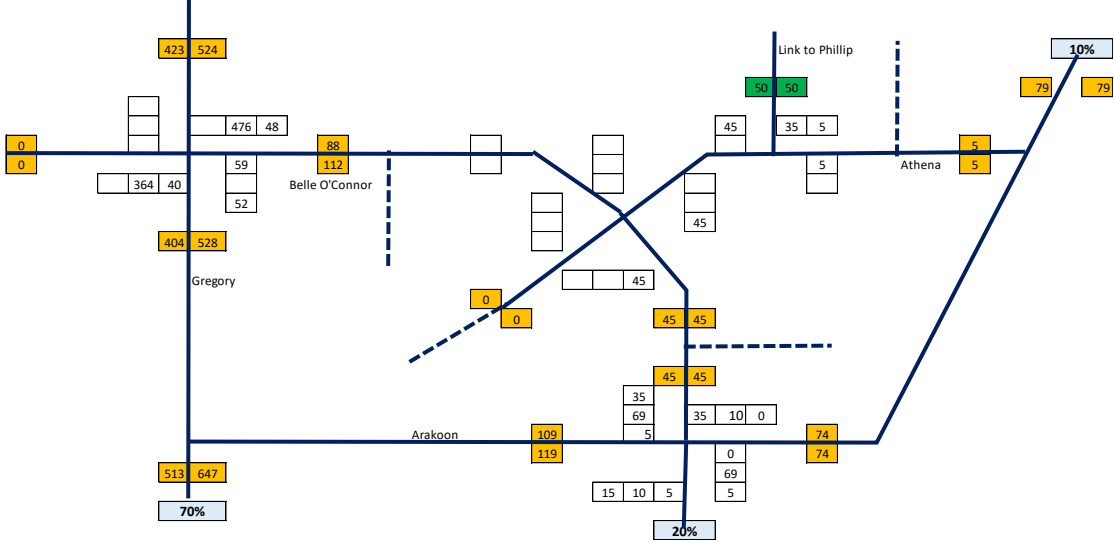
AM Peak Hour Existing (2022) Traffic Volumes (vph)

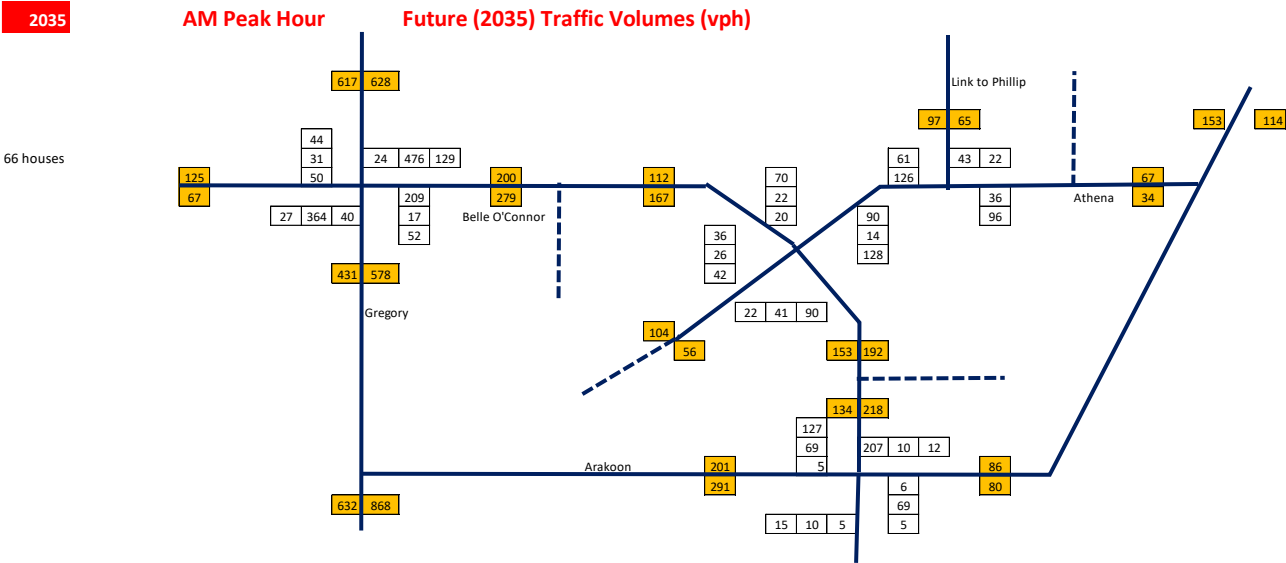
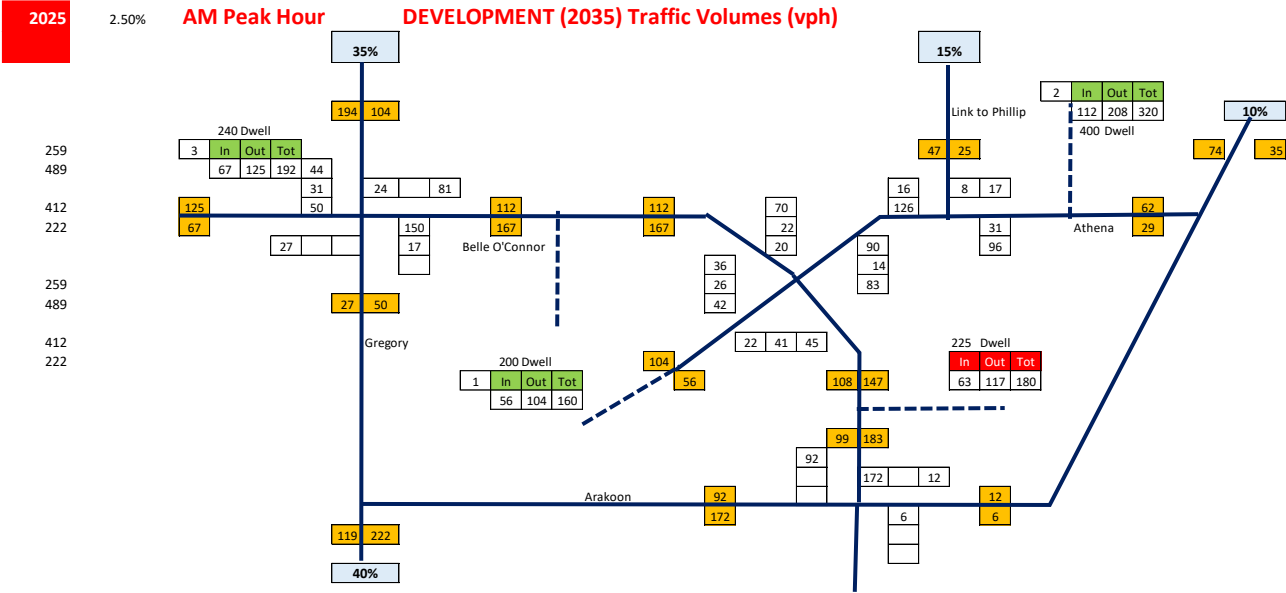


