TRAFFICWORKS™

Traffic Impact Assessment Report

Solar Energy Facility (solar farm) at 910 Princes Highway East, Bairnsdale

Project Number 220471
Revision Report 12/07/2023

Client BE Pro BD Pty Ltd (Bison Energy),

Document control record

Document prepared by:

Trafficworks Pty Ltd
ABN 59 125 488 977

TRAFFICWORKS™

1st Floor 132 Upper Heidelberg Rd Ivanhoe Vic 3079

PO Box 417 Ivanhoe Vic 3079

Ph (03) 9490 5900

www.trafficworks.com.au

Disclaimer

The information contained in this document is intended to be received, used and relied upon by the named addressee or client only for the purpose for which it has been prepared. Trafficworks Pty Ltd does not warrant the accuracy or relevance of the information, including by implication, contained in this document if it is used or relied upon by any person other than the named addressee or client. Copying, reproduction including by electronic means, unauthorised use or disclosure of this document is prohibited except with the express written authorisation of Trafficworks Pty Ltd.

Document control	
Report title	Solar Energy Facility (solar farm) at 910 Princes Highway East, Bairnsdale
Project number	220471
Client	BE Pro BD Pty Ltd (Bison Energy),
Client contact	Shannon O'Brien at Habitat Planning (02 6021 0662)

Revision	Date issued	Revision details / status	Prepared by	Authorised by
Draft	18/01/2023	Preliminary draft	Bob Citroën	Kate Kennedy
Final	23/01/2023	Final	Bob Citroën	
Final Rev #1	12/07/2023	Final #1	Bob Citroën	

TRAFFICWORKS™

Executive summary

Habitat Planning, on behalf of BE Pro BD Pty Ltd (Bison Energy), has engaged Trafficworks to undertake a traffic impact assessment (TIA) for the proposed development of a **Solar Energy Facility (solar farm) at 910 Princes Highway East, Bairnsdale.**

The table below summarises the site assessment and the proposed development details, and our conclusions and recommendations.

Address	Lot 1 on PS5165370, 910 Princes Highway East, Bairnsdale
Zoning	Farming (FZ1)
Proposed development	Solar Energy Facility (solar farm)
Road network	Princes Highway East (A1) along southern site frontage (no direct access) Site access from Power Station Road along western site frontage (Melbourne to Bairnsdale railway line along the northern boundary)
Traffic generation	5 vph in AM peak during establishment
Car parking	4 light vehicles + 1 truck during establishment
Conclusion	We conclude there are no traffic engineering reasons that would prevent the development from proceeding, subject to implementation of our recommendations.
Recommendations	— **1:** that specific areas be identified on the site plan to be dedicated to car and truck parking, vehicle manoeuvring and materials storage during the construction phase. — **2:** that detailed design of the new site entry driveway incorporate the relevant aspects of SD 265 of the IDM

Referenced documents

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

- AS/NZS 2890.1:2004 Parking Facilities Part 1: Off-street car parking
- Austroads:
  - *Guide to Road Design, Part 4: Intersections and Crossings, 2017*
  - *Guide to Road Design, Part 4A: Unsignalised and Signalised Intersections, 2017*
  - *Guide to Traffic Management, Part 6: Intersections, Interchanges and Crossings, 2020*
- VicRoads Supplement to:
  - *Austroads Guide to Road Design - Part 4A: Unsignalised and Signalised Intersections, 2011*
- Local Government Infrastructure Design Association's Infrastructure Design Manual (IDM), Version 5.30 released March 2020
- East Gippsland Shire Council Planning Scheme
- RTA Guide to Traffic Generating Developments, Version 2.2, October 2002
- Site Plan, drawings 24495P1 V1, prepared by Millar Merrigan Pty Ltd and dated 10/11/2020 (reproduced in Figure 8)
- Bairnsdale Battery Layout plan, sheet 1 of 1, Rev 1.2, prepared by Bison Energy and dated 16/11/2022.

TRAFFICWORKS™

Table of Contents

1 Introduction

Habitat Planning, on behalf of BE Pro BD Pty Ltd (Bison Energy), has engaged Trafficworks to undertake a traffic impact assessment (TIA) for the proposed development of a **Solar Energy Facility (solar farm) at 910 Princes Highway East, Bairnsdale**.

For the detail about:

- existing site conditions – see Section 2
- assessment of the proposed development – see Section 3
- traffic impact of the proposed development – see Section 4
- our conclusions and recommendations – see Section 5.

2 Existing conditions

2.1 Subject site

The site:

- is located at Lot 1, along the northern highway boundary at 910 Princes Highway East, east of Power Station Road, 5 km west of central Bairnsdale
- is currently vacant pasture used for stock grazing

Vehicular access to the land is currently available from Power Station Road, 400 m north of the highway. There is currently no gate access to the site along its highway frontage. The Melbourne-Bairnsdale railway line forms the northern boundary of the site.

Figure 1 shows the location of the site.

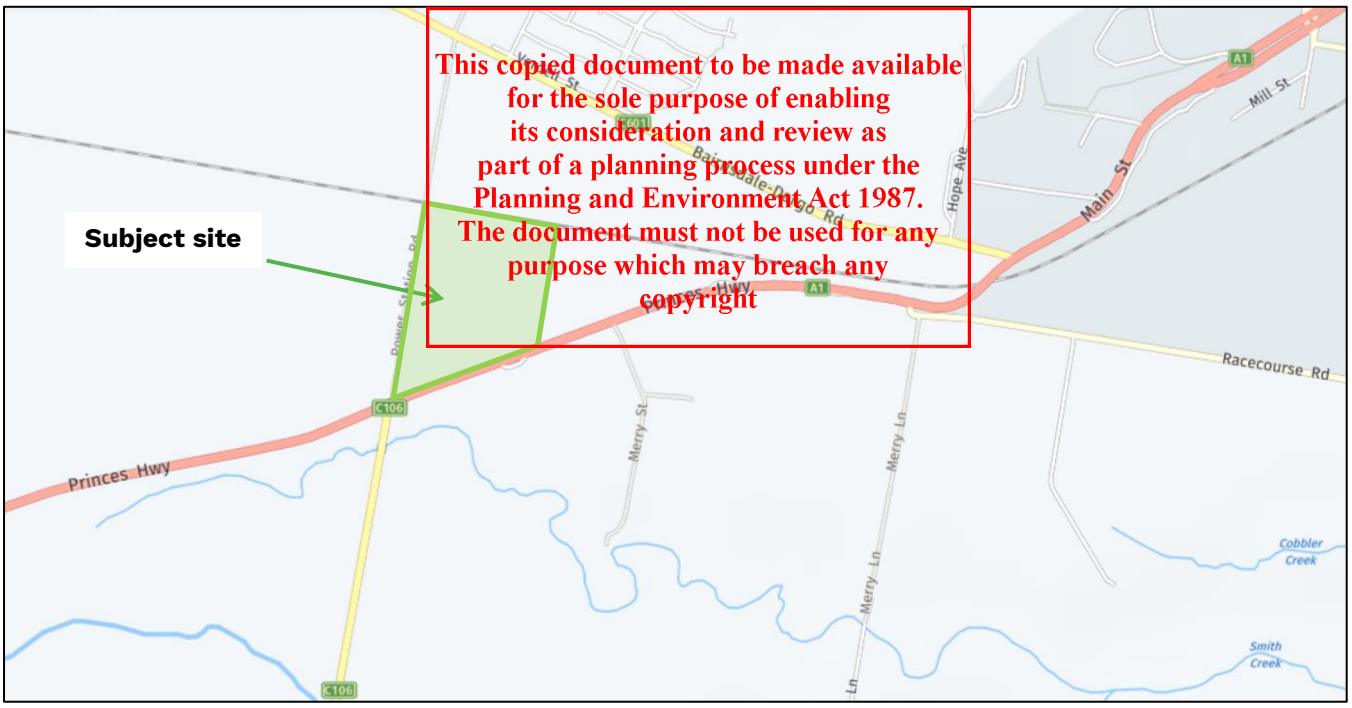


Figure 1: Location plan (reproduced with permission from NearMap under licence)

The site is surrounding by farming land all zoned Farming (FZ1). A timber mill operated by AusWestTimbers in located on land to the west of Power Station Road at the highway intersection and the Bairnsdale Power Station is located opposite the site some 500 m north of the highway.

