Traffic Impact Assessment

The Range Subdivision Moama

Addendum Report

Proposed Retirement Village Stage 12

The Range – Moama

Report 21 July 2023

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Document Control

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1. Background

In March 2020 Peter Meredith Consulting prepare a report assessing the traffic impacts of a proposed 13 Staged residential subdivision development (The Range) of Lot 11 Twenty-four Lane, Moama. The Traffic Impact Assessment Report (TIAR) investigated the traffic impacts on the surrounding road network arising from subdivisions development into residential allotments. The TIAR also included an assessment of the following existing and proposed key intersections:

- Beer Road and subdivision access road
- Twenty-Four Lane and Beer Road
- Twenty-Four Lane and subdivision access road.

It was concluded that the additional traffic generated by the subdivision will have a minimal impact on the existing operations of Twenty-four Lane and Beer Road and the wider road network at year 2033. It was also concluded that the provision of CHRs, BAR and BAL turning treatments at the proposed intersections of Twenty-four Lane and Street A and Beer Road and Street C together with the upgrade of the existing intersection of Twenty-four Lane and Beer Road will ensure safety and allow motorists to negotiate the turning movements with minimal delays.

It was also concluded that the redesign and incorporation of the St Anne's Winery left turn lane (AUL) into the layout of the proposed CHRs intersection treatment of Twenty-four Land and Street A will adequately cater for the existing traffic and B-double movements at the winery.

As part of the approval process the TIAR was submitted to Transport for NSW (TfNSW) for assessment and comment. The following assessment and required mitigation work was received from TfNSW 5 May 2020.
Due to the location of the development site relative to Moama and the surrounding road network it is anticipated that the majority of trips from this site will be towards the east via Perricoota Road for the preliminary stages (Stages 1-6) of the subdivision. However, the later stages (Stages 7-13) will generate traffic through the intersection of Beer Road with the Cobb Highway. As a minimum the future development of the subject site needs to demonstrate and address any potential impact on the operation of this intersection and options for funding of any necessary upgrade.

As the intersection of Beer Road with the Cobb Highway services the existing industrial estate and will also need to accommodate increased light vehicle traffic due to the proposed subdivision the intersection shall be upgraded from the existing auxiliary left-turn treatment (AUL) to a channelised left-turn treatment (CHL). This is required for road safety reasons due to the anticipated increased volumes of vehicle through the intersection and mix of heavy and light vehicles using the intersection in the future. This upgrade of the intersection shall be conditioned to be constructed prior to the issue of the subdivision certificate for Stage 7.

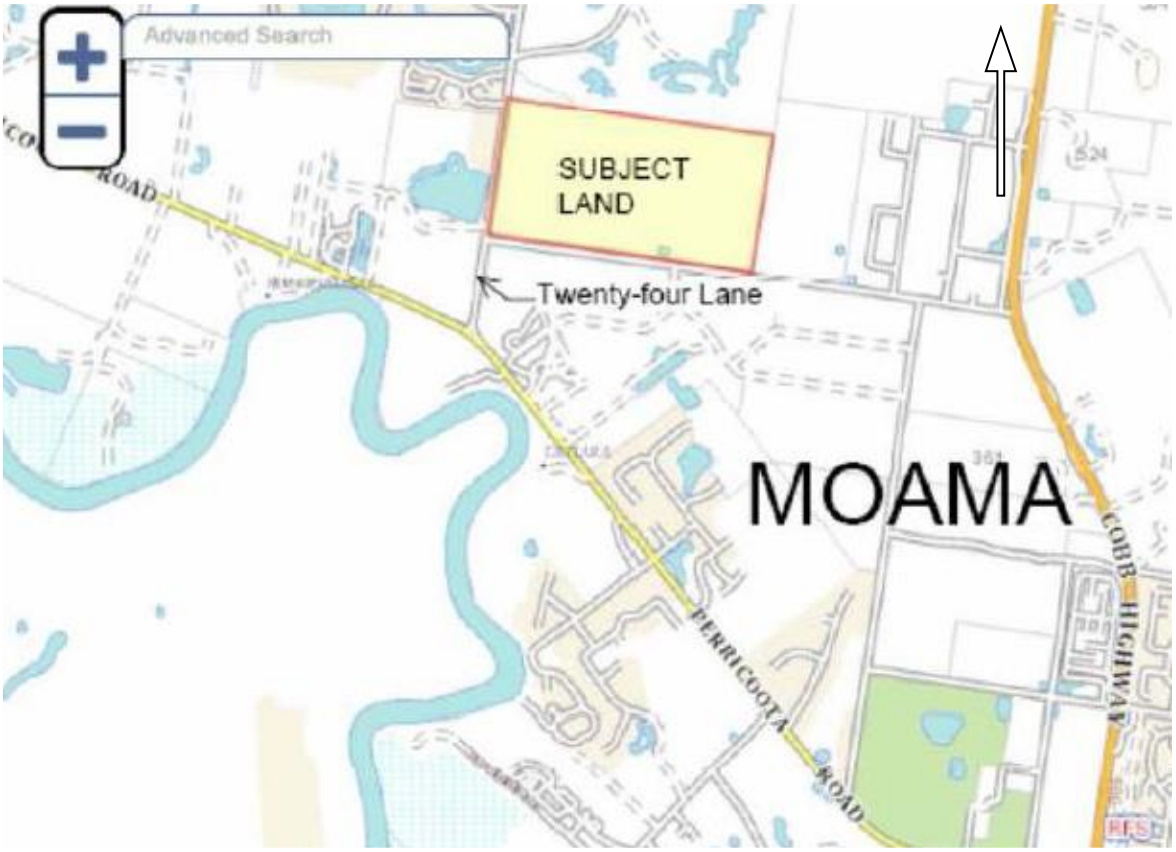
2. Introduction

The proponent is wanting to build a 147-lot retirement village within the approved subdivision, The Range. The retirement village is proposed to cover 54 Torrens Title housing lots in Stage 12 and the southern parts of stages 11 and 13 at The Range.

Habitat Planning are preparing a Development Application (DA) for the proposed retirement village, and as part of the DA process Peter Meredith Consulting has been engaged to prepare an addendum report to the original TIAR to assess the any changes traffic impacts caused by the development of the retirement village.

The assessment uses information provided in the TIAR March 2020, traffic generating development figures, and retirement village parking requirements.

2.1 Locality Plan



2.2 Documentation

The documentation provided for this assessment addendum includes:

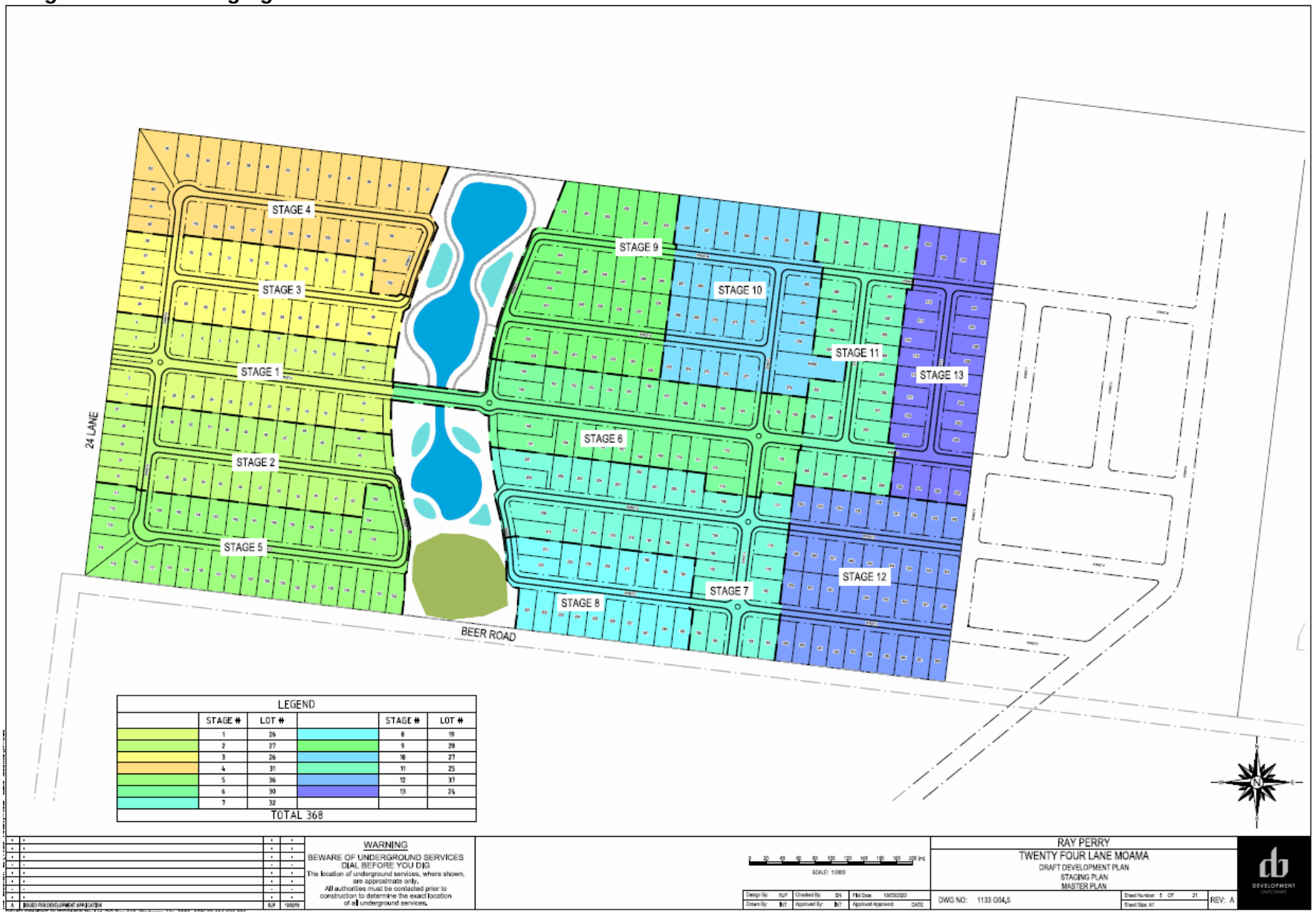
- Traffic Impact Assessment report for a proposed 13 stage residential subdivision by Peter Meredith Consulting March 2020;
- Murray River Council subdivision development approval DA 10.2019.284.1 (284/19);
- The Range Moama – Stage 12 Retirement Living proposal sheets 1 to 6;
- TfNSW assessment and comment DA 10.2019.284.1 (CNR 6362) – proposed 368 LOT residential subdivision, lot 11

2.3 References

References used in the preparation of this traffic impact assessment include the following:

- *Roads and Maritime Services (RMS) Guide to Traffic Generating Developments, Version 2.2 October 2002 for traffic generation predictions.*
- *Department of Planning, Transport and Infrastructure (SA DPTI) trip generation rates.*
- *Austroads Guide to Road Design Part 4A. Unsignalised and Signalised Intersections.*
- *Murray Shire Development Control Plan 2012*

2.4 Existing Subdivision Staging Plan



3. Proposed Retirement Village

The proposed 147-lot retirement village is situated within the approved subdivision, The Range and consists of the following elements:

- The proposed retirement village consists of a high density 147-lots for retirement dwellings;
- Dwellings will be smaller 2 -3 bedrooms with double or single garages;
- The 147-lot retirement village covers 54 Torrens Title housing lots in Stage 12 and the southern parts of stages 11 and 13 of the approved residential subdivision known as The Range;
- The retirement village provides 38 visitor parking spaces;
- A community centre for use by residents with a parking space for deliveries and one accessible parking space;
- Each dwelling will have driveway access from a frontage roadway and garaging for resident vehicles. On dwelling sites visitors can also park off-street in the driveway;
- A central pathway running across the retirement village area will provide a connection to the existing subdivisions footpath network;
- The main access road (The Range Boulevard) is 8.0m wide and the other residential roadways (4) are 6.0m wide;
- Landscaping adjoining the larger parking areas;
- Roadside garbage collection.

Refer to the retirement village layout plans below.

THE RANGE

RETIERMENT LIVING
STAGE 12 - PROPOSAL

CONCEPT PLANS

10			
9			
8			
7			
6			
5			
4			
3			
2			
1	CONCEPT PLANS FOR COMMENT	DSJ	12/12/2022

WARNING

BEWARE OF UNDERGROUND SERVICES
DIAL BEFORE YOU DIG
THE LOCATION OF UNDERGROUND SERVICES, WHERE SHOWN ARE APPROXIMATE ONLY.

ALL AUTHORITIES MUST BE CONTACTED PRIOR TO CONSTRUCTION TO DETERMINE THE EXACT LOCATION OF ALL UNDERGROUND SERVICES

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SCALE 1:1000 @ A1 & 1:2000 @ A3

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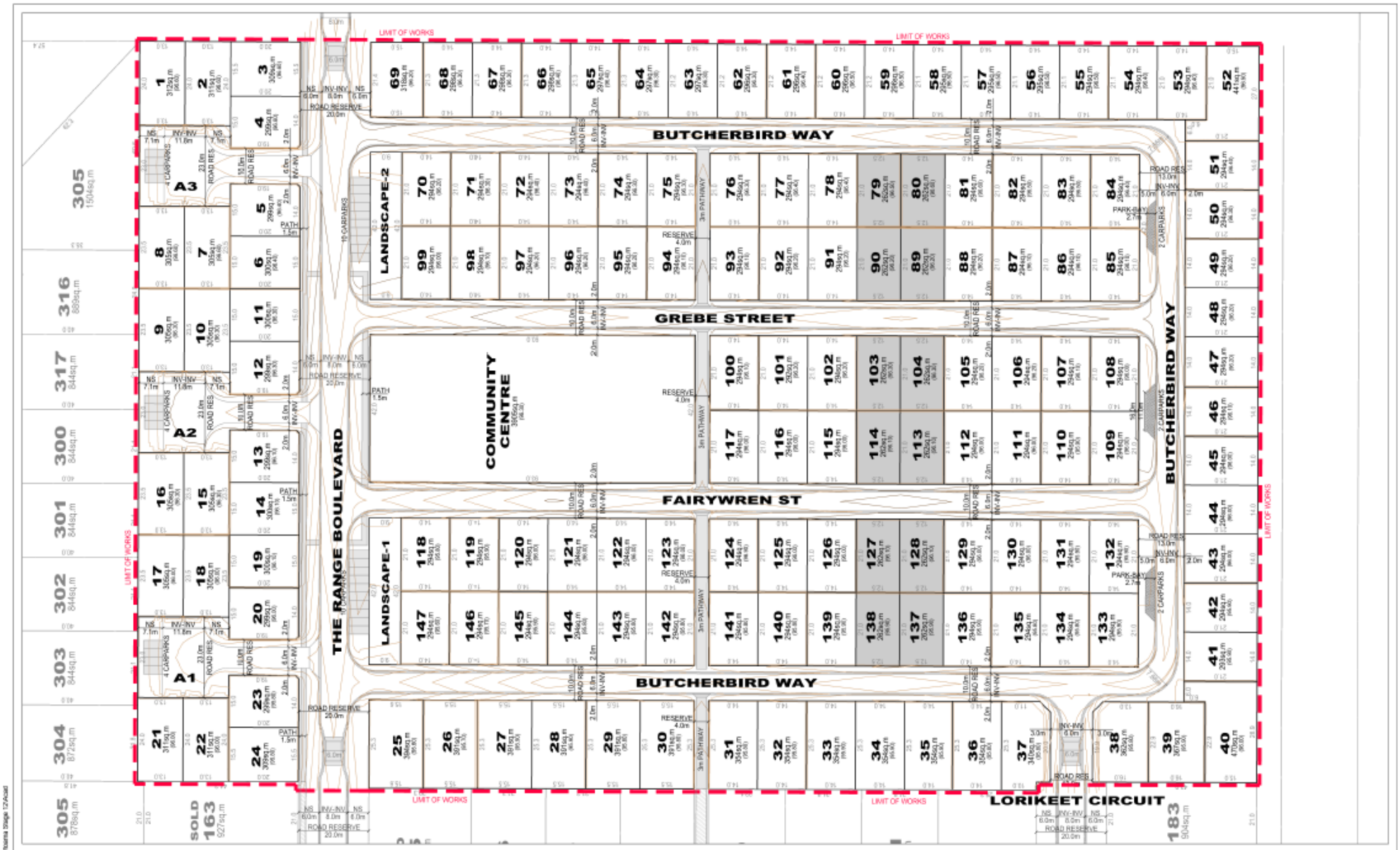
THE RANGE - MOAMA
STAGE12 - RETIERMENT LIVING MOAMA
COVER SHEET

DESIGN BY: DSJ | DRAWN BY: DSJ | CHECKED BY: __ | PLOT DATE: 25/01/2023 | DWG: 1194_RETIERMENT.DWG | SHEET: 1 OF 6 | SHEET SIZE: A1 | REV: A

DEVELOPMENT OUTCOMES



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DESIGN BY:	DSJ	DRAWN BY:	DSJ	CHECKED BY:	—	PLOT DATE:	25/01/2023	DWG:	1194_RETIERMENT.DWG

THE RANGE - MOAMA
STAGE12 - RETIERMENT LIVING
MOAMA
DETAIL LAYOUT PLAN

SHEET:	2	OF	6	SHEET SIZE: A1

REV: A

DEVELOPMENT OUTCOMES

FILE LOCATION Z:\1194 - 24 Lara Moama Stage 12\Acad

4. Traffic Generation from Retirement Village

The impacts of the fully developed retirement village on the local road network and the existing residential subdivision are primarily related to any increase in traffic generated by the 147-lot retirement village in comparison to the traffic generated by the 54 lot residential lots being replaced. A comparison of traffic generation rates for residential dwellings and retirement village dwellings is discussed below.

4.1 Residential Dwellings

Traffic generation levels for residential dwellings are established using the rates suggested in the *RTA Guide to Traffic Generating Developments Technical Direction TDT 2013/04a Updated Traffic Surveys.* Traffic generation rates for Low Density Residential Dwellings (regional areas) are as follows:

- Daily vehicle trips (vpd) = 7.4 per dwelling
- Weekday average evening (PM) peak hour vehicle trips (vph) = 0.78 per dwelling
- Weekday average morning (AM) peak hour vehicle trips (vph) = 0.71 per dwelling

By applying the above rates, the 54 residential lots that are being replaced could potentially generate:

- Daily vehicle trips = 54 lots x 7.4 = **400vpd**
- PM peak hour vehicle trips = 54 lots x 0.78 = **42vph**
- AM peak hour vehicle trips = 54 lots x 0.71 = **39 vph**

4.2 Retirement Village Dwellings

Traffic generation levels for developments are typically determined by reference to published standards with the amount of traffic generated depending on the land use. The following sources has been used to determine traffic generation levels for the retirement village dwellings.

4.2.1 RTA Guide to Traffic Generating Developments

Traffic generation levels for the retirement village can be established using the rates suggested in the RTA Guide to Traffic Generating Developments Section 3.3.4 Housing for aged and disabled persons. The rates suggested for high density housing for aged and disabled persons are as follows:

- Daily vehicle trips = 1 - 2 per dwelling
- Evening peak hour vehicle trips = 0.1 - 0.2 per dwelling

By applying the above rates, the 147-lot retirement village could potentially generate:

- Daily vehicle trips = 147 x 2 = **294vpd**
- Evening peak hour vehicle trips = 147 x 0.2 = **30vph**

4.2.2 South Australian Department of Planning and Infrastructure January 2014.

Retirement style living refers to developments purposely built for retirement community. Residents are typically active and are in possession of private vehicles. Table 7.8 shows the statistical analysis and suggests the following rates per dwelling:

- Daily vehicle trips = 3 per dwelling
- Evening peak hour vehicle trips = 0.3 per dwelling

By applying the above rates, the 147-lot retirement village could potentially generate:

- Daily vehicle trips = 147 x 3 = **441vpd**
- Evening peak hour vehicle trips = 147 x 0.3 = **44vph**

It is concluded that the rates suggested in by South Australian Department of Planning and Infrastructure January 2014 are more appropiate for the proposed 147 lot retirement village at The Range.

4.3 Summary

When comparing the traffic generation for the 54 residential dwellings and the 147 retirement village dwellings there is a difference of plus 2vph during the evening peak for the retirement village. It is concluded that the retirement village will have no impact on the existing road network or the proposed intersection treatments for the proposed The Range subdivision as described in the March 2020 TIAR.

5. Traffic Distribution from Retirement Village

The retirement village road layout is closer to Beer Road, and it is anticipated that the traffic generated by the retirement village will be distributed in a 70/30 split towards Beer Road (via The Range Boulevard) and Twenty-four Lane as described in the Section 5.3 Traffic Distribution and Analysis in the March 2020 TIAR. It is concluded that the retirement village will not change the traffic distribution of the subdivision and the proposed intersection treatments for the subdivision will not be affected.

