



Rise Urban Pty Ltd

Orange Springs BESS

Transport Impact Statement

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I Introduction

I.1 Background

PJA has been engaged by *Rise Urban Pty Ltd* to prepare a *Transport Impact Statement (TIS)* to support a development application (DA) for a proposed 300MW Battery Energy Storage System (BESS) at Orange Springs. The site comprising a total area of 19.50 ha is located at Orange Springs within the Shire of Gingin on land located at the south-west corner of Brand Highway and Orange Springs Road.

Orange Springs is located approximately 125km north of Perth.

The site location and context is shown in Figure 1-1.

Figure 1-1: Site Location and Context

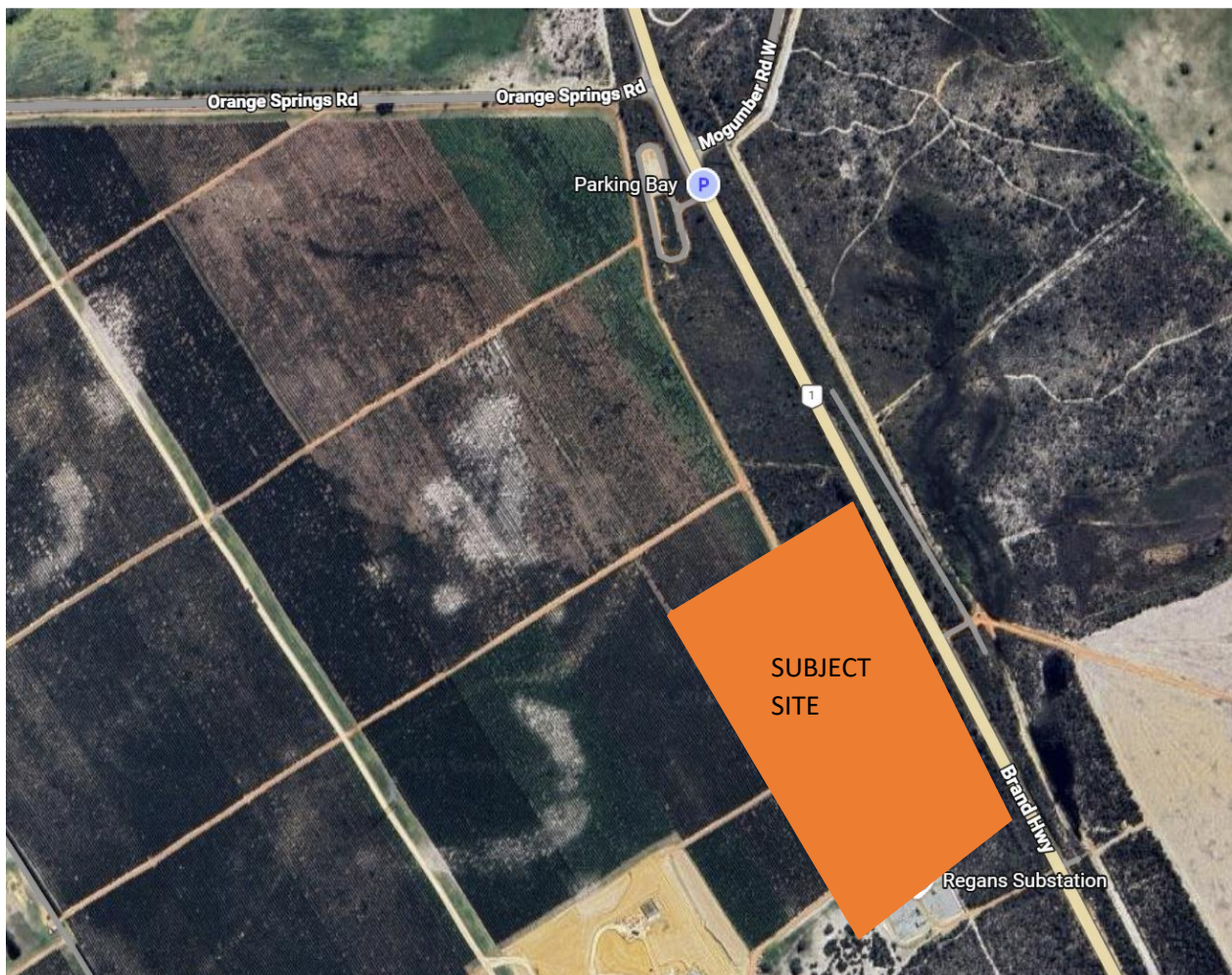


Image courtesy of Google Maps



1.2 Purpose of a TIS

The planning system in Western Australia stipulates that all developments go through a process of stages to ensure that the statutory planning is consistent with the strategic planning. A more detailed assessment of the transport networks for developments is required within the land use planning stages. The *Western Australian Planning Commission* (WAPC) guidelines for a Transport Impact Assessment (TIA) shows the level of detail required at each stage. The proposed Orange Springs BESS falls under *Volume 4* of the WAPC Guidelines, where a *more* “localised/detailed technical assessment” of the existing and proposed transport networks will be undertaken. The intent of this TIS is to provide a greater level of technical detail on the development and its immediate surrounds.

