



Paul Sun Energy Pty Ltd

# Booral Solar Farm

## TRAFFIC IMPACT ASSESSMENT

WGA240360

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23 April 2025





#### Revision History

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### Appendix A SITE LAYOUT PLAN



# 1 INTRODUCTION

## 1.1 Background

WGA has been engaged by Paul Sun Energy Pty Ltd to prepare a Traffic Impact Assessment (TIA) report for the proposed solar farm located at Lot 130 Booral Road, Bulahdelah, New South Wales.

Under this development application it is proposed to construct a solar farm consisting of approximately 9,724 solar panel modules across 143 racks providing a total capacity of 5834.4 kilowatt peak (kWp).

## 1.2 Documentation Referenced

In the course of undertaking this assessment, the following information and documents have been referenced:

- Concept plans prepared by Mindaro Pty Ltd dated 3 March 2025.
- MidCoast Council Development Control Plan.
- Australian Standard Parking Facilities:
  - Part 1: Off-Street Car Parking (AS2890.1).
  - Part 2: Off-Street Commercial Vehicle Facilities (AS2890.2).
- Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management.
- RTA Guide to Traffic Generating Developments.
- TfNSW Traffic Volume Viewer.
- Nearmap aerial and Google Streetview imagery, as required.



# 2 DEVELOPMENT PROPOSAL

## 2.1 General

The proposal seeks to permit the construction of a solar farm development located at Lot 130 Booral Road, Bulahdelah, New South Wales.

Plans of the proposal prepared by Mindaro Pty Ltd dated 3 March 2025 indicate that the proposed development will comprise the following key components:

- 9,724 solar panels across 143 tracking systems.
- High Voltage (HV) cabling to existing Bulahdelah zone substation.
- On-site car parking.
- Storage shed and water tanks.
- Internal access roads.

An overview of the proposed development layout is shown in Figure 2.1 and included within Appendix A.



**Figure 2.1: Proposed Site Layout**

## 2.2 Car Parking Arrangements

Following the completion of the main construction works, it is proposed to provide at least five (5) on-site car parking spaces to accommodate any maintenance vehicles required to access the site following the commissioning of the solar farm.



## 2.3 Vehicle Access

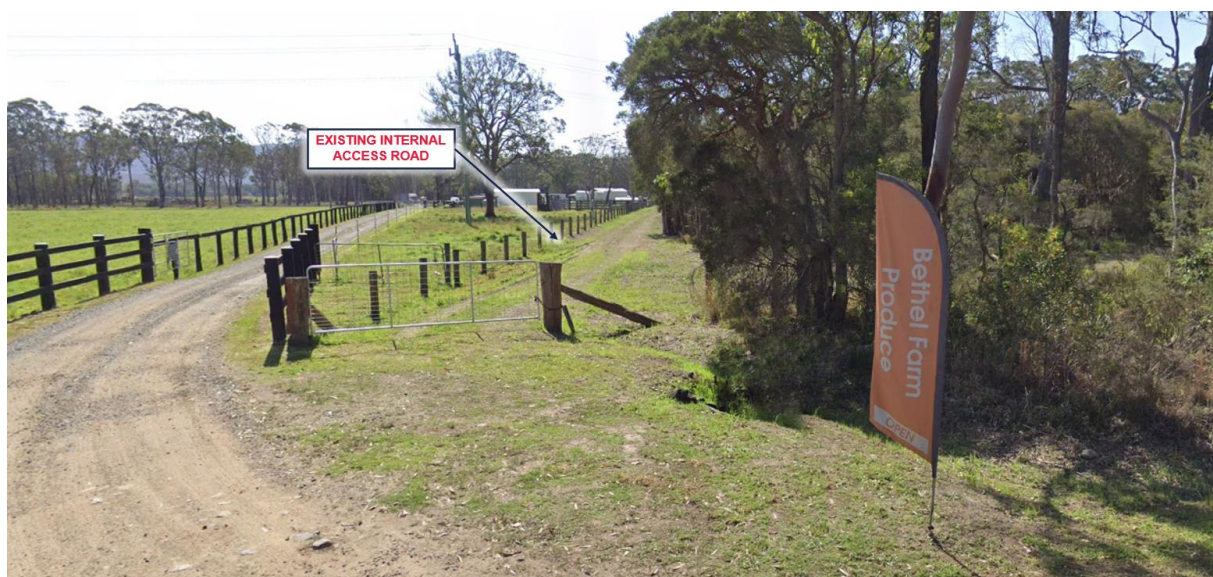
The site is proposed to be accessed via two (2) access points which provides direct access to Booral Road on the southern boundary of the site as shown in Figure 2.2.



**Figure 2.2: Proposed Site Access Arrangements**

It is proposed to leverage an existing site access in the southern corner of the site which provides direct access to an existing unsealed access road shown in Figure 2.3 and further discussed in Section 2.4.

It is proposed to construct a further access on the eastern boundary of the site adjacent the existing substation. The site access would tie into the existing access road servicing the substation and provides an alternate access to Booral Road.



**Figure 2.3: Existing Internal Access Road from Booral Road**



## 2.4 Internal Access Roads

A number of internal access roads are proposed within the site to provide access to the on-site car parking areas and maintenance shed.

The alignment of the internal access road network intends to leverage areas currently cleared of vegetation (i.e. overhead powerline easements) to minimise disruption to flora and fauna. The roads are generally proposed to be unsealed with a width of 7.5m and capable of accommodating two-way passing movements.