6. Parking Requirement

Like traffic generation, parking requirements for the proposed retirement village depends on the land use. The Murray Shire Development Control Plan 2012 states that Higher density being generally but not exclusively groups of two or more dwellings on a single lot (regardless of lot size) or single dwellings on small lots (<450m2). Therefore, parking requirements applies to higher density residential developments such as retirement villages. The parking requirement for higher density residential development is give as:

For every 4 dwelling on the site 1 visitor space should be provided. The required visitor parking is calculated as 147/4 = 36.75 **say 37 visitor spaces.**

It is determined that the **38 spaces** provided will suitably cater for any additional demand for visitor parking within the retirement village.

At this stage there are no design details for the community centre. It is anticipated that the community centre for use by residents will include, at a minimum, an off-street parking space for delivery vehicles and one accessible parking space.

7. Conclusions

It is concluded that:

- The proposed retirement village will have no impact on the existing level of traffic generation and there will be no anticipated changes to the traffic distribution on Beer Road or Twenty-Four Lane from traffic generated by the retirement village;
- The are no changes required to the proposed intersection treatments as proposed by the March 2020 TIAR;
- The **38 spaces** provided will suitably cater for any additional demand for visitor parking within the retirement village.

Appendix A

Extract from publications for land use traffic generating development rates

1A. Trip generation rates for assessment of development proposals. *Department of Planning and Infrastructure January 2014.*

1. Introduction

Parsons Brinckerhoff was commissioned by Department of Planning, Transport and Infrastructure (DPTI) to develop a set of vehicle trip generation rates for a range of land uses which may be used to determine traffic impacts associated with proposed development assessment.

The scope of work comprised of collating relevant data from various published resources including the 'Land Use Traffic Generation Guidelines' published by Director-General of Transport, South Australia in 1987, 'Guide to Traffic Generating Developments' published by Roads and Traffic Authority (RTA) in 2002, 'Trip Generation' by Institute of Transportation Engineers (ITE) last updated in 2012 (9th edition) and surveys or studies undertaken by other consultants including Parsons Brinckerhoff.

7.4 Retirement-style living

Retirement-style living refers to developments built purposely for retired community. Residents are typically active with possession of private vehicle(s). Table 7.7 summarises the trip rates collected from the available sources. It should be noted that the trip rates from TRICS has been excluded from further analysis, as rates from TRICS were only provided per resident, and could not be compared to the other source which provided rates per unit dwelling.

It is noted that the daily trip rates from the USA are higher than the rates from the other sources; while daily trip rates from Australia and New Zealand are fairly consistent. Peak hour trip rates appear to have good consistency between the different data sources.

Table 7.7 Trip rates for retirement-style living

Source	Year	Country	Daily trips	Unit	Peak hour trips	Unit	Local relevance	Reliability
Land Use Traffic Generation Guidelines	1987	Australia, SA	2.25	unit	-	-	5	1
Land Development Code Trip Generation Manual for City of San Diego	2003	San Diego USA	4	unit	-	-	1	1
Trips and Parking Related to Land Use Douglass and Abley	2011	New Zealand	2.6	unit	0.3	unit	3	3
ITE Trip Generation 9th Edition	2012	USA	3.68	dwelling	0.27	dwelling	1	5
TRICS	2013	UK	3.7	resident	0.5	resident	-	-

Table 7.8 shows the statistical analysis, including the average and 95% confidence interval, as well as the weighted average calculated using the local relevance and reliability score. The statistical analysis shows that:

- The average daily trip rate and weighted average daily trip rate are both approximately 3 trips per dwelling.
- The average and weighted average peak hour trip rates are both approximately 0.3 trips per dwelling.

The average together with the 95% confidence interval, the weighted average and rates from the available sources, are provided in Figure 7.7 and Figure 7.8 for daily and peak hour, respectively.

Table 7.8 Statistical analysis of trip rates for retirement-style living

		Daily trips		Peak hour trips	
Number of sources		4		2	
Average		3.13		0.29	
Standard Deviation (ō)		0.84		0.02	
2ō (95%)	range	1.45	4.81	0.24	0.33
Weighted average		2.96		0.29	

Appendix B

Traffic Impact Assessment March 2022 - The Range Moama

Insert

Traffic Impact Assessment March 2022

Here

Traffic Impact Assessment

Lot 11 DP 701453 Twenty-Four Lane

Proposed Residential Subdivision

Moama, NSW

Draft Report, 10 March 2020

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1. Executive Summary

Background Information

A planning application for the rezoning of 59.1ha of land described as Lot 11 DP701453, on the corner of Twenty-four Lane and Beer Road, Moama was submitted to Murray River Council in July 2016. The subject land was zoned RU1 Primary Production and the rezoning of the land to R1 General Residential to allow for residential development was successful.

Proposed residential subdivision– Twenty-four Lane, Moama

The Murray River Council has requested that a revised traffic impact assessment report (TIAR) be prepared to support a development application for the proposed residential subdivision of Lot 11 DP 701453, on the corner of Twenty-four Lane and Beer Road, Moama.

Peter Meredith Consulting has been engaged to prepare a report assessing the traffic impacts of a proposed 13 Staged residential subdivision development of Lot 11 Twenty-four Lane, Moama. The revised TIAR investigates the traffic impacts on the surrounding road network arising from subdivision of the site into residential allotments. This includes the following existing and proposed intersections:

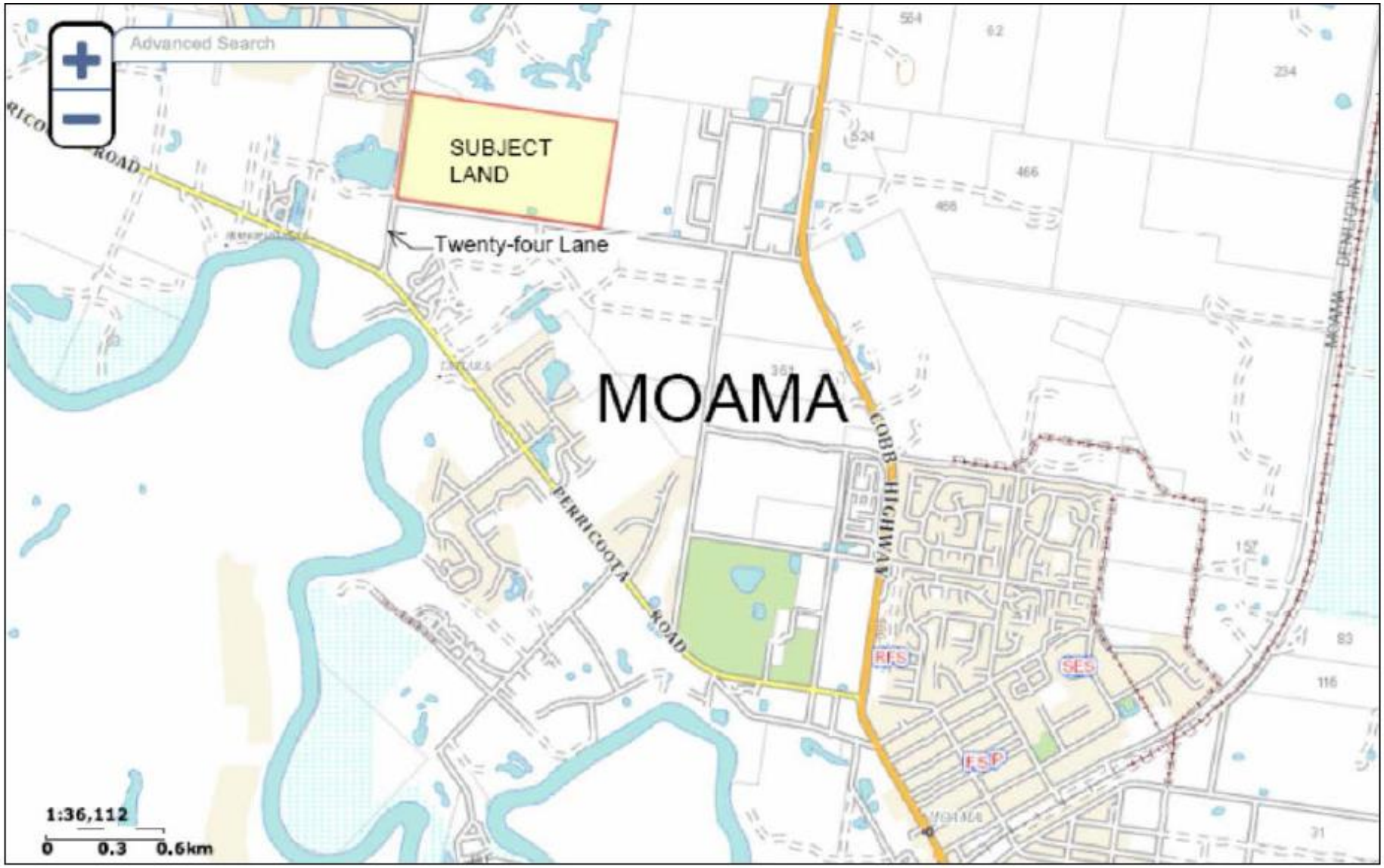
- Beer Road and subdivision access road
- Twenty-Four Lane and Beer Road
- Twenty-Four Lane and subdivision access road.

It is concluded that the additional traffic generated by the subdivision will have a minimal impact on the existing operations of Twenty-four Lane and Beer Road and the wider road network at years 2025 and 2033.

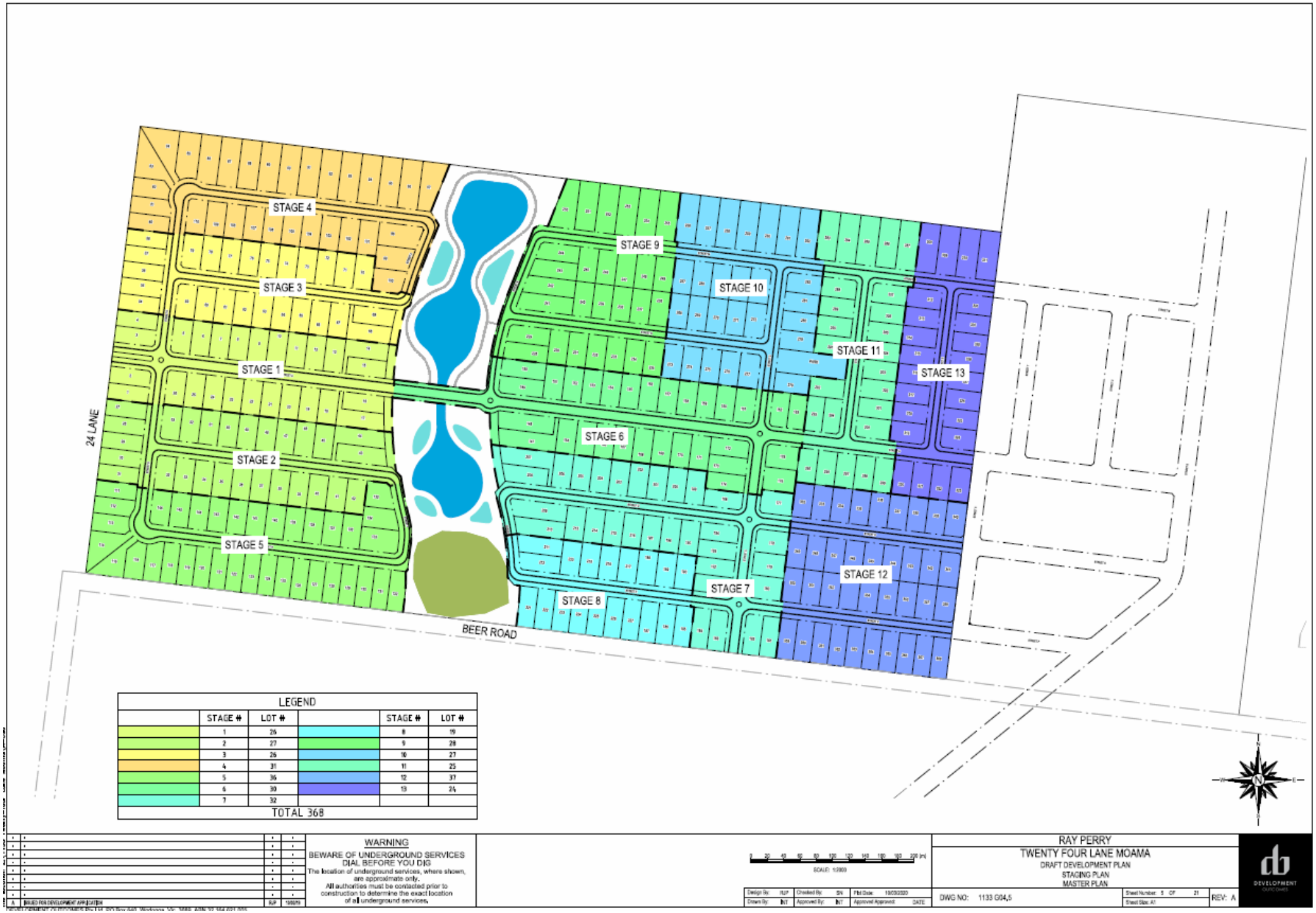
Also, the provision of CHRs, BAR and BAL turning treatments at the proposed intersections of Twenty-four Lane/Street A and Beer Road/Street C together with the upgrade of the existing intersection of Twenty-four Lane and Beer Road will ensure safety and allow motorists to negotiate the turning movements with minimal delays.

It was also concluded that the redesign and incorporation of the St Anne's Winery left turn lane (AUL) into the layout of the proposed CHRs intersection treatment of Twenty-four Land and Street A will adequately cater for the existing traffic and B-double movements at the winery.

1.1 Locality Plan



1.2 Subdivision Staging Plan



1.3 Site Characteristics

Address	Lot 11 DP 701453 Corner Twenty-four Lane and Beer Road, Moama NSW
Road Hierarchy	Twenty Four Lane and Beer Road are local roads under the management of the Murray River Council. Twenty Four Lane connects to Perricoota Road, which is also under the management of the Murray River Council. Beer Road connects to the Cobb Highway (which is under the management of NSW RMS) and Twenty-four Lane.
Proposed Use	Rezoning to R1 General Residential for proposed subdivision.
Access	Site frontage onto Twenty-four Lane and Beer Road via proposed T-junction intersections with turning treatments
Existing Traffic volumes and Speed Environment	**Twenty Four Lane** Average daily traffic 2,213vpd AM peak northbound 61vph southbound 101vph PM peak northbound 104vph southbound 78vph 85th percentile speed 80.3km/h Speed limit 80km/h **Beer Road (near Twenty-four Lane)** Average daily traffic 155vpd AM peak eastbound 8vph westbound 5vph PM peak eastbound 4vph westbound 5vph 85th percentile speed 79.6km/h Speed limit 80km/h
Traffic Generation	Information obtained from RMS Guide to Traffic Generating Developments Technical Direction TDT 2013/04a Updated Traffic Surveys and suggests daily, AM peak vehicle and PM peak movements generated by the subdivision of the site into 368 residential lots as 2,723vpd with AM 261 and PM 287vph (respectively)

1.3 Recommendations

- Murray River Council concur with the locations and turning treatments at the proposed intersections of Twenty-four Lane/Street A and Beer Road/Street C;

- Murray River Council concur with the incorporation of the St Anne's Winery AUL into the layout of the proposed CHRs intersection treatment of Twenty-four Land and Street A

2. Introduction

Peter Meredith Consulting has been engaged to prepare a report assessing the traffic impacts of a proposed 13 Staged residential subdivision development of Lot 11 Twenty-four Lane, Moama. The subject land has recently been rezoned to R1 General Residential to allow for residential development. The Murray River Council has requested a revised traffic impact assessment to support a development application for the proposed residential subdivision.

A revised Traffic Impact Assessment to the satisfaction of Clause 104 & Schedule 3 Traffic-generating development in the State Environmental Planning Policy (Infrastructure) 2007. This document is to include existing intersection of Beer Road and Twenty-four Lane, new intersection of Twenty-four Lane including entrance to across the road and new intersection to Beer Road (if upgrades are required then highlight at how many lots).

The revised TIAR investigates the traffic impacts on the surrounding road network arising from subdivision of the site into residential allotments. This includes the following proposed intersections:

- Existing intersection of Twenty-Four Lane and Beer Road
- Proposed intersection of Twenty-Four Lane and subdivision access road
- Proposed intersection of Beer Road and subdivision access road

The assessment uses existing traffic flow data obtained from manual peak hour traffic counts, on-site observations, traffic generating development figures, and future traffic growth predictions.

2.1 Documentation

The documentation and information provided for this assessment includes:

- Rezoning TIA July 2017 report by Peter Meredith Consulting
- RFI by Murray River Council
- Design plans of the reconstruction of Beer Road, including the intersection of Twenty-four Lane and Beer Road by Murray River Council DWG 2019-0050 sheets 1 to 7 (18/12/2019)

2.2 References

References used in the preparation of this assessment include the following:

- *Roads and Maritime Services (RMS) Guide to Traffic Generating Developments, Version 2.2 October 2002 for traffic generation predictions and Technical Direction TDT 2013/04a Updated Traffic Surveys.*
- *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections.*
- *RMS supplement to Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections.*
- *Austroads Guide to Road Design Part 6: Roadside Design, Safety and Barriers.*
- *Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings*
- Signalised and Unsignalised Intersection Design and Research Aid (SIDRA). SIDRA Intersections 8.0 Plus software.

3. Existing Conditions

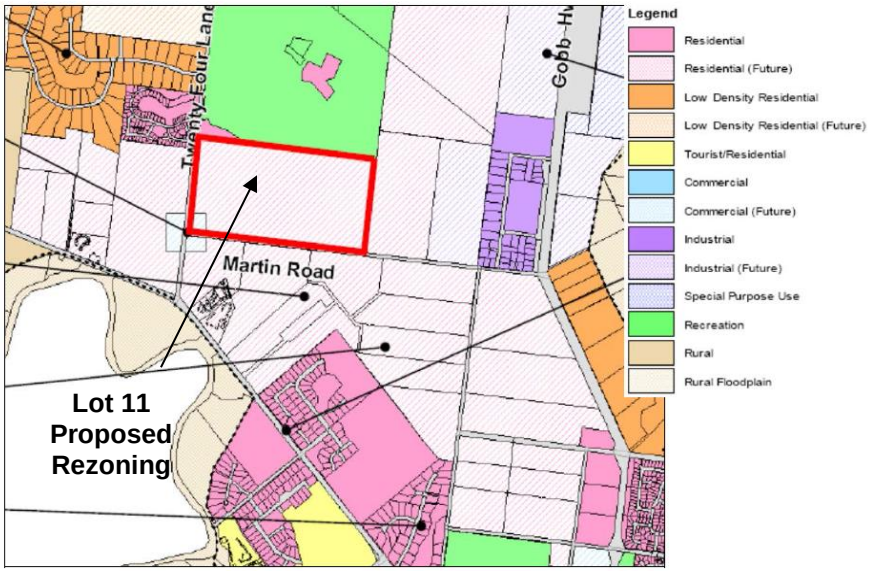
The proposed development is situated on the north east corner of Twenty-four Lane and Beer Road, Moama. The site can be accessed from both roads, and is described as Lot 11 DP 701453.

3.1 Land Use

The proposed development site comprises a large vacant allotment of land described as, Lot 11 DP 701453, Twenty Four Lane, Moama.

The development site has a total area of 59.1 hectares and is currently zoned R1 General Residential under the Murray Local Environmental Plan 2011. The subject land is presently vacant, and has historically been used for agricultural activities.

Surrounding land uses include other agricultural sites, as well as a golf course to the north, residential development to the north-west, tourist resorts and residential development to the south/south-east, and industrial development east of the site.



3.2 Road Network

Twenty Four Lane

Twenty Four Lane forms the western boundary of the site. It runs north from Perricoota Road, and is sealed between Perricoota Road and Tataila Road. It provides access for local traffic from nearby residential and tourist/golf course areas, as well as rural areas further north. It is a local road under the management of the Murray River Council.

Adjacent to the development site Twenty Four Lane has a road reserve width of 24m and consists of the following characteristics:

- An undivided two-way road with a sealed carriageway width of 8.7m;
- Two traffic lanes of 3.5m and a sealed shoulder of 0.95m on both sides;
- Line marked centre and edge lines;
- At the Beer Road intersection reconstruction works are in progress to construct BAR and BAL turning treatments; and
- A shared pedestrian/cyclist path on the western side.

Photo 1 shows the reconstruction in progress of the existing intersection of Twenty-four Lane and Beer Road to include BAR and BAL turning treatments. Photo looking south towards the intersection with Beer Road

Photo 2 looking north bound from approximate location of proposed intersection of Twenty-four Lane and Street A. Photo shows location St Anne's Winery AUL

Photo 3 looking south bound from approximate location of proposed intersection of Twenty-four Lane and Street A. Photo shows start and location St Anne's Winery AUL

Beer Road

Beer Road forms the southern boundary of the site. It runs east/west between the Cobb Highway and Twenty Four Lane, and is sealed for approximately 700m west of the Cobb Highway. The remaining 1.4km is currently under reconstruction and will have a formation width of 14m with a 10m wide sealed pavement. At its eastern end, Beer Road provides access into industrial areas, while further west it provides access to rural properties (as well as providing a link for through traffic between Twenty-four Lane and the Cobb Highway).