The level of assessment required is generally dependent upon the number of vehicle trips the proposed development is considered to generate within the peak hour of the development. The proposed Orange Springs BESS is anticipated to generate less than 100 vehicle trips within the peak hour and thus warrants a Transport Impact Statement to be provided in alignment with *Volume 4 Part C* of the WAPC TIA Guidelines.

The key components of this TIS relevant to the DA are as follows:

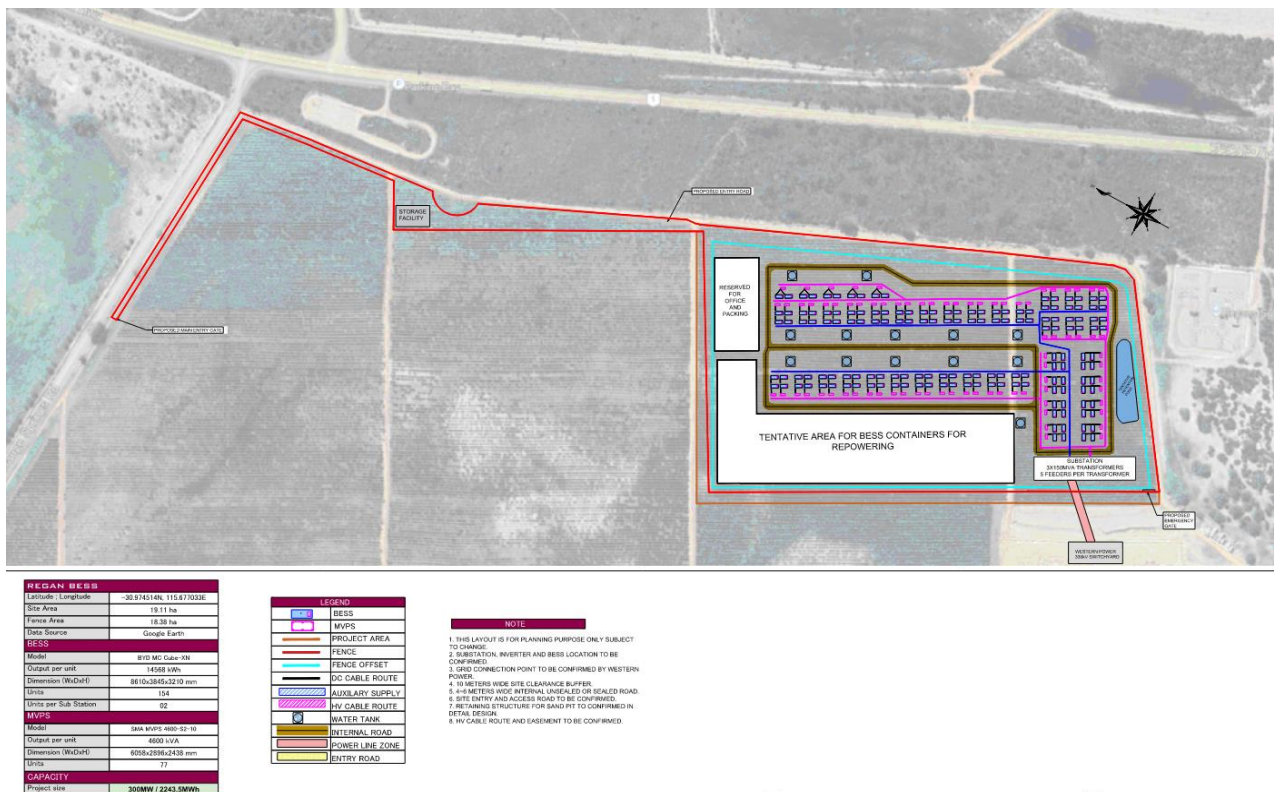
- To assess the routes for equipment transport and vehicle movements.
- To assess the generation of traffic volumes of equipment to be transported.
- To assess the vehicle types and route requirements.
- To assess the access locations.