2035

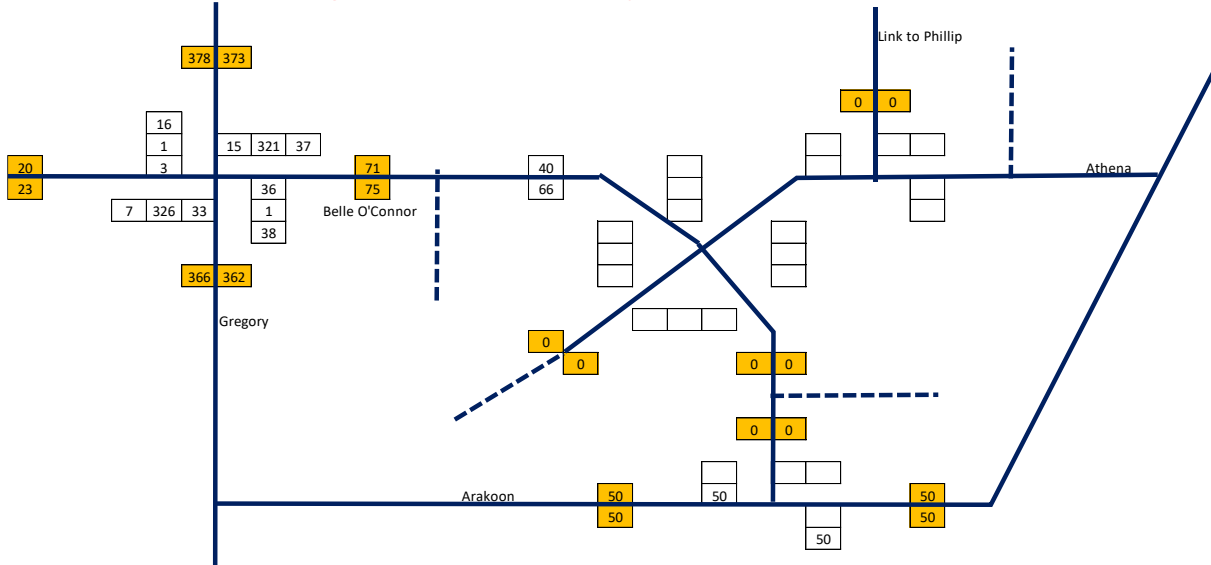
2.50%

AM Peak Hour BASE (2035) Traffic Volumes (vph)

