Amber

Traffic & Transportation Direction

Kidman Way Solar Farm

Kidman Way, Hillston

Traffic Impact Assessment

December 2023

Reference: 686 rep 231221 final

Kidman Way Solar Farm

Kidman Way, Hillston

Traffic Impact Assessment

Prepared for: NGH Pty Ltd

Status: Draft report

Date: 21 December 2023

Reference: 686 rep 231221 final

Revision	Date	Description	Author	Reviewed	Approved
A	20/06/23	Draft 01	Rico Kobelt	Oliver Mihaila	Michael Willson
B	08/12/23	Final 01	Oliver Mihaila	Michael Willson	Michael Willson
C	21/12/23	Final 02	Oliver Mihaila	Michael Willson	Michael Willson

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1. Background

1.1 Background

Amber Organisation Pty Ltd has been engaged by NGH Pty Ltd to conduct a review of the traffic implications of the Kidman Way Solar Farm and prepare a Traffic Impact Assessment.

The solar farm is proposed to have a capacity of 5MW and is located approximately 3km south of the Hillston town centre. Access to the site is proposed via an existing access track connecting with Kidman Way at the northern boundary of the site. Staff are expected to primarily be located in Hillston with all plant expected to be delivered from Port Botany or Port of Melbourne.

Figure 1 shows the proposed layout of the site in relation to the road network, access location and existing infrastructure.

Figure 1: Site Layout

Source: NGH Pty Ltd

1.2 Purpose of Document

This Traffic Impact Assessment has been prepared to assess the construction, operational and decommissioning traffic impacts, and the access arrangements of the solar farm. It is based on surveys and observations at the site and our experience of similar developments elsewhere.

More specifically, the report addresses the following key matters:

- Details of both light and heavy vehicle traffic volumes and proposed transport routes;
- An assessment of the potential traffic impacts of the project on road network function and safety;
- An assessment of the capacity of the existing road network to accommodate the type and volume of traffic generated by the project;
- Details of measures to mitigate and/or manage potential impacts, including construction traffic control, road dilapidation surveys and measures to control dust generated by traffic volumes; and
- Details of access roads and how these connect to the existing road network and ongoing operational maintenance.

