

Traffic Impact Assessment Report

9438 Mitchell Highway, Cathundral, NSW

Project Number 230729

Final Report 4/06/2024

Client Green Gold Energy Pty Ltd

Document control record

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Executive summary

Green Gold Energy Pty Ltd engaged Trafficworks to undertake a traffic impact assessment (TIA) for the proposed solar energy facility development at **9438 Mitchell Highway, Cathundral, NSW**.

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

Address	9438 Mitchell Highway, Cathundral, NSW
Zoning	RU1: Primary Production
Proposed development	Solar Energy Facility
Road network	Mitchell Highway (A32)
Traffic generation	Daily and peak hour traffic volumes of: — 50 vehicles per day (vpd) — 21 vehicles per hour (vph)
Car parking	20 car parking spaces
Conclusion	We conclude that subject to the implementation of our recommendations, there are no traffic engineering reasons that would prevent the development from proceeding: — the peak traffic generation will occur during the construction phase of the development, where 20 light vehicles (generating 40 trips per day) and 5 heavy vehicles (generating 10 trips per day) will access the subject site — the car parking demand during the development's construction phase will likely be 20 spaces — the proposed development plan indicates a formal on-site car parking provision — roadside vegetation within the Mitchell Highway road reserve may restrict the sight distance requirements at the site access — the setback of the security fencing for the subject site will provide the minimum 20 m required to allow storage of a 19 m semi-trailer clear of the traffic lane on Mitchell Highway

-
- the intersection of Mitchell Highway and the subject site access meets the warrant for a type BAR turn lane. However, no additional work is required at the intersection of Mitchell Highway and the subject site access to accommodate the development traffic, given that the construction phase generates peak traffic and is for a limited period.
-

Recommendations

It is recommended that:

- **Recommendation 1:** before the commencement of works, inspect the subject site access and trim/remove any roadside vegetation that restricts compliance with the applicable sight distance requirement of 190 m
 - **Recommendation 2:** the subject site access driveway should be constructed according to Figure 7.4 in Austroads Guide to Road Design Part 4 requirements and to the council's satisfaction
 - **Recommendation 3:** truck warning signs should be displayed near the subject site access during the construction phase when heavy vehicles are making deliveries to the site.
-

Referenced documents

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

- Austroads Guide to Road Design
 - Part 4A – Unsignalised and Signalised Intersections, for sight distance criteria and provision for turning vehicles at intersections (AGRD4)
- Austroads Guide to Traffic Management
 - Part 6 – Intersections, Interchanges and Crossings Management, for sight distance criteria and provision for turning vehicles at intersections (AGTM6)
- Australian Standards:
 - AS 2890.1-2004 Parking facilities - Off-street car parking
 - AS 2890.2-2018 Parking facilities - Off-street commercial vehicle facilities
- RTA Guide to Traffic Generating Developments, Version 2.2, October 2002
- Warren Shire Council
 - Development Control Plan (DCP) 2013
 - Local Environmental Plan (LEP) 2012

Table of Contents

1	Introduction	1
2	Existing conditions	2
2.1	Subject site	2
2.2	Road network	5
2.2.1	Mitchell Highway (A32)	5
2.3	Traffic volumes	7
2.4	Crash history	7
3	Traffic assessment of the proposed development	8
3.1	Development summary	8
3.1.1	Construction	8
3.1.2	Heavy vehicle access to the subject site	8
3.1.3	Operation / decommissioning	9
3.2	Traffic generation	10
3.2.1	Construction phase traffic volumes	10
3.2.2	Operational phase traffic volumes	10
3.2.3	Peak traffic generation	11
3.3	Traffic distribution assumptions	11
3.4	Anticipated traffic volumes	11
4	Car parking assessment of the proposed development	13
4.1	Planning scheme car parking assessment	13
5	Access to the site	14
5.1	Site access – Access driveway ESD requirement	14
5.2	Access location and operation	15
5.3	Site security	16
5.4	Turn provisions impact	16
5.4.1	Turn lane treatments	17
6	Conclusions and recommendations	19
Appendix 1 – Development Plans		20
Appendix 2 – Acronyms and terms		21

1 Introduction

Green Gold Energy Pty Ltd engaged Trafficworks to undertake a traffic impact assessment (TIA) for the proposed solar energy facility development at **9438 Mitchell Highway, Cathundral, NSW.**

For the details about:

- existing site conditions – see section 2
- description of the proposed development – see section 3
- traffic impact of the proposed development – see section 3
- car parking assessment of the proposed development – see section 4
- assessment of the access to the proposed development – see section 5
- our conclusions and recommendations – see section 6.

2 Existing conditions

2.1 Subject site

The subject site:

- comprises a small area contained within Lot 2 of DP1184528 (in Nevertire), approximately 86 km northeast of Dubbo, NSW
- is surrounded by land currently used for farming and agricultural activities.

The site has vehicular access to Mitchell Highway. The access passes through the following properties:

- 9438 Mitchell Highway, Cathundral
 - Lot 15 of DP755303
- Mitchell Highway, Nevertire
 - Lot 26 of DP820770
 - Lot 28 of DP850160
 - Lot 4 of DP755303
- Nevertire
 - Lot 2 of DP1184528

Figure 1 shows the subject site's location, which is surrounded predominantly by farmland properties, and includes details of the access road.