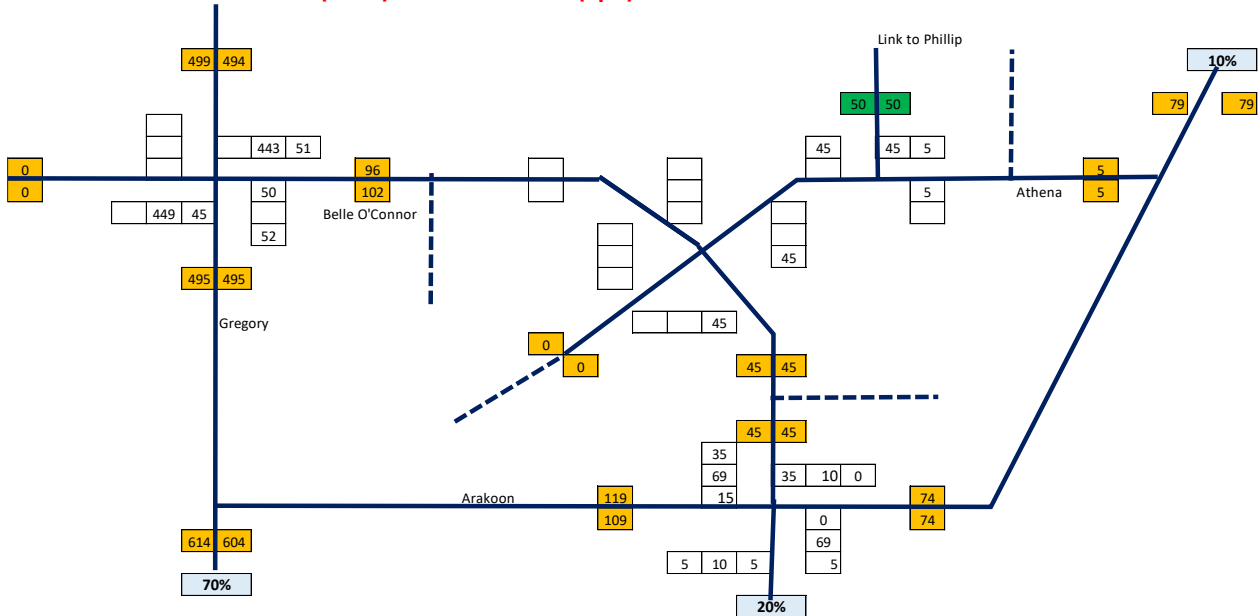




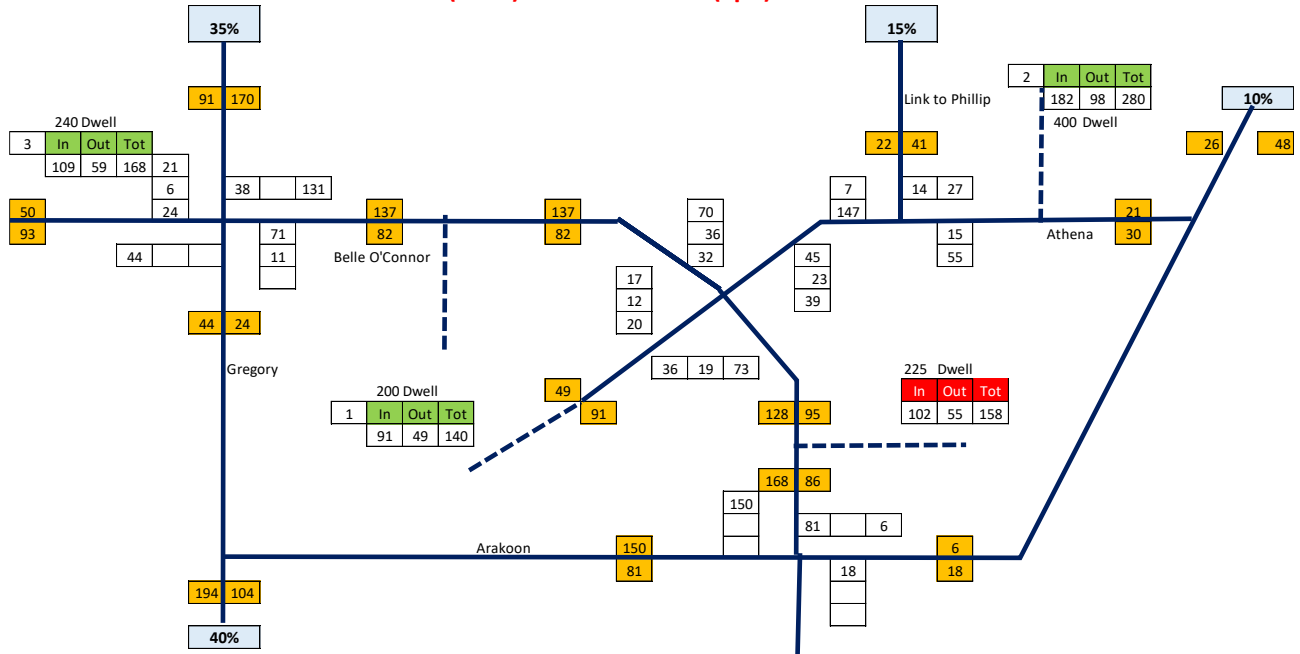
PM Peak Hour Existing (2022) Traffic Volumes (vph)