Additionally, the carriageway is proposed to be widened to provide a min. outside radius of 15m to provide an adequate turning area for vehicles up to 19m semi-trailers during the construction phase of the project.

### 2.4.1 Emergency Vehicle Access

All internal access roads are to be constructed to accommodate an 8.8m Medium Rigid Vehicle (MRV) or similar, to ensure that emergency vehicle access is possible throughout the site.

The *NSW Fire & Rescue Safety Guideline: Access for Fire Brigade Vehicles and Firefighters* outlines the requirements for providing access for fire brigade vehicles to any premises using public roads, or access to any site using a privately owned road system.

The guideline states that a minimum carriageway width of 4.5m for General Fire Appliance (emergency vehicle) access, with the minimum turning circle radius of any curved carriageway section to be 6.5m (inner) and 11.5m (outer).

Furthermore, any carriageway that extends longer than 120m from an intersection and does not lead directly to an exit or connecting carriageway (i.e. dead end) is to have a suitable turnaround area so that a Fire Appliance (emergency vehicle) does not need to reverse out.

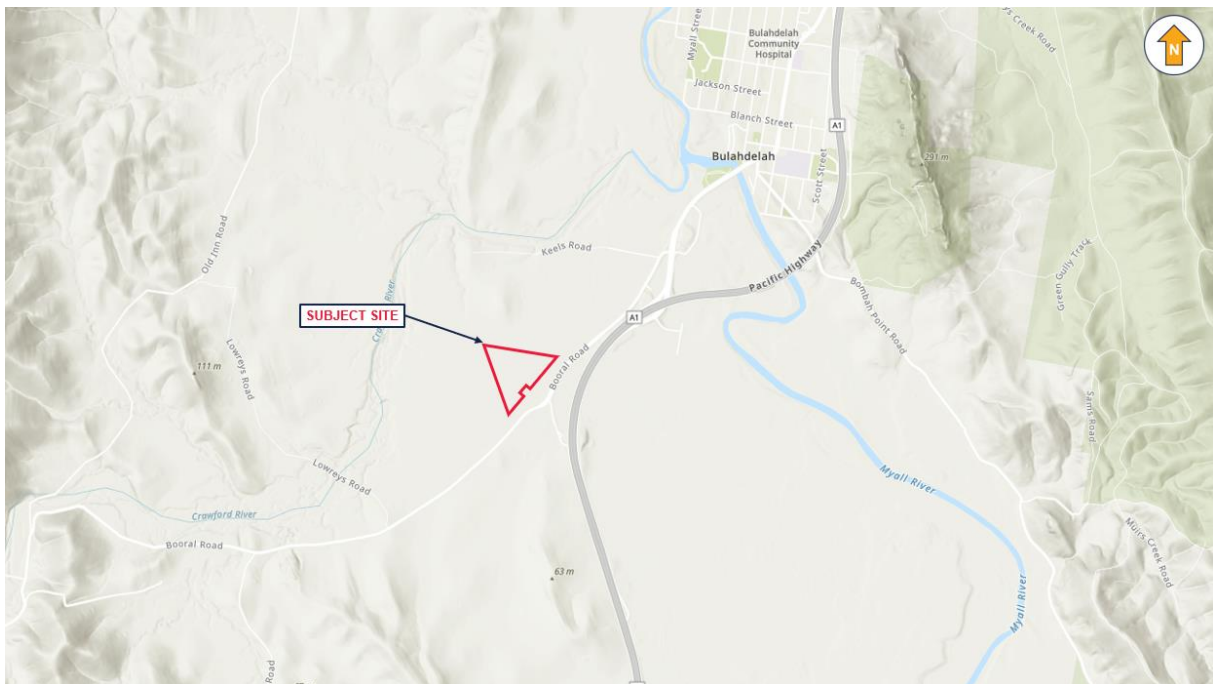


# 3 SITE CONTEXT

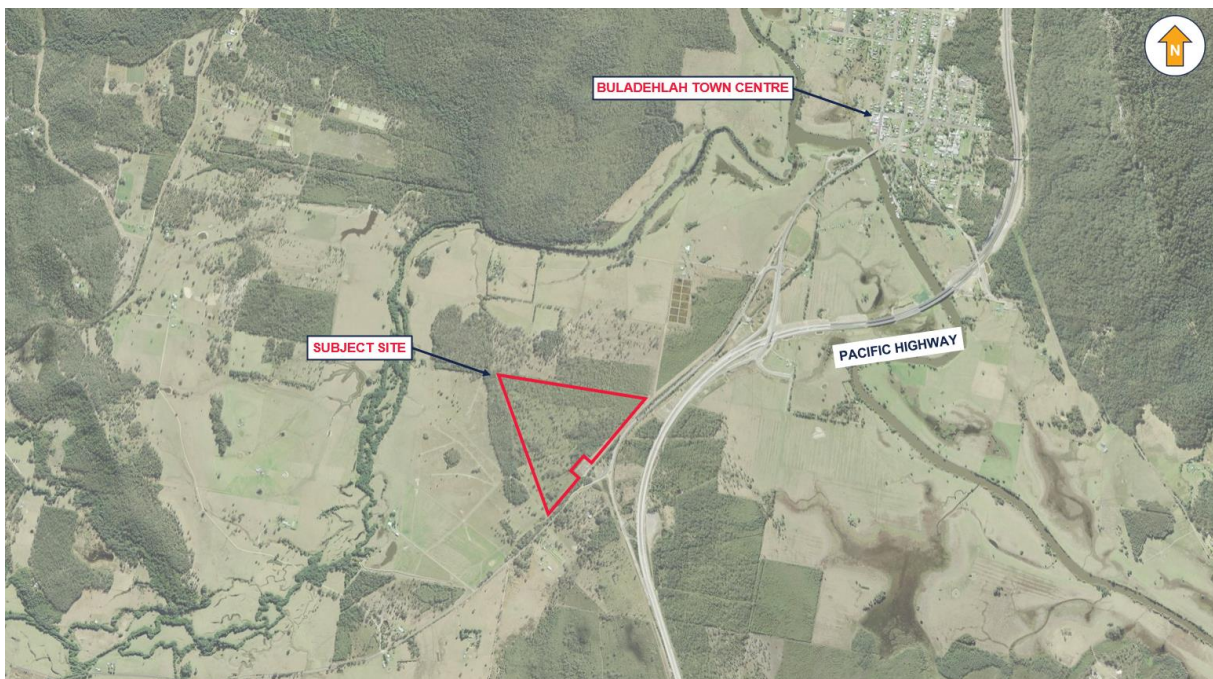
## 3.1 Subject Site

The subject site is located at lot 130 Booral Road, Bulahdelah. Land uses within the vicinity of the site are generally rural in nature, with the location of the subject site in the context of the surrounding network illustrated in Figure 3.1.

Further Nearmap aerial imagery of the site and surrounding environs is shown in Figure 3.2.



**Figure 3.1: Subject Site and Surrounding Road Network**



**Figure 3.2: Subject Site and Surrounding Environs**



### 3.2 Planning Zone

The subject site is located within a rural landscape zone (RU2) and abuts a Classified Road (SP2) Zone along a portion of the southern perimeter.

The location of the subject site in the context of the surrounding planning zones is shown in Figure 3.3.

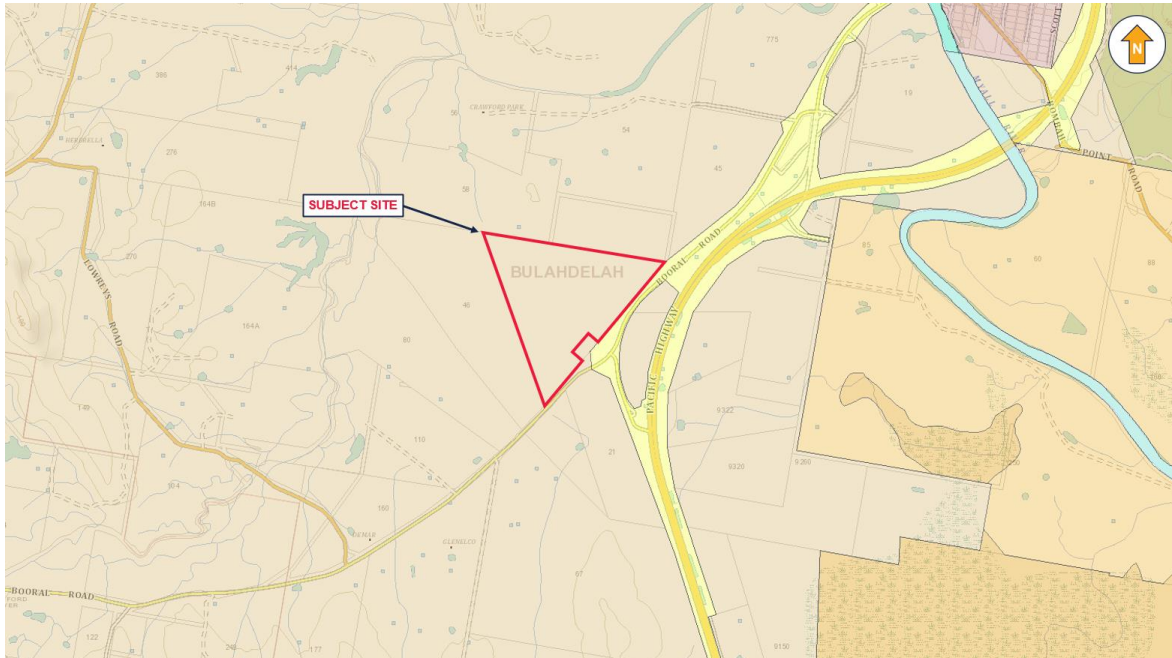


Figure 3.3: Extract of Land Zoning Map

### 3.3 Road Network

The subject site is accessed via Booral Road which is classified as a Local Road under Transport for NSW's (TfNSW) Road Network Classification. The road hierarchy of the surrounding network has been reproduced in Figure 3.4.