Princes Highway is located in a Transport Zone category 2 (TRZ2) and the Melbourne-Bairnsdale railway line in a Transport Zone category 1 (TRZ1).

Figure 2 shows the zoning for the site and surrounding land.

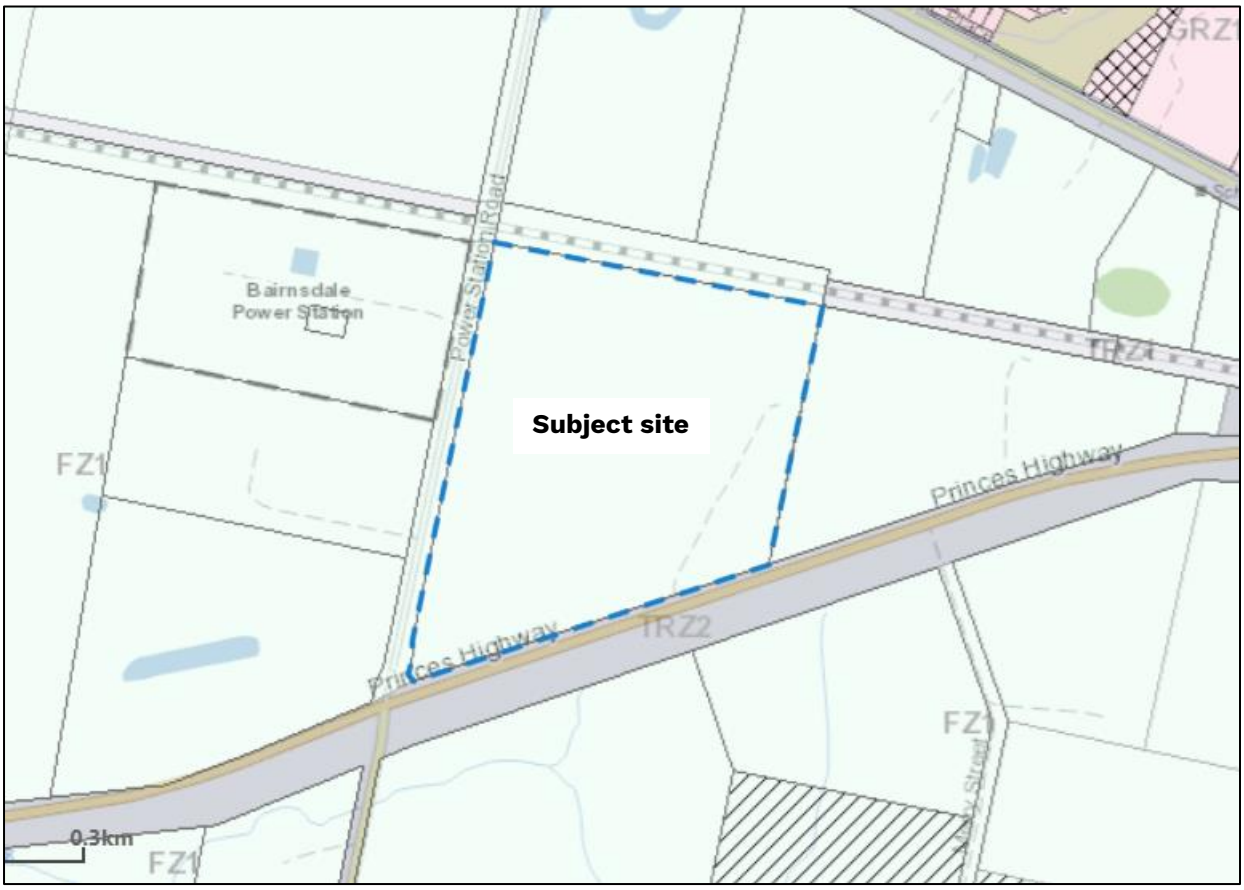


Figure 2: Zoning plan (reproduced from the Vicplan website)

2.2 Road network

The road network includes:

- Princes Highway East (A1) along the site's southern frontage
- Power Station Road along the site's western frontage
- Bengworden Road (C106) as the extension of Power Station Road to the south of the highway.

2.2.1 Princes Highway

Table 1 describes the features of the highway.

Table 1: Princes Highway features

Feature	Description
Road type	State Arterial Road (A1) managed by the Department of Transport and Planning (DTP)
Access	The highway provides a long-distance travel route through Gippsland, between Melbourne and Bairnsdale (and beyond into southern NSW).
Carriageway	7.4 m wide (2 x 3.7 m traffic lanes) bounded by 2.0 m sealed shoulders. The highway has been widened at the approaches to the Power Station Road/Bengworden Road intersection to provide full channelised right turn lanes (CHR) and auxiliary left turn lanes (AUL) for both directions of travel. Additionally, the cross-section on the west approach contains a wide median treatment that is fitted with central barriers further to the west.
Road reservation	60 m wide
Speed limit	The default 100 km/h rural speed limit applies to this section of highway
Bicycle lanes/footpaths	Not provided at this rural location

Figure 3 and Figure 4 provide photos of the highway at the site.

Figure 3: View to the west along the Princes Highway at the subject site frontage (to the right) approaching the Power Station Road intersection

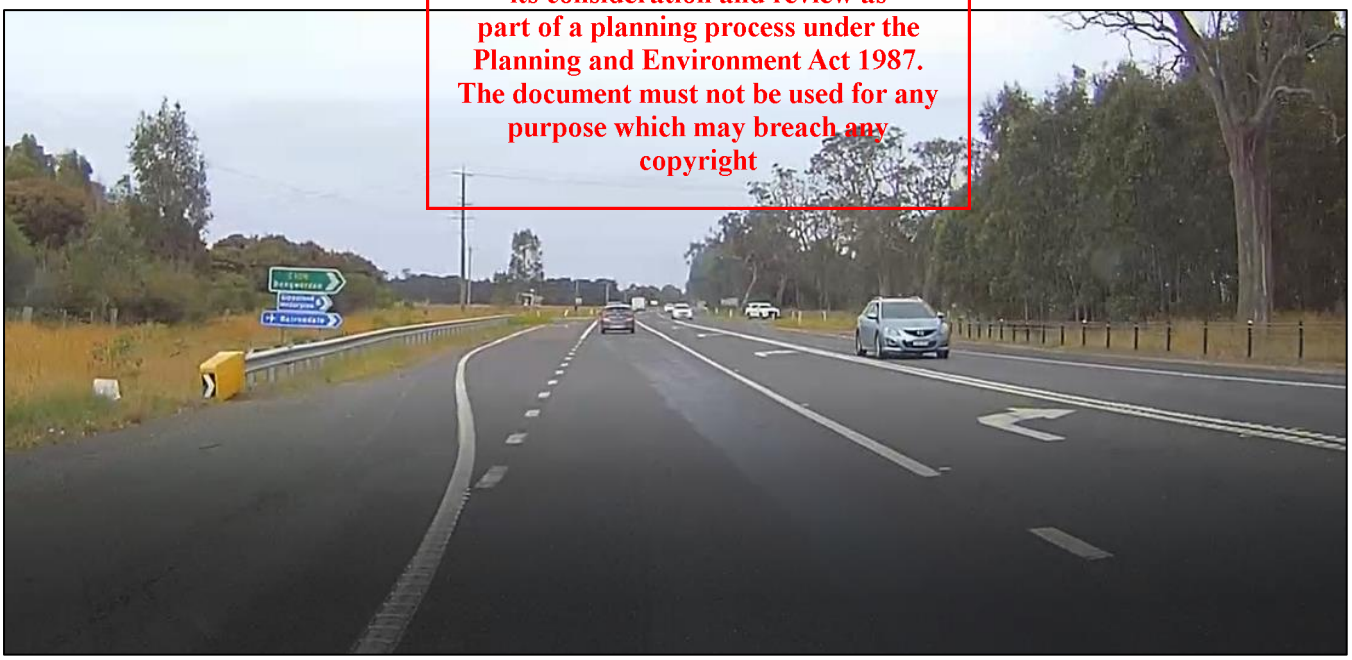


Figure 4: View to the east along the Princes Highway approaching the Power Station Road intersection

2.2.2 Power Station Road

Table 1 describes the features of this road.

