Proposed Solar Energy Facility

Cobden South - Ecklin Road

Cobden

Traffic Impact Assessment Report

Client:

Bison Energy Australia Pty Ltd

Project No. 200125

Final Report Rev 1– 16/08/2021

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EXECUTIVE SUMMARY

Trafficworks has been engaged by Habitat Planning Pty Ltd, on behalf of Bison Energy Australia Pty Ltd, to undertake a Traffic Impact Assessment (TIA) for a proposed solar (renewable) energy facility (solar farm), approximately 3 km west of Cobden Township.

The proposed development involves constructing a 5 megawatt solar farm comprising a series of photovoltaic arrays, an internal substation and inverter on approximately 12.2 ha of currently cropping and grazing land at the property known as 181 Cobden-Terang Road (Lot 1 of TP601664).

Based on the information provided, it is understood that the peak traffic generation from the development will occur during the nine-month construction period. Therefore, this TIA's primary focus is to determine the traffic impacts of the construction phase of the development.

The assessment has concluded that the proposed development would not adversely affect traffic conditions on the adjacent road network if the recommendations in this report are implemented.

A summary for the site, the proposed development and the recommendations resulting from this assessment are shown in Table 1 below.

Table 1: Development Proposals and Recommended Actions

Address	181 Cobden-Terang Road, Cobden (Lot 1 of TP 601664)
Existing Zoning	Farming Zone (FZ)
Proposed Development	Solar energy facility (solar farm)
Road Network	Cobden-Terang Road (C156) • Default 100km/h rural speed limit • carries approximately 680 vehicles per day (with 12.2% CVs) Cobden South - Ecklin Road • Default 100km/h rural speed limit • carries estimated 230 vehicles per day
Recommendations	1: that the proposed emergency access points onto Cobden-Terang Road along the northern boundary should be locked with access provided only for emergency services 2: that detailed design of the new principal driveway into the site includes the IDM requirements as set out in IDM standard drawing SD 265.

Reference documents

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

- *Corangamite Shire Council Planning Scheme*
- Local Government Infrastructure Design Association's *Infrastructure Design Manual (IDM),* Version 5.20 released March 2019
- *RTA Guide to Traffic Generating Developments – Version 2.2A 2002*
- Austroads *Guide to Road Design Part 4: Intersections and Crossings: General*

- Austroads *Guide to Road Design, Part 4A – Unsignalised and Signalised Intersections* (referenced as AGRD4A in this report)
- Department of Environment, Land, Water and Planning *Solar Energy Facilities Design and Development Guidelines*, August 2019.

This assessment is based on the Overall Site Layout plan (S4/DA1 dated April 2021) prepared by Habitat Planning and reproduced in Attachment A to this report.

TABLE OF CONTENTS

1. INTRODUCTION

Trafficworks has been engaged by Habitat Planning, on behalf of Bison Energy Australia Pty Ltd, to undertake a Traffic Impact Assessment (TIA) for a proposed solar farm at the property known as 181 Cobden-Terang Road (Lot 1 of TP601664), Cobden.

The subject site is within a property abutting the southeast side of the Cobden-Terang Road. However, it is proposed that access to the site for construction and future ongoing maintenance of the facility will be from Cobden South-Ecklin Road that forms the south-eastern boundary of the solar farm site.

Based on the information provided it is understood that the peak traffic generation from the development is likely to occur during the nine-month construction period. Therefore, this TIA has been carried out primarily focussing on the impacts of the construction phase of the development.

The TIA has been undertaken to:

- estimate the traffic generation and distribution to / from the proposed development
- determine the suitability of the preferred access location
- determine the likely traffic impacts on the existing road network
- identify any necessary mitigation works.

Subsequent to the preparation of the TIA report dated 24/08/2020, the client has advised that the scope of the proposed development has changed to include the following modification:

- the entire lot area is now being utilised rather than just a portion of the site, because more space is needed to achieve the required energy generation
- the power conversion unit and batteries have been relocated to the centre of the site, away from site boundaries
- the main entry has been relocated to the southern property corner. This will be the construction and operational access point
- it is also proposed to allow for secondary emergency access/egress via two existing gates in the northern boundary (directly accessing Cobden-Terang Road).

This Revision 1 of the TIA reassesses the proposal in the context of the above changes od scope.

2. EXISTING CONDITIONS

2.1 Subject site

The subject site at 181 Cobden-Terang Road, and all adjacent land, is located within a Farming Zone (FZ1) under the Corangamite Shire Council (the Council) Planning Scheme. The site is within a property abutting the south side of the Cobden-Terang Road that is in a Road Zone Category 1 (RDZ1).