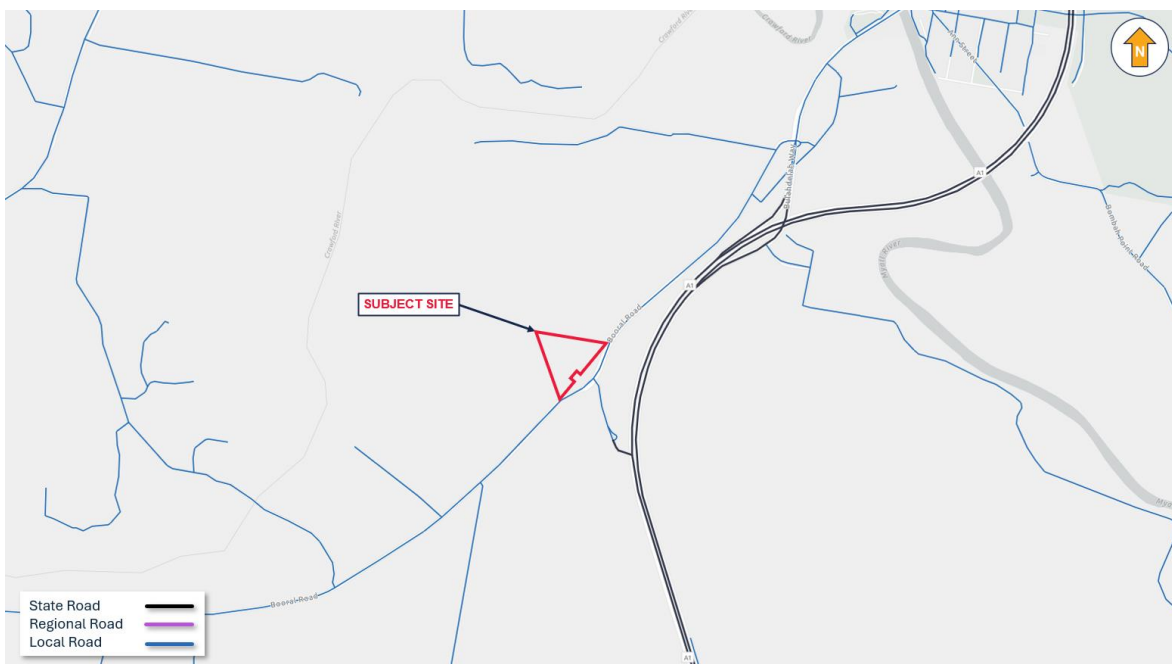


Figure 3.4: Surrounding Road Network Hierarchy



### 3.3.1 Booral Road

Booral Road is a local road managed by MidCoast Council, which generally runs from Bulahdelah Way in the north and The Bucketts Way in the south.

In the vicinity of the site Booral Road provides one (1) traffic lane in each direction across its approximate 7.2m pavement width. Along the site frontage Booral Road has unsealed grassed verges of varying width, with a posted speed limit of 100km/h.

Views of Booral Road facing east and west proximate to the site are provided within Figure 3.5 and Figure 3.6 respectively.



**Figure 3.5: Booral Road Facing South from the Subject Site**



**Figure 3.6: Booral Road Facing North from the Subject Site**



### 3.3.2 Old Pacific Highway

Old Pacific Highway is a local road managed by MidCoast Council and provides connection between Pacific Highway and Booral Road.

Old Pacific Highway provides one (1) traffic lane in each direction across its approximate 10.5m pavement width and includes an approx. 1.5m wide sealed shoulder on each side of the carriageway. Between Pacific Highway and Booral Road, Old Pacific Highway has a posted speed limit of 80km/h.

Views of Old Pacific Highway are shown in Figure 3.7 and Figure 3.8.



**Figure 3.7: Old Pacific Highway Facing South from Booral Road**



**Figure 3.8: Booral Road Facing East Towards Old Pacific Highway Intersection**



### 3.4 Existing Traffic Volumes

Booral Road traffic volume data has been obtained from the TfNSW Traffic Volume Viewer to determine the prevailing traffic conditions along the site frontage.

A review of the publicly available data revealed that the traffic volume information from the data station is incomplete, with only westbound traffic volumes available over a number of dates for the year 2007.

In order to supplement the TfNSW data, it has been assumed that Booral Road traffic volumes are distributed evenly across eastbound and westbound movements across a typical day, as is the case for most roads across the network. Therefore, it would be expected that Booral Road would accommodate approximately twice the volume of reported eastbound traffic volumes.

Additionally, an assumed growth rate of 1.5% per annum has been applied in order to determine the likely existing traffic volumes on Booral Road, with a summary of the historic traffic volumes and calculated existing traffic volumes is outlined in Table 3.1.

**Table 3.1: Existing Booral Road Traffic Volumes**

DIRECTION	DAILY TRAFFIC VOLUMES	
	2007 SURVEYED VOLUMES	2025 PROJECTED <sup>1</sup> VOLUMES
Eastbound	105 vpd	137 vpd
Westbound	105 vpd ( <i>assumed</i> )	137 vpd
Both Directions	210 vpd ( <i>assumed</i> )	274 vpd

<sup>1</sup> Calculated based on an assumed compound annual growth rate of 1.5%.

Austrroads Guide to Traffic Management (AGTM) Part 6: Intersections, Interchanges and Crossings Management provides guidance on converting daily traffic volumes (AADT) to peak hour volumes where peak period volumes are unknown. Section 3.3.6 of AGTM Part 6 states that for rural situations, the design hour volumes typically equate to 11 to 16% of the AADT.

To provide a conservative assessment the Booral Road peak hour traffic volumes have been taken to be 16% of the calculated daily volumes. Therefore, Booral Road would be expected to accommodate a total of 44 vehicles per hour (across both directions) in each of the morning and afternoon peak periods.



### 3.5 Crash History

Recent crash statistics have been obtained from the TfNSW Centre for Road Safety Interactive Crash Statistics and includes data for a five (5) year period between 2019 and 2023. The crash history surrounding the subject site is shown in Figure 3.9.



**Figure 3.9: Historical Crashes Surrounding the Subject Site**

A review of the available data suggests that there have been no crashes on the network in close proximity to the subject site.

### 3.6 Sustainable Transport

There is limited sustainable transport infrastructure connections available within close proximity to the site, with no footpaths provided along Booral Road resulting in pedestrian activity nearby the site unlikely.

Additionally, bus routes currently servicing Bulahdelah (routes 150, 151 and 153) do not operate along Booral Road and are therefore not expected to be affected by any site generated activity.