Table 2: Power Station Road features

Feature	Description
Road type	Classified as a rural access road in East Gippsland Shire Council's Road Register
Access	This local access road also provides a connection between the Princes Highway and the Bairnsdale Dargo Road (C601) clear of Bairnsdale Township. Large splitter island treatments in Power Station Road and Bengworden Road at the highway result in a staggered-T configuration for this intersection.
Carriageway	5.6 m wide seal bounded by gravel shoulders and grass verges
Road reservation	20 m wide
Speed limit	The default 100 km/h rural speed limit applies to this road
Bicycle lanes/footpaths	Not provided at this rural location

Figure 5 and Figure 46 provide photos of Power Station Road just north of the highway and at the proposed site access point.

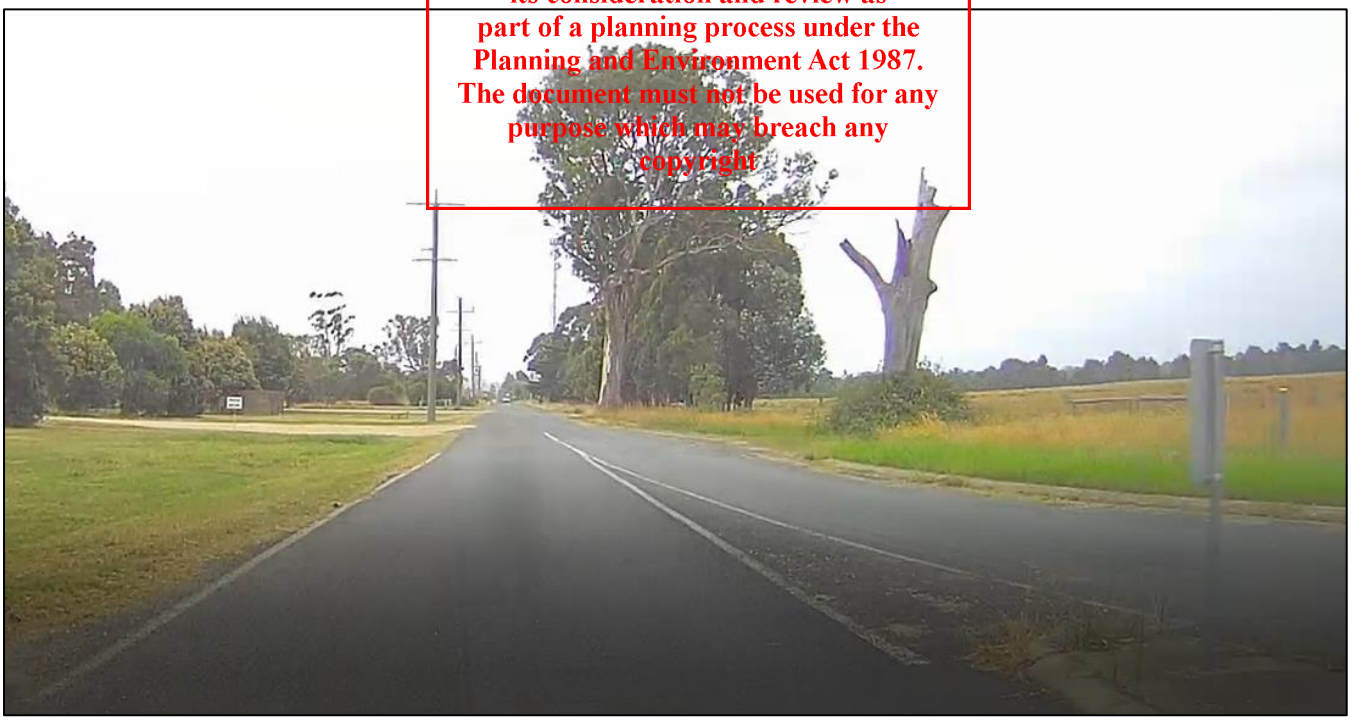


Figure 5: View to the north along Power Station Road north of the Princes Highway intersection.

Figure 6: View to the north along Power Station Road at the proposed site access location to the right.

2.3 Traffic volumes

2.3.1 Princes Highway East

The DPT open data portal indicates the following 2020 traffic volume estimates along the Princes Highway:

- West of Bengworden Road:
  - Eastbound: 3,500 vpd (vehicles per day)
  - Westbound: 3,600 vpd
  - Two-way (combined) 7,100 vpd
  - Commercial vehicle content: 13.5%
- East of Bengworden Road:
  - Eastbound: 4,100 vpd (vehicles per day)
  - Westbound: 4,400 vpd
  - Two-way (combined) 8,500 vpd
  - Commercial vehicle content: 11.5%

On the basis that peak hour volumes are approximately 10% of daily totals, the morning and afternoon peak hour traffic volumes along the Princes Highway are estimated to be 350-410 vph (vehicles per hour) southeast bound and 360-440 vph northwest bound, or 710-850 vph two-way.

2.3.2 Power Station Road

Traffic volumes on Power Station Road were surveyed by East Gippsland Shire Council in October/November 2021. The survey results are summarised in Table 3.

Table 3: Surveyed traffic volumes for Power Station Road

Survey date	Location	Weekday two-way volume (vpd)	Peak hour two-way volume (vph)	Commercial vehicles (%)	2023 Estimate (vph)
22/10/21 - 8/11/21	530 m north of Princes Highway	92	9 (8:00-9:00AM)	9.5%	10*

*Estimated using 2% pa compound growth

The volumes from this 2021 survey, factored up to reflect current-day levels, are used in the ensuing analysis, i.e. peak hour volume of 10 vph, or 5 vph in each direction.

2.4 Crash history

The DPT data portal, which details all injury crashes reported to Victoria Police on roads throughout Victoria, indicates that no casualty crashes have occurred on the roads in the vicinity of the subject site in the last five-year period for which data is available, i.e. 1/01/2017 – 31/12/2021.

Conclusion 1: Based on this crash history, we conclude that there is no crash trend that requires immediate investigation.

2.5 Public transport

There are no public transport services in the vicinity of the site. This matter is not pursued further in this report.

2.6 Pedestrians and cyclists

There are no footpaths or on/off road bicycle facilities in the vicinity of this rural property located outside the Bairnsdale built-up area. The development is not expected to generate pedestrian or cycle activity and this matter is not pursued further in this report.

3 Assessment of the proposed development

3.1 Details of proposed development

The project comprises use and development of the approximately 20.7 ha site for a 50 MW solar energy facility, battery storage and utility installations that will include the following typical components (refer also to Figure 7):

- installation of some 12,000 photo-voltaic (PV) panels in 55 arrays on single axis trackers (60 degrees) and pile driven into the ground
- aboveground and underground cabling between panel arrays to combiner boxes and inverters
- Sungrow 4950 MVPS inverter within a power station and control room (in shipping container)
- battery storage facility (shipping container configuration)
- new internal substation yard
- aboveground and underground cabling and electrical connections between the panel inverters
- new 66 kV feeder line across Power Station Road required to connect to the Ausnet substation to the west.

Figure 7: Site Layout (Bairnsdale Battery Layout Drawing, Rev 1.2 prepared by Bison Energy)

Vehicular access to the development site, during establishment and for future maintenance, will be through the present gateway onto Power Station Road some 400 m north of the highway and follow the internal driveway to the facilities.

Based on the information provided by the client, the peak traffic generated by the development will occur during the three-month construction phase. Therefore, this report's primary focus is on assessing impacts during the peak construction phase of the development.

During the operational phase, the proposed facility is expected to generate one visit (or two vehicle movements) per day for maintenance and monitoring purposes on an irregular basis (i.e. not daily). This operational access is also to be via the proposed driveway from Power Station Road.

3.2 Traffic generation and distribution

3.2.1 Traffic generation

Appendix 1.1 details the anticipated traffic generation during the construction phase and the likely distribution of this traffic. This is summarised as follows:

During the first month of construction anticipated daily traffic generation is:

- 4 light vehicle entry movements in the AM and 4 departures in the PM, with 100% approaching from the east (from Bairnsdale) then turning north into Power Station Road
- 2 to 3 heavy vehicle arrivals (and departures) all approaching from the west (from Melbourne) then turning north into Power Station Road.

This reduces during months two and three to:

- 4 light vehicle entry movements in the AM and 4 departures in the PM, with 100% approaching from the east
- 1 heavy vehicle arrival (and departure) per day approaching from the west.

