TRAFFIC IMPACT ASSESSMENT

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

LOT 191 DP 757125
3843 YARRIE LAKE ROAD, WEE WAA

PREPARED FOR: PROVIDENCE ASSET GROUP

JANUARY 2021

20/194

TRAFFIC IMPACT ASSESSMENT
PROVIDENCE ASSET GROUP

SOLAR PHOTVOLTAIC (PV) POWER FARM
LOT 191 DP757125
3843 YARRIE LAKE ROAD

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1.0 INTRODUCTION

Intersect Traffic Pty Ltd (Intersect Traffic) has been engaged by Providence Asset Group to prepare a traffic impact assessment report for a proposed Solar Photovoltaic (PV) Power Farm (up to 5MW) on Lot 191 DP 757125 – 3843 Yarrie Lake Road, Wee Waa.

The proposed development involves installation of solar panel banks, off-load area, inverter and AC combiner area, HV switchboard area, MV power station area, direct connection to a suitable existing power line near the site, on-site car parking and temporary construction office. Vehicular access to the site will be via the existing access road off Yarrie Lake Road approximately 3 km south-east of Wee Waa. The development concept plans are shown in ***Attachment A.***

This report is required to support a development application to Narrabri 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 Yarrie Lake Road, Wee Waa approximately 1.4 km south of Culgoora Road and approximately 3 kilometres south-east of the Wee Waa town centre. The site currently contains vacant rural pasture used for agricultural purposes.

The property has the formal title of Lot 191 DP757125, 3843 Yarrie Lake Road, Wee Waa with road frontage access off an unnamed gravel access road off Yarrie Lake Road. The development area for the proposal is approximately 15 hectares. The site is currently zoned RU1 – Primary Production pursuant to the Narrabri LEP (2012).

The proposed vehicular access to the site will be provided via the existing gravel access to the site off Yarrie Lake Road approximately 1.4 km south of Culgoora Road. Deliveries to the site will use the identified delivery road shown on ***Figure 1,*** being via Yarrie Lake Road to Narrabri and then the Kamilaroi Highway from the south from Sydney and Newcastle or from the north from Brisbane. Yarrie Lake Road, whilst not being an approved B-Double route, is identified as an exception route and is currently used by road trains. It is therefore considered that Yarrie Lake Road is suitable to carry the proposed construction traffic for the development, including B-Double delivery vehicles, with large road trains already using Yarrie Lake Road. ***Photograph 1*** below shows the existing development site from the gravel access road off Yarrie Lake Road while ***Photograph 2*** shows the gravel access road intersection with Yarrie Lake Road.

Figure 1 – Site Location

Photograph 1 – Development site from gravel access road

Photograph 2 – Gravel access road off Yarrie Lake Road.

3.0 EXISTING ROAD NETWORK

3.1 Kamilaroi Highway

The Kamilaroi Highway is a classified state highway (SH29) with its primary function to connect the New England Highway at Willow Tree to the Mitchell Highway at Bourke through Gunnedah, Boggabri, Narrabri, Wee Waa, Walgett and Brewarrina. As such it is an arterial road and major NSW transport route from inland NSW to the NSW coastal area. As a sealed rural arterial road the Kamilaroi Highway is under the care and control of Transport for NSW (TfNSW).

Near Narrabri the Kamilaroi Highway is a two-lane two-way sealed rural road with a 9-metre wide sealed carriageway consisting of 3.5 metre wide travel lanes and 1 metre wide sealed shoulders. Additional turning lanes are provided at major intersections along its length. Near Narrabri the speed zoning is 100 km/h and 60 km/h through Narrabri. At the time of inspection the Kamilaroi Highway was observed to be in good condition as shown in ***Photograph 3*** below. It is considered suitable for use by heavy vehicle traffic.

Photograph 3 – Kamilaroi Highway, near site.

