TRAFFIC IMPACT ASSESSMENT

SOLAR PHOTOVOLTAIC (PV) POWER GENERATING FARM & ASSOCIATED SUPPORTIVE INFRASTRUCTURE

LOT 61 DP 1053533
231 BROOCKMANNS ROAD, FINLEY

PREPARED FOR: PROVIDENCE ASSET GROUP

APRIL 2020

20/020

TRAFFIC IMPACT ASSESSMENT
PROVIDENCE ASSET GROUP

SOLAR PHOTVOLTAIC (PV) POWER FARM
LOT 61 IN DP 1053533
231 BROOCKMANNS ROAD, FINLEY

Intersect Traffic Pty Ltd (ABN: 43 112 606 952)

Address:
16 Mount Harris Drive
Maitland Vale NSW 2320
PO Box 268
East Maitland NSW 2323

Contact:
(Mob) 0423 324 188
Email: jeff@intersecttraffic.com.au

QUALITY ASSURANCE

This document has been prepared, checked, and released in accordance with the Quality Control Standards established by Intersect Traffic Pty Ltd.

Issue	Date	Description	By
A	13/03/20	Draft	JG
B	24/03/20	Traffic Data / Edit	JG
C	17/04/20	Client Amendments / Final Proof	JG
D	17/04/20	Approved	JG

This document has been authorised by

Date 17th April 2020

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1.0 INTRODUCTION

Intersect Traffic Pty Ltd (Intersect Traffic) has been engaged by KDC Pty Ltd on behalf of Providence Asset Group to prepare a traffic impact assessment report for a proposed Solar Photovoltaic (PV) Power Farm (up to 5MW) on Lot 61 DP 1053533 – 231 Broockmanns Road, Finley.

The proposed development involves installation of solar panel banks, off-load area, inverter, and AC combiner area, HV switchboard area, MV power station area, 22 kV powerline to a direct connection to a suitable power line in Hamilton Street or Dales Road, on-site car parking and temporary construction office. Vehicular access to the site will be via a new access road with turnaround area off Broockmanns Road near the eastern end of the site. The development concept plans are shown in ***Attachment A.***

This report is required to support a development application to Berrigan Shire Council and allow the Council to assess the proposal in respect of its impact on the local and state road network.

This report presents the findings of the traffic and parking assessment and includes the following:

1. An outline of the existing situation near the site.
2. Assessment of the additional traffic generated by the proposal, identifies a preferred delivery route and the additional traffic's impact on the local road network.
3. Review of the adequacy of the proposed vehicular access to the site.
4. Review of the suitability and provision of on-site car parking through assessment against Council and Australian Standards requirements.
5. Presentation of conclusions and recommendations.

2.0 SITE DESCRIPTION

The subject site is shown in ***Figure 1*** below. It is located on the southern side of Broockmanns Road, Finley approximately 1 km's west of Hamilton Street / Dales Road and approximately 2.8 kilometres south-west of Finley. The site currently contains agricultural paddocks and a dwelling that is not within the development area.

The property has the formal title of Lot 61 in DP 1053533, 231 Broockmanns Road, Finley, and the development area for the proposal is approximately 15 hectares. The site is currently zoned RU1 – Primary Production pursuant to the Berrigan LEP (2013).

The existing main vehicular access to the site is provided at Broockmanns Road via a single width rural access crossing to the paddock which will be upgraded as part of the development works. Deliveries to the site will use the identified delivery roads shown on ***Figure 1*** being via the Newell Highway from the south, McNamara Street and Hamilton Street to Broockmanns Road noting all deliveries will likely originate out of Melbourne. The employee traffic accessing the site will also utilise the Newell Highway, McNamara Street, Hamilton Street to Broockmanns Road route. ***Photograph 1*** below shows the existing development site from Broockmanns Road while ***Photograph 2*** shows the existing vehicular access to the site.

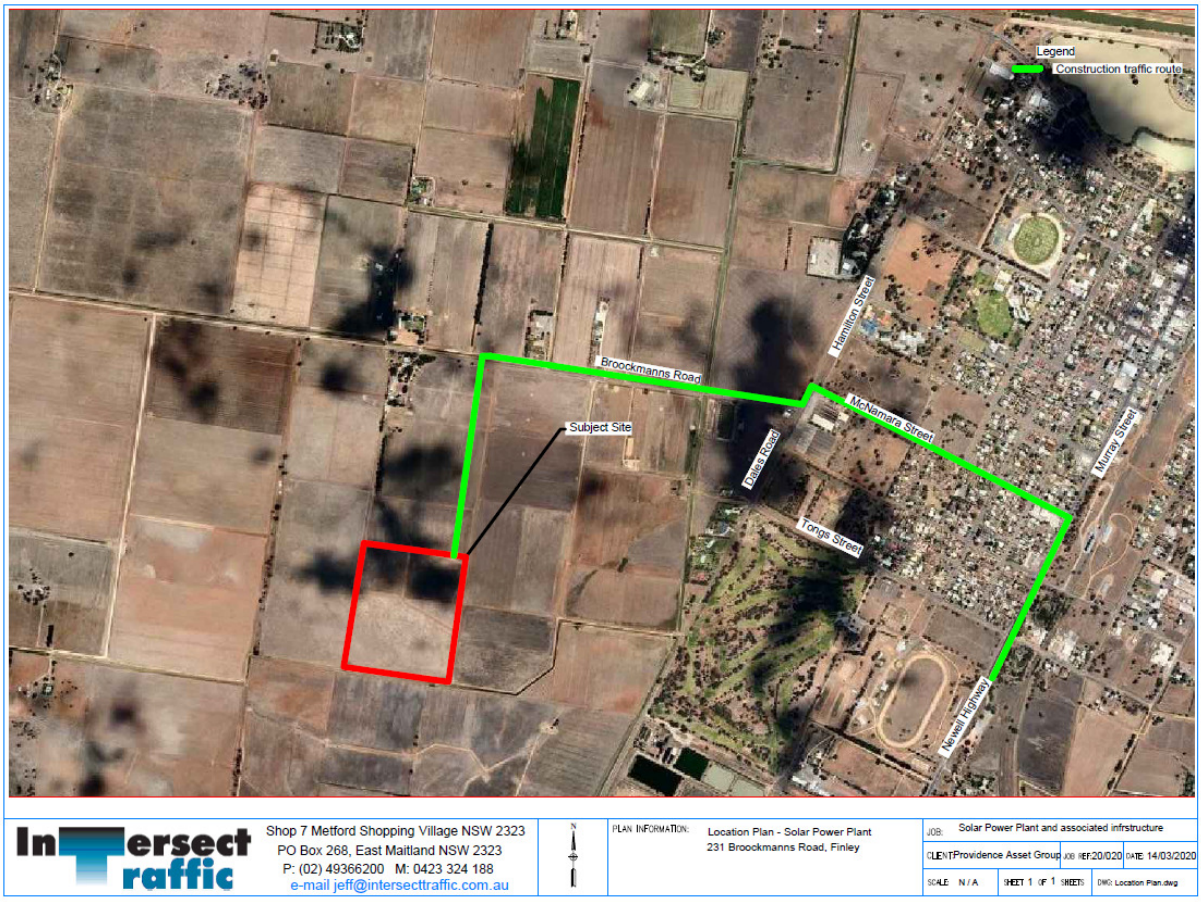


Figure 1 – Site Location

Photograph 1 – Development site

Photograph 2 – Existing vehicular access

3.0 EXISTING ROAD NETWORK

Newell Highway

The Newell Highway is a classified state highway (A39) with its primary function to connect Victoria from Tocumwal on the NSW / Victoria border to Goondiwindi on the NSW / Queensland border and all regions along its length within country NSW. As such it is an arterial road and major NSW transport route from and to Victoria and Queensland. As a sealed rural arterial road the New England Highway is under the care and control of NSW Roads and Maritime Services (RMS) or Transport for NSW (TfNSW) as they are known as now.

Near Finley the Newell Highway is a two-lane two-way sealed rural road with an 11-metre wide sealed carriageway consisting of 3.5 metre wide travel lanes and 2 metre wide sealed shoulders. Additional turning lanes and raised concrete channelised central medians are provided at major intersections along its length and kerb and gutter runs along both sides of the road through the Finley township. Near the site through the Finley township the speed zoning is 50 km/h while south of Finley a 100 km/h speed zoning is in effect and at the time of inspection the Newell Highway was observed to be in excellent condition as shown in ***Photograph 3*** below.

Photograph 3 – Newell Highway, Finley.

McNamara Street & Hamilton Street

These streets are local collector streets with their primary function to collect and distribute traffic from the local street areas of Finley to the arterial road network (Newell Highway or Riverina Highway) as well as provide vehicular access to properties along their length. As local roads they are all under the care and control of Berrigan Shire Council and a 50 km/h speed zoning applies to all these streets. McNamara Street is already a designated B-Double route allowing B-Doubles to travel from the Newell Highway to access the regional saleyards on Hamilton Street near the Broockmanns Road intersection.

These streets are all two-lane two-way sealed urban roads with varying pavement / carriageway widths as follows.

- McNamara Street – 9 metres to 16 metres.
- Hamilton Street – 7 metres to 9 metres.

Some sections of these roads have urban style kerb and gutter along their edges though some sections also have unsealed road shoulders and table drains along their length. Generally they provide two lanes of travel (one per direction) as well as some on-street parking along their length and on inspection were found to be in fair to good condition. The following major intersection controls were in place along these travel routes.

- Newell Highway / McNamara Street – Priority controlled give way T-intersection.
- Hamilton Street / McNamara Street – Priority controlled give way T-intersection.

Photograph 4 below shows Hamilton Street (near saleyards) respectively, along the transport route to the site.

Photograph 4 – Hamilton Street, Finley near McNamara Street

Broockmanns Road

Broockmanns Road is a rural local road on the western outskirts of Finley with its primary function to provide vehicular access to the properties along its length. As a local road it is under the care and control of Berrigan Shire Council and being close to the urban section of Finley, a 50 km/h speed zoning would still apply to the section of Broockmanns Road from Hamilton Street to the development site access.

The section of Broockmanns Road utilised by this development for access has a sealed pavement 6 metres wide with minimal width shoulders and table drains. This section of road also includes a

narrow bridge crossing of an irrigation canal adjacent to the site. This section of road is suitable for the two-way flow of traffic and a number of B-Double livestock carrying vehicles were observed using the road during site inspections. At the time of inspection Broockmanns Road was observed to be in fair to good condition as shown in ***Photograph 5*** below. Broockmanns Road intersects with Hamilton Street and Dales Road via a priority controlled give way T-intersection adjacent to the Finley regional saleyards on Hamilton Street as shown in ***Photograph 6***.

Photograph 5 – Broockmanns Road near development site.

Photograph 6 – Broockmanns Road / Hamilton Street / Dales Road intersection.