Operational traffic is confined to a single light vehicle attending the site on an intermittent basis.

Conclusion 2: For the purpose of this assessment, peak traffic generation will occur during the morning peak and has assumed the arrival of four light vehicles and one heavy vehicle during the morning peak hour, all heading north along Power Station Road from the highway.

3.3 Car parking assessment

3.3.1 Provision of car parking

Appendix A2.2 details estimated parking demand, anticipated parking provision and assesses parking adequacy.

4 Traffic impacts of the proposed development

Table 4 summarises traffic impacts and recommendations for:

- sight distance
- turn provisions
- the existing road network.

For the detail that supports this summary and the recommendations, see Appendix 1 – Detailed TIA.

Table 4: Summary of road network assessment findings

Area assessed	Impact (Y/N)	Impact summary and recommendations
Sight distance to vehicles – at the access driveway (ESD)	No	the location of the driveway, at 400 m from the Princes Highway intersection, achieves compliance with the entering sight distance (ESD) criteria in AS/NZS 2890.1. Refer Appendix A1.3.1 – Site access – ESD requirement for detailed assessment.
Sight distance to pedestrians	NA	as there are no frontage road footpaths and no anticipated pedestrian activity in the area, this requirement of AS/NZS 2890.1 is not applicable to the subject site access (Refer Appendix A1.3.3).
Turn provisions	Yes	The analysis indicates that the: — right turn from Power Station Road into the site access meets the warrants for a basic right turn treatment. This basic treatment is covered in the design requirements of SD 265 of the IDM as outlined in Appendix A1.4.5 Driveway Entry. — As there are not expected to be any left turns from Power Station Road into the site access, no left turn treatment is proposed. Refer Appendices A1.4 - Turn provisions impact for detailed assessments.
Existing road network	No	the intersection treatment in the Princes Highway at Power Station Road adequately caters for the additional turns by construction and component delivery vehicles for this project without a need for upgrading. Refer Appendix 1 for detailed assessment.

5 Conclusions and recommendations

We conclude there are no traffic engineering reasons that would prevent the development from proceeding, as outlined below:

- based on the crash history, we conclude that there is no crash trend that requires immediate investigation
- for the purpose of this assessment, peak traffic generation will occur during the morning peak and has assumed the arrival of four light vehicles and one heavy vehicle during the morning peak hour, all heading north along Power Station Road from the highway.
- the location of the site access driveway, at 400 m from the Princes Highway intersection, achieves compliance with the entering sight distance criteria in AS/NZS 2890.1.
- based on the data gathered and assessed in this section, we conclude that the:
    - right turn from Power Station Road into the proposed site access meets the warrants for a basic right turn treatment in the morning peak period.
    - no left turn treatment is required.
- the current intersection treatment in the Princes Highway at Power Station Road adequately caters for the additional turns by component delivery and trade vehicles for this project without a need for upgrading.

As such, this TIA has identified the following matters that need to be addressed when preparing plans to accompany the Planning Permit Application:

- **Recommendation 1:** that specific areas be identified on the site plan to be dedicated to car and truck parking, vehicle manoeuvring and materials storage during the construction phase.
- **Recommendation 2:** that detailed design of the new site entry driveway incorporate the relevant aspects of SD 265 of the IDM

Appendix 1 – Detailed TIA

The TIA has assessed the impact of the proposed development on:

- traffic generation in Section A1.1
- car parking in Section A1.2
- sight distance in Section A1.3
- turn provisions in Section A1.4
- the existing road network in Section A1.5

A1.1 – Traffic generation and distribution assessment

A1.1.1 – Traffic generation

Traffic generation for new developments is typically estimated using the traffic generation rates provided in the RTA Guide to Traffic Generating Developments (2002) or the rates provided in the Infrastructure Design Manual (IDM). However, traffic generation rates for solar energy facilities are not covered in either the RTA Guide or the IDM.

Therefore, the traffic generation to / from the site for the construction phase of the development was estimated empirically to establish the likely peak traffic generation using information provided by the client.

On-site construction for the proposed solar energy facility comprises the preparation of footings, delivery of a prefabricated inverter, construction and fitting of the substation, delivery of solar panels, assembly, and connection of components.

The total construction period is estimated to extend over three months. The client envisages the following timeframes:

- Weeks 1-4 – Initial delivery of PEG SD System and fencing in seven containers on semi-trailers.

  Photo-voltaic (PV) modules will progressively be delivered ahead of installation. These components will be transported in 27 containers on semi-trailers. Assuming a progressive delivery schedule, this will result in 1 to 2 deliveries by semi-trailer per day.

  There is a probability of occasional additional contractor heavy vehicles arriving during this stage (crane trucks, concrete deliveries etc). These will approach Power Station Road along the Princes Highway from the east.

Overall, allowance is made for 4 light vehicles and 2 to 3 heavy vehicle arrivals per day on average.

- Month 2 – By now PV modules are installed and most of the containers will have arrived and be stored on site. So, allow for 4 light vehicles and 1 heavy vehicle per day average.
- Month 3 – Substation components to arrive for installation. They will arrive in 2 containers on semi-trailers. Maintain the 4 light vehicles and 1 heavy per day average arrival frequency.

Following completion and commissioning, the operational traffic is expected to generate one visit (or two vehicle movements) per day for maintenance and monitoring purposes on an irregular basis.

A1.1.2 Traffic distribution assumptions

Tradesmen working on the site are expected to be based in Bairnsdale and travel to the site each day in their own vehicles, generating four arrivals in the morning and four departures in the evening, all travelling from/to the east into Power Station Road to approach the site entrance from the south.

It is assumed that all component deliveries during the peak construction phase mostly by semi-trailer, will approach Power Station Road from Melbourne along Princes Highway from the west and access the site from the south. These trips are expected to be spread throughout the day, with one arrival during the morning peak hour.

The development will attract no traffic along Power Station Road from the north.

A1.1.3 – Traffic summary

During the first month of construction anticipated daily traffic generation is:

- 4 light vehicle entry movements in the AM and 4 departures in the PM, with 100% approaching from the east
- 2 to 3 heavy vehicle arrivals (and departures) all approaching from the west

This reduces during months two and three to:

- 4 light vehicle entry movements in the AM and 4 departures in the PM, with 100% approaching from the east
- 1 heavy vehicle arrival (and departure) per day approaching from the west

Operational traffic is confined to a single light vehicle attending the site on an intermittent basis.

A1.2 – Car parking assessment

A1.2.1 – Statutory parking provision

Section 5 of the RTA Guide to Traffic Generating Developments or Table 1 to Clause 52.06 of the Planning Scheme are the normal sources used to establish the requirements for the provision and design of car parking spaces for new developments. Neither of these sources covers the construction or operation of solar farms and parking demand has been estimated from first principles as outlined in the following section.

A1.2.2 – Car parking demand assessment

During construction the client has indicated a likely need to accommodate parking of four trades vehicles and up to two semi-trailers per day.

Post completion there will only be a requirement for one car to visit on an intermittent basis for maintenance purposes.

A1.2.3 – Adequacy of car parking

The Site Layout plan does not indicate any specific parking and vehicle manoeuvring areas or materials storage areas. Scrutiny of the plan indicates that there is ample available space on the site to make this provision, but it needs to be identified.

Recommendation 1: that specific areas be identified on the site plan to be dedicated to car and truck parking, vehicle manoeuvring and materials storage during the construction phase.

A1.3 – Sight distance impact

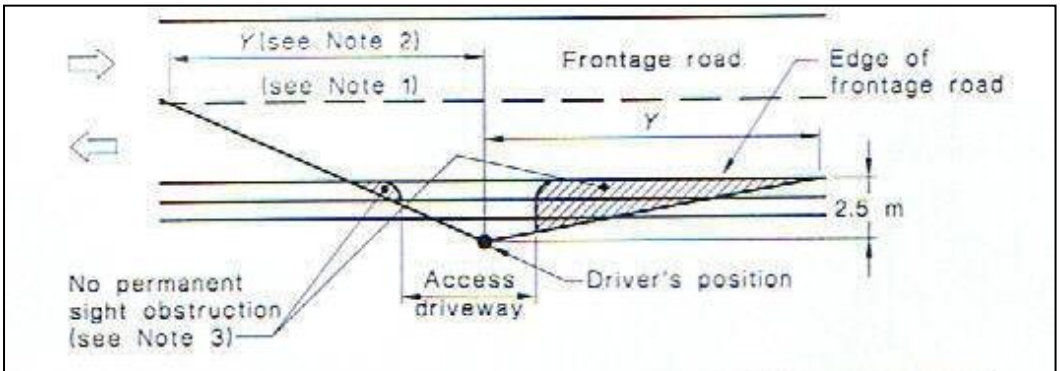
A1.3.1 – Site access – ESD requirement

Section 3.2.4 in AS/NZS 2980.1 Parking Facilities – Part 1: Off-street car parking, sets out minimum sight distance criteria at access driveways as follows:

- entering sight distance (ESD) criteria for a driver exiting an access driveway to traffic on the frontage road
- sight distance to pedestrians.