The subject property comprises two parcels, one either side of the Cobden South - Ecklin Road. The solar farm is to be sited on the parcel to the northwest of Cobden South - Ecklin Road, (Lot 1 of TP601664), which comprises vacant pasture used for cropping and grazing. It is intended to upgrade the existing primary access from this site to Cobden South - Ecklin Road at the southern limit of its southeast site frontage for all construction and future maintenance.

The location of the site and its surrounding road network is shown in Figure 1.

Figure 1 – Locality plan (Source Nearmap under licence to Trafficworks)

2.2 Road network

Cobden-Terang Road

The Cobden-Terang Road is a state arterial road (C156) managed by Regional Roads Victoria (RRV)[1]. It is generally aligned in a southeast-northwest direction and provides a connection between Cobden to the east and the Princes Highway at Terang to the northwest.

Near the subject site, the Cobden-Terang Road is configured as a two-way, two-lane road with a 6.5 m wide sealed pavement (2 x 3.25 m traffic lanes) and bounded by 1.2 m wide sealed shoulders (see Photo 1). Adjacent to the subject land and for approximately 1 km to the northwest

[1] RRV (formerly VicRoads) is part of the Department of Transport (DoT)

it follows a winding curvilinear alignment, paralleling a water course / depression. Safe and convenient access along this site boundary is not considered feasible.

The road is subject to the rural default 100 km/h speed limit.

Photo 1: View to the east at the subject property to the right. Curvilinear alignment and roadside vegetation inhibit suitable access to this section of road

Cobden South - Ecklin Road

Cobden South - Ecklin Road along the south-eastern boundary of the subject site is a rural collector road managed by the Council. It is configured as a 6.5 m wide sealed pavement (2 x 3.25 m traffic lanes), bounded by 1.0 – 1.5 m wide unsealed shoulders. It is located asymmetrically in a 60 m road reservation with the road centre line located 10 m from the northwest reserve boundary. The remainder of the road reservation is thickly vegetated (refer Photos 2 & 3).

This road is also subject to the rural default 100 km/h speed limit.

Photo 2 – View to the east along Cobden South - Ecklin Road with the subject property to the left

Photo 3 – View to the west along Cobden South - Ecklin Road with the subject property to the right

2.3 Traffic volumes

Cobden-Terang Road

The *Department of Transport (DoT) Open Data Portal* details traffic volumes for many of the arterial roads in Victoria. Scrutiny of these records indicates that the estimate of 2020 traffic volumes along the Cobden-Terang Road are 680 vehicles per day (vpd), with a heavy vehicle content of around 13% of the daily traffic volumes. The traffic growth along this section of the Cobden-Terang Road, as shown in the DoT data, is 2% per annum compound.

Traffic splits were 332 vpd southeast bound and 348 vpd northwest bound. Assuming peak hour traffic volumes are 10% of the average daily traffic volumes, current-day one-way peaks would be in the order of 33 - 35 vph.

Cobden South - Ecklin Road

Traffic counts data for Cobden South - Ecklin Road obtained from the Council indicate total traffic of 166 vpd in 2004 (including 13% heavy vehicles). Adopting a compound growth rate of 2% per annum, this would indicate current day traffic volumes in the order of 230 vpd, or 115 vpd in each direction, with in one-way peak volumes of around 12 vph.

2.4 Crash history

The *DoT Open Data Portal* details all injury crashes on roads throughout Victoria that have been reported to Police. Scrutiny of these records indicates that there have been no casualty crashes on either Cobden-Terang Road or Cobden South - Ecklin Road in the vicinity of the site during the most recent five-year period.

It can be concluded that the road network surrounding the subject site operates relatively safely and requires no urgent remedial safety works.

3 PROPOSED DEVELOPMENT

3.1 Development summary

The proposed development involves constructing a solar farm with photovoltaic arrays, internal substation and inverter, covering the 12.2-hectare area, accessed via the current driveway, to be upgraded, onto Cobden South - Ecklin Road at the southern corner of the property approximately 700 m southwest of the Cobden-Terang Road intersection (see Photo 4 below and location on the proposed overall site layout plan in Figure A1 of Attachment A).

During the operational phase, the proposed facility is expected to generate one visit (or two vehicle movements) per day for maintenance and monitoring purposes. Ongoing access to the facility is to be via the current upgraded driveway.