1.3 Proposed Development

The project includes the construction of a 300MW BESS. Vehicle access to the site is proposed via an entry road connecting to Orange Springs Road approximately 350m west of the intersection with Brand Highway. The entry road is approximately 900m in length to connect to the BESS site which comprises an internal access road throughout the site.

The proposed site layout is shown in Figure 1-2.

Figure 1-2: Site Layout



In addition to the main entry gate to the north, an emergency access gate is also located on the south-west corner of the site.

The BESS will comprise the following key components:

- 3 x 150MVA transformers
- Area for BESS containers for repowering
- Office and packaging area
- Storage facility
- A system of unsealed access roads.

Given that the site is located within 125km of Perth there is no worker accommodation proposed with workers anticipated to commute.



I.4 Key Issues

The site will generate heavy vehicle traffic during the construction period. This will require construction vehicles to travel along Brand Highway, Orange Springs Road and the entry road to access the site. The road network needs to be able to physically accommodate the vehicle sizes and required turning movements for the duration of the construction period, and also ensure safety of those traveling the roads and navigating the intersections.

2 Existing Conditions

2.1 Existing Site Use and Access

The subject site is currently used for agricultural purposes. Existing access to the land appears to be via a gated access to Orange Springs Road located approximately 1km west of Brand Highway and adjacent to the high voltage power lines.

Figure 2-1: Existing Site Access from Orange Springs Road



Image courtesy of Google Earth



2.2 Road Network

2.2.1 Brand Highway

Brand Highway in the vicinity of the site is a single carriageway road with one 3.5m traffic lane in each direction with 1m (approx.) sealed shoulders. Brand Highway is subject to a 110km/h speed limit and is a State Road, classified as Primary Distributer in the Main Roads WA Functional Road Hierarchy.

Brand Highway is part of the RAV Network 7 which enables operation of heavy vehicles up to 36.5m in length (i.e. B-Triples).

Brand Highway carries an average of 2,627 vehicles per day (weekdays) south of Mogumber Road West comprising 51% heavy vehicles.¹

Figure 2-2: Brand Highway looking south adjacent to the site (GoogleMaps)



2.2.2 Orange Springs Road

Orange Springs Road in the vicinity of the site is a single carriageway road with one 3.3m (approx.) traffic lane in each direction with unsealed shoulders. Orange Springs Road has no posted speed limit so is subject to the default 110km/h speed limit for rural areas.

¹ Main Roads WA TrafficMap database

Orange Springs Road is a local road and is classified as Regional Distributer in the Main Roads WA functional road hierarchy. Orange Springs Road is classified as RAV Network 4 which permits operation of heavy vehicles up to 27.5m in length (B-Doubles).

The existing traffic volume on Orange Springs Road is not reported on Main Roads WA TrafficMap database. Mogumber Road West carries in the order of 100 vehicles per day east of Brand Highway.

It is estimated that Orange Springs Road could be expected to also carry in the order of 100 vehicles per day.

Figure 2-3: Orange Springs Road looking east adjacent to the site (GoogleMaps)



Orange Springs Road intersects with Brand highway approximately 100m north of the intersection of Brand Highway and Mogumber Road West with right and left turn deceleration lanes provided at both intersections as shown in Figure 2.4.



Figure 2-4: Brand Highway / Orange Springs Road / Mogumber Road West intersection



Image courtesy of Nearmap

2.3 Crash Data

A review of the Main Roads WA Intersection Crash Ranking Report indicates no crashes have been reported at the Brand Highway / Orange Springs Road intersection or on Orange Springs Road in the vicinity of the site during the observed 5-year period.

2.4 Active Travel and Public Transport

Given the nature of the development and the location, there are no active or public transport facilities currently provided or proposed as part of the development.