Un-signalised access driveways shall be located so the intersection sight distance available to drivers leaving the driveway along the frontage road is at least that

shown in Figure 3.2 of AS/NZS 2890.1 (reproduced in Figure 8) from a driver's position set back 2.5 m from the edge of frontage road (edge of traffic lane).



Frontage road speed (Note 4) km/h	Distance (Y) along frontage road m		
	Access driveways other than domestic (Note 5)		Domestic property access (Note 6)
	Desirable 5 s gap	Minimum SSD	
40	55	35	30
50	69	45	40
60	83	65	55
70	97	85	70
80	111	105	95
90	125	130	Use values from 2nd and 3rd columns
100	139	160	
110	153	190	

Figure 8: Sight distance requirements at driveways (Source: Figure 3.2 from AS/NZS 2890.1)

A1.3.2 – Impacts for this development

From Figure 8, the applicable minimum ESD (or SSD) for vehicles departing the site at the access driveway onto Power Station Road is 160 m for the 100 km/h approach speed. This criterion is satisfied at the site driveway location (refer photos in Figures 9 and 10).

Conclusion 3: the location of the access driveway, at 400 m from the Princes Highway intersection, achieves compliance with the entering sight distance criteria in AS/NZS 2890.1.

Figure 9: Unobstructed view from the proposed driveway to the south

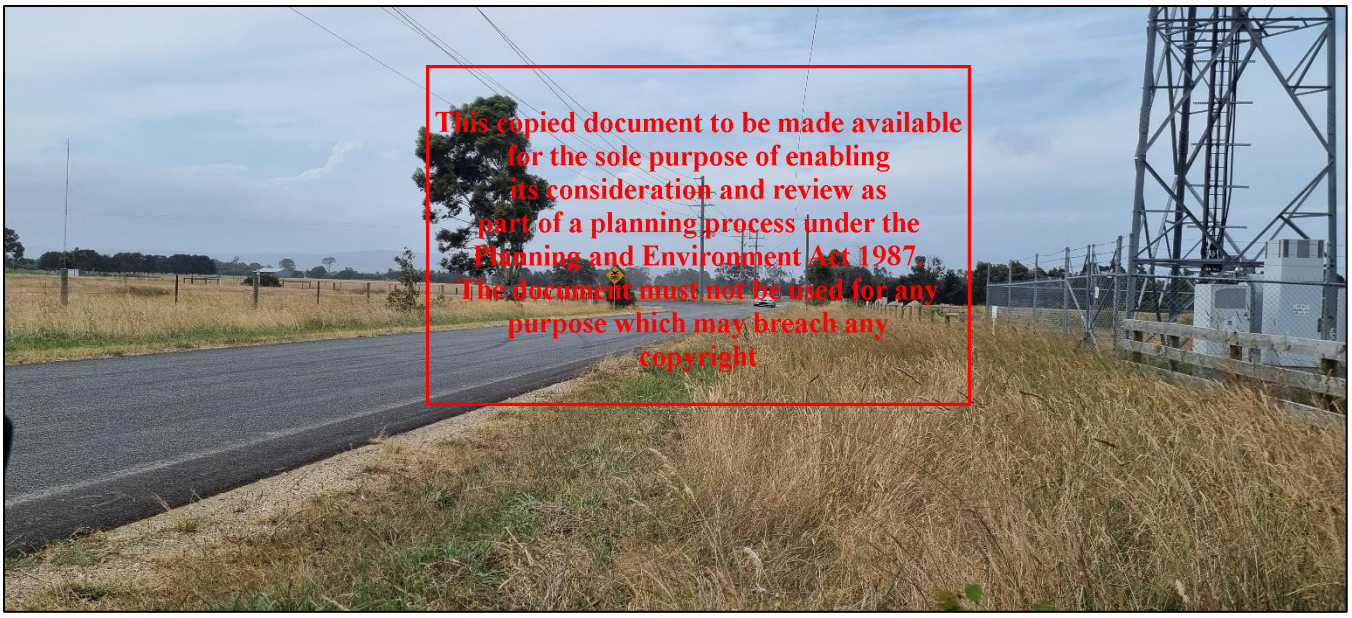


Figure 10: Unobstructed view from the proposed driveway to the north

A1.3.3 – Sight distance to pedestrians

As there are no frontage road footpaths and no anticipated pedestrian activity in the area, this requirement of AS/NZS 2890.1 is not applicable to the subject site access.

A1.4 - Turn provisions impact

The traffic turning from a major road into a minor road or a significant development should not delay through traffic or compromise road safety.

Turn treatments are generally provided at sign-controlled intersections from major roads into minor roads or at significant access points to ensure safe and efficient

operation of the intersection. Traffic volumes and speed environment are used to determine appropriate turn lane treatments at such locations.

Figure 11 summarises the anticipated peak hour traffic generated entering the proposed development as detailed in Section A1.1.3.

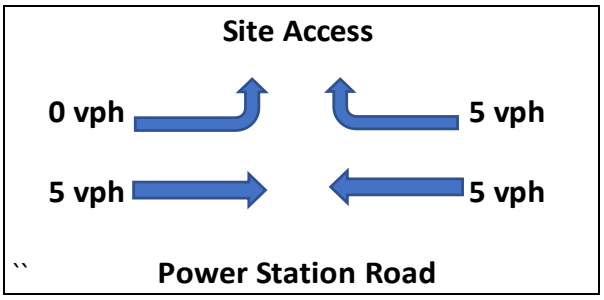
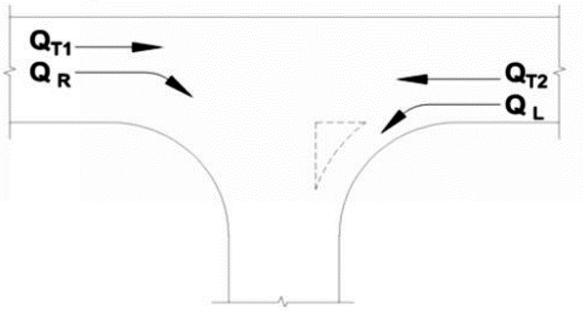


Figure 11: Anticipated AM Peak traffic generated from the proposed development

Figure 12 shows the formulae used to determine the major road volume (Q_M) needed to select the appropriate turn treatment.

To determine the turning treatments, the outcomes from these calculations are applied to Figure 3.25 of the Austroads Guide to Traffic Management Part 6 (AGTM6), shown in Figure 13, with the graph in Figure 3.25a used for the subject site access located in a 100 km/h speed environment.