3.2 Yarrie Lake Road / Mooloobar Street / Goobar Street

Yarrie Lake Road is a local sealed rural road with its primary function to collect and distribute traffic from the rural areas north-west of Narrabri to the arterial road network, as well as provide vehicular access to properties along its length. Yarrie Lake Road becomes Goobar Street and Mooloobar Street through Narrabri before connecting to Kamilaroi Highway via a single lane roundabout. As a local road this length of road it is under the care and control of Narrabri Shire Council and a 50 km/h speed zoning would apply to Mooloobar Street and Goobar Street while a 100 km/h speed zoning applies to Yarrie Lake Road. Whilst not a designated (approved) B-Double route, this route is listed as an exception route, being currently used by road trains and considered suitable for use by the construction vehicles required by the development.

Yarrie Lake Road has a minimum 7 metre wide sealed pavement and gravel / grass shoulders and verge that comfortably allows two lanes of traffic flow, one in each direction, with parking or pull over areas along its length. It currently services a number of rural properties along its length and connects Narrabri to Wee Waa. At the time of inspection Yarrie Lake Road, Goobar Street and Mooloobar Street were all found to be in good condition as shown in ***Photographs 4, 5 & 6*** below. The Kamilaroi Highway / Mooloobar Street roundabout is shown in ***Photograph 7***.

Photograph 4 – Yarrie Lake Road near site.

Photograph 5 – Goobar Street, Narrabri.

Photograph 6 – Mooloobar Street, Narrabri.

Photograph 7 – Kamilaroi Highway / Mooloobar Street roundabout.

4.0 ALTERNATIVE TRANSPORT MODES

Forest Coach Lines provide regular public transport (bus) services within Narrabri but does not extend its services to Wee Waa. Therefore it is concluded that the site is not serviced at all be public transport services. As a rural area there are no pedestrian footpaths or on / off road cycleways within the local road network. Near the site, pedestrians are generally required to utilise the grass verges and road shoulders / pavement, while cyclists are required to utilise the road shoulders or share the travel lanes with other vehicles.

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 existing gravel access off Yarrie Lake Road to the construction site.
- Construction of security fence and entrance gate; and
- Drainage and landscaping to Narrabri 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 – 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 TfNSW 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). 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 is calculated below. 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 all south-east towards Narrabri with deliveries being via the New England Highway and Kamilaroi Highway from the south or via Newell Highway and Kamilaroi Highway from the north originating from either Newcastle or Sydney or Brisbane. In accessing the site, the likely transportation route as envisaged is shown on the location plan (***Figure 1***) in this report.

Existing traffic volumes in the area were recorded by Northern Transport Planning and Engineering on behalf of Intersect Traffic with a traffic classifier count undertaken on Yarrie Lake Road approximately 100 metres south-east of the site access road from Thursday 26th November 2020 until Wednesday 2nd December 2020 a period of 1 week. Intersect Traffic also undertook manual traffic counts at the Kamilaroi Highway (Cooma Street) / Mooloobar Street roundabout during the likely peak AM and PM traffic periods (road network) i.e. 8 am – 9 am and 4.00 pm – 5.00 pm on Monday 1st December 2020 and Tuesday 2nd December 2020 respectively. These periods were chosen following interrogation of Transport for NSW (TfNSW) data in the area on its Traffic Volume Viewer application. The data sheets for these counts are provided in ***Attachment B***. Note the traffic classifier count identified a heavy vehicle percentage of traffic of 5%.

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

- Yarrie Lake Road south-east of site access - 30 vtph in the AM peak and 33 vtph in the PM peak.
- Kamilaroi Highway south-west of Mooloobar Street – 368 vtph in the AM peak and 336 vtph in the PM peak.
- Kamilaroi Highway north-east of Mooloobar Street – 548 vtph in the AM peak and 467 vtph in the PM peak; and
- Mooloobar Street north of Kamilaroi Highway – 199 vtph in the AM peak and 139 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 undertake a 2030 (10 year horizon period) assessment of this development.