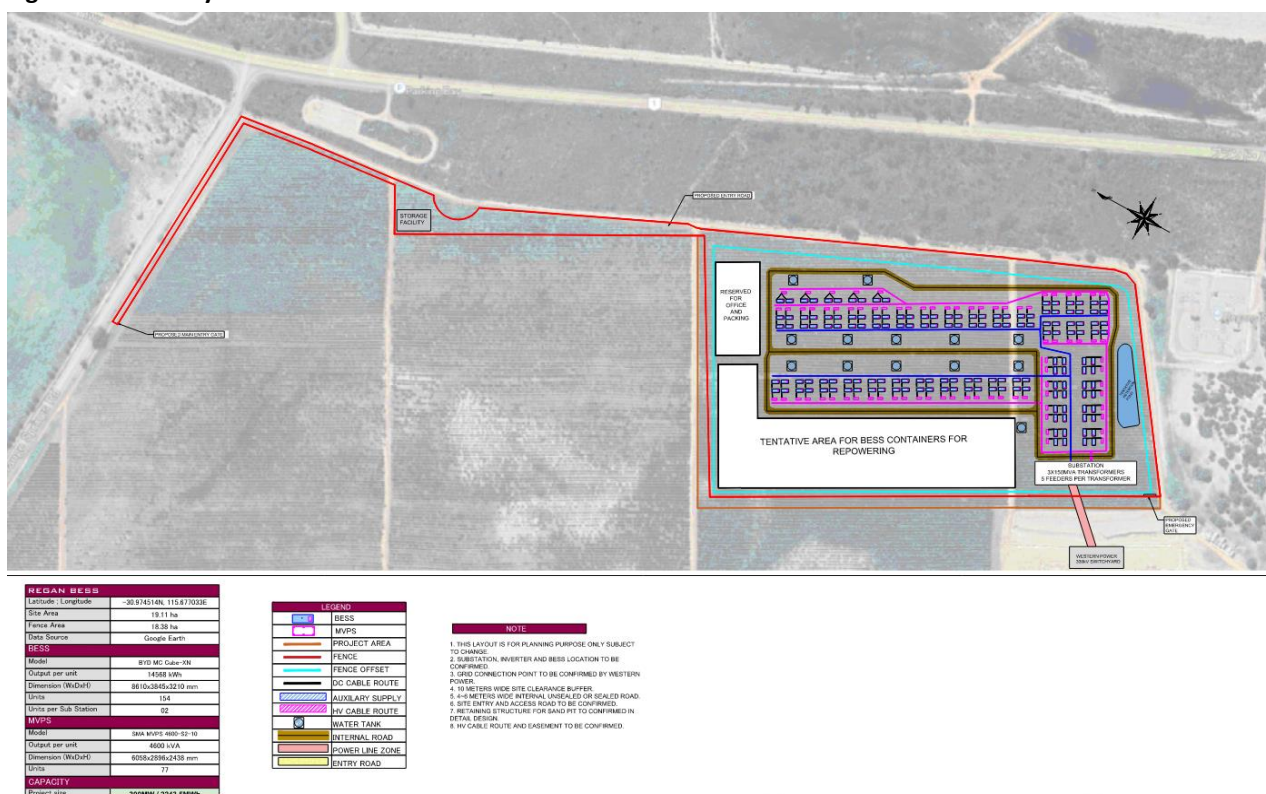
3 Proposed Development

3.1 Proposed Development

The project includes the construction of a 300MW BESS, accessed directly from Orange Springs Road, approximately 350m west of the intersection with Brand Highway.

The proposed site layout is shown in Figure 3-1.

Figure 3-1: Site Layout



The BESS will comprise the following key components:

- 3 x 150MVA transformers
- Area for BESS containers for repowering
- Office and packaging area
- Storage facility
- A system of unsealed access roads.

There is no proposed worker accommodation camp.

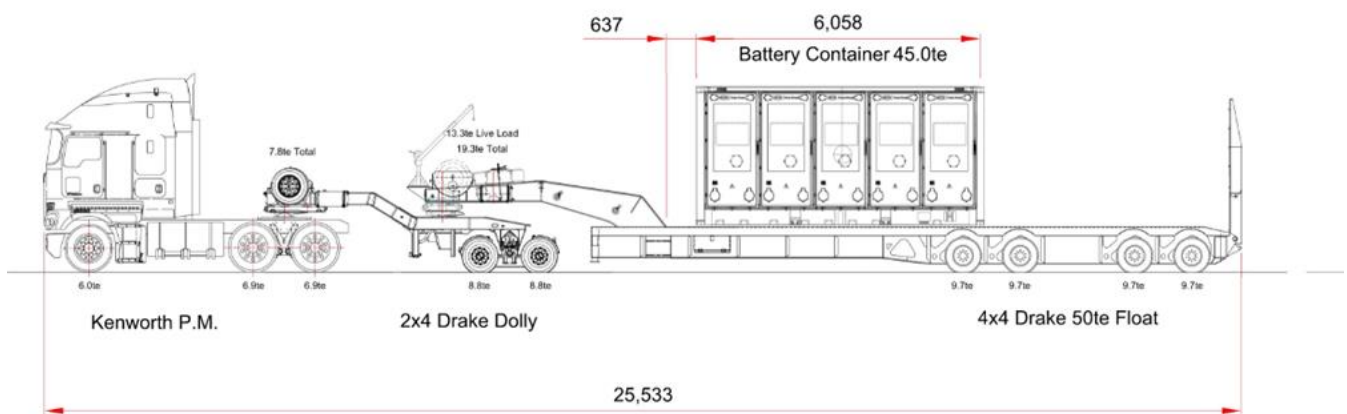
Construction Phase

Information from the Client indicates the following assumptions:



