

TRAFFIC IMPACT ASSESSMENT

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

PART LOT 392 DP 751780 AMAROO DRIVE, MOREE

PREPARED FOR: PROVIDENCE ASSET GROUP

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TRAFFIC IMPACT ASSESSMENT PROVIDENCE ASSET GROUP

AMAROO SOLAR FARM SOLAR PHOTVOLTAIC (PV) POWER FARM PART LOT 392 DP751780 AMAROO DRIVE, MOREE

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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 Part Lot 392 DP751780, Amaroo Drive, Moree.

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 an upgraded site access road with turnaround area off the end of Amaroo Drive approximately 1.3 km west of Narrabri Road (Newell Highway). The development concept plans are shown in **Attachment A**.

This report is required to support a development application to Moree Plains 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, identification of a preferred delivery route and the additional traffics 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 off the western end of Amaroo Drive approximately 1 km west of Narrabri Road (Newell Highway), 2.5 km north-west of Moree Airport and approximately 1.9 km south-west of the Moree CBD. The site currently contains vacant rural pasture used for agricultural purpose. The property has the formal title of Part Lot 392, DP750781, Amaroo Drive, Moree with road frontage access directly off the end of Amaroo Drive within a right of access corridor serving approximately 3 properties. The development area for the proposal has an area of approximately 15 hectares. The site is currently zoned RU1 – Primary Production pursuant to the Moree Plains LEP (2011).

The proposed vehicular access to the site will be provided via Amaroo Drive utilising the existing shared gravel / dirt access road. Deliveries to the site will use the identified delivery road shown on *Figure 2* being via the Newell Highway North and South via New England Highway and Kamilaroi Highway for deliveries from Sydney and the Newell Highway for deliveries from Brisbane then Frome Street, Banksia Way and Amaroo Drive, Moree. *Photograph 1* below shows the existing development site from Amaroo Drive while *Photograph 2* shows the existing site access road off Amaroo Drive.



Figure 1 – Site Location



Photograph 1 – Development site from Amaroo Drive.



Photograph 2 – Existing site access road off Amaroo Drive.



3.0 DEVELOPMENT TRANSPORTATION ROUTE

Deliveries to the site will use the identified delivery road shown in *Figure 2* below being via the Newell Highway from Brisbane and the Newell Highway via the New England Highway and Kamilaroi Highway from Newcastle and Sydney, then via Frome Street, Banksia Way and Amaroo Drive (Moree). All state highways and Frome Street on the delivery route are approved B-Double roads however Banksia Way and Amaroo Drive are not, therefore special approval from Council will be required for B-Double deliveries to the site along these two roads. However both Banksia Way and Amaroo Drive are considered to be constructed to a standard suitable for heavy vehicle traffic therefore, the delivery vehicle transportation routes to the site are suitable to carry the proposed heavy vehicle construction traffic for the development.



Figure 2 – Site Deliveries Transportation Route

4.0 EXISTING ROAD NETWORK

4.1 Newell Highway (including Frome Street)

The Newell Highway is a classified state highway (HW17) with its primary function to connect the Victorian border at Tocumwal to the Queensland border at Goondiwindi through Finley, Jerilderie, Narrandera, Mirrool, West Wyalong, Wyalong, Marsden, Forbes, Parkes, Peak Hill, Dubbo, Gilgandra, Coonabarabran, Narrabri, Bellata, Gurley, Moree, Camurra and Boggabilla. As such it is an arterial road and a major north-south NSW transport route through the Riverina, NSW Central West and North-West areas. As a sealed rural arterial road the Newell Highway is under the care and control of Transport for NSW (TfNSW).



Through Moree the Newell Highway is a two-lane two-way sealed urban road generally with an 18metre wide sealed carriageway between upright kerb and gutter consisting of two 3.5 metre wide travel lanes (one in each direction) and 5.5 metre wide breakdown / parking lanes along both sides of the road as well as turning lanes at major intersections. Through Moree the speed zoning is 60 km/h and 50 km/h while 110 km/h speed zones exist both north and south of Moree. At the time of inspection the Newell Highway was observed to be in good condition as shown in **Photograph 3** below. The Newell Highway is an approved B-Double route through Moree and is suitable for heavy vehicle use associated with the development.



Photograph 3 – Newell Highway (Frome Street) through Moree

4.2 Banksia Way / Amaroo Drive

Banksia Way and Amaroo Drive is the local road connection to the development site access. Both are local urban roads with their primary function to provide vehicular access to properties along their length however they also perform a collector road function, in that they collect and distribute traffic from other local roads in the area to the arterial road network (Newell Highway). As local roads Banksia Way and Amaroo Drive are both under the care and control of Moree Plains Shire Council.

Banksia Way has a sealed carriageway width of 12 metres between upright kerb and gutter while Amaroo Drive has a sealed carriageway width of 11 metres. This comfortably provides a single lane of travel in each direction with parking lanes on both sides of the road.