Photo 4 shows Beer Road under reconstruction looking east from approximate location of proposed intersection of Beer Road and Street C

Photo 5 shows Beer Road under reconstruction looking west from approximate location of proposed intersection of Beer Road and Street C

3.3 Speed Environment

In the vicinity of the development site, Twenty-Four Lane has a posted speed limit of 80km/h. Beer Road has no speed limit signage, and hence the default rural speed limit of 100km/h applies but it is expected that a new speed limit of 80km/h will be introduced.

3.4 Existing Traffic

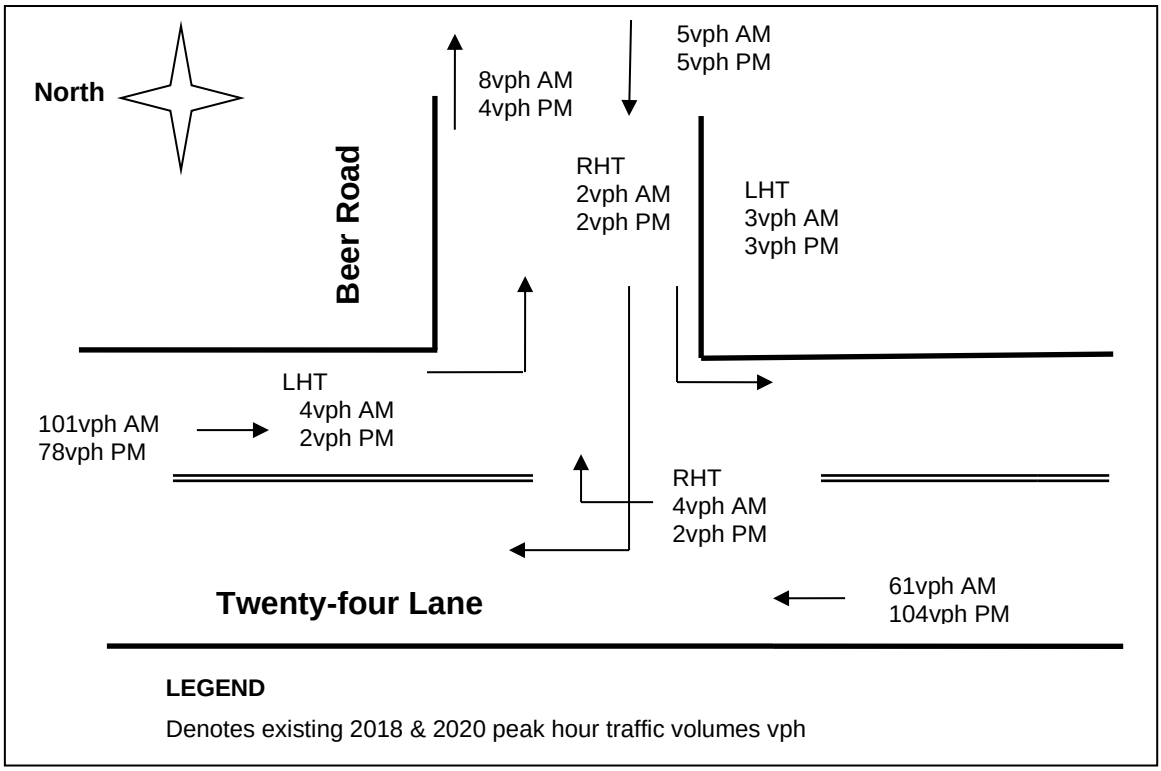
3.4.1 Twenty-four Lane and Beer Road

Existing mid-block traffic data from 2018 and 2020 was provided by Murray River Council for Twenty-four Lane and Beer Road respectively. The results of the traffic counts are shown in tables in Appendix A. A summary of the average daily traffic (ADT) and peak hour traffic volumes (vph) in each direction and speed profile are listed in the table below:

Location	ADT 5-day week	AM peak 8.00-9.00	PM peak 5.00-6.00	85th % speed In both directions.
Twenty-Four Lane 2018	2213 vpd	162 vph	183 vph	80.3 km/h
(North of Beer Rd)				
Northbound	1116 vpd	61 vph	104 vph	
Southbound	1096 vpd	101 vph	78 vph	
Beer Road 2020	155 vpd	11 vph	9 vph	79.6 km/h
(west end near Twenty-Four Lane)				
Eastbound	84 vpd	8 vph	4 vph	
Westbound	71 vpd	5 vph	5 vph	

A summary of the existing peak hour turning movements at the intersection of Twenty-four Lane and Beer Road are shown in Figure 1 below. Note: turning volumes at Beer Road have been assumed as a 50/50 split.

Figure 1: Existing 2018 and 2020 AM and PM peak traffic flows at the intersection of the Twenty-four Lane and Beer Road



The intersection was modelled to determine the existing level-of-service (LOS) using the intersection analysis program SIDRA Intersection 8.0. The analysis determines the future capacity and operational level-of-service (LOS) of the intersection movements. *Refer to Table 3.1 below for the Austroads definitions of level-of-service.*

Full results for the site are included in Appendix B, however the key outcomes may be summarised as follows:

All movements on the Twenty-four Lane and Beer Road operate well within capacity in both the AM and PM peak periods with a LOS A for all movements. Minimal queuing and delays are experienced, with the worst being on right hand turns. *Refer to Appendix B for SIDRA movement summaries.*

3.4.2 St Anne's Winery

The proposed access road (Street A) to the new subdivision connecting to the eastern side of Twenty-Four Lane is approximately 75m south of the St Anne's Winery access driveway located on the western side of Twenty-four Lane. To help with traffic movement calculations the traffic volumes using the St Anne's Winery were provided by St Anne's Winery Management. The traffic volumes are shown in the table below:

Location	ADT 5-day week	AM peak 7.30-8.30	PM peak 4.00-5.00
St Anne's Winery access driveway at Twenty-Four Lane 2020	50 vpd (Staff 50)	25vph	25 vph
Northbound (Left-in/out)		22 vph	3 vph
Southbound (right-in/out)		3 vph	22 vph

Note: Volumes in one B-double movement per day north bound left ingress and south bound right turn egress.

Table 3.1: Level-of-service (LOS) for capacity and operational analysis for all types of road facilities

Level of service A	A condition of free-flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.
Level of service B	In the zone of stable flow where drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is a little less than with level of service A.
Level of service C	Also, in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.
Level of service D	Close to the limit of stable flow and approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational problems.
Level of service E	Traffic volumes are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause breakdown.
Level of service F	In the zone of forced flow, where the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow breakdown occurs, and queuing and delays result.

3.5 Public Transport

Public buses operate in the Moama area, with a total of five routes connecting areas within Moama and Echuca. This includes a service connecting Twenty-four Lane with the Moama and Echuca CBDs via Perricoota Road and the Cobb Highway. This route currently operates three times per day, Monday to Friday.

3.6 Pedestrians and Cyclists

Twenty-four Lane has a shared path for pedestrians and cyclists on its western side opposite the site. This provides access south to Perricoota Road, where it connects into the broader path network providing access into the Moama CBD and beyond. Beer Road has no pedestrian or cyclist facilities at present; while the Cobb Highway only has facilities further south near the Moama CBD.

4. Proposed Development

The proposed residential subdivision consists of a 13-stage development and consists of the following main elements:

- The 13-stage 368 lot low density residential subdivision consists of the following stages:
  Stage 1 - 26 lots
  Stage 2 – 27 lots
  Stage 3 – 26 lots
  Stage 4 – 31 lots
  Stage 5 – 36 lots
  Stage 6 – 30 lots
  Stage 7 - 25 lots
  Stage 8 – 26 lots
  Stage 9 – 28 lots
  Stage 10 – 27 lots
  Stage 11 – 25 lots
  Stage 12 – 37 lots
  Stage 13 – 24 lots

The proposed indicative timing of the new 13 Stage subdivision is given as:

Stages 1 to 5: 2021 to 2024 inclusive
Stages 6 to 10: 2025 to 2029 inclusive
Stages 10 to 13: 2029 to 2033

- Access to stages 1 to 5 (year 2021/24) of the subdivision will be from Street A (the major circulation roadway from Stage 1 to Stage 12) with and initial 2 x 6.0m median separated traffic lanes connecting to Twenty-four Lane and then a single two-way 11.6m wide roadway after Street D. The intersection of Twenty-four Lane and Street A with turning treatments will be constructed at Stage 1;

- After the completion of Stage 5 Street A will be extended across the lagoon area to service Stage 6;

- The construction of Stage 7 will see a connection to Beer Road with Street C a single two-way 11.6m wide circulating roadway. The intersection of Beer Road and Street C with turning treatments will be constructed at Stage 7;

- The remaining Stages 8 to 13 will then be constructed with initial access from Streets A and C;

- The major circulation roadways have been designed so that they can be extended and incorporated into future staging of the subdivision. Other Streets connected to the circulating Streets A and C are 8.6m and 6.6m wide roadways. All cross round intersections will be controlled with small roundabouts;

- There will be no direct access from lots onto Twenty-four Lane or Beer Road;

- The major and minor circulation roadway caters for a future designated public/school bus route and provides a 1.2m wide footpath as pedestrian access for the subdivision;

- A 3.5m wide gravel walking path is included in the Lagoon area;

- The proposed new T-junction intersections of Twenty-Four Lane/ Street A and with Beer Road/Street C allows for right and left turning movements. The Twenty-Four Lane/ Street A intersection will also include the redesign and connection of St Anne's Winery access driveway including the provision for the existing AUL to accommodate B-double vehicles.

5. Future Traffic Growth and Analysis

5.1 Existing Traffic Growth

A standard 2% per annum traffic growth has been applied to the existing and future volumes to allow for the increase in background traffic volumes arising from general increases across the network. This has been calculated over 13 years to year 2033 (ie. The year of full development of the proposed development).

5.2 Traffic Generation by Proposed Development

Traffic generation levels for the proposed residential subdivision are established using the rates suggested in the *RMS Guide to Traffic Generating Developments Technical Direction TDT 2013/04a Updated Traffic Surveys.* Traffic generation rates for Low Density Residential Dwellings (regional areas) will be used. Assumed generation rates are as follows:

- Daily vehicle trips (vpd) = 7.4 per dwelling
- Weekday average evening (PM) peak hour vehicle trips (vph) = 0.78 per dwelling
- Weekday average morning (AM) peak hour vehicle trips (vph) = 0.71 per dwelling

By applying the above rates, the proposed fully developed subdivision (by year 2033) could potentially generate:

- Daily vehicle trips = 368 lots x 7.4 = **2,723 vpd**
- PM peak hour vehicle trips = 368 lots x 0.78 = **287 vph**
- AM peak hour vehicle trips = 368 lots x 0.71 = **261 vph**

The traffic generation can be further broken down into stages of the development and the relevant access points:

Stages 1 to 6 – 176 lots

Access to these lots will be via a T-junction intersection at Twenty-four Lane and Street A constructed at Stage 1 anticipated by 2021. By applying the above rates, the proposed fully developed stages 1 to 6 (by year 2025) could potentially generate:

- Daily vehicle trips = 176 lots x 7.4 = **1,302 vpd**
- PM peak hour vehicle trips = 176 lots x 0.78 = **137 vph**
- AM peak hour vehicle trips = 176 lots x 0.71 = **125 vph**

Stages 7 to 13 – 192 lots

Access to these lots will be via a T-junction intersection at and Street C constructed in 2021.

By applying the above rates, the proposed fully developed stages 7 to 13 (by year 2033) could potentially generate:

- Daily vehicle trips = 192 lots x 7.4 = **1,421 vpd**
- PM peak hour vehicle trips = 192 lots x 0.78 = **150 vph**
- AM peak hour vehicle trips = 192 lots x 0.71 = **136 vph**

Note: For ease of understanding AM peak volumes will be used in calculations.

5.3 Traffic Distribution and Analysis

Traffic generated by the development will be distributed throughout the network depending on origin/destination and route choices. This can be estimated by assessing likely origins and destinations based on existing traffic flows, previous studies and land uses.

The following assumptions have been made in determining the distribution of traffic:

Assumption	Reasoning
Twenty-four Lane and Street A Intersection • In the AM peak, 70% (88 vph) of traffic generated by the subdivision will be outbound, and 30% (37 vph) inbound. In the PM peak, the corresponding split will be 30/70 with 96vph inbound and 41vph outbound. • It is anticipated that there will be an outbound/inbound 90/10 left/right turn split during the AM peak and reversed during the PM peak.	Industry standard based on RTA Guide to Traffic Generating Developments and also review of existing traffic movement data. Likely origins and destinations based on existing traffic flows, previous studies and land uses.

Assumption	Reasoning
• St Anne's access has different peak AM and PM traffic flows to subdivision movements. Allow 70% of actual traffic volumes to coincide with subdivision peak traffic times	St Anne's AM (7.30-8.30) PM (4.00-5.00)
Twenty-four Lane Beer Road Intersection Of the AM 79 vph heading east on Twenty-four Lane 30% (24 vph) will turn left onto Beer Road and head south bound towards the Cobb Highway. In the PM 11vph (30% of 37vph) will turn left onto Beer Road. The reverse will occur respectively for AM and PM peaks	Likely origins and destinations based on driving to commercial and industrial employment at the Cobb Highway industrial precincts.
Beer Road and Street C Intersection • In the AM peak, 70% (95 vph) of traffic generated by the subdivision will be outbound, and 30% (41 vph) inbound. In the PM peak, the corresponding split will be 30/70 with 105vph inbound and 45vph outbound.	Likely origins and destinations based on existing traffic flows, previous studies and land uses.
• It is anticipated that there will be an outbound/inbound 90/10 left/right turn split during the AM peak and reversed during the PM peak;	Likely origins and destinations based on existing traffic flows.
• Of the 10% heading west towards twenty-four Lane it is anticipated that there will be a 50/50 right/left turn split during the AM and PM peaks.	Likely origins and destinations based on existing traffic flows,

These assumptions have been used to determine the additional traffic generated at the proposed intersections of Twenty-four Lane/Street A and Beer Road/Street C and the additional traffic likely to be generated at Twenty-four Lane/Beer Road.

A summary of the proposed and additional turning movements for each intersection are shown in Figure 2, Figure 3 and Figure 4, below.

Figure 2: Future AM and PM 2025 peak traffic flows generated by full development at the intersection of the Twenty-four Lane and Street A

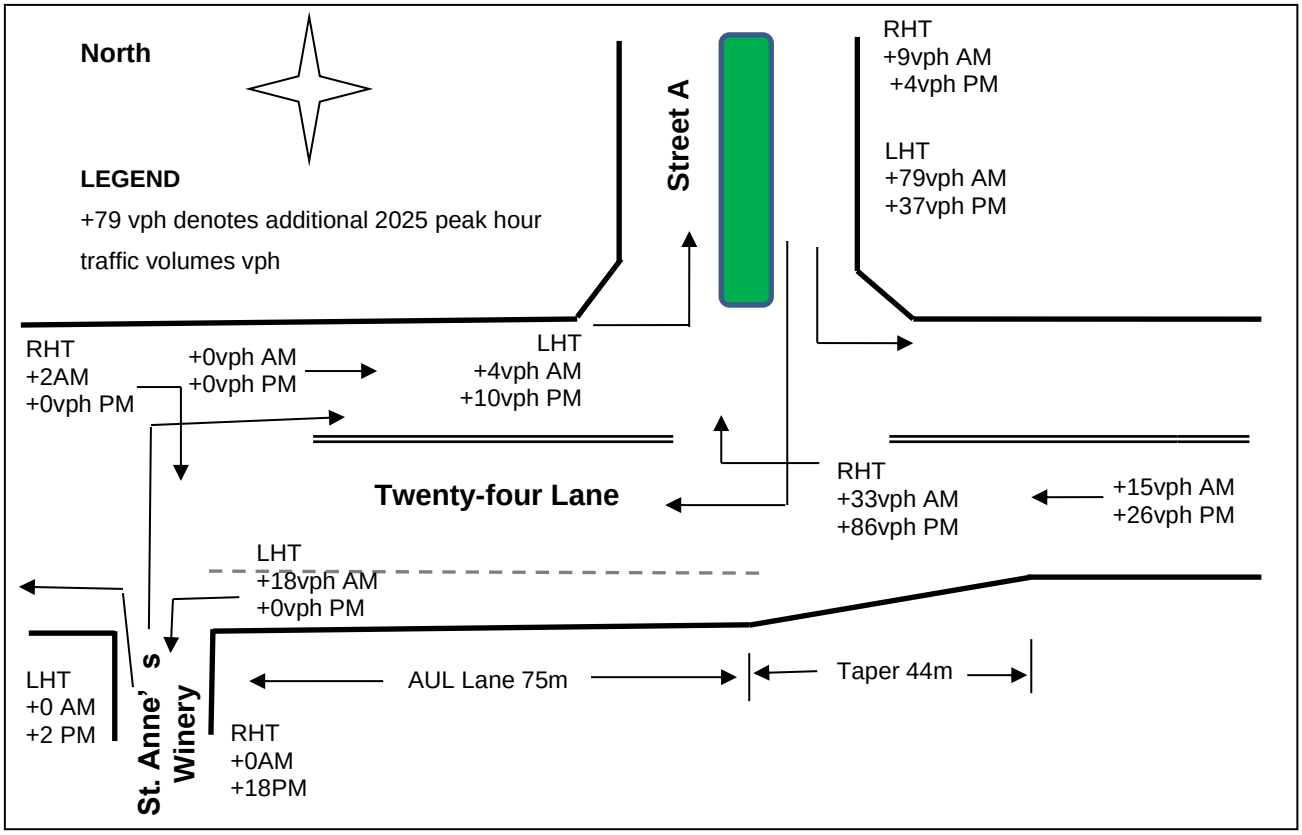


Figure 3: Future AM and PM 2033 peak traffic flows generated by full development at the intersection of the Beer Road and Street C