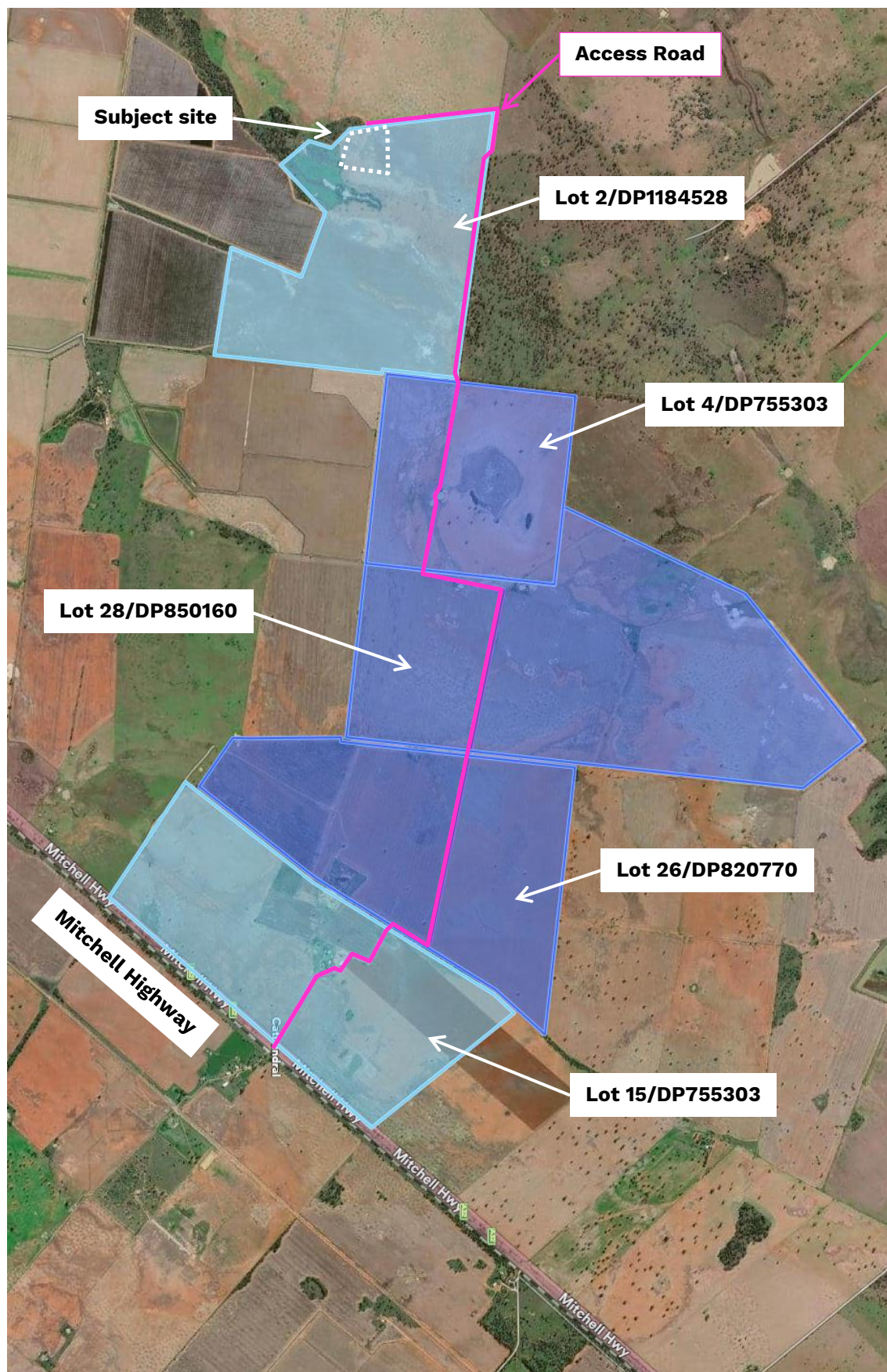


Figure 1: Location plan (reproduced with permission from Nearmap)

The subject site and most of the surrounding land are located within a Primary Production Zone (RU1), as per the Warren Shire Council (Council) Local Environmental Plan 2012 (LEP).

Figure 2 shows the zoning for the subject site and surrounding area.

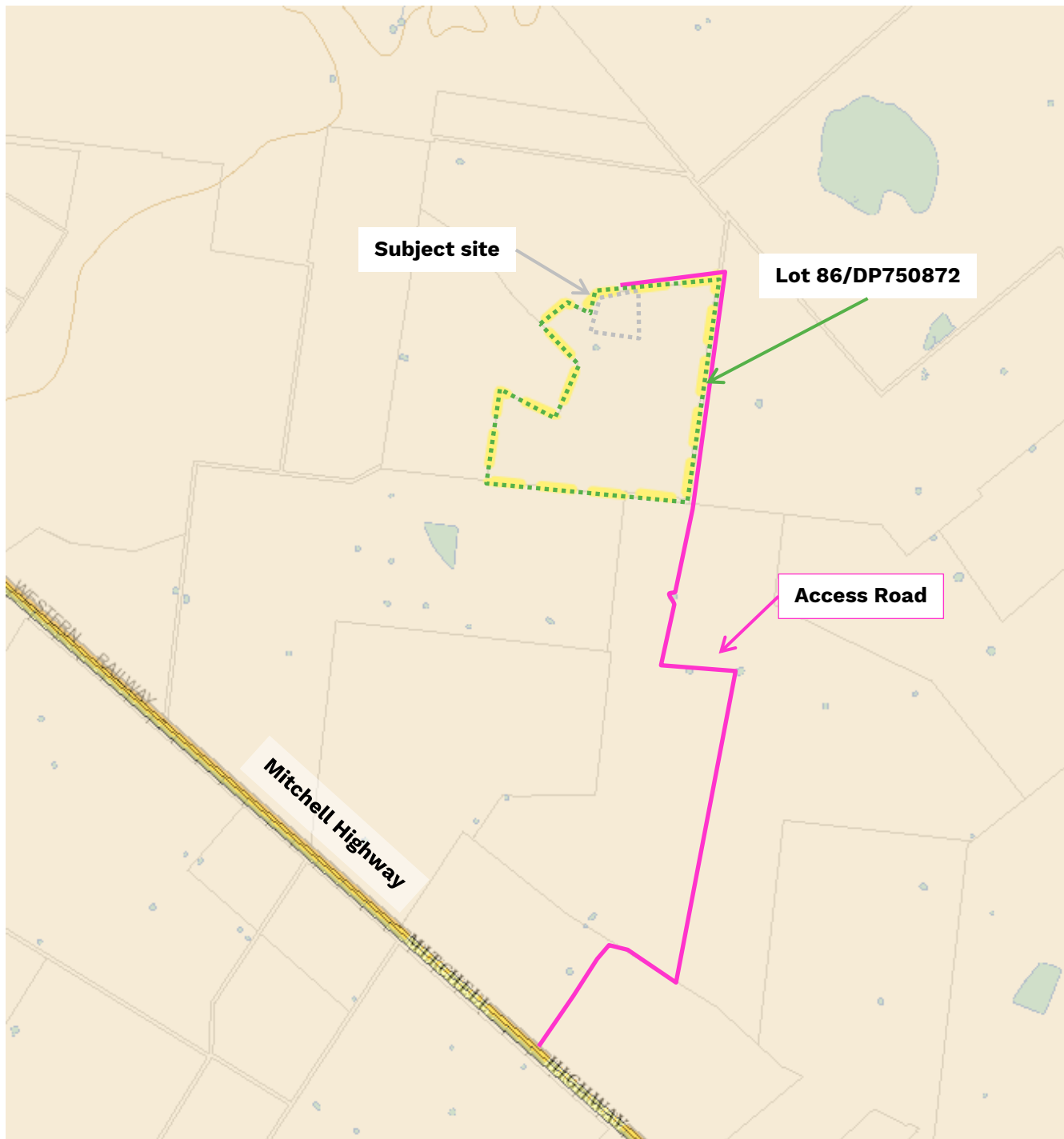


Figure 2: Zoning plan (reproduced from NSW ePlanning Spatial Viewer)

2.2 Road network

2.2.1 Mitchell Highway (A32)

Table 1 describes the features of this road.