4.0 ALTERNATE TRANSPORT MODES

NSW Trainlink run public transport (bus) services through Finley on the Echuca to Wagga Wagga route (Routes 733 and 734) and the Echuca to Albury route (Routes 741 & 742) as shown in the route map shown below in ***Figure 2***. These run once daily on Monday, Wednesday, Friday, and Sunday (Routes 733 and 734) and Tuesday, Thursday, and Saturday (Routes 741 & 742). This service provides access to facilities within the larger regional towns in the area including to railway stations and therefore connection to rail services to the capital cities of Sydney and Melbourne.

As a rural area there are no pedestrian footpaths within the local road network except within the Finley township. Near the site pedestrians are generally required to utilise the grass verges and road shoulders / pavement when walking in the area. Within the township concrete pedestrian footpaths are restricted generally the main commercial precinct as shown in ***Photograph 3***

The only observed off-road shared pathway near the site was a 2 metre wide bitumen sealed pathway on the eastern side of Hamilton Street and along the southern side of the Riverina Highway heading towards the Finley commercial area (see ***Photograph 9***). Along all other travel routes cyclists are required to utilise the road verge or the road pavement and share travel lanes with other vehicles when cycling in the area.

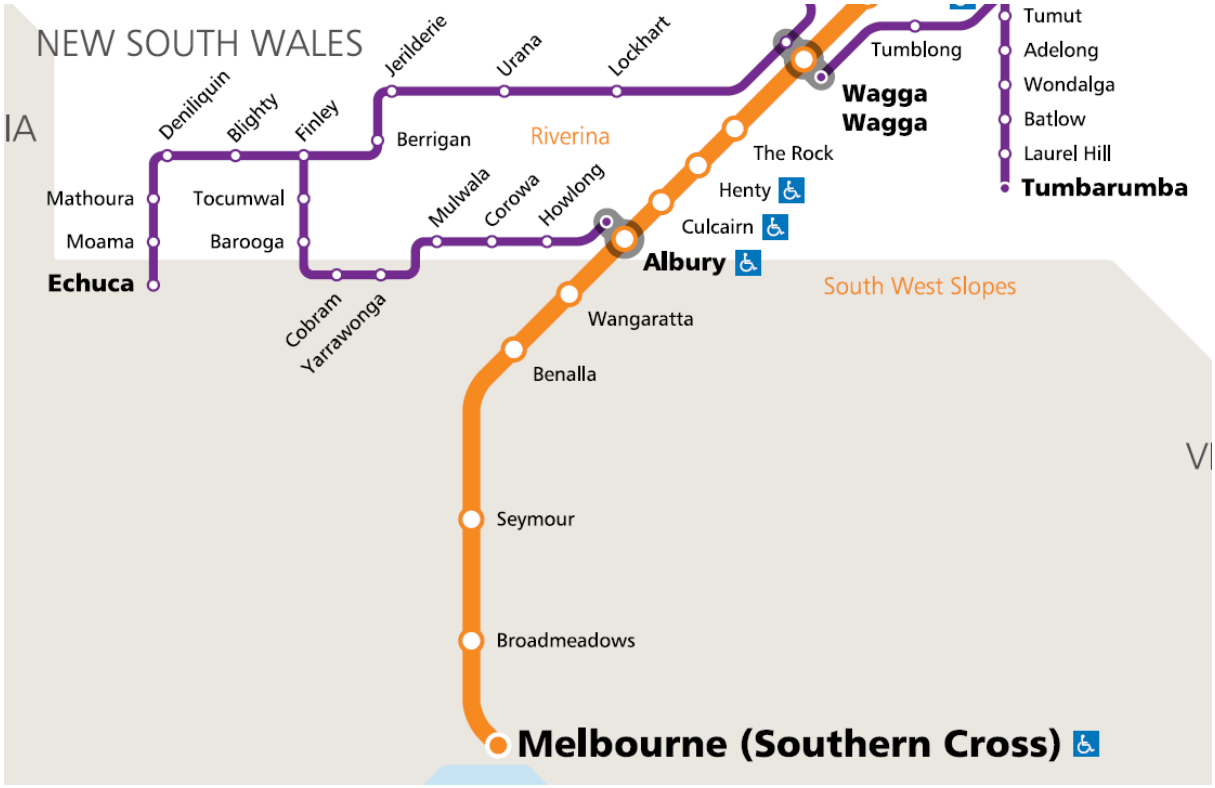


Figure 2 – NSW Trainlink route – Armidale to Tenterfield

Photograph 9 – Bitumen sealed shared pathway – Hamilton Street near Riverina Highway

5.0 DEVELOPMENT PROPOSAL

The proposed development involves the construction of a Solar Photovoltaic (PV) Power Farm on the site. The development concept plans are shown in ***Attachment A*** with the specific works involved in the expansion listed below:

- Installation of temporary construction office and amenities.
- Installation of Solar Panel arrays.
- Earthworks for construction lay-down area, hardstand areas and internal roads.
- Installation of inverters, transformers, and switchgear.
- Construction of unsealed access road from Broockmanns Road including sealed access crossing from the property boundary to edge of pavement.
- Construction of security fence and entrance gate; and
- Drainage and landscaping to Berrigan Shire Council requirements.

The development will require a team of 30 construction employees for a period of up to 6 months working 7 am to 5 pm Monday to Friday and 8 am to 1 pm on Saturdays. The majority of traffic movements associated with the development will occur during the construction of the solar power farm. Traffic movements generated by the operation of the development would include a single staff light vehicle movement associated with maintenance inspections as required and specific maintenance work which would be short term and infrequent. Deliveries during construction works would be expected to be within rigid and articulated vehicles. More detail on construction traffic is provided later in this report.

6.0 TRAFFIC IMPACTS

6.1 – Traffic Generation and Trip Distribution

The RMS publication "*RTA's Guide to Traffic Generating Developments (2002)*" provides advice on the traffic generating potential of different land uses. However this document does not cover Solar Farms therefore determining traffic generation is reliant on advice from the applicant regarding construction and operation of the development.

From an operational perspective traffic generation is expected to be minimal with only regular daily maintenance inspections carried out when necessary. Therefore based on 1 visit per day per week a peak hour traffic generation of 2 vehicle trips per hour (vtph) has been assumed for this assessment. There may be times when specific maintenance tasks have to be undertaken but these will be infrequent, short-term, and undertaken under a construction traffic management plan for the work.

Construction traffic estimates for the development are as follows based on the information provided in ***Attachment C***.

- Construction employees on-site – Maximum 30 transported in up to 10 light vehicles per day arriving between 6 am and 7 am and departing between 5 pm and 6 pm.
- Deliveries – Mainly heavy rigid vehicles and articulated vehicles (AV) though possibly B-Doubles may also access the site. Maximum – 8 per day but average of 5 per day between 10 am and 4 pm. Whilst these are likely to mostly arrive outside the peak hour traffic generation periods associated with the arrival and departure of employees, logistically there could be occurrences when due to circumstances out of the control of the contractor, a delivery arrives during the peak hour periods.
- Other vehicles – Some earthworks plant may be required on-site as well as concrete agitators and road base material deliveries during construction of the access. It would be expected a maximum frequency of 3 deliveries within a peak hour is assumed.
- Construction period – up to 6 months

Based on this advice the likely peak hour traffic generation which will occur in the AM peak coinciding with employees arriving on site and in the PM peak coinciding with employees leaving the site. It is also noted deliveries involve 2 trips with an inbound trip and an outbound trip.

AM peak = 10 inbound employees + 3 x 2 roadworks and other plant + 1 x 2 deliveries = 18 vtph (14 inbound and 4 outbound).
PM peak = 10 outbound employees + 3 x 2 roadworks and other plant + 1 x 2 deliveries = 18 vtph (14 outbound and 4 inbound).

It is expected that the distribution of trips will be 100 % south to and from Melbourne for deliveries and it is also assumed that the construction site employees trips will be distributed 50:50 to the north and south along the Newell Highway at McNamara Street as they access the site from their temporary accommodation. In accessing the site the likely transportation route as envisaged is shown on the location plan (***Figure 1***) noting McNamara Street is already a B-Double designated road.

Existing traffic volumes in the area were recorded by Intersect Traffic at the Newell Highway / Tongs Street intersection during the likely peak AM and PM traffic periods i.e. 8 am – 9 am and 3.00 pm – 4.00 pm on Thursday 5th March 2020 and Wednesday 4th March 2020, respectively. These periods were chosen following interrogation of NSW RMS data in the area on its Traffic Volume Viewer application. The data sheets for these counts are provided in ***Attachment B***. For the purposes of this assessment it is assumed traffic volumes on McNamara Street will be a maximum of 50 % of the traffic volumes on the Newell Highway.

These traffic counts determined that the relevant peak hour two-way traffic volumes on the state and local road network in the AM and PM periods during this period were.

- Newell Highway south of Tongs Street - 190 vtph in the AM peak and 233 vtph in the PM peak
- Newell Highway north of Tongs Street – 217 vtph in the AM peak and 250 vtph in the PM peak.

Given the construction will be completed within a 6 month period and the peak operational traffic volume from the site is only 2 vtph there is no need to do a 2030 (10 year horizon period) assessment of this development.

6.2 – Road Capacity

Table 4.3 of the RMS publication "*RTA's Guide to Traffic Generating Developments"* provides some guidance on likely mid-block capacity of two-lane two-way urban roads. This table is reproduced below as ***Table 1***:

Table 1 – Urban Road Mid-Block Capacity Table

Table 4.3
Typical mid-block capacities for urban roads with interrupted flow

Type of Road	One-Way Mid-block Lane Capacity (pcu/hr)	
Median or inner lane:	Divided Road	1,000
	Undivided Road	900
Outer or kerb lane:	With Adjacent Parking Lane	900
	Clearway Conditions	900
	Occasional Parked Cars	600
4 lane undivided:	Occasional Parked Cars	1,500
	Clearway Conditions	1,800
4 lane divided:	Clearway Conditions	1,900

Source: - RTA's Guide to Traffic Generating Developments (2002)

This table indicates the one-way mid-block capacity of a single travel lane on an undivided urban road is 900 vtph therefore the two-way mid-block capacity of a two-way urban road is twice this value i.e. 1,800 tph. Therefore the technical two-way mid-block capacity of the local and state road network is 1,800 vtph.

However when considering the local road network i.e. McNamara Street, Hamilton Street and Broockmanns Road it is more appropriate to apply the environmental capacity guidelines set by NSW RMS in Figure 4.6 of its "*RTA's Guide to Traffic Generating Developments"* document given the standard of construction of these roads and their primary function of providing access to properties / dwellings along their length. This figure is reproduced below as ***Table 2***.

Table 2 – Environmental Road Capacity Table

Table 4.6
Environmental capacity performance standards on residential streets

Road class	Road type	Maximum Speed (km/hr)	Maximum peak hour volume (veh/hr)
Local	Access way	25	100
	Street	40	200 environmental goal
			300 maximum
Collector	Street	50	300 environmental goal
			500 maximum

Note: Maximum speed relates to the appropriate design maximum speeds in new residential developments. In existing areas maximum speed relates to 85th percentile speed.

Source: - RTA's Guide to Traffic Generating Developments (2002)

As local streets Tongs Street, McNamara Street, Hamilton Street, Dale's Road and Broockmanns Road should have traffic volumes less than 300 vtph to maintain an acceptable level of residential amenity within these roads.