6.2 – Road Capacity

Table 4.5 of the TfNSW publication "*RTA's Guide to Traffic Generating Developments"* provides some guidance on likely mid-block capacity of two-lane two-way rural roads. This table is reproduced below as ***Table 1***:

Table 1 – Rural Road Mid-Block Capacity Table

Table 4.5
peak hour flow on two-lane rural roads (veh/hr)
(Design speed of 100km/hr)

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

The data for Table 4.5 assumes the following criteria:

- *terrain level* with 20% no overtaking.
- *rolling* with 40% no overtaking.
- *mountainous* with 60% no overtaking.
- 3.7 m traffic lane width with side clearances of at least 2m.
- 60/40 directional split of traffic.

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

It is assumed that the appropriate terrain level for Yarrie Lake Road is level and that a satisfactory level of service (LoS) on the road network is a LoS C. Therefore, after adopting a 5% heavy vehicle percentage on traffic volumes, the above table suggests the relevant two-way mid-block road capacities for a LoS C for Yarrie Lake Road is 970 vtph.

Within Narrabri, the Kamilaroi Highway (Cooma Street) and Mooloobar Street are urban roads for which Table 4.3 of *RTA's Guide to Traffic Generating Developments,* reproduced as ***Table 2*** below, provides guidance on mid-block capacity for a level of service C. Noting the Kamilaroi Highway and Mooloobar Street as two-way two-lane undivided roads, the one-way capacity of these streets is 900 vtph and the two-way mid-block capacity is 1,800 vtph.

Therefore the two-way mid-block road capacity thresholds adopted in this assessment are.

- Kamilaroi Highway and Mooloobar Street – 1,800 vtph; and
- Yarrie Lake Road – 970 vtph.

As the combination of 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 will be well below the existing capacity thresholds determined above, then the local and state road network has sufficient spare two-way mid-block capacity to cater for the construction and operation of the Solar Farm.

Table 2 – Urban Road mid-block capacity table (LoS C).

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)

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 mid-block efficiency.

6.3 – Intersection Capacity

The main intersections impacted by the construction of the development is the Kamilaroi Highway (Cooma Street) / Mooloobar Street roundabout and the Yarrie Lake Road / site access road stop sign controlled T-intersection. However traffic volumes at these intersections are generally below the thresholds sourced from Austroads *Guide to Traffic Management Part 6 – Intersections, Interchanges and Crossings (2010),* reproduced below in ***Table 3*** of this report**.** 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.

Table 3 – Uninterrupted flow condition thresholds at an intersection

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)

With traffic flows on the Kamilaroi Highway (Cooma Street) being generally less than 500 vtph and traffic flows on Mooloobar Street being less than 200 vtph, then it is concluded that the intersection is currently operating with uninterrupted flow conditions, confirmed by observation on site. The additional 18 vtph generated by the construction of the Solar Farm will not result in the thresholds within the above table being reached Therefore, it can be concluded that during construction and post development, the Kamilaroi Highway (Cooma Street) / Mooloobar Street roundabout will continue to operate with uninterrupted flow conditions. Similarly, the Yarrie Lake Road operates with traffic flows less than 200 vtph and as the site access road would operate with traffic flows less than 30 vtph during the construction of the solar farm, the site access road would also continue to operate with uninterrupted flow conditions during construction. Therefore it is reasonable to conclude that the development does not adversely impact on the operation of these intersections or any other intersection on the local and state road network.

6.4 Access Assessment

In terms of width, the access to the development providing access to a user class 1 (long term) car parking facility with less than 25 car spaces fronting a local road is required to be a category 1 access (Table 3.1 of the Standard). 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. However the proposed entrance width at the combined entry / exit access at the unnamed laneway will need to be a minimum 12.5 metres wide to cater for the swept turning paths for delivery vehicles during the construction stage and 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.* The current access conditions to the site were observed to be satisfactory in terms of width to accommodate the largest delivery vehicle whilst complying with the Australian Standards requirements.