Table 1: Mitchell Highway features

Feature	Description
Road type	Classified state arterial road (A32) managed by Transport for New South Wales (TfNSW)
Access	Provides access between the Mid and Great Western Highways at Bathurst, to the southeast, and the Landsborough Highway, near Augathella in Central Queensland.
Carriageway	Two-way, two-lane road with 3.5 m traffic lanes and 1.5 m sealed shoulders on each side
Road reservation	40 m wide
Speed limit	Posted speed limit of 110 km/h

Figure 3 and Figure 4 provides further information about the road.



Figure 3: Mitchell Highway facing northwest adjacent to the subject site access on the right (Source: Google)



Figure 4: Mitchell Highway facing southeast adjacent to the subject site access on the left (Source: Google)

2.3 Traffic volumes

TfNSW Traffic Volume Viewer details traffic volumes for many of the arterial roads in New South Wales. Scrutiny of the records indicates that in 2009, 895 vehicles per day (vpd) travelled along the section of Mitchell Highway located approximately 40 km northwest of the subject site (Station Id: 96052).

The two-way traffic volumes recorded by the station indicate the following:

- a daily traffic volume of 454 vpd northwest bound and 441 vpd southeast bound
- AM commuter peak (9:00 am to 10:00 am) of 36 vehicles per hour (vph) northwest bound and 40 vph southeast bound
- PM commuter peak (3:00 pm to 4:00 pm) of 36 vehicles per hour (vph) northwest and 38 vph southeast bound.

Projecting the traffic volumes to 2024 by adopting a compound growth rate of 1% per annum (an estimate for regional NSW), Mitchell Highway is currently estimated to carry:

- a daily traffic volume of 527 vpd northwest bound and 512 vpd southeast bound (1,039 vpd two-way)
- AM commuter peak (9:00 am to 10:00 am) of 42 vph northwest bound and 46 vph southeast bound (88 vph two-way)
- PM commuter peak (3:00 pm to 4:00 pm) of 42 vehicles per hour (vph) northwest bound and 44 vph southeast bound (86 vph).

2.4 Crash history

TfNSW Centre for Road Safety website details all injury crashes on roads throughout New South Wales and reports that no casualty crashes have occurred on the roads in the vicinity of the subject site in the last five years (2018 – 2022).

Based on this, we conclude that no crash trend requires immediate investigation.

3 Traffic assessment of the proposed development

3.1 Development summary

The proposed development in Cathundral involves constructing a solar energy facility to generate power to connect to the local electricity grid. The facility will provide a reliable power source to the local community. The proposed development plan is provided in Appendix 1.

The proposed facility will be un-staffed, and the period that will generate the most traffic will be the construction phase. Any access to the site once in operation will be for security or maintenance purposes.

The development will have direct access to Mitchell Highway via an existing access.

3.1.1 Construction

On-site construction for the proposed solar energy facility is mainly limited to the assembly and connection of components, with the typical solar panels readily transportable via 12.5 m rigid trucks.

Access to the site by a larger vehicle will only be required to deliver the inverter / transformer / power station (in a 40 ft container), which a 19 m semi-trailer will deliver.

The typical construction schedule for this type of solar energy facility is shown in Table 2.

Table 2: Construction delivery schedule

Time period	Site Works
Month 1	Civil earthworks, fencing and landscaping
Months 2 to 5	Delivery of long lead materials
	PV panel and LV cable installation
Months 5 to 8	HV station installation, testing and commissioning
Month 9	Site clean-up and demobilisation

There is a 9-month construction phase before the full operation of the facility.

3.1.2 Heavy vehicle access to the subject site

The proposed heavy vehicle access route to the site during construction is via the Mitchell Highway.

Figure 5 indicates the recommended route for all heavy vehicles to the subject site.

