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Ref: 067
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Issued via email: bridgette.p@nghconsulting.com.au

Dear Bridgette

Yarren Hut Solar Farm – Traffic Impact Assessment

Amber has been asked to assess the traffic matters of the proposed solar farm located approximately 16.5km northwest of Nyngan, New South Wales. Access to the site will be provided via the existing driveway that connects to the south-western side of Mitchell Highway, which is proposed to be widened and realigned to accommodate simultaneous truck movements. Staff will be located within the nearby regional towns, with all plant expected to be delivered from the southeast along Mitchell Highway. An assessment of the traffic impacts of the solar farm is provided below.

1. Existing Conditions

1.1 Road Network

Mitchell Highway is a State Arterial Road under the care and management of Transport for New South Wales (TfNSW). It is located in the central and south western regions of Queensland and the northern and central western regions of New South Wales. In New South Wales, the Mitchell Highway's south-eastern terminus is at its junction with the Great Western and Mid-Western highways, and it links with the Golden, Newell, Oxley, Barrier and Kamilaroi highways. Within the vicinity of the site, it typically accommodates one lane of traffic in each direction and has a sealed width of approximately 7 metres, with grass berms provided on both sides of the road. It has a speed limit of 110km/hr.

1.2 Traffic Volumes

Traffic volume data for Mitchell Highway was obtained from the RMS traffic volume viewer. The closest available data was located 280 metres east of Pangee Street, Nyngan, where the 2018 data recorded an average daily traffic count of 1,238 vehicles per day (vpd). The traffic count data also indicates that 25% of all traffic is heavy vehicles.

2. Traffic Assessment

2.1 Traffic Generation

The solar farm construction is expected to take approximately 10 months, with the peak construction period expected to take 5 months. Construction activities would be undertaken during standard

daytime construction hours (7:00am to 6:00pm Monday to Friday, and 7:00am to 1:00pm on Saturdays). Any construction outside of these normal working hours would only be undertaken with prior approval from relevant authorities.

A maximum of 40 staff will be on-site during peak construction periods. It is understood that two shuttle buses will be provided that can accommodate approximately 20 staff. The remaining 20 staff will access the site using private vehicles. Assuming a conservative vehicle occupancy rate of 1.35 for workers, the site is expected to generate 15 light vehicle movements during each of the peak periods.

Approximately 17 trucks will access the site per day during peak construction periods. The delivery trucks will predominantly be Medium and Heavy Rigid Trucks (MRV and HRV as defined within AS 2890.2:2009). Articulated Vehicles (AV as defined within AS 2890.2:2009) and B-Doubles will be used to transport larger plant such as the PV panels.

It is also noted that one Restricted Access Vehicle / Oversized Vehicle will also be required for the delivery of the sub-station transformer to the site.

Therefore, it is anticipated that during peak construction the site could generate up to 34 heavy and 34 light vehicle movements per day. Table 1 summarises the traffic movements generate during the peak construction period of the solar farm.

Table 1: Traffic Generation During Peak Construction Periods

Vehicle Type	Vehicle Movements per Day
Light Vehicle (car / 4WD)	30
Shuttle Bus	4
MRV/HRV	4
AV/B-Double	30
Total	**68**

Accordingly, the site is expected to generate approximately 168 vehicle movements per day during peak periods. During operation, the solar farm is expected to generate a maximum of 6 light vehicle movements per day.

2.2 Traffic Distribution

Traffic accessing the site will do so via the single access point to/from Mitchell Highway. The following provides a breakdown of the access distribution for each of the vehicle classifications outlined within Table 1:

- Light Vehicles: It is anticipated that most staff will be local within Nyngan, with all staff travelling from the southeast.
- Shuttle Bus: It has been assumed that all shuttle buses will travel to/from the southeast.
- MRV/HRV: These vehicles will predominantly be water trucks and vehicles transporting materials such as concrete and fencing supplies which will be sourced within the surrounding area. The Applicant has advised that all movements will be to/from the southeast.
- AV: Plant will be transported via Sydney to/from the southeast.

The peak hour for the solar farm will occur at the start and end of the day when staff are transported to/from the site. During the morning peak all vehicle movements will be towards the site and in the

evening peak all vehicle movements will be away from the site. Heavy vehicle movements will be distributed throughout the day and will be split evenly between inbound and outbound movements.

2.3 Traffic Assessment

The site is expected to generate approximately 17 light vehicle movements associated with staff during each of the morning and evening peak periods. Outside of these times the site will generate approximately 2-3 light and 3-4 heavy vehicle movements per hour.

