TRAFFIC AND PARKING IMPACT ASSESSMENT OF PROPOSED MANUFACTURED HOME ESTATE AT 16 DENTON CLOSE, WINDELLA

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Development Type: **Manufactured Home Estate**

Site Address: **16 Denton Close, Windella**

Prepared for: **Mavid Development Pty Ltd**

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1 INTRODUCTION

M^CLaren Traffic Engineering was commissioned by *Mavid Development Pty Ltd* to provide a traffic and parking impact assessment of the proposed manufactured home estate at 16 Denton Close, Windella, as depicted in **Annexure A**.

1.1 Description and Scale of Development

The proposed development has the following characteristics relevant to traffic and parking:

- 282 x manufactured home sites;
- An ancillary community centre with bar, function room, pool, lawn bowls and pickle ball facilities. The community centre is only to be used by residents of the manufactured home estate and their visitors
- 67 x visitor car parking spaces including four (4) accessible spaces.

Vehicular access to the proposed site is to occur via a 12.5m width driveway from River Road consisting of 5m width entry and exit lanes separated by a 2.5m width median. There is an additional 7m width driveway limited to fire and emergency vehicles from Denton Road.

1.2 State Environmental Planning Policy (Transport and Infrastructure) 2021

The proposed development does not qualify as a traffic generating development with relevant size and/or capacity under *Clause 2.122* of the *SEPP (Transport and Infrastructure) 2021,* as the proposal provides less than 300 dwellings. Accordingly, formal referral to Transport for NSW (TfNSW) is unnecessary in this regard and the application can be assessed by Maitland City Council officers.

The proposed development has frontage to a classified road and therefore qualifies as such with reference to *Clause 2.119 of SEPP (Transport and Infrastructure) 2021*. The development therefore must satisfy that:

> *(b) the safety, efficiency, and ongoing operation of the classified road will not be adversely affected by the development as a result of:*
>
> *(i) the design of the vehicular access to the land.*
>
> *(ii) the emission of smoke or dust from the development*
>
> *(iii) the nature, volume or frequency of vehicles using the classified road to gain access to the land.*

The proposed site contains a frontage to the New England Highway, a TfNSW classified road, although no vehicular access is proposed via the classified road. The traffic impact of the estimated traffic generation of the proposed development is assessed in detail within **Section 5**, where it is concluded that the proposed development will result in no adverse impacts on the surrounding road network.

1.3 Local Government (Manufactured Home Estates, Caravan Parks, Camping Grounds and Moveable Dwellings) Regulation 2021

The proposed development qualifies as a development within the definitions contained with the regulation as a Manufactured Home Estate and as such shall be assessed accordingly. The regulation is understood to supersede the Council's Development Control Plans (DCP).

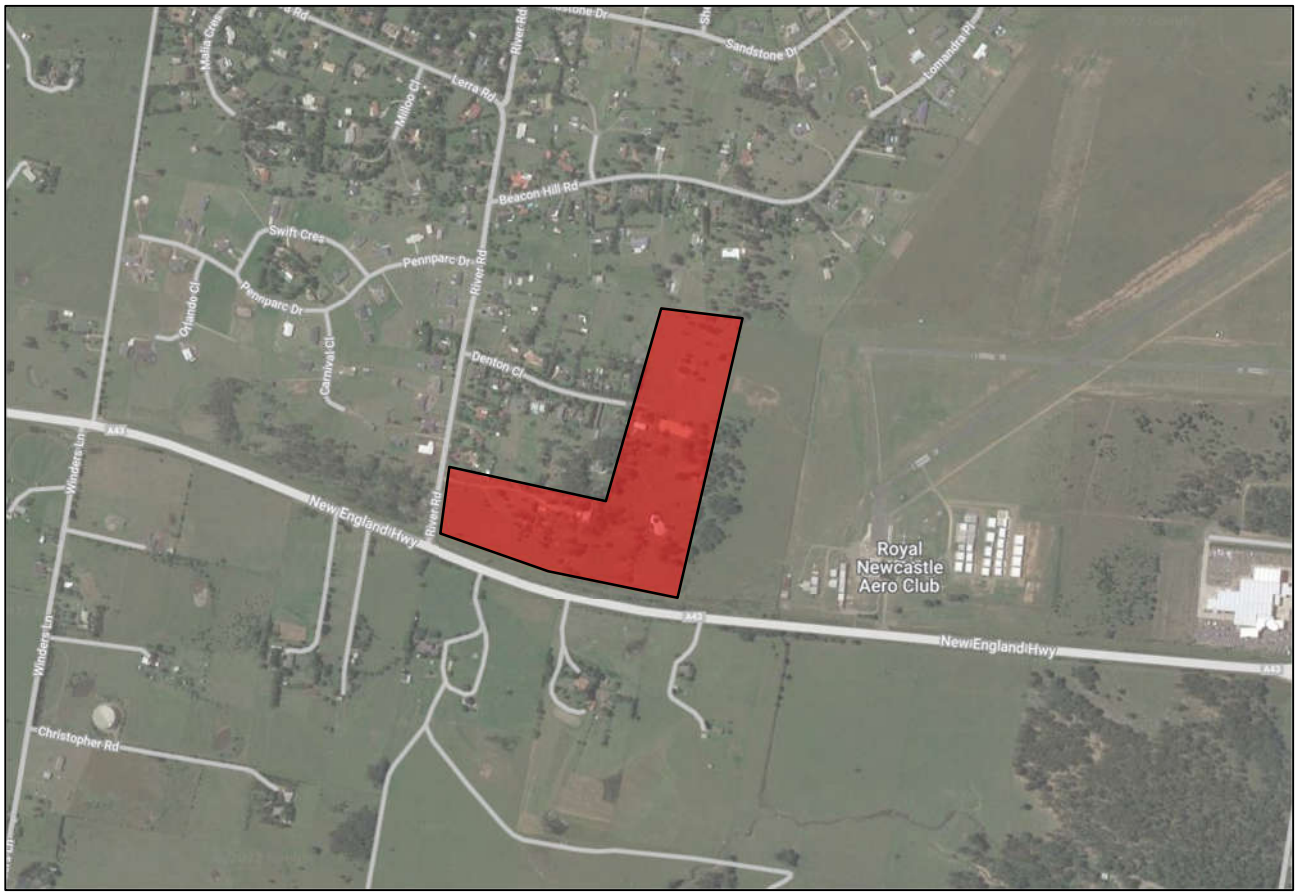
1.4 Site Description

The subject site is currently zoned *RU2 – Rural Landscape* under the *Maitland Local Environmental Plan 2011*. The subject site currently consists of a residential dwelling and a large portion of the site being vacant, with vehicular access to the site provided via a driveway from River Road. The site has frontages to Denton Close and River Road to the west and New England Highway to the south.

The site is generally surrounded by low-density residential dwellings and vacant / agricultural land with Maitland Airport located to the east of the site.

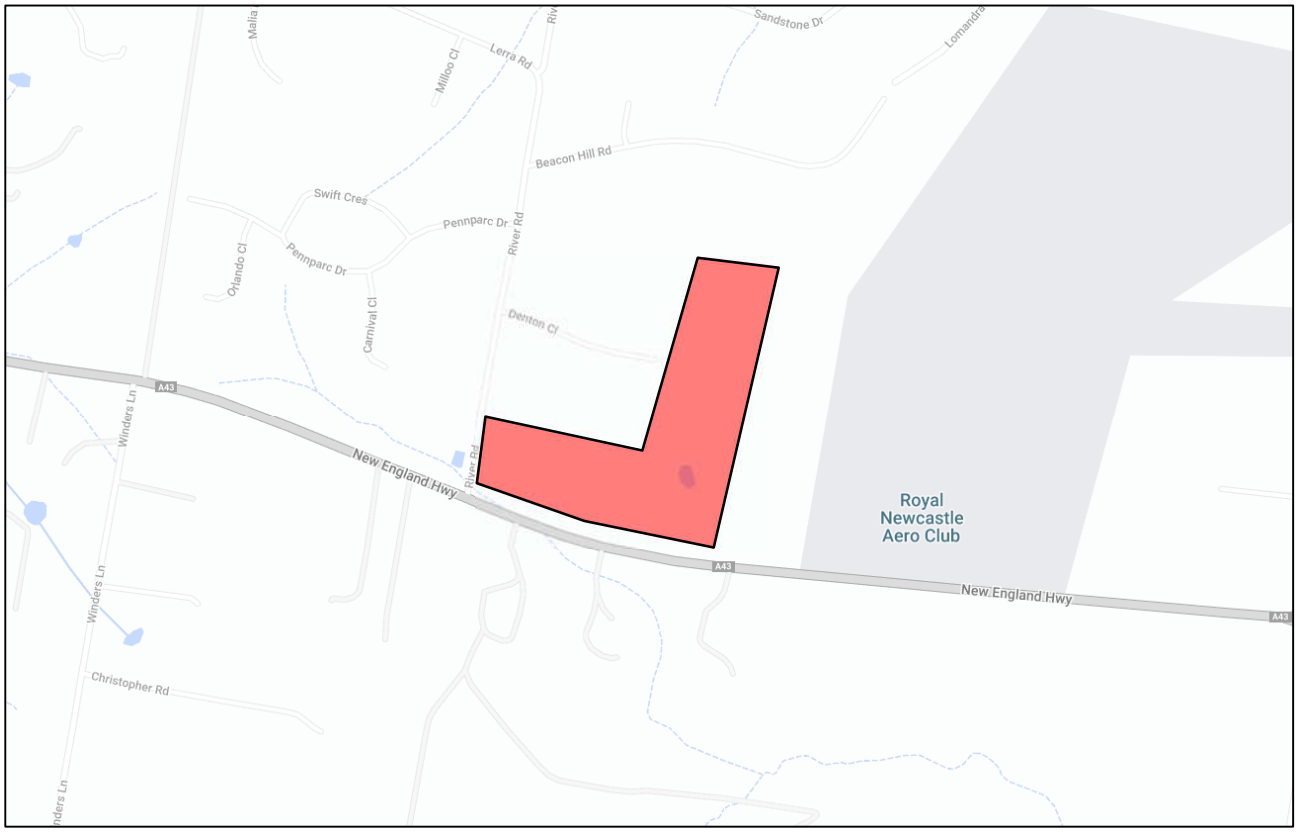
1.5 Site Context

The location of the site is shown on an aerial photo and a street map in **Figure 1** and **Figure 2** respectively.



Site Location

FIGURE 1: SITE CONTEXT – AERIAL PHOTO



Site Location

FIGURE 2: SITE CONTEXT – STREET MAP

2 EXISTING TRAFFIC AND PARKING CONDITIONS

2.1 Road Hierarchy

The road network servicing the site has characteristics as described in the following sub-sections.

2.1.1 New England Highway

- TfNSW Classified State Highway (HW 9);
- Approximately 13m wide two-way carriageway facilitating one (1) traffic flow lane in each direction and formalised shoulders;
- Signpost 80km/h speed limit;
- No kerbside parking permitted along both sides of the road.

2.1.2 River Road

- Unclassified Collector Road;
- Approximately 10m wide two-way carriageway facilitating one (1) traffic flow lane in each direction.
- Signposted 50km/h speed limit;
- No shoulder parking permitted with informal grassy shoulders on both sides of the road.

2.1.3 Denton Close

- Unclassified LOCAL Road;
- Approximately 5m wide two-way carriageway facilitating one (1) traffic flow lane in each direction;
- No speed limit signposted, default 50km/h limit applies;
- No shoulder parking permitted with informal grassy shoulders on both sides of the road.

2.2 Existing Traffic Management

- 'Give Way' sign-controlled intersection of New England Highway / River Road;
- Priority controlled intersection of River Road / Denton Close.

2.3 Existing Traffic Environment

Turning movement count surveys were conducted at the intersection of New England Highway / River Road between 6:00 AM and 10:00 AM & 3:00 PM to 7:00 PM on Wednesday 7 December 2022 representing a typical operating weekday. The full survey results are shown in **Annexure B** for reference.

2.3.1 Existing Road Performance

The performance of the surrounding intersections under the existing traffic conditions has been assessed using SIDRA INTERSECTION 9.0, **Table 1** summarises the resultant intersection performance data, with full SIDRA results reproduced in **Annexure C**.

TABLE 1: EXISTING INTERSECTION PERFORMANCES (SIDRA INTERSECTION 9.0)

Intersection	Peak Hour	Degree of Saturation[1]	Average Delay[2] (sec/vehicle)	Level of Service[3]	Control Type	Worst Movement
EXISTING PERFORMANCE						
New England Highway / River Road	AM	0.46	N/A (Worst: 17.3)	**N/A** (Worst: B)	Give Way	RT from River Road (N)
	PM	0.50	N/A (Worst: 19.3)	**N/A** (Worst: B)		RT from River Road (N)

Notes: (1) The Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.
(2) The average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.
(3) The Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.
(4) No overall Level of Service is provided for Give Way and Stop controlled intersections as the low delays associated with the dominant movements skew the average delay of the intersection. The Level of Service of the worst approach is an indicator of the operation of the intersection, with a worse Level of Service corresponding to long delays and reduced safety outcomes for that approach.

As shown, the intersection of New England Highway is currently performing at a high level of efficiency, with worst movement Level of Service (LoS) "B" conditions in both the AM & PM peak hour periods. The LoS "B" performance is characterised by low approach delays and spare capacity.

2.3.2 Two-Way Traffic Volumes

Automatic traffic count surveys were undertaken from Saturday 3 December to Friday 9 December 2022 inclusive, along New England Highway located approximately 200m east of the intersection of New England Highway / River Road to determine the existing characteristics of the road in terms of:

- Peak traffic volumes and speeds;
- Daily traffic volumes and speeds;
- Classification of vehicles.

Detailed results are reproduced in **Annexure B**, with the results summarised in **Table 2**.