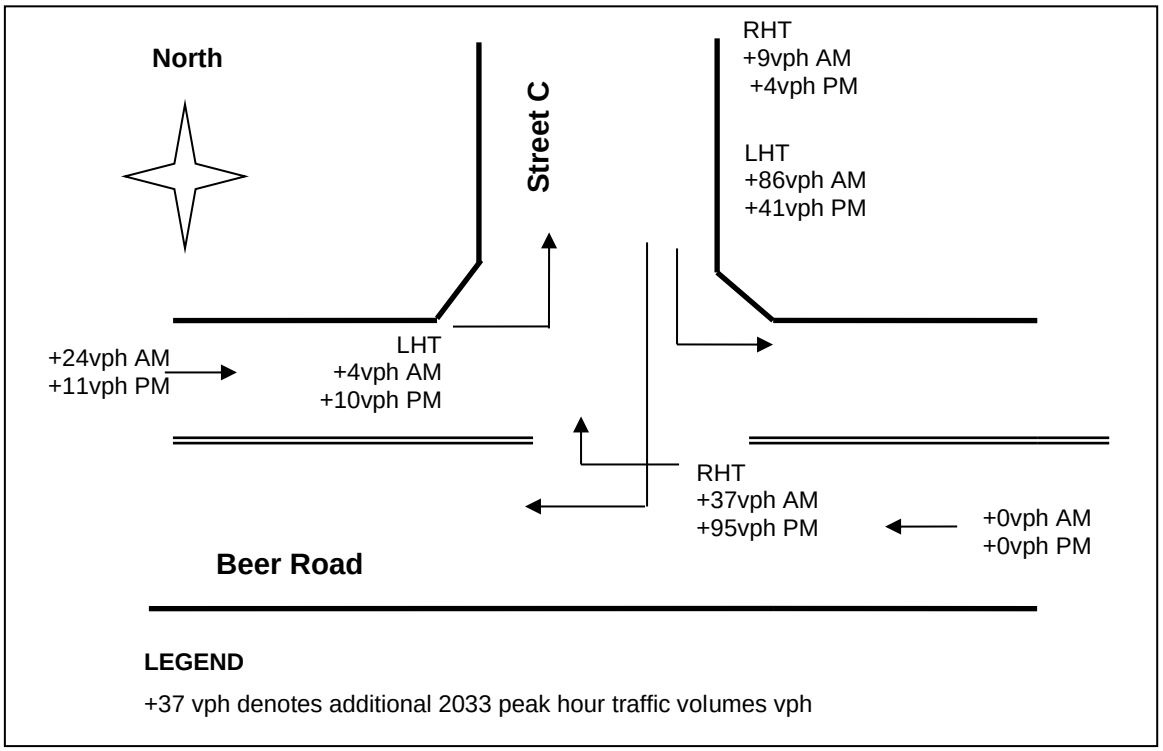
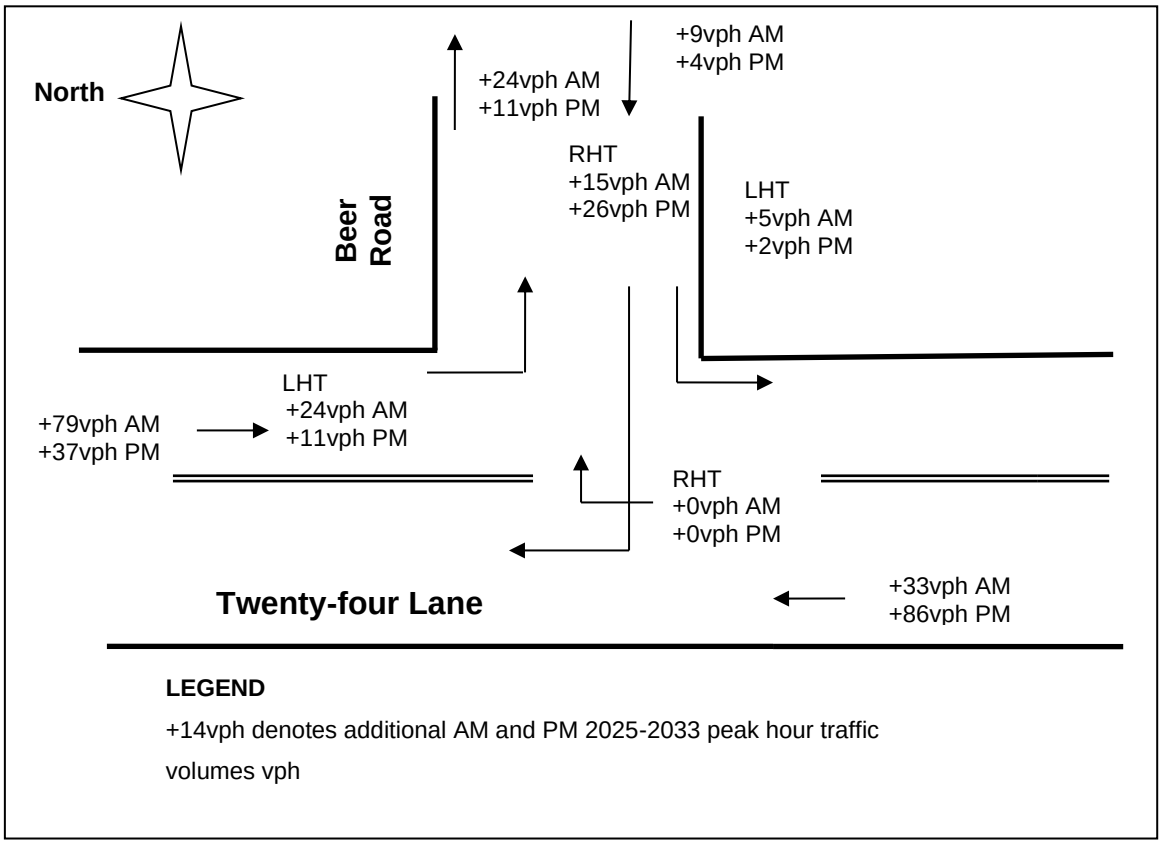


Figure 4: Future additional 2025-2033 AM and PM peak traffic flows at the intersection of the Twenty-four Lane and Beer Road



5.4 Intersection Turning Treatments Twenty-four Lane and Beer Road

Applying the generated and distribution traffic volumes shown above in Figures 2, 3 and 4 indicates that warrants are met for turning treatments in accordance with *AGTM Part 6: Intersections, Interchanges and Crossings Section 2.3.6 Warrants for BA, AU and CH Turn Treatments.* Figure 2.26 provides guidance on minimum preferred turn treatments for roads with design speeds less than 100km/h but greater than 70km/h. Analysis indicates that a CHR(s) right-turn (red line) and BAL left-turn (blue line) treatments are required for the intersection of Twenty-four Lane and Street A. In addition, analysis indicates that BAR right-turn (red line) and BAL left-turn (blue line) treatments are required for the intersection of Beer Road and Street C. *Refer to calculations for* $\boldsymbol{Q_M}$ *the major road traffic volume parameter is shown in Figure 2.27 below.*

To ensure the safe operation of vehicles turning at the proposed T-junction intersection of Twenty-four Lane and Street A an CHRs for right turning vehicles in accordance with *ARDG Part 4A Unsignalised and Signalised intersections Figure 7.7: Urban CHR(S) treatment on a two-lane road* should be provided and a BAL for left turning vehicles in accordance with *ARDG Part 4A Unsignalised and Signalised intersections Figure 8.2: Rural basic left-turn treatment (BAL)* should also be provided.

To ensure the safe operation of vehicles turning at the proposed T-junction intersection of Beer Road and Street C a BAR in accordance with *ARDG Part 4A Unsignalised and Signalised intersections 7.5.1 Urban Basic Right-turn Treatment (BAR) and BAL* in accordance with *Figure 8.2: Rural basic left-turn treatment (BAL)* should also be provided. Refer to Figure 5, 6 and 7 below.

Figure 2.26 Warrants for turn treatments on major roads at unsignalized intersections

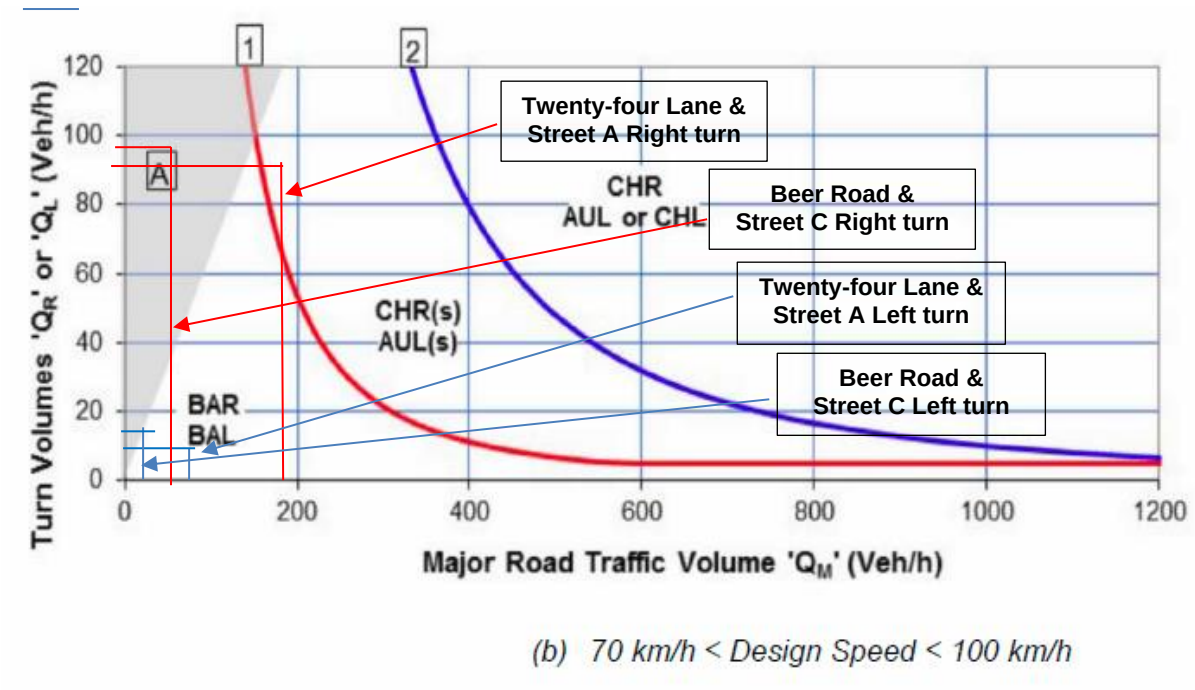
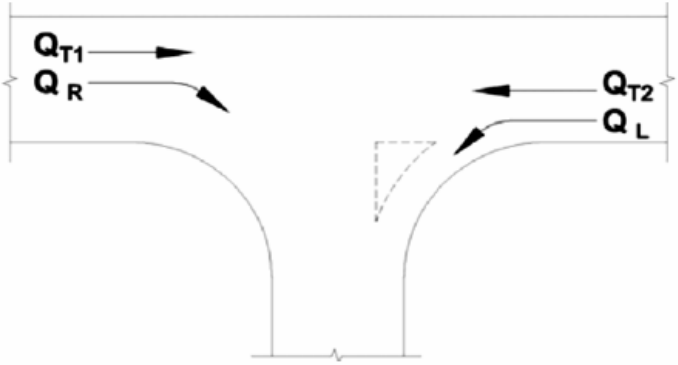


Figure 2.27: Calculation of the major road traffic volume Qm



Road type	Turn type	Splitter island	Q_M (veh/h)
Two-lane two-way	Right	No	= $Q_{T1} + Q_{T2} + Q_L$
		Yes	= $Q_{T1} + Q_{T2}$
	Left	Yes or no	= Q_{T2}

5.4.1 Calculations for QM

Twenty-four Lane and Street A T-junction intersection

Twenty-four Lane right turn into Street A (PM north bound worst-case scenario)

Q_R = 86vph

$Q_M = Q_{T1} + Q_{T2} + Q_L$

Q_M = 104 + 78 + 11 = 193vph

Twenty-four Lane left turn into Street A (PM south bound worst-case scenario)

Q_L = 4vph

$Q_M = Q_{T2}$

Q_M = 79 = 79vph

Beer Road and Street C T-junction intersection

Beer Road right turn into Street C (PM north bound worst-case scenario)

Q_R = 95vph

$Q_M = Q_{T1} + Q_{T2} + Q_L$

Q_M = 14 + 5 + 24 = 43vph

Beer Road left turn into Street C (PM south bound worst-case scenario)

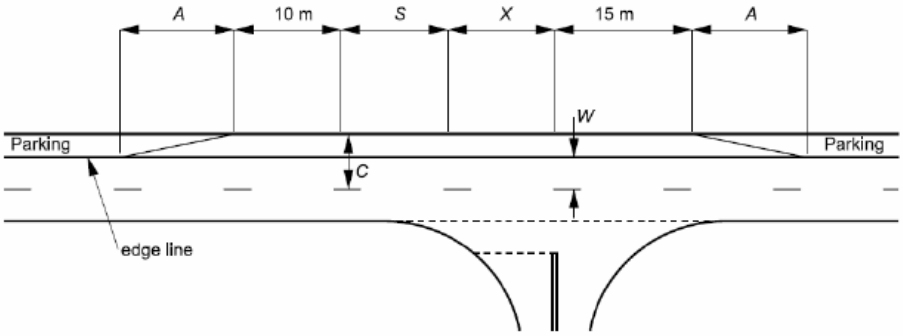
Q_L = 10vph

$Q_M = Q_{T2}$

Q_M = 15 = 15vph

Figure 5: Urban Basic Right-turn Treatment BAR

Figure 7.6: Basic right-turn treatment (BAR) for a two-lane urban road



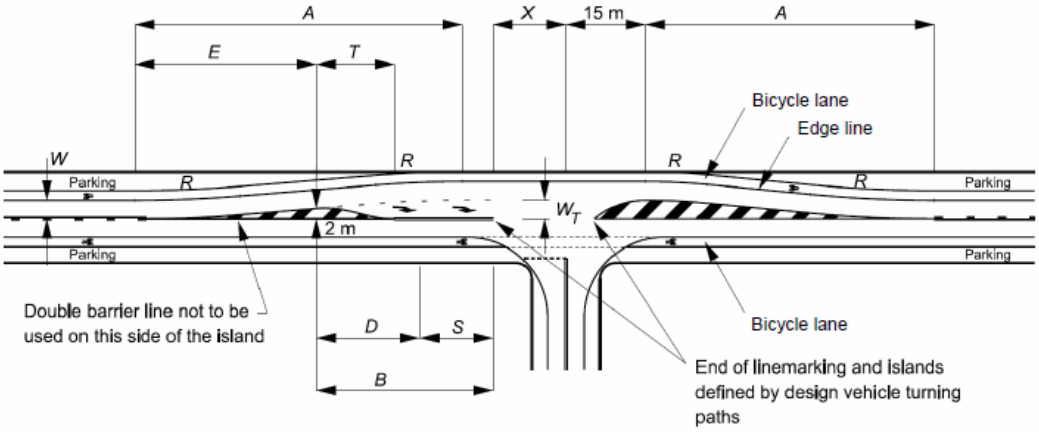
Notes: This diagram does not show any specific bicycle facilities. Where required bicycle facilities should be provided in accordance with this Part.

The dimensions of the treatment are defined thus:

- *W* = *Nominal through lane width (m) (including widening for curves). Width to be continuous through the intersection.*
- *C* = *On straights* – *6.0 m minimum*
  – *6.5 m minimum for 19 m semi-trailers and B-doubles*
  – *7.0 m minimum for Type 1 and Type 2 road trains*
  On curves – *widths as above + curve widening (based on widening for the design turning vehicle plus* – *widening for the design through vehicle).*
- *A* = $\frac{0.5V(C-W)}{3.6}$
  Increase length A on tighter curves (e.g. where side friction demand is greater than the maximum desirable). Where the design through vehicle is larger than or equal to a 19 m semi-trailer, the minimum speed used to calculate A is 80 km/h.
- *V* = *Design speed of major road approach (km/h).*
- *S* = *Storage length to cater for one design turning vehicle (m) (minimum length 12.5 m).*
- *X* = *Distance based on design vehicle turning path, refer to Design Vehicles and Turning Path Templates (Austroads 2013f).*

Figure 6: Urban Channelised T-junction – Short Lane Type CHR(S)

Figure 7.7: Urban CHR(S) treatment on a two-lane road



Notes:

This layout includes bicycle lanes. The layout may be used without providing bicycle lanes if insufficient space is available to accommodate them. If midblock bicycle lanes exist in the latter case, alternative treatments must be provided for cyclists to negotiate the intersection (e.g. a separate bicycle path on the nature strip).

Islands are to comprise linemarking only (i.e. no raised or depressed medians). Diagonal rows of raised reflective pavement markers within the painted island may be used to improve the delineation of the diagonal pavement markings.

The dimensions of the treatment are defined thus:

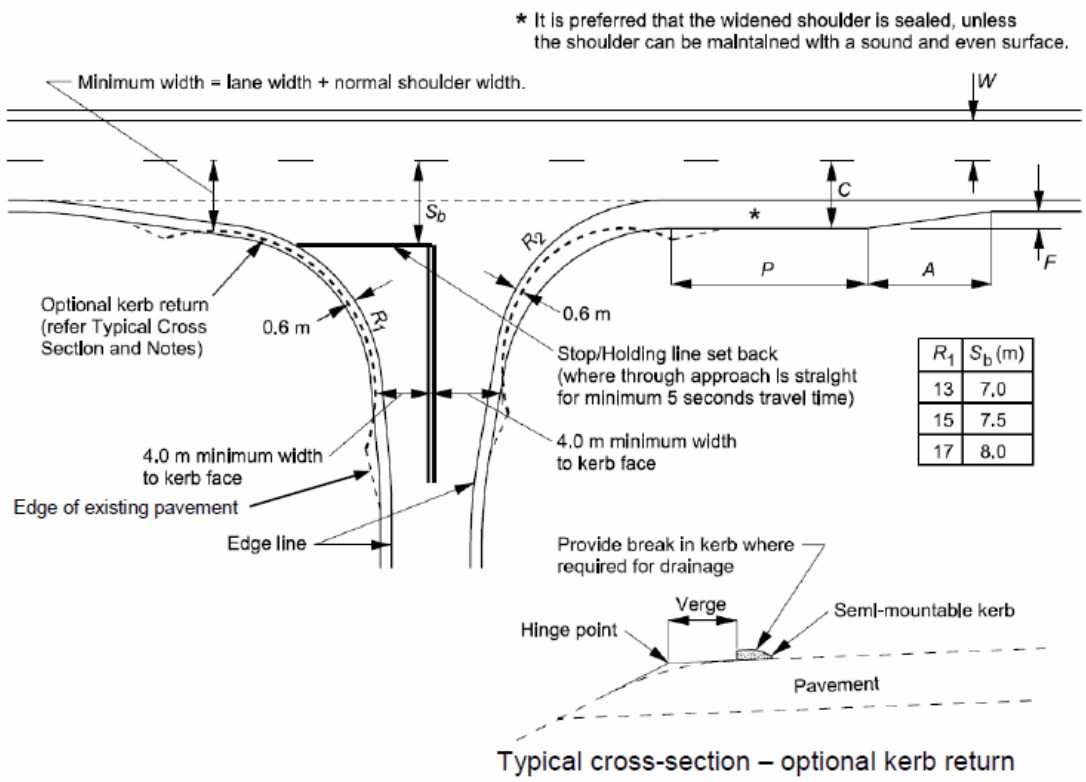
- W = *Nominal through lane width (m) (incl. widening for curves). For a new intersection on an existing road, the width is to be in accordance with the current link strategy.*
- W_T = *Nominal width of turn lane (m) (incl. widening for curves based on the design turning vehicle) = 3.0 m minimum.*
- B = *Total length of auxiliary lane including taper, diverge/deceleration and storage (m).*
- E = *Distance from start of taper to 2.0 m width (m) = (A/W$_T$) x 2.*
- T = *Physical taper length (m) given by Equation 5 being:* $T = \frac{0.33VW_T}{3.6}$
- R = *Radius (m).*
- S = *Storage length to cater for one design turning vehicle (m).*
- V = *Design speed of major road approach (km/h).*
- X = *Distance based on design vehicle turning path, refer to Design Vehicles and Turning Path Templates (Austroads 2013f).*

Note: Values of A, D, R and T are shown in Table 7.1.

Source: Department of Main Roads (2006)[31].

Figure 7: Rural Basic Left-turn Treatment (BAL)

Figure 8.2: Rural basic left-turn treatment (BAL)



R_1	S_b (m)
13	7.0
15	7.5
17	8.0

Notes:

- *R_1 and R_2 are determined by the swept path of the design vehicle.*
- *The dimensions of the treatment are defined thus:*

W = *Nominal through lane width (m) (including widening for curves).*

C = *On straights – 6.0 m minimum.*
On curves – 6.0 m plus curve widening (based on widening for the design turning vehicle plus widening for the design through vehicle).

$A = \frac{0.5VF}{3.6}$

V = *Design speed of major road approach (km/h).*

F = *Formation/carriageway widening (m).*

P = *Minimum length of parallel widened shoulder (Table 8.1).*

S_b = *Setback distance between the centre of the major road and the give way or stop line in the minor road.*

5.5 Capacity of Intersections at Twenty-four Lane and Beer Road

A SIDRA analysis of the operation of the following existing and future T-junction intersections with CHRs and BAL treatments was undertaken for the existing, generated and future additional traffic flows:

- Twenty-four Lane and Street A with CHRs and BAL treatments, including St Anne's Winery access (2025);
- Beer Road and Street C with BAR and BAL treatments (2033);
- Twenty-four Lane and Beer Road (2025)

The analysis determines the future capacity and operational level-of-service (LOS) of the intersection movements. *Refer to Table 3.1 above for the Austroads definitions of level-of-service.*

A brief summary of the SIDRA results is listed below:

Twenty-four Lane and Street A including St Anne's Winery driveway (2025)
All movements on the Twenty-four Lane and Street A operate well within capacity in both the AM and PM peak periods with a LOS A for all movements, except for the right turn egress in the PM from the St Anne's driveway with a LOS of B. In general, minimal queuing and delays are experienced, with the worst being on right hand turns.

Beer Road and Street C (2033)
All movements on the Beer Road and Street C operate well within capacity in both the AM and PM peak periods with a LOS A for all movements. In general, minimal queuing and delays are experienced, with the worst being on right hand turns.

Twenty-four Lane and Beer Road (2025)
All movements on the Twenty-four Lane and Beer Road operate well within capacity in both the AM and PM peak periods with a LOS A for all movements. In general, minimal queuing and delays are experienced, with the worst being on right hand turns.

It is concluded that the additional traffic generated by the subdivision will have a minimal impact on the existing operations of Twenty-four Lane and Beer Road and the wider road network. In additional the provision of turning treatments at the proposed and existing intersections will ensure safety and allow motorists to negotiate the turning movements with minimal delays. *Refer to Appendix B for SIDRA movement summaries.*

6. Impacts & Mitigating Works

The impacts of the proposed subdivision on through-traffic on Twenty-four Lane and Beer Road are primarily related to the low speed turning manoeuvres at the proposed and intersections. The impacts are quantified below and appropriate mitigating works are recommended, if required.