Mitchell Highway is estimated to currently be accommodating 1,238 vehicles per day based on the 2018 traffic volume count data. Assuming 10% of these trips are generated during peak periods, the peak hour traffic volume is 124 vehicles per hour. Therefore, during the peak hours Mitchell Highway would accommodate approximately 141 vehicles per hour with the development traffic, which is well within the capacity of the road network. Outside of these times, the increase in traffic of up to 7 vehicle movements per hour would result in a negligible change to the traffic environment.

The increase of up to 17 light vehicle movements during the morning and evening peak hour will predominantly be to/from the township of Nyngan. Given the minimal level of traffic (approximately one vehicle every four minutes) the road network within the township is expected to be able to accommodate the increase in traffic in a safe and efficient manner.

Accordingly, the road network is able to accommodate the traffic generated by the development during the construction and operational period.

It is noted that the following major projects are occurring in the surrounding area:

- The Nyngan Scandium Mine project has been approved. The site is located approximately 20km west of Nyngan, with access proposed via Gilgai Road and Barrier Highway. The development is expected to generate in the order of 70 vehicle movements per day once constructed.
- Western Slopes Pipeline has been issued SEARs documentation but has yet to have the required Environmental Impact Statement submitted. The proposed infrastructure involves the construction and operation of an approximately 450km buried, steel, gas transmission pipeline between the Narrabri Gas Project and the existing Moomba Sydney Pipeline.
- Nyngan Solar Farm has been constructed and is located approximately 10 kilometres west of the Nyngan township. The development is expected to generate in the order of 6 vehicle movements per day.
- Bogan River Solar Farm is located 2km south of the township of Nyngan, between the junction of Tottenham Road and the Mitchell Highway. The development application was withdrawn in December 2018.

Given the location of the projects, it is expected that a high proportion of the vehicle movements will travel through the township of Nyngan. Based on the information available, the total peak hour traffic volume for the projects is estimated to be in the order of 10 vehicles per hour. Accordingly, the combined increase in traffic generated by the site and these projects is expected to have a minimal cumulative impact on the road network, including through the Nyngan township.

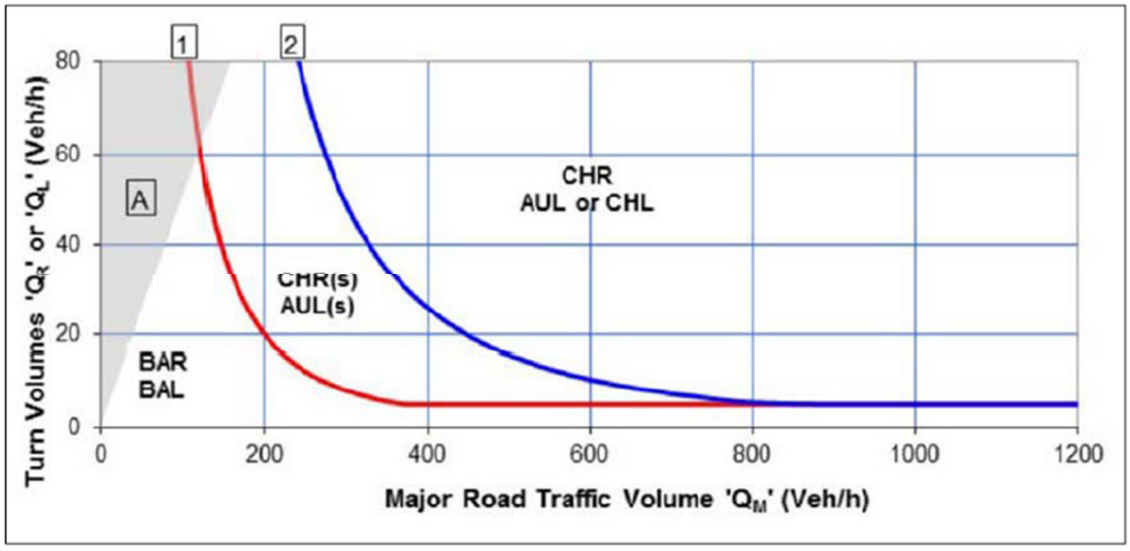
3. Intersection Assessment

3.1 Turning Treatments

Austroads Guide to Traffic Management Part 6: Intersections, Interchanges, and Crossings specifies the turning treatments required at intersections. Figure 2.26 of the guide, shown below in Figure 1,

specifies the required turn treatments on the major road at unsignalised intersections, and is provided below for a design speed of greater than or equal to 100km/hr.

Figure 1: Figure 2.26 of Austroads Guide to Traffic Management Part 6



The peak hour turning volumes will be generated by staff accessing the site in the morning. Based on the traffic distribution described above the site will generate 17 left turn movements from the southeast, and 0 right turn movements from the northwest. Based on these volumes and Mitchell Highway having a Major Road Traffic Volume of 124 vehicles per hour, the intersection would require a Basic Left Turn (BAL) turn treatment and no right turn treatment.