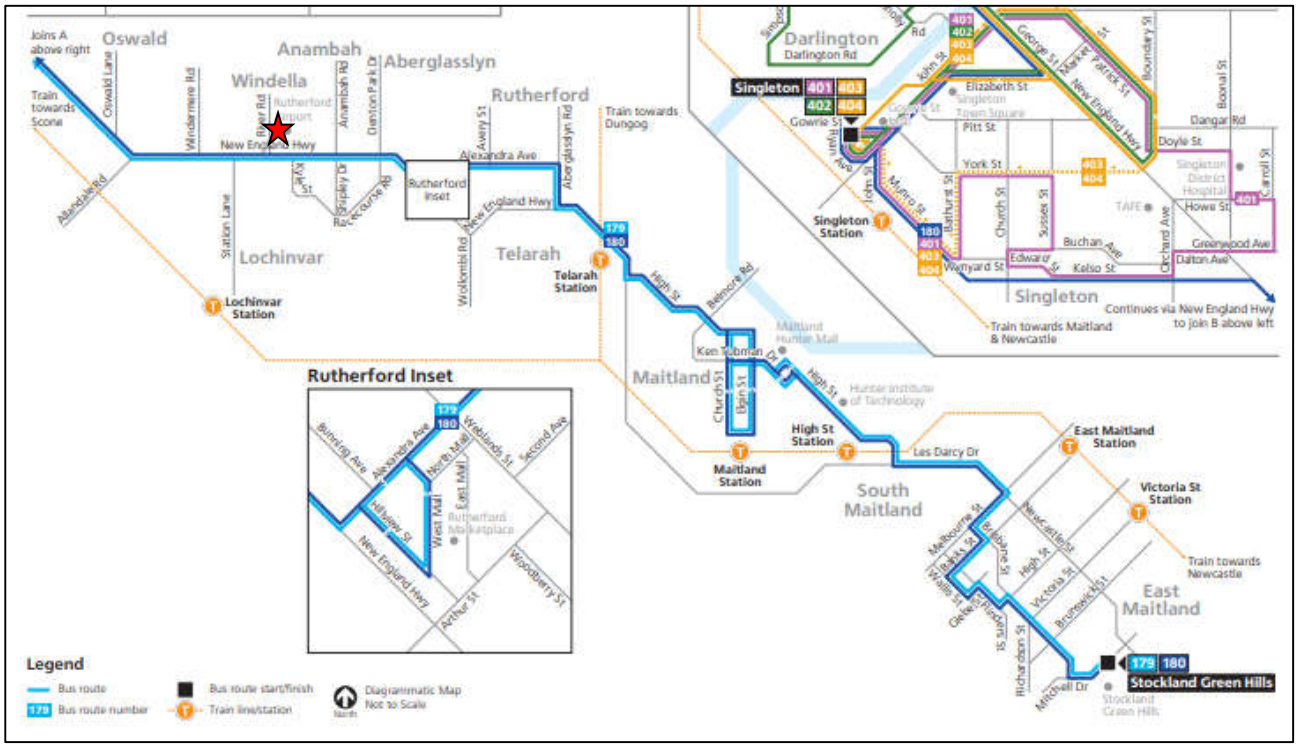
TABLE 2: 7-DAY TUBE SURVEY RESULTS

Road	Direction	Weekday Peak Hour Volumes		Average Daily Volume	85th Percentile Speed	Heavy Vehicles
		Time	Volume			
New England Highway	Eastbound	AM 8am – 9am	857	8,017	85.7km/h	8.0%
		PM 3pm – 4pm	778			
	Westbound	AM 8am – 9am	610	8,358	84.0km/h	7.4%
		PM 3pm – 4pm	761			

2.4 Public Transport

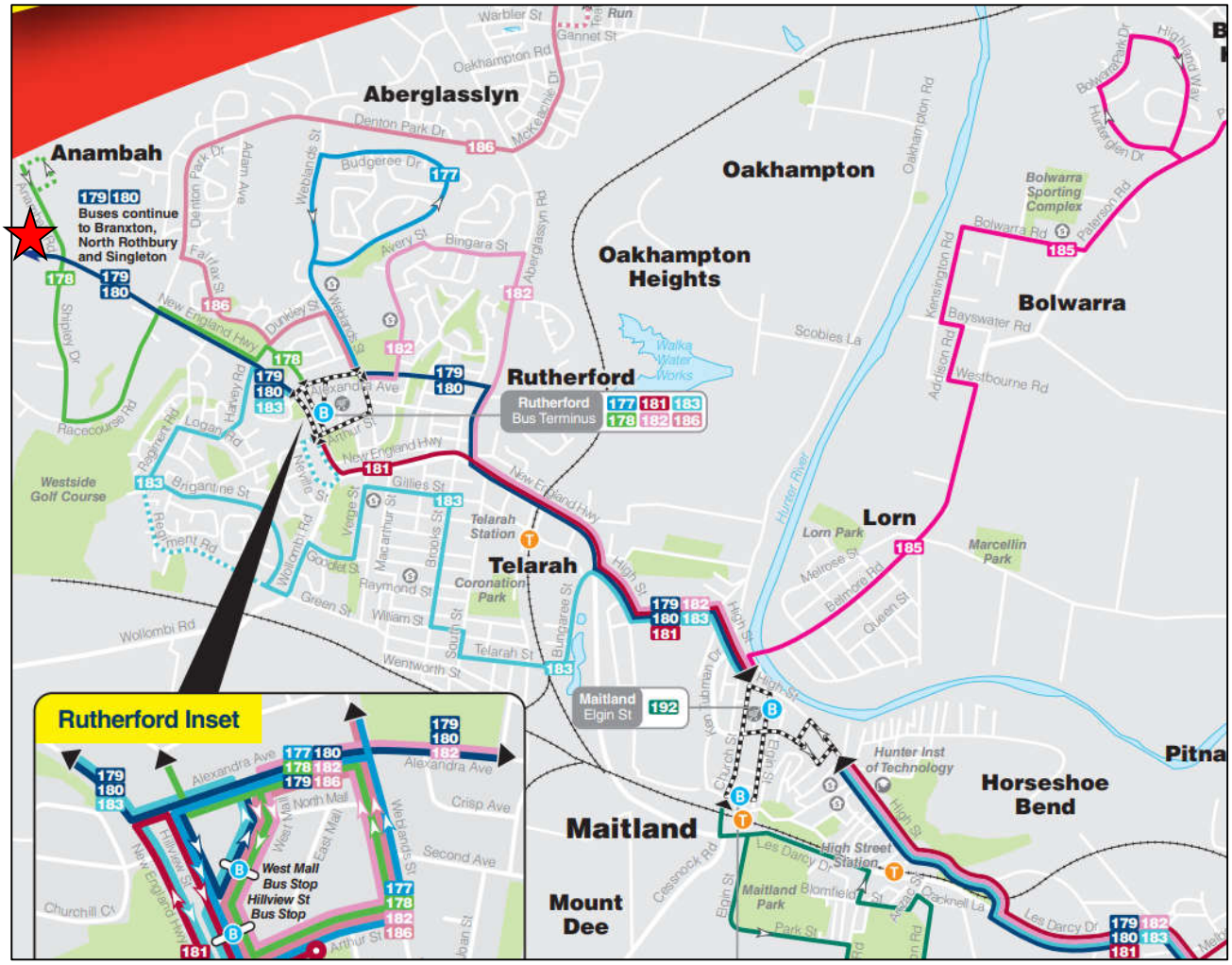
The subject site has access to existing bus stop (ID: 232173) located approximately 400m walking distance to the west from the southern frontage of the subject site on New England Highway. The bus stop services existing bus route 179 (North Rothbury to Green Hills Shopping Centre via Maitland) and 180 (Singleton Heights to Green Hills Shopping Centre via Maitland) provided by Hunter Valley Buses.

The location of the site subject to the surrounding public transport network is shown in **Figure 3** and **Figure 4**.



Site Location

FIGURE 3: PUBLIC TRANSPORT NETWORK MAP



Site Location (approximately 2km west of star location)

FIGURE 4: PUBLIC TRANSPORT NETWORK MAP

2.5 Future Road and Infrastructure Upgrades

From Maitland City Council Development Application tracker and TfNSW projects website, it appears that there are no future planned road or public transport changes that will affect traffic conditions within the immediate vicinity of the subject site.

3 INTERNAL ROAD AND CAR PARKING DESIGN

3.1 Local Government Regulation 2021

Reference is made to the *Local Government Regulation 2021 (Manufactured Home Estates, Caravan Parks, Camping Grounds and Movable Dwellings)* (LGR 2021) which outlines the road hierarchy for access roads and internal roads for Manufactured Home Estates. The LGR outlines the following criteria for the sites internal and access roads:

> ***Part 2…Division 3 Manufactured home estates***
>
> ***Subdivision 3 Roads***
>
> *20 Entrance and exit roads*
>
> *(1) A road that forms an entrance to or exit from a manufactured home estate must be at least 8m wide.*
>
> *(2) For a divided road, the width of the sealed portion of the road on either side of the median strip must be at least 5 metres.*
>
> *21 Width of roads*
>
> *(1) The width of the road reserve must be at least—*
>
> *(a) 8.5 metres for a major access road, and*
>
> *(b) 6 metres for a minor access road.*
>
> *(2) The width of the sealed portion of an access road must be at least—*
>
> *(a) 6 metres for a major access road, and*
>
> *(b) 4 metres for a minor access road.*
>
> *(3) If a minor access road exceeds 80 metres in length, a passing bay must be provided within the road reserve.*
>
> *(4) Passing bays must be provided at intervals of no more than 100 metres.*
>
> *(5) The width of the sealed portion of an access road at a passing or parking bay must be at least—*
>
> *(a) 8.5 metres for a major access road, and*
>
> *(b) 6 metres for a minor access road.*

Based on the above, the manufactured home estate internal roads require the following, which are also provided on the proposed plan:

- Entrance and exit divided roads of minimum 5m in width on either side of the median strip;

- Road reserve widths of minimum 8.5m for major access roads (access road serving more than 30 dwellings) and 6m for minor access roads (access road serving no more than 30 dwellings);

- Sealed portion of the road a minimum 6m width for major access roads and 4m width for minor access roads.

- Sealed portion of the road at passing bays is a minimum 8.5m width for major access roads and 6m for minor access road.

3.1 Planning for Bushfire Protection 2019

While it is not clear to this firm whether *Planning for Bushfire Protection 2019* applies to the proposal, planning for fire service access and resident evacuation is reasonable in the circumstances. All roads appear to be *non-perimeter roads* and as such require:

- *minimum 5.5m carriageway width kerb to kerb;*
- *parking is provided outside of the carriageway width;*
- *hydrants are located clear of parking areas;*
- *roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m;*
- *curves of roads have a minimum inner radius of 6m;*
- *the road crossfall does not exceed 3 degrees; and*
- *a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.*

Each of the above measures are met or exceeded by the proposal with the exception of *a minimum of 5.5m carriageway width kerb to kerb* along the one-way segments of road.

3.2 Car Parking Design

The car parking layout as depicted in **Annexure A,** has been assessed to achieve the relevant clauses and objectives of *AS2890.1:2004*, *AS2890.2:2018* and *AS2890.6:2022*. Swept path testing has been undertaken and the results are reproduced within Error! Reference source not found. for reference.

The proposed car parking and vehicular access design achieves the following:

- 12.5m wide two-way driveway facilitating access to River Road;
- Minimum 5.4m long, 2.5m wide spaces for visitors;

- Minimum 5.4m long, 2.4m wide accessible spaces with adjacent associated 5.4m long, 2.4m wide shared space;
- Parallel parking spaces of minimum 6.1m in length x 2.5m width;
- Obstructed parallel parking spaces of minimum 6.4m in length x 2.5m width;.

Whilst the plans have been assessed to comply with the relevant standards, it is usual and expected that a design certificate be required at the Construction Certificate stage to account for any changes following the development application.

3.3 AS2890.1:2004 – Off-Street Parking Facilities

The type of access treatment required for a development which includes off-street car parking is outlined in *AS2890.1:2004*, which provides different requirements for different scales of off-street car parking facility. The proposed development will include approximately **348** car parking spaces and has access from a local road. On this basis, *Table 3.1* of *AS2890.1* specifies that the site requires a Category 3 access driveway, being a separate entry and exit driveway of 6m and 4-6m width respectively, separated by a median 1-3m wide. The driveway currently has a combined width of 15m outside the property boundary. The driveway connects to a circulation roadway at the property boundary which has separated 5m width entry and exit carriageways separated by a 2.5m width median.

3.4 AUSTROADS Guide to Road Design

3.4.1 Intersection Design Requirements

While the *AS2890.1* category 3 driveway design is not a public intersection, the safety of the location and design of the infrastructure proposed must be considered in a similar manner. The design of unsignalised public road intersections is informed by the *AUSTROADS Guide to Road Design Part 4A*, which includes sight line requirements and a warrant-based assessment method to determine the appropriate intersection treatment type.

3.4.2 Sight Distance Assessment

Reference is made to the *AUSTROADS Guide to Road Design Part 4A: Unsignalised and Signalised Intersections – Table 3.2* and *Table 3.4* which outlines the safe intersection sight distance (SISD) required on sealed roads. The sites driveway is located in a signposted 50km/h speed zone, where the NSW Government's *Movement and Place, Design of roads and streets* details that the design speed is to be taken as the posted speed limit. Based on aerial mapping, the average gradient from the site driveway to the north along River Road is 6.5% (uphill) while the average gradient from the site driveway to the south along River Road is 2.5% (downhill). For a reaction time of 2 seconds, the SISD required is 103m to the north, and 96m to the south.

From a desktop assessment using aerial imagery and Google streetview, there are minimal structures within the road verge of River Road which would provide obstructions to sight lines. Looking from the site driveway towards the north, sight lines are limited by a crest in the road. Looking towards the south from the site driveway, there appear to be clear sight lines to the intersection of River Road / New England Highway. Accordingly, the available sight lines from the site driveway are expected to be approximately 235m to the north and

128m to the south. The estimated available sight distance determined from this desktop assessment has been shown on an aerial image in **Figure 5**. Accordingly, the available sight lines exceed the minimum SISD requirements.

FIGURE 5: SIGHT DISTANCE ON AERIAL IMAGE

3.4.3 Warrant Assessment

Reference is made to *AUSTROADS Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings 2020* (AGTM6) which outlines warrants for intersection treatments, with the warrant graph for speeds less than 70km/h extracted in **Figure 6**.