Sight distance at the existing access off Yarrie Lake Road was observed to be in excess of 250 metres in each direction which therefore complies with the requirements of Figure 3.2 of Australian Standard *AS2890.1-2004 Parking Facilities – Part 1 Off-street car parking (160 metres minimum SSD for 100 km/h*) as well as Austroads *Guide to Road Design – Part 4A – Unsignalised and signalised intersections - Table 3.2 (248 metres for 100 km/h)* for safe intersection sight distance. Sight distance at the site access off the site access road was also observed to be in excess of 105 metres which would be compliant with Figure 3.2 of Australian Standard *AS2890.1-2004 Parking Facilities – Part 1 Off-street car parking* for a reduced speed environment of 80 km/h which is realistically the maximum speed likely on the site access road.

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 Yarrie Lake Road has a sealed pavement a minimum 7 metres wide and therefore complies with Austroads Standards for Rural Roads with more than 500 vtph. It would therefore allow two heavy vehicles to pass each other at normal speed. Similarly the site access road has an unsealed pavement width in excess of 7 metres wide which also allows two heavy vehicles to pass each other at normal speed. Therefore it is considered the proposed transportation route to the site is suitable to carry heavy vehicles and thus is suitable to cater for the construction traffic from the Solar Farm construction.

Overall, 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 of the Narrabri Shire Council's Development Control Plan – Parking Code No. 1. Adopting the factory rates for this project the relevant on-site car parking provision during the operation of the Solar Farm is.

- *1.3 spaces per 100m² GFA .*

With no building proposed for the Solar Farm the development is theoretically not required to provide any on-site car parking space under the DCP requirements. However with a single maintenance vehicle visit to the site likely to occur at most once a week it would be prudent to provide at least 1 on-site vehicle car park within the development. 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. Construction employee car parking will be provided on the hard stand area identified as the construction lay down area and this is large enough to cater for the expected storage requirements during construction as well as the provision of at least 10 on-site car parks for construction employees which is the expected traffic generation from employees to the site as well as being in excess of the Industrial land use requirements of the Narrabri Shire Council Development Control Plan – Parking Code No. 1. 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 Narrabri Shire Council's Development Control Plan – Parking Code No. 1.

The employee car parking area would need to comply with the requirements of Australian Standard *AS2890.1-2004 Parking Facilities – Part 1 Off-street car parking* with parking bay sizes 2.4 m x 5.4 m and aisle widths of 5.8 metres. There is sufficient room on-site to ensure compliance with this requirement which could be covered by a suitable condition of consent. Overall it is considered suitable on-site car parking can be provided for the development ensuring all vehicle movements to and from the site off Yarrie Lake Road and the site access road will be undertaken in a forward direction.

8.0 ALTERNATIVE TRANSPORT MODES

The proposed development will not generate any increase in public transport demand during both the construction and operational phases of the development particularly given the site is not currently serviced by convenient public transport. 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 191 DP 757125 – 3843 Yarrie Lake Road, Wee Waa 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 and state road network are well below the two-way mid-block capacity threshold of 1,800 vtph for the urban sections of the Kamilaroi Highway (Cooma Street) and Mooloobar Street (LoS C) as well as the two-way mid-block rural road capacity (LoS) of 970 vtph for Yarrie Lake Road. Traffic volumes will remain below these thresholds during the construction and operation of the development.
- The Kamilaroi Highway (Cooma Street) / Mooloobar Street roundabout and the Yarrie Lake Road / site access road stop sign controlled intersection will continue to operate with uninterrupted flow conditions during and post construction of the Solar Farm with little if any impact on the operation of these intersections resulting from the development.
- It is also reasonable to conclude the development will not adversely impact on the intersections on the wider state road network given the high levels of intersection control on the major intersections.
- 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.
- 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 191 DP 757125 – 3843 Yarrie Lake Road, Wee Waa, 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 Narrabri Shire Council, Austroads, Australian Standards and TfNSW.