6.1 Sight Distance

The existing speed limits on Twenty-four Lane and Beer Road are 80km/h. The minimum safe intersection sight distance (SISD) as set out in the *Austroads Guide to Road Design Part 4A: Section 3 Sight Distance, Table 3.2* for a design speed of 80km/h is 181m for a reaction time of 2.5 seconds. These criteria are satisfied at the proposed T-junction intersections of Twenty-four Lane/Street A and Beer Road/Street C in both directions, with measured inter-visible sight distances of over 300m in both directions at both intersections. *Refer Photos 2 to 5.*

6.2 St Anne's Winery Driveway

The proposed access road (Street A) to the new subdivision connecting to the eastern side of Twenty-four Lane is approximately 75m south of the St Anne's Winery access driveway located on the western side of Twenty-four Lane. St Anne's Driveway has an existing 75m long AUL turning lane that caters for B-double operations to and from the winery. CHRs and BAL turning treatments are proposed at the intersection of Twenty-four Land and Street A. Traffic analysis indicates that there will be minimal impact to traffic operations at the intersection of Twenty-four Lane and Street A and including St Anne's Winery. However, to ensure safety the existing AUL catering for B-doubles turning in the winery should be redesigned and incorporated into the layout of the proposed CHRs intersection treatment of Twenty-four Land/Street A and St Anne's Winery driveway. The new arrangement of the intersection will be submitted with detailed subdivision drawings at a later date.

7. Conclusions and Recommendations

It is concluded that:

- It is concluded that the additional traffic generated by the subdivision will have a minimal impact on the existing operations of Twenty-four Lane and Beer Road and the wider road network at years 2025 and 2033;

- The provision of turning treatments at the proposed intersection of Twenty-four Lane/Street A and Beer Road/Street C and the upgrade of the existing intersection of Twenty-four Lane/Beer Road will ensure safety and allow motorists to negotiate the turning movements with minimal delays. All intersection movements operate with an average LOS A;

- The redesigned and incorporation of the St Anne's Winery left turn lane (AUL) into the layout of the proposed CHRs intersection treatment of Twenty-four Land and Street A will adequately cater for the existing traffic and B-double movements at the winery;

- Sight distance criteria are met for the proposed intersections of Twenty-four Lane/Street A and Beer Road/ Street C.

It is recommended that:

- Murray River Council concur with the locations and turning treatments at the proposed intersections of Twenty-four Lane/Street A and Beer Road/Street C;

- Murray River Council concur with the incorporation of the St Anne's Winery AUL into the layout of the proposed CHRs intersection treatment of Twenty-four Land/Street A

Appendix A

Traffic Data Twenty-four Lane (2018):

- A1: Twenty-four Lane virtual weekly north bound;
- A2: Twenty-four Lane virtual weekly south bound;
- A3: Twenty-four Lane Speed stats.

Beer Road west end near Twenty-four Lane (2020):

- A4: Beer Road virtual weekly east bound;
- A5: Beer Road virtual weekly west bound;
- A6: Beer Road Speed stats.

A1: Twenty-four Lane virtual weekly north bound

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-184
Site: 1029.0.0SN
Description: **24 Lane north of Beer rd**
Filter time: **12:00 Thursday, 23 August 2018 => 7:00 Tuesday, 11 September 2018**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10) Dir(N) Sp(10,160) Headway(>0)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
Hour									
0000-0100	2.3	1.0	0.0	2.0	2.0	7.3	9.0	1.5	3.6
0100-0200	0.7	1.0	1.0	2.5	1.3	3.0	5.7	1.2	2.2
0200-0300	1.0	0.3	0.0	1.5	1.0	3.7	3.3	0.8	1.6
0300-0400	1.0	0.0	0.5	1.0	0.0	1.3	1.7	0.5	0.8
0400-0500	5.3	5.0	5.0	3.5	5.7	7.0	5.7	5.0	5.4
0500-0600	16.7	17.3	17.5	17.5	16.3	8.3	7.3	17.0	14.1
0600-0700	14.3	16.0	16.5	25.0	14.3	36.7	9.0	16.7	18.6
0700-0800	40.7	66.5	34.0	66.5	35.0	59.0	15.0	46.8	43.5
0800-0900	69.0	90.0	60.5	40.5	47.7	45.0	32.3	61.0	53.6
0900-1000	**118.0<**	71.5	**101.5<**	54.5	**86.7<**	53.3	50.7	89.1	76.7
1000-1100	77.3	71.0	68.0	84.5	67.7	103.3	58.3	73.5	75.9
1100-1200	86.0	**117.5<**	83.5	**126.0<**	86.0	**116.7<**	**94.0<**	**97.5<**	**100.1<**
1200-1300	89.7	105.5	**99.5<**	87.7	92.7	**102.0<**	**109.3<**	93.8	**97.6<**
1300-1400	77.7	74.5	73.5	69.0	94.0	78.7	85.0	78.3	79.4
1400-1500	73.0	72.5	66.5	66.3	82.0	78.3	77.7	72.5	74.2
1500-1600	87.0	97.0	90.0	83.0	92.3	72.3	73.7	89.3	84.2
1600-1700	84.7	**106.5<**	88.5	101.0	**107.3<**	73.7	67.3	97.6	89.1
1700-1800	**109.0<**	103.5	96.5	**107.0<**	102.0	70.0	71.3	**104.2<**	93.6
1800-1900	61.3	94.5	84.0	89.7	79.3	65.7	51.7	80.6	73.7
1900-2000	28.3	34.5	25.0	42.0	44.7	40.3	28.3	35.7	35.3
2000-2100	19.7	16.0	29.0	24.7	23.7	30.7	17.3	22.6	23.1
2100-2200	11.7	20.5	13.5	18.7	19.7	20.3	11.0	16.8	16.4
2200-2300	4.7	9.5	9.0	7.7	17.3	16.7	6.0	9.7	10.2
2300-2400	2.3	4.5	3.0	6.3	9.3	12.0	5.0	5.3	6.3
Totals									
0700-1900	973.3	1070.5	946.0	975.7	972.7	918.0	786.3	984.1	941.5
0600-2200	1047.3	1157.5	1030.0	1086.0	1075.0	1046.0	852.0	1075.9	1034.9
0600-0000	1054.3	1171.5	1042.0	1100.0	1101.7	1074.7	863.0	1090.9	1051.4
0000-0000	1081.3	1196.2	1066.0	1128.0	1128.0	1105.3	895.7	1116.9	1079.2
AM Peak	0900	1100	0900	1100	0900	1100	1100		
	118.0	117.5	101.5	126.0	86.7	116.7	94.0		
PM Peak	1700	1600	1200	1700	1600	1200	1200		
	109.0	106.5	99.5	107.0	107.3	102.0	109.3		

*** - No data.**

A2: Twenty-four Lane virtual weekly south bound

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-185
Site: 1029.0.0SN
Description: 24 Lane north of Beer rd
Filter time: 12:00 Thursday, 23 August 2018 => 7:00 Tuesday, 11 September 2018
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10) Dir(S) Sp(10,160) Headway(>0)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
Hour									
0000-0100	2.7	2.3	3.0	1.5	2.3	7.0	10.0	2.4	4.3
0100-0200	2.0	1.3	0.5	1.0	1.3	8.7	9.0	1.3	3.7
0200-0300	1.0	0.3	0.0	1.0	1.7	3.7	3.3	0.8	1.7
0300-0400	0.7	0.7	1.5	1.0	0.0	1.7	1.7	0.7	1.0
0400-0500	3.7	3.0	1.5	0.5	1.7	2.7	1.0	2.2	2.1
0500-0600	16.7	15.7	16.5	14.5	15.3	5.7	2.7	15.8	12.1
0600-0700	27.3	28.0	31.0	22.0	29.3	16.7	9.7	27.7	23.1
0700-0800	56.0	58.5	53.0	62.0	49.0	27.0	12.7	55.2	43.4
0800-0900	**98.3<**	**103.0<**	**104.5<**	**101.0<**	**101.0<**	60.0	43.7	**101.3<**	**84.8<**
0900-1000	76.3	67.5	78.5	66.5	70.7	81.7	59.3	72.2	71.6
1000-1100	65.0	71.0	56.5	57.0	60.7	82.0	**76.3<**	62.2	67.8
1100-1200	74.7	79.0	50.0	76.5	74.7	**91.0<**	72.0	71.6	74.9
1200-1300	99.3	92.5	58.5	83.7	**95.3<**	86.0	85.0	87.5	86.8
1300-1400	94.7	**116.5<**	76.0	82.3	92.0	86.7	87.7	91.7	90.3
1400-1500	**100.7<**	111.0	**109.5<**	**96.0<**	93.3	73.0	**95.0<**	**100.8<**	**95.5<**
1500-1600	85.3	83.5	100.5	94.0	69.3	75.7	70.3	85.7	81.7
1600-1700	87.3	104.0	102.0	95.7	70.3	**100.7<**	76.7	90.2	89.7
1700-1800	68.0	91.5	83.0	91.7	64.7	100.3	63.7	78.6	79.7
1800-1900	31.7	53.5	47.5	45.7	51.0	50.7	36.3	45.2	44.6
1900-2000	31.3	38.0	26.0	32.0	34.7	34.7	30.7	32.5	32.5
2000-2100	20.0	36.5	29.5	41.3	27.0	35.3	27.0	30.5	30.7
2100-2200	9.3	17.5	14.0	28.7	30.3	30.7	14.7	20.6	21.3
2200-2300	6.7	10.0	10.5	14.7	19.0	24.0	11.7	12.5	14.2
2300-2400	5.3	5.5	7.0	10.0	9.7	13.0	5.0	7.7	8.1
Totals									
0700-1900	937.3	1031.5	919.5	952.0	892.0	914.7	778.7	941.9	910.8
0600-2200	1025.3	1151.5	1020.0	1076.0	1013.3	1032.0	860.7	1053.3	1018.4
0600-0000	1037.3	1167.0	1037.5	1100.7	1042.0	1069.0	877.3	1073.4	1040.7
0000-0000	1064.0	1190.3	1060.5	1120.2	1064.3	1098.3	905.0	1096.6	1065.6
AM Peak	0800	0800	0800	0800	0800	1100	1000		
	98.3	103.0	104.5	101.0	101.0	91.0	76.3		
PM Peak	1400	1300	1400	1400	1200	1600	1400		
	100.7	116.5	109.5	96.0	95.3	100.7	95.0		

*** - No data.**

A3: Twenty-four Lane Speed stats.

Speed Statistics

SpeedStat-191
Site: 1029.0.0SN
Description: **24 Lane north of Beer rd**
Filter time: **12:00 Thursday, 23 August 2018 => 9:40 Tuesday, 11 September 2018**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

Vehicles = 40244
Posted speed limit = 60 km/h, Exceeding = 33453 (83.13%), Mean Exceeding = 73.32 km/h
Maximum = 157.3 km/h, **Minimum** = 11.7 km/h, **Mean** = 70.1 km/h
85% Speed = 80.3 km/h, **95% Speed** = 87.1 km/h, **Median** = 70.2 km/h
20 km/h Pace = 60 - 80, **Number in Pace** = 27257 (67.73%)
Variance = 118.46, **Standard Deviation** = 10.88 km/h

Speed Bins (Partial days)

Speed	Bin		Below		Above		Energy	vMult	n * vMult
0 - 10	0	0.0%	0	0.0%	40244	100.0%	0.00	0.00	0.00
10 - 20	18	0.0%	18	0.0%	40226	100.0%	0.00	0.00	0.00
20 - 30	46	0.1%	64	0.2%	40180	99.8%	0.00	0.00	0.00
30 - 40	165	0.4%	229	0.6%	40015	99.4%	0.00	0.00	0.00
40 - 50	993	2.5%	1222	3.0%	39022	97.0%	0.00	0.00	0.00
50 - 60	5569	13.8%	6791	16.9%	33453	83.1%	0.00	0.00	0.00
60 - 70	12932	32.1%	19723	49.0%	20521	51.0%	0.00	0.00	0.00
70 - 80	14124	35.1%	33847	84.1%	6397	15.9%	0.00	0.00	0.00
80 - 90	5123	12.7%	38970	96.8%	1274	3.2%	0.00	0.00	0.00
90 - 100	1004	2.5%	39974	99.3%	270	0.7%	0.00	0.00	0.00
100 - 110	209	0.5%	40183	99.8%	61	0.2%	0.00	0.00	0.00
110 - 120	46	0.1%	40229	100.0%	15	0.0%	0.00	0.00	0.00
120 - 130	7	0.0%	40236	100.0%	8	0.0%	0.00	0.00	0.00
130 - 140	5	0.0%	40241	100.0%	3	0.0%	0.00	0.00	0.00
140 - 150	2	0.0%	40243	100.0%	1	0.0%	0.00	0.00	0.00
150 - 160	1	0.0%	40244	100.0%	0	0.0%	0.00	0.00	0.00
160 - 170	0	0.0%	40244	100.0%	0	0.0%	0.00	0.00	0.00
170 - 180	0	0.0%	40244	100.0%	0	0.0%	0.00	0.00	0.00
180 - 190	0	0.0%	40244	100.0%	0	0.0%	0.00	0.00	0.00
190 - 200	0	0.0%	40244	100.0%	0	0.0%	0.00	0.00	0.00

Total Speed Rating = 0.00
Total Moving Energy (Estimated) = 0.00

Speed limit fields (Partial days)

	Limit	Below		Above	
0	60 (PSL)	6791	16.9%	33453	83.1%

A4: Beer Road virtual weekly east bound

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-187
Site: 1091.0.0EW
Description: Beer road west end
Filter time: 15:00 Thursday, 12 December 2019 => 7:00 Monday, 6 January 2020
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10) Dir(E) Sp(10,160) Headway(>0)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
Hour									
0000-0100	0.0	0.3	0.3	0.0	0.3	0.0	0.3	0.2	0.2
0100-0200	0.3	0.7	0.3	0.0	0.0	0.5	0.5	0.2	0.3
0200-0300	0.3	0.3	0.0	0.3	0.8	0.8	0.3	0.4	0.4
0300-0400	0.8	0.0	1.0	0.3	0.3	0.3	0.5	0.5	0.4
0400-0500	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
0500-0600	0.5	0.3	0.3	0.7	0.5	0.3	0.3	0.5	0.4
0600-0700	1.5	2.3	2.0	3.0	2.5	1.0	0.8	2.2	1.8
0700-0800	5.7	5.3	2.3	5.3	4.5	2.3	2.0	4.6	3.8
0800-0900	9.0	**5.7<**	4.3	8.0	**9.8<**	3.5	2.8	**7.5<**	6.0
0900-1000	**9.3<**	4.3	4.0	6.3	7.3	4.5	4.5	6.3	5.7
1000-1100	7.3	4.0	5.0	**8.3<**	7.8	5.8	5.0	6.6	6.2
1100-1200	8.0	4.0	**5.0<**	7.7	8.8	**6.8<**	**6.5<**	6.8	**6.8<**
1200-1300	**9.0<**	8.3	6.7	**9.0<**	6.5	**7.0<**	5.0	**7.8<**	**7.2<**
1300-1400	6.7	7.7	**7.3<**	8.7	5.8	3.0	5.8	7.1	6.2
1400-1500	4.0	**9.7<**	3.3	7.3	**7.3<**	2.5	**6.3<**	6.4	5.7
1500-1600	7.3	6.7	2.7	5.5	5.3	2.5	1.8	5.5	4.4
1600-1700	5.0	7.3	4.0	8.8	5.5	5.5	1.3	6.2	5.3
1700-1800	2.3	6.0	2.0	5.3	3.5	6.3	2.5	3.9	4.0
1800-1900	3.7	6.7	1.7	3.3	2.5	5.3	3.3	3.5	3.7
1900-2000	2.7	6.3	1.7	2.5	2.5	2.0	1.5	3.1	2.6
2000-2100	3.7	2.3	1.0	3.0	3.8	1.8	1.0	2.8	2.4
2100-2200	1.3	1.3	0.7	1.3	1.0	1.8	1.0	1.1	1.2
2200-2300	0.3	0.3	0.3	0.8	0.5	0.5	0.3	0.5	0.4
2300-2400	0.0	0.3	0.0	0.8	0.3	1.3	0.0	0.3	0.4
Totals									
0700-1900	77.3	75.7	48.3	83.4	74.3	54.8	46.5	72.2	65.1
0600-2200	86.5	88.0	53.7	93.2	84.0	61.3	50.8	81.4	73.1
0600-0000	86.8	88.7	54.0	94.7	84.8	63.0	51.0	82.2	73.9
0000-0000	88.8	90.3	56.0	96.0	86.5	64.8	52.8	83.9	75.7
AM Peak	0900	0800	1100	1000	0800	1100	1100		
	9.3	5.7	5.0	8.3	9.8	6.8	6.5		
PM Peak	1200	1400	1300	1200	1400	1200	1400		
	9.0	9.7	7.3	9.0	7.3	7.0	6.3		

*** - No data.**

A5: Beer Road virtual weekly west bound

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-186
Site: 1091.0.0EW
Description: Beer road west end
Filter time: 15:00 Thursday, 12 December 2019 => 7:00 Monday, 6 January 2020
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10) Dir(W) Sp(10,160) Headway(>0)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
Hour									
0000-0100	0.0	0.3	0.3	0.0	0.3	0.0	0.0	0.2	0.1
0100-0200	0.0	0.0	0.3	0.0	0.3	0.0	0.8	0.1	0.2
0200-0300	0.0	0.0	0.7	0.0	0.3	0.0	0.3	0.2	0.2
0300-0400	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
0400-0500	1.3	1.0	0.7	1.0	0.8	0.3	0.0	0.9	0.7
0500-0600	0.0	0.7	1.0	1.7	1.5	0.3	0.5	0.9	0.8
0600-0700	1.8	2.0	2.0	2.0	2.3	2.5	1.5	2.0	2.0
0700-0800	5.7	6.7	1.7	3.3	3.0	2.0	1.8	4.0	3.3
0800-0900	5.0	6.0	4.7	2.3	5.0	3.3	2.3	4.6	4.0
0900-1000	4.3	1.7	**6.0<**	6.0	5.8	2.8	4.0	4.8	4.3
1000-1100	4.7	4.7	3.0	4.7	6.5	**7.5<**	**5.5<**	4.8	5.4
1100-1200	**7.7<**	**8.0<**	5.3	**8.3<**	**7.5<**	7.0	5.0	**7.4<**	**6.9<**
1200-1300	6.0	4.0	**5.0<**	5.0	**8.3<**	**5.3<**	**5.3<**	**5.8<**	**5.6<**
1300-1400	3.3	4.0	4.3	4.0	5.5	2.8	4.8	4.3	4.1
1400-1500	4.0	5.3	3.0	5.7	6.8	2.3	4.5	5.1	4.5
1500-1600	**7.7<**	3.7	3.0	6.3	5.5	4.0	4.0	5.3	4.9
1600-1700	6.0	5.0	3.0	4.3	5.5	2.0	2.3	4.8	3.9
1700-1800	3.3	**7.0<**	4.0	4.3	6.3	4.0	3.8	5.0	4.6
1800-1900	5.0	6.3	3.0	**6.5<**	3.0	5.0	2.0	4.8	4.4
1900-2000	5.0	1.7	1.3	1.3	3.5	3.3	1.0	2.5	2.4
2000-2100	3.0	0.7	1.3	2.0	1.5	0.8	1.0	1.7	1.4
2100-2200	0.7	1.7	0.0	1.0	0.3	0.5	1.0	0.7	0.7
2200-2300	0.0	0.7	1.0	1.0	1.0	0.5	0.3	0.8	0.6
2300-2400	0.7	0.0	0.7	0.5	0.5	0.8	0.0	0.5	0.4
Totals									
0700-1900	62.7	62.3	46.0	60.6	68.5	47.8	45.0	60.6	56.0
0600-2200	73.1	68.3	50.7	66.8	76.0	54.8	49.5	67.6	62.5
0600-0000	73.8	69.0	52.3	68.3	77.5	56.0	49.8	68.8	63.6
0000-0000	75.0	71.0	55.3	71.0	80.5	56.8	51.3	71.2	65.6
AM Peak	1100	1100	0900	1100	1100	1000	1000		
	7.7	8.0	6.0	8.3	7.5	7.5	5.5		
PM Peak	1500	1700	1200	1800	1200	1200	1200		
	7.7	7.0	5.0	6.5	8.3	5.3	5.3		

*** - No data.**

A6: Beer Road Speed stats.