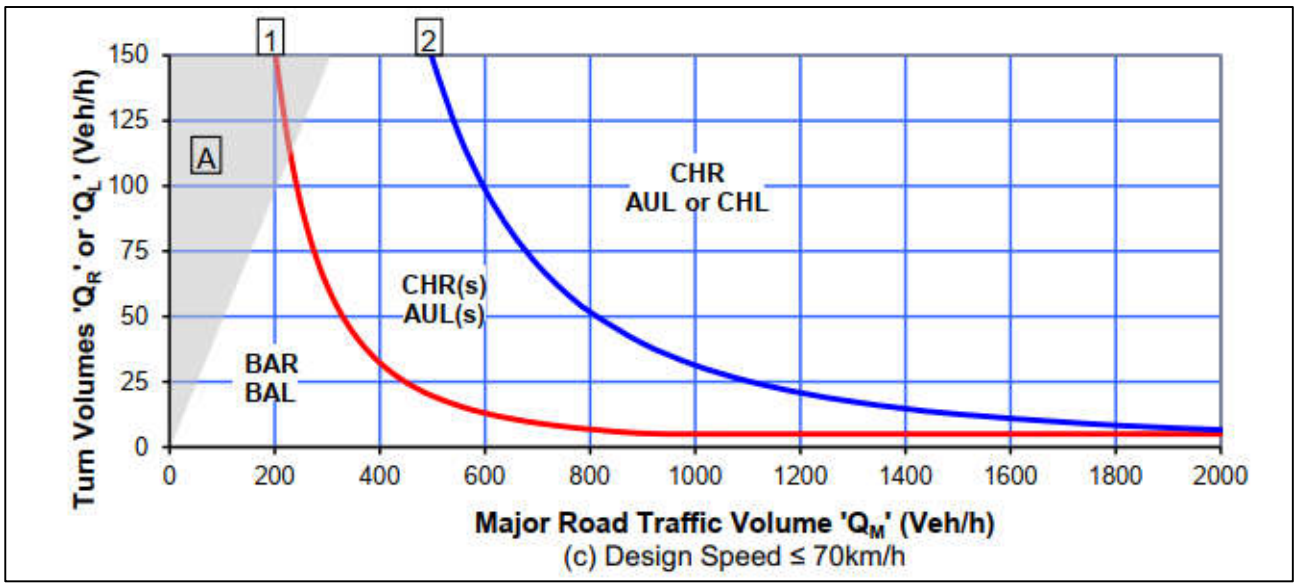
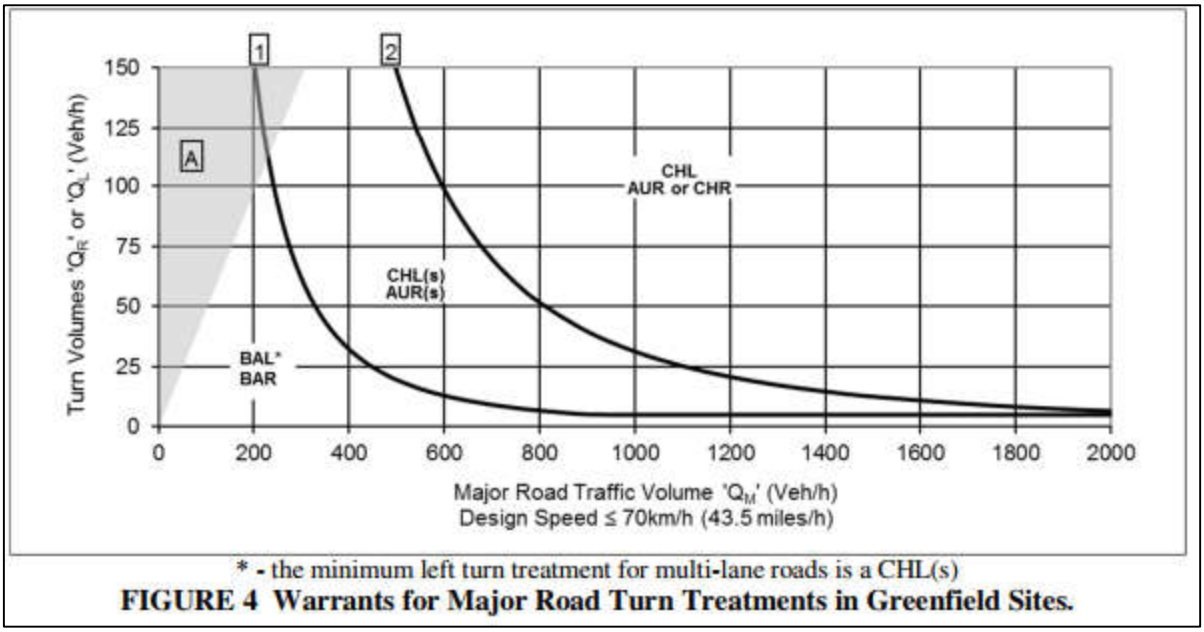


FIGURE 6: EXTRACT OF FIGURE 3.25 OF AGTM6 2020

The warrants outlined within the *AUSTROADS* Guides are based on research undertaken by Dr Owen K Arndt, the Director (Road Design) of the Queensland Department of Transport and Main Roads. Subsequent to his original research from which warrants reproduced in *AUSTROADS* are drawn, Dr Arndt released a paper titled *Development of Warrants for Unsignalized Intersection Turn Treatments* dated November 2014. This paper outlines the development methodology of these turning warrants and separates the requirements for Greenfield (new) sites and Brownfield (existing) sites based upon a cost to benefit analysis.

The Greenfield site warrant diagram for speeds less than 70km/h is extracted in **Figure 7 Figure 6**. It can be seen that the warrants for Greenfield sites in the Arndt Paper 2014 are the same as that presented in AGTM6 2020, showing the correlation between the two documents. The Arndt Paper 2014 also provides warrants for Brownfield sites, with the relevant diagram extract in **Figure 8**.

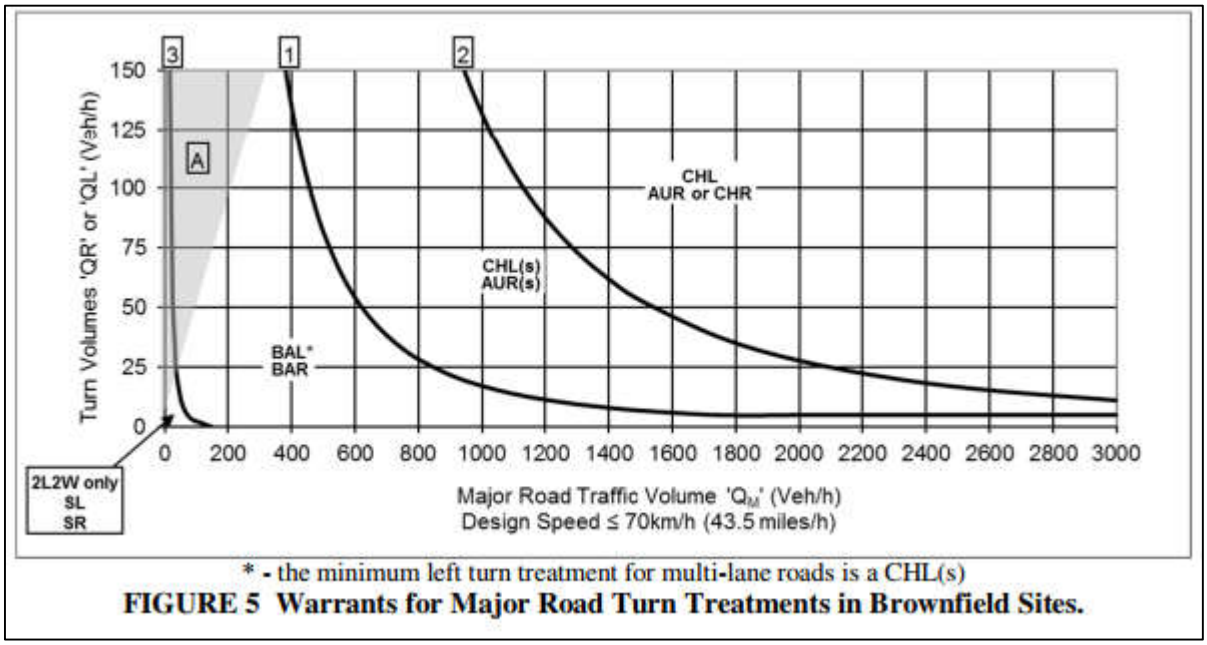
The site on River Road is a Brownfield site, meaning that the extract from **Figure 8** should apply.



* - the minimum left turn treatment for multi-lane roads is a CHL(s)

FIGURE 4 Warrants for Major Road Turn Treatments in Greenfield Sites.

FIGURE 7: EXTRACT OF FIGURE 4 OF ARNDT PAPER 2014



* - the minimum left turn treatment for multi-lane roads is a CHL(s)

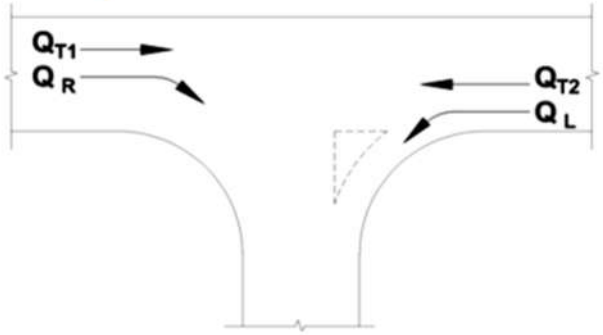
FIGURE 5 Warrants for Major Road Turn Treatments in Brownfield Sites.

FIGURE 8: EXTRACT OF FIGURE 5 OF ARNDT PAPER 2014

3.4.3.1 River Road / Site Driveway Warrants

To determine the applicable treatment, the major road traffic volumes (Q_M) and right turn volumes (Q_R) are to be deduced based upon the future traffic at the interface of River Road and the subject site driveway determined from the existing traffic counts and estimated peak hour traffic generation as per **Section 5.1**. It is noted that there are two (2) potential scenarios for future traffic generation, being the AM peak hour and the afternoon PM peak hour. The applicable volumes for the warrant assessment are as shown in **Table 3**.

Figure 3.26: Calculation of the major road traffic volume Q_M



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}
Four-lane two-way	Right	No	= 50% x $Q_{T1} + Q_{T2} + Q_L$
		Yes	= 50% x $Q_{T1} + Q_{T2}$
	Left	Yes or no	= 50% x Q_{T2}
Six-lane two-way	Right	No	= 33% x $Q_{T1} + Q_{T2} + Q_L$
		Yes	= 33% x $Q_{T1} + Q_{T2}$
	Left	Yes or no	= 33% x Q_{T2}

Source: TMR (2016a).

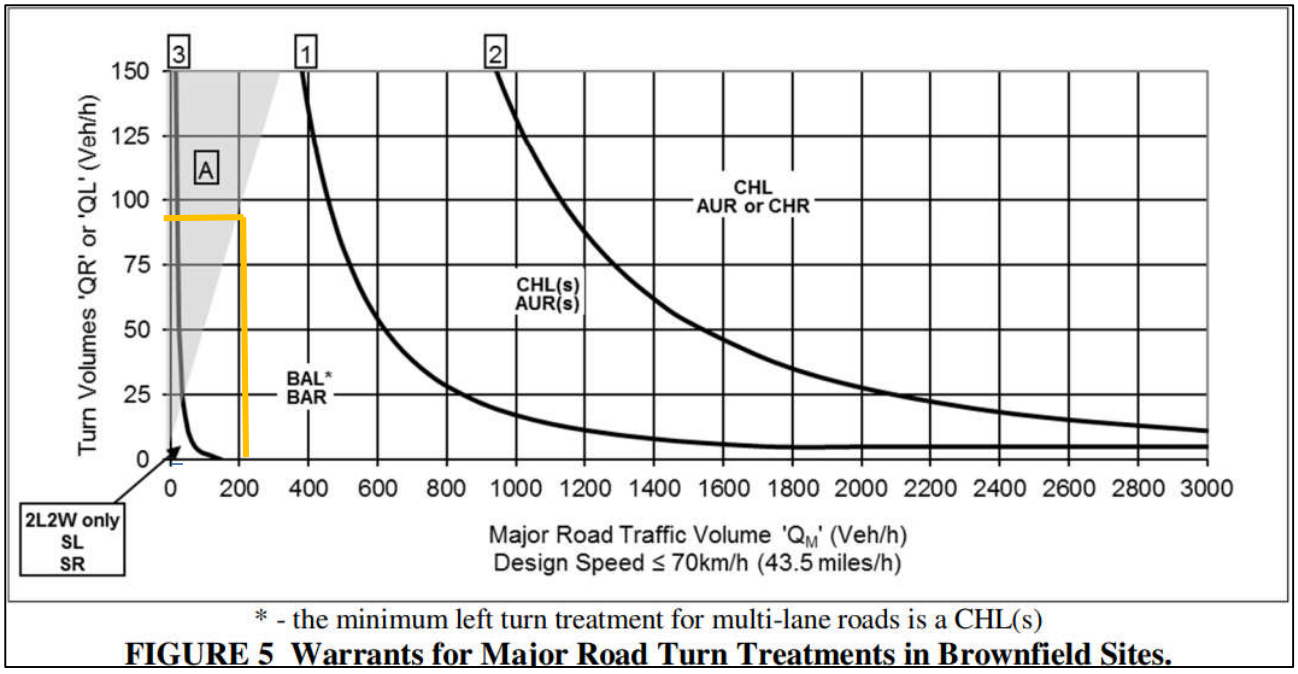
FIGURE 9: CALCULATION OF Q_M

TABLE 3: TURNING WARRANT VOLUMES

Time of Peak	Right Turn Warrant		Left Turn Warrant	
	Q_M	Q_R	Q_M	Q_L
AM Peak	179	23	124	0
PM Peak	208	92	87	0

The volumes for the PM Peak, being the worst-case scenario, are plotted on the Brownfield site turning warrant diagram, as shown in **Figure 10.**

Strictly speaking, a Basic Right Turn (BAR) is warranted on traffic volume grounds. It appears on site that there is an informal road widening which allows large vehicles to turn into and out of the current site driveway, such that a formalisation of the BAR area would not be a drastic change to the current road geometry.



* - the minimum left turn treatment for multi-lane roads is a CHL(s)

FIGURE 5 Warrants for Major Road Turn Treatments in Brownfield Sites.

Key: Right Turn Warrant

FIGURE 10: RIVER ROAD TURNING WARRANT ASSESSMENT (PM PEAK)

The site has low passing volumes and compliant sight distance to the north. The likelihood of a vehicle having to wait to turn right into the site is very low. Nevertheless, it would increase safety and efficiency for site users and passing vehicles alike to provide a BAR treatment.

The BAR treatment design for rural roads is provided in *Figure 7.5* of *AUSTROADS Guide to Road Design Part 4A*, which is reproduced in **Annexure E** for reference along with a concept plan as it applies to the subject site.