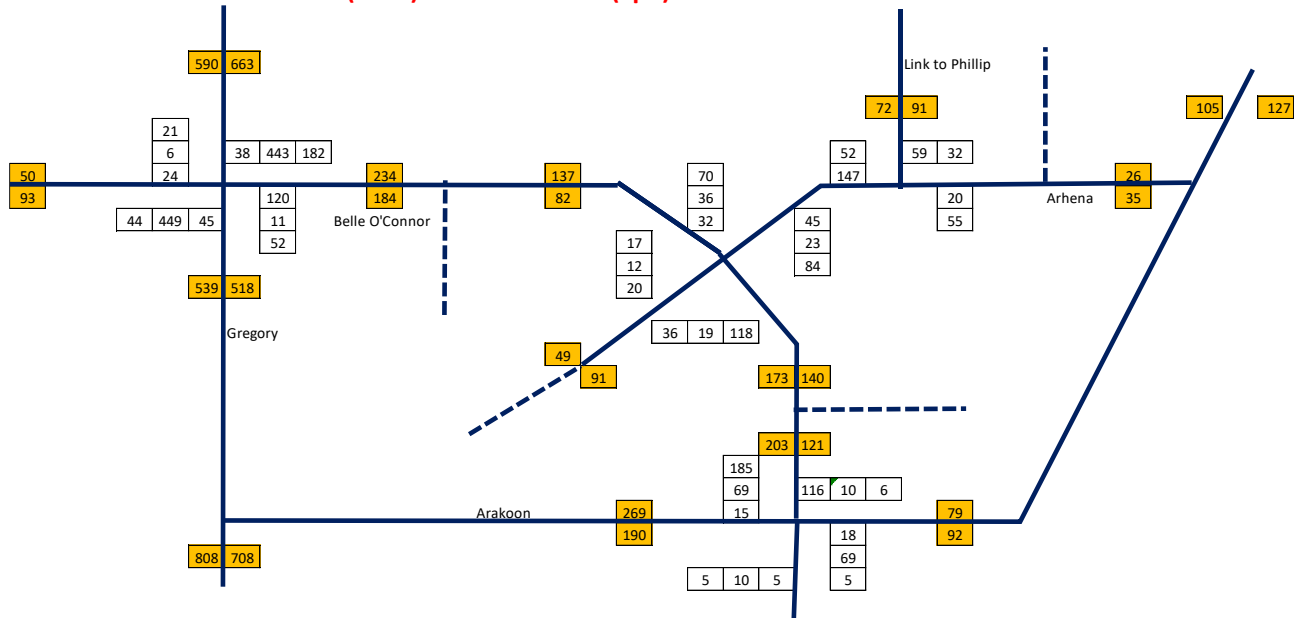
PM Peak Hour BASE (2035) Traffic Volumes (vph)



PM Peak Hour DEVELOPMENT (2035) Traffic Volumes (vph)



PM Peak Hour Future (2035) Traffic Volumes (vph)