- The BESS will include 150 to 160 battery containers and in the order of 75 inverter units. It is assumed that each battery and inverter will be delivered by an individual truck direct from a staging facility in Perth (i.e. 225 – 235 heavy vehicle deliveries).
- Each unit is housed in 20 ft style containers with a gross weight of up to 45t per battery container, handled as standard 20 ft containers using port-type handling equipment and container locking pins.
- Each batter container (up to 45t) would be transported on a heavy float trailer with an appropriate dolly arrangement and container locks.
- The design vehicle for these deliveries is a 25 metre articulated combination, as shown in Figure 3-2.

Figure 3-2: Battery Container Transport Arrangement



Operational Phase

There is no daily on-site staffing during the operational phase. Visits via light vehicles for inspections and routine maintenance will be infrequent (generally 1 – 2 visits per month) with short term increases during any planned maintenance.

Heavy vehicle access will only be required occasionally for major equipment replacement, typically 2 – 3 times per year.

3.2 Site Access

Vehicle access to the site is proposed via an entry road connecting to Orange Springs Road approximately 350m west of the intersection with Brand Highway. The entry road is approximately



900m long to connect to the BESS site within which an internal road is provided throughout the site.

A proposed emergency gate is located at the south-west corner of the site.

Information provided by the Client indicates that the largest vehicle accessing the site will be a 25m articulated vehicle as shown above in Figure 3-2.

The site access from Orange Springs Road will need to be designed to cater for the above transporter truck movements.

3.3 Parking

All parking requirements will be catered for on-site in open-air car parking area. The plans indicate an area set aside for the office and car parking immediately north of the battery installation.

The majority of car parking will be required during the construction phase and is anticipated to comprise an unsealed parking area. Minimal car parking is anticipated to be required during the operational phase.

Additional areas will remain available within the site to accommodate any overflow parking demand that may occasionally arise during the operational period such as for scheduled maintenance or replacement of facilities.



4 Traffic Analysis

4.1 Traffic Generation

There are no specific traffic generation rates associated with “Battery Energy Storage System (BESS)” in the Western Australian Planning Commission Transport Impact Assessment Guidelines, or the New South Wales Road Transport Authority Guide to Traffic Generating Developments. Therefore, to determine the traffic generation of the site the forecast employee numbers and frequency of vehicles during the construction phase have been considered.

The majority of traffic activity is associated with the construction phase with reduced activity during operation associated with monitoring and maintenance activity. The following sets out the assumptions and estimated traffic generation during the construction and operational phases.

Construction Phase

Information from the Client indicates the following assumptions:

- 20 to 30 heavy vehicle movements per day (10 – 15 in and out) comprising battery and inverter deliveries, transformers and major equipment moves and general construction freight. Deliveries are generally spread evenly across the day.
- 20 to 30 light vehicle movements per day (10 – 15 in and out) for contractors and supervision in utes and cars. Staff generally arrive in the morning and depart at the conclusion of the work day.
- Across the full construction program, the 225 BESS and inverter deliveries will be scheduled from a Perth interim storage facility. As such, the proponent can tailor the delivery schedule to suit the construction program, for example by batching deliveries to manage peak daily truck numbers.

Operational Phase

There is no daily on-site staffing during the operational phase. Visits via light vehicles for inspections and routine maintenance will be infrequent (generally 1 – 2 visits per month) with short term increases during any planned maintenance.

Heavy vehicle access will only be required occasionally for major equipment replacement, typically 2 – 3 times per year.

The traffic generation summary is set out in Table 4.1.

Table 4-1: Traffic Generation Construction Phase Summary

Total Vehicle Trips	Daily		AM Peak		PM Peak	
	In	Out	In	Out	In	Out
Contractors (LV)	15	15	15	0	0	15
Material / Equipment Delivery (HV)	15	15	2	2	2	2
Sub total	30	30	17	2	2	17
TOTAL TRIPS	60 per day		19 per hour		19 per hour	

4.2 Directional Distribution

All heavy vehicle movements are expected to arrive from Perth which is located south of Orange Springs via Brand Highway.

It is assumed that the vast majority (if not all) light vehicles will arrive and depart from the south via Brand Highway.

Given the above it is assumed that all arriving traffic will turn left from Brand Highway into Orange Springs Road and exiting traffic will turn right from Orange Springs Road into Brand Highway. A summary of the anticipated traffic distribution during the construction phase is shown in Figure 4-1.