Amaroo Drive connects to Banksia Way 180 metres south of Frome Street via a priority controlled give way T-intersection while Banksia Way connects to Frome Street also via a priority controlled give way T-intersection both constructed as basic right turn (BAR) / basic left turn (BAL) intersections. Immediately east of Banksia Way, Frome Street connects to the Newell Highway



town bypass also via a priority controlled give way T-intersection constructed as a channelised right turn (CHR)/ channelised left turn (CHL) intersection.

A 50 km/h speed zoning applies to Banksia Way and Amaroo Drive up to the existing site access road. Both roads are considered suitable to carry the heavy vehicle traffic generated by the development but are not part of an approved B-Double route. At the time of inspection Banksia Way and Amaroo Drive were found to be in good condition as shown in *Photographs 4 & 5* below.



Photograph 4 – Banksia Way south of Frome Street.



Photograph 5 – Amaroo Drive – west of Boston Street to site access road.



5.0 ALTERNATE TRANSPORT MODES

Reynolds Fogarty run bus services in Moree township running an on demand bus service which needs to be prebooked as well as a two town loop services (1 AM and 1 PM) to coincide with the arrival and departure the North West Explorer XPT train service and NSW Trainlink runs a Moree to Werris Creek service that connects through Narrabri, Boggabri and Gunnedah. The on demand town service ensures the site is serviced by public transport with bus stops being located on Amaroo Drive.

A shared off-road pathway exists along both Banksia Way and Amaroo Drive from Frome Street to Boston Street as shown in *Photograph 6* below. This provides a safe travel route for pedestrians and cyclists from Frome Street to the site access road. From the Frome Street / Banksia Way intersection back to the Moree CBD and accommodation places pedestrian pathways are haphazard with no continuous network while specialty cycle facilities are almost non-existent. These pathways have been provided to aid pedestrian and cycle travel to the nearby schools. In other areas pedestrians would be required to utilise the grassed footways and cyclists will be required to share travel lanes on the road network through to Banksia Way.



Photograph 6 – Shared off-road pathway – Amaroo Drive



6.0 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 required construction works 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.
- Upgrading of unsealed access crossing and existing access road from Amaroo Drive to the construction site.
- > Construction of security fence and entrance gate; and
- > Drainage and landscaping to Moree Plains 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 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 provided via rigid and articulated vehicles. More detail on construction traffic is provided later in this report.

7.0 TRAFFIC IMPACTS

7.1 – 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



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 an inbound trip and an outbound trip.

AM peak = 10 inbound employees + 3×2 roadworks and other plant + 1×2 deliveries = 18×10^{-10} (14 inbound and 4 outbound).

PM peak = 10 outbound employees + 3×2 roadworks and other plant + 1×2 deliveries = 18×10^{-10} vtph (14 outbound and 4 inbound).

It is expected that the distribution of trips will be 100% north through the local street network (Boston Street) for employee traffic to and from accommodation places within Moree while heavy vehicle traffic will be 80% south on Newell Highway and 20% north on Newell Highway for both locally sourced and imported materials. Lots of materials will be imported, such as inverters, transformers, racking system etc. In accessing the site, the likely transportation route for the solar panel components as envisaged is shown on *Figure 2.*

Existing traffic volumes in the area were recorded by Intersect Traffic at the Frome Street / Banksia Way intersection and the Newell Highway / Frome Street intersection during the likely AM and PM peak hour traffic periods (8am – 9am and 3 pm to 4 pm respectively) on Thursday 4th March 2021 and Friday 5th March 2021 respectively. The data sheets for these counts are provided in *Attachment B*.

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:

- Newell Highway south of Frome Street 454 vtph in the AM peak and 495 vtph in the PM peak.
- Newell Highway north of Frome Street 177 vtph in the AM peak and 211 vtph in the PM peak;
- Frome Street west of Banksia Way 332 vtph in the AM peak and 342 vtph in the PM peak; and
- Banksia Way to Amaroo Drive south of Frome Street 183 vtph in the AM peak and 176 vtph in the PM peak.

The counts show that total traffic volumes in the AM and PM peaks are similar. Therefore, based on the traffic data collected, the following existing peak traffic volumes have been adopted in the report;

- > Newell Highway south of Frome Street 495 vtph in the PM peak.
- > Newell Highway north of Frome Street 211 vtph in the PM peak.
- Frome Street west of Banksia Way 342 vtph in the PM peak.
- > Banksia Way to Amaroo Drive south of Frome Street 183 vtph in the AM 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.

7.2 – Road Capacity

Table 4.3 of the TfNSW publication "*RTA's Guide to Traffic Generating Developments*" provides some guidance on likely mid-block capacity of two-lane two-way urban roads for a desirable Level of Service (LoS) C. This table is reproduced below as **Table 1**: Within Moree the Newell Highway is considered of urban construction and has a speed zoning less than 80 km/h therefore the urban road capacity table is considered the relevant reference table for assessment.