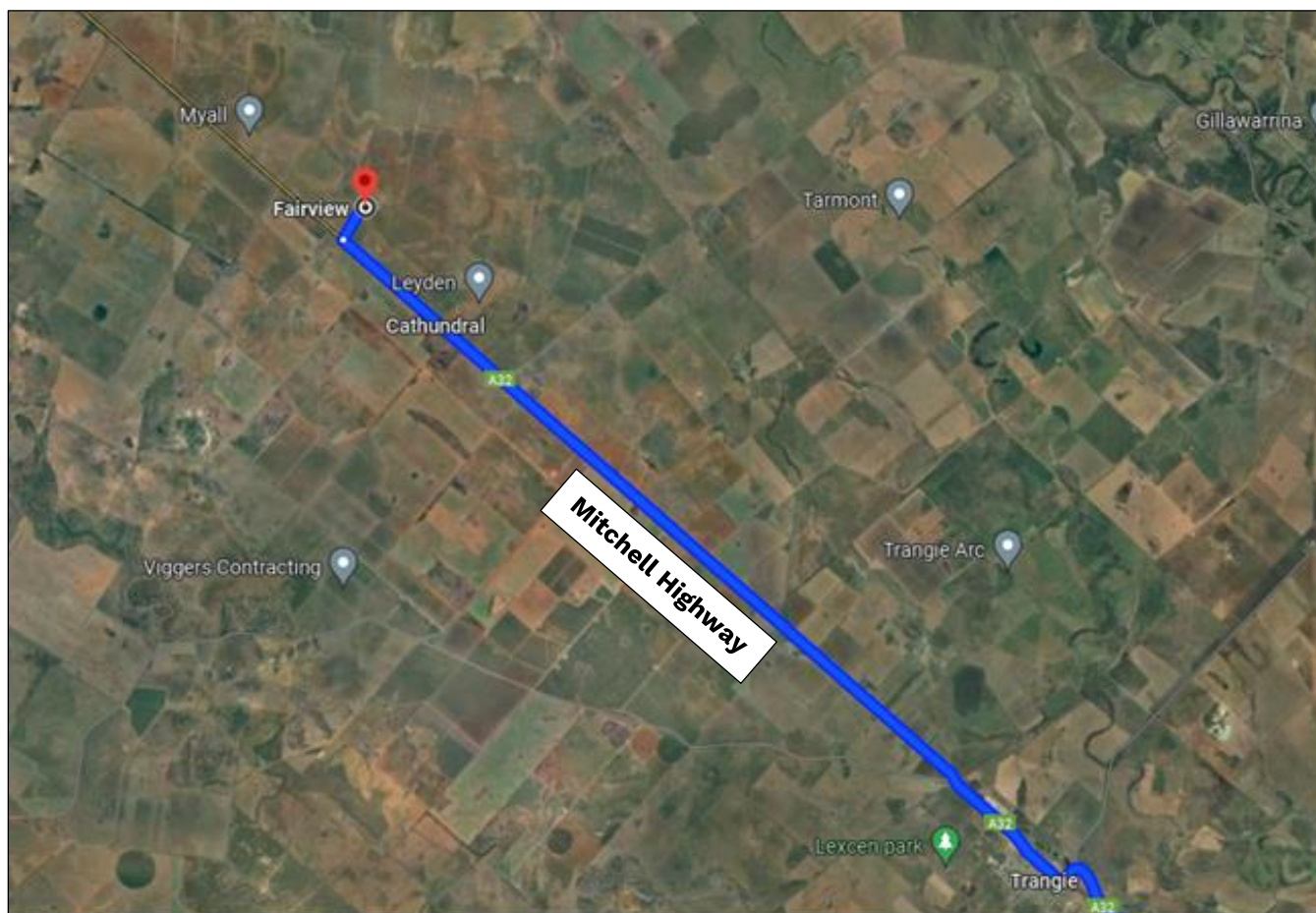


Figure 5: Recommended route to/from the subject site

All heavy vehicle traffic will arrive at the subject site from Sydney (to the southeast) and access it via the designated route.

3.1.3 Operation / decommissioning

Upon completion of the leasing period, if the lease is not renewed, it will be incumbent on the facility's operator to decommission the facility, remove all installations and restore the subject site to its pre-existing state.

Upon approval of this application, the responsible authority may require a decommissioning and rehabilitation plan to be submitted for endorsement.

3.2 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). However, the RTA Guide's traffic generation rates are unavailable for solar energy facilities.

Therefore, an empirical assessment was undertaken to estimate the traffic generation to/from the proposed development. Traffic generation analysis was undertaken for the construction and operational phases of the development to establish peak traffic generation.

3.2.1 Construction phase traffic volumes

Based on the information provided, the peak light vehicle traffic generation will likely occur during the second month of the construction phase.

It is expected that 20 construction staff vehicles will access the subject site per day, resulting in a total daily traffic generation of 40 vpd, including:

- 20 vpd arriving at the start of the shift at approximately 7.00 am
- 20 vpd departing at the end of the shift at approximately 5.00 pm

Assessment of the heavy vehicles accessing the subject site during the construction phase revealed that the peak traffic generation is likely to occur from the start of the second month to the end of the fifth month. During this period, 5 heavy vehicles will access the subject site daily, resulting in 10 vpd (5 vpd arriving and 5 vpd departing).

Assuming the construction work will be undertaken during normal working hours, the 5 vehicles will be expected to access the subject site outside commuter peak hours. The impact of heavy vehicles on the morning and afternoon commuter peaks is considered negligible. However, conservatively, for this assessment, it has been assumed that a single heavy vehicle will arrive / depart the subject site during the AM and PM peak hours.

The heavy vehicles accessing the subject site will be mainly 12.5 m rigid trucks, with occasional 19 m semi-trailers (i.e., no B-double trucks will require access). The trucks will access the subject site via a right turn from Mitchell Highway.

3.2.2 Operational phase traffic volumes

The proposed solar energy facility will have remote monitoring in real-time, allowing for constant surveillance and monitoring without on-site staffing.

The compound will contain key infrastructure that requires a high degree of security. Upon identification of potential issues, action can be taken indirectly from the control centre or directly using chosen contractors to travel to the site. Up to 2 light vehicles will attend the subject site every 6 months during the operational phase for general maintenance.

3.2.3 Peak traffic generation

Assessment of the traffic generation volumes during the construction and operational phases of the development revealed that the peak traffic generation for the subject site would occur during the construction phase. This will see 20 light vehicles (generating 40 trips per day) and 5 heavy vehicles (generating 10 trips per day) access the subject site daily.

Conclusion 1: the peak traffic generation will occur during the construction phase of the development, where 20 light vehicles (generating 40 trips per day) and 5 heavy vehicles (generating 10 trips per day) will access the subject site.

3.3 Traffic distribution assumptions

Our traffic distribution assumptions are the following:

- 100% of light vehicles will arrive to/from the southeast (Dubbo)
- all heavy vehicles will arrive to/from the southeast (Port of Sydney).

3.4 Anticipated traffic volumes

From the information provided in Section 3.2.1, the AM and PM development peaks will occur when staff arrive / depart the subject site, as they generate the most traffic. As a result, the development peaks are expected to occur between:

- 6:00 am – 8:00 am
- 4:00 pm – 6:00 pm

Based on the time periods listed, the development peak will occur outside the commuter peaks (9 – 10 am and 3 – 4 pm).

Table 3 shows the anticipated peak hour traffic volumes at the proposed access to the development.

Table 3: Anticipated peak hour traffic volumes at the proposed access to the development

Period	Type	Left In	Right In	Left Out	Right Out	Total
AM Peak	Light	0	20	0	0	20
	Heavy	0	1	0	0	1
	TOTAL	0	21	0	0	21

PM Peak	Light	0	0	20	0	20
	Heavy	0	0	1	0	1
	TOTAL	0	0	21	0	21

4 Car parking assessment of the proposed development

4.1 Planning scheme car parking assessment

The RTA Guide provides car parking rates for new developments. However, the parking requirement for solar energy storage facilities is currently unavailable. Therefore, an empirical assessment was undertaken to estimate the demand for car parking for the proposed development.

Section 3.2.1 outlined that up to 20 light vehicles will access the subject site during the development's construction phase, generating a demand for 20-space car parking.

The proposed site plan indicates provision for 20 formal on-site car parking spaces.

Conclusion 2: the car parking demand during the development's construction phase will likely be 20 spaces.