Therefore the road capacity thresholds adopted in this assessment are as follows.

- Newell Highway – 1,800 vtph.
- McNamara Street, Hamilton Street and Broockmanns Road – 300 vtph.

As the two-way mid-block peak hour traffic data and traffic generation figures reported in ***Section 6.1*** in the AM and PM peak hour traffic volumes on the local and state road network during construction of the Solar Farm are still expected to be well below the existing capacity thresholds determined above then the local and state road network has sufficient spare two-way capacity to cater for the construction and operation of the Solar Farm. The addition of up to 18 vtph will not cause the capacity thresholds determined above to be reached therefore it can be concluded that the proposed development will not adversely impact on the local and state road network efficiency.

6.3 – Intersection Capacity

Based on the traffic volume data collected for the project, it has been determined that even during construction and post development, traffic volumes on the local and state road network are less than the traffic volume thresholds identified within Austroads *Guide to Traffic Management Part 6 – Intersections, Interchanges and Crossings,* reproduced below. The Guide states that if traffic volumes are not above these thresholds, then uninterrupted flow conditions can be assumed and little or no delay will be experienced by motorists at these intersections. No further intersection analysis is then required.

Major road type[1]	Major road flow (vph)[2]	Minor road flow (vph)[3]
Two-lane	400	250
	500	200
	650	100
Four-lane	1000	100
	1500	50
	2000	25

Source: - Austroads Guide to Traffic Management – Part 6: Intersections, Interchanges and Crossings (2010).

Peak traffic volumes on all intersections along the transportation route including the site access intersection will remain with major road flows less than 400 vtph and minor road traffic volumes less than 250 vtph post development therefore all these intersections will remain operating with uninterrupted flow conditions with little if any delay for motorists. This also means that no special lane treatments are required at the proposed site access and a normal heavy duty rural access would be sufficient for the development.

Overall it can be concluded that the proposed Solar Farm at the site will not adversely impact on the efficiency and effectiveness of the local and state road network.

6.4 Access Assessment

As the proposed access to the development services a user class 1 (long term) car parking facility with less than 25 car spaces fronting a local road it is required to be a category 1 access (Table 3.1 of *AS2890.1-2004 Parking Facilities – Part 1 Off-street car parking*). Table 3.2 of the Standard then specifies a category 1 access facility as a combined entry / exit between 3.0 to 5.5 metres wide. The proposed entrance width at the combined entry / exit access at Broockmanns Road will need to be a minimum 12.5 metres wide to cater for the swept turning paths for delivery vehicles during construction stage to satisfy the requirements of Australian Standard *AS2890.1-2004 Parking Facilities – Part 1 Off-street car parking* and Australian Standard *AS2890.2-2002 Parking Facilities – Part 2 Off-street commercial vehicle facilities.*

Sight distance at the proposed access off Broockmanns Road was observed to be in excess of 300 metres in each direction therefore complies with the requirements of Figure 3.2 of Australian Standard *AS2890.1-2004 Parking Facilities – Part 1 Off-street car parking (70 metres desirable for 50 km/h*) as well as Austroads *Guide to Road Design – Part 4A – Unsignalised and signalised intersections - Table 3.2 (100 metres for 50 km/h)* for safe intersection sight distance.

It is therefore concluded that the proposed site access is suitably located and satisfactory for use for the Solar Farm as it complies with the requirements of Australian Standard *AS2890.1-2004 Parking Facilities – Part 1 Off-street car parking* and Australian Standard *AS2890.2-2002 Parking Facilities – Part 2 Off-street commercial vehicle facilities.*

The main issue with access for construction vehicles to the site is the suitability of the local road network to safely cater for heavy vehicle deliveries. In this regard it is noted that both McNamara Street and Broockmanns Road are B-Double designated routes and the rest of the transportation route has a sealed pavement of a minimum 6 metres wide which complies with Austroads Standards for Rural Roads with less than 500 vtph. It would therefore allow two heavy vehicles to pass each other at low speed. Therefore it is considered the proposed transportation routes to the site are suitable to carry heavy vehicles and thus are suitable to cater for the construction traffic from the Solar Farm construction. However, the additional heavy vehicle loading from the construction will accelerate the deterioration in the sealed pavement along the transportation route. It is therefore recommended that a dilapidation report be prepared for the project in consultation with Berrigan Shire Council to identify unsatisfactory pavement damage caused by the construction of the Solar Farm and ensure the road network is repaired to Council's satisfaction post the construction stage of the development. This will require pre and post construction stage inspections of the road pavement along the proposed transport routes.

Overall with a suitable condition of consent included for the preparation of a dilapidation report covering the proposed transportation routes and the satisfactory repair of the local road network post construction it is considered the local and state road network would be suitable to cater for the expected construction traffic associated with the development.

7.0 ON-SITE CAR PARKING

On-site car parking for the proposal is required to comply with the Industrial Development controls within Berrigan Development Control Plan (DCP) (2015). Adopting the industrial development rates for this project the relevant on-site car parking provision during the operation of the Solar Farm is.

- *1 space per 100 m^2 GFA.*

With no buildings on the site and only 1 employee engaged in the day to day operation of the Solar Farm the development is only required to provide 1 on-site car parking space to comply with the DCP.

However it is the responsibility of the applicant to also provide sufficient on-site car parking for construction employees during the duration of the construction of the development for the development to comply with the car parking objectives of the DCP. The site plan shows provision of a construction laydown area with provision to accommodate at least the expected employee vehicle generation of 10 vehicles which is also in excess of the Industrial land use requirements of the Berrigan DCP (2014). With significant overflow parking areas also on site it is considered reasonable to conclude the development provides sufficient on-site car parking that complies with the objectives and controls related to car parking required within the Berrigan DCP (2014).

A review of the car parking plans indicates the car parking area is sufficient in size such that parking bays and aisle widths would comply with the requirements of Australian Standard *AS2890.1-2004 Parking Facilities – Part 1 Off-street car parking* and this could be suitably conditioned on the consent for inclusion in Construction Certificate drawings. Therefore the on-site car parking is considered suitable for the development ensuring all vehicle movements to and from the site off Broockmanns Road will be undertaken in a forward direction.

8.0 ALTERNATE TRANSPORT MODES

The proposed development will not generate any increase in public transport demand during both the construction and operational phases of the development. Therefore there is no nexus for the provision of new services or improved infrastructure resulting from the development. Similarly, the development will not generate any additional pedestrian or cycle traffic during both the construction and operation phases of the development therefore no nexus exists for the provision of additional pedestrian paths or cycle ways near the site.

9.0 CONCLUSIONS

This traffic and parking assessment for the proposed Solar Photovoltaic (PV) Power Farm (up to 5MW) on Lot 61 DP 1053533 – 231 Broockmanns Road, Finley has determined the following:

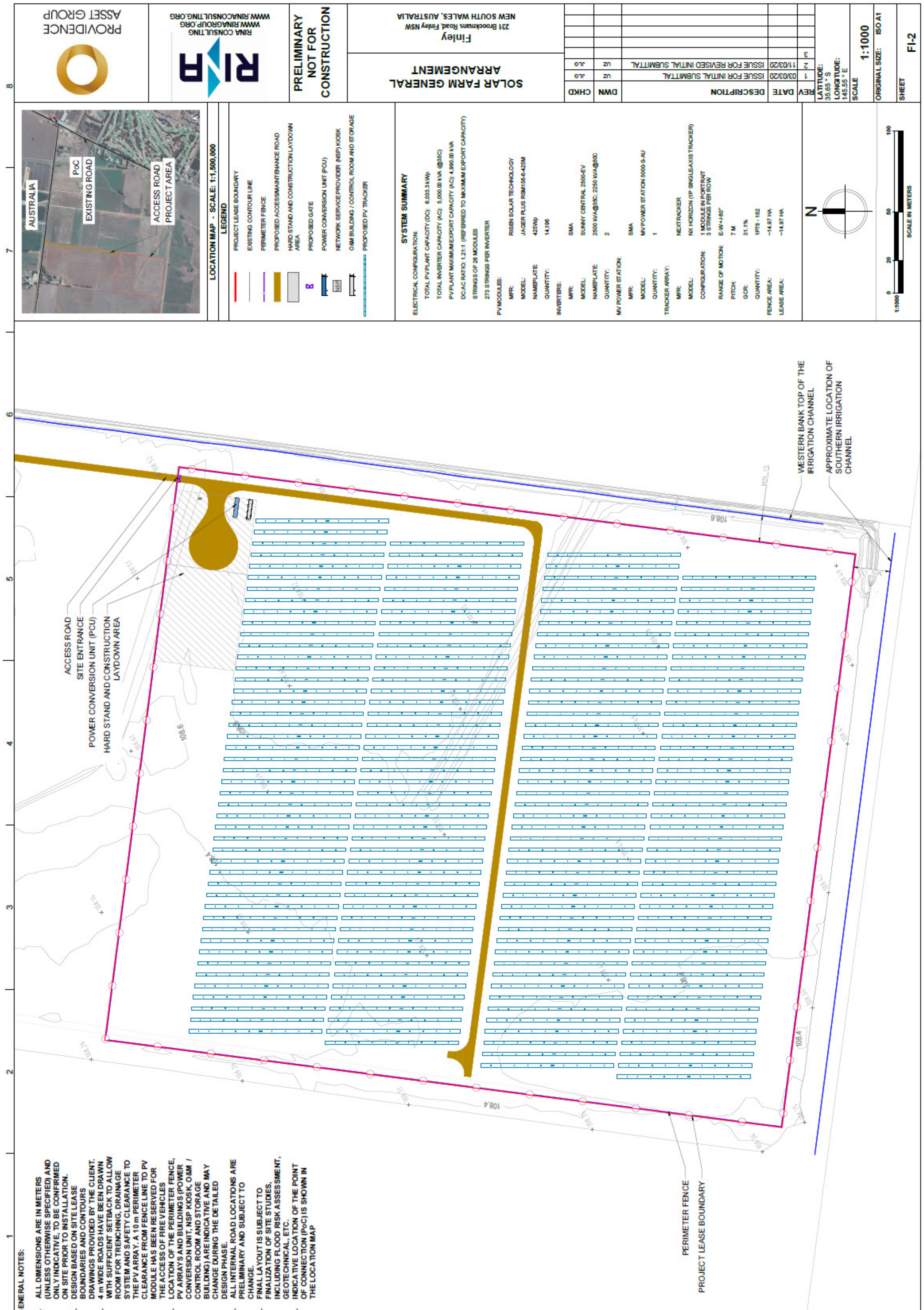
- The development during construction will generate up to an additional 18 vehicle movements to and from the site during the weekday AM and PM peak periods but only 2 vtph during the operation of the Solar Farm.
- The existing peak traffic volumes on the local road network are well below the two-way mid-block capacity threshold of 1,800 vtph for the Newell Highway (LoS C) as well as the environmental capacity of 200 vtph for the local road network (McNamara Street, Hamilton Street and Broockmanns Road). Traffic volumes will remain below these thresholds during the construction and operation of the development.
- All intersections along the main transportation route from the Newell Highway to the site will continue to operate satisfactorily and with uninterrupted flow conditions with little if any delay to motorists during construction and post development.
- Therefore, the additional construction and operational traffic generated by this development will not adversely impact on the efficiency or effectiveness of the local and state road network.
- The proposed site access is suitable for use for construction and operation of the development being compliant with Australian Standard and Austroads requirements.
- With a suitable condition of consent included for the preparation of a dilapidation report covering the proposed transportation routes and the satisfactory repair of the local road network post construction it is considered the local and state road network would be suitable to cater for the expected construction traffic associated with the development.
- There is sufficient area on-site to accommodate the expected peak parking demand generated by the development during both construction and operation with the provision of an AS2890.1-2004 compliant car park within the construction laydown area for a minimum 10 spaces as well as the provision of numerous overflow parking areas on the site.
- The proposed development will not generate any increase in public transport demand therefore no nexus exists for the provision of new services or improved infrastructure resulting from the development. Similarly, the development will not generate any additional pedestrian or cycle traffic therefore no nexus exists for the provision of additional pedestrian paths or cycle ways near the site.