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	$= Q_{T2}$

Figure 12: Formulae used to determine major road traffic (Source: Figure 3.26 from AGTM6)

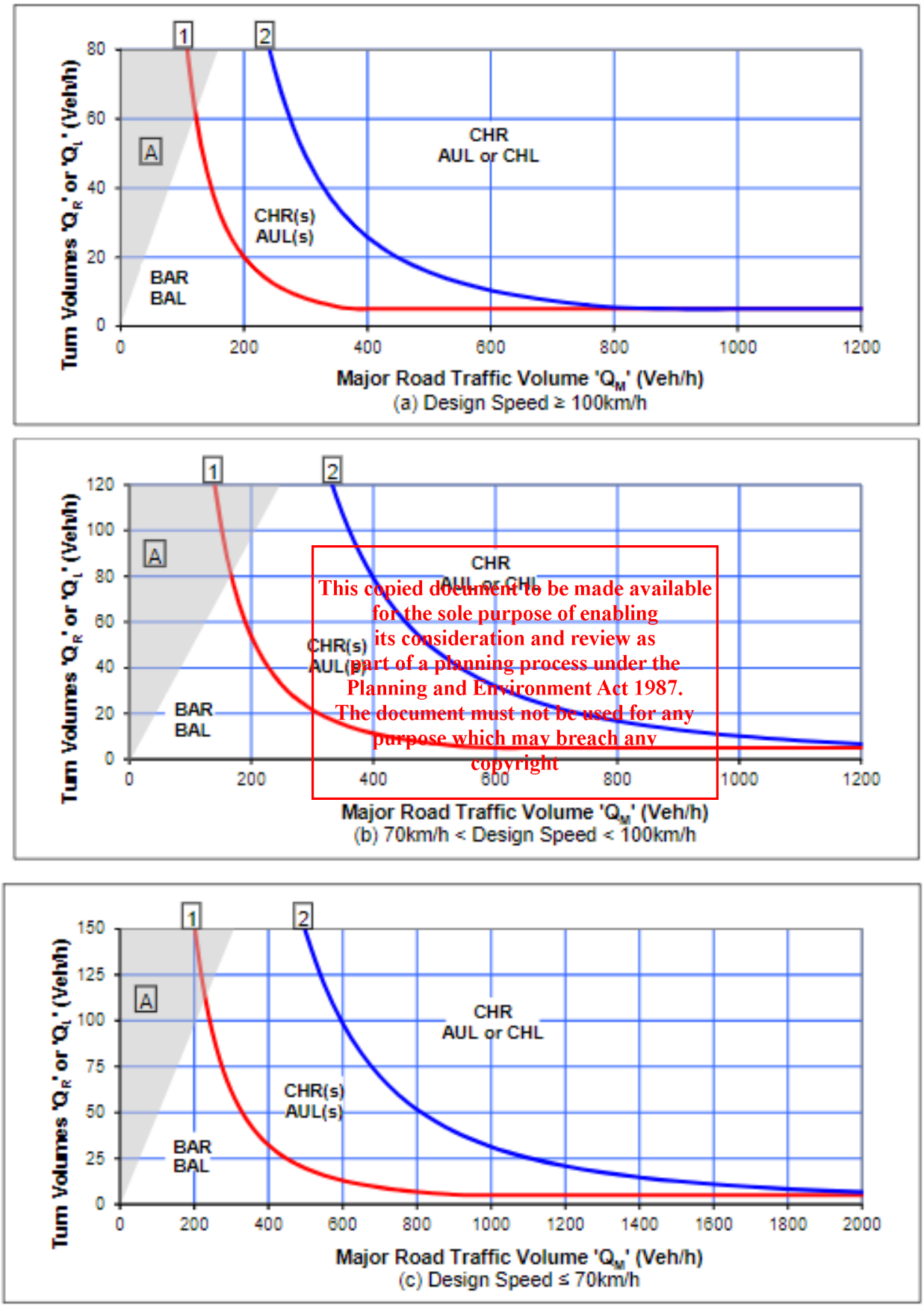


Figure 13: Warrants for turn treatments on major roads at unsignalised intersections (source: Figure 3.25, from AGTM6)

A1.4.1 – Turn lane treatments

Tables 9 & 10 in Appendix 2 summarise the various types of left and right turn treatments, as defined in the AGRD4 and AGRD4A.

A1.4.2 – Anticipated conditions for Power Station Road at the site access

To determine the anticipated conditions at the site access, current traffic volumes from Table 4 and anticipated turning traffic from Figure 12 have been applied to the formulae in Figure 13 and inserted into graph (a) in Figure 14 to obtain the results summarised in Table 5.

Table 5: Right turn lane treatments on Power Station Road at the proposed site access – anticipated conditions.

Road	Period	Q_{T1}	Q_{T2}	Q_L	Q_R	Q_M	Warrants
		vph	vph	vph	vph	vph	
Power Station Road	**AM**	5	5*	0	3	15	Type BAR
	PM	6	6	0	0	12	No treatment

As the development is not expected to generate any traffic to/from the north, provision of a left turn treatment was not considered.

Conclusion 4: based on the data gathered and assessed in this section, we conclude that the:

- right turn from Power Station Road into the proposed site access meets the warrants for a basic Type BAR right turn treatment in the morning peak period.
- no left turn treatment is required.

A1.4.3 – Right-turning treatment

The above assessment indicates Power Station Road meets the warrants for the minimum Type BAR treatment. There is currently minimal shoulder width for a passing vehicle to travel on and the provision of this widening is regarded as necessary for safety, albeit in an unsealed state because of the low level of use.

Figure 14 (reproduced from Figure A6 of AGRD4) outlines the configuration of the Type BAR treatment that should satisfy the dimensions outlined in Table 6.

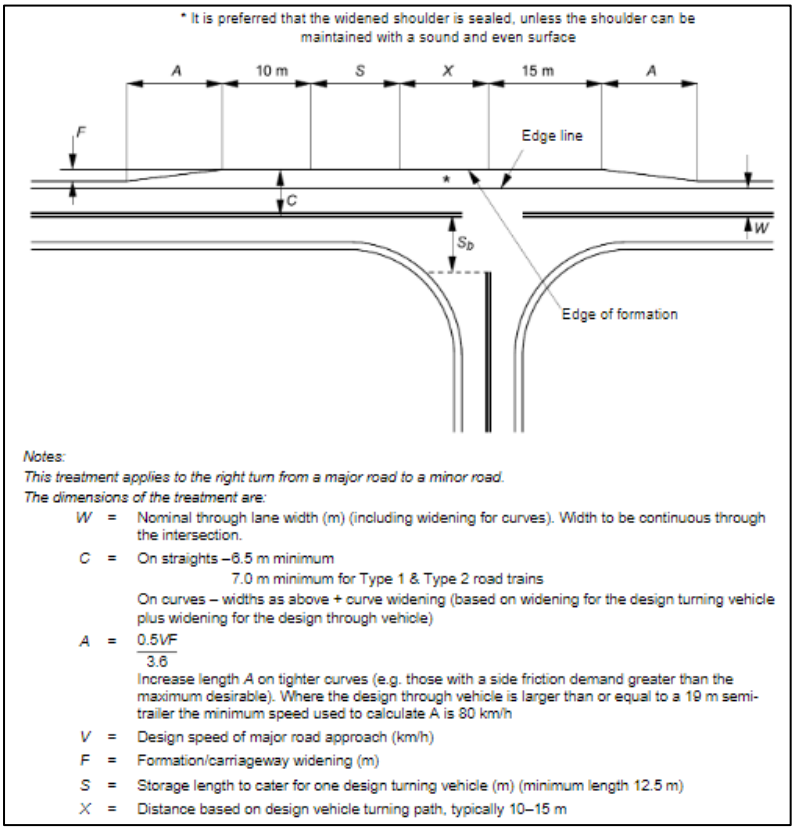


Figure 14: Basic Type BAR right turn treatment

Table 6: Minimum dimensions of the Type BAR treatment for a design speed of 100 km/h,

Feature	Code on Figure	Requirement
Lateral movement length	A = 0.5VF/3.6	45 m (for V = 100 and rounded)
Nominal through lane width	W	2.8 m (half existing seal width of 5.6 m)
Total lane width	C	6.0 m (from road centre line)
Formation widening	F = C - W	3.2 m
Storage length	S	12.5 m
Clearance to access centreline	X	15 m (nominal)
Treatment length	A + 10 + S + X + 15 + A	127.5 m

This treatment reflects the requirements of SD 265 of the IDM (see Section A1.4.5 below) and will ensure turns by semi-trailers entering or departing the site and the needs of through traffic are catered for.

A1.4.4 – Left-turning treatment

No treatment specified.

A1.4.5 – Driveway entry

The standard drawings accompanying Council's IDM specify typical entry treatments to be applied to new accesses. SD 265, reproduced in Appendix A2.3, illustrates the typical requirements at a rural vehicle crossing to cater for semi-trailer movements.

Although the configuration of the passing lane for right turns has been covered in Section A1.4.2 above, the following additional matters need to be incorporated in the cross-over design to comply with the IDM:

- the fence needs to be splayed and the gate set back to allow for an entering semi-trailer can stop clear of the traffic lanes in the event the gate is shut
- the driveway needs to be sealed between the edge of traffic lanes and the property boundary
- the formation needs to be widened (unsealed) opposite the entry to facilitate turns by semi-trailers into the site and to allow for passing manoeuvres of turning vehicles by through traffic
- no provision needs to be made for drainage along the road reserve as the land slopes away from the road formation.