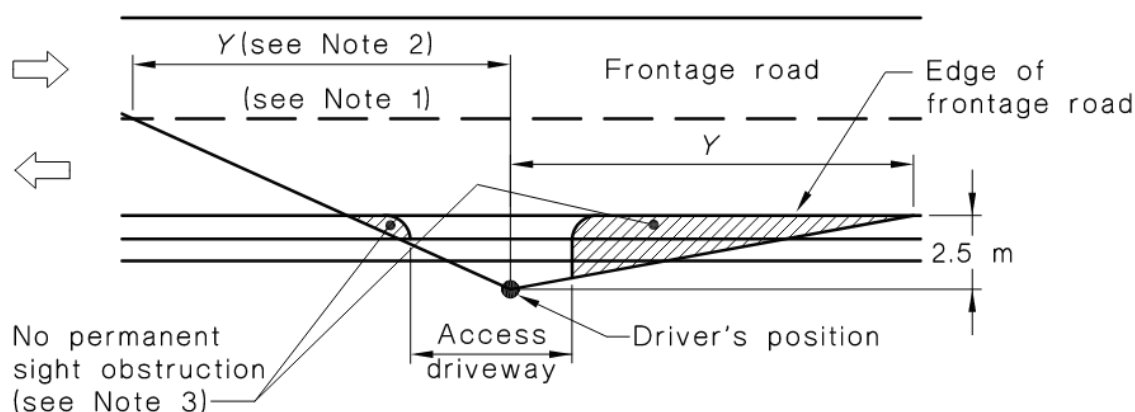
Conclusion 3: the proposed development plan indicates formal on-site car parking provision.

5 Access to the site

5.1 Site access – Access driveway ESD requirement

Section 3.2.4 in AS/NZS 2980.1 Parking Facilities – Part 1: Off-street car parking sets out the entering sight distance (ESD) criteria for a driver exiting an access driveway to traffic on the frontage road.

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 6).



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 2 nd and 3 rd columns
100	139	160	
110	153	190	

Figure 6: Sight distance requirements at driveways (Source: Figure 3.2 from AS/NZS 2890.1)

The proposed site access to the development along Mitchell Highway is subject to an expected 110 km/h operating speed. The corresponding minimum Stopping Sight Distance (SSD) is 190 m.

The desktop assessment of the approaches to the subject site access on Mitchell Highway determined that the subject length had no vertical (crests / dips) or horizontal (bends) alignment features that would restrict sight lines. However, mature, established trees in the road reserve (northeast side) may impact sightlines.

Conclusion 4: — roadside vegetation within the Mitchell Highway road reserve may restrict the sight distance requirements at the site access

Recommendation 1: before the commencement of works, inspect the subject site access and trim/remove any roadside vegetation that restricts compliance with the applicable sight distance requirement of 190 m.

5.2 Access location and operation

The subject site access driveway is recommended to be constructed per Figure 7.4 in Austroads Guide to Road Design Part 4: Intersections and Crossings requirements and to the council's satisfaction (refer to Figure 7). It should provide sufficient width to facilitate the movements of a 19 m semi-trailer accessing the subject site.

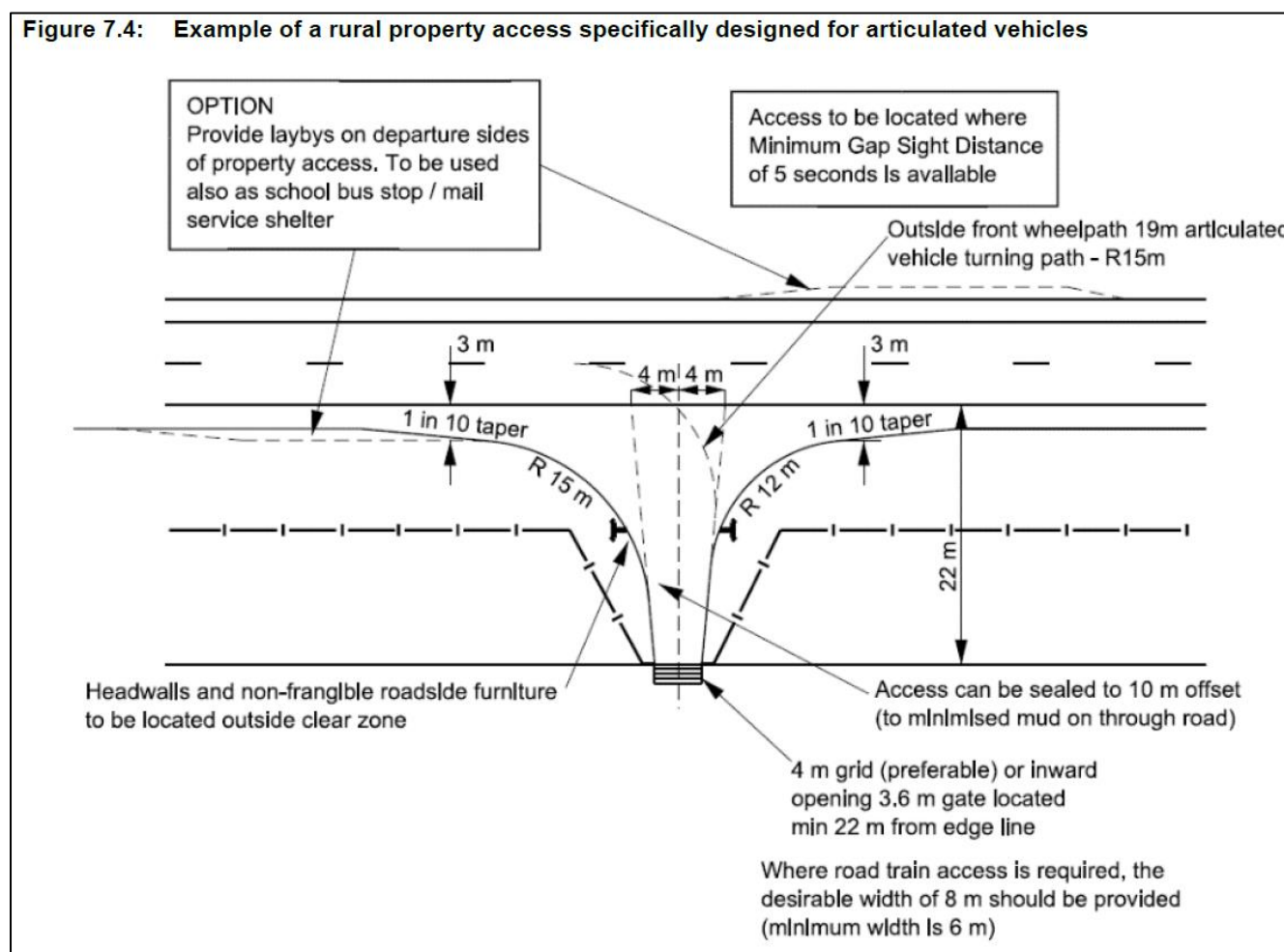


Figure 7: rural property access designed for an articulated vehicle

Recommendation 2: the subject site access driveway should be constructed according to Figure 7.4 in Austroads Guide to Road Design Part 4 requirements and to the council's satisfaction.

5.3 Site security

The proposed development will likely include installing site security to restrict access to authorised vehicles only. This will involve the provision of security gates installed at the access to the development.