Speed Statistics

SpeedStat-193
Site: 1091.0.0EW
Description: **Beer road west end**
Filter time: **14:00 Thursday, 12 December 2019 => 10:10 Monday, 6 January 2020**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10) Dir(NESW) Sp(10,160) Headway(>0)

Vehicles = 3479
Posted speed limit = 60 km/h, Exceeding = 2291 (65.85%), Mean Exceeding = 73.32 km/h
Maximum = 143.1 km/h, **Minimum** = 10.7 km/h, **Mean** = 65.2 km/h
85% Speed = 79.6 km/h, **95% Speed** = 87.5 km/h, **Median** = 65.5 km/h
20 km/h Pace = 57 - 77, **Number in Pace** = 1875 (53.89%)
Variance = 218.17, **Standard Deviation** = 14.77 km/h

Speed Bins (Partial days)

Speed	Bin		Below		Above		Energy	vMult	n * vMult
0 - 10	0	0.0%	0	0.0%	3479	100.0%	0.00	0.00	0.00
10 - 20	31	0.9%	31	0.9%	3448	99.1%	0.00	0.00	0.00
20 - 30	40	1.1%	71	2.0%	3408	98.0%	0.00	0.00	0.00
30 - 40	83	2.4%	154	4.4%	3325	95.6%	0.00	0.00	0.00
40 - 50	305	8.8%	459	13.2%	3020	86.8%	0.00	0.00	0.00
50 - 60	729	21.0%	1188	34.1%	2291	65.9%	0.00	0.00	0.00
60 - 70	969	27.9%	2157	62.0%	1322	38.0%	0.00	0.00	0.00
70 - 80	821	23.6%	2978	85.6%	501	14.4%	0.00	0.00	0.00
80 - 90	375	10.8%	3353	96.4%	126	3.6%	0.00	0.00	0.00
90 - 100	95	2.7%	3448	99.1%	31	0.9%	0.00	0.00	0.00
100 - 110	24	0.7%	3472	99.8%	7	0.2%	0.00	0.00	0.00
110 - 120	3	0.1%	3475	99.9%	4	0.1%	0.00	0.00	0.00
120 - 130	2	0.1%	3477	99.9%	2	0.1%	0.00	0.00	0.00
130 - 140	1	0.0%	3478	100.0%	1	0.0%	0.00	0.00	0.00
140 - 150	1	0.0%	3479	100.0%	0	0.0%	0.00	0.00	0.00
150 - 160	0	0.0%	3479	100.0%	0	0.0%	0.00	0.00	0.00
160 - 170	0	0.0%	3479	100.0%	0	0.0%	0.00	0.00	0.00
170 - 180	0	0.0%	3479	100.0%	0	0.0%	0.00	0.00	0.00
180 - 190	0	0.0%	3479	100.0%	0	0.0%	0.00	0.00	0.00
190 - 200	0	0.0%	3479	100.0%	0	0.0%	0.00	0.00	0.00

Total Speed Rating = 0.00
Total Moving Energy (Estimated) = 0.00

Speed limit fields (Partial days)

	Limit	Below		Above	
0	60 (PSL)	1188	34.1%	2291	65.9%

Appendix B

SIDRA Movement Summaries:

- B1 Twenty-Four Lane and Beer Road Existing AM 2020
- B2 Twenty-Four Lane and Beer Road Existing PM 2020
- B3 Twenty-Four Lane and Beer Road Additional AM 2025
- B4 Twenty-Four Lane and Beer Road Additional PM 2025
- B5 Twenty-Four Lane and Street A Future AM 2025
- B6 Twenty-Four Lane and Street A Future PM 2025
- B7 Beer Road and Street C Future AM 2033
- B8 Beer Road and Street C Future PM 2033

B1 Twenty-Four Lane and Beer Road Existing AM 2020

MOVEMENT SUMMARY

▽ Site: 101 [Twenty Four Lane/Beer Road AM 2020]

TIA MoaMA
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 1 years

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: Twenty Four Lane												
11	T1	65	5.0	0.032	0.0	LOS A	0.0	0.2	0.03	0.04	0.03	69.3
12	R2	4	5.0	0.032	6.7	LOS A	0.0	0.2	0.04	0.05	0.04	31.7
Approach		70	5.0	0.032	0.4	NA	0.0	0.2	0.03	0.04	0.03	64.6
East: Beer Rd												
1	L2	2	5.0	0.006	2.4	LOS A	0.0	0.1	0.26	0.36	0.26	23.6
3	R2	3	5.0	0.006	3.2	LOS A	0.0	0.1	0.26	0.36	0.26	24.0
Approach		5	5.0	0.006	2.9	LOS A	0.0	0.1	0.26	0.36	0.26	23.8
North: Twenty Four Lane												
4	L2	4	5.0	0.002	6.5	LOS A	0.0	0.0	0.00	0.61	0.00	58.2
5	T1	108	5.0	0.057	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
Approach		113	5.0	0.057	0.3	NA	0.0	0.0	0.00	0.02	0.00	69.4
All Vehicles		188	5.0	0.057	0.4	NA	0.0	0.2	0.02	0.04	0.02	64.1

Site Level of Service (LOS) Method: Delay (SIDRA). 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.

Organisation: PETER MEREDITH CONSULTING | Processed: Thursday, 5 March 2020 2:47:13 PM
Project: C:\Users\Leader\Documents\PETER MEREDITH CONSULTING\2212 TIA Moama 24 lane subdidvision\SIDRA Summaries\TIA Twenty Four Lane Moama.sip8

B2 Twenty-Four Lane and Beer Road Existing PM 2020

MOVEMENT SUMMARY

Site: 101 [Twenty Four Lane/Beer Road PM 2020]

TIA Moama
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

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: Twenty Four Lane												
11	T1	131	5.0	0.059	0.0	LOS A	0.0	0.1	0.01	0.01	0.01	69.8
12	R2	3	5.0	0.059	6.8	LOS A	0.0	0.1	0.01	0.01	0.01	32.0
Approach		134	5.0	0.059	0.1	NA	0.0	0.1	0.01	0.01	0.01	68.3
East: Beer Rd												
1	L2	3	5.0	0.002	2.4	LOS A	0.0	0.1	0.19	0.33	0.19	23.6
3	R2	4	5.0	0.005	3.6	LOS A	0.0	0.1	0.36	0.40	0.36	23.9
Approach		6	5.0	0.005	3.1	LOS A	0.0	0.1	0.29	0.37	0.29	23.8
North: Twenty Four Lane												
4	L2	3	5.0	0.001	6.5	LOS A	0.0	0.0	0.00	0.61	0.00	58.2
5	T1	99	5.0	0.052	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
Approach		101	5.0	0.052	0.2	NA	0.0	0.0	0.00	0.02	0.00	69.6
All Vehicles		241	5.0	0.059	0.2	NA	0.0	0.1	0.01	0.02	0.01	65.6

Site Level of Service (LOS) Method: Delay (SIDRA). 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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B3 Twenty-Four Lane and Beer Road Additional AM 2025

MOVEMENT SUMMARY

Site: 101 [Twenty Four Lane/Beer Road additional AM 2025]

TIA MoaMA
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 5 years

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: Twenty Four Lane												
11	T1	109	5.0	0.051	0.1	LOS A	0.0	0.3	0.04	0.03	0.04	69.4
12	R2	5	5.0	0.051	7.3	LOS A	0.0	0.3	0.04	0.03	0.04	31.7
Approach		113	5.0	0.051	0.4	NA	0.0	0.3	0.04	0.03	0.04	66.2
East: Beer Rd												
1	L2	6	5.0	0.031	2.9	LOS A	0.1	0.8	0.41	0.48	0.41	23.4
3	R2	17	5.0	0.031	4.7	LOS A	0.1	0.8	0.41	0.48	0.41	23.8
Approach		23	5.0	0.031	4.2	LOS A	0.1	0.8	0.41	0.48	0.41	23.7
North: Twenty Four Lane												
4	L2	32	5.0	0.018	6.5	LOS A	0.0	0.0	0.00	0.61	0.00	58.2
5	T1	208	5.0	0.109	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
Approach		241	5.0	0.109	0.9	NA	0.0	0.0	0.00	0.08	0.00	68.1
All Vehicles		377	5.0	0.109	0.9	NA	0.1	0.8	0.04	0.09	0.04	60.6

Site Level of Service (LOS) Method: Delay (SIDRA). 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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B4 Twenty-Four Lane and Beer Road Additional PM 2025

MOVEMENT SUMMARY

▽ Site: 101 [Twenty Four Lane/Beer Road additional PM 2025]

TIA Moama
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 5 years

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: Twenty Four Lane												
11	T1	220	5.0	0.098	0.0	LOS A	0.0	0.1	0.01	0.01	0.01	69.9
12	R2	2	5.0	0.098	7.0	LOS A	0.0	0.1	0.01	0.01	0.01	32.0
Approach		222	5.0	0.098	0.1	NA	0.0	0.1	0.01	0.01	0.01	69.0
East: Beer Rd												
1	L2	7	5.0	0.006	2.5	LOS A	0.0	0.2	0.23	0.35	0.23	23.6
3	R2	34	5.0	0.051	5.0	LOS A	0.2	1.4	0.47	0.54	0.47	23.7
Approach		41	5.0	0.051	4.5	LOS A	0.2	1.4	0.43	0.51	0.43	23.7
North: Twenty Four Lane												
4	L2	15	5.0	0.009	6.5	LOS A	0.0	0.0	0.00	0.61	0.00	58.2
5	T1	133	5.0	0.070	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
Approach		148	5.0	0.070	0.7	NA	0.0	0.0	0.00	0.06	0.00	68.6
All Vehicles		411	5.0	0.098	0.7	NA	0.2	1.4	0.05	0.08	0.05	57.9

Site Level of Service (LOS) Method: Delay (SIDRA). 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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B5 Twenty-Four Lane and Street A Future AM 2025

MOVEMENT SUMMARY

▽ Site: 101 [Twenty Four Lane/Street A Future AM 2025]

TIA MoaMA
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 5 years

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: Twenty Four Lane												
1	L2	21	5.0	0.012	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.4
11	T1	88	5.0	0.047	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
12	R2	45	5.0	0.036	6.7	LOS A	0.1	1.0	0.23	0.58	0.23	30.0
Approach		154	5.0	0.047	2.7	NA	0.1	1.0	0.07	0.25	0.07	48.9
East: Street A												
1	L2	91	5.0	0.097	2.5	LOS A	0.4	2.6	0.24	0.38	0.24	23.6
3	R2	10	5.0	0.097	5.1	LOS A	0.4	2.6	0.24	0.38	0.24	24.0
Approach		102	5.0	0.097	2.8	LOS A	0.4	2.6	0.24	0.38	0.24	23.7
North: Twenty Four Lane												
4	L2	5	5.0	0.003	6.5	LOS A	0.0	0.0	0.00	0.61	0.00	58.2
5	T1	117	5.0	0.063	0.0	LOS A	0.0	0.1	0.01	0.01	0.01	69.7
9	R2	2	0.0	0.063	5.9	LOS A	0.0	0.1	0.01	0.01	0.01	61.8
Approach		124	4.9	0.063	0.4	NA	0.0	0.1	0.01	0.03	0.01	69.0
West: St Annnes												
10	L2	1	5.0	0.003	5.9	LOS A	0.0	0.1	0.26	0.55	0.26	51.8
12	R2	1	5.0	0.003	9.5	LOS A	0.0	0.1	0.26	0.55	0.26	52.0
Approach		2	5.0	0.003	7.7	LOS A	0.0	0.1	0.26	0.55	0.26	51.9
All Vehicles		382	5.0	0.097	2.0	NA	0.4	2.6	0.10	0.22	0.10	41.1

Site Level of Service (LOS) Method: Delay (SIDRA). 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.

B6 Twenty-Four Lane and Street A Future PM 2025

MOVEMENT SUMMARY

▽ Site: 101 [Twenty Four Lane/Street A Future PM 2025]

TIA Moama
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 5 years

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: Twenty Four Lane												
1	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
11	T1	151	5.0	0.081	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
12	R2	100	5.0	0.078	6.8	LOS A	0.3	2.3	0.22	0.58	0.22	30.2
Approach		251	5.0	0.081	2.7	NA	0.3	2.3	0.09	0.23	0.09	45.9
East: Street A												
1	L2	43	5.0	0.036	2.4	LOS A	0.1	0.9	0.18	0.34	0.18	23.6
3	R2	5	5.0	0.010	6.0	LOS A	0.0	0.2	0.47	0.51	0.47	23.5
Approach		47	5.0	0.036	2.7	LOS A	0.1	0.9	0.21	0.36	0.21	23.6
North: Twenty Four Lane												
4	L2	12	5.0	0.007	6.5	LOS A	0.0	0.0	0.00	0.61	0.00	58.2
5	T1	90	5.0	0.048	0.0	LOS A	0.0	0.1	0.01	0.01	0.01	69.8
9	R2	1	0.0	0.048	6.1	LOS A	0.0	0.1	0.01	0.01	0.01	61.9
Approach		103	4.9	0.048	0.8	NA	0.0	0.1	0.01	0.08	0.01	68.2
West: St Annes driveway												
10	L2	2	0.0	0.046	6.1	LOS A	0.2	1.1	0.47	0.68	0.47	50.6
12	R2	21	0.0	0.046	10.0	LOS B	0.2	1.1	0.47	0.68	0.47	50.8
Approach		23	0.0	0.046	9.6	LOS A	0.2	1.1	0.47	0.68	0.47	50.8
All Vehicles		425	4.7	0.081	2.6	NA	0.3	2.3	0.10	0.23	0.10	45.0

Site Level of Service (LOS) Method: Delay (SIDRA). 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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B7 Beer Road and Street C Future AM 2033

MOVEMENT SUMMARY

Site: 101 [Beer Road/Street C Future AM 2033]

TIA MoaMA
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 13 years

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: Beer Road												
11	T1	7	5.0	0.004	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
12	R2	49	5.0	0.036	6.5	LOS A	0.1	1.1	0.11	0.58	0.11	30.3
Approach		56	5.0	0.036	5.7	NA	0.1	1.1	0.10	0.51	0.10	32.5
North: Street C												
1	L2	114	5.0	0.090	2.1	LOS A	0.3	2.5	0.10	0.33	0.10	23.7
3	R2	12	5.0	0.013	2.6	LOS A	0.0	0.3	0.22	0.35	0.22	24.0
Approach		126	5.0	0.090	2.2	LOS A	0.3	2.5	0.11	0.33	0.11	23.7
West: Beer Road												
4	L2	5	5.0	0.003	6.5	LOS A	0.0	0.0	0.00	0.61	0.00	58.2
5	T1	32	5.0	0.017	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
Approach		37	5.0	0.017	0.9	NA	0.0	0.0	0.00	0.09	0.00	68.0
All Vehicles		219	5.0	0.090	2.9	NA	0.3	2.5	0.09	0.33	0.09	28.9

Site Level of Service (LOS) Method: Delay (SIDRA). 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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B8 Beer Road and Street C Future PM 2033

MOVEMENT SUMMARY

▽ Site: 101 [Beer Road/Street C Future PM 2033]

TIA MoaMA
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 13 years

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: Beer Road												
11	T1	5	5.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
12	R2	126	5.0	0.092	6.5	LOS A	0.4	2.8	0.10	0.58	0.10	30.3
Approach		131	5.0	0.092	6.2	NA	0.4	2.8	0.10	0.56	0.10	31.0
North: Street C												
1	L2	54	5.0	0.042	2.1	LOS A	0.2	1.1	0.06	0.32	0.06	23.7
3	R2	5	5.0	0.006	3.0	LOS A	0.0	0.2	0.29	0.37	0.29	24.0
Approach		60	5.0	0.042	2.2	LOS A	0.2	1.1	0.08	0.33	0.08	23.7
West: Beer Road												
4	L2	13	5.0	0.008	6.5	LOS A	0.0	0.0	0.00	0.61	0.00	58.2
5	T1	15	5.0	0.008	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
Approach		28	5.0	0.008	3.1	NA	0.0	0.0	0.00	0.29	0.00	63.8
All Vehicles		219	5.0	0.092	4.7	NA	0.4	2.8	0.08	0.46	0.08	30.4

Site Level of Service (LOS) Method: Delay (SIDRA). 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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Traffic Impact Assessment

The Range Subdivision Moama

Addendum Report

Proposed Lifestyle Estate Stage 12 & 13

The Range – Moama

Report 30 April 2024

PETER MEREDITH CONSULTING
19 Orchard Way
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Document Control

Version	Date	Issue	Author	Reviewed	Approved
Draft	30/04/2023	A	PJM	SN(DO)	PJM

TABLE OF CONTENTS

1. Background

In March 2020 Peter Meredith Consulting prepare a report assessing the traffic impacts of a proposed 13 Staged residential subdivision development (The Range) of Lot 11 Twenty-four Lane, Moama. The Traffic Impact Assessment Report (TIAR) investigated the traffic impacts on the surrounding road network arising from subdivisions development into residential allotments. The TIAR also included an assessment of the following existing and proposed key intersections:

- Beer Road and subdivision access road
- Twenty-Four Lane and Beer Road
- Twenty-Four Lane and subdivision access road.

It was concluded that the additional traffic generated by the subdivision will have a minimal impact on the existing operations of Twenty-four Lane and Beer Road and the wider road network at year 2033. It was also concluded that the provision of CHRs, BAR and BAL turning treatments at the proposed intersections of Twenty-four Lane and Street A and Beer Road and Street C together with the upgrade of the existing intersection of Twenty-four Lane and Beer Road will ensure safety and allow motorists to negotiate the turning movements with minimal delays.

It was also concluded that the redesign and incorporation of the St Anne's Winery left turn lane (AUL) into the layout of the proposed CHRs intersection treatment of Twenty-four Land and Street A will adequately cater for the existing traffic and B-double movements at the winery.

As part of the approval process the TIAR was submitted to Transport for NSW (TfNSW) for assessment and comment. The following assessment and required mitigation work was received from TfNSW 5 May 2020.
Due to the location of the development site relative to Moama and the surrounding road network it is anticipated that the majority of trips from this site will be towards the east via Perricoota Road for the preliminary stages (Stages 1-6) of the subdivision. However, the later stages (Stages 7-13) will generate traffic through the intersection of Beer Road with the Cobb Highway. As a minimum the future development of the subject site needs to demonstrate and address any potential impact on the operation of this intersection and options for funding of any necessary upgrade.

As the intersection of Beer Road with the Cobb Highway services the existing industrial estate and will also need to accommodate increased light vehicle traffic due to the proposed subdivision the intersection shall be upgraded from the existing auxiliary left-turn treatment (AUL) to a channelised left-turn treatment (CHL). This is required for road safety reasons due to the anticipated increased volumes of vehicle through the intersection and mix of heavy and light vehicles using the intersection in the future. This upgrade of the intersection shall be conditioned to be constructed prior to the issue of the subdivision certificate for Stage 7.

Design plans for the construction of the channelised left-turn treatment (CHL) at the intersection of Beer Road with the Cobb Highway have been prepared by Development Outcomes and these have been approved by TfNSW.

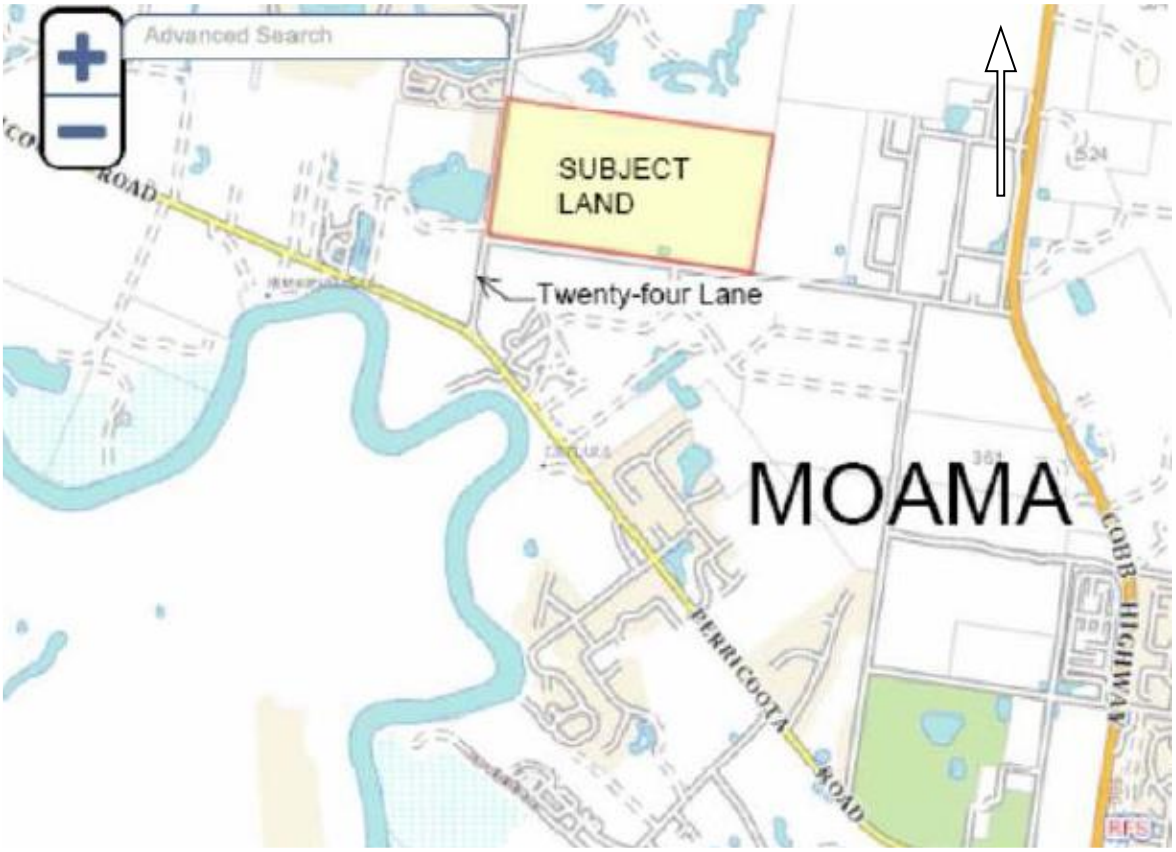
2. Introduction

The proponent is wanting to build a 197-lot Lifestyle Estate within the approved subdivision, The Range. The 197-lot Lifestyle Estate covers 66 original Torrens Title housing lots in Stages 12 and 13 of the approved residential subdivision known as The Range.