Photo 4 - Looking northwest from Cobden South - Ecklin Road at the proposed access to the development site.

It is proposed to provide two additional emergency access points onto Cobden-Terang Road along the northern boundary of the site. As noted in Section 2.2, due to the curvilinear alignment of this road and roadside vegetation, safe and convenient access along this site boundary is not considered feasible. As such, these emergency accesses should not be used during construction or normal operation and should be locked with access provided only for emergency services.

Recommendation 1: that the proposed emergency access points onto Cobden-Terang Road along the northern boundary should be locked with access provided only for emergency services.

It is intended for the southern access 700 m from the Cobden-Terang Road intersection to function as the primary access to the site, both during construction and for long term maintenance. Sight lines from this access to the northeast and southwest are unobstructed and satisfy SISD requirements (see Photos 5 & 6).

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

Photo 5 - Looking southwest from the access 700 m from Cobden-Terang Road (image courtesy of Google streetview via Nearmap under licence to Trafficworks)

Photo 6 - Looking northeast from the access 700 m from Cobden-Terang Road (image courtesy of Google streetview via Nearmap under licence to Trafficworks)

3.2 Construction traffic generation

Typically, the traffic generation for new developments are estimated using generic traffic generation rates provided in the *RTA Guide to Traffic Generating Developments – Version 2.2A 2002*. However, traffic generation rates for this type of facility are not covered in the RTA Guide.

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 rates using information provided by the client

On-site construction for the proposed solar farm 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. Predominantly, equipment and materials will be transported to the site in containers on rigid trucks. Delivery of some of the heavier components (e.g. the power station and inverter) could be by semi-trailer or B-Double and design of the site access will need to cater for these vehicles.

The total construction period is estimated to extend over nine months as follows:

- Months 1 to 4 will involve preparation of the site for component delivery and generate up to 4 light vehicle entries and 1 heavy vehicle entry per day
- Months 5 and 6 represent the peak construction phase that is to generate 4 light vehicle and 4 heavy vehicle movements per day
- Months 7 to 9 will involve completion of construction and commissioning that will again only involve up to 4 light vehicle entries and 1 heavy vehicle entry per day.

3.3 Traffic distribution

Based on advice provided by the client, tradesmen working on the site are likely to be accommodated in nearby townships, most likely Cobden or Camperdown but potentially also Terang, being bused to the site each day. This is assumed to involve one or two minibuses approaching and departing to/from the northeast, arriving in the morning and departing in the evening.

It has been assumed that 100% of the heavy vehicle traffic, during the peak construction phase, will access the site from the northeast, as being the most direct route for the delivery of components from Melbourne. These trips are expected to be spread throughout the day, with one arrival during the morning peak hour.

It is unlikely that there will be any left turns from Cobden South - Ecklin Road into the site from the southwest.

3.4 Traffic volumes

It is understood that the proposed solar farm will be built during 2021/22. From Section 2.3, the estimated traffic volumes on Cobden South - Ecklin Road are 230 vpd, translating into 12 vph in the peak periods in each direction.

Turning construction traffic from Cobden South - Ecklin Road into the site during the peak construction phase at the start of the work day (critical for determining the impact on through traffic) is estimated to be:

- right turns from the northeast: 4 vph (2 cars + 2 minibuses) + 1 vph (heavy)
- left turns from the southwest: Nil.

On the assumptions noted in Section 3.3, turning traffic from Cobden-Terang Road into Cobden South - Ecklin Road is expected to comprise up to two right turns (1 car + 1 minibus) from the

northwest and three left turns (1 car + 1 minibus + 1 truck) from the east during the morning peak hour.

Conclusion 1: peak traffic generation by the development is likely to occur during months 5 and 6 of the construction phase of the development and involve:

- five right turn entry movements (2 cars + 2 minibuses + 1 truck) during the morning peak
- no left turn entries during the morning peak.