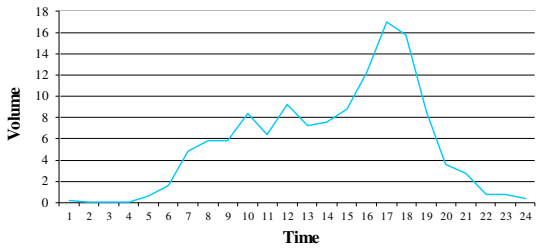
JR Garry BE (Civil), Masters of Traffic
Director
Intersect Traffic Pty Ltd

ATTACHMENT A
DEVELOPMENT PLANS

ATTACHMENT B
TRAFFIC COUNT DATA

Site 2 Yarrie Lake Rd 1.5km E of Culgoora Rd [80] **Eastbound**

Day	*Thu*	*Fri*	*Sat*	*Sun*	*Mon*	*Tue*	*Wed*	*W/Day*	*W/End*	*7 Day*
Time	26/11/2020	27/11/2020	28/11/2020	29/11/2020	30/11/2020	1/12/2020	2/12/2020	*Ave.*	*Ave.*	*Ave*
0:00	0	0	2	1	0	0	1	0	2	1
1:00	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0
4:00	1	1	0	1	0	1	0	1	1	1
5:00	1	1	2	0	2	3	1	2	1	1
6:00	4	5	1	2	5	5	5	5	2	4
7:00	7	5	3	3	6	4	7	6	3	5
8:00	5	8	9	2	7	6	3	6	6	6
9:00	5	16	5	6	10	4	7	8	6	8
10:00	4	10	2	15	5	6	7	6	9	7
11:00	11	7	7	8	11	9	8	9	8	9
12:00	5	12	12	12	5	5	9	7	12	9
13:00	8	13	18	11	8	4	5	8	15	10
14:00	9	10	12	14	9	7	9	9	13	10
15:00	9	12	12	14	9	11	20	12	13	12
16:00	17	21	9	6	17	11	19	17	8	14
17:00	15	20	5	7	15	17	12	16	6	13
18:00	6	7	7	9	8	10	12	9	8	8
19:00	3	5	1	0	3	7	0	4	1	3
20:00	4	2	4	3	2	2	4	3	4	3
21:00	0	3	1	5	0	1	0	1	3	1
22:00	0	1	0	0	1	0	2	1	0	1
23:00	1	0	1	0	0	0	1	0	1	0
Total	**115**	**159**	**113**	**119**	**123**	**113**	**132**	**128**	**116**	**125**

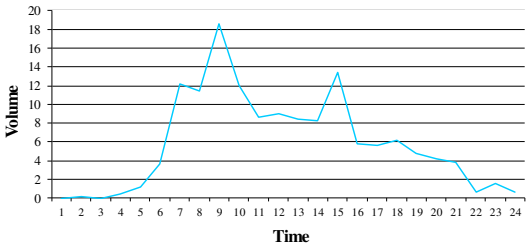


Summary

	from	to	
AM Peak	9:00 AM	10:00 AM	**16**
PM Peak	4:00 PM	5:00 PM	**21**
		Week Day Average	**128**
		Weekend Day Average	**116**
		7 Day Average	**125**