# 4 TRAFFIC CONSIDERATIONS

## 4.1 General

The following assessment seeks to provide seeks to determine the likely traffic generation during the various stages of the project, based upon estimated workforce and light and heavy vehicle movements provided by the applicant.

## 4.2 Construction Program

Construction of the project is expected to take up to 18 weeks, including up to four (4) weeks for testing and commissioning.

It is expected that the project will occur in three (3) primary phases, with a summary of the works required in each phased provided in Table 4.1.

**Table 4.1: Summary of Project Work Phases**

PHASE	TASK	DURATION
<b>Construction</b> (14 – 18 weeks)	• Tree clearing (as required)	2 weeks
	• Excavation / civil works	3 to 4 weeks
	• Electrical works	6 to 8 weeks
	• Delivery of tracker structure and panels	4 weeks
	• Installation of tracker structure and panels	8 to 12 weeks
	• Construction of Maintenance Shed	2 weeks
<b>Testing &amp; Commissioning</b> (2 – 4 weeks)	• Testing and commissioning works	2 to 4 weeks
<b>Operation</b> (ongoing)	• Maintenance (mowing and panel cleaning) • General inspections	Ongoing

It is understood that there will be up to 18 personnel on-site at any given time throughout the duration of the construction phase for a period of up to 8 weeks depending on the timing of the works. On average, between 8 and 10 workers will be on-site for a duration of 10 to 12 weeks during primary construction.

Following the completion of the construction phase, the site will move into a commissioning phase where vehicular movements a significantly reduced with most testing and commissioning works able to be conducted remotely.

Once commissioned, the site will move into its operations phase which would be expected to extend for the life of the asset. During this stage, limited light vehicle movements are expected and would predominantly be associated with routine operations and/or maintenance personnel and activities.



## 4.3 Traffic Generation

### 4.3.1 Daily Traffic Movements

Based on the provided traffic generation estimates, the daily vehicle two-way trips are detailed in Table 4.2

It is noted that the below estimates include traffic movements associated with general delivery trucks such as low loaders which are required to complete single trips during the mobilisation and demobilisation phases of construction only.

Therefore, these movements have not been accounted for in the calculation of total daily two-way movements.

**Table 4.2: Estimated Daily Traffic Generation**

PHASE	TASK	VEHICLE TYPE	DESCRIPTION	ESTIMATED TWO-WAY MOVEMENTS
<b>Construction Phase</b>	Tree and vegetation clearing	Light vehicle	• 5 operators/labourers drive to/from site each day	10 trips/day
		Low loader truck	• 2 Machines to be transported to site	4 trips*
		Hopper truck	• 2 trucks transporting cleared material off site each day	4 trips/day
	Excavation and civil works	Light vehicle	• 3 operators to drive to site each day.	6 trips/day
		Low loader truck	• 3 Excavators to be transported to site	6 trips*
	Electrical works	Light vehicle	• 5 technicians and labours drive to/from site each day	10 trips/day
		Semi-trailer	• 1x 20-foot container delivery	2 trips*
	Tracker and panel installation	Light vehicle	• 10 installers drive to/from each site each day	20 trips/day
		Semi-trailer	• 2x 40-foot container delivery for tracker structure	4 trips*
		Semi-trailer	• 10x 40-foot container delivery for panels	20 trips*
		Concrete truck	• 1 5m <sup>3</sup> concrete delivery	2 trips*
	Maintenance shed construction	Light vehicle	• 4 labourers drive to/from site each day	8 trips/day
		Semi-trailer	• 1 delivery of shed materials	2 trips*
		Concrete truck	• 2 5m <sup>3</sup> concrete delivery	4 trips*
<b>Testing &amp; Commissioning Phase</b>	Testing & commissioning	Light vehicle	• 2 technicians drive to/from site each day	4 trips/day
<b>Operations Phase</b>	Maintenance (grass)	Light vehicle	• Up to 4 labourers (2 vehicles) drive to/from site up to 2 days per month	4 trips*
	Maintenance (panels)	Light vehicle	• Up to 4 labourers (2 vehicles) drive to/from site for 5 days every 3 months	4 trips*



PHASE	TASK	VEHICLE TYPE	DESCRIPTION	ESTIMATED TWO-WAY MOVEMENTS
	Inspections	Light vehicle	<ul style="list-style-type: none"> <li>1 inspector drive to/from site as required</li> </ul>	2 trips*
TOTAL				62 trips/day

\* Denotes a non-recurring trip and has not been included in the total

The traffic movements outlined above are considered to be a conservative representation of the estimated daily two-way movements as these works are unlikely to occur simultaneously. Instead, traffic movements associated with the construction of the site will likely be distributed over the 18 week construction period.

With consideration of the daily traffic generation outlined above, the peak daily traffic generation associated with the various phases of the project can be summarised as follows:

- **Construction (including testing and commissioning):** 62 trips per day.
- **Operations and maintenance:** 10 trips per day (during peak summer operations).

#### 4.3.2 Peak Period Traffic Movements

As noted previously in Section 4.2, there is expected to be a maximum of up to 18 construction personnel located on site at any given time throughout the construction phase of the project. Based on the provided information, WGA understands that this will equate to up to 8 vehicles on-site.

Conservatively assuming that all construction vehicles will arrive / depart from the site in any one (1) hour period, the project would be expected to generate up to 8 peak hour movements (during morning and afternoon peaks) during the construction phase.