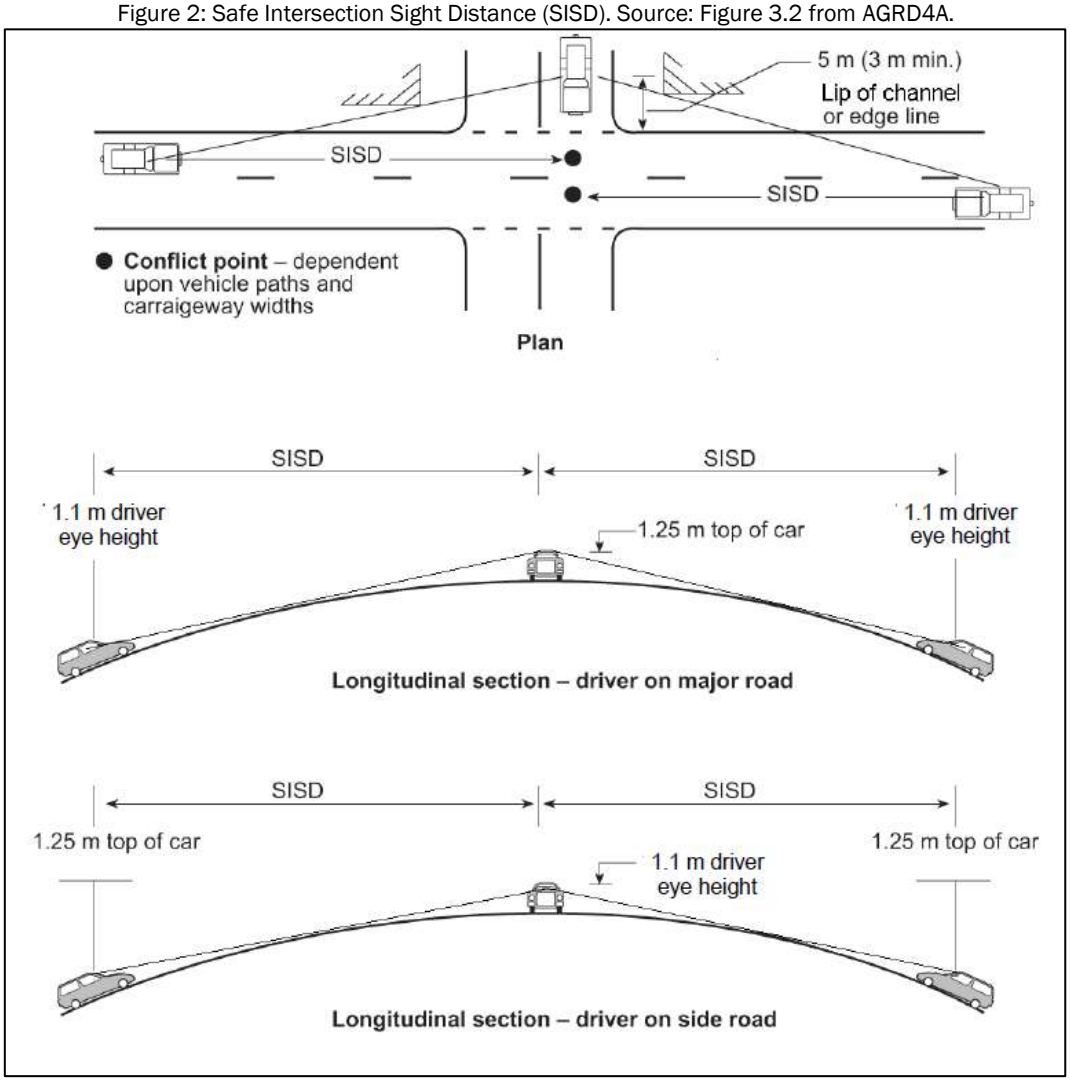
4 ASSESSMENT

The impacts of the development on the adjacent road network are primarily related to the need to provide adequate visibility at the access points for safe ingress/egress and to accommodate low speed turning manoeuvres by vehicles accessing the development. These impacts are quantified below, with appropriate mitigating works being considered.

4.1 Sight distance

The visibility criterion normally required by DoT for safe access to the arterial road network is Safe Intersection Sight Distance (SISD). This is nominated in the AGRD4A as the minimum distance which should be provided on the road at a minor intersection or significant traffic generating development (refer to Section 3.2.2 in AGRD4A) and provides sufficient distance for a driver of a vehicle on the major road to observe a vehicle from the minor access approach moving into a collision situation (e.g. in the worst case, stalling across the traffic lanes) and to decelerate to a stop before reaching the collision point (refer Figure 2).

Figure 2: Safe Intersection Sight Distance (SISD). Source: Figure 3.2 from AGRD4A.



The minimum SISD criterion specified in Table 3.2 of AGRD4A requires clear visibility for a desirable minimum distance of 248 m for a design speed of 100 km/h adopting a general reaction time R_T of 2 seconds and from a driver's position at 5.0 m (3.0 m min) from the edge of traffic lane. No grade corrections are necessary on the essentially flat alignment of Cobden South - Ecklin Road.