3.4.3.2 New England Highway Warrants

The existing intersection of New England Highway / River Road currently has:

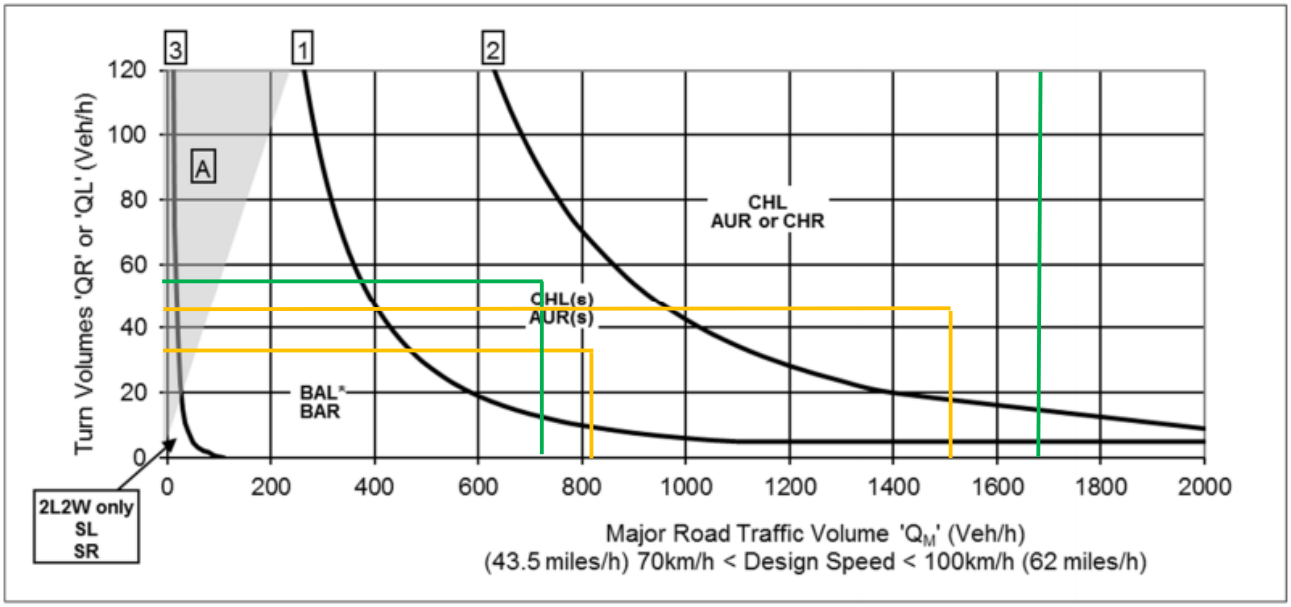
- An Auxillary Left Turn (AUL) treatment on New England Highway (major road);
- An Auxillary Left Turn (AUL) treatment on River Road (minor road) and;
- A Channelised Right Turn Treatment (CHR) on New England Highway.

To determine the applicable treatment, the major road traffic volumes (Q_M) as well as left and right turn volumes (Q_L and Q_R) are to be deduced based upon the future traffic at the interface of Hew England Highway and River Road determined from the existing traffic counts and estimated peak hour traffic generation as per **Section 5.1**. It is noted that there are two (2) potential scenarios for future traffic generation, being the AM peak hour and the afternoon PM peak hour.

The resulting treatment options are summarised in **Table 4**. The appropriate warrants for Brownfield sites from the Arndt Paper 2014 for New England Highway are provided in **Figure 11.**

TABLE 4: MAJOR ROAD / MINOR ROAD TURNING TREATMENT INPUTS

Road Type	Turn Type	Q_M (veh/h)	$Q_{L/R}$	Treatment Requirement
AM Peak				
Two-lane two-way without splitter island	Left	811	32	**AUL(s)**
	Right	1512	45	**CHR**
PM Peak				
Two-lane two-way without splitter island	Left	718	54	**AUL(s)**
	Right	1678	159	**CHR** (off the graph)



Key: AM Peak Hour Turn Warrants PM Peak Hour Turn Warrants

FIGURE 11: NEW ENGLAND HIGHWAYTREATMENT WARRANT

Therefore, the existing AUL and CHR intersection treatments at the intersection of New England Highway / River Road are satisfactory for the expected traffic volumes after the proposed development in accordance with the Austroads warrants.

4 PARKING ASSESSMENT

4.1 Local Government (Manufactured Home Estates, Caravan Parks, Camping Grounds and Moveable Dwellings) Regulation 2021 Car Parking Requirements

The proposed development takes the form of a Manufactured Home Estate and a Caravan Park and therefore, the applicable parking requirements are provided in the *Local Government (Manufactured Home Estates, Caravan Parks, Camping Grounds and Moveable Dwellings) Regulation 2021* (LGR 2021) which designated the following car parking requirements.

> ***Part 2…Division 3 Manufactured home estates***
>
> *Clause 23 Visitor Parking*
>
> *(1) A manufactured home estate must contain at least the following number of visitor parking spaces*
>
> *….*
>
> *(d) for a manufactured home estate containing more than 105 sites – 20 spaces plus 1 additional space for every 7 sites above 140 sites.*
>
> *(2) Each parking space must have minimum dimensions of*
>
> *(a) For angle parking – 5.4 metres by 2.5 metres, or*
>
> *(b) Otherwise – 6.1 metres by 2.5 metres*
>
> *Clause 45 Site Coverage*
>
> *(2) If there is no carport or garage on the dwelling site, the site must contain an area*
>
> *(a) With minimum dimensions of 6m x 3m, and*
>
> *(b) Accessible from an access road, and*
>
> *(c) Used for car parking.*

The car parking requirements for the proposed development are summarised in **Table 5**.

TABLE 5: LGR 2021 CAR PARKING REQUIREMENTS

Use	Scale	Rates	Parking Required	Parking Provided
Manufactured Home Estate Residents	282 home sites	1 per home site	282	282 sites
Manufactured Home Estate Visitors		20 spaces plus 1 additional space for every 7 sites above 140 sites	40.3 (**40**)	67
Total	**-**	**-**	**322**	**349**

Based on the above car parking requirement, each manufactured home site requires one (1) car parking space, either via a carport / garage or an accessible area with dimensions of 6m x 3m accessed from the road and useable as car parking. It is expected that each manufactured home will either include a garage / carport or an area with dimensions of 6m x 3m accessed from the road which is useable as car parking. Further, the manufactured home estate requires the minimum provision of **40** visitor car parking spaces based on LGR 2021 requirements. The proposed development provides **67** car parking spaces for visitors, complying with LGR 2021 requirements.

4.2 Accessible Car Parking Requirements

Reference is made to the LGR 2021 which states the following requirements regarding the provision of accessible parking:

> *24 Visitor parking for people with disabilities*
>
> *(1) A manufactured home estate must contain—*
>
> *(a) at least 1 visitor parking space for people with a disability (a disabled parking space), or*
>
> *(b) if the manufactured home estate contains 100 sites or more—at least 1 additional disabled parking space for—*
>
> *(i) the first 100 sites, and*
>
> *(ii) every further 100 sites, and*
>
> *(iii) a remaining part, if any, of 100 sites.*
>
> *Example—*
>
> *A manufactured home estate containing 235 sites must contain at least 3 disabled parking spaces.*

In accordance with the LGR 2021 requirements, the proposed manufactured home estate development requires the provision of three (3) accessible visitor parking spaces. Four (4) disabled-accessible visitor car parking spaces have been provided, complying with the LGR 2021 requirements. Therefore, the accessible car parking provision is considered acceptable.

4.3 Bicycle & Motorcycle Parking Requirements

The Local Government Regulation 2021 does not provide bicycle or motorcycle parking requirements for manufactured home estate developments.

Reference is made to *Maitland City Council Development Control Plan* (DCP) *2011, Part C Design Guidelines* which states the following requirements relevant to bicycle parking provision:

> ***5. BICYCLE PARKING***
>
> *Provision is to be made for cyclists via the installation of bicycle parking facilities in accordance with Australian Standard AS 2890.3-2015 – Bicycle Parking Facilities and Austroads Guide to Traffic Engineering, Part 14, Bicycles: Second Edition.*

The Maitland DCP, AS2890.3:2015 and Austroads Guides do not provide bicycle parking rates applicable to manufactured home estates. It is considered reasonable that residents of the manufactured home estates will be able to accommodate bicycle parking within their homes and/or garages. It is also considered reasonable that visitors to the estate could park informally in front of the respective manufactured home.

The Maitland DCP 2011 does not specify requirements for the provision of motorcycle parking for manufactured home estates. Accordingly, no motorcycle parking facilities have been provided, thus satisfying Council requirements.

4.4 Servicing & Loading

It has been advised that there will be a waste management plan for the operation of the site. As part of this waste management plan, waste collection will be undertaken by a private contractor with a vehicle of a size up to and including a 12.5m Heavy Rigid Vehicle (HRV). The waste collection vehicle will generally follow the loop road around the site as well as via the two-way streets (i.e. major access roads), but access of the one-way streets of the site will not be undertaken by this vehicle. Instead, the waste collection vehicle will collect bins for manufactured homes lots of these roads at the end of each of these streets.

Swept path testing has been undertaken to assess the ability of a waste collection vehicle to access the proposed streets, with results provided in **Annexure D**. The swept path testing has been undertaken using the *Autoturn 11* software package with a design vehicle of a 12.5m Heavy Rigid Vehicle (HRV) in accordance with *AS2890.2:2018*. The results indicate that a HRV can successfully circulate the site via the major access roads of the site and can pass an Australian 99·8th percentile light vehicle (B99) at provided passing bays. Therefore, the waste collection vehicle access of the site is considered acceptable. Other servicing or loading associated with the manufactured homes could be similarly undertaken via the major access roads of the site, with access to the minor access roads restricted to B99 sized vehicles.

The proposed development also provides a loading bay near the community centre with dimensions of 4m width x 6.9m length which is sufficient to accommodate a loading vehicle up to and including a 6.4m length Small Rigid Vehicle (SRV) in accordance with AS2890.2:2018.

For the construction / installation of the manufactured homes of the estate, it has been advised that the delivery of these modular homes will be undertaken by a 15.2m length Articulated Vehicle. A letter from Hunter Valley Modular Homes has been received which states that they "*confirm that we will be able to achieve delivery of modular homes on the back of trucks through the main entry on River Road, Windella NSW 2320.*", with a copy of this letter provided in **Annexure F**.

5 TRAFFIC ASSESSMENT

The impact of the expected traffic generation levels associated with the subject proposal is discussed in the following sub-sections.

5.1 Traffic Generation

Traffic generation rates for the relevant land uses are provided in the *RTA Guide to Traffic Generating Developments (2002)* (RTA Guide) as adopted by Transport for New South Wales (TfNSW) and recent supplements (namely TDT 2013/04a).

Typically manufactured home estates are marketed towards the over 50's population and the applicant confirms that the subject estate will be marketed to this age group. Accordingly, it is considered appropriate that a traffic generation rate applicable to Housing for Seniors can be applied to the Manufactured Home Estate use. As such the RTA Guide and TDT 2013/04a outlines the following applicable traffic generation rates for the proposed land uses:

> ***RTA Guide***
>
> > *3.8.3 Tourist facilities.*
> >
> > ***Caravan parks***
> >
> > *NSW based data is not available – See the ITE Trip Generation manual for comparible* (sic) *rates from the USA.*
>
> ***TDT 2013/04a***
>
> > ***Housing for seniors***
> >
> > > *Weekday daily vehicle trips = 2.1 per dwelling*
> > >
> > > *Weekday peak hour vehicle trips = 0.4 per dwelling*
> > >
> > > *Note: morning site peak hour does not generally coincide with the network peak*

For a campground / recreation vehicle park, the *ITE Trip Generation Manual, 10th Edition* details average peak hour generation rates of 0.21 trips per occupied campsite during the AM peak hour and 0.27 trips per occupied campsite during the PM peak hour. It is considered that a campground / recreational vehicle park is not applicable to a manufactured home estate and the Housing for Seniors traffic generation rate will be used instead. In any case, the use of the Housing for Seniors rate represents a worst-case assessment.

Whilst the AM peak traffic generation of a Housing for Seniors development is not expected to coincide with the AM network peak, the development will be assessed as through the AM peak traffic generation does coincide as a sensitivity assessment.

The resulting AM and PM peak hourly traffic generation is summarised in **Table 5**.

TABLE 6: ESTIMATED TRAFFIC GENERATION

Use	Scale	Peak	Generation Rate	Trips
Manufactured Home Estate	282 lots	AM	0.4 trips per dwelling	113(1) (23 in, 90 out)
		PM	0.4 trips per dwelling	113(1) (90 in, 23 out)

Note:

1) Assumes 20% inbound / 80% outbound spilt during the AM peak hour period, vice versa for the PM Peak period.

As shown, the expected traffic generation associated with the proposed development is in the order of **113** vehicle trips in both the AM peak period (23 in, 90 out) and PM peak period (90 in, 23 out).

5.2 Traffic Assignment

Given the surrounding road network, existing traffic volumes, and available routes to / from the site, it is assumed that 100% of traffic entering and exiting the site will use the intersection of River Road / New England Highway. The adopted distribution is summarised below:

- 70% to/from the east via New England Highway;
- 30% to/from the west via New England Highway.

5.3 Traffic Impact

The traffic generation outlined in **Section 5.1** & **5.2** above has been added to the existing traffic volumes recorded. SIDRA INTERSECTION 9.1 was used to assess the intersections performance. The purpose of this assessment is to compare the existing intersection operations to the future scenario under the increased traffic load. The results of this assessment are shown in **Table 7**.

TABLE 7: INTERSECTION PERFORMANCE (SIDRA INTERSECTION 9.1)

Intersection	Peak Hour	Degree of Saturation[1]	Average Delay[2] (sec/vehicle)	Level of Service[3]	Control Type	Worst Movement
EXISTING PERFORMANCE						
New England Highway / River Road	AM	0.46	N/A (Worst: 17.3)	**N/A** (Worst: B)	Give Way	RT from River Road (N)
	PM	0.50	N/A (Worst: 19.3)	**N/A** (Worst: B)		RT from River Road (N)
FUTURE (POST DEVELOPMENT) PERFORMANCE						
New England Highway / River Road	AM	0.46	N/A (Worst: 17.4)	**N/A** (Worst: B)	Give Way	RT from River Road (N)
	PM	0.50	N/A (Worst: 19.8)	**N/A** (Worst: B)		RT from River Road (N)
River Road / Site Driveway	AM	0.07	N/A (Worst: 5.9)	**N/A** (Worst: A)	Give Way	LT from Site Driveway
	PM	0.13	N/A (Worst: 5.8)	**N/A** (Worst A)		LT from Site Driveway

Notes: (1) The Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.
(2) The average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.
(3) The Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.
(4) No overall Level of Service is provided for Give Way and Stop controlled intersections as the low delays associated with the dominant movements skew the average delay of the intersection. The Level of Service of the worst approach is an indicator of the operation of the intersection, with a worse Level of Service corresponding to long delays and reduced safety outcomes for that approach.

As shown, the intersection of New England Highway / River Road will retain the same worst movement Level of Service “B” under future conditions with minimal delays and additional capacity. The intersection of the Site Driveway / River Road is expected to operate with a high level of efficiency with a worst movement Level of Service “A” conditions in both the AM and PM peak hour period. This Level of Service “A” is characterised by low approach delays and spare capacity. Therefore, the results indicate that there will be no adverse impact on the existing road network as a result of the proposed development.