The peak traffic generation during the AM and PM peak periods is expected to comprise 17 vehicles (including 2 heavy vehicles) turning left into Orange Springs Road and then left into the site access during the AM peak hour, and 17 vehicles (including 2 heavy vehicles) turning right from the site access into Orange Springs Road and then right only Brand Highway during the PM peak hour.

Figure 4-1: Estimate Traffic Movements during Construction Phase (AM / PM peak hour)



4.3 Impact on Surrounding Roads

The WAPC Transport Impact Assessment Guidelines (2016) provide guidance on the assessment of traffic impacts:

'As a general guide, an increase in traffic of less than 10 percent of capacity would not normally be likely to have a material impact on any particular section of road but increases over 10 percent may. All sections of road with an increase greater than 10 percent of capacity should therefore be included in the analysis. For ease of assessment, an increase of 100 vehicles per hour for any lane can be considered as equating to around 109 percent of capacity. Therefore, any section of road where development traffic would increase flows by more than 100 vehicles per hour for any lane should be included in the analysis.'

As set out in Table 4-1, the proposed development is expected to generate in the order of 20 vehicle movements per hour during the AM and PM peak hours. This volume is well within the threshold of 100 vehicles per hour per lane. As such, the impact of the development traffic on the surrounding road network is not considered to be significant.



5 Traffic Management Requirements

As set out in Section 2, Brand Highway and Orange Springs Road are constructed roads and part of the RAV network.

As such, not traffic management alterations are anticipated to be required at the Brand Highway / Orange Springs Road which is shown in Figure 5-1.

Figure 5-1: Brand Highway / Orange Springs Road intersection



The right turn and left turn deceleration lanes on approach to Orange Springs Road are both approximately 175m in length.

Orange Springs Road is flat and straight in the vicinity of the proposed site access. Orange Springs Road bends to the south approximately 1.1km west of Brand Highway.

6 Site Specific Issues

6.1 Road Intersection Design Standards

Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management Section 3.3.6 provides warrants to determine what level of intersection turning facilities should be provided at an intersection.

For a road with a design speed of greater than 100km/h, traffic volumes on the major road below 100 vehicles per hour in the peak period only require a Basic Right Turn and Basic Left Turn Treatment, irrespective of the number of vehicles that are turning.

Orange Springs Road falls within the bracket, refer Figure 6-3.