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	
median of inner lane.	Undivided Road	900	
	With Adjacent Parking Lane	900	
Outer or kerb lane:	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)

Noting that the Newell Highway, including the small section of Frome Street to Banksia Way are two-way undivided roads, wide enough to accommodate parking lanes then the one-way mid-block lane capacity is considered to be 900 vtph and the two-way mid-block road capacity is 1,800 vtph and this would be the technical two-way mid-block road capacity these roads.

Banksia Way and Amaroo Drive with 50 km/h speed limits and primarily providing vehicular access to residents would also be subject to the environmental capacity goals listed in Table 4.6 of the TfNSW publication "*RTA's Guide to Traffic Generating Developments*" to maintain suitable levels of residential amenity in the area. This table is reproduced below as **Table 2**. This table suggests a maximum two-way mid-block capacity of 300 vtph for local roads.

Therefore the two-way mid-block capacity thresholds for the local and state road network adopted in this assessment are;

- Newell Highway / Frome Street 1,800 vtph; and
- Banksia Way / Amaroo Drive 300 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. 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.

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)
	Access way	25	100
Local	Otreat	40	200 environmental goal
Street		40	300 maximum
Collector	Street	50	300 environmental goal
Collector	Sueel	00	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)



7.3 – Intersection Capacity

The main intersection impacted by the construction of the development is the Newell Highway / Frome Street priority controlled give way controlled T-intersection and the Frome Street / Banksia Way priority controlled give way T-intersection. During traffic counts at these intersections both were observed to operate satisfactorily with almost uninterrupted flow conditions with little delay to motorists. This is further evidenced when reviewing the following table sourced from 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.

Noting traffic volumes on Frome Street will be below 400 vtph and on Banksia Way / Amaroo Drive they will be below 250 vtph during construction of the solar farm, it can be concluded uninterrupted flow conditions would remain in place without further intersection analysis. As such the construction of the solar farm will not adversely impact on the Frome Street / Banksia Way priority controlled give way T-intersection and no upgrading or special construction restrictions would be required.

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

 Table 3 – Uninterrupted flow condition thresholds at an intersection

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

During counts at the Newell Highway / Frome Street intersection, it was noted some delay and queuing was occurring for the right turn movement out of Frome Street. As such this intersection has been modelled using the Sidra Intersection modelling program. This software package predicts likely delays, queue lengths and thus levels of service that will occur at intersections. Assessment is then based on the level of service requirements of TfNSW shown below in **Table 4**. It is assumed that if it can be shown the development does not adversely impact on the operation of these intersections, then the development will not adversely impact on any other intersections on the local and state road network.

Assumptions made in this modelling were;

- The intersection was modelled as per the current layout and speed zoning;
- Existing traffic volumes used were as recorded by Intersect Traffic in March 2021;
- Development traffic was distributed as per *Figure 4* above.
- Only 2021 AM and PM models were established as modelling is for construction traffic only which will have a 6 month loading period.
- Deliveries to the solar farm were only modelled as it is understood that employee movements would be to accommodation places within Moree and would not use this intersection. Therefore a total of 8 vtph for construction traffic will be loaded onto the intersection with 75 % of traffic having an origin / destination to the south and 25 % having an origin / destination to the north. The proportion of inbound and outbound trips were considered to be equal.
- Heavy vehicle percentage was 10 %.



Table 4 – TfNSW Intersection LoS criteria for intersections

Table 4.2 Level of service criteria for intersections

Level of Service	Average Delay per Traffic Signals, Vehicle (secs/veh) Roundabout		Give Way & Stop Signs
А	< 14	Good operation	Good operation
В	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
С	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays	At capacity, requires other control mode
		Roundabouts require other control mode	

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

The results of the modelling for the worst average delay / LoS case are shown below in *Table 5* while the Sidra Movement Summary Sheets are provided in *Attachment D*.

Model	Deg. Satn (v/c)	Worst Average Delay (s)	Worst Level of Service	95 % back of queue length (cars)
2021 AM	0.200	8.0	А	0.8
2021 PM	0.219	8.4	А	0.9
2021 AM + development	0.205	8.0	А	0.9
2021 PM + development	0.225	8.4	A	1.0

Table 5 – Sidra results –	Newell Highway /	Frome Street a	ive way T-intersection

The modelling shows that the Newell Highway / Frome Street priority controlled give way Tintersection would continue to operate satisfactorily during construction of the solar farm. The average delays and LoS experienced at the intersection for all movements were found to be well within the thresholds for satisfactory operation of the intersection determined by TfNSW and as shown in **Table 4** above.

Therefore it can be concluded the construction of the solar farm will not adversely impact on the efficiency and effectiveness of the adjoining state and local road network.