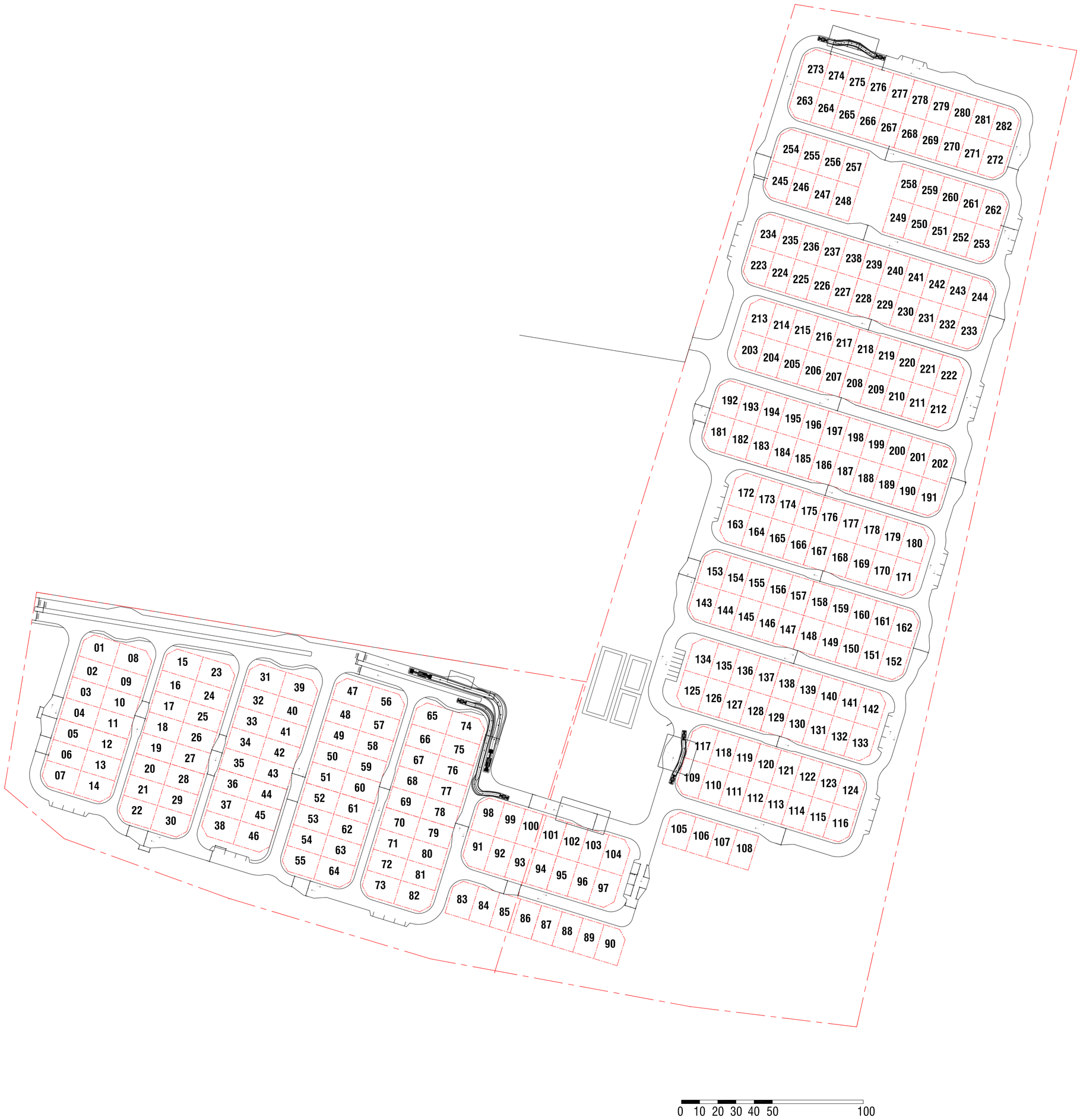
6 CONCLUSION

In view of the foregoing, the proposed manufactured home estate at 16 Denton Close, Windella is fully supportable in terms of its traffic and parking impacts. The following outcomes of this traffic and parking impact assessment are relevant to note:

- The *Local Government (Manufactured Home Estates, Caravan Parks, Camping Grounds and Moveable Dwellings) Regulation 2021* provides the governing car parking requirements for both residents and visitors within the proposed development. The LGR requires the provision of a car parking space per each manufactured home lot and 41 car parking spaces for visitors. 67 visitor car parking spaces are proposed, satisfying the visitor parking requirement. It will be a requirement during the design stage to check parking provision, vehicular accessibility and compliance for each manufactured home site, although the proposed sites would generally be able to accommodate suitable access locations and parking provisions on each individual site.
- The proposed plan of the internal road layout generally meets the requirements of the applicable legislation and will generally be able to accommodate a 12.5m Heavy Rigid Vehicle, which is envisaged to be the largest vehicle to access the site during typical operations (excluding construction).
- The proposed development provides a loading bay near the community centre with dimensions of 4m width x 6.9m length which is sufficient to accommodate a loading vehicle up to and including a 6.4m length Small Rigid Vehicle (SRV) in accordance with AS2890.2:2018.
- Council's DCP does not require the provision of bicycle and motorcycle parking facilities.
- The traffic generation of the proposed development has been estimated to be some **113** vehicle trips in both the AM peak hour period (23 in, 90 out) and PM peak hour period (90 in, 23 out). The impacts of the traffic generation have been modelled using SIDRA INTERSECTION 9.1, indicating that there will be no detrimental impact to the performance of the intersections as a result of the generated traffic in the existing conditions.

ANNEXURE A: SITE PLANS

(1 SHEET)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83 84 85 86 87 88 89 90
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ANNEXURE B: TRAFFIC SURVEY DATA

(2 SHEETS)

TRANS TRAFFIC SURVEY

trafficsurvey.com.au

TURNING MOVEMENT SURVEY

Intersection of New England Hwy and River Rd, Windella

GPS	-32.704501, 151.479410						
Date:	Wed 07/12/22	North:	River Rd		Survey Period	AM:	6:00 AM-10:00 AM
Weather:	Fine	East:	New England Hwy			PM:	3:00 PM-7:00 PM
Suburban:	Windella	South:	N/A		Traffic Peak	AM:	8:00 AM-9:00 AM
Customer:	McLaren	West:	New England Hwy			PM:	4:15 PM-5:15 PM

All Vehicles

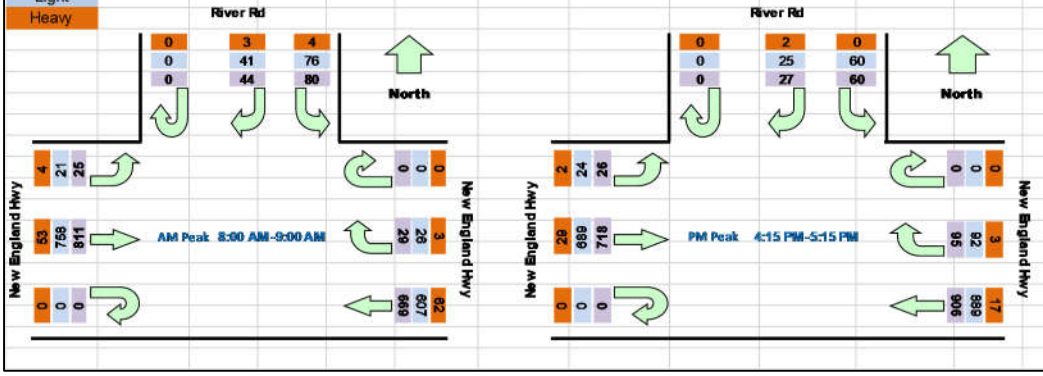
Time		North Approach River Rd			East Approach New England Hwy			West Approach New England Hwy			Hourly Total	
Period Start	Period End	U	R	L	U	R	WB	U	EB	L	Hour	Peak
6:00	6:15	0	1	7	0	6	117	0	89	0	1111	
6:15	6:30	0	5	9	0	1	149	0	119	1	1175	
6:30	6:45	0	6	13	0	6	104	0	130	2	1190	
6:45	7:00	0	3	11	0	6	140	0	182	4	1278	
7:00	7:15	0	14	16	0	7	127	0	112	8	1259	
7:15	7:30	0	5	12	0	4	143	0	130	5	1375	
7:30	7:45	0	16	17	0	3	142	0	166	5	1462	
7:45	8:00	0	3	31	0	3	107	0	180	3	1576	
8:00	8:15	0	14	24	0	4	188	0	166	4	1658	Peak
8:15	8:30	0	11	18	0	10	174	0	168	5	1563	
8:30	8:45	0	10	23	0	9	188	0	227	6	1447	
8:45	9:00	0	9	15	0	6	119	0	250	10	1283	
9:00	9:15	0	4	10	0	9	115	0	163	4	1145	
9:15	9:30	0	2	14	0	8	90	0	152	4		
9:30	9:45	0	2	16	0	13	103	0	162	3		
9:45	10:00	0	4	8	0	13	108	0	135	3		
15:00	15:15	0	8	3	0	22	187	0	189	10	1704	
15:15	15:30	0	8	10	0	16	150	0	225	18	1723	
15:30	15:45	0	10	13	0	22	228	0	180	9	1757	
15:45	16:00	0	6	8	0	23	161	0	190	8	1806	
16:00	16:15	0	5	10	0	23	189	0	205	6	1829	
16:15	16:30	0	9	15	0	29	212	0	190	6	1832	Peak
16:30	16:45	0	5	15	0	22	262	0	199	8	1793	
16:45	17:00	0	6	16	0	21	199	0	172	5	1691	
17:00	17:15	0	7	14	0	23	233	0	157	7	1586	
17:15	17:30	0	6	17	0	19	196	0	177	7	1425	
17:30	17:45	1	4	12	0	11	197	0	175	9	1251	
17:45	18:00	0	1	12	0	23	144	0	125	9	1074	
18:00	18:15	0	3	12	0	13	125	0	123	4	934	
18:15	18:30	0	2	8	0	10	83	0	136	9		
18:30	18:45	0	2	7	0	10	80	0	120	13		
18:45	19:00	0	3	5	0	5	62	0	91	8		

Peak Time		North Approach River Rd			East Approach New England Hwy			West Approach New England Hwy			Peak
Period Start	Period End	U	R	L	U	R	WB	U	EB	L	total
8:00	9:00	0	44	80	0	29	669	0	811	25	1658
16:15	17:15	0	27	60	0	95	906	0	718	26	1832

Note: Site sketch is for illustrating traffic flows. Direction is indicative only, drawing is not to scale and not an exact streets configuration.

Graphic

Total
Light
Heavy



TRANS TRAFFIC SURVEY

trafficsurvey.com.au

T. 1300 82 88 82 - F. 1300 83 88 83 - E. traffic@trafficsurvey.com.au - W. www.trafficsurvey.com.au

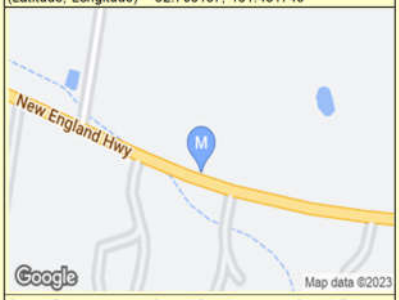
AUTOMATIC COUNT SUMMARY

Street Name :	New England Hwy	**Location :**	Approx. 200m East of River Rd
Suburb :	Windella	**Start Date :**	00:00 Sat 03/December/2022
Machine ID:	U358YHJE/P	**Finish Date :**	00:00 Sat 10/December/2022
Site ID:	2306	**Speed Zone :**	80 km/h
Prepared By :	Vo Son Binh	**Email:**	binh@trafficsurvey.com.au

GPS information		Lat 32° 42' 18.60 South Long 151° 28' 54.26 East	Direction of Travel		
			Both directions	**Westbound**	**Eastbound**
Traffic Volume :		Weekdays Average	18,031	9,201	8,830
(Vehicles/Day)		7 Day Average	16,375	8,358	8,017
Weekday	**AM**	08:00	1466	610	857
Peak hour start	**PM**	15:00	1539	761	778
Speeds :		85th Percentile	84.9	84.0	85.7
(Km/Hr)		Average	79.2	78.7	79.8
Classification % :		Light Vehicles up to 5.5m	92.3%	92.6%	92.0%

Location

GPS Information	Load Google Map (internet required)
(Latitude, Longitude)	-32.705167, 151.481740



Speed Data | Speed Graph | Speed Bin
Volume Data | Volume Graph | Classification

QUALITY SYSTEM CERTIFICATION DNV·GL ISO 9001
SAFETY SYSTEM CERTIFICATION DNV·GL AS/NZS 4801
ENVIRONMENTAL SYSTEM CERTIFICATION DNV·GL ISO 14001

QUALITY ASSURED COMPANY BY ISO 9001:2015
OH&S SYSTEM CERTIFIED TO ISO 4801:2001
ENVIRONMENT MANAGEMENT SYSTEM CERTIFIED TO ISO14001:2015

Status of movement – Covid 19

"Traffic behaviour is not the same as pre-pandemic (traditional morning/afternoon peak is much less pronounced and school start/finish times are much more pronounced), the current patterns are close enough to what probably is going to be a 'COVID normal' situation for at least the next year or two. Workplaces are currently not all yet open.
These results should be used for indicative assessment only."