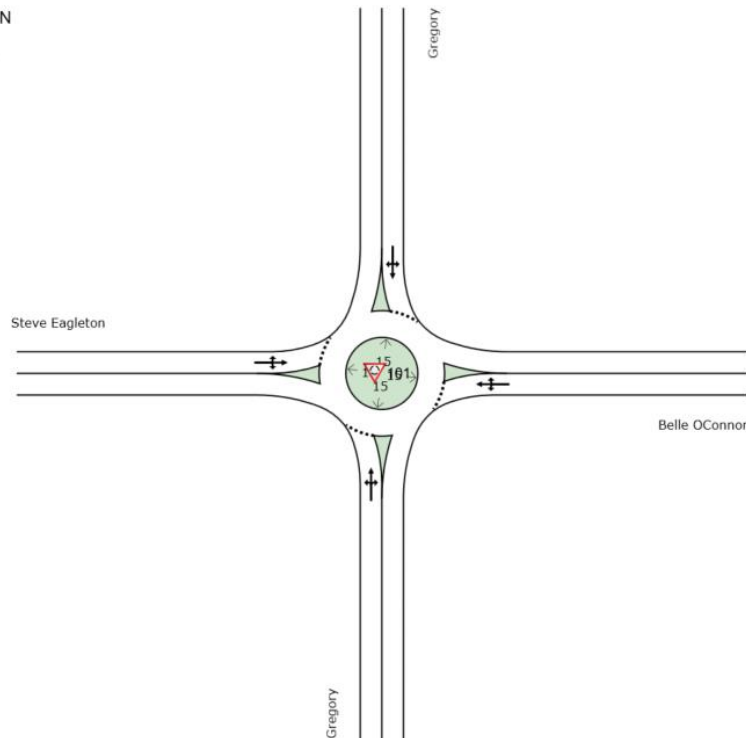
LANE SUMMARY

 **Site: 101 [Gregory Belle OConnor AM 2035 (Site Folder: General)]**

New Site
 Site Category: (None)
 Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF [Veh	QUEUE Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Gregory													
Lane 1 	431	3.0	1103	0.391	100	5.0	LOS A	2.6	18.5	Full	500	0.0	0.0
Approach	431	3.0		0.391		5.0	LOS A	2.6	18.5				
East: Belle OConnor													
Lane 1 	278	3.0	872	0.319	100	9.4	LOS A	1.9	13.8	Full	500	0.0	0.0
Approach	278	3.0		0.319		9.4	LOS A	1.9	13.8				
North: Gregory													
Lane 1 	629	3.0	1313	0.479	100	4.1	LOS A	3.5	25.3	Full	500	0.0	0.0
Approach	629	3.0		0.479		4.1	LOS A	3.5	25.3				
West: Steve Eagleton													
Lane 1 	125	3.0	830	0.151	100	8.0	LOS A	0.8	6.0	Full	500	0.0	0.0
Approach	125	3.0		0.151		8.0	LOS A	0.8	6.0				
Intersection	1463	3.0		0.479		5.7	LOS A	3.5	25.3				







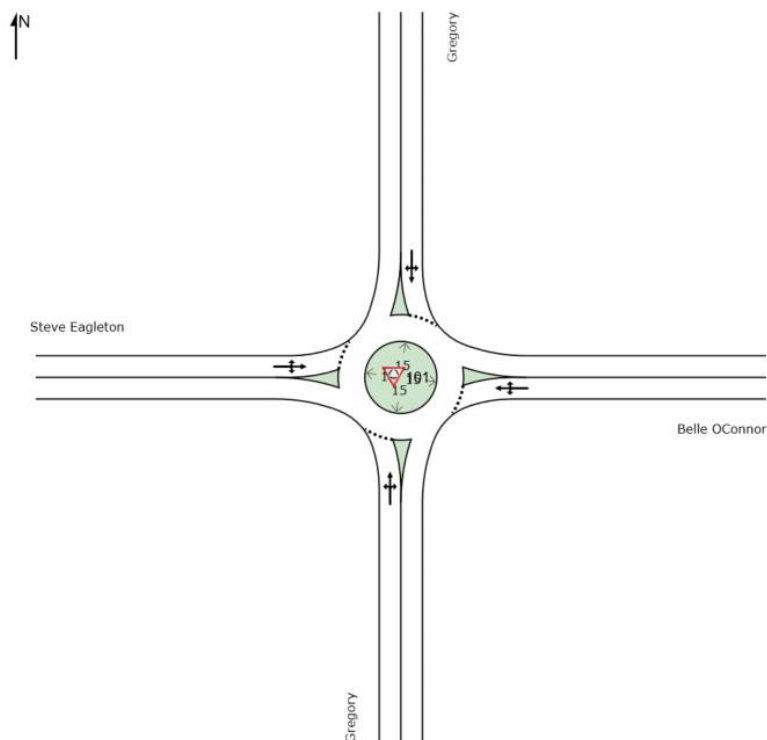
LANE SUMMARY

 **Site: 101 [Gregory Belle OConnor PM 2035 (Site Folder: General)]**

New Site
 Site Category: (None)
 Roundabout

Lane Use and Performance





	DEMAND FLOWS [Total HV] veh/h %		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh]	95% BACK OF QUEUE Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Gregory													
Lane 1 	538	3.0	1226	0.439	100	4.6	LOS A	3.0	21.6	Full	500	0.0	0.0
Approach	538	3.0		0.439		4.6	LOS A	3.0	21.6				
East: Belle OConnor													
Lane 1 	183	3.0	911	0.201	100	8.4	LOS A	1.1	7.8	Full	500	0.0	0.0
Approach	183	3.0		0.201		8.4	LOS A	1.1	7.8				
North: Gregory													
Lane 1 	663	3.0	1410	0.470	100	3.9	LOS A	3.4	24.1	Full	500	0.0	0.0
Approach	663	3.0		0.470		3.9	LOS A	3.4	24.1				
West: Steve Eagleton													
Lane 1 	51	3.0	823	0.062	100	8.1	LOS A	0.3	2.3	Full	500	0.0	0.0
Approach	51	3.0		0.062		8.1	LOS A	0.3	2.3				
Intersection	1435	3.0		0.470		4.9	LOS A	3.4	24.1				