## 4.4 Site Generated Traffic Distribution

It is expected that the majority of traffic movements associated with the construction phase of the project site will access the site from the east, with the Pacific Highway able to be conveniently accessed via Old Pacific Highway and Bulahdelah Way.

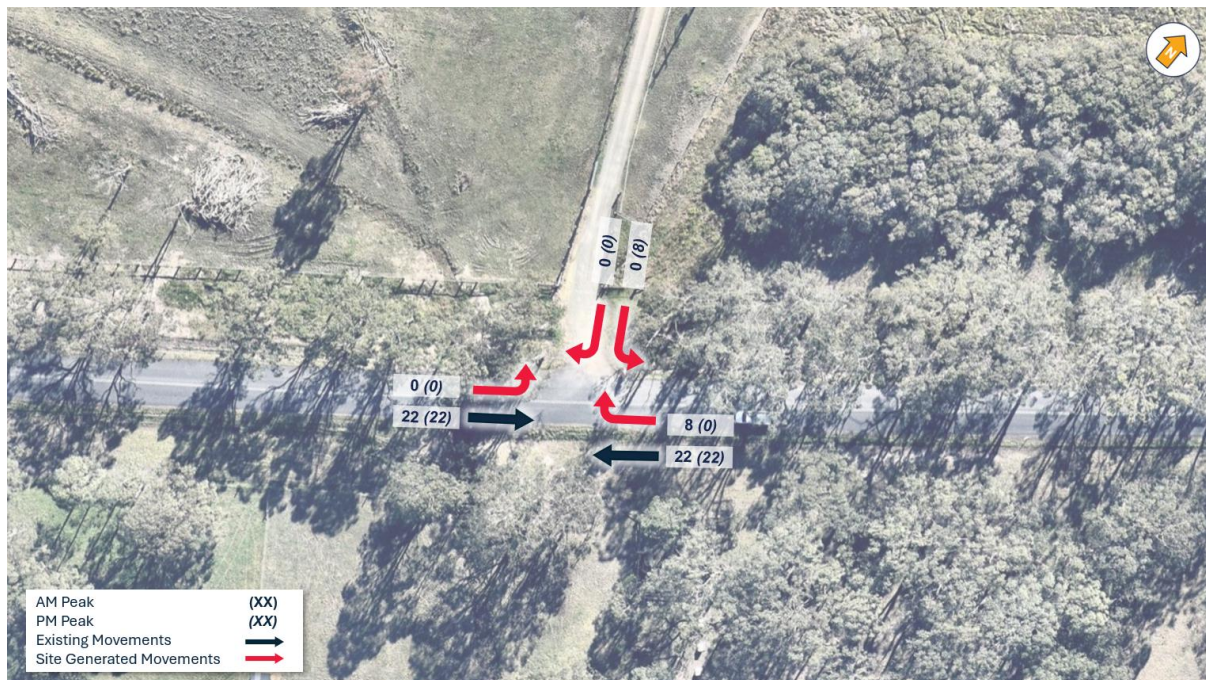
For the purposes of this assessment, all site generated traffic has been assumed to exhibit the following distribution:

	Inbound:	Outbound:
• <b>Westbound</b> ( <i>right turn in</i> ):	100%	0%
• <b>Eastbound</b> ( <i>left turn out</i> ):	0%	100%



## 4.5 Construction Phase Traffic Conditions

Based on the likely existing Booral Road traffic volumes calculated in Section 3.4 and the estimated site generated traffic volumes and distributions discussed in the preceding sections, the anticipated peak period traffic volumes associated with the construction phase of the project are shown in Figure 4.1.



**Figure 4.1: Construction Phase Peak Period Traffic Volumes**

Section 4.2.4 of the *RTA Guide to Traffic Generating Developments* provides guidance on mid-block capacities for rural roads and likely levels of service and has been reproduced in Figure 4.2.

Terrain	Level of Service	Percent of Heavy Vehicles			
		0	5	10	15
Level	B	630	590	560	530
	C	1030	970	920	870
	D	1630	1550	1480	1410
	E	2630	2500	2390	2290
Rolling	B	500	420	360	310
	C	920	760	650	570
	D	1370	1140	970	700
	E	2420	2000	1720	1510
Mountainous	B	340	230	180	150
	C	600	410	320	260
	D	1050	680	500	400
	E	2160	1400	1040	820

**Figure 4.2: Peak Hour Flow on Two-lane Rural Roads (veh/h) (Design Speed of 100km/h)**

At the site frontage Booral Road has an average downhill grade of approximately 2.5% towards the west of the site. Additionally, with consideration of the existing Booral Road cross-section and posted speed limit of 100km/h the criteria for Booral Road have been taken as the following:

- **Terrain:** Rolling.
- **Percentage Heavy Vehicles:** 10%.
- **Speed Limit:** 100km/h.



As outlined in Table 3.1 Booral Road is expected to accommodate approx. 274 vehicle per day across both directions, equating to approximately 44 vehicles per hour.

Therefore, application of the estimated construction phase traffic volumes (8 vph) to the existing Booral Road traffic volumes outlined above suggests that during peak periods, Booral Road would be expected to carry approximately 52 vehicles per hour.

The RTA Guide states that a desirable level of service (LOS) for a minor rural road is LOS C or better. Application of the heavy vehicle and terrain factor equates to a target level of service threshold of 650 vehicles per hour.

Therefore, with consideration of the above, the traffic volumes anticipated to be generated by the site during construction are expected to be readily absorbed by the surrounding road network (particularly Booral Road), with negligible impacts on safety and performance expected.