The *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* specifies the requirements for the design of turn treatments. The proposed design for the site access is provided within Appendix A, based on an AV design vehicle, which is the largest vehicle expected to access the site. A swept path assessment has been prepared for the access design using the software package 'AutoTurn'. The swept path assessment is shown within Appendix B and shows that the vehicle is able to access the site in a suitable manner.

Accordingly, the proposed intersection turning treatment has been appropriately designed and in accordance with the Austroads dimensional requirements.

3.2 Sight Distance Assessment

Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections specifies the Safe Intersection Sight Distance (SISD) as the minimum sight distance which should be provided along the major road at any intersection. Table 3.1 of the guide specifies the SISD required for various design speeds. Given Mitchell Highway has a speed limit of 110km/hr the required SISD is 285 metres. The available sight distance at the access greatly exceeds the Austroads requirements.

4. On-site Layout

The layout of the internal road network, parking facilities and infrastructure has been provided within Appendix C.

5. Traffic Management Plan

A Traffic Management Plan (TMP) will be prepared prior to construction commencing by the appointed contractor. The TMP will provide additional information regarding the traffic volumes and distribution of construction vehicles that is not available at this time, including:

- Road transport volumes, distribution and vehicle types broken down into:
  - Hours and days of construction.
  - Schedule for phasing/staging of the project.
- The origin, destination and routes for:
  - Employee and contractor light traffic.
  - Heavy vehicle traffic.
  - Over size and over mass traffic.

The following provides recommended measures that should be adopted within the TMP to minimise the impact of construction traffic along the road network:

- Neighbours of the solar farm be consulted and notified regarding the timing of major deliveries which may require additional traffic control and disrupt access.
- Loading and unloading is proposed to occur within the work area. No street or roads will be used for material storage at any time.
- Delivery of larger plant to occur outside of school bus service times to prevent larger vehicles interacting with the school bus.
- All vehicles will enter and exit the site in a forward direction.
- Management of vehicular access to and from the site is essential in order to maintain the safety of the general public as well as the labour force. The following code is to be implemented as a measure to maintain safety within the site:
  - Utilisation of only the designated transport routes.
  - Construction vehicle movements are to abide by finalised schedules as agreed by the relevant authorities.
- Implementation of a proactive erosion and sediment control plan for on-site roads, hardstands and laydown areas.
- All permits for working within the road reserve must be received from the relevant authority prior to works commencing.
- A map of the primary haulage routes highlighting critical locations.
- An induction process for vehicle operators and regular toolbox meetings.
- A complaint resolution and disciplinary procedure.
- Local climatic conditions that may impact road safety of employees throughout all project phases (e.g. fog, wet and significant dry, dusty weather).

The above recommendations will ensure the construction traffic will create a minimal impact to the capacity and safety of the surrounding road network.

6. Conclusions

Amber has assessed the traffic impacts of the solar farm located approximately 16.5km northwest of Nyngan, New South Wales. Access to the site will be provided via the existing driveway that connects to the south-western side of Mitchell Highway, which is proposed to be widened and realigned to accommodate simultaneous truck movements. Staff will be located within the nearby regional towns, with all plant expected to be delivered from the southeast along Mitchell Highway. The above assessment determined the following:

- The site will generate up to 68 vehicle movements per day during peak construction times, including 34 truck movements;
- The road network is able to accommodate the traffic generated by the development during the construction and operational period. Further, the cumulative impact of the site traffic with nearby developments is expected to be minimal;
- The design provided within Appendix A, for the intersection of the site access with Mitchell Highway, will ensure the access will operate in a safe manner and will be able to accommodate the maximum design vehicle expected to access the site; and
- In order to mitigate the impacts of the development during construction a TMP will be prepared which should include the recommendations provided within Section 5 of this document.

Accordingly, based on the assessment above, it is concluded that the proposed access arrangements for the solar farm are suitable to accommodate the expected construction vehicle types and traffic volumes during the construction and operation phase of the project.

If you have any questions please feel free to contact the undersigned.