ANNEXURE C: SIDRA RESULTS

(10 SHEETS)

MOVEMENT SUMMARY

Site: 101 [EX AM - Stage 1 New England Highway / River Road (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Network1 - EX AM (Network Folder: General)]

Stage 1 of Intersection of New England Highway and River Road
Existing Conditions
AM Peak Hour Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Median															
2	T1	All MCs	31	10.3	31	10.3	0.068	9.2	LOS A	0.1	0.6	0.68	0.83	0.68	39.6
Approach			31	10.3	31	10.3	0.068	9.2	LOS A	0.1	0.6	0.68	0.83	0.68	39.6
North: River Road (N)															
7	L2	All MCs	84	5.0	84	5.0	0.163	10.7	LOS A	0.2	1.6	0.70	0.86	0.70	48.3
8	T1	All MCs	46	6.8	46	6.8	0.095	9.3	LOS A	0.1	0.9	0.68	0.83	0.68	39.9
Approach			131	5.6	131	5.6	0.163	10.2	LOS A	0.2	1.6	0.69	0.85	0.69	46.2
West: New England Highway (W)															
10	L2	All MCs	26	16.0	26	16.0	0.016	7.2	LOS A	0.0	0.0	0.00	0.63	0.00	59.6
11	T1	All MCs	854	6.5	854	6.5	0.456	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.6
Approach			880	6.8	880	6.8	0.456	0.3	NA	0.0	0.0	0.00	0.02	0.00	78.8
All Vehicles			1041	6.8	1041	6.8	0.456	1.8	NA	0.2	1.6	0.11	0.15	0.11	72.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [EX AM - Stage 2 New England Highway / River Road (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Network1 - EX AM (Network Folder: General)]

Stage 2 of Intersection of New England Highway and River Road
Existing Conditions
AM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: New England Highway (E)															
5	T1	All MCs	704	9.3	704	9.3	0.383	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
6	R2	All MCs	31	10.3	31	10.3	0.018	7.0	LOS A	0.0	0.0	0.00	0.67	0.00	61.7
Approach			735	9.3	735	9.3	0.383	0.4	NA	0.0	0.0	0.00	0.03	0.00	79.2
North: Median															
9	R2	All MCs	46	6.8	46	6.8	0.073	8.0	LOS A	0.1	0.6	0.55	0.81	0.55	48.9
Approach			46	6.8	46	6.8	0.073	8.0	LOS A	0.1	0.6	0.55	0.81	0.55	48.9
All Vehicles			781	9.2	781	9.2	0.383	0.8	NA	0.1	0.6	0.03	0.07	0.03	77.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

MOVEMENT SUMMARY

Site: 101 [EX PM - Stage 1 New England Highway / River Road (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N102 [Network2 - EX PM (Network Folder: General)]

Stage 1 of Intersection of New England Highway and River Road
Existing Conditions
PM Peak Hour Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Median															
2	T1	All MCs	100	3.2	100	3.2	0.165	7.3	LOS A	0.2	1.6	0.63	0.80	0.63	41.2
Approach			100	3.2	100	3.2	0.165	7.3	LOS A	0.2	1.6	0.63	0.80	0.63	41.2
North: River Road (N)															
7	L2	All MCs	63	0.0	63	0.0	0.093	8.6	LOS A	0.1	0.9	0.61	0.81	0.61	50.6
8	T1	All MCs	28	7.4	28	7.4	0.053	8.4	LOS A	0.1	0.5	0.63	0.79	0.63	40.7
Approach			92	2.3	92	2.3	0.093	8.6	LOS A	0.1	0.9	0.61	0.80	0.61	48.5
West: New England Highway (W)															
10	L2	All MCs	26	8.0	26	8.0	0.015	7.1	LOS A	0.0	0.0	0.00	0.63	0.00	62.0
11	T1	All MCs	756	4.0	756	4.0	0.398	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach			782	4.2	782	4.2	0.398	0.3	NA	0.0	0.0	0.00	0.02	0.00	78.9
All Vehicles			974	3.9	974	3.9	0.398	1.8	NA	0.2	1.6	0.12	0.17	0.12	71.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

MOVEMENT SUMMARY

Site: 101 [EX PM - Stage 2 New England Highway / River Road (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N102 [Network2 - EX PM (Network Folder: General)]

Stage 2 of Intersection of New England Highway and River Road
Existing Conditions
PM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: New England Highway (E)															
5	T1	All MCs	954	1.9	954	1.9	0.495	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.5
6	R2	All MCs	100	3.2	100	3.2	0.055	6.9	LOS A	0.0	0.0	0.00	0.67	0.00	61.7
Approach			1054	2.0	1054	2.0	0.495	0.8	NA	0.0	0.0	0.00	0.06	0.00	78.4
North: Median															
9	R2	All MCs	28	7.4	28	7.4	0.067	10.9	LOS A	0.1	0.6	0.70	0.87	0.70	45.6
Approach			28	7.4	28	7.4	0.067	10.9	LOS A	0.1	0.6	0.70	0.87	0.70	45.6
All Vehicles			1082	2.1	1082	2.1	0.495	1.0	NA	0.1	0.6	0.02	0.09	0.02	77.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

MOVEMENT SUMMARY

Site: 101 [FU AM - Stage 1 New England Highway / River Road (Site Folder: Future 70% East)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Network3 - FUT AM (Network Folder: General)]

Stage 1 of Intersection of New England Highway and River Road
Future Conditions
AM Peak Hour Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Median															
2	T1	All MCs	47	6.7	47	6.7	0.100	8.9	LOS A	0.1	0.9	0.69	0.83	0.69	39.8
Approach			47	6.7	47	6.7	0.100	8.9	LOS A	0.1	0.9	0.69	0.83	0.69	39.8
North: River Road (N)															
7	L2	All MCs	152	2.8	152	2.8	0.282	11.4	LOS A	0.4	3.2	0.73	0.91	0.85	48.3
8	T1	All MCs	76	4.2	76	4.2	0.153	9.4	LOS A	0.2	1.5	0.69	0.83	0.69	39.9
Approach			227	3.2	227	3.2	0.282	10.7	LOS A	0.4	3.2	0.72	0.89	0.80	46.3
West: New England Highway (W)															
10	L2	All MCs	34	12.5	34	12.5	0.020	7.2	LOS A	0.0	0.0	0.00	0.63	0.00	60.6
11	T1	All MCs	854	6.5	854	6.5	0.456	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.6
Approach			887	6.8	887	6.8	0.456	0.4	NA	0.0	0.0	0.00	0.02	0.00	78.6
All Vehicles			1162	6.1	1162	6.1	0.456	2.8	NA	0.4	3.2	0.17	0.23	0.18	68.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [FU AM - Stage 2 New England Highway / River Road (Site Folder: Future 70% East)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Network3 - FUT AM (Network Folder: General)]

Stage 2 of Intersection of New England Highway and River Road
Future Conditions
AM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: New England Highway (E)															
5	T1	All MCs	704	9.3	704	9.3	0.383	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
6	R2	All MCs	47	6.7	47	6.7	0.027	7.0	LOS A	0.0	0.0	0.00	0.67	0.00	61.7
Approach			752	9.1	752	9.1	0.383	0.5	NA	0.0	0.0	0.00	0.04	0.00	78.9
North: Median															
9	R2	All MCs	76	4.2	76	4.2	0.115	8.0	LOS A	0.1	1.0	0.56	0.82	0.56	50.0
Approach			76	4.2	76	4.2	0.115	8.0	LOS A	0.1	1.0	0.56	0.82	0.56	50.0
All Vehicles			827	8.7	827	8.7	0.383	1.2	NA	0.1	1.0	0.05	0.11	0.05	76.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

MOVEMENT SUMMARY

Site: 101 [FU PM - Stage 1 New England Highway / River Road (Site Folder: Future 70% East)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Network4 - FUT PM (Network Folder: General)]

Stage 1 of Intersection of New England Highway and River Road
Future Conditions
PM Peak Hour Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Median															
2	T1	All MCs	167	1.9	167	1.9	0.280	8.2	LOS A	0.4	3.1	0.67	0.86	0.77	40.5
Approach			167	1.9	167	1.9	0.280	8.2	LOS A	0.4	3.1	0.67	0.86	0.77	40.5
North: River Road (N)															
7	L2	All MCs	80	0.0	80	0.0	0.117	8.7	LOS A	0.2	1.2	0.61	0.82	0.61	50.6
8	T1	All MCs	36	5.9	36	5.9	0.073	9.1	LOS A	0.1	0.7	0.67	0.82	0.67	40.1
Approach			116	1.8	116	1.8	0.117	8.8	LOS A	0.2	1.2	0.63	0.82	0.63	48.3
West: New England Highway (W)															
10	L2	All MCs	57	3.7	57	3.7	0.031	7.0	LOS A	0.0	0.0	0.00	0.63	0.00	63.4
11	T1	All MCs	756	4.0	756	4.0	0.398	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach			813	4.0	813	4.0	0.398	0.6	NA	0.0	0.0	0.00	0.04	0.00	78.3
All Vehicles			1096	3.5	1096	3.5	0.398	2.6	NA	0.4	3.1	0.17	0.25	0.18	68.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

MOVEMENT SUMMARY

Site: 101 [FU PM - Stage 2 New England Highway / River Road (Site Folder: Future 70% East)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Network4 - FUT PM (Network Folder: General)]

Stage 2 of Intersection of New England Highway and River Road
Future Conditions
PM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: New England Highway (E)															
5	T1	All MCs	954	1.9	954	1.9	0.495	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.5
6	R2	All MCs	167	1.9	167	1.9	0.091	6.9	LOS A	0.0	0.0	0.00	0.67	0.00	61.7
Approach			1121	1.9	1121	1.9	0.495	1.1	NA	0.0	0.0	0.00	0.10	0.00	77.7
North: Median															
9	R2	All MCs	36	5.9	36	5.9	0.082	10.7	LOS A	0.1	0.7	0.70	0.87	0.70	46.2
Approach			36	5.9	36	5.9	0.082	10.7	LOS A	0.1	0.7	0.70	0.87	0.70	46.2
All Vehicles			1157	2.0	1157	2.0	0.495	1.4	NA	0.1	0.7	0.02	0.12	0.02	76.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

MOVEMENT SUMMARY

Site: 101 [FU AM - River Road / Site Driveway (Site Folder: Future 70% East)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Intersection of River Road and Site Driveway
Future Conditions
AM Peak Hour Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: River Road (S)															
2	T1	All MCs	57	13.0	57	13.0	0.046	0.2	LOS A	0.1	1.0	0.15	0.21	0.15	57.7
3	R2	All MCs	24	0.0	24	0.0	0.046	5.8	LOS A	0.1	1.0	0.15	0.21	0.15	55.1
Approach			81	9.1	81	9.1	0.046	1.9	NA	0.1	1.0	0.15	0.21	0.15	56.9
East: Site Driveway															
4	L2	All MCs	97	0.0	97	0.0	0.066	5.9	LOS A	0.3	1.9	0.23	0.55	0.23	52.2
Approach			97	0.0	97	0.0	0.066	5.9	LOS A	0.3	1.9	0.23	0.55	0.23	52.2
North: River Road (N)															
8	T1	All MCs	131	5.6	131	5.6	0.069	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach			131	5.6	131	5.6	0.069	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
All Vehicles			308	4.8	308	4.8	0.069	2.4	NA	0.3	1.9	0.11	0.23	0.11	56.5

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

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

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

MOVEMENT SUMMARY

Site: 101 [FU PM - River Road / Site Driveway (Site Folder: Future 70% East)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Intersection of River Road and Site Driveway
Future Conditions
PM Peak Hour Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: River Road (S)															
2	T1	All MCs	127	4.1	127	4.1	0.126	0.2	LOS A	0.5	3.7	0.17	0.28	0.17	57.1
3	R2	All MCs	97	0.0	97	0.0	0.126	5.7	LOS A	0.5	3.7	0.17	0.28	0.17	54.5
Approach			224	2.3	224	2.3	0.126	2.6	NA	0.5	3.7	0.17	0.28	0.17	56.0
East: Site Driveway															
4	L2	All MCs	24	0.0	24	0.0	0.016	5.8	LOS A	0.1	0.4	0.18	0.54	0.18	52.3
Approach			24	0.0	24	0.0	0.016	5.8	LOS A	0.1	0.4	0.18	0.54	0.18	52.3
North: River Road (N)															
8	T1	All MCs	92	2.3	92	2.3	0.048	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach			92	2.3	92	2.3	0.048	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
All Vehicles			340	2.2	340	2.2	0.126	2.1	NA	0.5	3.7	0.12	0.22	0.12	56.7

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

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

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

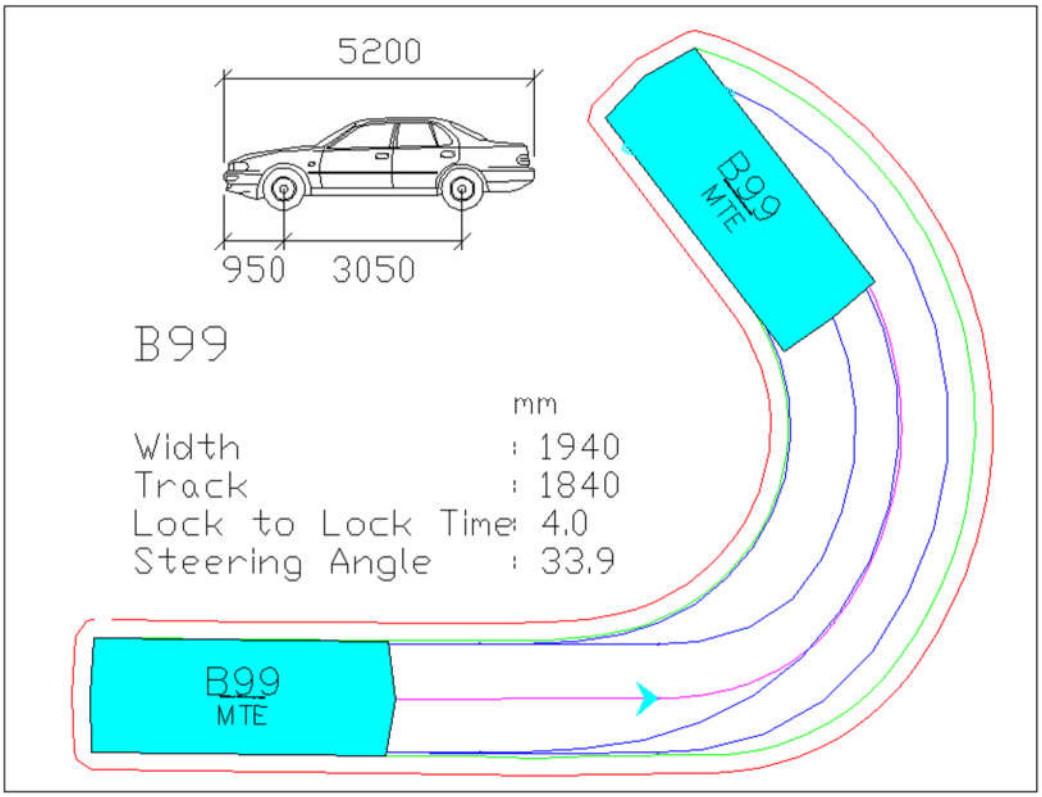
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

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

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

ANNEXURE D: SWEPT PATH TESTING

(6 SHEETS)