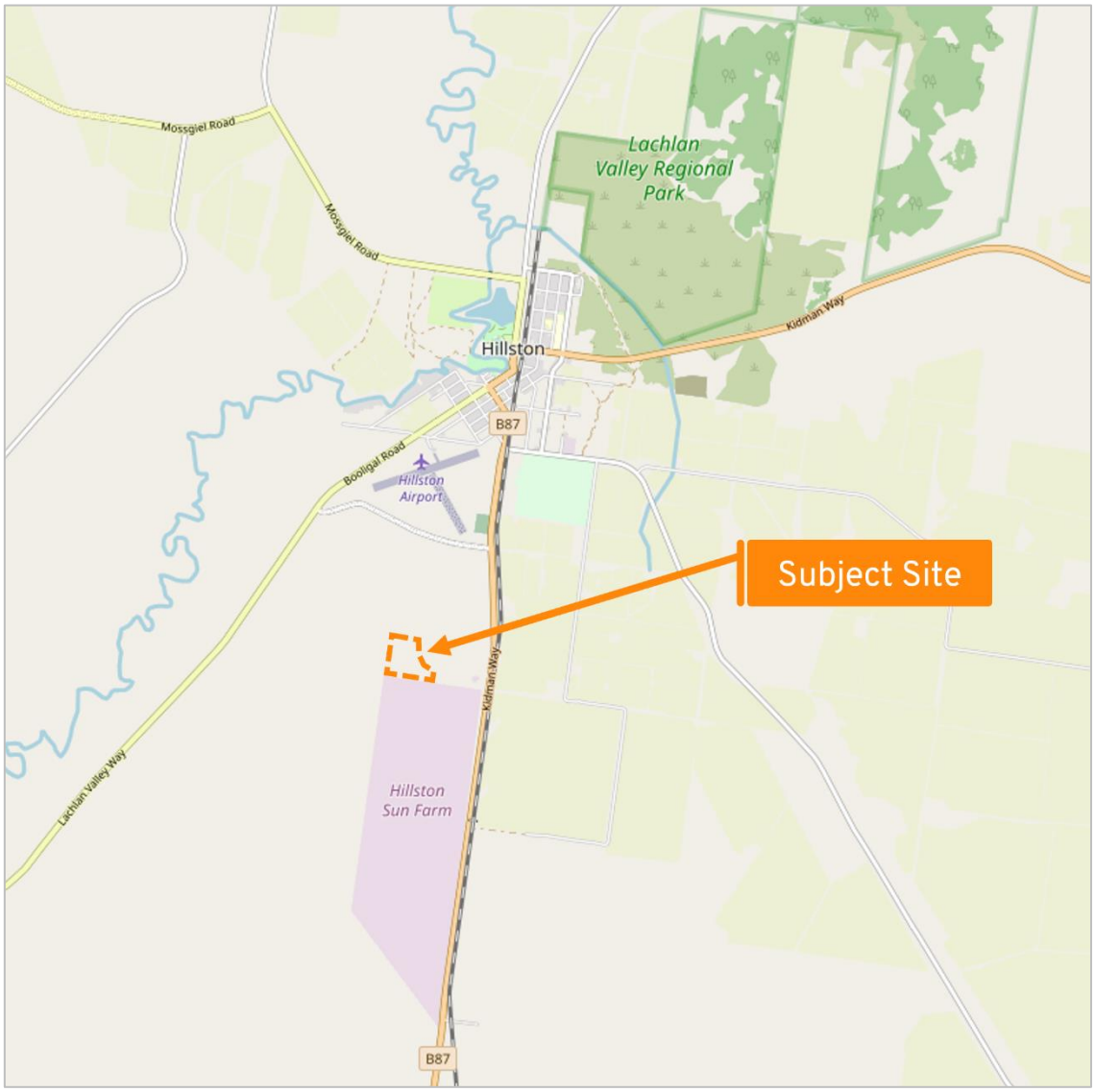
The traffic assessment has been undertaken in accordance with the *RTA Guide to Traffic Generating Developments* and relevant Austroads Guidelines. It has also been undertaken in consultation with Carrathool Shire Council.

2. Existing Conditions

2.1 Site Location

The site forms Lot 1 in DP626213 and is located approximately 3km south of Hillston on the western side of Kidman Way. Figure 2 shows the location of the site in relation to the surrounding transport network.

Figure 2: Site Location



Source: OpenStreetMap

The figure indicates the site has access to the State road network via Kidman Way which is located approximately 750 metres east of the site.

The site and surrounding area are zoned Primary Production (RU1) and predominantly occupied by agricultural land. Land further to the north is zoned Air Transport Facility (SP2) associated with Hillston Airport, and the town centre has a mixture of zones permitting industrial, commercial and residential uses.

Figure 3 provides an aerial photograph of the site and the surrounding area. It shows that the surrounding area is predominantly agricultural or vegetated land and that the site is situated to the south of the Hillston town centre. The 85MW Hillston Solar Farm is situated directly south of the site.

Figure 3: Aerial Photograph of Site and Surrounds

Source: Google Earth

2.2 Road Network

Kidman Way is a State road under the care and management of Transport for New South Wales (TfNSW). It runs in a general north-south alignment from Bourke to its connection with Newell Highway near Jerilderie. Within the vicinity of the site, it has a carriageway width of approximately 7.0 metres accommodating one lane of traffic in each direction, and has a speed limit of 100km/hr.

2.3 Traffic Volumes

Traffic volume data has been collected from the TfNSW Traffic Volume Viewer for Kidman Way, approximately 2.5 kilometres north of the site. A summary of the traffic volumes is provided within Table 1. In order to calculate the current 2023 traffic volumes on the road network, an annual growth rate of 1.5% has been applied to the 2006 survey data.