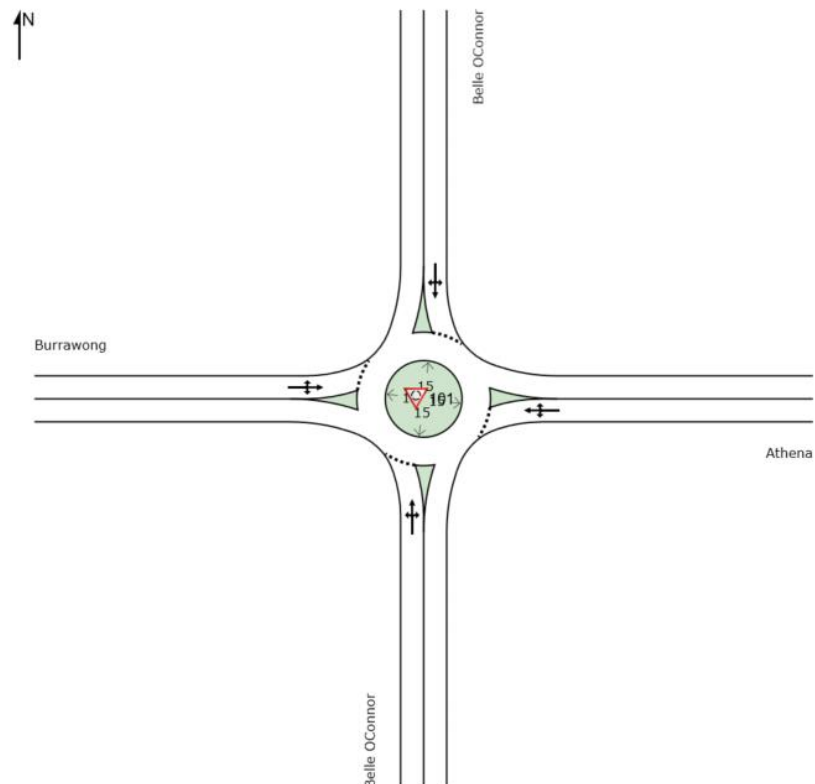


LANE SUMMARY

 **Site: 101 [Belle OConnor Burrawong AM 2035 (Site Folder: General)]**

New Site
 Site Category: (None)
 Roundabout

Lane Use and Performance													
	DEMAND FLOWS [Total HV] veh/h %		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %	
South: Belle OConnor													
Lane 1 	161	3.0	1215	0.133	100	6.1	LOS A	0.6	4.5	Full	500	0.0	0.0
Approach	161	3.0		0.133		6.1	LOS A	0.6	4.5				
East: Athena													
Lane 1 	244	3.0	1312	0.186	100	5.1	LOS A	0.9	6.6	Full	500	0.0	0.0
Approach	244	3.0		0.186		5.1	LOS A	0.9	6.6				
North: Belle OConnor													
Lane 1 	118	3.0	1179	0.100	100	4.6	LOS A	0.5	3.3	Full	500	0.0	0.0
Approach	118	3.0		0.100		4.6	LOS A	0.5	3.3				
West: Burrawong													
Lane 1 	109	3.0	1125	0.097	100	5.8	LOS A	0.4	3.2	Full	500	0.0	0.0
Approach	109	3.0		0.097		5.8	LOS A	0.4	3.2				
Intersection	633	3.0		0.186		5.4	LOS A	0.9	6.6				