Figure 6-1: Turning Treatment Warrant AGTM Part 6

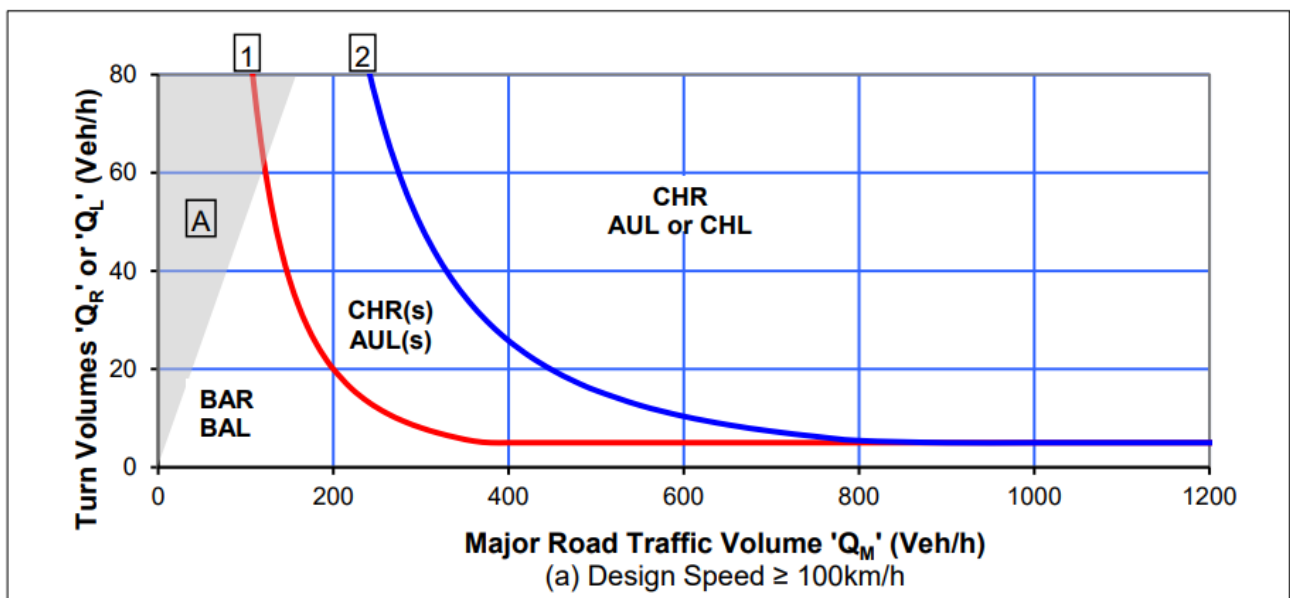


Image courtesy of Austroads Guide to Traffic Management Part 6

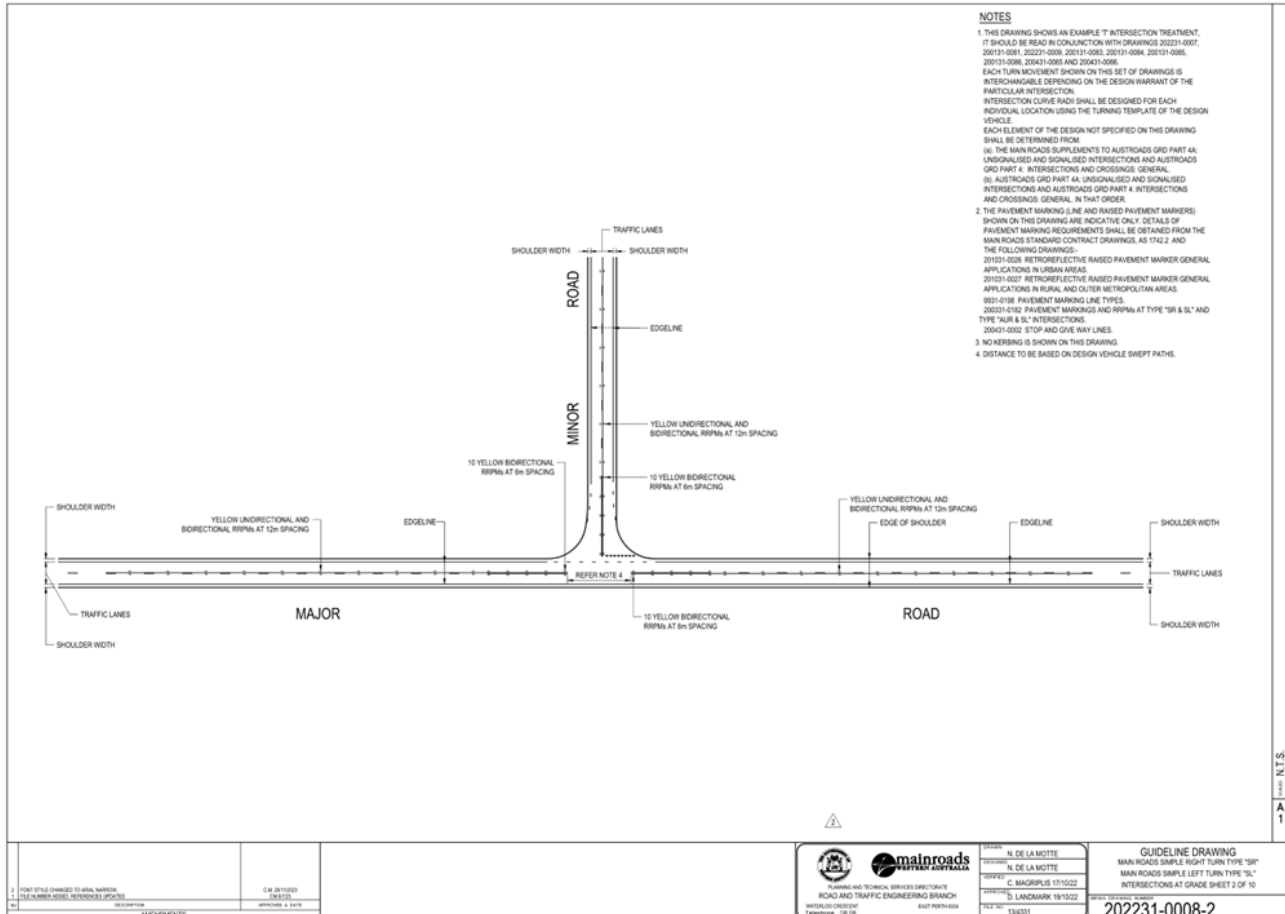
MRWA Supplement to Austroads Guide to Road Design Part 4A.8 (noting Austroads has since been updated) provides additional guidance around when turning treatments should be applied and in what form.

The Simple Left (SL) and Simple Right (SR) turn treatment are applicable to rural roads and in situations where the turning traffic is less than or equal to 5 vehicles per hour and where heavy vehicles are not the predominant vehicle type.