Site 2 Yarrie Lake Rd 1.5km E of Culgoora Rd [80] **Westbound**

Day	*Thu*	*Fri*	*Sat*	*Sun*	*Mon*	*Tue*	*Wed*	*W/Day*	*W/End*	*7 Day*
Time	26/11/2020	27/11/2020	28/11/2020	29/11/2020	30/11/2020	1/12/2020	2/12/2020	*Ave.*	*Ave.*	*Ave*
0:00	0	0	2	0	0	0	0	0	1	0
1:00	0	1	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0
3:00	1	0	0	0	0	0	1	0	0	0
4:00	1	1	1	1	2	1	1	1	1	1
5:00	4	3	5	2	2	5	4	4	4	4
6:00	16	9	2	1	17	7	12	12	2	9
7:00	12	13	9	2	11	12	9	11	6	10
8:00	11	17	6	5	23	22	20	19	6	15
9:00	11	13	10	5	12	11	13	12	8	11
10:00	10	9	8	11	12	7	5	9	10	9
11:00	10	12	7	10	10	8	5	9	9	9
12:00	10	7	7	7	10	6	9	8	7	8
13:00	9	8	8	8	9	8	7	8	8	8
14:00	16	13	9	10	16	11	11	13	10	12
15:00	5	6	8	11	5	4	9	6	10	7
16:00	2	12	8	7	2	5	7	6	8	6
17:00	6	8	11	6	6	3	8	6	9	7
18:00	5	7	5	5	4	4	4	5	5	5
19:00	2	3	8	12	3	7	6	4	10	6
20:00	2	6	3	2	3	4	4	4	3	3
21:00	1	1	2	2	1	0	0	1	2	1
22:00	2	2	0	1	2	2	0	2	1	1
23:00	0	0	0	0	0	2	1	1	0	0
Total	**136**	**151**	**119**	**108**	**150**	**129**	**136**	**140**	**114**	**133**