10.0 RECOMMENDATION

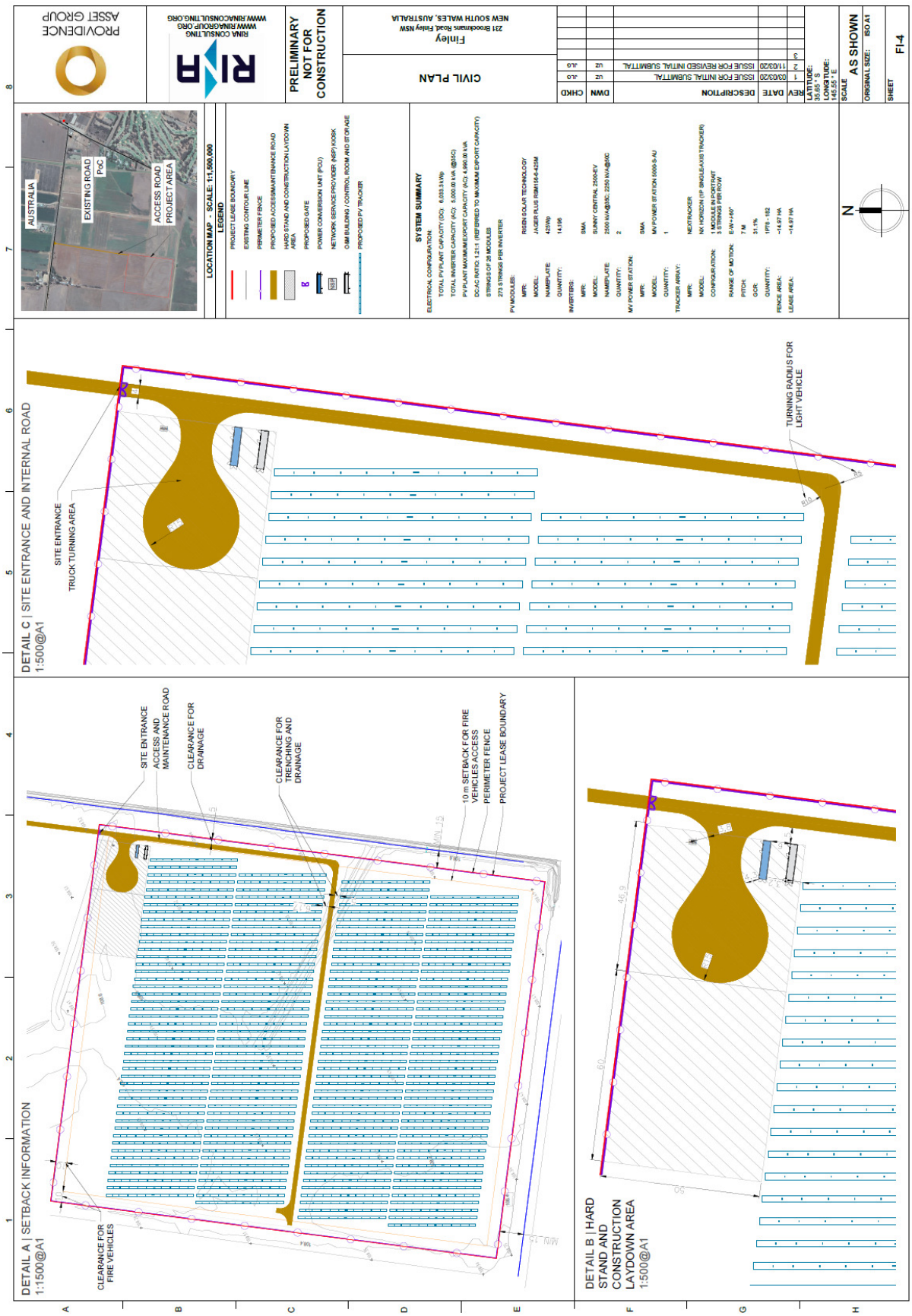
Having carried out this traffic and parking assessment for the proposed Solar Photovoltaic (PV) Power Farm (up to 5MW) on Lot 61 DP 1053533 – 231 Broockmanns Road Finley, it is recommended that the proposal can be supported from a traffic perspective as the development will not adversely impact on the local road network and complies with all relevant requirements of Berrigan Shire Council, Austroads, Australian Standards and NSW RMS.

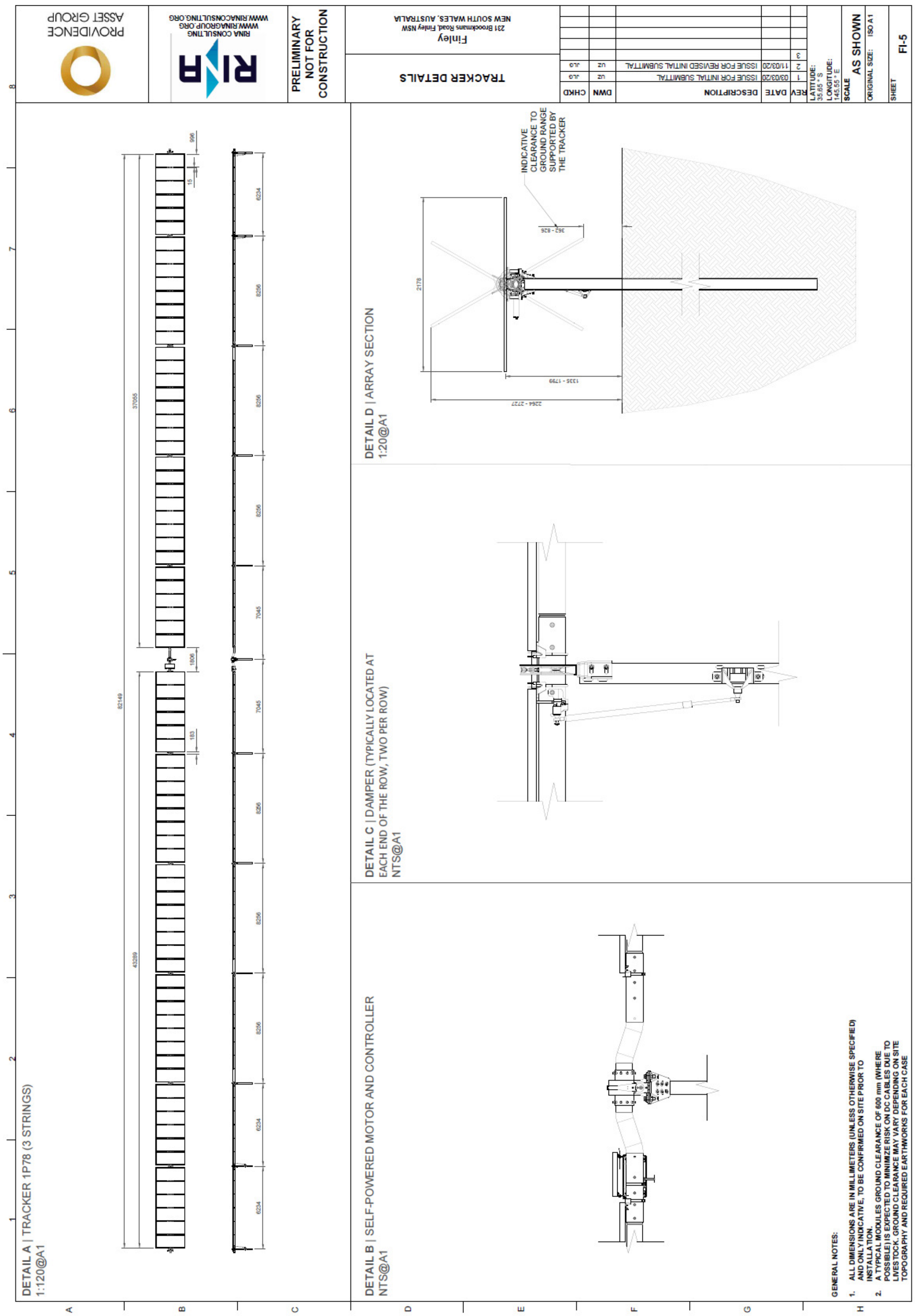
JR Garry BE (Civil), Masters of Traffic
Director
Intersect Traffic Pty Ltd