7.4 Access Assessment

In terms of width, 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. As the proposed entrance at the combined entry / exit access at Amaroo Drive will only need to accommodate a straight through heavy vehicle movement it will need to be a minimum 6.5 metres wide to accommodate 2 heavy vehicles passing each other and comply with the requirements of Australian Standard *AS2890.2-2002 Parking Facilities – Part 2 Off-street commercial vehicle facilities..*

Sight distance at the proposed access off Amaroo Drive was observed to be in excess of 250 metres therefore complies with the requirements of Figure 3.2 of Australian Standard *AS2890.1-2004 Parking Facilities – Part 1 Off-street car parking (69 metres desirable SSD for 50 km/h)* as well as Austroads *Guide to Road Design – Part 4A – Unsignalised and signalised intersections - Table 3.2 (97 metres for 100 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 Banksia Way and Amaroo Drive have sealed pavement greater than 11 metres wide and therefore complies with Austroads Standards for Urban Roads. Further while undertaking the traffic counts at the Frome Street / Banksia Way intersection it was noted that there was significant heavy vehicle traffic on these roads already indicating it was already suitable for heavy vehicle traffic. Therefore, it is considered that the proposed transportation route to the site is suitable to carry heavy vehicles and is thus suitable to cater for the construction traffic for the Solar Farm construction.

8.0 ON-SITE CAR PARKING

The on-site car parking requirements within the *Moree Plains DCP (2013)* for industrial type uses is shown below and considered relevant to the development.

1 space per 2 staff employed, or 1 space per 100 square metres of gross leasable floor area (whichever is the greater).

With no building proposed for the solar farm, and only 1 regular maintenance employee visiting the site at any time, the development is therefore required to provide 1 on-site car parking space under the DCP requirements. However, it is the responsibility of the applicant to also provide sufficient on-site car parking for construction employees during the construction of 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 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. This is in excess of the Industrial land use car parking requirements of the Moree Plains Shire Council. With significant overflow parking areas also on site, it is reasonable to conclude the development provides sufficient on-site car parking that complies with the objectives of the *Moree Plains DCP (2013)*

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 2.4m x 5.4m and aisle widths of 5.8m. There is sufficient room on-site to ensure compliance with this requirement. 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 Amaroo Drive will be undertaken in a forward direction.

9.0 ALTERNATE TRANSPORT MODES

The proposed development will not generate any increase in public transport demand during either the construction or operational phases of the development as transport to and from the site will be provided in company vehicles. 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.



10.0 CONCLUSIONS

This traffic and parking assessment for the proposed Solar Photovoltaic (PV) Power Farm on Part Lot 392 DP751780, Amaroo Drive, Moree has concluded 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 midblock capacity thresholds for the local and state road network (LoS C). Traffic volumes will remain below these thresholds during the construction and operation of the development.
- The Frome Street / Banksia Way priority controlled give way cross T-intersections 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.
- Sidra Intersection modelling of the Newell Highway / Frome Street priority controlled give way T-intersection continues to operate satisfactorily during the construction of the development.
- It is also reasonable to conclude the development will not adversely impact the intersections on the wider local and state road network given the high levels of intersection control on the major intersections and the relatively low traffic generation from the 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.
- As the majority of the transportation route to the site is already an approved B-Double route and as Banksia Way and Amaroo Drive already carry significant heavy vehicle traffic, 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. This will be achieved 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.

11.0 RECOMMENDATION

Having carried out this traffic and parking assessment for the proposed Solar Photovoltaic (PV) Power Farm on Part Lot 392 DP751780, Amaroo Drive, Moree, it is recommended that the proposal can be supported from a traffic perspective as the development will not adversely impact on the local and state road network and complies with all relevant requirements of Moree Plains Shire Council, Austroads, Australian Standards and TfNSW.