Should the development include security gates, they should be installed to cater for all queuing vehicles. It is indicated that only one truck is expected to arrive and queue at any time. If the gate for the subject site access were setback 20 m from Mitchell Highway, this would allow for a 19 m semi-trailer waiting for clearance to enter the subject site.

The subject site's fencing is more than 20 m from the edge of the traffic lane on Mitchell Highway. Therefore, the setback will provide the minimum required to store one heavy vehicle clear of the traffic lane.

Conclusion 5: the setback of the security fencing for the subject site will provide the minimum 20 m required to allow storage of a 19 m semi-trailer clear of the traffic lane on Mitchell Highway.

5.4 Turn provisions impact

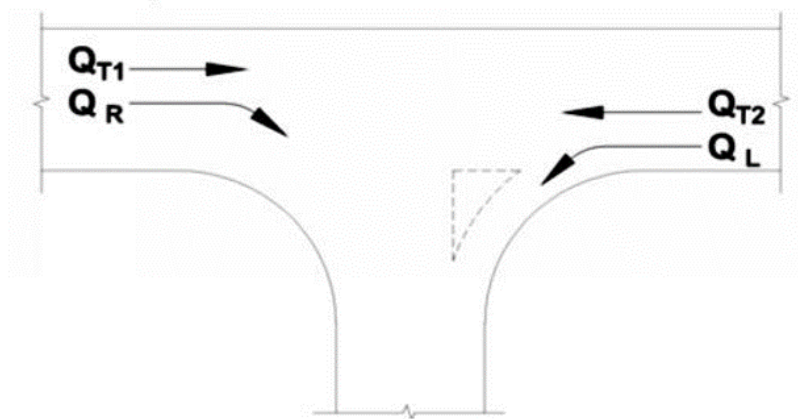
The traffic turning from major roads into minor roads should not delay through traffic.

Generally, turn treatments from major roads into minor roads at sign-controlled intersections are provided for safe and efficient intersection operation.

Figure 8 shows the formulas determining the major road volume (QM).

The results were then applied to Figure 3.25, Austroads Guide to Traffic Management Part 6 (AGTM6), to determine the intersections' turning treatments.

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 8: Formulas used to determine major road traffic (Source: Figure 3.26 from AGTM6)

5.4.1 Turn lane treatments

Traffic volumes help determine appropriate turn lane treatments at access intersections to development sites.

To determine anticipated conditions at the intersection, traffic volumes from Table 3 were used to determine the warrants shown in Table 4 and were applied in Figure 9.

Table 4: Right turn lane treatments on Mitchell Highway at the subject site intersection – anticipated conditions

Road	Peak Period	Left Turn Q_L (vph)	Right Turn Q_R (vph)	Through Q_T (vph)	Q_M	Q_M
					Left Turn	Right Turn
Mitchell Highway	AM	0	21	Q_{T1} 42	0	88
				Q_{T2} 46		
	PM	0	0	Q_{T1} 42	0	0
				Q_{T2} 44		

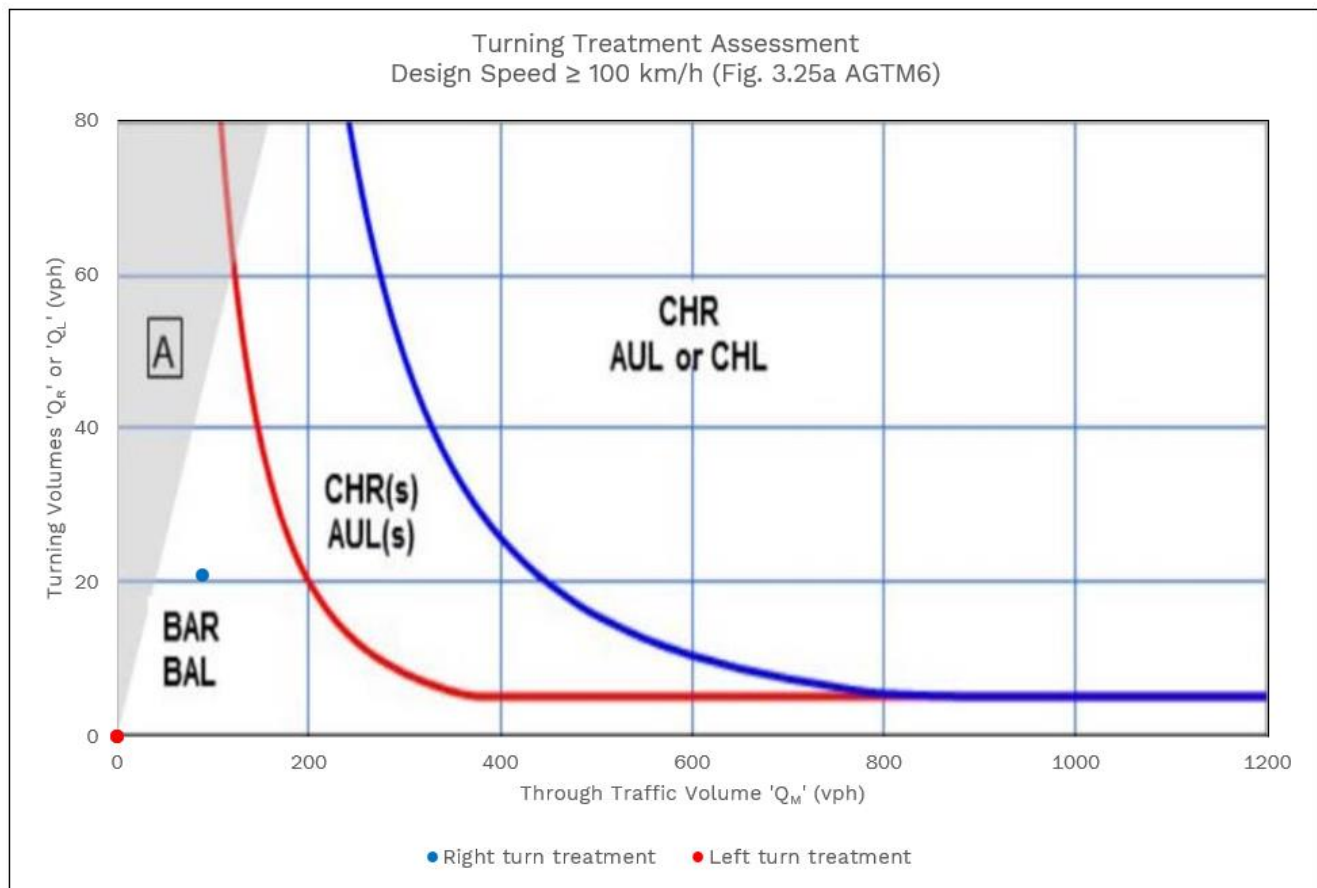


Figure 9: Graph used to determine the turn treatments Mitchell Highway at site access intersection – anticipated conditions

Based on the data gathered and reported in this section, our key observations are:

- right turn from Mitchell Highway into the subject site access meets the warrants for a BAR treatment in the morning peak period
- left turn from Mitchell Highway into the subject site; access treatment is not required.