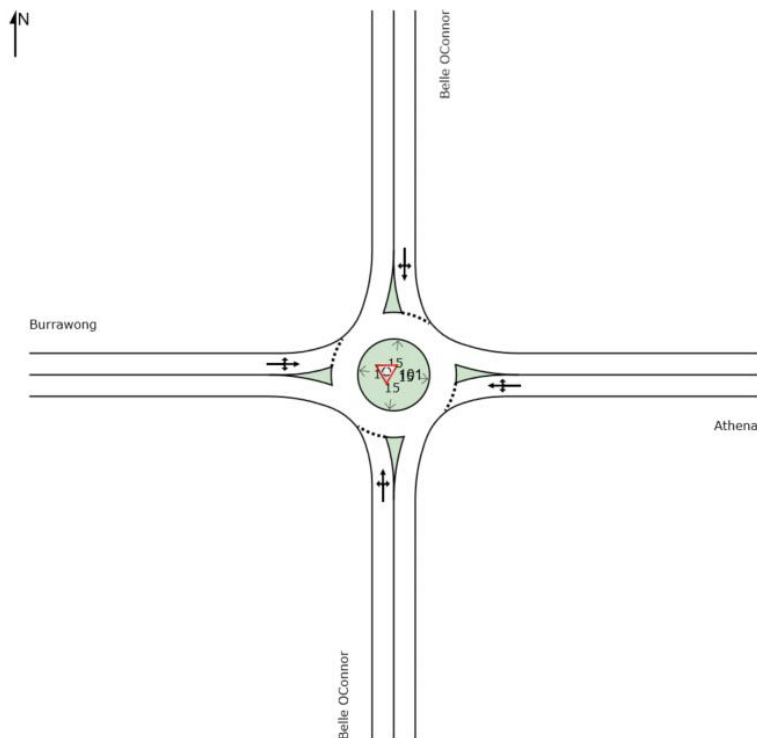
LANE SUMMARY

 **Site: 101 [Belle OConnor Burrawong PM 2035 (Site Folder: General)]**

New Site
 Site Category: (None)
 Roundabout

Lane Use and Performance


	DEMAND FLOWS [Total HV] veh/h %		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh]	95% BACK OF QUEUE Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Belle OConnor													
Lane 1 d	182	3.0	1262	0.144	100	6.4	LOS A	0.7	4.9	Full	500	0.0	0.0
Approach	182	3.0		0.144		6.4	LOS A	0.7	4.9				
East: Athena													
Lane 1 d	160	3.0	1272	0.126	100	4.8	LOS A	0.6	4.3	Full	500	0.0	0.0
Approach	160	3.0		0.126		4.8	LOS A	0.6	4.3				
North: Belle OConnor													
Lane 1 d	145	3.0	1185	0.123	100	4.8	LOS A	0.6	4.1	Full	500	0.0	0.0
Approach	145	3.0		0.123		4.8	LOS A	0.6	4.1				
West: Burrawong													
Lane 1 d	52	3.0	1157	0.045	100	5.6	LOS A	0.2	1.4	Full	500	0.0	0.0
Approach	52	3.0		0.045		5.6	LOS A	0.2	1.4				
Intersection	539	3.0		0.144		5.4	LOS A	0.7	4.9				

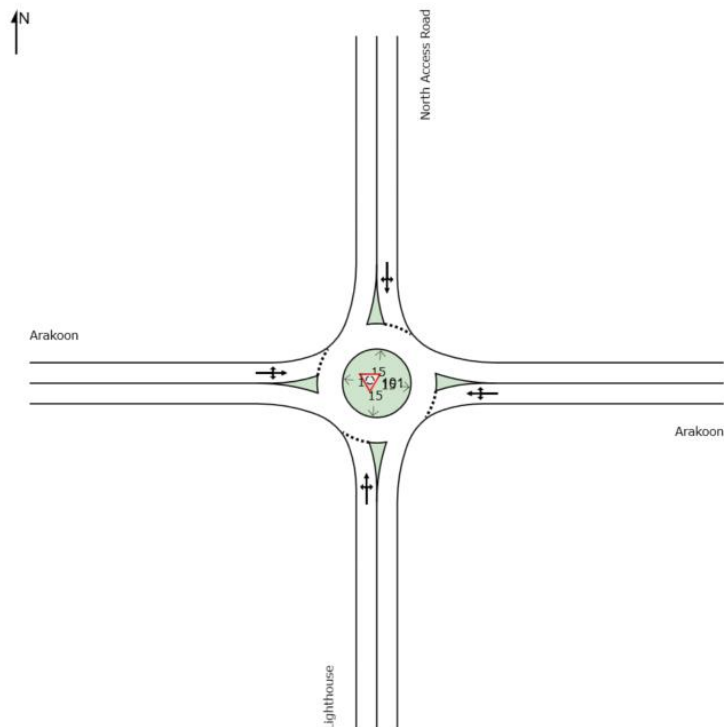


LANE SUMMARY

Site: 101 [Arakoon Lighthouse AM 2035 (Site Folder: General)]

New Site
 Site Category: (None)
 Roundabout

Lane Use and Performance													
	DEMAND FLOWS [Total HV]		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh	Dist]	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Lighthouse													
Lane 1 	32	3.0	1076	0.029	100	5.1	LOS A	0.1	0.9	Full	500	0.0	0.0
Approach	32	3.0		0.029		5.1	LOS A	0.1	0.9				
East: Arakoon													
Lane 1 	84	3.0	1122	0.075	100	4.5	LOS A	0.3	2.5	Full	500	0.0	0.0
Approach	84	3.0		0.075		4.5	LOS A	0.3	2.5				
North: North Access Road													
Lane 1 	241	3.0	1323	0.182	100	7.1	LOS A	0.9	6.2	Full	500	0.0	0.0
Approach	241	3.0		0.182		7.1	LOS A	0.9	6.2				
West: Arakoon													
Lane 1 	212	3.0	1482	0.143	100	3.4	LOS A	0.7	5.0	Full	500	0.0	0.0
Approach	212	3.0		0.143		3.4	LOS A	0.7	5.0				
Intersection	568	3.0		0.182		5.2	LOS A	0.9	6.2				