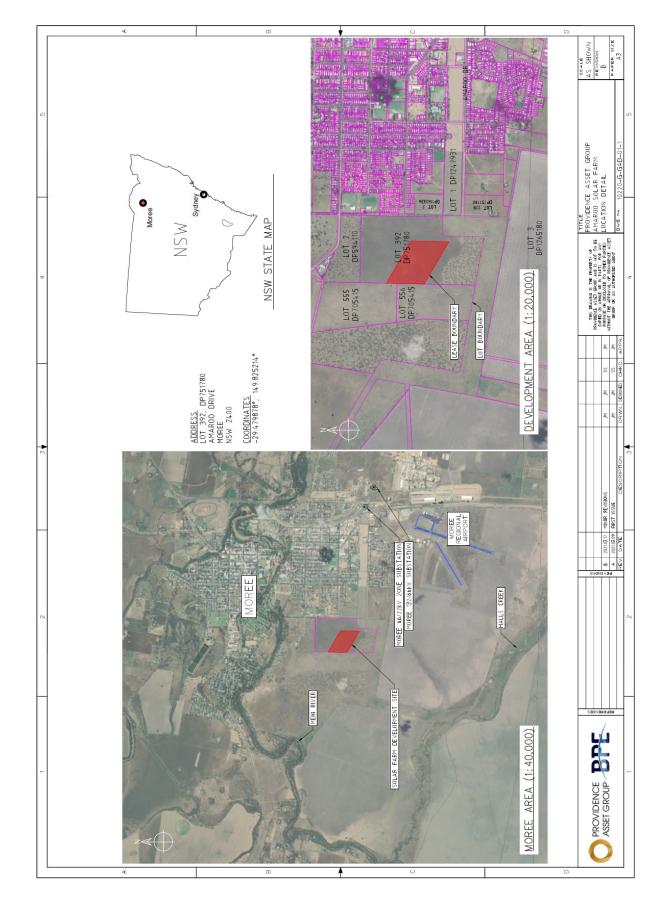
1. Carles

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

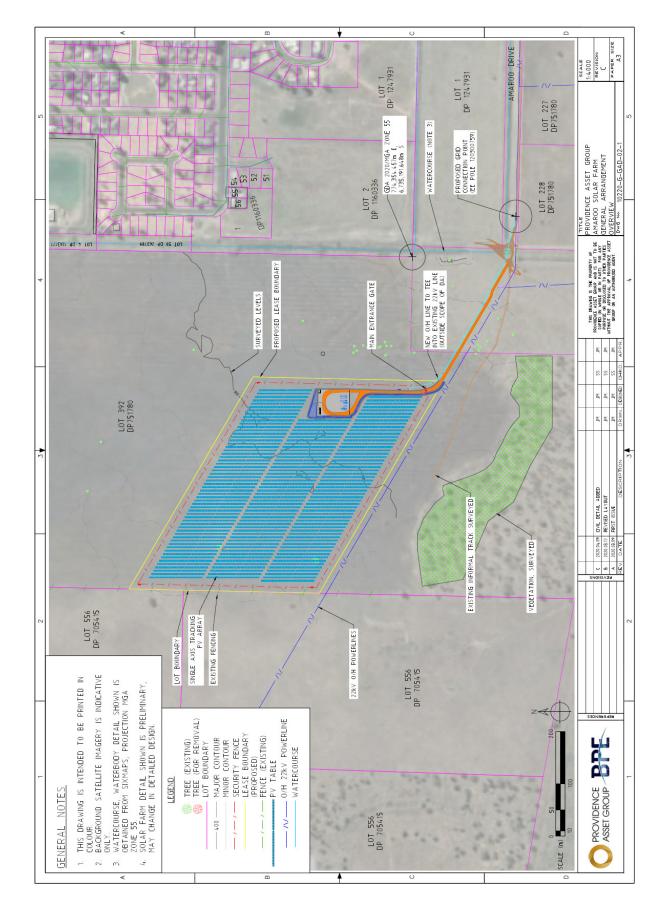


ATTACHMENT A DEVELOPMENT PLANS

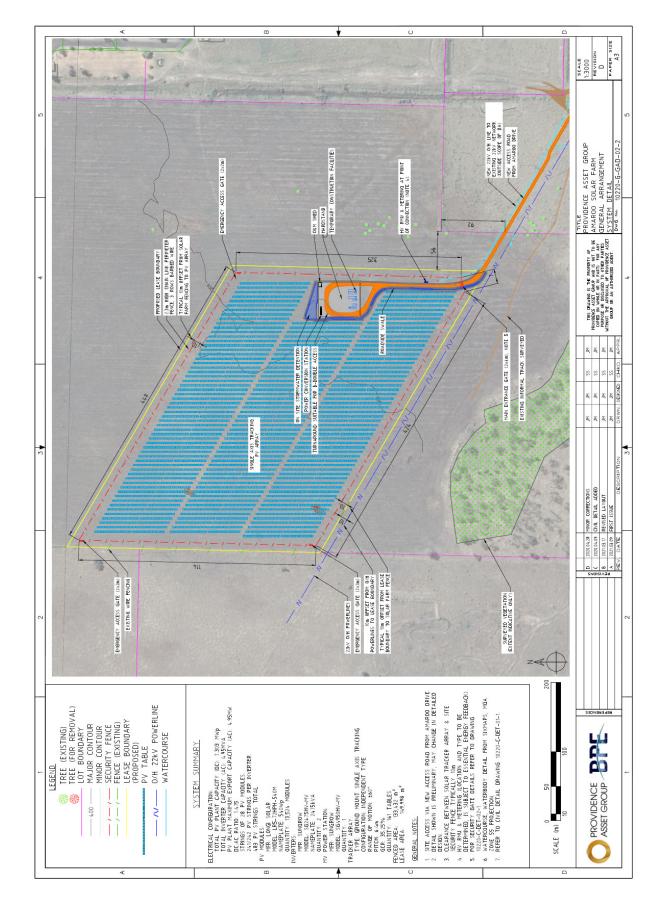








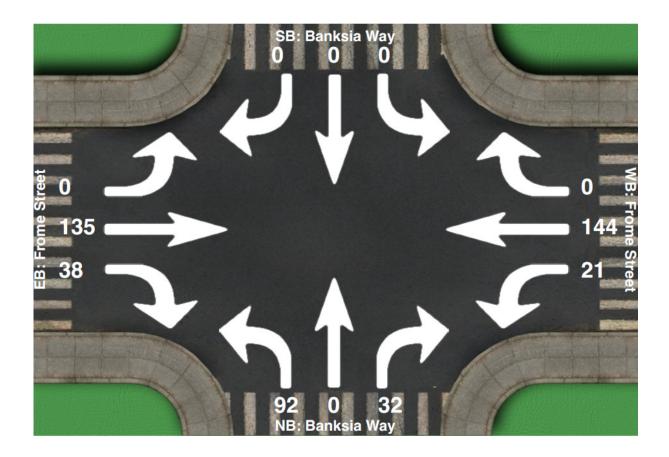




ATTACHMENT B TRAFFIC COUNT DATA



Location: Banksia Way at Frome Street, Moree GPS Coordinates: Lat=-29.482563, Lon=149.848190 Date: 2021-03-04 Day of week: Thursday Weather: Analyst: Jeff



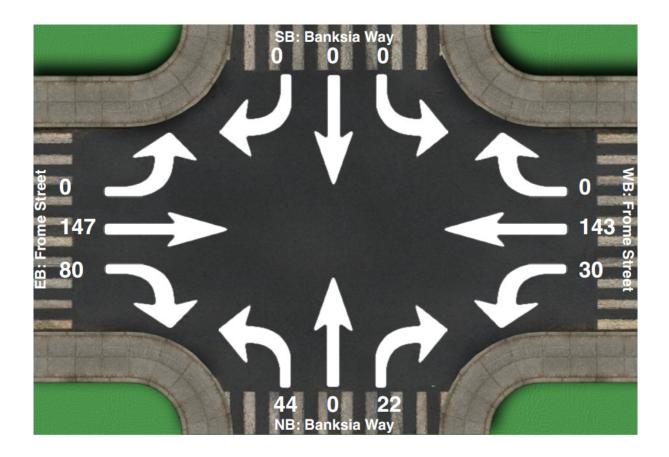
Intersection Peak Hour

08:00 - 09:00

	Sc	outhBou	ind	Westbound			Northbound			Eastbound			Total	
	Left Thru Righ			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	TOTAL	
Vehicle Total	0	0 0 0			21 144 0			92 0 32			135	38	462	