Recommendation 2: that detailed design of the new site entry driveway incorporate the relevant aspects of SD 265 of the IDM.

A1.5 – The existing road network

As noted earlier, all delivery traffic is expected to approach the site along the Princes Highway from the west and execute a left turn from the Princes Highway into Power Station Road. Numbers of these trucks are expected to peak at 3 vpd.

This highway intersection is currently configured to provide an AUL left turn lane with the following dimensions:

- Diverge/deceleration length D = 120 m
- Taper length T = 30 m (included in D)
- Through lane width W = 3.5 m

- Turn lane width W_T = 3.5 m

The above dimensions are consistent with the requirements for a rural Type AUL treatment in a 100 km/h speed environment (refer Appendix A2.2), except for the deceleration length D, which assumes a speed reduction to about 90 km/h prior to a vehicle entering the turn lane.

Similarly, all trades traffic is expected to approach the site along the Princes Highway from the east and execute a right turn from the Princes Highway into Power Station Road. Numbers of these vehicles are expected to be 4 vph during the morning peak.

This highway intersection is currently configured to provide a Type CHR right turn lane with the following dimensions:

- Lateral movement length A = 100 m (for V = 100 km/h)
- Diverge/deceleration length D = 125 m (to stop condition)
- Taper length T = 30 m (included in D)
- Storage length S= 12.5 m
- Clearance to intersection X = 15 m

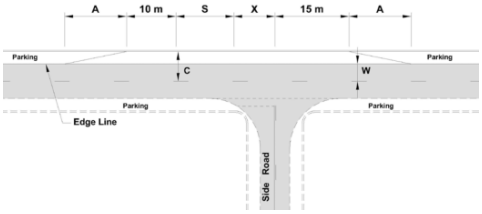
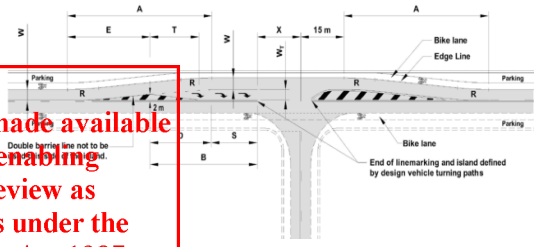
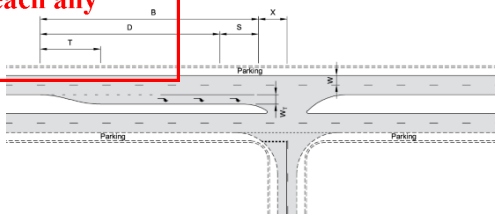
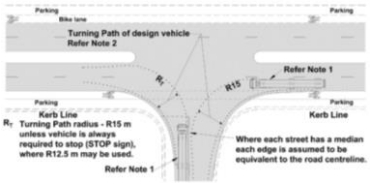
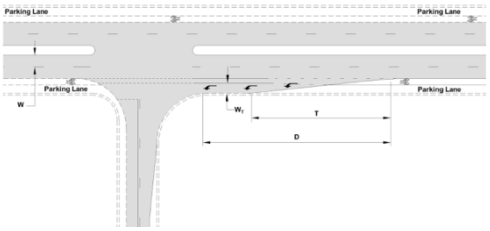
The above dimensions are consistent with the requirements for a rural Type CHR treatment in a 100 km/h speed environment (refer Appendix A2.2), except for the deceleration length D, which assumes a speed reduction to about 90 km/h prior to a vehicle entering the turn lane.

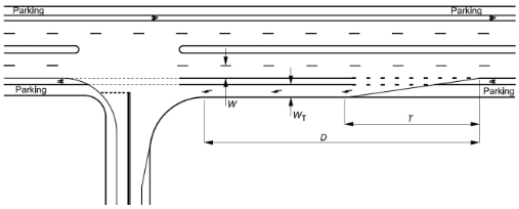
Conclusion 5: the current intersection treatment in the Princes Highway at Power Station Road adequately caters for the additional turns by component delivery and trade vehicles for this project without a need for upgrading.

Appendix 2 – Turn treatments

A2.1 - Urban

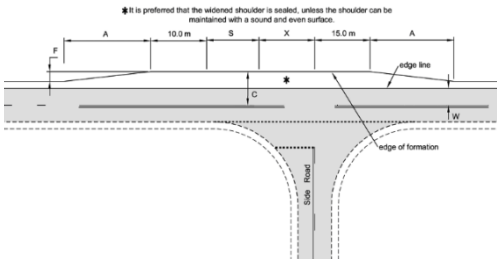
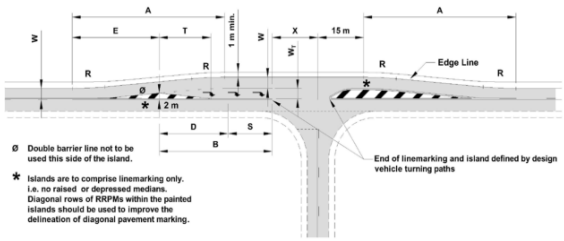
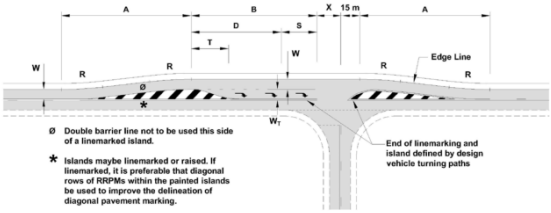
Table 9: Turn Treatment Descriptions **(Urban)** (Source: noted Sections from Austroads Guides to Road Design Parts 4 and 4A).

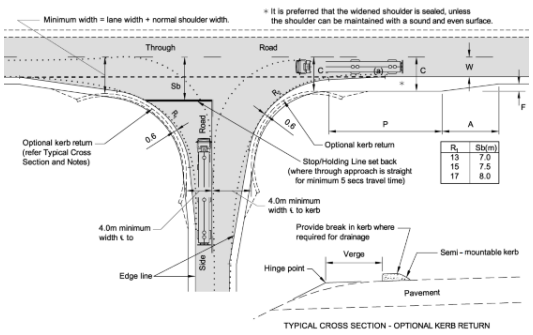
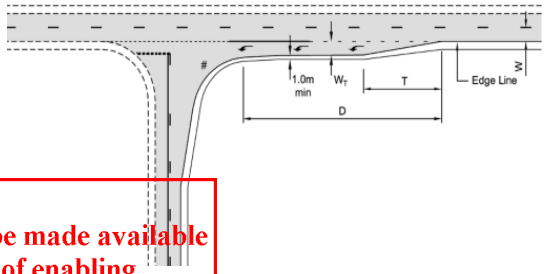
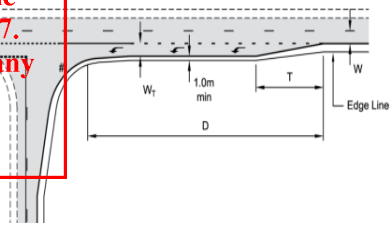
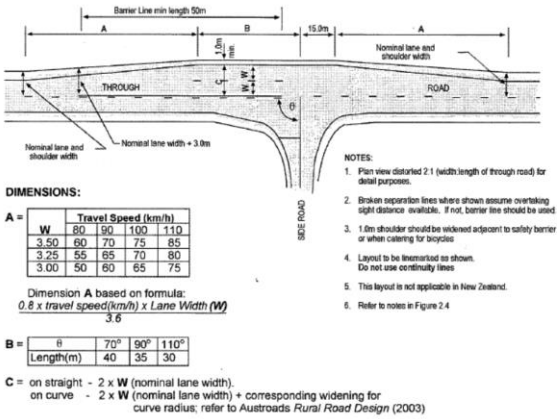
Turn treatment	Description	
BAR	**BA**sic **R**ight turn treatment on the major road, features a widened area (usually in place of parking) on the major road that allows through vehicles to pass to the left of turning vehicles *(Figure 7.6 of Austroads Guide to Road Design Part 4A).*	
CHR(S)	**CH**annelised **R**ight (Short) turn is a shorter version of the Channelised Right turn treatment which is reduced by removing space provided for storage in the right lane. This treatment type can only be used with line marking *(Figure 7.7 of Austroads Guide to Road Design Part 4A).*	
CHR	**CH**annelised **R**ight turn treatment has two vehicle travel paths (through and right turns) separated by physical or painted medians or islands *(Figure 7.8 of Austroads Guide to Road Design Part 4A).*	
BAL	**BA**sic **L**eft turn treatment on the major road has a radius large enough to accommodate a design vehicle turning left into the minor road without crossing the centre line of the minor road (*Figure A15 of Austroads Guide to Road Design Part 4).*	
AUL(S)	**AU**xiliary **L**eft (**S**hort) turn treatment is a shorter version of the Auxiliary Left turn treatment which is reduced by allowing some deceleration to occur in the through lane on the major road. This turn treatment also allows through vehicles to pass to the right of turning vehicles *(Figure A17 of Austroads Guide to Road Design Part 4).*	