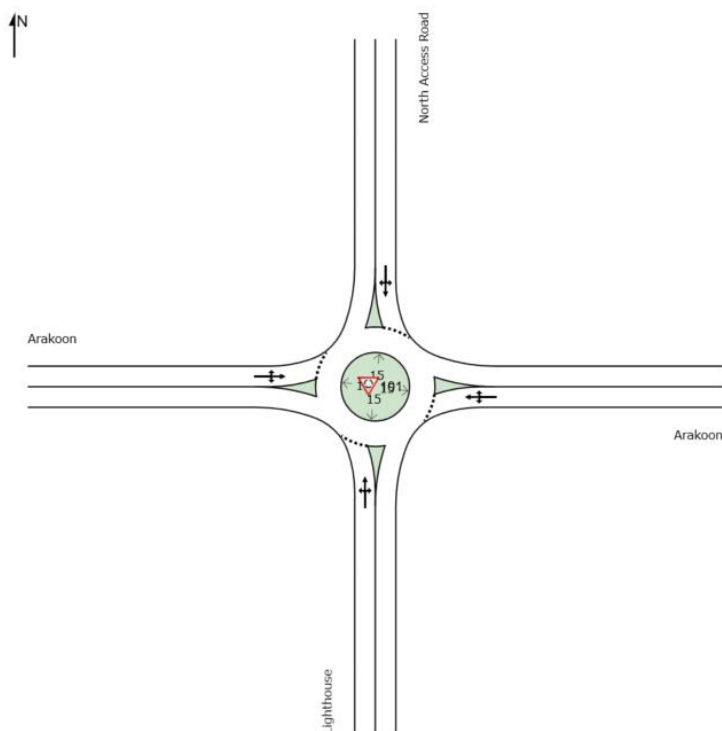
LANE SUMMARY

Site: 101 [Arakoon Lighthouse PM 2035 (Site Folder: General)]

New Site
 Site Category: (None)
 Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total HV]		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh]	95% BACK OF QUEUE Dist]	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Lighthouse													
Lane 1 	21	3.0	1141	0.018	100	5.0	LOS A	0.1	0.6	Full	500	0.0	0.0
Approach	21	3.0		0.018		5.0	LOS A	0.1	0.6				
East: Arakoon													
Lane 1 	97	3.0	1193	0.081	100	4.6	LOS A	0.4	2.6	Full	500	0.0	0.0
Approach	97	3.0		0.081		4.6	LOS A	0.4	2.6				
North: North Access Road													
Lane 1 	139	3.0	1262	0.110	100	7.1	LOS A	0.5	3.6	Full	500	0.0	0.0
Approach	139	3.0		0.110		7.1	LOS A	0.5	3.6				
West: Arakoon													
Lane 1 	283	3.0	1455	0.195	100	3.6	LOS A	1.0	6.9	Full	500	0.0	0.0
Approach	283	3.0		0.195		3.6	LOS A	1.0	6.9				
Intersection	540	3.0		0.195		4.7	LOS A	1.0	6.9				



Traffic Impact Assessment Certification

CERTIFICATION OF TRAFFIC IMPACT ASSESSMENT REPORT

REGISTERED PROFESSIONAL ENGINEER QUEENSLAND

Project title: Proposed Residential Development
LOT 9 DP1219664, 157 ARAKOOON ROAD, SOUTH WEST ROCKS 2431 NSW

As a qualified, professional engineer and understand and recognise:

- the significant role of engineering as a profession, and that
- the community has a legitimate expectation that my certification affixed to this engineering work can be trusted, and that
- I am responsible for ensuring its preparation has satisfied all necessary standards, conduct and contemporary practice.

I certify:

- a. I am satisfied that all submitted components comprising this traffic impact assessment have been completed in accordance with the traffic engineering practices and relevant standards using sound engineering principles, and
- b. where specialised areas of work have not been under my direct supervision, I have reviewed the outcomes of the work and consider the work and its outcomes as suitable for the purposes of this traffic impact assessment, and that
- c. the outcomes of this traffic impact assessment are a true reflection of results of assessment, and that
- d. I believe the recommendations arising from this impact assessment embrace contemporary practice initiatives and will deliver the desired outcomes.

Name	Glen Robert Holdsworth
Qualifications	CPEng, NER, B.Eng.(Civil), M.Eng.Sc.(Highways)
RPEQ No.	4152
RPEQ Competencies	Transport, Traffic and Parking
Postal Address	P O Box 3062 Helensvale Town Centre 4212
Email	gholdsworth@trafficparking.com.au

Signature

Date



21st Dec 2023