Habitat Planning are preparing a Development Application (DA) for the proposed Lifestyle Estate, and as part of the DA process Peter Meredith Consulting has been engaged to prepare an addendum report to the original TIAR to assess the any changes traffic impacts caused by the development of the 197-lot Lifestyle Estate.

The assessment uses information provided in the TIAR March 2020, traffic generating development figures, and Lifestyle Estate parking requirements.

2.1 Locality Plan



2.2 Documentation

The documentation provided for this assessment addendum includes:

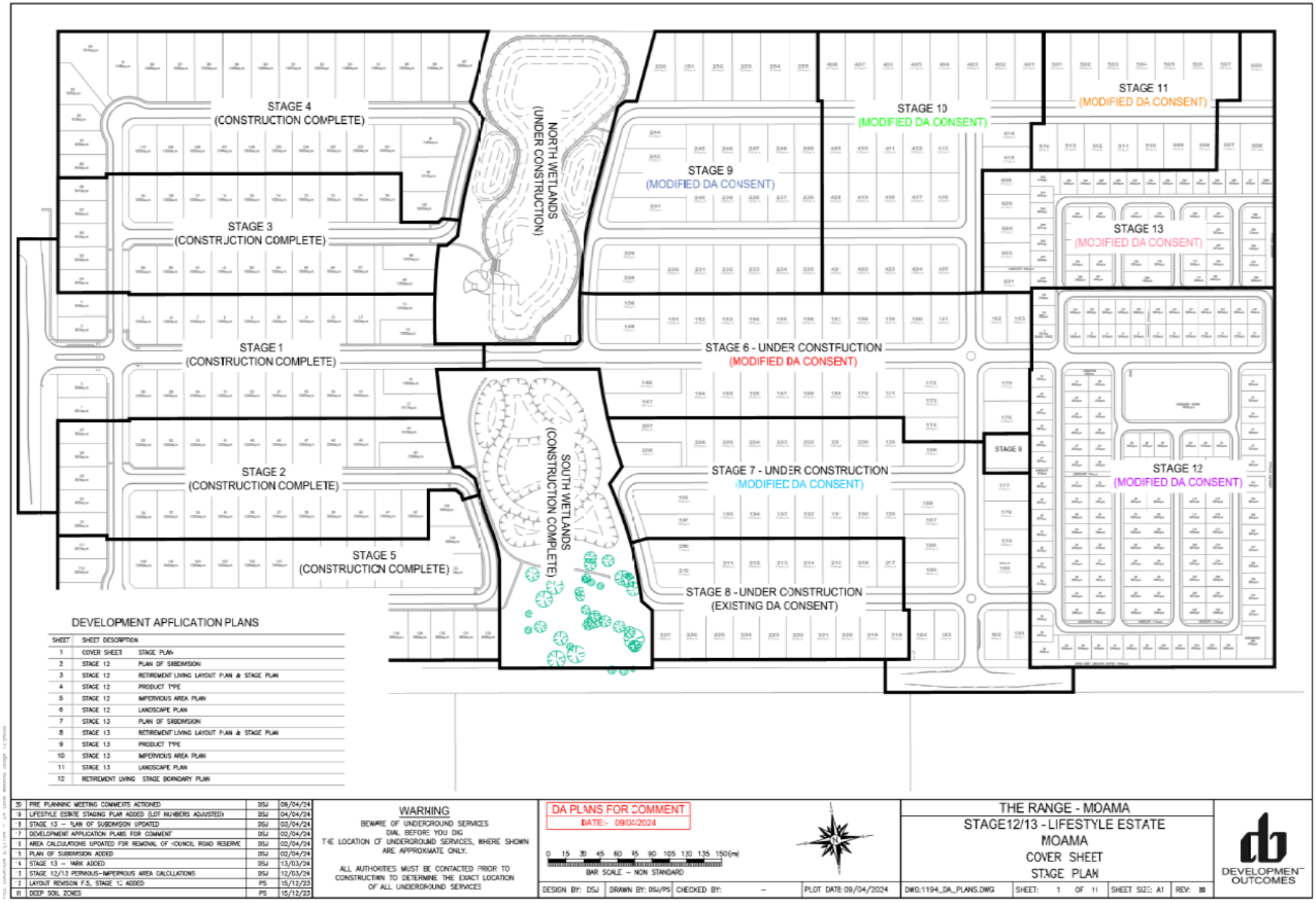
- Traffic Impact Assessment report for a proposed 13 stage residential subdivision by Peter Meredith Consulting March 2020;
- Murray subdivision development approval DA 10.2019.284.1 (284/19);
- The Range Moama – proposed Lifestyle Estate Stages 12 and 13 Dwg No.1194 Revision 20 sheets 1 to 11;
- TfNSW assessment and comment DA 10.2019.284.1 (CNR 6362) – proposed 368 LOT residential subdivision, lot 11

2.3 References

References used in the preparation of this traffic impact assessment include the following:

- *Roads and Maritime Services (RMS) Guide to Traffic Generating Developments, Version 2.2 October 2002 for traffic generation predictions.*
- *Department of Planning, Transport and Infrastructure (SA DPTI) trip generation rates.*
- *Austroads Guide to Road Design Part 4A. Unsignalised and Signalised Intersections.*
- *Murray Development Control Plan 2012*

2.4 Subdivision Staging Plan

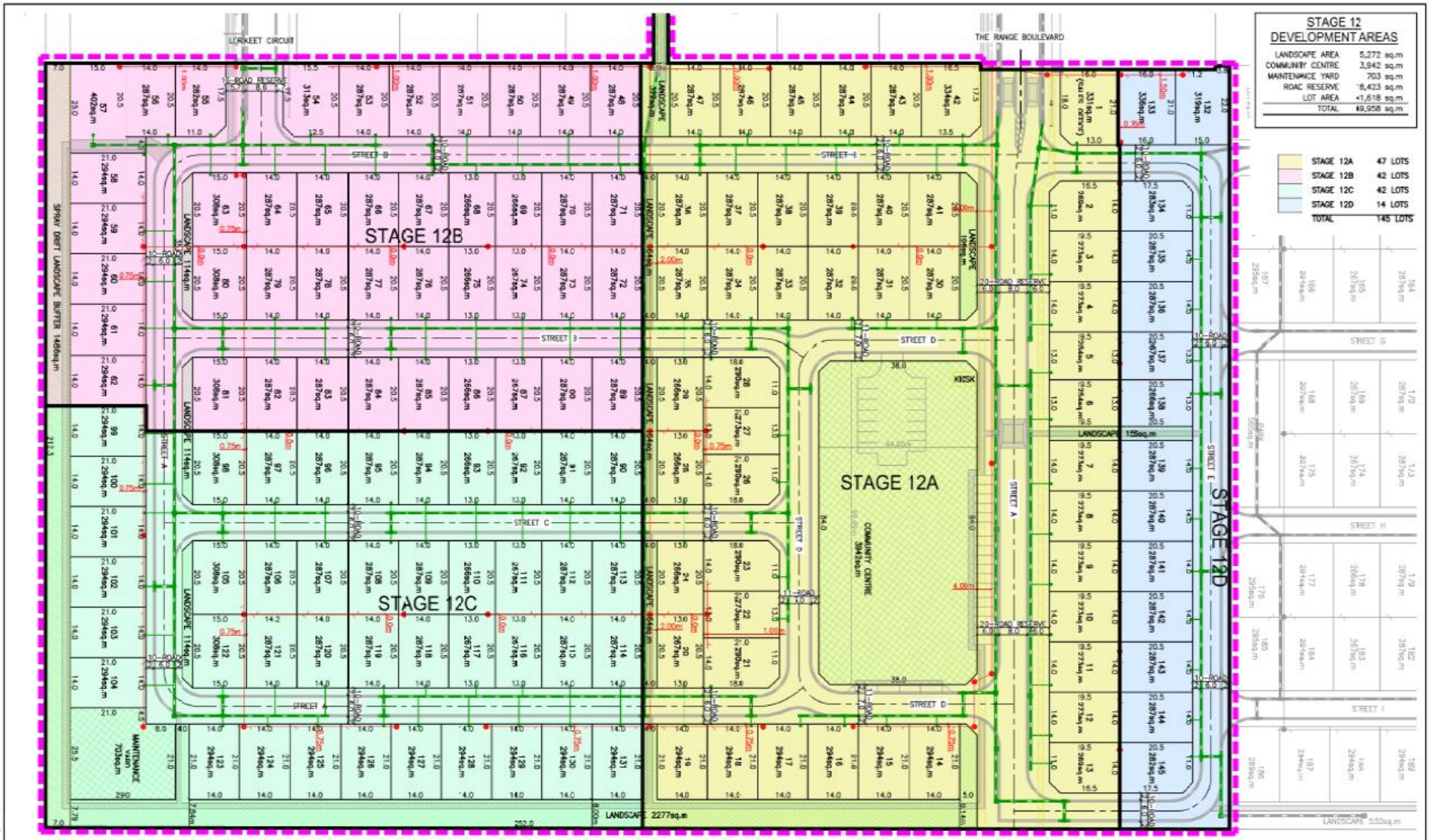


3. Proposed Lifestyle Estate

The proposed 197-lot Lifestyle Estate is situated within the approved subdivision, The Range and consists of the following elements:

- The proposed Lifestyle Estate consists of a high density 197-lots for retirement dwellings;
- Dwellings will be smaller 2 -3 bedrooms dwellings with double or single garages;
- The 197-lot Lifestyle Estate covers 66 original Torrens Title housing lots in Stages 12 and 13 of the approved residential subdivision known as The Range;
- Development staging of the Lifestyle Estate consists of the following:
    - Stage 12A – 47 lots;
    - Stage 12B – 42 lots
    - Stage 12C – 42 lots;
    - Stage 12D – 14 lots;
    - Stage 13A - 26 lots;
    - Stage 13B – 26 lots.
    - Total 197 lots.
- A community centre for use by residents with 33 parking spaces including a delivery/loading bay and one accessible parking space;
- Each dwelling will have driveway access from a frontage roadway and garaging for resident vehicles. On dwelling sites visitors can also park off-street in the driveway;
- Central and perimeter pathways running across the Lifestyle village area will provide a connection to the existing subdivisions footpath network and community centre;
- The main access roads are The Range Boulevard at 8.0m wide and Lorikeet Circuit at 8.6m wide the other residential roadways streets A to I are 6.0m wide;
- Traffic calming facilities and flat top formal pedestrian crossing points;
- Landscaping including small park areas;
- Roadside garbage collection.

Refer to the Lifestyle Estate layout plans below.



20	PRE PLANNING MEETING COMMENTS ACTIONED	DSJ	08/04/24
19	LIFESTYLE ESTATE STAGING PLAN ADDED (LOT NUMBERS ADJUSTED)	DSJ	04/04/24
18	STAGE 13 – PLAN OF SUBDIVISION UPDATED	DSJ	03/04/24
17	DEVELOPMENT APPLICATION PLANS FOR COMMENT	DSJ	02/04/24
16	AREA CALCULATIONS UPDATED FOR REMOVAL OF COUNCIL ROAD RESERVE	DSJ	02/04/24
15	PLAN OF SUBDIVISION ADDED	DSJ	02/04/24
14	STAGE 13 – PARK ADDED	DSJ	13/03/24
13	STAGE 12/13 PERVIOUS–IMPERVIOUS AREA CALCULATIONS	DSJ	12/03/24
12	LAYOUT REVISION F.S. STAGE 12 ADDED	PS	15/12/23
11	DEEP SOIL ZONES	PS	15/12/23

WARNING

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DA PLANS FOR COMMENT
DATE:- 09/04/2024

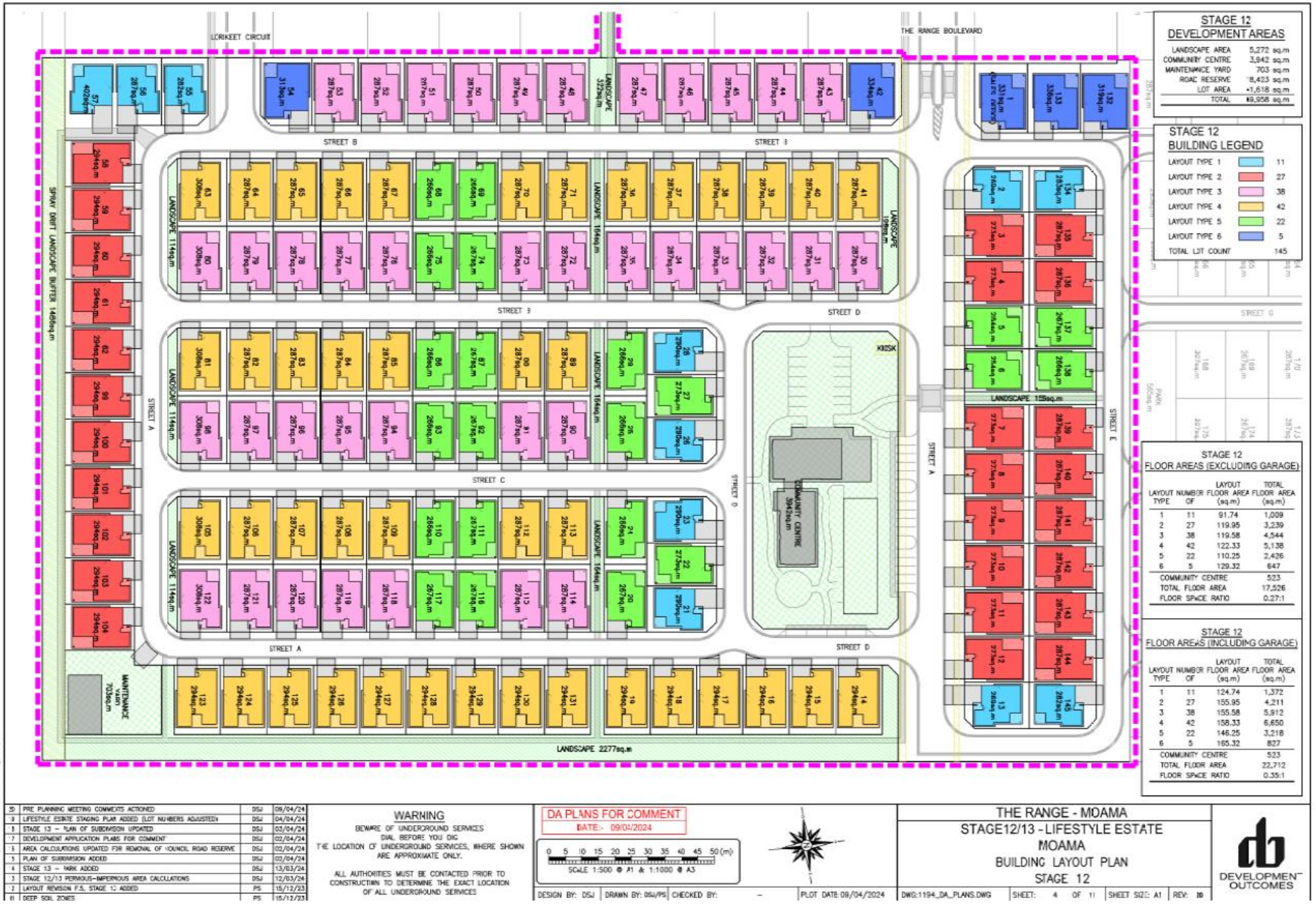
0 5 10 15 20 25 30 35 40 45 50 (m)
SCALE 1:500 @ A1 & 1:1000 @ A3

DESIGN BY: DSJ | DRAWN BY: DSJ/PS | CHECKED BY: – | PLOT DATE: 09/04/2024

THE RANGE - MOAMA
STAGE12/13 - LIFESTYLE ESTATE MOAMA
DETAIL LAYOUT PLAN & STAGE PLAN STAGE 12

DWG:1194_DA_PLANS.DWG | SHEET: 3 OF 11 | SHEET SIZE: A1 | REV: 20

DEVELOPMENT OUTCOMES


LORIKEET CIRCUIT
THE RANGE BOULEVARD
STREET A
STREET B
STREET C
STREET D
STREET E
SPRAY DRIFT LANDSCAPE BUFFER 1465sq.m
MAINTENANCE YARD 703sq.m
KIOSK
COMMUNITY CENTRE 394.2sq.m
LANDSCAPE 2277sq.m
LANDSCAPE 15Sq.m
PARK 565sq.m
STAGE 12
DEVELOPMENT AREAS
LANDSCAPE AREA 5,272 sq.m
COMMUNITY CENTRE 3,942 sq.m
MAINTENANCE YARD 703 sq.m
ROAD RESERVE 18,423 sq.m
LOT AREA 41,618 sq.m
TOTAL 69,958 sq.m
STAGE 12
BUILDING LEGEND
LAYOUT TYPE 1 11
LAYOUT TYPE 2 27
LAYOUT TYPE 3 38
LAYOUT TYPE 4 42
LAYOUT TYPE 5 22
LAYOUT TYPE 6 5
TOTAL LOT COUNT 145
STAGE 12
FLOOR AREAS (EXCLUDING GARAGE)
LAYOUT TYPE | NUMBER OF | LAYOUT FLOOR AREA (sq.m) | TOTAL FLOOR AREA (sq.m)
1 | 11 | 91.74 | 1,009
2 | 27 | 119.95 | 3,239
3 | 38 | 119.58 | 4,544
4 | 42 | 122.33 | 5,138
5 | 22 | 110.25 | 2,426
6 | 5 | 129.32 | 647
COMMUNITY CENTRE 523
TOTAL FLOOR AREA 17,526
FLOOR SPACE RATIO 0.27:1
STAGE 12
FLOOR AREAS (INCLUDING GARAGE)
LAYOUT TYPE | NUMBER OF | LAYOUT FLOOR AREA (sq.m) | TOTAL FLOOR AREA (sq.m)
1 | 11 | 124.74 | 1,372
2 | 27 | 155.95 | 4,211
3 | 38 | 155.58 | 5,912
4 | 42 | 158.33 | 6,650
5 | 22 | 146.25 | 3,218
6 | 5 | 165.32 | 827
COMMUNITY CENTRE 523
TOTAL FLOOR AREA 22,712
FLOOR SPACE RATIO 0.35:1
20 PRE PLANNING MEETING COMMENTS ACTIONED DSJ 09/04/24
9 LIFESTYLE ESTATE STAGING PLAN ADDED (LOT NUMBERS ADJUSTED) DSJ 04/04/24
8 STAGE 13 – PLAN OF SUBDIVISION UPDATED DSJ 03/04/24
7 DEVELOPMENT APPLICATION PLANS FOR COMMENT DSJ 02/04/24
5 AREA CALCULATIONS UPDATED FOR REMOVAL OF COUNCIL ROAD RESERVE DSJ 02/04/24
5 PLAN OF SUBDIVISION ADDED DSJ 02/04/24
4 STAGE 13 – PARK ADDED DSJ 13/03/24
3 STAGE 12/13 PERVIOUS-IMPERVIOUS AREA CALCULATIONS DSJ 12/03/24
2 LAYOUT REVISION F.S. STAGE 12 ADDED PS 15/12/23
1 DEEP SOIL ZONES PS 15/12/23
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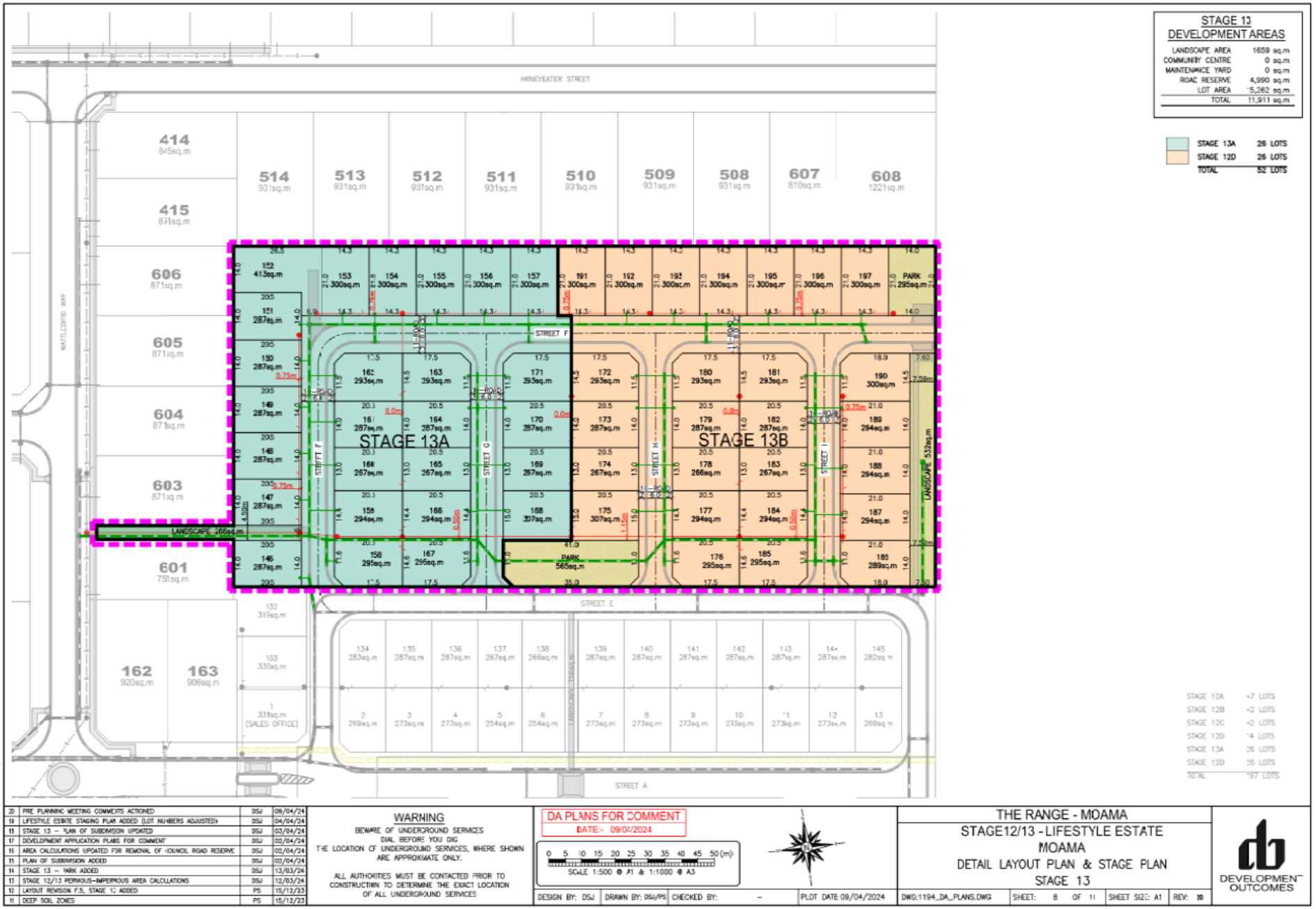
SCALE 1:500 @ A1 & 1:1000 @ A3
DESIGN BY: DSJ | DRAWN BY: DSJ/PS | CHECKED BY: – | PLOT DATE: 09/04/2024
THE RANGE - MOAMA
STAGE12/13 - LIFESTYLE ESTATE
MOAMA
BUILDING LAYOUT PLAN
STAGE 12
DWG: 1194_DA_PLANS.DWG | SHEET: 4 OF 11 | SHEET SIZE: A1 | REV: 20
DEVELOPMENT OUTCOMES