In this instance the ongoing operational phase of the development is expected to generate less than one movement per day and as such the Simple intersection treatment is considered appropriate for the permanent site access as shown indicatively in Figure 6-2.

Figure 6-2: SL/SR MRWA standard drawing 202231-0008-2



Orange Springs Road is part of the MRWA RAV4 network, with sealed shoulder width of approximately 1m near the site access. It is noted that the site access will have to continue to cater for the 25m B-Double delivery vehicle for future battery / transformer replacement, and therefore site access design should be suitable for this sized vehicle.

The crossover to the site is located on a local road (Orange Springs Road) and so the design specifications will also need to meet the specifications set by the Shire of Gingin.

7 Safety Issues

7.1 Safe Intersection Sight Distance Assessment

All construction traffic entering and exiting the site will be doing so via the intersection with Orange Springs Road. The access point is located on a straight section of Orange Springs Road approximately 350m west of Brand Highway.

To determine the suitability of this intersection to be used as the main access point to the site, an assessment on the available sight distance at the access road intersection with Orange Springs Road has been undertaken.

The safe intersection sight distance (SISD) is the sight distance that should be provided at all intersections to ensure there is adequate warning of the intersection for approaching drivers. The required sight distance is determined based on the design speed on the road, or the travelled speed if available. No traffic data is available for Orange Springs Road so a design speed of 120km/h has been adopted comprising the default speed limit of 110km/h plus 10km/h.

Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections notes that for a road with a design speed of 120km/h, the SISD is 341m with a reaction time of 2.5 seconds, and 324m with a reaction time of 2.0 seconds (MRWA absolute minimum) as measured 7m from the edge of the lane.

7.2 Standard Restricted Access Vehicle Route Assessment Guidelines

The Guide refers to the required approach sight distance for a RAV approaching an intersection with a major road, and the required entering sight distance from an intersection of a minor road with a major road.

For a speed limit of 100km/h (noting Orange Springs Road has no posted speed limit and so the default 110km/h speed limit applies), the required sight distance is 252m for level ground.



Figure 7-1: Standard RAV Route Assessment Guidelines – Appendix D Required Sight Distance

Appendix D: Required Sight Distances									
Posted Speed km/h	Downhill				Level	Uphill			
	-8%	-6%	-4%	-2%		2%	4%	6%	8%
40	74	72	70	68	66	65	64	62	61
50	102	98	95	92	89	87	85	84	82
60	134	128	123	119	116	112	110	107	105
70	170	162	155	149	144	140	136	133	130
80	209	198	190	182	176	170	165	161	157
90	252	239	228	218	210	203	197	191	186
100	308	290	275	263	252	242	234	227	220

The above values have been derived using the formula given in Austroads Guidelines with following factors:

Reaction Time	4.0 s
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(Deceleration rate of 0.29g up to 90 km/h, 0.28g at 100 km/h.)

7.3 Available Site Distance

Figure 7-2 shows the straight-line measurement of 341m from 7m from the edge line to the west. It is noted that the access point is located approximately 350m from Brand Highway which equates to the site distance requirement noting vehicles arriving from the east will still be accelerating from the Brand Highway intersection.

Figure 7-2: Desktop Assessment of Safe Intersection Sight Distance at Site Access to Orange Springs Road



7.4 Remedial Measures

There are a small group of trees located to the west of the site access point as shown in Figure 7-2. Depending on the exact final location of the access point there may be a requirement to remove some trees to maintain appropriate sight distance. This can be determined at detailed design.

Figure 7-3: Trees located west of indicative site access point that may limit sight lines





8 Conclusion

There is a proposal to develop a 300MW Battery Energy Storage System (BESS) at Orange Springs. The following conclusions are drawn from this traffic assessment:

- Access to the site is proposed via a new site access to Orange Springs Road located approximately 350m west of Brand Highway.
- Orange Springs Road is a RAV4 road which is sealed, straight and flat in the vicinity of the site access and is subject to the default speed limit of 110km/h.
- A sight distance review has determined there is sufficient line of sight available.
- During the construction phase there are expected to be up to 15 heavy vehicles and 15 light vehicles entering and exiting the site per day with all traffic expected to arrive from the south via Brand Highway.
- During the operational phase (following construction) the site is expected to generate less than one vehicle arrival per day on a typical day.
- *MRWA Supplement to Austroads Guide to Road Design Part 4A.8* (noting this Austroads Guide has since been superseded) indicates that a Simple turning treatment is required given the ongoing use of the development will generate less than 5 vehicle movements per hour.
- Simple turning treatments in accordance with MRWA Standard Drawing 202231-0008-2 should be provided noting the access will need to cater for B-Double access for future battery replacement.