The above SISD requirements along Cobden South - Ecklin Road from the position of a driver departing the site at the primary driveway are satisfied, with unobstructed visibility in excess 300 m available to the northeast and to the southwest (refer photos 5 & 6).

Conclusion 2: Austroads SISD requirements are satisfied in both directions along Cobden South - Ecklin Road from the principal driveway location.

There are no sight line impediments at the intersection of Cobden South - Ecklin Road with Cobden-Terang Road, which is located on the outside of a curve in Cobden-Terang Road.

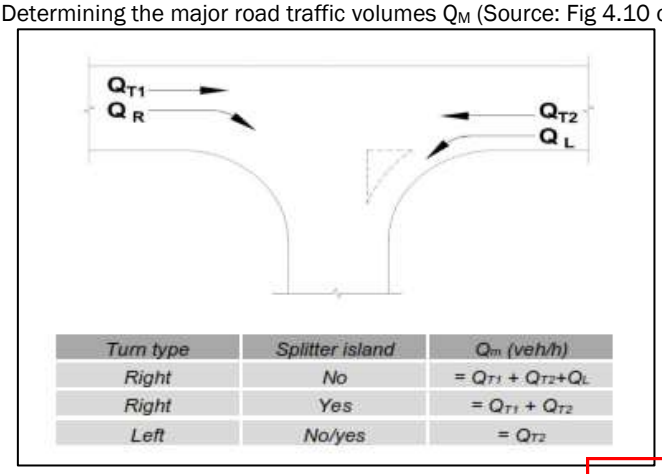
4.2 Turn provisions

Separate turn lanes are normally provided to avoid congestion and/or delays to through traffic and to improve safety for traffic movements at intersections and at significant access points, such as the driveway to the proposed development. The type of turn treatment is determined, based on the speed environment and the combination of through and turning traffic volumes. Figure 2.26(a) of AGTM6 (reproduced in Figure 4) is used for the selection of treatment types at locations with a design speed of 100 km/h or more.

From Section 3.5 of this report, current one-way traffic on Cobden South - Ecklin Road is estimated at 12 vph in each direction during the daily peak hours.

Superimposed over these peak traffic flows are the additional traffic movements generated by the development construction traffic. These are estimated to represent five right turn entry movements from the northeast and no left turns from the southwest during the AM peak. In accordance with Figure 4.10 from AGRD4*A* (reproduced in Figure 3), these volumes have been used in Table 2 to derive the Q_L and Q_R values and the major road traffic parameters Q_M that reflect the worst-case conditions at the start of the day's construction.

Figure 3 - Determining the major road traffic volumes Q_M (Source: Fig 4.10 of AGRD4A)