Additionally, with consideration of the traffic volumes anticipated to be generated by the site during the construction phase of the project, it is estimated that the site would generate one (1) entry or exit movement approximately every seven (7) and a half minutes on average across the critical morning and afternoon site generated peak periods.



# 5 CAR PARKING CONSIDERATIONS

## 5.1 Statutory Requirements

Part 10 of the MidCoast Council Development Control Plan do not outline recommended parking provisions for solar farm developments. Therefore, the car parking required should be based on a first principles approach dependent upon the number of site personnel required to carry out the construction works, and ongoing maintenance required post-construction.

Given the rural nature of the site, it should be assumed that all site personnel would arrive by private vehicle, with Table 4.2 stating that up to five (5) vehicles can be located on site at any given time (grass and panel maintenance and routine inspections).

The proposed parking arrangement is located nearby the maintenance shed with construction parking to be allocated in close proximity to the respective work area.

It is therefore expected that all parking demands expected to be generated during both the construction and operations phases of the project would be able to be satisfactorily accommodated on-site.

## 5.2 Car Park Design and Layout

All formal car parking areas are to be designed in accordance with the requirements outlined in Australian Standard Parking Facilities: Part 1: Off-Street Car Parking (AS2890.1) for User Class 1A (employee parking), with the on-site car parking to be dimensioned as followed:

- **Car park length:** 5.4m
- **Car park width:** 2.5m
- **Aisle width:** 5.8m (min.)



## 6 SUMMARY AND CONCLUSIONS

This Traffic Impact Assessment (TIA) report has been prepared to accompany the DA submission permitting the construction of the proposed solar farm located at Lot 130 Booral Road, Bulahdelah, New South Wales.

Based on the discussions and analysis outlined within this report the following key conclusions are derived:

- The proposed development is to comprise approx. 9,734 solar panels across 143 tracking systems. The solar farm is to be supported by a storage shed, formal on-site parking and internal access roads.
- The proposal is expected to generate up to 62 vehicle trips per day during the main construction phase of the project, with 8 vehicles per hour expected to access the site during the site generated peak periods.
- Once construction is complete, traffic movements to/from the site are expected to reduce significantly, with only intermittent access required for maintenance and routine inspections.
- Vehicles up to 19m semi-trailers are expected to access the site in order to deliver plant and equipment during the construction phase of the project.
- The traffic movements generated by the construction phase of the project has been assessed against the calculated road capacity of Booral Road, with it expected that the generated volumes would have a negligible impact on the existing operation of Booral Road and the broader network.
- All parking demands generated by the site (during both construction and operational phases) are able to be satisfactorily accommodated on site, with the provided on-site parking to be provided in accordance with the standards outlined in AS2890.1.

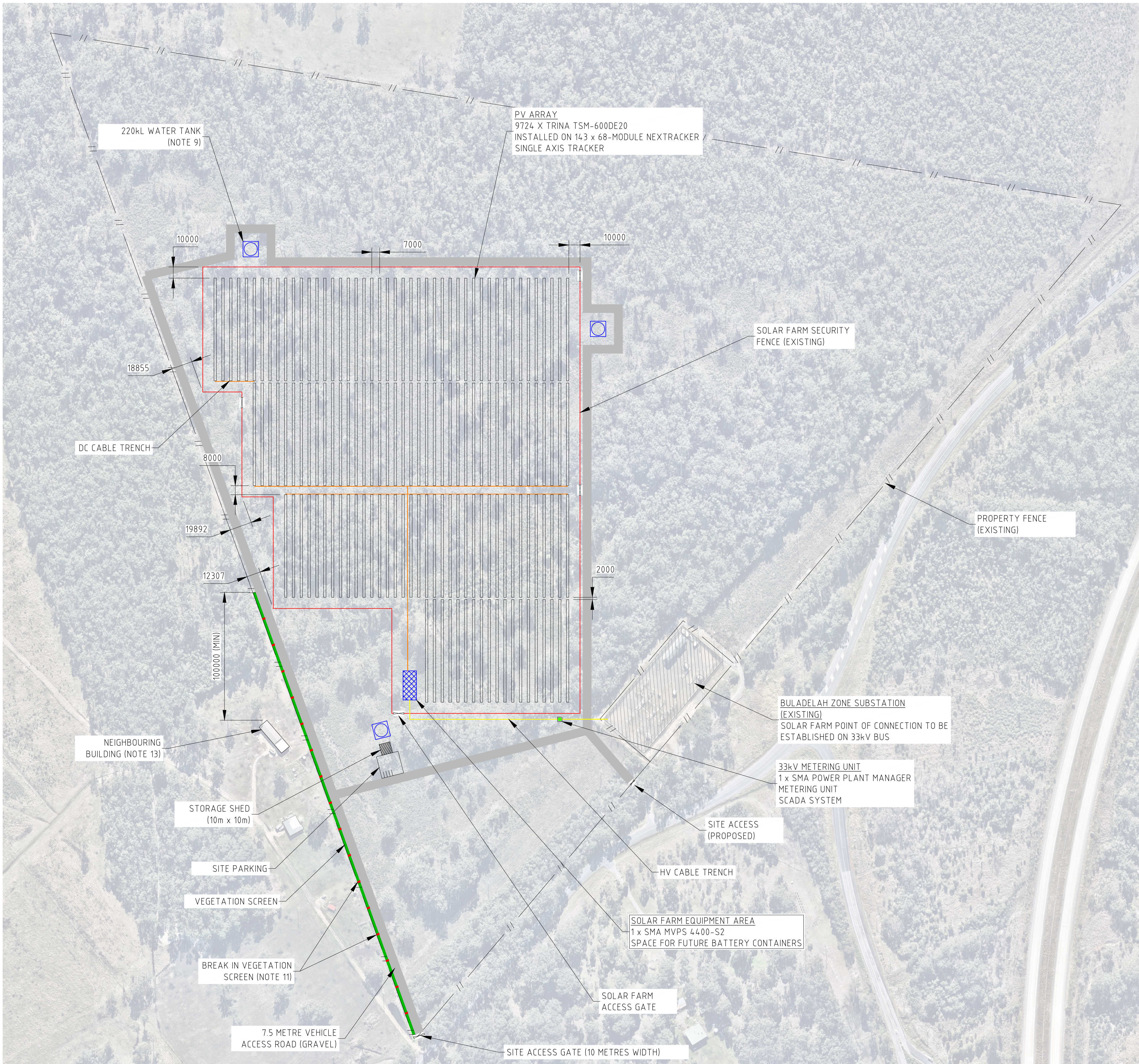
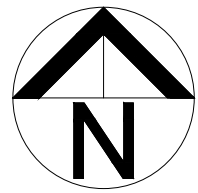