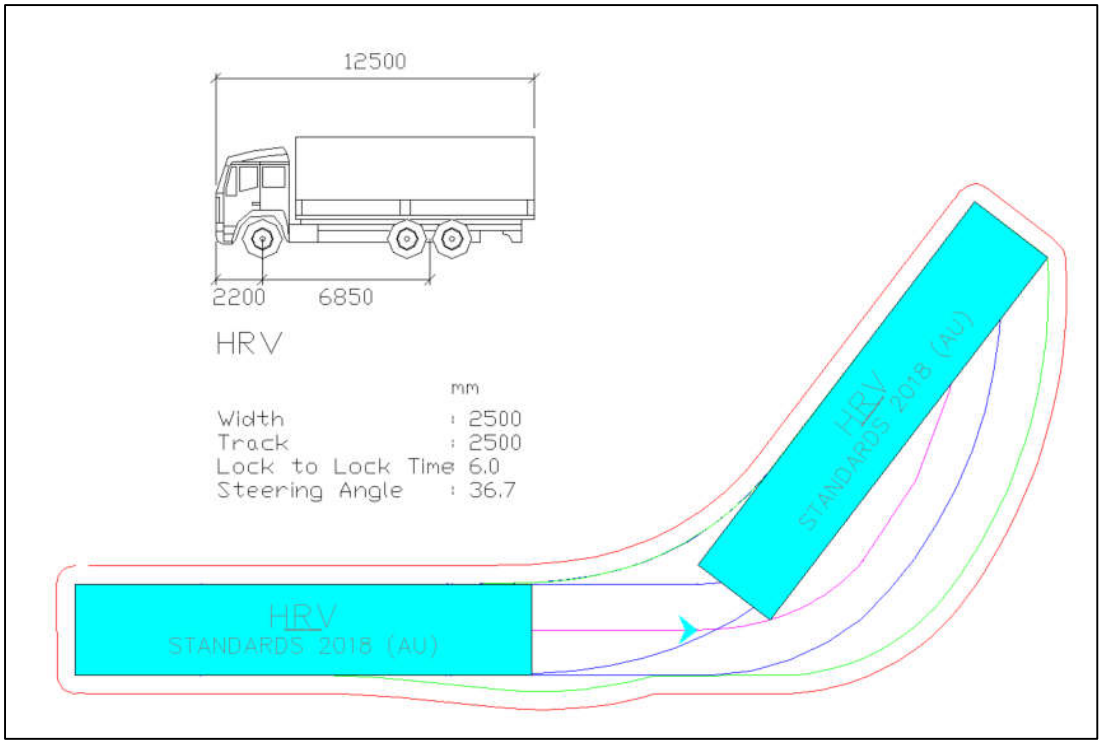


AUSTRALIAN STANDARD 99.8TH PERCENTILE SIZE VEHICLE (B99)

Blue – Tyre Path

Green – Vehicle Body

Red – 300mm Clearance

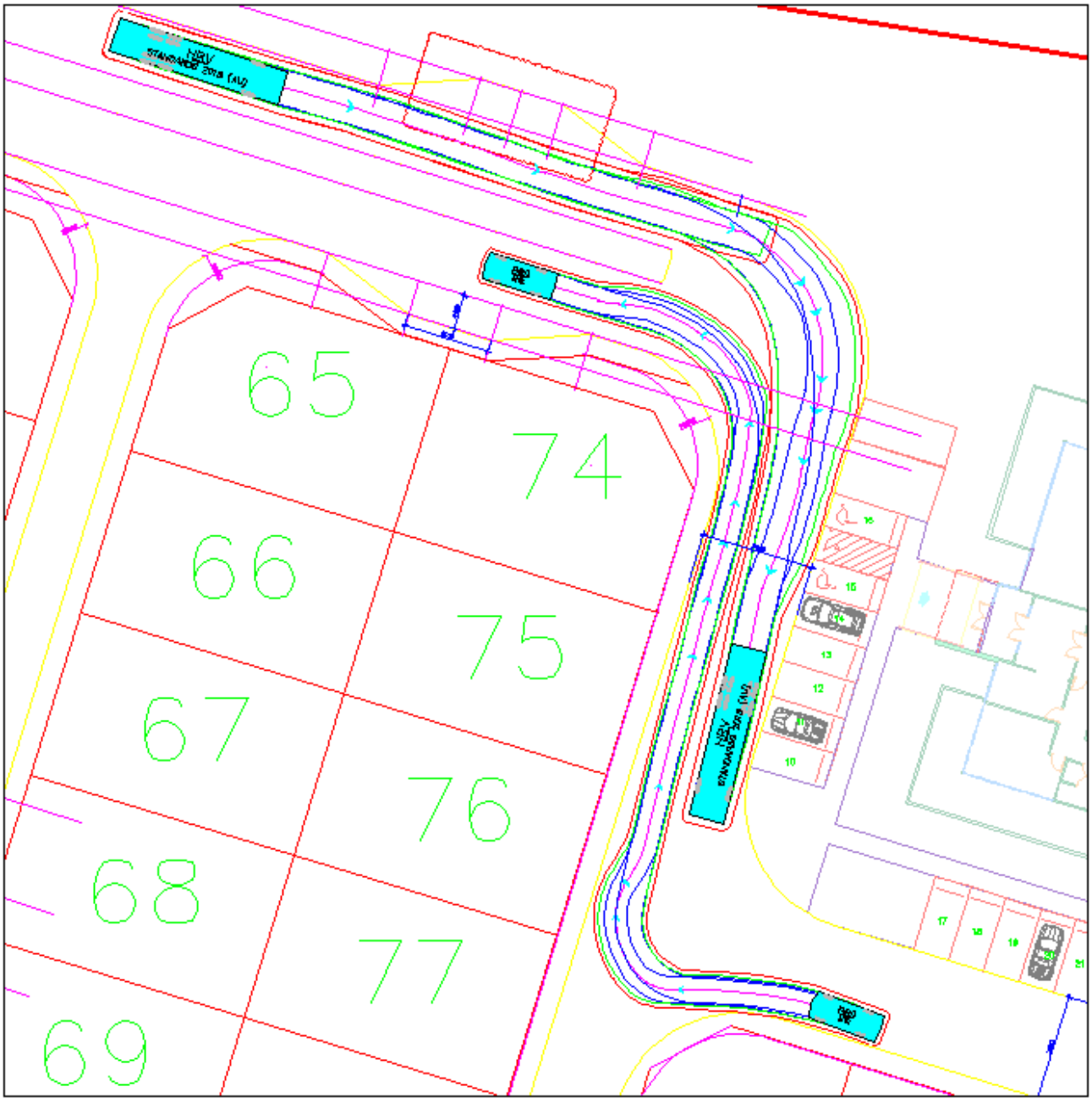


AUSTRALIAN STANDARD HEAVY RIGID VEHICLE (HRV)

Blue – Tyre Path

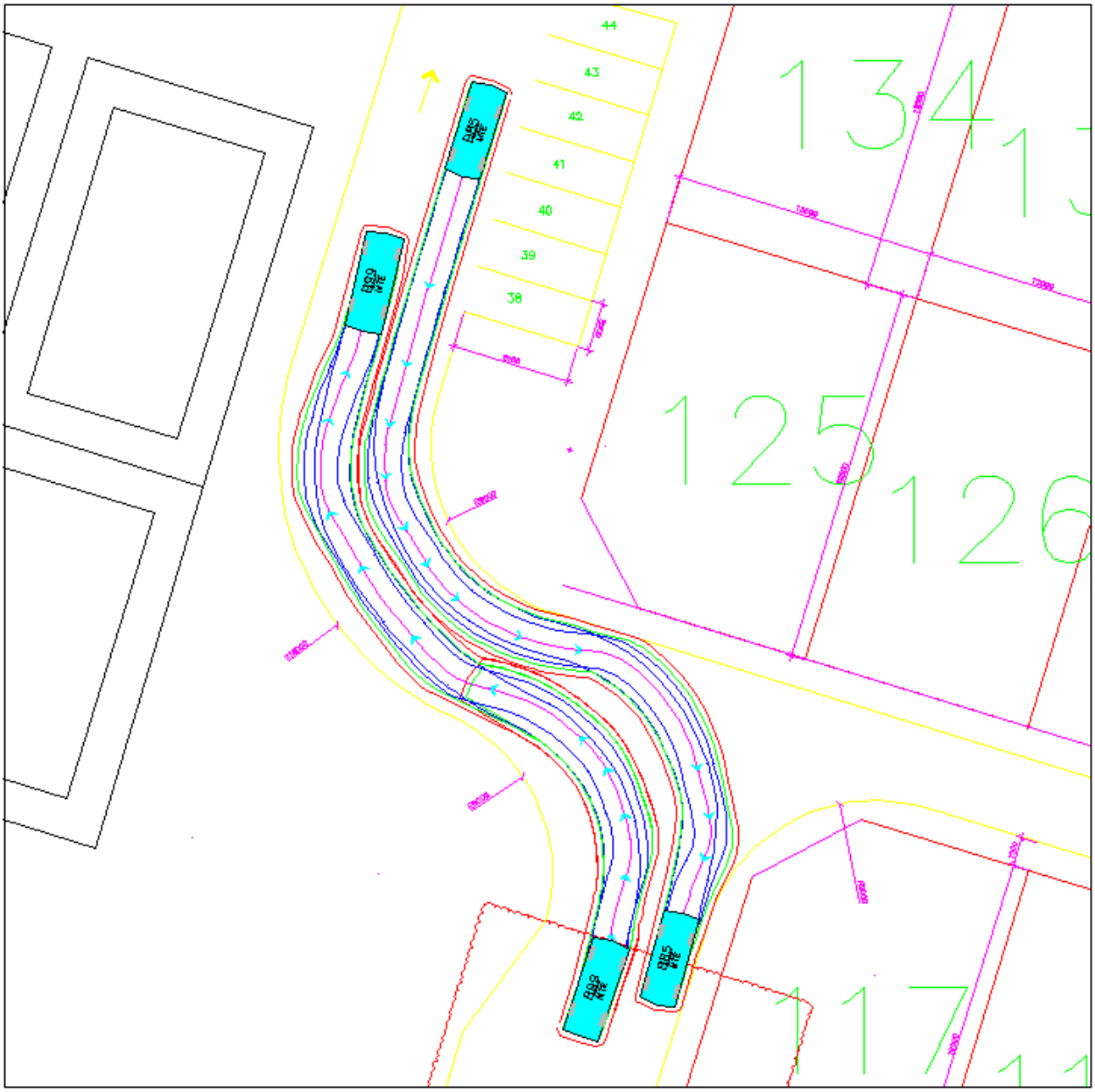
Green – Vehicle Body

Red – 500mm Clearance



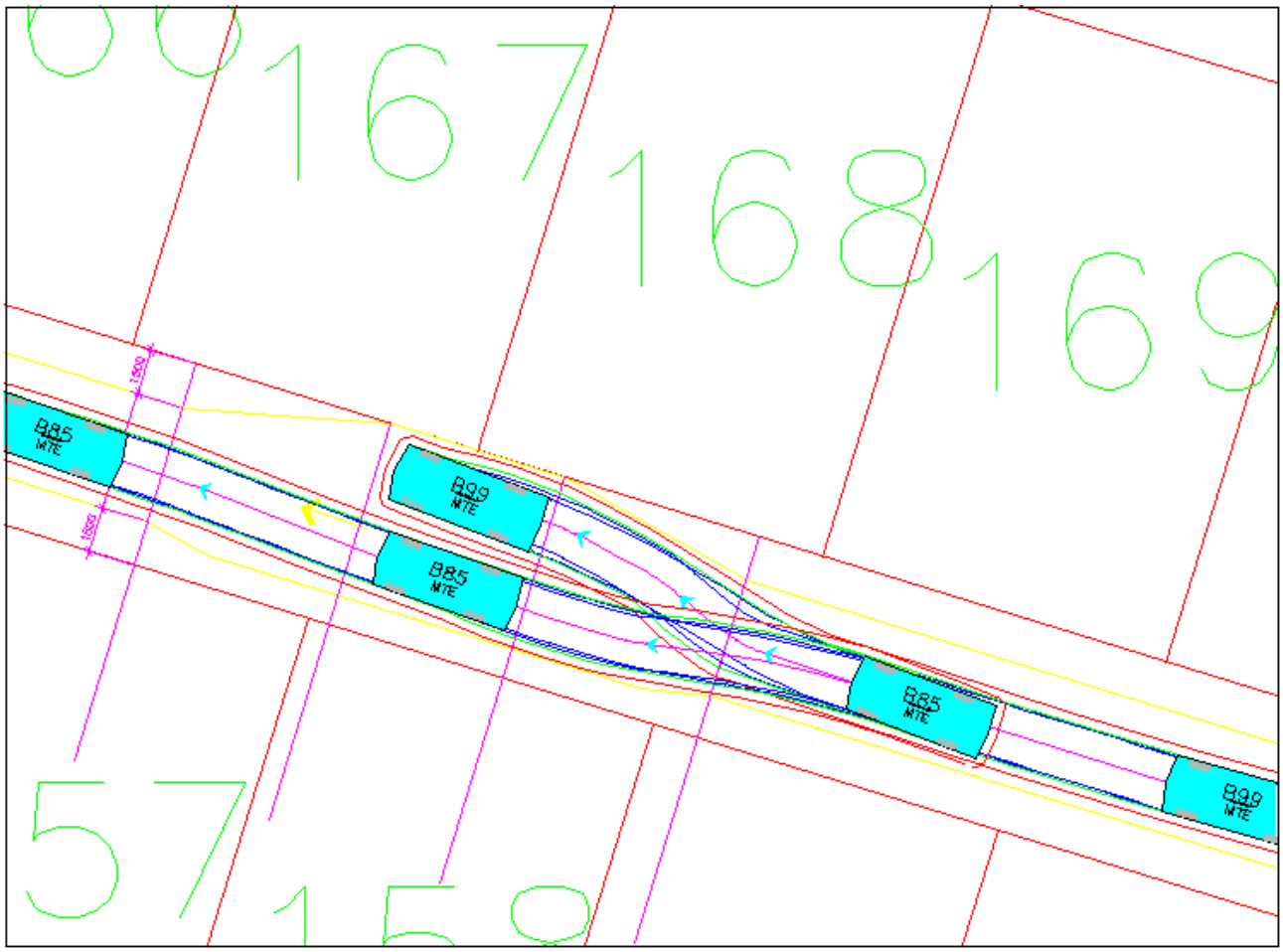
B99 and HRV Two Way Passing near Community Centre