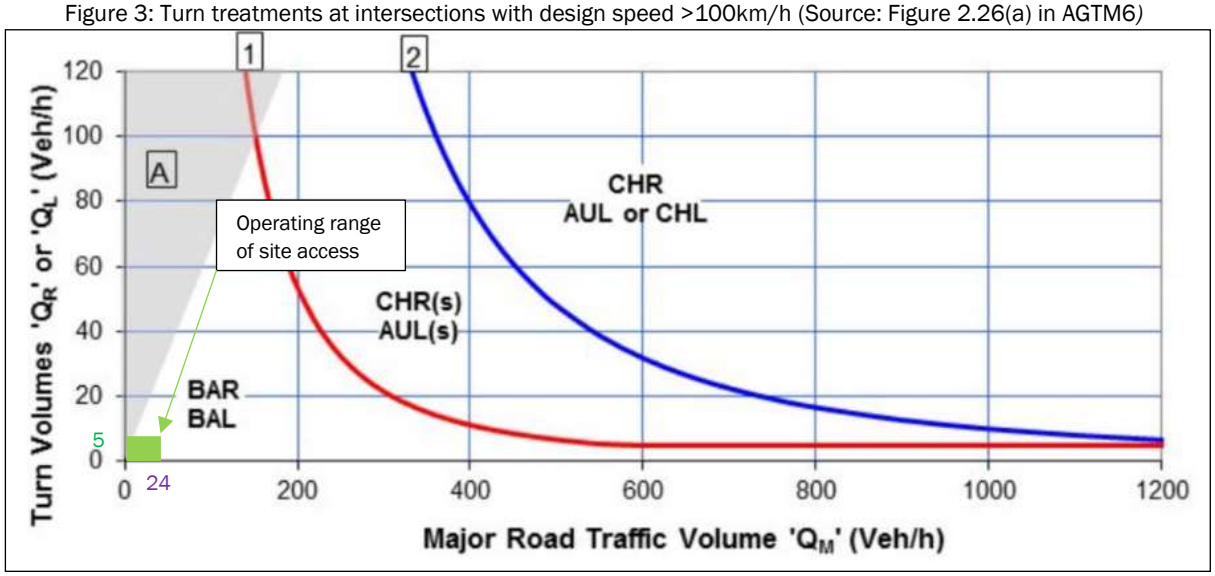


Turn type	Splitter island	Q_m (veh/h)
Right	No	$= Q_{T1} + Q_{T2} + Q_L$
Right	Yes	$= Q_{T1} + Q_{T2}$
Left	No/yes	$= Q_{T2}$

Table 2 - Warrants for turn treatments at the Cobden-Terang Road site access – AM in peak construction phase

Major Road	Minor Access	Left Turn	Right Turn	Thru Q_T		Q_M Left Turn	Q_M Right Turn
		Q_L	Q_R	Q_{T1}	Q_{T2}	$Q_M=Q_{T2}$	$Q_M=Q_{T1}+Q_{T2}+Q_L$
Cobden South - Ecklin Road	Site driveway	0	5	12	12	12	24

Figure 3: Turn treatments at intersections with design speed >100km/h (Source: Figure 2.26(a) in AGTM6)



Applying the volumes from Table 2 to Figure 3 indicates that existing traffic plus construction traffic turning into the site access in the AM peak hour during the peak construction period requires the provision of a basic Type BAR right turn treatment in Cobden South - Ecklin Road. With no turns from the southwest, no specific treatment is envisaged for left turns. The basic right turn requirements are expected to be satisfied as part of the upgrading of the current driveway (refer to Section 4.3).

Conclusion 3: that construction traffic accessing the development will require only basic right turn provision in Cobden South - Ecklin Road at the principal driveway into the site.

No additional treatment is required at the intersection of Cobden South - Ecklin Road and Cobden-Terang Road.

4.3 Access driveway

The Infrastructure Design Manual (IDM) used by most rural municipalities in Victoria, provides a typical B Double Vehicle Crossing (Rural Entrance) layout in its Standard Drawing SD 265 (reproduced in Attachment B). This layout has been adopted as it is likely that some of the component deliveries will be undertaken by B-Doubles. SD 265 sets out the minimum standard that is expected to apply to the driveway connection to the Cobden South - Ecklin Road, which will include the following design features (refer SD 265):

- minimum 3.0 m wide driveway with bell-mouth set out as per the table in the drawing
- minimum 375 mm diameter culvert located at least 600 mm clear of the edge of road formation and provided with drivable endwalls

- set-back for the gate within the driveway of 25 m from the edge of traffic lane to store an entering B-Double clear of traffic should the gate be closed
- road widening opposite the entrance to comprise:
  - total southbound pavement width C = 6.0 m, hence widening W = 2.75 m (C – current lane width of 3.25 m)
  - road widening length B = 35 m before and 15 m past the driveway centreline
  - taper lengths A = 40 m (from 0.5VW/3.6 where V = 100 km/h, W = 2.75, and rounded).

The above design aspects will need to be incorporated into the detailed design of the principal driveway connection to Cobden South - Ecklin Road.

Recommendation 2: that detailed design of the new principal driveway into the site includes the IDM requirements as set out in standard drawing SD 265.

As noted earlier, after completion of construction, there is expected to be a need for up to one light vehicle to attend the site on a daily basis for ongoing monitoring and maintenance purposes. This level of additional traffic requires no further work at this property driveway.

Conclusion 4: post-construction traffic to the facility requires no additional work to be undertaken on the access network.

4.4 Parking

Statutory car parking requirements for new and existing developments is outlined in Clause 52.06 of the Council Planning Scheme. However, the parking requirement for this type of use is not included in Table 1 to Clause 52.06. Therefore, the car parking demand for the proposed development was estimated empirically.

As discussed in Section 3.2 of this report, during the construction phase of the development, up to 2 light vehicles and 2 minibuses are likely to access the site daily. Assuming all vehicles will be at the site at the same time, the subject site is likely to have a car parking demand of at least 4 spaces during construction. The car parking demand for the site post construction is one space.

The proposed development plan indicates ample room for on-site car parking within the site that is expected to accommodate the anticipated number of vehicles.

There is not considered to be a requirement for bicycle parking at this remote location.