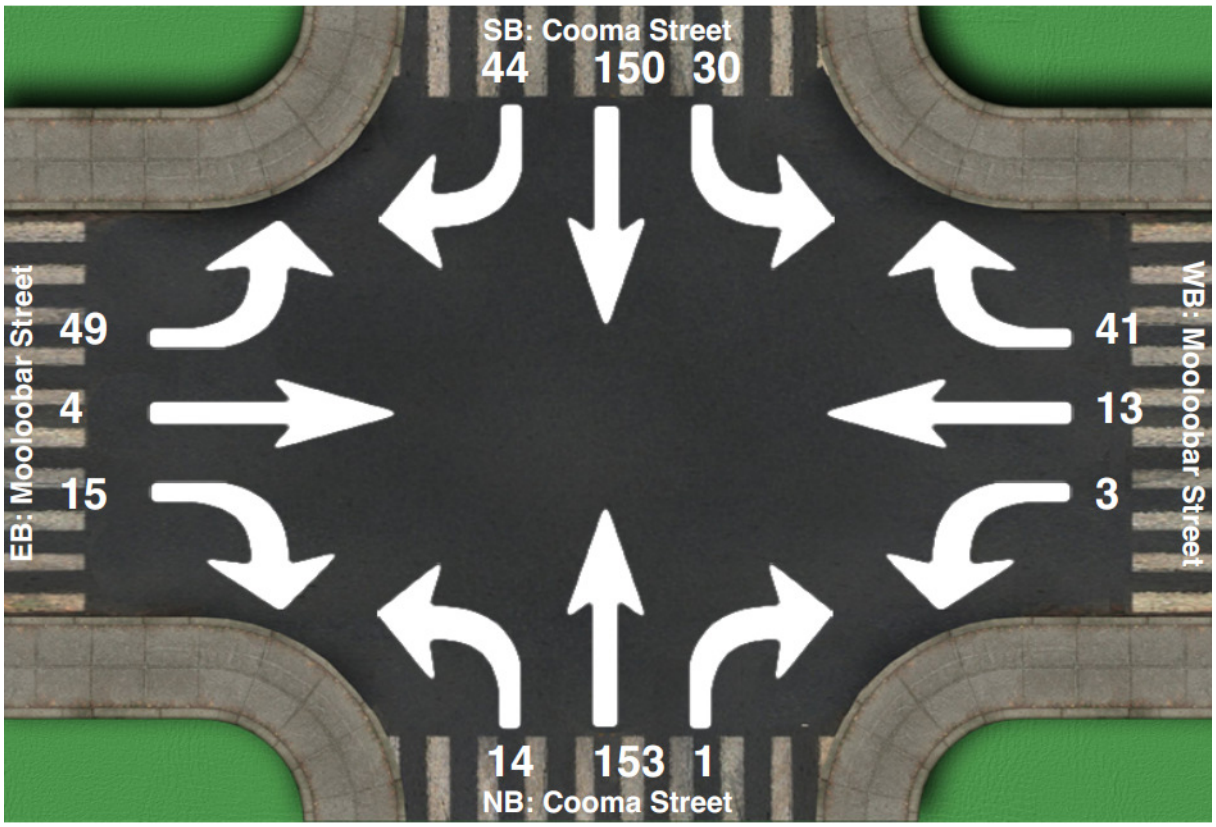


Summary

	from	to	
AM Peak	8:00 AM	9:00 AM	**23**
PM Peak	2:00 PM	3:00 PM	**16**
		Week Day Average	**140**
		Weekend Day Average	**114**
		7 Day Average	**133**

Intersection Peak Hour

Location: Cooma Street at Mooloobar Street, Narrabri
GPS Coordinates:
Date: 2020-12-02
Day of week: Wednesday
Weather:
Analyst: Jeff



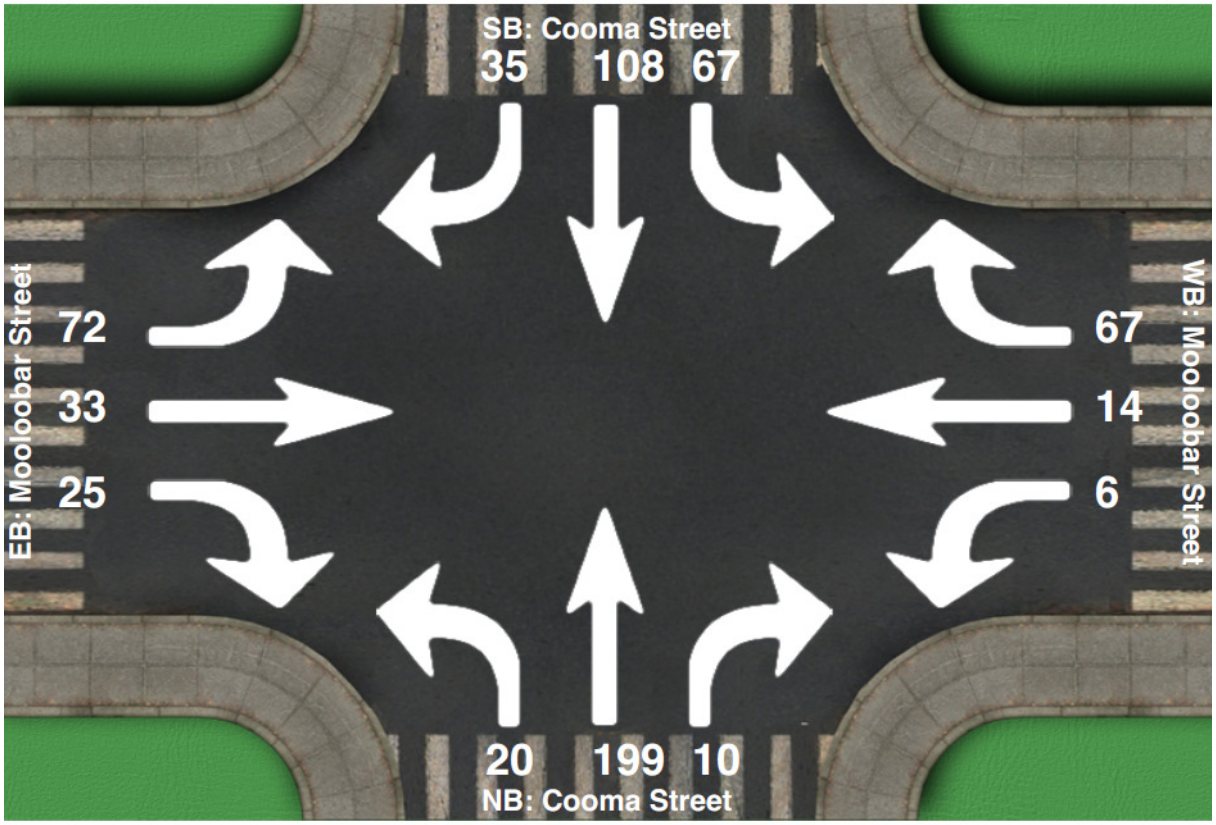
Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	30	150	44	3	13	41	14	153	1	49	4	15	517
Factor	0.68	0.91	0.73	0.25	0.65	0.64	0.70	0.89	0.25	0.72	0.33	0.75	0.91
Approach Factor	0.90			0.68			0.91			0.74			