Turn treatment	Description
AUL	**AU**xiliary **L**eft turn treatment is a left turn lane on the major road that allows through vehicles to pass to the right of turning vehicles *(Figure 8.6 of Austroads Guide to Road Design Part 4A).* 

A2.2 – Rural

Table 10: Turn Lane Treatment Descriptions **(Rural)** (Source: noted *Sections from Austroads Guides to Road Design Parts 4 and 4A*).

Turn treatment	Description
BAR	**BA**sic **R**ight turn treatment on the major road, features a widened area (usually in place of parking) on the major road that allows through vehicles to pass to the left of turning vehicles *(Figure A6 of Austroads Guide to Road Design Part 4).* 
CHR(S)	**CH**annelised **R**ight (**S**hort) turn is a shorter version of the Channelised Right turn treatment which is reduced by removing space provided for storage in the right lane. This treatment type can only be used with line marking *(Figure A7 of Austroads Guide to Road Design Part 4).* 
CHR	**CH**annelised **R**ight turn treatment has two vehicle travel paths (through and right turns) separated by physical or painted medians or islands *(Figure A8 of Austroads Guide to Road Design Part 4).* 

Turn treatment	Description	
BAL	**BA**sic **L**eft turn treatment on the major road has a radius large enough to accommodate a design vehicle turning left into the minor road without crossing the centre line of the minor road (*Figure 8.2 of Austroads Guide to Road Design Part 4A).*	
AUL(S)	**AU**xiliary **L**eft (**S**hort) turn treatment is a shorter version of the Auxiliary Left turn treatment which is reduced by allowing some deceleration to occur in the through lane on the major road. This turn treatment also allows through vehicles to pass to the right of turning vehicles *(Figure 8.3 of Austroads Guide to Road Design Part 4A).*	
AUL	**AU**xiliary **L**eft turn treatment is a left turn lane on the major road that allows through vehicles to pass to the right of turning vehicles *(Figure 8.4 of Austroads Guide to Road Design Part 4A).*	
AUR	In addition to the above, DoT will allow the use of the rural **Au**xiliary lane **R**ight turn treatment (from GTEP Part 5) in lieu of the CHR(s) treatment, (*refer Sections 7.5.2 and 7.7.2 of VicRoads Supplement to AGRD4A*)	

A2.3 - IDM

Standard Drawing SD 265, which accompanies the Infrastructure Design Manual used by most regional councils in Victoria, should be applied to local road accesses for developments that represent significant traffic generators, particularly those that attract semi-trailer and B-Double use. This layout is shown in Figure 17 below.

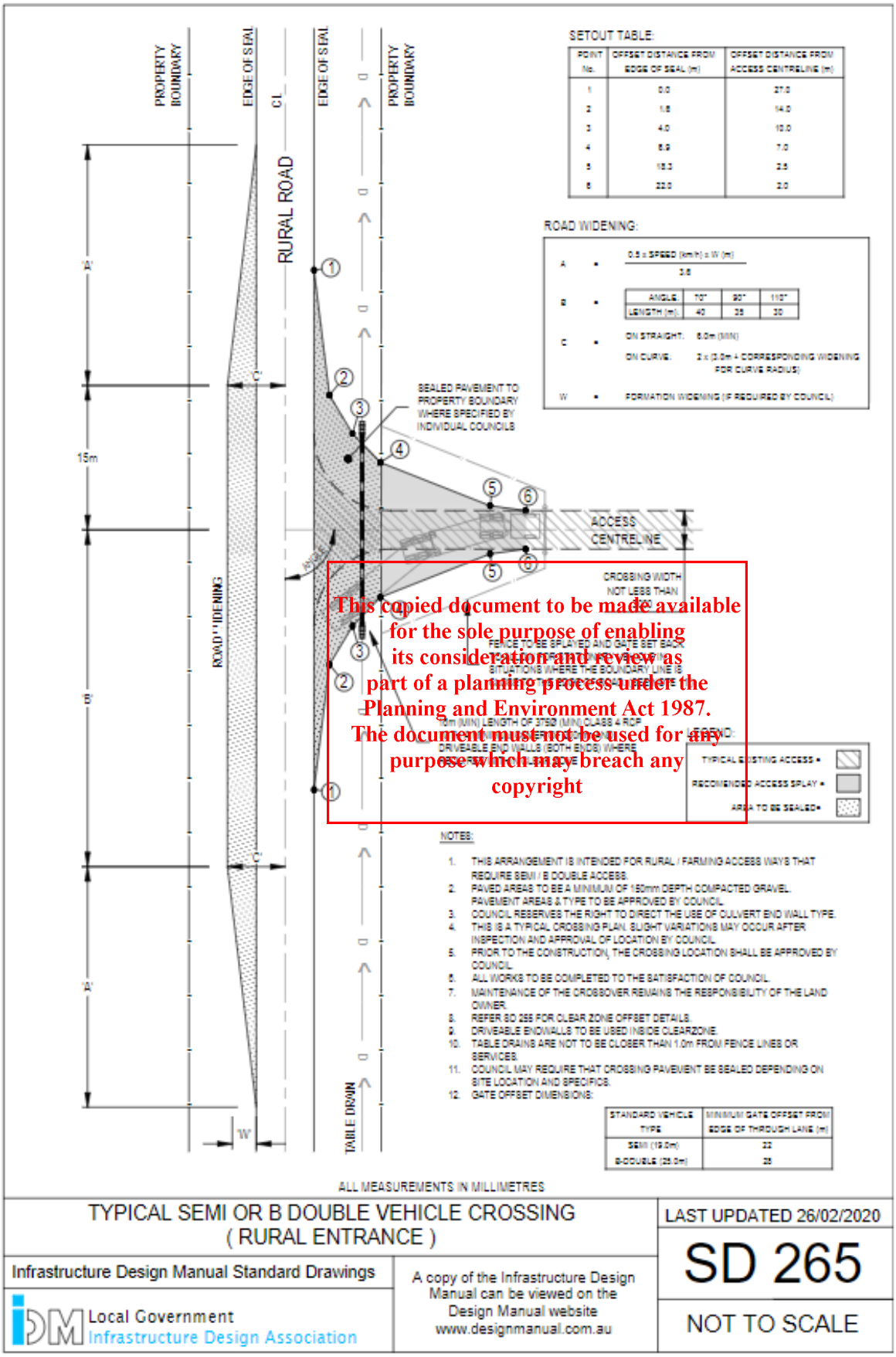


Figure 17: SD 265 from the IDM

Appendix 3 – Acronyms and terms

Acronyms / terms	Definition
AGRD4	Austroads Guide to Road Design Part 4 – Intersections and crossings
AGRD4A	Austroads Guide to Road Design Part 4A – Unsignalised and signalised intersections
AGTM6	Austroads Guide to Traffic Management Part 6 – Intersections, interchanges and crossings management
AGTM8	Austroads Guide to Traffic Management Part 8 – Local street management
AS/NZS2890.1	Australian Standard / New Zealand Standard 2890.1 Parking facilities Part 1: Off-street car parking
DoT	Department of Transport (formerly VicRoads)
ESD	Entering sight distance
IDM	Infrastructure Design Manual
PSP	Precinct structure plan
SIDRA	SIDRA intersection – micro analytical traffic engineering software to model the performance of intersections
SISD	Safe intersection sight distance
TIA	traffic impact assessment
vpd	vehicles per day
vph	vehicles per hour
VPA	Victorian Planning Authority