Factor	0.00	0.00	0.00	0.58	0.82	0.00	0.72	0.00	0.67	0.00	0.82	0.86	0.95	
Approach Factor		0.00			0.86			0.70			0.86			



Location: Banksia Way at Frome Street, Moree GPS Coordinates: Date: 2021-03-04 Day of week: Thursday Weather: Analyst: Jeff



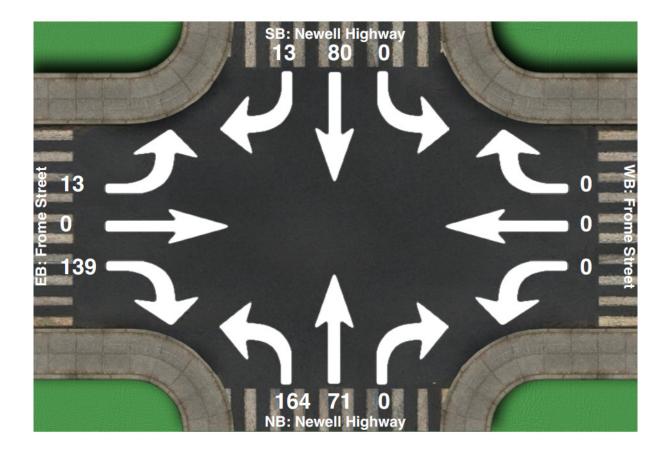
Intersection Peak Hour

15:00 - 16:00

	So	outhBou	ind	Westbound			Northbound			Ea	Total			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	TOLAI	
Vehicle Total	0	0 0 0			143	0	44	0	22	0	147	80	466	
Factor	0.00	0.00	0.00	0.62	0.81	0.00	0.65	0.00	0.55	0.00	0.85	0.80	0.88	
Approach Factor	8	0.00			0.86			0.79			0.86			



Location:Newell Highway at Frome Street, MoreeGPS Coordinates:Lat=-29.484561, Lon=149.850199Date:2021-03-05Day of week:FridayWeather:Jeff