Successful



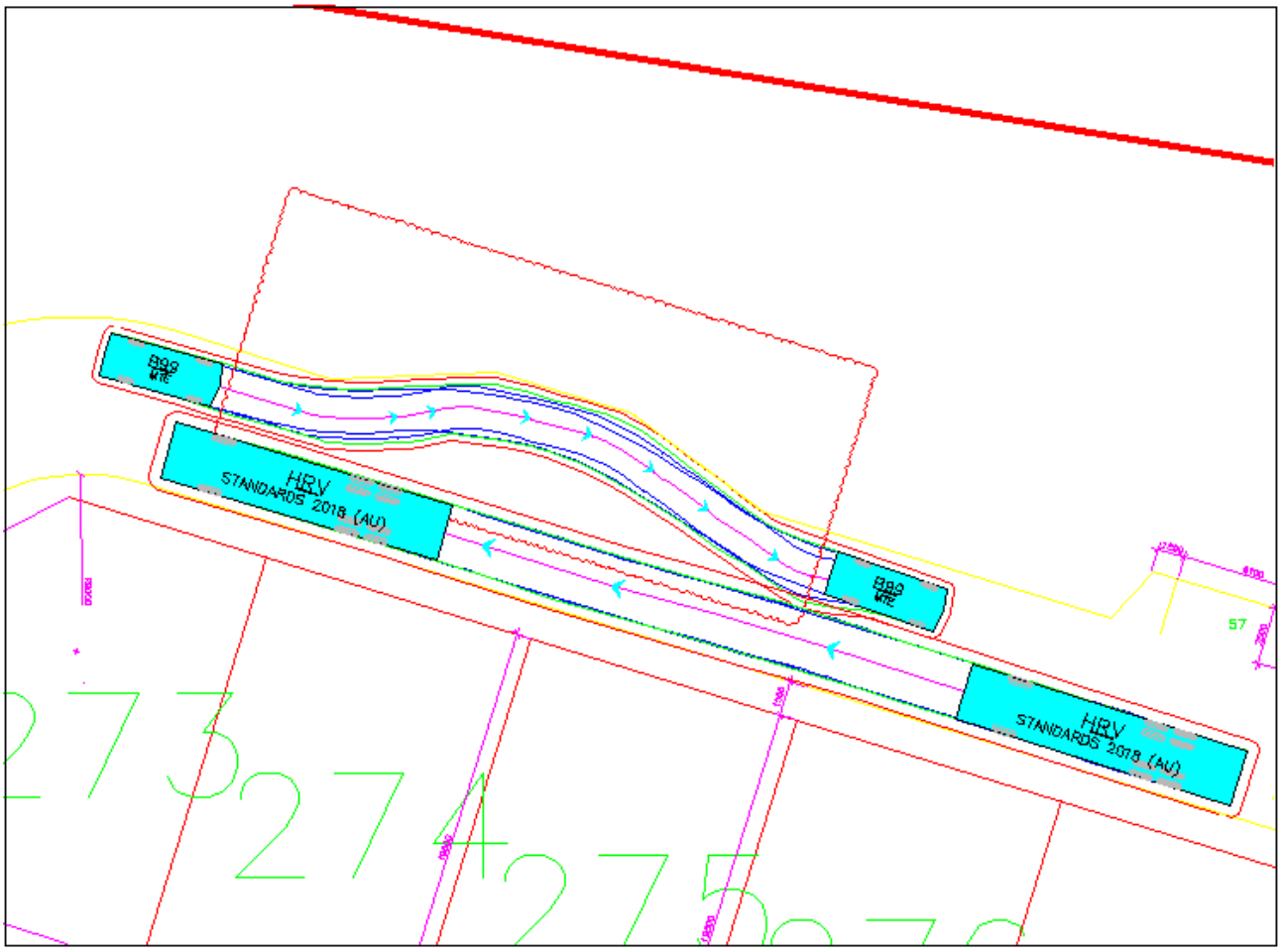
B99 and B85 Two Way Passing on Major Access Road

Successful



B99 and B85 Two Way Passing at Minor Access Road Passing Bay

Successful

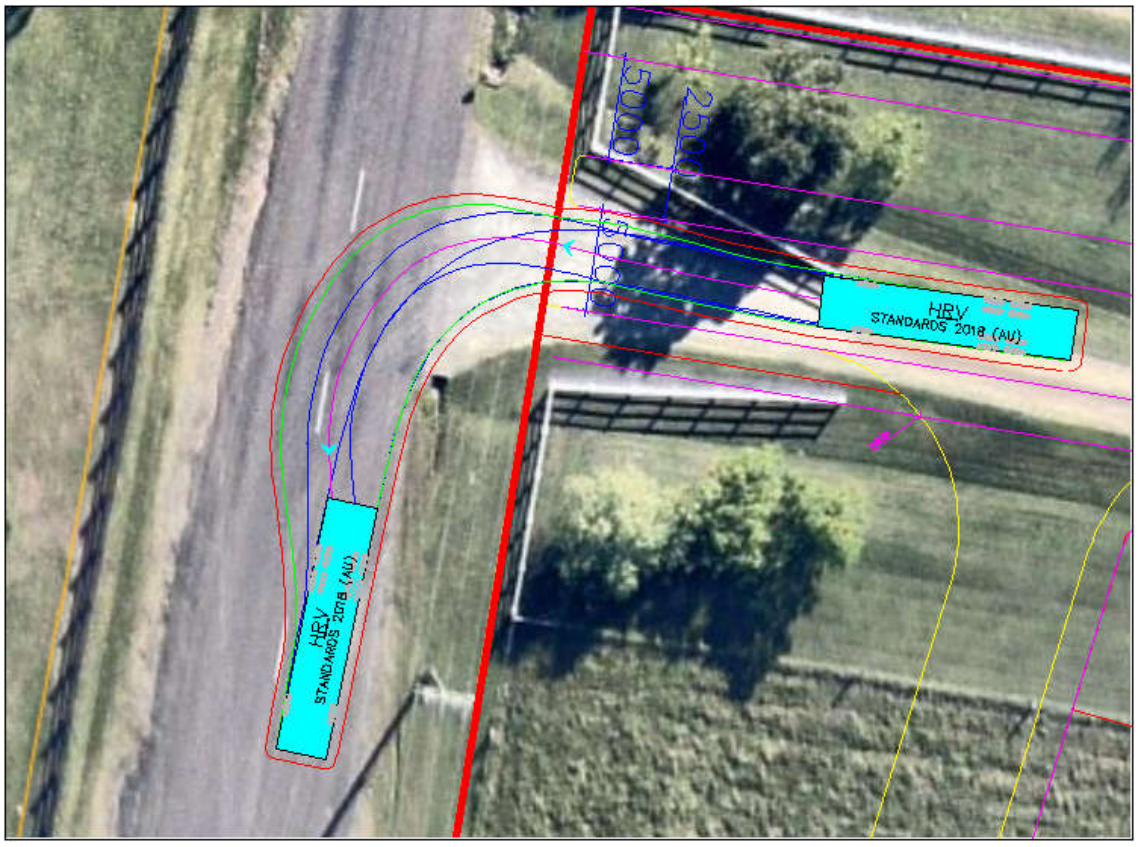


B99 and HRV Two Way Passing at Major Access Road Passing Bay

Successful

HRV Driveway Entry – Right Turn IN

Successful



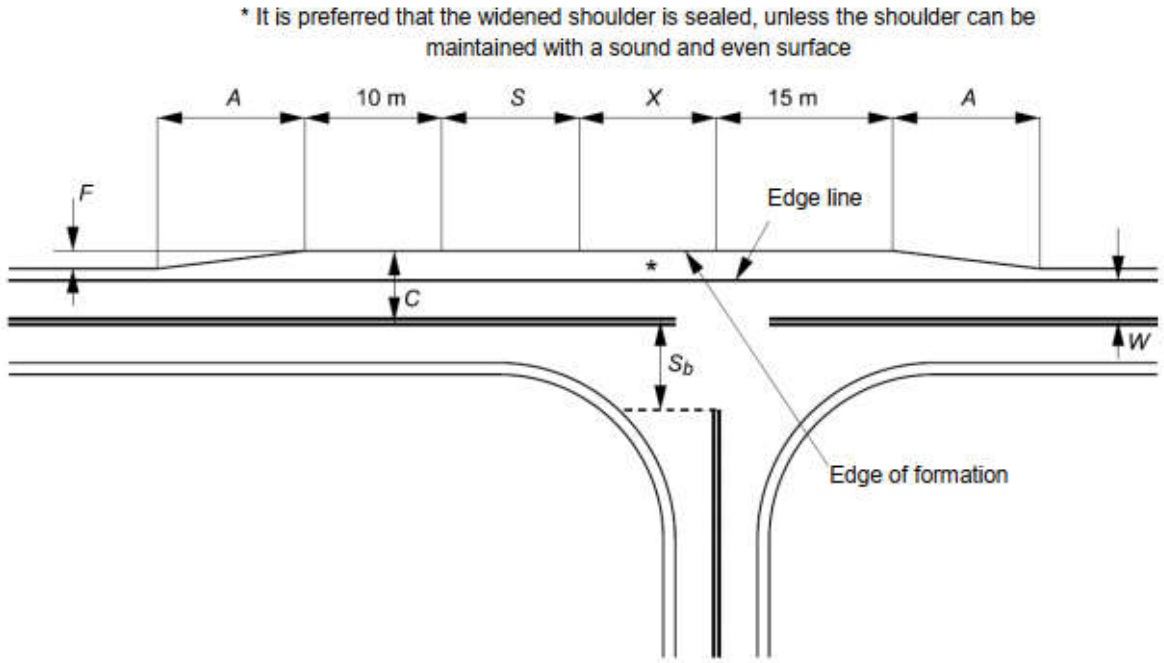
HRV Driveway Exit – Left Turn OUT

Successful

ANNEXURE E: BAR DESIGN GUIDELINES AND CONCEPT

(2 SHEETS)

Figure 7.1: Basic right (BAR) turn treatment on a two-lane rural road



Notes:

This treatment applies to the right turn from a major road to a minor road.

The dimensions of the treatment are:

- W = *Nominal through lane width (m) (including widening for curves). Width to be continuous through the intersection*
- C = *On straights – 6.5 m minimum*
  7.0 m minimum for Type 1 & 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 = $\frac{0.5VF}{3.6}$
  Increase length A on tighter curves (e.g. those with a side friction demand 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)*
- F = *Formation/carriageway widening (m)*
- S = *Storage length to cater for one design turning vehicle (m) (minimum length 12.5 m)*
- X = *Distance based on design vehicle turning path, typically 10–15 m*
- S_b = *Setback distance between the centre of the major road and the give way or stop line in the minor road. The holding line is typically placed in prolongation of the kerb line or edge line, however, it may be set back if there is a problem with the design vehicle over-running the holding line, or if it is desired to hold vehicles back some distance from the intersecting roadway (AS 1742.2 - 2009). The setback needs to be balanced such that sight distance is not negatively impacted to create a safety issue and the needs of pedestrians is met.*

Source: Department of Main Roads (2006).

BAR TREATMENT (AUSTROADS GUIDE TO ROAD DESIGN PART 4A)

BAR Concept

ANNEXURE F: HUNTER VALLEY MODULAR HOMES LETTER AND TRUCK SPECIFICATIONS

(2 SHEETS)

Transportable Homes Pty Ltd T/As
Hunter Valley Modular Homes
ABN: 91 129 715 626

3rd April 2023

Brett Caveny
Oasis Communities Pty Ltd
Suite 1, 20 Mustang Drive
Rutherford NSW 2320

Dear Oasis Communities Pty Ltd,

This letter has been prepared to outline that we have reviewed the site plan and site. After review we can confirm that we will be able to achieve delivery of modular homes on the back of trucks through the main entry on River Road, Windella NSW 2320.

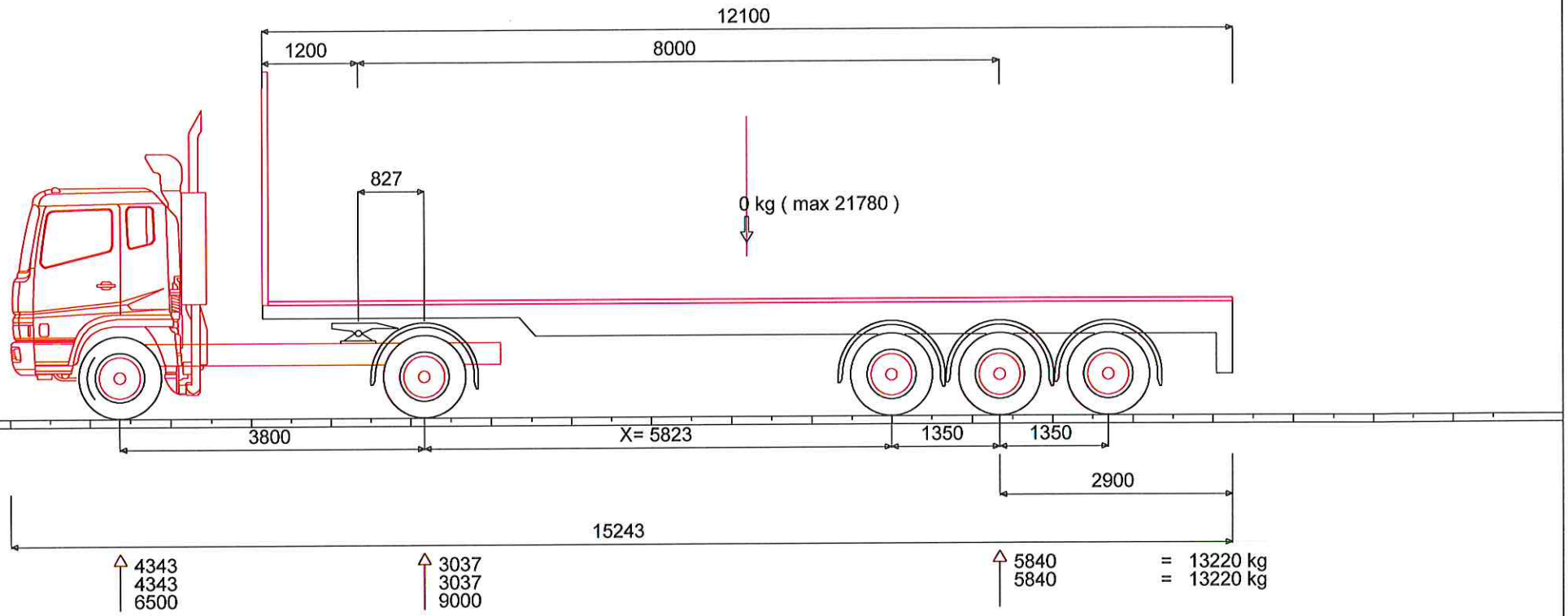
Yours Sincerely,

W.vanRugge

Willem van Rugge

Transportable Homes Pty Ltd

Trading as Hunter Valley Modular Homes.



MITSUBISHI F Series FP 54J 257kW 4x2 GR2RFAA 3800

R out= 12500 R min = 5073