Intersection Peak Hour

Location: Cooma Street at Mooloobar Street, Narrabri
GPS Coordinates: Lat=-30.344281, Lon=149.762128
Date: 2020-12-03
Day of week: Thursday
Weather:
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	67	108	35	6	14	67	20	199	10	72	33	25	656
Factor	0.49	0.77	0.67	0.50	0.39	0.42	0.50	0.87	0.42	0.82	0.49	0.69	0.73
Approach Factor	0.78			0.42			0.88			0.68			

ATTACHMENT C
TRAFFIC GENERATION INFORMATION

PROVIDENCE ASSET GROUP

Preliminary Solar Farm Vehicle Movement Guidance

27/03/2020

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.

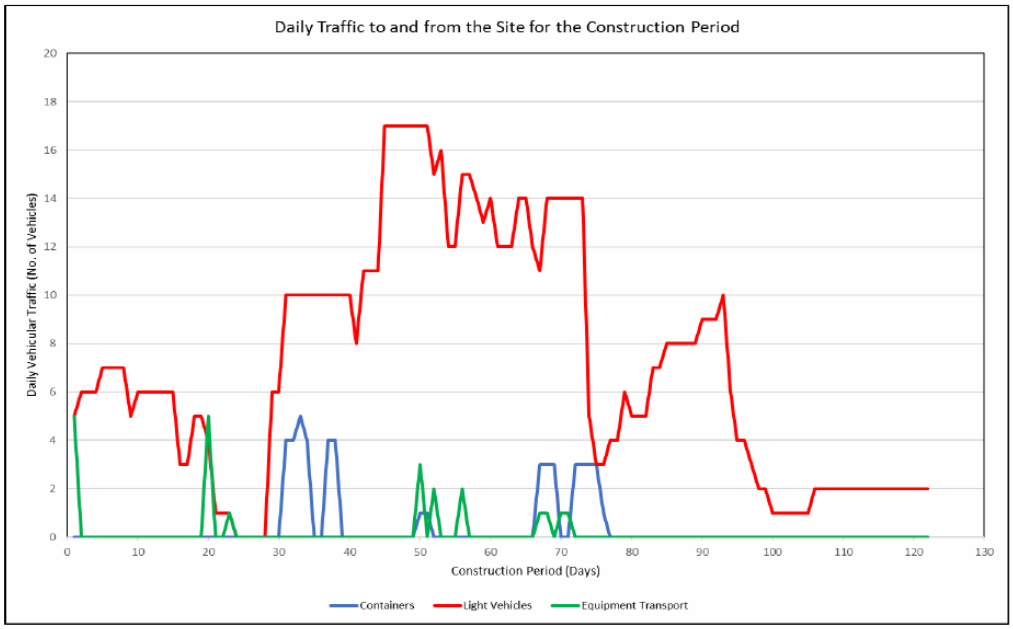


Figure 1 - Daily Traffic to and from Site for the Construction Period

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	