STAGE 13
DEVELOPMENT AREAS
LANDSCAPE AREA 1659 sq.m
COMMUNITY CENTRE 0 sq.m
MAINTENANCE YARD 0 sq.m
ROAD RESERVE 4,990 sq.m
LOT AREA 5,262 sq.m
TOTAL 11,911 sq.m
STAGE 13A 26 LOTS
STAGE 12D 26 LOTS
TOTAL 52 LOTS
HINEYEATER STREET
WATTLEDIRD WAY
STAGE 13A
STAGE 13B
STREET A
STREET E
STREET F
STREET G
STREET H
STREET I
LANDSCAPE 566sq.m
LANDSCAPE 539sq.m
PARK 565sq.m
PARK 295sq.m
414 845sq.m
415 871sq.m
606 871sq.m
605 871sq.m
604 871sq.m
603 871sq.m
601 751sq.m
162 920sq.m
163 906sq.m
514 931sq.m
513 931sq.m
512 931sq.m
511 931sq.m
510 931sq.m
509 931sq.m
508 931sq.m
607 810sq.m
608 1221sq.m
132 319sq.m
133 335sq.m
1 338sq.m (SALES OFFICE)
STAGE 12A 17 LOTS
STAGE 12B 12 LOTS
STAGE 12C 12 LOTS
STAGE 12D 14 LOTS
STAGE 13A 26 LOTS
STAGE 12D 26 LOTS
TOTAL 97 LOTS
20 PRE PLANNING MEETING COMMENTS ACTIONED DSJ 09/04/24
19 LIFESTYLE ESTATE STAGING PLAN ADDED (LOT NUMBERS ADJUSTED) DSJ 04/04/24
18 STAGE 13 – PLAN OF SUBDIVISION UPDATED DSJ 03/04/24
17 DEVELOPMENT APPLICATION PLANS FOR COMMENT DSJ 02/04/24
16 AREA CALCULATIONS UPDATED FOR REMOVAL OF COUNCIL ROAD RESERVE DSJ 02/04/24
15 PLAN OF SUBDIVISION ADDED DSJ 02/04/24
14 STAGE 13 – PARK ADDED DSJ 13/03/24
13 STAGE 12/13 PERMIOUS-IMPERMIOUS AREA CALCULATIONS DSJ 12/03/24
12 LAYOUT REVISION F.S. STAGE 12 ADDED PS 15/12/23
11 DEEP SOIL ZONES PS 15/12/23
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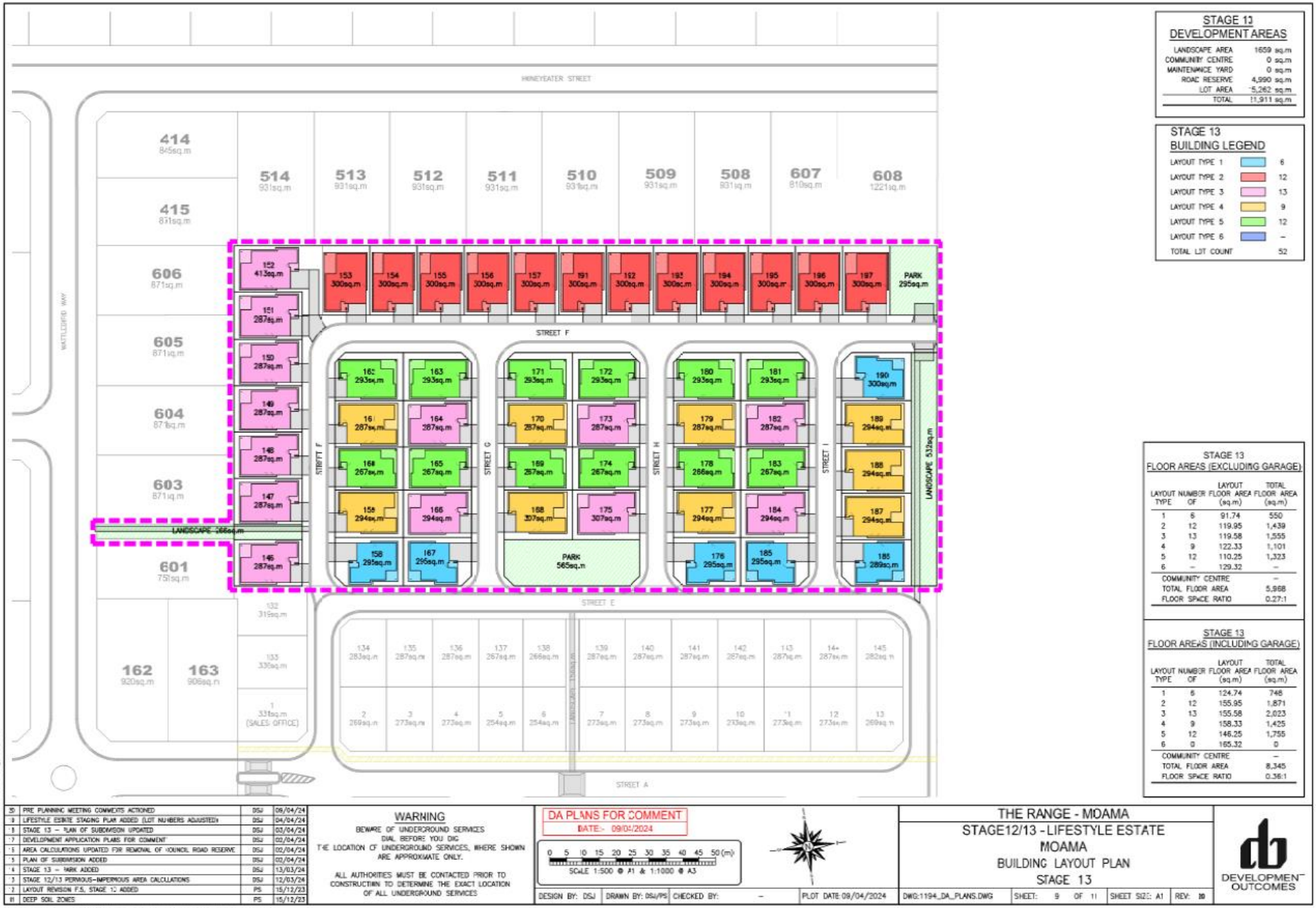
DESIGN BY: DSJ
DRAWN BY: DSJ/PS
CHECKED BY: –
PLOT DATE: 09/04/2024
THE RANGE - MOAMA
STAGE12/13 - LIFESTYLE ESTATE
MOAMA
DETAIL LAYOUT PLAN & STAGE PLAN
STAGE 13
DWG:1194_DA_PLANS.DWG
SHEET: 8 OF 11
SHEET SIZE: A1
REV: 20
DEVELOPMENT OUTCOMES


STAGE 13
DEVELOPMENT AREAS
LANDSCAPE AREA 1659 sq.m
COMMUNITY CENTRE 0 sq.m
MAINTENANCE YARD 0 sq.m
ROAD RESERVE 4,990 sq.m
LOT AREA 5,262 sq.m
TOTAL 11,911 sq.m
STAGE 13
BUILDING LEGEND
LAYOUT TYPE 1 6
LAYOUT TYPE 2 12
LAYOUT TYPE 3 13
LAYOUT TYPE 4 9
LAYOUT TYPE 5 12
LAYOUT TYPE 6 –
TOTAL LOT COUNT 52
STAGE 13
FLOOR AREAS (EXCLUDING GARAGE)
LAYOUT TYPE | NUMBER OF | LAYOUT FLOOR AREA (sq.m) | TOTAL FLOOR AREA (sq.m)
1 | 6 | 91.74 | 550
2 | 12 | 119.95 | 1,439
3 | 13 | 119.58 | 1,555
4 | 9 | 122.33 | 1,101
5 | 12 | 110.25 | 1,323
6 | – | 129.32 | –
COMMUNITY CENTRE –
TOTAL FLOOR AREA 5,968
FLOOR SPACE RATIO 0.27:1
STAGE 13
FLOOR AREAS (INCLUDING GARAGE)
LAYOUT TYPE | NUMBER OF | LAYOUT FLOOR AREA (sq.m) | TOTAL FLOOR AREA (sq.m)
1 | 6 | 124.74 | 748
2 | 12 | 155.95 | 1,871
3 | 13 | 155.58 | 2,023
4 | 9 | 158.33 | 1,425
5 | 12 | 146.25 | 1,755
6 | 0 | 165.32 | 0
COMMUNITY CENTRE –
TOTAL FLOOR AREA 8,345
FLOOR SPACE RATIO 0.36:1
HONEYEATER STREET
WATTLEDYED WAY
STREET F
STREET G
STREET H
STREET I
STREET E
STREET A
LANDSCAPE 532sq.m
PARK 295sq.m
PARK 565sq.m
LANDSCAPE 266sq.m
414 845sq.m
415 831sq.m
606 871sq.m
605 871sq.m
604 871sq.m
603 871sq.m
601 751sq.m
514 931sq.m
513 931sq.m
512 931sq.m
511 931sq.m
510 931sq.m
509 931sq.m
508 931sq.m
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THE RANGE - MOAMA
STAGE12/13 - LIFESTYLE ESTATE
MOAMA
BUILDING LAYOUT PLAN
STAGE 13
DWG:1194_DA_PLANS.DWG SHEET: 9 OF 11 SHEET SIZE: A1 REV: D
DEVELOPMENT OUTCOMES

4. Traffic Generation from Lifestyle Estate

The impacts of the fully developed Lifestyle Estate on the local road network and the existing residential subdivision are primarily related to any increase in traffic generated by the 197-lot Lifestyle Estate in comparison to the traffic generated by the 66 lot residential lots being replaced. A comparison of traffic generation rates for residential dwellings and retirement village dwellings is discussed below.

4.1 Residential Dwellings

Traffic generation levels for residential dwellings are established using the rates suggested in the *RTA Guide to Traffic Generating Developments Technical Direction TDT 2013/04a Updated Traffic Surveys.* Traffic generation rates for Low Density Residential Dwellings (regional areas) are as follows:

- Daily vehicle trips (vpd) = 7.4 per dwelling
- Weekday average evening (PM) peak hour vehicle trips (vph) = 0.78 per dwelling
- Weekday average morning (AM) peak hour vehicle trips (vph) = 0.71 per dwelling

By applying the above rates, the 54 residential lots that are being replaced could potentially generate:

- Daily vehicle trips = 66 lots x 7.4 = **488.40vpd say 489**
- PM peak hour vehicle trips = 66 lots x 0.78 = **51.48vph say 52**
- AM peak hour vehicle trips = 66 lots x 0.71 = **46.86 vph say 47**

4.2 Lifestyle Estate Dwellings

Traffic generation levels for developments are typically determined by reference to published standards with the amount of traffic generated depending on the land use. The following sources has been used to determine traffic generation levels for the Lifestyle Estate dwellings.

4.2.1 RTA Guide to Traffic Generating Developments

Traffic generation levels for the retirement village can be established using the rates suggested in the RTA Guide to Traffic Generating Developments Section 3.3.4 Housing for aged and disabled persons. The rates suggested for high density housing for aged and disabled persons are as follows:

- Daily vehicle trips = 1 - 2 per dwelling
- Evening peak hour vehicle trips = 0.1 - 0.2 per dwelling

By applying the above rates, the 197-lot Lifestyle Estate could potentially generate:

- Daily vehicle trips = 197 x 2 = **394vpd**
- Evening peak hour vehicle trips = 197 x 0.2 = **39.4vph say 40**

4.2.2 South Australian Department of Planning and Infrastructure January 2014.

Lifestyle Estate living refers to developments purposely built for retirement community. Residents are typically active and are in possession of private vehicles. Table 7.8 shows the statistical analysis and suggests the following rates per dwelling:

- Daily vehicle trips = 3 per dwelling
- Evening peak hour vehicle trips = 0.3 per dwelling

By applying the above rates, the 197-lot retirement village could potentially generate:

- Daily vehicle trips = 197 x 3 = **591vpd**
- Evening peak hour vehicle trips = 197 x 0.3 = **59.1vph say 59**

The Lifestyle Estate is located 4km form the Moama CBD. To carry out shopping and seek other services residents from the Lifestyle Estate would have to drive on more occasions than if they were centrally located within Moama. It is concluded that the rates suggested in by South Australian Department of Planning and Infrastructure January 2014 are more appropiate for the proposed 197 lot retirement village at The Range.

4.3 Summary

When comparing the traffic generation for the 66 residential dwellings (52vph) and the 197 Lifestyle Estate dwellings (59) there is a difference of plus **7vph** during the evening peak from the Lifestyle Estate. It is concluded that the Lifestyle Estate will have no impact on the existing road network or the proposed intersection treatments for the proposed The Range subdivision as described in the March 2020 TIAR.

5. Traffic Distribution from Lifestyle Estate

Within the Lifestyle Estate the street layout is closer to Beer Road, and it is anticipated that the traffic generated by the Lifestyle Estate will be distributed in a 70/30 split towards Beer Road (via The Range Boulevard) and Twenty-four Lane as described in the Section 5.3 Traffic Distribution and Analysis in the March 2020 TIAR. It is concluded that the 197-lot Lifestyle Estate will not change the traffic distribution of the subdivision and the proposed intersection treatments for the subdivision will not be affected.

6. Parking Requirement

6.1 Residential Parking

Like traffic generation, parking requirements for the proposed Lifestyle Estate depends on the land use. *Section 2.6 Parking and Access* of the Murray Development Control Plan 2012 (DCP2012) states the following in relation to residential parking:

On-site parking at the following rates:

• One bedroom dwelling: 1 space

• Two or more-bedroom dwelling: 2 spaces

Each proposed dwelling will have driveway access from a frontage roadway and garaging for 1 or 2 resident vehicles depending on the dwelling size. On dwelling sites visitors can also park off-street in the driveway. Therefore, parking requirements for the proposed dwellings within the Lifestyle Estate meets the requirements of the Murray DCP2012.

6.2 Community Centre Parking

Section 7.5 Activity Centres and Community Facilities in the Murray DCP2012 doesn't not stipulate any parking requirement for community centres. The Lifestyle Estate proposes 33 dedicated onsite parking passes that are in and around the proposed Community Centre for visitors and include a delivery/loading bay and one accessible parking space.

7. Conclusions

It is concluded that:

- The proposed Lifestyle Estate will have no significant impact on the existing and proposed level of traffic generation and there will be no anticipated changes to the traffic distribution on Beer Road or Twenty-Four Lane from traffic generated by the Lifestyle Estate;
- The are no changes required to the proposed intersection treatments as proposed by the March 2020 TIAR;
- Parking requirements for the Lifestyle Estate and the Community Centre have been met.

Appendix A

Extract from publications for land use traffic generating development rates

1A. Trip generation rates for assessment of development proposals. *Department of Planning and Infrastructure January 2014.*

1. Introduction

Parsons Brinckerhoff was commissioned by Department of Planning, Transport and Infrastructure (DPTI) to develop a set of vehicle trip generation rates for a range of land uses which may be used to determine traffic impacts associated with proposed development assessment.

The scope of work comprised of collating relevant data from various published resources including the 'Land Use Traffic Generation Guidelines' published by Director-General of Transport, South Australia in 1987, 'Guide to Traffic Generating Developments' published by Roads and Traffic Authority (RTA) in 2002, 'Trip Generation' by Institute of Transportation Engineers (ITE) last updated in 2012 (9th edition) and surveys or studies undertaken by other consultants including Parsons Brinckerhoff.

7.4 Retirement-style living

Retirement-style living refers to developments built purposely for retired community. Residents are typically active with possession of private vehicle(s). Table 7.7 summarises the trip rates collected from the available sources. It should be noted that the trip rates from TRICS has been excluded from further analysis, as rates from TRICS were only provided per resident, and could not be compared to the other source which provided rates per unit dwelling.

It is noted that the daily trip rates from the USA are higher than the rates from the other sources; while daily trip rates from Australia and New Zealand are fairly consistent. Peak hour trip rates appear to have good consistency between the different data sources.

Table 7.7 Trip rates for retirement-style living

Source	Year	Country	Daily trips	Unit	Peak hour trips	Unit	Local relevance	Reliability
Land Use Traffic Generation Guidelines	1987	Australia, SA	2.25	unit	-	-	5	1
Land Development Code Trip Generation Manual for City of San Diego	2003	San Diego USA	4	unit	-	-	1	1
Trips and Parking Related to Land Use Douglass and Ableу	2011	New Zealand	2.6	unit	0.3	unit	3	3
ITE Trip Generation 9th Edition	2012	USA	3.68	dwelling	0.27	dwelling	1	5
TRICS	2013	UK	3.7	resident	0.5	resident	-	-

Table 7.8 shows the statistical analysis, including the average and 95% confidence interval, as well as the weighted average calculated using the local relevance and reliability score. The statistical analysis shows that:

- The average daily trip rate and weighted average daily trip rate are both approximately 3 trips per dwelling.
- The average and weighted average peak hour trip rates are both approximately 0.3 trips per dwelling.

The average together with the 95% confidence interval, the weighted average and rates from the available sources, are provided in Figure 7.7 and Figure 7.8 for daily and peak hour, respectively.

Table 7.8 Statistical analysis of trip rates for retirement-style living

		Daily trips		Peak hour trips	
Number of sources		4		2	
Average		3.13		0.29	
Standard Deviation (δ)		0.84		0.02	
2δ (95%)	range	1.45	4.81	0.24	0.33
Weighted average		2.96		0.29	

Appendix B

Traffic Impact Assessment March 2022 - The Range Moama

Insert

Traffic Impact Assessment March 2022

Here