Conclusion 6: the intersection of Mitchell Highway and the subject site access meets the warrant for a type BAR turn lane.

The intersection is subject to low volumes along Mitchell Highway, and the additional traffic generated by the development will only occur during the construction phase (approximately nine months). As a result, upgrading the turn treatments for a short construction period would be unnecessary.

Conclusion 7: no additional work is required at the intersection of Mitchell Highway and the subject site access to accommodate the development traffic.

Truck warning signs should be displayed near the subject site access during the construction phase when heavy vehicles are making deliveries to the site.

Recommendation 3: truck warning signs should be displayed near the subject site access during the construction phase when heavy vehicles are making deliveries to the site.

6 Conclusions and recommendations

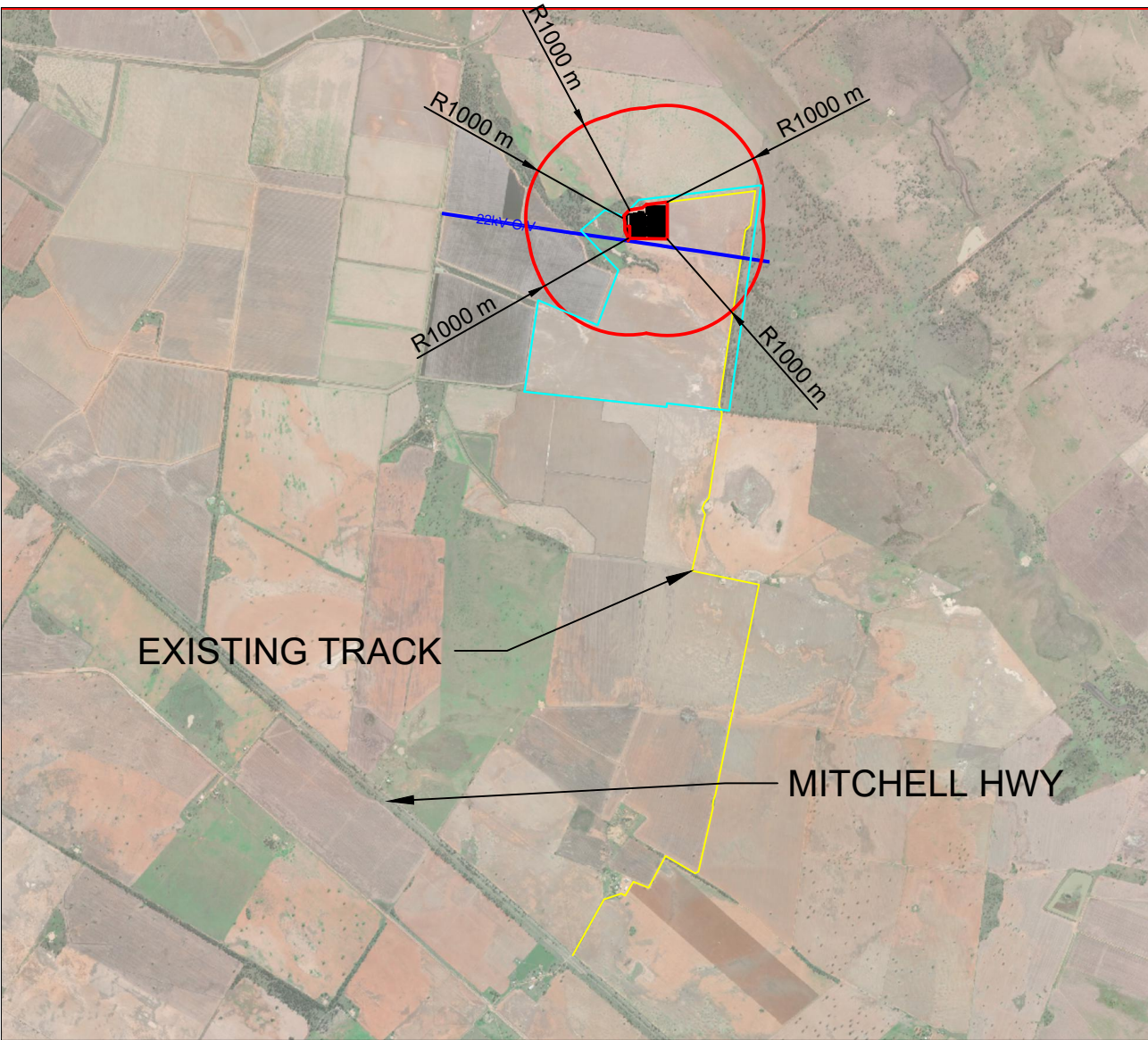
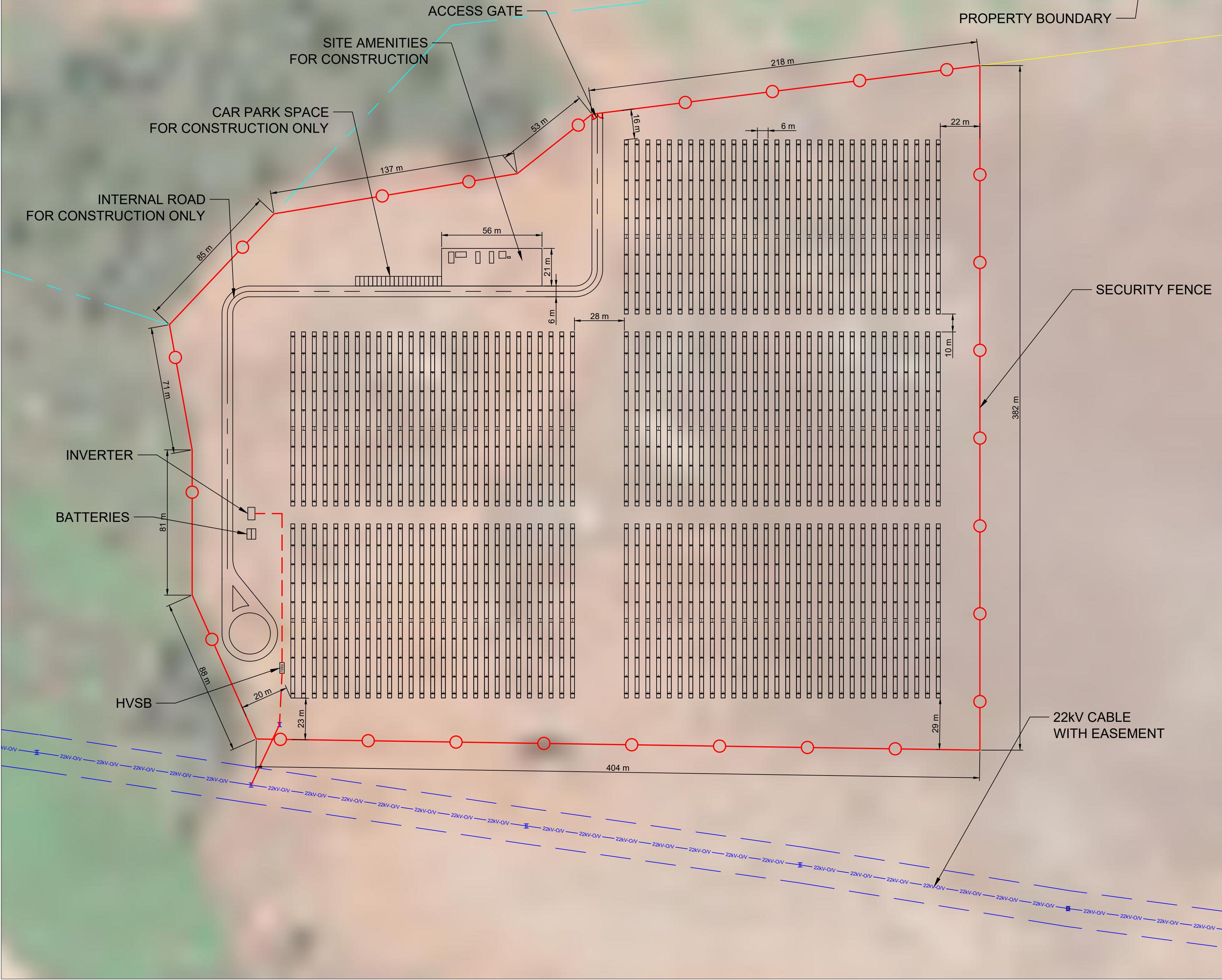
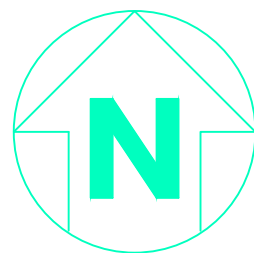
We conclude there are no traffic engineering reasons that would prevent the development from proceeding, as outlined below:

- the peak traffic generation will occur during the construction phase of the development, where 20 light vehicles (generating 40 trips per day) and 5 heavy vehicles (generating 10 trips per day) will access the subject site
- the car parking demand during the development's construction phase will likely be 20 spaces
- the proposed development plan indicates a formal on-site car parking provision
- roadside vegetation within the Mitchell Highway road reserve may restrict the sight distance requirements at the site access
- the setback of the security fencing for the subject site will provide the minimum 20 m required to allow storage of a 19 m semi-trailer clear of the traffic lane on Mitchell Highway
- the intersection of Mitchell Highway and the subject site access meets the warrant for a type BAR turn lane; however, no additional work is required to accommodate the development traffic given that the construction phase generates peak traffic volumes and is for a limited time.

However, this TIA has identified a number of recommendations that need to be addressed:

- **Recommendation 1:** before the commencement of works, inspect the subject site access and trim/remove any roadside vegetation that restricts compliance with the applicable sight distance requirement of 190 m
- **Recommendation 2:** the subject site access driveway should be constructed according to Figure 7.4 in Austroads Guide to Road Design Part 4 requirements and to the council's satisfaction
- **Recommendation 3:** truck warning signs should be displayed near the subject site access during the construction phase when heavy vehicles are making deliveries to the site.

Appendix 1 – Development Plans



NOTES

1. ACTUAL DIMENSIONS AND CLEARANCES MAY VARY SUBJECT TO SITE CONDITIONS.
2. DIMENSIONS OF ELECTRICAL EQUIPMENT ARE INDICATIVE ONLY. ACTUAL DIMENSIONS TO BE CONFIRMED.
3. EXISTING ESSENTIAL ENERGY 11kV POLE IS FOR ILLUSTRATION ONLY. ACTUAL POSITION IS SUBJECT TO THE ACTUAL MEASUREMENT ON SITE.
4. TWO NEW POLES WILL BE INSTALLED TO CARRY OVERHEAD TRANSMISSION LINES AND CONNECT TO ESSENTIAL ENERGY NETWORK.
5. SITE STORAGE AND AMENITY FACILITIES TO BE ON SITE ONLY DURING CONSTRUCTION PHASE. NO PERMANENT BUILDINGS TO BE KEPT ON SITE AFTER CONSTRUCTION COMPLETED.

LEGEND

- PROPOSED PV ARRAY
- 22kV-OV
- 22kV CABLE WITH EASEMENT
- SECURITY FENCE
- PROPOSED OVERHEAD & UNDERGROUND HV CABLES
- PROPERTY BOUNDARY

SYSTEM SPECIFICATIONS

DC	6.42	MW	TOTAL MODULES	11664
MODULE CAPACITY	550	W	MODULES PER STRING	27
NUMBER OF INVERTERS	1	-	NUMBER OF STRINGS	432
INVERTER MODEL	SG-4950HV-MV	-	MODULE MODEL	LR5-72HPH-550M

FOR INFORMATION

No	DATE	DRN	CHK	ENG	Q.A.	PROJECT	DESCRIPTION	NUMBER	TITLE
C	05/04/24	D.S.	ACE	D.S.	D.S.		UPDATE SITE PLAN		
B	28/06/23	D.S.	ACE	D.S.	D.S.		UPDATE DETAILS & ROAD LOCATION		
A	01/06/23	MG	ACE	MG	MG		DRAFT FOR INFORMATION		
REVISION									
REFERENCE DRAWINGS									



9438 Mitchell Hwy, Cathundral, NSW, 2823
4.95 MVA PV EXPORT SYSTEM
SITE PLAN

DATE: 05/04/24	DRN: D.S.	CHK: ACE	ENG: D.S.	Q.A: D.S.	SCALE: NTS
PROJ No	DRG No				REV C

Appendix 2 – 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
DPE	Department of Planning and Environment
ESD	Entering site distance
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
TfNSW	Transport for New South Wales (NSW)
vpd	vehicles per day
vph	vehicles per hour