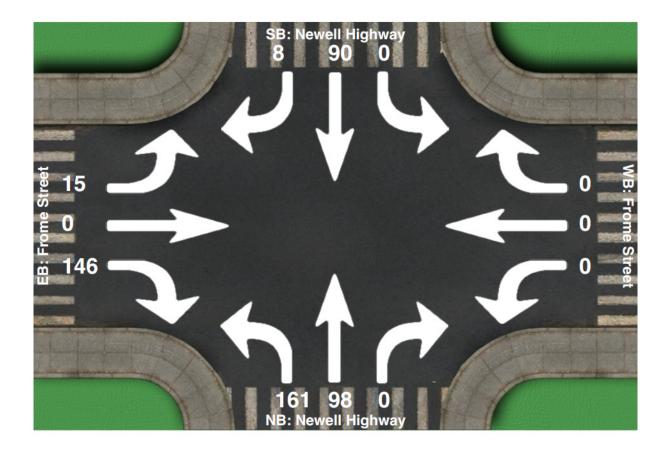
Intersection Peak Hour

08:00 - 09:00

	So	outhBou	ind	Westbound			Northbound			Ea	Total			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	TOtal	
Vehicle Total	0	0 80 13			0 0 0			164 71 0			13 0 139			
Factor	0.00	0.00 0.95 0.65		0.00 0.00 0.00		0.98 0.68 0.00		0.46 0.00		0.97	0.96			
Approach Factor		0.89			0.00			0.86			0.93			



Location:Newell Highway at Frome Street, MoreeGPS Coordinates:Lat=-29.484578, Lon=149.850228Date:2021-03-05Day of week:FridayWeather:Jeff



Intersection Peak Hour

15:00 - 16:00

	Sc	outhBou	ind	We	Westbound			Northbound			Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total	
Vehicle Total	0 90 8		0 0 0		161 98 0		15 0 146			518				
Factor	0.00 0.90 0.50		0.00 0.00 0.00		0.91 0.88 0.00		0.62 0.00		0.85	0.95				
Approach Factor	0.91			0.00			0.95							

ATTACHMENT C TRAFFIC GENERATION INFORMATION





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.

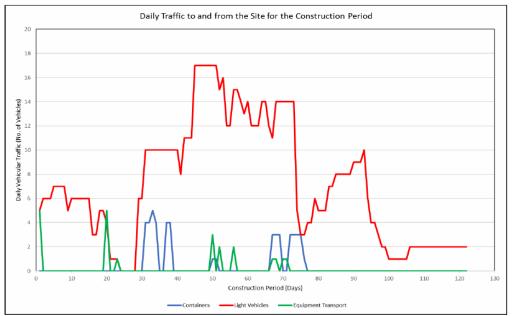


Figure 1 - Daily Traffic to and from Site for the Construction Period

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.

Preliminary Solar Farm Vehicle Movement Guidance

Page 1



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.

Preliminary Solar Farm Vehicle Movement Guidance

Page 2



5MW Solar Farm - Typical Vehicle Mov	ements		
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	

ATTACHMENT D SIDRA MOVEMENT TABLES



V Site: 101 [2021 AM (Site Folder: General)]

Newell Highway / Frome Street Moree Give Way T Site Category: (None) Give-Way (Two-Way)

Vehi	cle M	ovemen	t Perfor	mance										
Mov ID	Turn	INP VOLU [Total veh/h		DEM/ FLO [Total veh/h		Deg. Satn v/c		Level of Service		ACK OF EUE Dist] m	Prop. I Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South	n: New	ell Highw	/ay											
1 2	L2 T1	164 71	10.0 10.0	173 75	10.0 10.0	0.112	5.8 0.0	LOS A LOS A	0.5	3.7 0.0	0.07	0.52	0.07	53.7 60.0
Appro		235 ell Highw	10.0 ay	247	10.0	0.112	4.0	NA	0.5	3.7	0.05	0.36	0.05	55.4
8 9	T1 R2	80 13	10.0 10.0	84 14	10.0 10.0	0.046 0.011	0.0 5.9	LOS A LOS A	0.0 0.0	0.0 0.3	0.00 0.18	0.00 0.54	0.00 0.18	60.0 52.4
Appro		<mark>9</mark> 3	10.0	98	10.0	0.046	0.8	NA	0.0	0.3	0.02	0.08	0.02	58.8
West	: From	e Street												
10 12	L2 R2	13 139	10.0 10.0	14 146	10.0 10.0	0.012 0.200	5.9 8.0	LOS A LOS A	0.0 0.8	0.3 6.4	0.17 0.45	0.54 0.68	0.17 0.45	52.7 51.2
Appro	bach	152	10.0	160	10.0	0.200	7.8	LOSA	0.8	6.4	0.42	0.67	0.42	51.3
All Vehic	les	480	10.0	505	10.0	0.200	4.6	NA	0.8	6.4	0.16	0.40	0.16	54.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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V Site: 101 [2021 AM + development (Site Folder: General)]