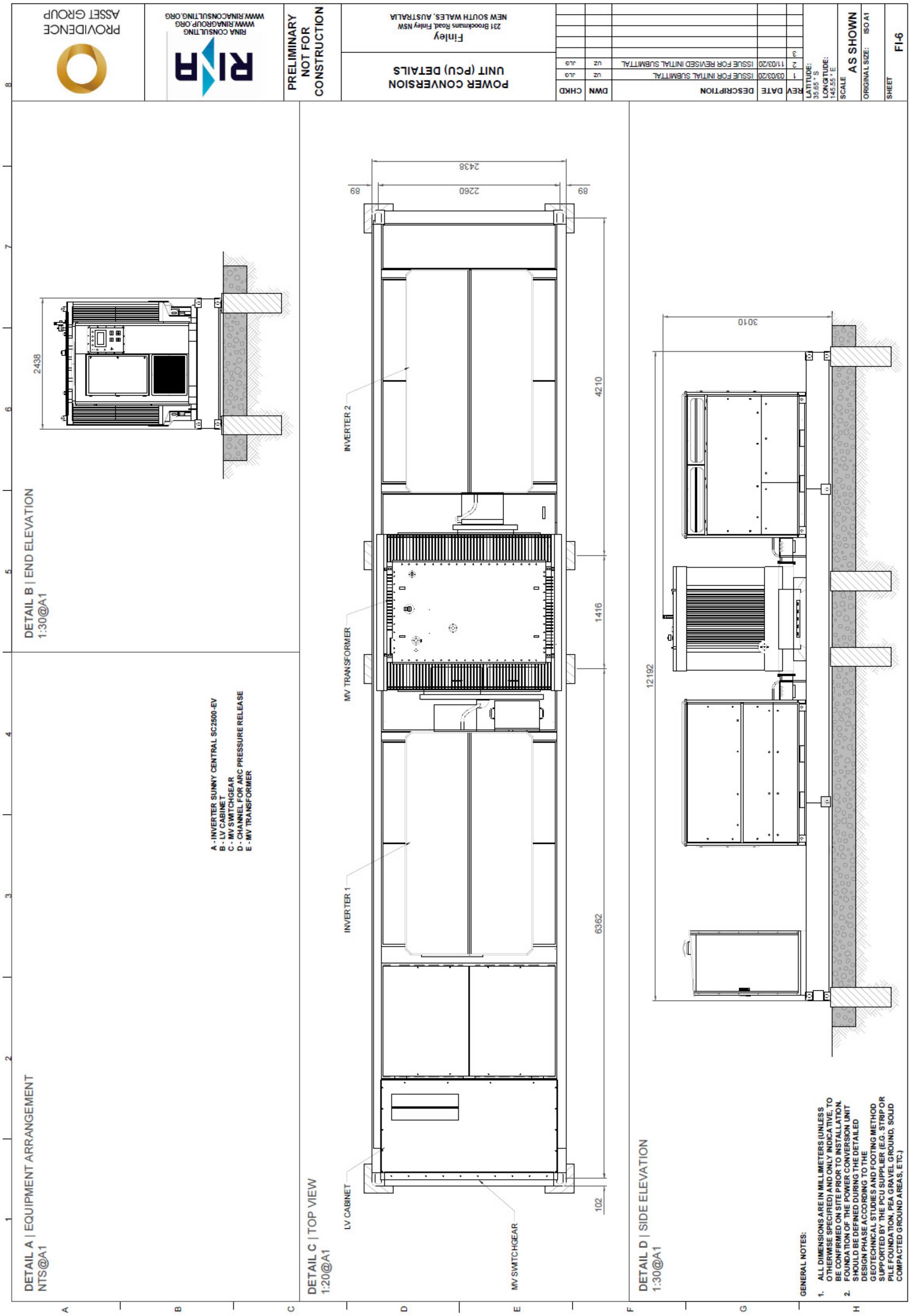
ATTACHMENT A
DEVELOPMENT PLANS

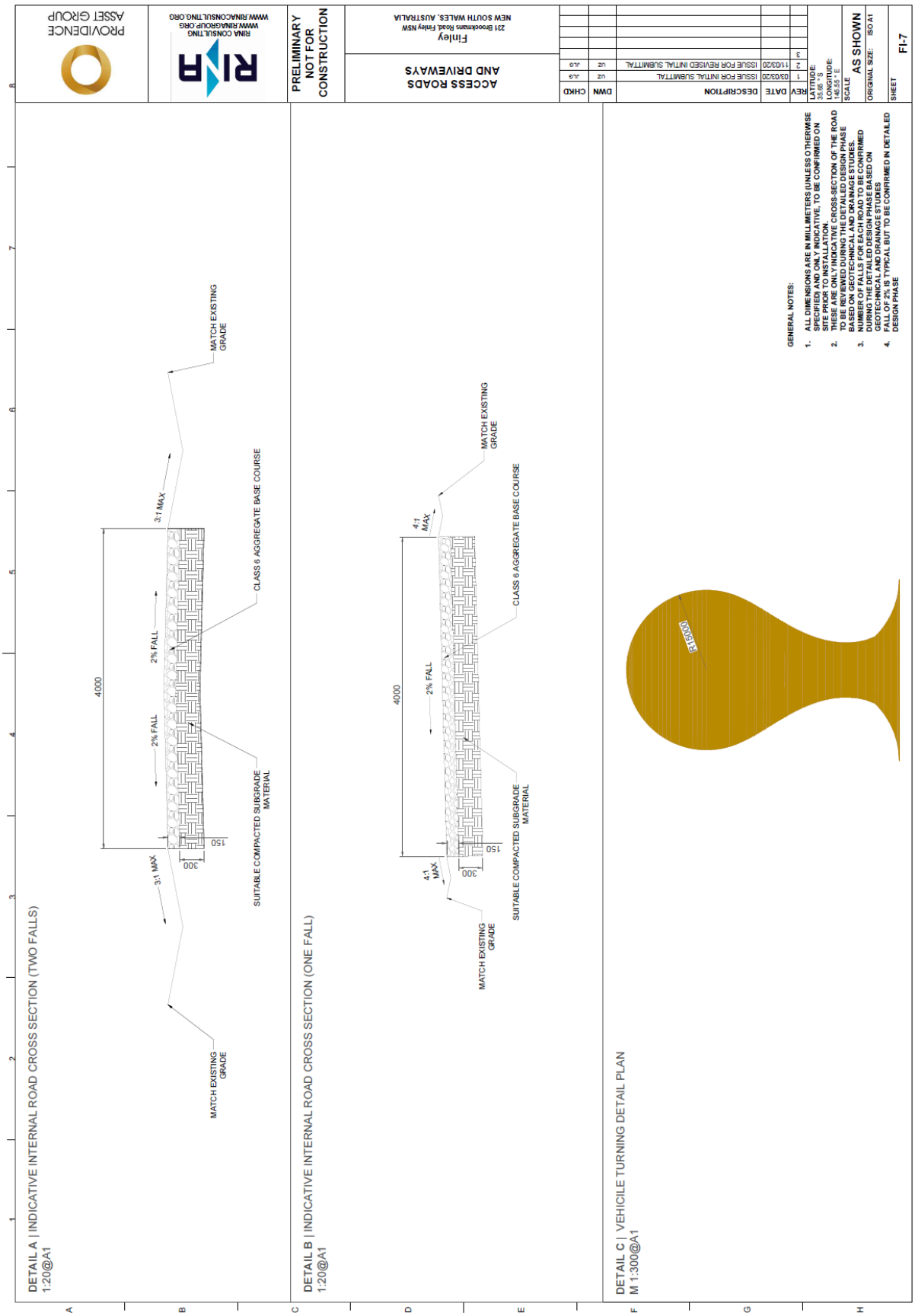

PRELIMINARY NOT FOR CONSTRUCTION
SOLAR FARM GENERAL ARRANGEMENT
Finley
231 Broockmanns Road, Finley NSW
NEW SOUTH WALES, AUSTRALIA
PROVIDENCE ASSET GROUP
RINA CONSULTING
LOCATION MAP - SCALE: 1:1,500,000
LEGEND
SYSTEM SUMMARY
ACCESS ROAD
SITE ENTRANCE
POWER CONVERSION UNIT (PCU)
HARD STAND AND CONSTRUCTION LAYDOWN AREA
WESTERN BANK TOP OF THE IRRIGATION CHANNEL
APPROXIMATE LOCATION OF SOUTHERN IRRIGATION CHANNEL
PERIMETER FENCE
PROJECT LEASE BOUNDARY
GENERAL NOTES:
1:1000
ISO A1
FI-2