Yours sincerely
Amber Organisation

Michael Willson
Director

Appendix A

Access Design

The following design details have been taken from Austroads Guide to Road Design Part 4A:

Rural Left-turn Treatment (BAL) Section 8.2.1.
1: Design speed of 110km/h.
2: Lane widths of 3.2m have been used.
3: Taper length calculates to 49m.
4: Formation/carriageway widening is 2.5m.
5: Minimum length of parallel widened shoulder used from Table 8.1 is 35m

Yarren Hut Solar Farm

Mitchell Highway / Site Access Intersection

Access Design

DRAWN: MW
DATE: 11/03/2020
SCALE: NTS
DWG NO: 067-S01A

Amber

Appendix B

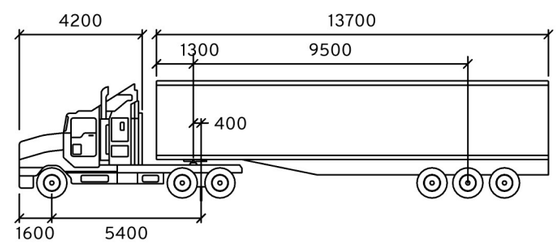
Swept Path Assessment

Site Access

Vehicle Envelope

300mm Clearance

AV



	mm
Tractor Width	: 2500
Trailer Width	: 2500
Tractor Track	: 2500
Trailer Track	: 2500
Lock to Lock	: 6.0s
Steering Angle	: 28.3
Articulating Angle	: 70.0

Yarren Hut Solar Farm

Mitchell Highway / Site Access Intersection

Swept Path Assessment

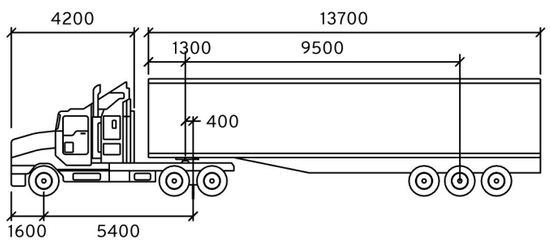
DRAWN: MW
DATE: 11/03/2020
SCALE: NTS
DWG NO: 067-S01A

Amber 2

Vehicle Envelope

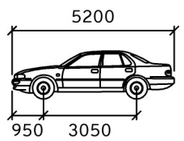
300mm Clearance

AV



	mm
Tractor Width	: 2500
Trailer Width	: 2500
Tractor Track	: 2500
Trailer Track	: 2500
Lock to Lock	: 6.0s
Steering Angle	: 28.3
Articulating Angle	: 70.0

B99



	mm
Width	: 1940
Track	: 1840
Lock to Lock	: 6.0s
Steering Angle	: 33.9

Yarren Hut Solar Farm

Mitchell Highway / Site Access Intersection

Swept Path Assessment

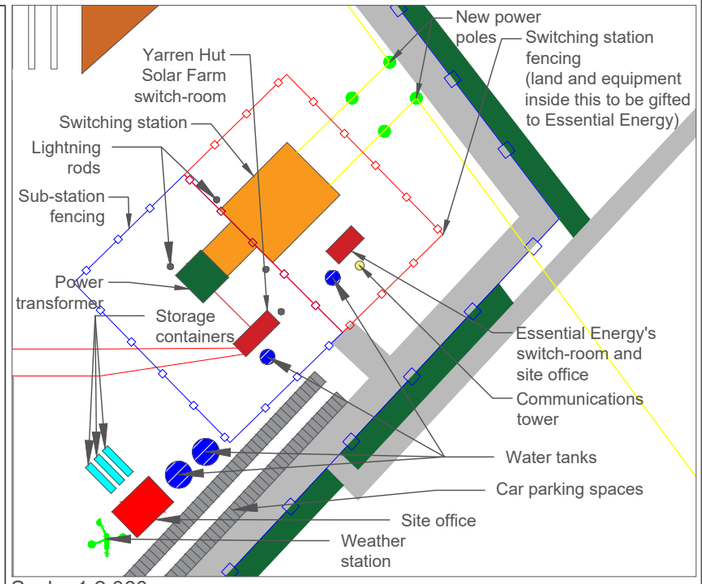
DRAWN: MW
DATE: 11/03/2020
SCALE: NTS
DWG NO: 067-S01A

Amber 3

Appendix C

Site Layout

Scale: 1:6,450



Scale: 1:2,060

LEGEND:

- Fencing
- Internal track
- Laydown areas / retention basins
- 22 / 33 kV feeders
- 66 kV power-line
- Solar panel tables
- Inverter stations
- Existing power poles
- New power poles
- Weather stations

Rev	Date	Name Editor	Modification / Adaptation of the drawing
3	13.02.2020	TSP	Sub-station and switching station updates
2	28.01.2020	TSP	Updated based on internal review comments
1	13.12.2019	TSP	PRELIMINARY ISSUED

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Bondi Junction 2022 | Australia

	Date:	Name:
Drawn:	12.12.2019	TSP
Changed:		
Checked:		

Project: Yarren Hut Solar Farm 28 MVA

Drawing Title: Concept site layout

File Name: BWre-AU-YAR-001-GAL

Format: A3