Newell Highway / Frome Street Moree Give Way T Site Category: (None) Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INP VOLU [Total veh/h		DEM/ FLO [Total veh/h		Deg. Satn v/c		Level of Service	95% B/ QUI [Veh. veh		Prop. E Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South	h: New	ell Highw	/ay											
1 2 Appro	L2 T1 oach	167 71 238	10.0 10.0 10.0	176 75 251	10.0 10.0 10.0	0.114 0.041 0.114	5.8 0.0 4.0	LOS A LOS A NA	0.5 0.0 0.5	3.8 0.0 3.8	0.07 0.00 0.05	0.52 0.00 0.37	0.07 0.00 0.05	53.7 60.0 55.4
North	n: New	ell Highw	ay											
8 9 Appro	T1 R2	80 14 94	10.0 10.0 10.0	84 15 99	10.0 10.0 10.0	0.046 0.012 0.046	0.0 5.9 0.9	LOS A LOS A NA	0.0 0.0 0.0	0.0 0.3 0.3	0.00 0.18 0.03	0.00 0.54 0.08	0.00 0.18 0.03	60.0 52.4 58.7
		e Street	10.0	00	10.0	0.040	0.0		0.0	0.0	0.00	0.00	0.00	00.1
10 12	L2 R2	14 142	10.0 10.0	15 149	10.0 10.0	0.013 0.205	6.0 8.0	LOS A LOS A	0.0 0.9	0.3 6.6	0.17 0.45	0.54 0.68	0.17 0.45	52.7 51.2
Appro	oach	156	10.0	164	10.0	0.205	7.9	LOSA	0.9	6.6	0.43	0.67	0.43	51.3
All Vehic	les	488	10.0	514	10.0	0.205	4.7	NA	0.9	6.6	0.16	0.41	0.16	54.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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V Site: 101 [2021 PM (Site Folder: General)]

Newell Highway / Frome Street Moree Give Way T Site Category: (None) Give-Way (Two-Way)

Vehi	cle M	ovemen	t Perfo	rmance										
Mov ID	Turn	INP VOLU [Total veh/h		DEM/ FLO [Total veh/h		Deg. Satn v/c		Level of Service		ACK OF EUE Dist] m	Prop. E Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South	n: New	ell Highw	ay											
1 2 Appro	L2 T1 bach	161 98 259	10.0 10.0 10.0	169 103 273	10.0 10.0 10.0	0.110 0.056 0.110	5.7 0.0 3.6	LOS A LOS A NA	0.5 0.0 0.5	3.6 0.0 3.6	0.05 0.00 0.03	0.53 0.00 0.33	0.05 0.00 0.03	53.7 60.0 55.9
North	: New	ell Highw	ay											
8 9 Appro	T1 R2 bach	90 8 98	10.0 10.0 10.0	95 8 103	10.0 10.0 10.0	0.052 0.007 0.052	0.0 6.0 0.5	LOS A LOS A NA	0.0 0.0 0.0	0.0 0.2 0.2	0.00 0.21 0.02	0.00 0.54 0.04	0.00 0.21 0.02	60.0 52.3 59.3
West	: From	e Street												
10 12	L2 R2	15 146	10.0 10.0	16 154	10.0 10.0	0.014 0.219	6.1 8.4	LOS A LOS A	0.0 0.9	0.4 7.1	0.20 0.48	0.54 0.71	0.20 0.48	52.6 50.9
Appro	oach	161	10.0	169	10.0	0.219	8.2	LOSA	0.9	7.1	0.45	0.69	0.45	51.1
All Vehic	les	518	10.0	545	10.0	0.219	4.4	NA	0.9	7.1	0.16	0.39	0.16	54.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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V Site: 101 [2021 PM + development (Site Folder: General)]

Newell Highway / Frome Street Moree Give Way T Site Category: (None) Give-Way (Two-Way)

Vehi	cle M	ovemen	t Perfo	rmance										
Mov ID	Turn	INP VOLU [Total veh/h		DEM/ FLO [Total veh/h		Deg. Satn v/c		Level of Service		ACK OF EUE Dist] m	Prop. E Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South	n: New	ell Highw	/ay											
1 2 Appro	L2 T1 bach	164 98 262	10.0 10.0 10.0	173 103 276	10.0 10.0 10.0	0.112 0.056 0.112	5.7 0.0 3.6	LOS A LOS A NA	0.5 0.0 0.5	3.7 0.0 3.7	0.05 0.00 0.03	0.53 0.00 0.33	0.05 0.00 0.03	53.7 60.0 55.9
North	: New	ell Highw	ay											
8 9 Appro	T1 R2 bach	90 9 99	10.0 10.0 10.0	95 9 104	10.0 10.0 10.0	0.052 0.008 0.052	0.0 6.0 0.6	LOS A LOS A NA	0.0 0.0 0.0	0.0 0.2 0.2	0.00 0.21 0.02	0.00 0.54 0.05	0.00 0.21 0.02	60.0 52.3 59.2
West	: From	e Street												
10 12	L2 R2	16 149	10.0 10.0	17 157	10.0 10.0	0.015 0.225	6.1 8.4	LOS A LOS A	0.1 1.0	0.4 7.3	0.20 0.48	0.54 0.71	0.20 0.48	52.6 50.9
Appro	oach	165	10.0	174	10.0	0.225	8.2	LOSA	1.0	7.3	0.46	0.69	0.46	51.0
All Vehic	les	526	10.0	554	10.0	0.225	4.5	NA	1.0	7.3	0.16	0.39	0.16	54.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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