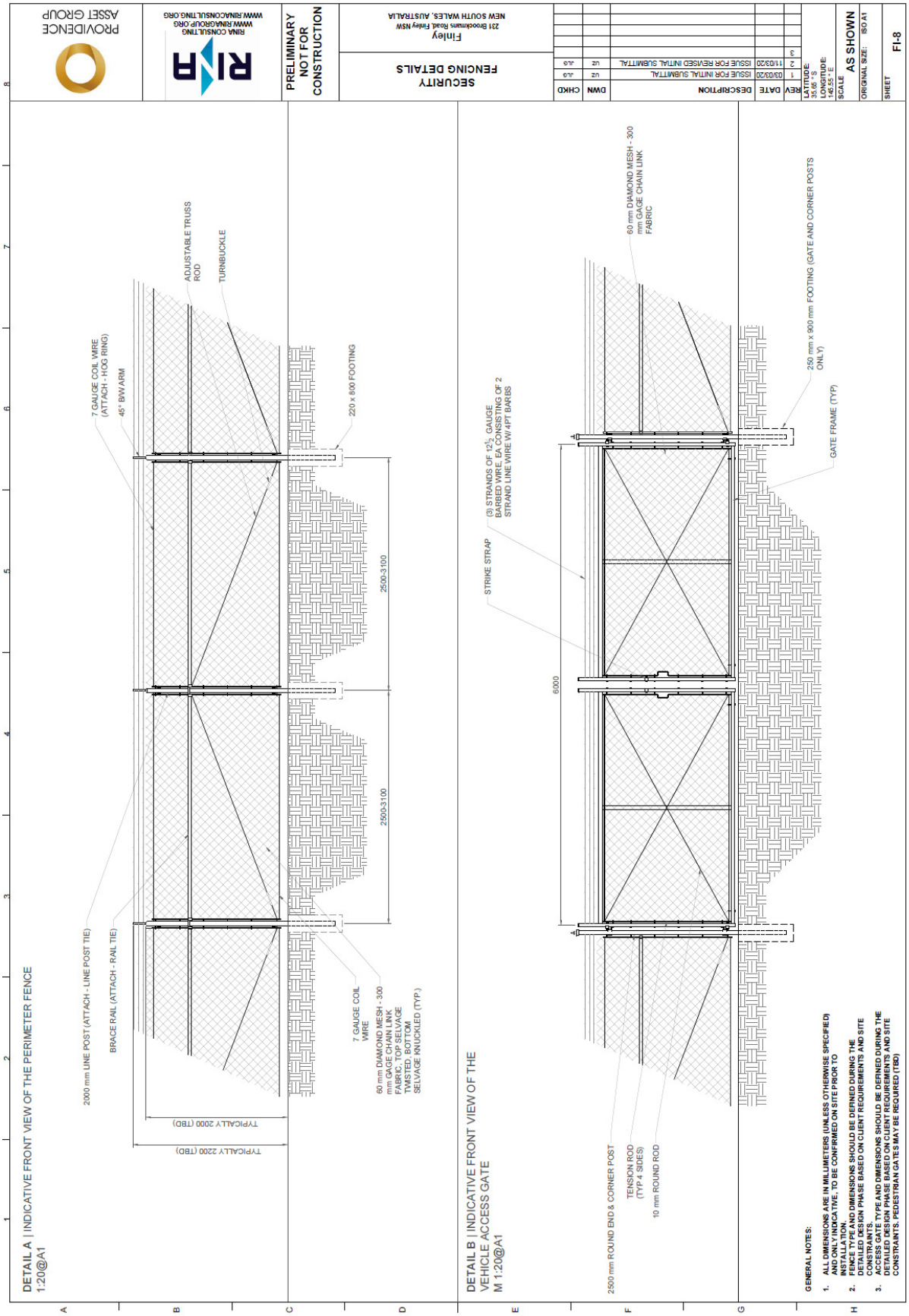

DETAIL B | PROPOSED ACCESS ROAD ROUTE
1:1500@A1
EXISTING PUBLIC ROAD
EXISTING OVERHEAD LINE
INDICATIVE EXISTING ROAD OUTLINE
ACCESS/MAINTENANCE ROAD
LENGTH FROM EXISTING
ROAD TO GATE: ~700 m
PROPOSED GATE LOCATION
DETAIL A | SETBACK INFORMATION
1:1500@A1
POTENTIAL LANDSCAPE
MITIGATION
WESTERN BANK TOP OF THE
IRRIGATION CHANNEL
10 m SETBACK FOR FIRE
VEHICLES ACCESS
MIN 15 m
PERIMETER FENCE
AREA: ~14.97 HA
PROJECT LEASE BOUNDARY
AREA: ~14.97 HA
APPROXIMATE LOCATION OF
SOUTHERN IRRIGATION CHANNEL
~356
~421
GENERAL NOTES:
1. ALL DIMENSIONS ARE IN METERS (UNLESS OTHERWISE SPECIFIED) AND ONLY INDICATIVE, TO BE CONFIRMED ON SITE PRIOR TO INSTALLATION.
2. DESIGN BASED ON SITE LEASE BOUNDARIES AND CONTOURS DRAWINGS PROVIDED BY THE CLIENT.
3. 4 m WIDE ROADS HAVE BEEN DRAWN WITH SUFFICIENT SETBACK TO ALLOW ROOM FOR TRENCHING, DRAINAGE SYSTEM AND SAFETY CLEARANCE TO THE PV ARRAY. A 10 m PERIMETER CLEARANCE FROM FENCE LINE TO PV MODULE HAS BEEN RESERVED FOR THE ACCESS OF FIRE VEHICLES
4. LOCATION OF THE PERIMETER FENCE ARE INDICATIVE AND MAY CHANGE DURING THE DETAILED DESIGN PHASE.
5. FINAL LAYOUT IS SUBJECT TO FINALIZATION OF SITE STUDIES, INCLUDING FLOOD RISK ASSESSMENT, GEOTECHNICAL, ETC.
6. BASED ON THE CONTOUR DRAWINGS THE SITE IS PRACTICALLY FLAT
PROVIDENCE
ASSET GROUP
RINA CONSULTING
WWW.RINAGROUP.ORG
WWW.RINACONSULTING.ORG
PRELIMINARY
NOT FOR
CONSTRUCTION
Finley
231 Broockmanns Road, Finley NSW
NEW SOUTH WALES, AUSTRALIA
KEY SITE DETAILS
REV DATE DESCRIPTION DWN CHKD
1 03/03/20 ISSUE FOR INITIAL SUBMITTAL UZ JLG
2 11/03/20 ISSUE FOR REVISED INITIAL SUBMITTAL UZ JLG
LATITUDE: 35.65 ° S
LONGITUDE: 145.55 ° E
SCALE AS SHOWN
ORIGINAL SIZE: ISO A1
SHEET FI-3
N

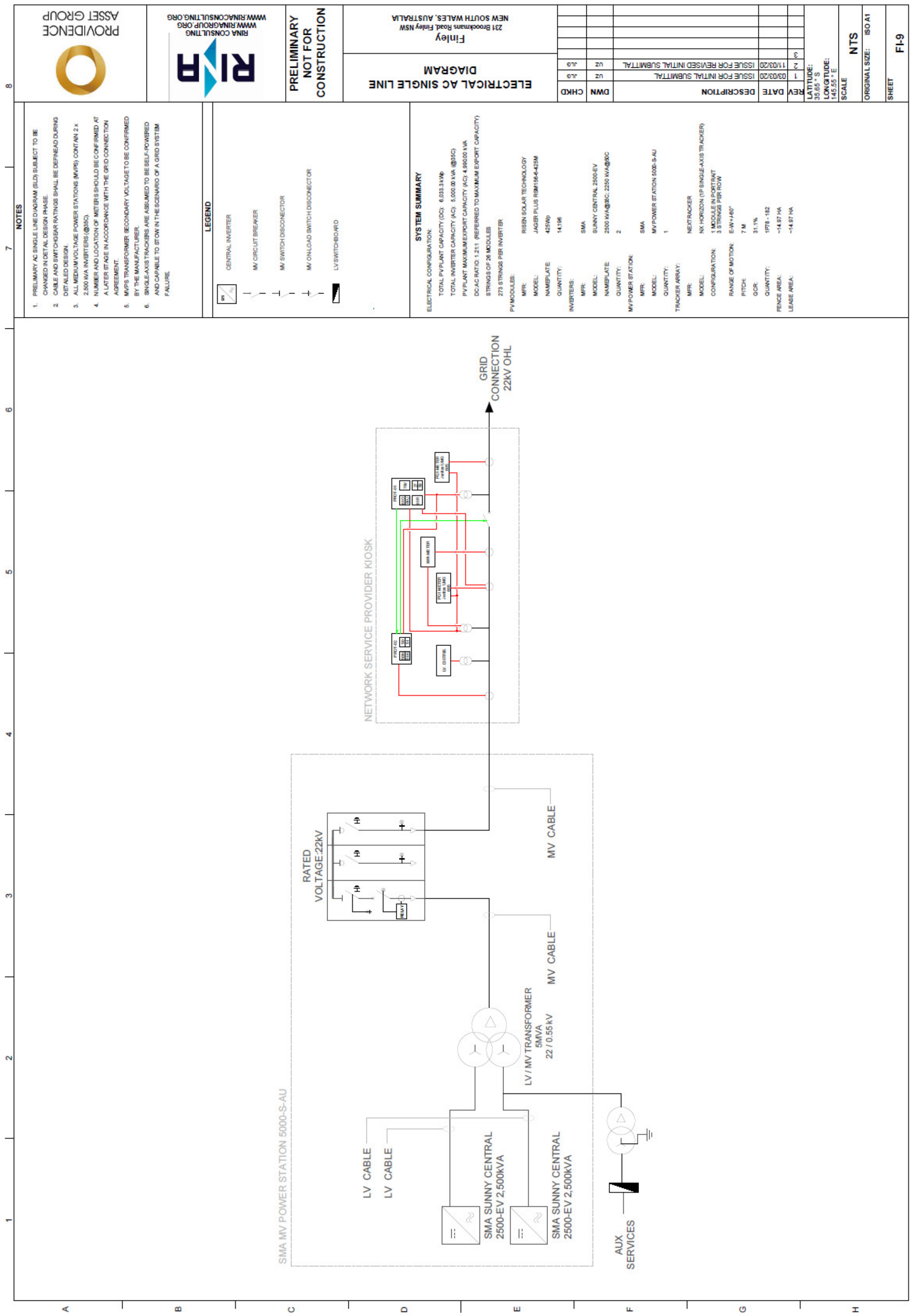

PROVIDENCE ASSET GROUP
RINA CONSULTING
WWW.RINAGROUP.ORG
WWW.RINACONSULTING.ORG
PRELIMINARY NOT FOR CONSTRUCTION
CIVIL PLAN
Finley
231 Broockmans Road, Finley NSW
NEW SOUTH WALES, AUSTRALIA
DESCRIPTION
ISSUE FOR INITIAL SUBMITTAL
ISSUE FOR REVISED INITIAL SUBMITTAL
DATE
03/03/20
11/03/20
DWN
CHKD
LATITUDE: 35.65° S
LONGITUDE: 145.55° E
SCALE AS SHOWN
ORIGINAL SIZE: ISO A1
SHEET FI-4
LOCATION MAP - SCALE: 1:1,500,000
AUSTRALIA
EXISTING ROAD
PoC
ACCESS ROAD
PROJECT AREA
LEGEND
PROJECT LEASE BOUNDARY
EXISTING CONTOUR LINE
PERIMETER FENCE
PROPOSED ACCESS/MAINTENANCE ROAD
HARD STAND AND CONSTRUCTION LAYDOWN AREA
PROPOSED GATE
POWER CONVERSION UNIT (PCU)
NETWORK SERVICE PROVIDER (NSP) KIOSK
O&M BUILDING / CONTROL ROOM AND STORAGE
PROPOSED PV TRACKER
SYSTEM SUMMARY
ELECTRICAL CONFIGURATION:
TOTAL PV PLANT CAPACITY (DC): 6,033.3 kWp
TOTAL INVERTER CAPACITY (AC): 5,000.00 kVA @35C
PV PLANT MAXIMUM EXPORT CAPACITY (AC): 4,990.00 kVA
DC:AC RATIO: 1.21:1 (REFERRED TO MAXIMUM EXPORT CAPACITY)
STRINGS OF 26 MODULES
273 STRINGS PER INVERTER
PV MODULES:
MFR: RISEN SOLAR TECHNOLOGY
MODEL: JAGER PLUS RSM156-6-425M
NAMEPLATE: 425Wp
QUANTITY: 14,196
INVERTERS:
MFR: SMA
MODEL: SUNNY CENTRAL 2500-EV
NAMEPLATE: 2500 kVA@40C, 2250 kVA@50C
QUANTITY: 2
MV POWER STATION:
MFR: SMA
MODEL: MV POWER STATION 5000-S AU
QUANTITY: 1
TRACKER ARRAY:
MFR: NEXTRACKER
MODEL: NX HORIZON (9P SINGLE-AXIS TRACKER)
CONFIGURATION: 1 MODULE IN PORTRAIT 3 STRINGS PER ROW
RANGE OF MOTION: E-W +/-60°
PITCH: 7 M
GCR: 31.1%
QUANTITY: 1P78 - 182
FENCE AREA: ~14.97 HA
LEASE AREA: ~14.97 HA
N
DETAIL C | SITE ENTRANCE AND INTERNAL ROAD
1:500@A1
SITE ENTRANCE
TRUCK TURNING AREA
TURNING RADIUS FOR LIGHT VEHICLE
DETAIL A | SETBACK INFORMATION
1:1500@A1
SITE ENTRANCE
ACCESS AND MAINTENANCE ROAD
CLEARANCE FOR DRAINAGE
CLEARANCE FOR TERRACING AND DRAINAGE
10 m SETBACK FOR FIRE VEHICLES ACCESS
PERIMETER FENCE
PROJECT LEASE BOUNDARY
CLEARANCE FOR FIRE VEHICLES
DETAIL B | HARD STAND AND CONSTRUCTION LAYDOWN AREA
1:500@A1
A
B
C
D
E
F
G
H
1
2
3
4
5
6
7
8


PROVIDENCE ASSET GROUP
RINA CONSULTING
PRELIMINARY NOT FOR CONSTRUCTION
Finley
231 Broockmanns Road, Finley NSW
NEW SOUTH WALES, AUSTRALIA
TRACKER DETAILS
AS SHOWN
FI-5
DETAIL A | TRACKER 1P78 (3 STRINGS)
1:120@A1
DETAIL B | SELF-POWERED MOTOR AND CONTROLLER
NTS@A1
DETAIL C | DAMPER (TYPICALLY LOCATED AT EACH END OF THE ROW, TWO PER ROW)
NTS@A1
DETAIL D | ARRAY SECTION
1:20@A1
INDICATIVE CLEARANCE TO GROUND RANGE SUPPORTED BY THE TRACKER
GENERAL NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS (UNLESS OTHERWISE SPECIFIED) AND ONLY INDICATIVE, TO BE CONFIRMED ON SITE PRIOR TO INSTALLATION.
2. A TYPICAL MODULES GROUND CLEARANCE OF 600 mm (WHERE POSSIBLE) IS EXPECTED TO MINIMIZE RISK ON DC CABLES DUE TO LIVESTOCK. GROUND CLEARANCE MAY VARY DEPENDING ON SITE TOPOGRAPHY AND REQUIRED EARTHWORKS FOR EACH CASE