Conclusion 5: that the development plan provides adequate car parking to accommodate the anticipated demand for four vehicles during construction.

5 CONCLUSIONS

The traffic assessment undertaken for the proposed solar farm at 181 Cobden-Terang Road, Cobden South, has made the following conclusions:

- **Conclusion 1:** peak traffic generation by the development is likely to occur during months 5 and 6 of the construction phase of the development and involve:
    - five right turn entry movements (2 cars + 2 minibuses + 1 truck) during the morning peak
    - no left turn entries during the morning peak
- **Conclusion 2:** Austroads SISD requirements are satisfied in both directions along Cobden South - Ecklin Road from the proposed principal driveway location.

  There are no sight line impediments at the intersection of Cobden South - Ecklin Road with Cobden-Terang Road, which is located on the outside of a curve in Cobden-Terang Road
- **Conclusion 3:** construction traffic accessing the development will require only basic right and left turn provision in Cobden South - Ecklin Road at the principal driveway into the site.

  No additional treatment is required at the intersection of Cobden South - Ecklin Road and Cobden-Terang Road
- **Conclusion 4:** post-construction traffic to the facility requires no additional work to be undertaken on the access network
- **Conclusion 5:** the development plan provides adequate car parking to accommodate the anticipated demand for four vehicles during construction.

The key recommendation in the assessment is as follows.

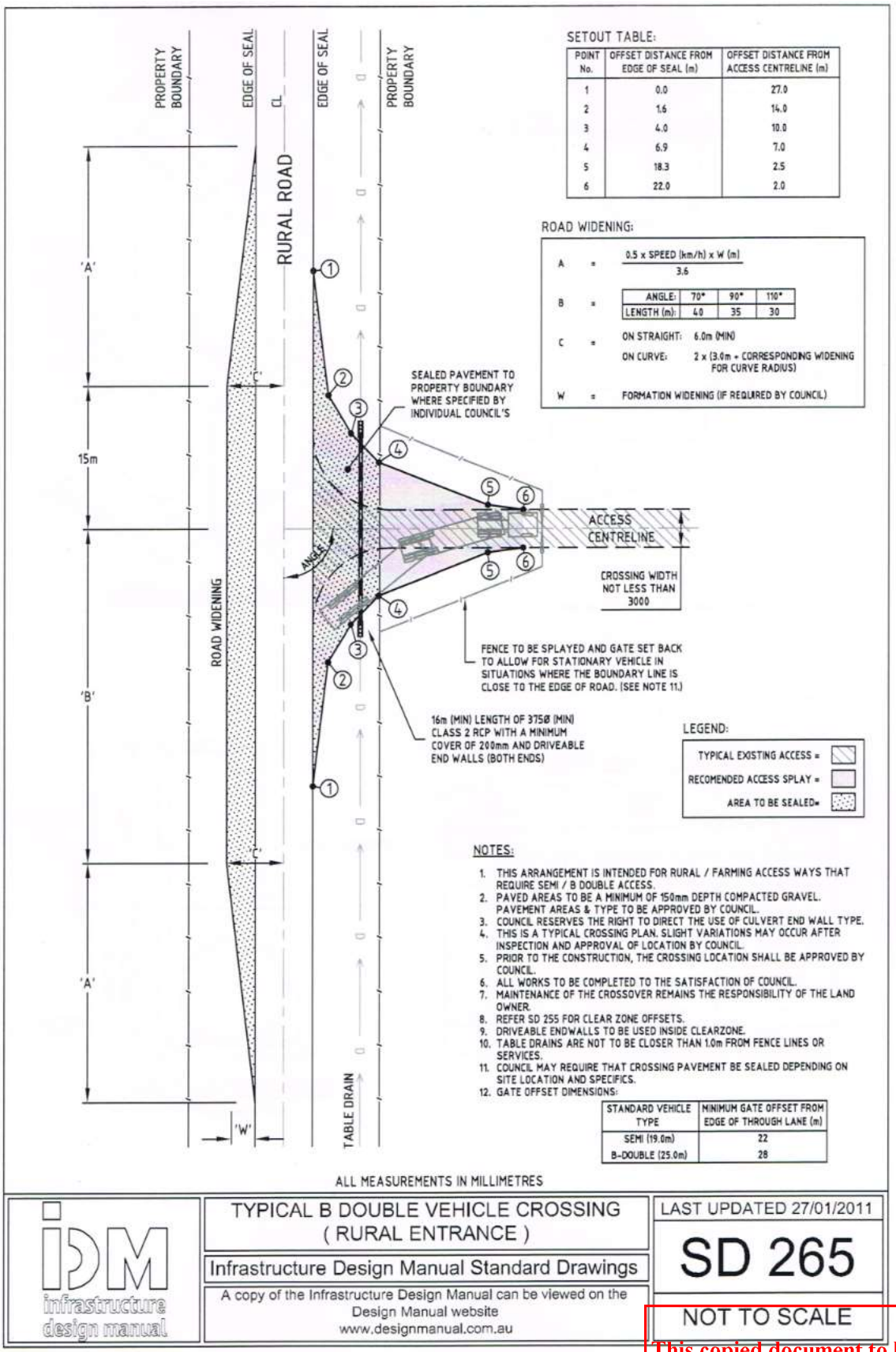
- **Recommendation 1:** that the proposed emergency access points onto Cobden-Terang Road along the northern boundary should be locked with access provided only for emergency services
- **Recommendation: 2** that detailed design of the principal driveway into the site includes the IDM requirements as set out in standard drawing SD 265.