# **APPENDIX A**

## SITE LAYOUT PLAN







SITE PLAN  
SCALE 1:2000

OVERALL SYSTEM SPECIFICATION		
MODULE	9724	TRINA TSM-600DE20 600W
INVERTER	1	SMA MVPS 4400-S2
RACKING	143	NEXTRACKER HORIZON (68 MODULE)
DC CAPACITY	5834.40	kWp
AC CAPACITY	4400	kVA
DC/AC RATIO	1.33	

- NOTES:
- DO NOT SCALE FROM THIS DRAWING.
  - ALL DIMENSIONS AND LEVELS ARE IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE. ALL DIMENSIONS TO BE VERIFIED ON SITE BY CONTRACTOR.
  - EXACT LOCATION OF ALL PARTS OF THE INSTALLATION TO BE DETERMINED BY CONTRACTOR ON SITE.
  - PRINT IN COLOUR.
  - THIS DRAWING IS BASED ON THE INFORMATION SUPPLIED TO THE DESIGNER FROM ITS CLIENTS OR SUBCONTRACTORS AND HAS BEEN PROVIDED IN ACCORDANCE WITH GSES' TERMS AND CONDITIONS.
  - ALL EXISTING EQUIPMENT LABELLED "EXISTING". ALL OTHER EQUIPMENT TO BE INSTALLED.
  - MODULE QUANTITIES ARE INDICATIVE ONLY. PV ARRAY LAYOUT TO BE CONFIRMED DURING DETAILED DESIGN.
  - NEXTRACKER RACKING DIMENSIONS AND MODULE QUANTITIES ARE APPROXIMATE. EXACT DIMENSIONS AND PANEL QUANTITIES TO BE DETERMINED DURING DETAILED DESIGN.
  - MIN. 10m CLEARANCE REQUIRED AROUND ALL WATER TANKS. ACTUAL DESIGN AND PLACEMENT IS TO BE CONFIRMED.
  - MIN. 10M AROUND THE PERIMETER OF THE SOLAR FARM SHALL BE LEFT UNTOUCHED TO SERVE AS ASSET PROTECTION ZONE (APZ).
  - BREAKS IN THE VEGETATION SCREEN ARE REQUIRED EVERY 25 METRES TO COMPLY WITH FIRE REGULATIONS.
  - 15 METRE TURNING CIRCLES AROUND WATER TANKS IS TO BE MAINTAINED FOR FIRE TRUCK ACCESS REQUIREMENTS.
  - VEGETATION SCREEN TO RUN AT LEAST 100 METRES PAST THE NEIGHBOURING BUILDING.
  - 7.5 METRE WIDE GRAVEL TRACK TO BE CONSTRUCTED AROUND PERIMETER OF SOLAR FARM.

LEGEND:	
	SUBSTATION
	HARDSTAND AREA
	STORAGE SHED
	DC CABLE TRENCH
	HV CABLE TRENCH
	TRAFFICABLE ROAD
	VEGETATION SCREEN
	BREAK IN VEGETATION SCREEN
	PROPERTY FENCE
	SOLAR FARM FENCE
	ACCESS GATE
	METERING UNIT

CONCEPT ISSUE  
NOT FOR CONSTRUCTION

REVISION PANEL					DESIGN PANEL				CLIENT		BOORAL SOLAR FARM			A1		TOTAL SHEETS:		3	
REV	DATE	DRN	DETAILS	APR'D	AUTHORISED	DESIGNED	REVIEWED	APPROVED	 <b>Mindaro</b>  MINDARO PTY LTD	 <b>Paul Sun Energy Pty Ltd</b> ACN 603 304 004  PAUL SUN ENERGY PTY LTD	LOT 130, BOORAL RD, BULAHDELAH			SHT SIZE	SITE ID:	PROJECT No: P2319		REVISION	
					N.TAM	V.MARALKAR					NSW 2423			SUPERSEDES:					
3	16/04/2025	B.C	UPDATED PER CLIENT FEEDBACK	N.T	SIGNATURE						CIVIL/SITE			DRAWING NUMBER					
2	20/03/2025	B.C	ADDED DIMENSIONS TO BOUNDARY	N.T							SITE PLAN			P2319-01-001-01					
1	3/03/2025	B.C	UPDATED BASED ON ECOLOGY STUDY	N.T															
0	7/03/2024	V.M	ISSUED FOR CONCEPT DESIGN	N.T															





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