POWER CONVERSION UNIT (PCU) DETAILS
Finley
231 Broockmanns Road, Finley NSW
NEW SOUTH WALES, AUSTRALIA
PRELIMINARY NOT FOR CONSTRUCTION
PROVIDENCE ASSET GROUP
RINA CONSULTING
WWW.RINAGROUP.ORG
WWW.RINACONSULTING.ORG
1 03/03/20 ISSUE FOR INITIAL SUBMITTAL
2 11/03/20 ISSUE FOR REVISED INITIAL SUBMITTAL
REV DATE DESCRIPTION DWN CHKD
AS SHOWN
ISO A1
FI-6
DETAIL A | EQUIPMENT ARRANGEMENT
NTS@A1
A - INVERTER SUNNY CENTRAL SC2500-EV
B - LV CABINET
C - MV SWITCHGEAR
D - CHANNEL FOR ARC PRESSURE RELEASE
E - MV TRANSFORMER
DETAIL B | END ELEVATION
1:30@A1
2438
DETAIL C | TOP VIEW
1:20@A1
INVERTER 1
INVERTER 2
MV TRANSFORMER
LV CABINET
MV SWITCHGEAR
2438
2260
89
4210
1416
6362
102
DETAIL D | SIDE ELEVATION
1:30@A1
3010
12192
GENERAL NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS (UNLESS OTHERWISE SPECIFIED) AND ONLY INDICATIVE, TO BE CONFIRMED ON SITE PRIOR TO INSTALLATION.
2. FOUNDATION OF THE POWER CONVERSION UNIT SHOULD BE DEFINED DURING THE DETAILED DESIGN PHASE ACCORDING TO THE GEOTECHNICAL STUDIES AND FOOTING METHOD SUPPORTED BY THE PCU SUPPLIER (E.G. STRIP OR PILE FOUNDATION, PEA GRAVEL GROUND, SOLID COMPACTED GROUND AREAS, ETC.)


DETAIL A | INDICATIVE INTERNAL ROAD CROSS SECTION (TWO FALLS)
1:20@A1
MATCH EXISTING GRADE
3:1 MAX
2% FALL
2% FALL
3:1 MAX
MATCH EXISTING GRADE
4000
300
150
CLASS 6 AGGREGATE BASE COURSE
SUITABLE COMPACTED SUBGRADE MATERIAL
DETAIL B | INDICATIVE INTERNAL ROAD CROSS SECTION (ONE FALL)
1:20@A1
MATCH EXISTING GRADE
4:1 MAX
2% FALL
4:1 MAX
MATCH EXISTING GRADE
4000
300
150
CLASS 6 AGGREGATE BASE COURSE
SUITABLE COMPACTED SUBGRADE MATERIAL
DETAIL C | VEHICLE TURNING DETAIL PLAN
M 1:300@A1
R15000
GENERAL NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS (UNLESS OTHERWISE SPECIFIED AND ONLY INDICATIVE, TO BE CONFIRMED ON SITE PRIOR TO INSTALLATION.
2. THESE ARE ONLY INDICATIVE CROSS-SECTION OF THE ROAD TO BE REVISED DURING THE DETAILED DESIGN PHASE BASED ON GEOTECHNICAL AND DRAINAGE STUDIES.
3. NUMBER OF FALLS FOR EACH ROAD TO BE CONFIRMED DURING THE DETAILED DESIGN PHASE BASED ON GEOTECHNICAL AND DRAINAGE STUDIES
4. FALL OF 2% IS TYPICAL BUT TO BE CONFIRMED IN DETAILED DESIGN PHASE
REV DATE DESCRIPTION DWN CHKD
1 03/03/20 ISSUE FOR INITIAL SUBMITTAL UZ JLG
2 11/03/20 ISSUE FOR REVISED INITIAL SUBMITTAL UZ JLG
LATITUDE: 34°38'35" S
LONGITUDE: 146°55' E
SCALE AS SHOWN
ORIGINAL SIZE: ISO A1
SHEET FI-7
ACCESS ROADS AND DRIVEWAYS
Finley
231 Broockmans Road, Finley NSW
NEW SOUTH WALES, AUSTRALIA
PRELIMINARY NOT FOR CONSTRUCTION
RINA CONSULTING
WWW.RINAGROUP.ORG
WWW.RINACONSULTING.ORG
PROVIDENCE ASSET GROUP

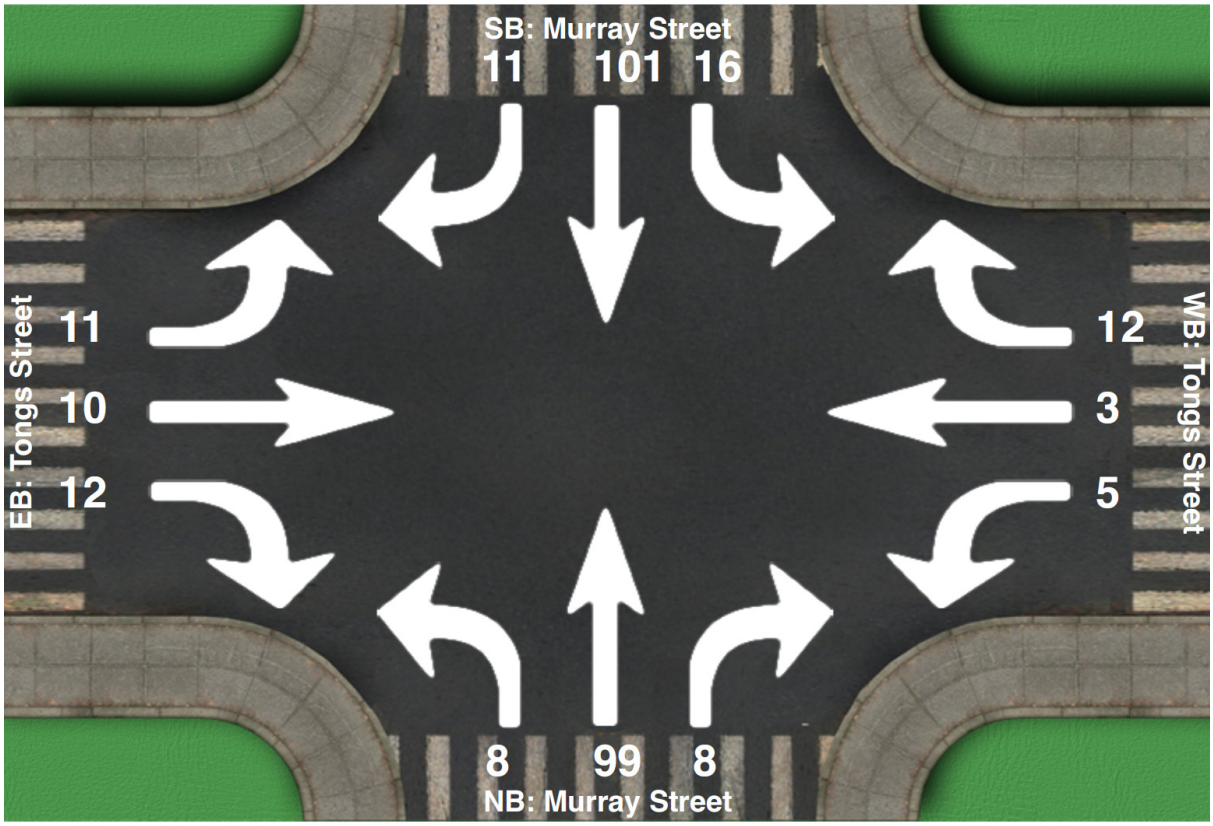

PROVIDENCE ASSET GROUP
RINA CONSULTING WWW.RINAGROUP.ORG WWW.RINACONSULTING.ORG
PRELIMINARY NOT FOR CONSTRUCTION
SECURITY FENCING DETAILS
Finley 231 Broockmans Road, Finley NSW NEW SOUTH WALES, AUSTRALIA
DESCRIPTION
ISSUE FOR INITIAL SUBMITTAL
ISSUE FOR REVISED INITIAL SUBMITTAL
DATE
03/03/20
11/03/20
DWN
CHKD
LATITUDE: 35.65 °S
LONGITUDE: 145.61 °E
SCALE AS SHOWN
ORIGINAL SIZE: ISO A1
SHEET FI-8
DETAIL A | INDICATIVE FRONT VIEW OF THE PERIMETER FENCE
1:20@A1
2000 mm LINE POST (ATTACH - LINE POST TIE)
BRACE RAIL (ATTACH - RAIL TIE)
7 GAUGE COIL WIRE (ATTACH - HOG RING)
45° B/W ARM
ADJUSTABLE TRUSS ROD
TURNBUCKLE
220 x 800 FOOTING
2500-3100
7 GAUGE COIL WIRE
60 mm DIAMOND MESH - 300 mm GAGE CHAIN LINK FABRIC, TOP SELVAGE TWISTED, BOTTOM SELVAGE KNUCKLED (TYP.)
TYPICALLY 2000 (TBD)
TYPICALLY 2200 (TBD)
DETAIL B | INDICATIVE FRONT VIEW OF THE VEHICLE ACCESS GATE
M 1:20@A1
STRIKE STRAP
(3) STRANDS OF 12½ GAUGE BARBED WIRE, EA CONSISTING OF 2 STRAND LINE WIRE W/ 4PT BARBS
60 mm DIAMOND MESH - 300 mm GAGE CHAIN LINK FABRIC
250 mm x 900 mm FOOTING (GATE AND CORNER POSTS ONLY)
GATE FRAME (TYP)
6000
2500 mm ROUND END & CORNER POST
TENSION ROD (TYP 4 SIDES)
10 mm ROUND ROD
GENERAL NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS (UNLESS OTHERWISE SPECIFIED) AND ONLY INDICATIVE, TO BE CONFIRMED ON SITE PRIOR TO INSTALLATION.
2. FENCE TYPE AND DIMENSIONS SHOULD BE DEFINED DURING THE DETAILED DESIGN PHASE BASED ON CLIENT REQUIREMENTS AND SITE CONSTRAINTS.
3. ACCESS GATE TYPE AND DIMENSIONS SHOULD BE DEFINED DURING THE DETAILED DESIGN PHASE BASED ON CLIENT REQUIREMENTS AND SITE CONSTRAINTS. PEDESTRIAN GATES MAY BE REQUIRED (TBD)


PROVIDENCE ASSET GROUP
RINA
PRELIMINARY NOT FOR CONSTRUCTION
ELECTRICAL AC SINGLE LINE DIAGRAM
Finley
NEW SOUTH WALES, AUSTRALIA
ISSUE FOR INITIAL SUBMITTAL
ISSUE FOR REVISED INITIAL SUBMITTAL
NTS
FI-9
NOTES
LEGEND
SYSTEM SUMMARY
GRID CONNECTION 22kV OHL
NETWORK SERVICE PROVIDER KIOSK
RATED VOLTAGE:22kV
MV CABLE
MV CABLE
LV / MV TRANSFORMER 5MVA 22 / 0.55 kV
LV CABLE
LV CABLE
SMA SUNNY CENTRAL 2500-EV 2,500kVA
SMA SUNNY CENTRAL 2500-EV 2,500kVA
AUX SERVICES
SMA MV POWER STATION 5000-S-AU