The proposed development would not adversely impact on the safety or operation of the surrounding road network, provided the recommended mitigations actions are implemented.

ATTACHMENT A – OVERALL SITE LAYOUT PLAN

Figure A1 – Site Layout plan

ATTACHMENT B – IDM STANDARD DRAWING SD 265



SETOUT TABLE:

POINT No.	OFFSET DISTANCE FROM EDGE OF SEAL (m)	OFFSET DISTANCE FROM ACCESS CENTRELINE (m)
1	0.0	27.0
2	1.6	14.0
3	4.0	10.0
4	6.9	7.0
5	18.3	2.5
6	22.0	2.0

ROAD WIDENING:

A = $\frac{0.5 \times \text{SPEED (km/h)} \times W\text{ (m)}}{3.6}$

B =

ANGLE:	70°	90°	110°
LENGTH (m):	40	35	30

C = ON STRAIGHT: 6.0m (MIN)
ON CURVE: 2 x (3.0m + CORRESPONDING WIDENING FOR CURVE RADIUS)

W = FORMATION WIDENING (IF REQUIRED BY COUNCIL)

LEGEND:
TYPICAL EXISTING ACCESS =
RECOMENDED ACCESS SPLAY =
AREA TO BE SEALED=

NOTES:

1. THIS ARRANGEMENT IS INTENDED FOR RURAL / FARMING ACCESS WAYS THAT REQUIRE SEMI / B DOUBLE ACCESS.
2. PAVED AREAS TO BE A MINIMUM OF 150mm DEPTH COMPACTED GRAVEL. PAVEMENT AREAS & TYPE TO BE APPROVED BY COUNCIL.
3. COUNCIL RESERVES THE RIGHT TO DIRECT THE USE OF CULVERT END WALL TYPE.
4. THIS IS A TYPICAL CROSSING PLAN. SLIGHT VARIATIONS MAY OCCUR AFTER INSPECTION AND APPROVAL OF LOCATION BY COUNCIL.
5. PRIOR TO THE CONSTRUCTION, THE CROSSING LOCATION SHALL BE APPROVED BY COUNCIL.
6. ALL WORKS TO BE COMPLETED TO THE SATISFACTION OF COUNCIL.
7. MAINTENANCE OF THE CROSSOVER REMAINS THE RESPONSIBILITY OF THE LAND OWNER.
8. REFER SD 255 FOR CLEAR ZONE OFFSETS.
9. DRIVEABLE ENDWALLS TO BE USED INSIDE CLEARZONE.
10. TABLE DRAINS ARE NOT TO BE CLOSER THAN 1.0m FROM FENCE LINES OR SERVICES.
11. COUNCIL MAY REQUIRE THAT CROSSING PAVEMENT BE SEALED DEPENDING ON SITE LOCATION AND SPECIFICS.
12. GATE OFFSET DIMENSIONS:

STANDARD VEHICLE TYPE	MINIMUM GATE OFFSET FROM EDGE OF THROUGH LANE (m)
SEMI (19.0m)	22
B-DOUBLE (25.0m)	28

ALL MEASUREMENTS IN MILLIMETRES

IDM infrastructure design manual

TYPICAL B DOUBLE VEHICLE CROSSING (RURAL ENTRANCE)

Infrastructure Design Manual Standard Drawings

A copy of the Infrastructure Design Manual can be viewed on the Design Manual website www.designmanual.com.au

LAST UPDATED 27/01/2011

SD 265

NOT TO SCALE

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