ATTACHMENT B
TRAFFIC COUNT DATA

Intersection Peak Hour

Location: Murray Street at Tongs Street, Finley
GPS Coordinates:
Date: 2020-03-04
Day of week: Wednesday
Weather:
Analyst: Jeff



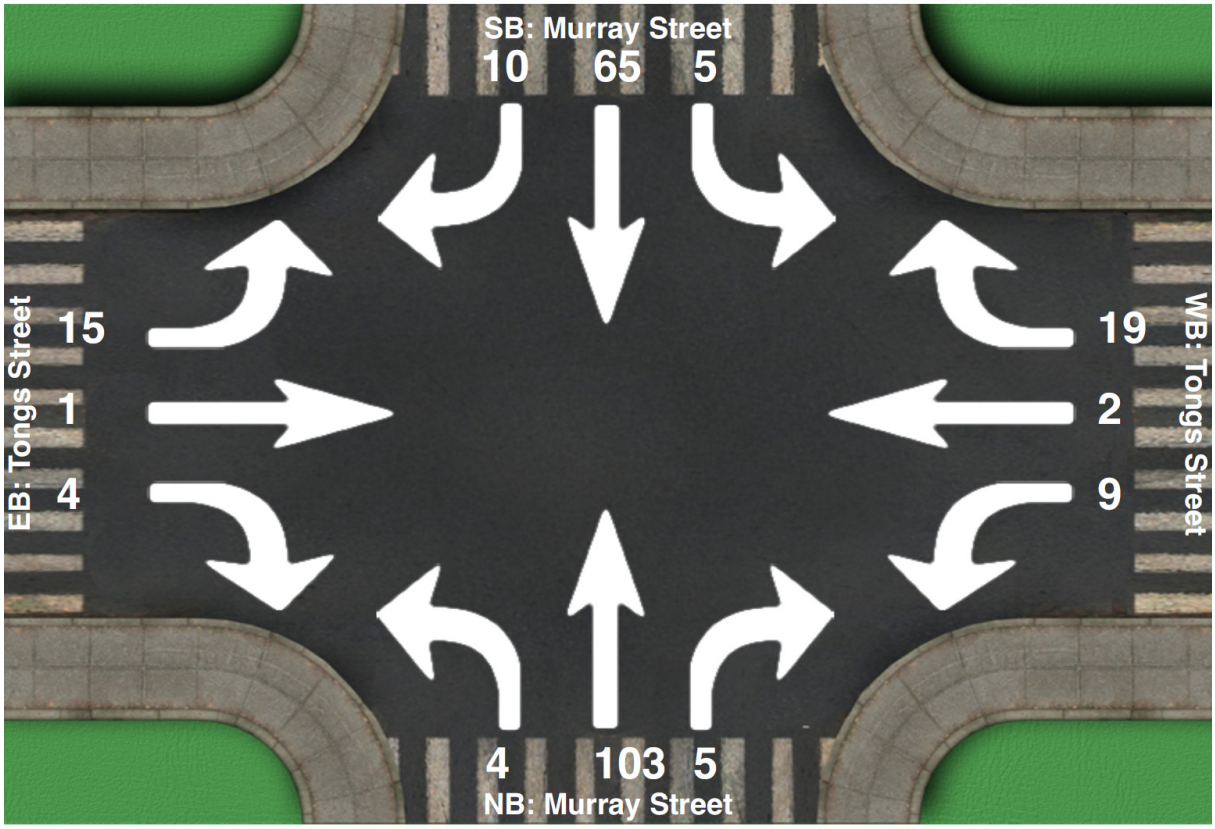
Intersection Peak Hour

15:00 - 16:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	16	101	11	5	3	12	8	99	8	11	10	12	296
Factor	0.57	0.84	0.55	0.62	0.25	0.43	0.50	0.80	0.50	0.92	0.62	0.43	0.90
Approach Factor	0.76			0.45			0.80			0.69			

Intersection Peak Hour

Location: Murray Street at Tongs Street, Finley
GPS Coordinates:
Date: 2020-03-05
Day of week: Thursday
Weather: Wet
Analyst: Jeff



Intersection Peak Hour

08:00 - 09:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	5	65	10	9	2	19	4	103	5	15	1	4	242
Factor	0.62	0.77	0.50	0.56	0.50	0.68	0.50	0.86	0.42	0.54	0.25	0.50	0.88
Approach Factor	0.83			0.62			0.82			0.62			

ATTACHMENT C
TRAFFIC GENERATION INFORMATION

Preliminary Manilla SF Vehicle Movement Guidance

Jake May, 05/02/2020

1 Traffic Generated by Construction Works

During the construction of the solar farm, it is estimated that approximately 50 x 40 ft containers will be transported to site. Added to these containers are waste traffic, equipment, temporary installations and workforce transport to and from site. A logistics agent will be engaged to manage the freight from the delivery port [TBC] to the solar farm site.

An estimation of the traffic created by the worksite is provided in Figure 1, below.

The vehicular traffic for the transport vehicles is based on a 3-axle rigid truck. The General Mass Limit (GML) for a 3-axle load is assumed to be 20 tonnes based on The Australian Trucking Association's 'Technical Advisory Procedure for Truck Configurations' [24]. Depending on the availability of vehicles it may be possible that a conventional B-doubles will transport equipment to site. The GML for this vehicle is 40 tonnes. In this case the vehicular traffic for the container loads will reduce by a factor of 2 for each B-double transporting equipment to site.

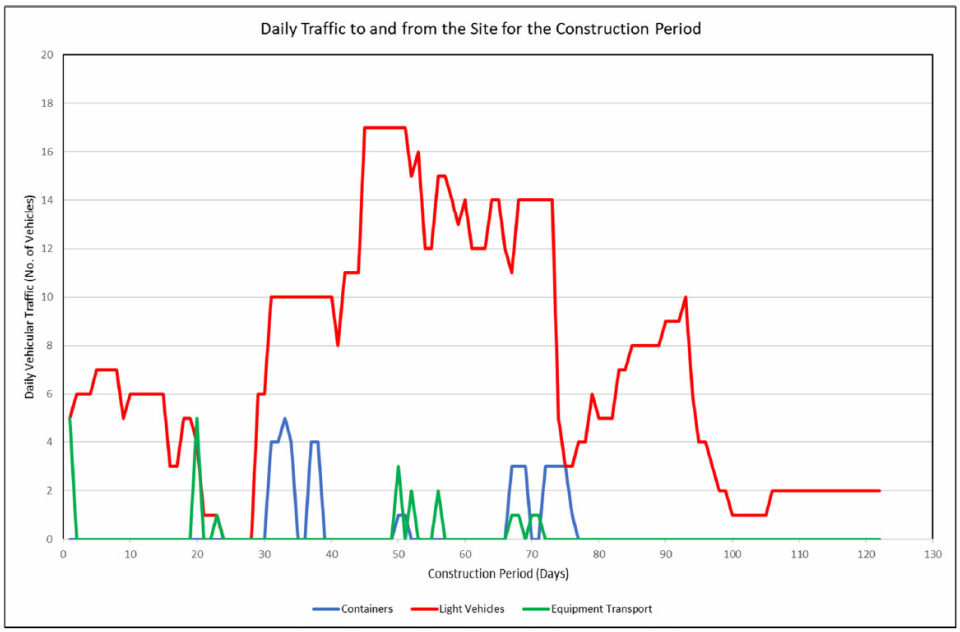


Figure 1 - Daily Traffic to and from Site for the Construction Period

At the peak of the equipment supply, the number of transport vehicles entering and leaving the solar farm site will be 4 to 5 daily for a period of just over a month into the construction period. There will be another busy week midway through the construction period where there will be approximately 3 transport vehicles entering and leaving the site daily.

All heavy transport to and from the site will predominantly be on standard working days between 8am and 4pm.

It is anticipated that there will be up to 30 personnel working on the site during the construction period that will generate the anticipated light vehicle traffic.

The light traffic will be concentrated at the beginning and the end of the day around 6-7am and 4-5pm. The container transport will be concentrated between 10am and 3pm.

2 Impact on Existing Traffic

With a maximum of eight to ten light vehicles and six to eight heavy vehicles travelling to and from the site daily, it is not anticipated that the increased traffic due to construction works will have any significant impact on the existing traffic.

3 Additional Road Signage of Existing Road

It is suggested that road signage is provided for the proposed site entrance on Manilla Road. The recommended locations of the warning signs be placed at distances of 200 metres approaching the intersection to the north and south. The warning signs will indicate that it is a construction site entrance. The entrance to the site on Mannum Road will be designed for the anticipated heavy transport loads volumes during the construction period that are detailed in Section 1. A Traffic Control Plan will be submitted to the DPTI Traffic Management Centre for approval, with all signage to be placed and maintained to the satisfaction of the Commissioner of Highways.

4 Parking

All parking for site personnel will be on site. This will be sign posted at the site entrance. Balance will not permit parking on Mannum Road and will incorporate this in the site induction.

5 O&M Traffic

Once the solar farm has been constructed and has entered the “operations and maintenance” stage the traffic onto site will consist of light vehicles, with few exceptions, at a frequency of 1 to 5 visits per fortnight.

5MW Solar Farm - Typical Vehicle Movements			
Construction - Major Equipment	Load	Quantity	Comments
Piling & Tracker Components	40' Container / Trailer	24	Doubles if permitted / practical
PV Modules	40' Container / Trailer	26	Doubles if permitted / practical
Switchgear	20' Container / Trailer	1	
Inverters	20' Container / Trailer	2	
Cranes	~50T	3	
Cables	40' Container / Trailer	2	Doubles if permitted / practical
Balance of Plant (BOP)	40' Container / Trailer	3	
Civil Plant	Float or Drop Deck	8	4ea at mob / demob
Piling Plant	Float or Drop Deck	4	2ea at mob / demob
Site Facilities	Float/Drop Deck/40' Trailer	8	4ea at mob / demob
Light trucks - 6 wheelers	local deliveries - sand, gen fteight etc	10	
Light trucks - 4 wheelers	local deliveries - sand, gen fteight etc	10	
		101	
Construction - Light Vehicles / Other	Load	Quantity	Comments
Light Vehicle - 4WD ute or similar	Personell / tools	384	Average 4 per day
Light Vehicle - ?	Workforce private vehicles	576	Average 6 per day - depends on engagement of workforce
		960	
O&M	Load	Quantity	Comments
Light Vehicle - 4WD ute or similar	fortnightly inspection	30	1 per fortnight, plus additional
Light Vehicle - 4WD ute or similar	3 monthly Inspections	8	2 visits, 4 times per year
Light Vehicle - 4WD ute or similar	Faults	4	
Light trucks - 4 wheelers	PV Module cleaning	2	Once per Year
		44	