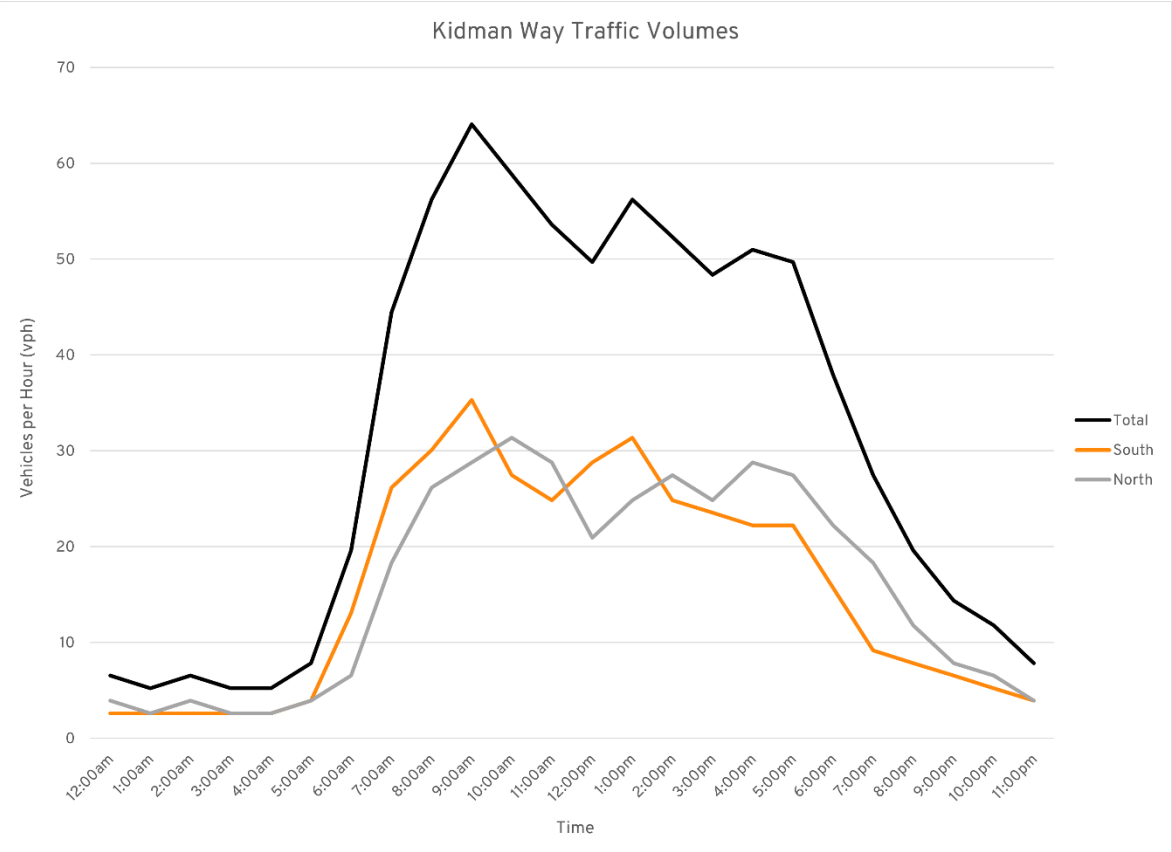
Table 1: Kidman Way Traffic Volumes

Road	Survey Location	Station ID	Survey Year	Recorded Volume	Growth Factor	Estimated Current Volumes
Kidman Way	100m South of Griffith Road, Hillston	97139	2006	581 vpd AM – 49 vph (9am) PM – 43 vph (1pm)	1.5%	760 vpd AM – 64 vph PM – 56 vph

vpd – vehicles per day
vph – vehicles per hour

Whilst it is acknowledged that the traffic data is from 2006, it is considered that the survey data provides a useful source of information to determine the daily distribution of traffic on Kidman Way. The traffic volumes have been provided for each hour and separated into northbound and southbound movements to show the daily traffic volume profile. The traffic volumes are shown in Figure 4 which has utilised a 1.5% growth factor to estimate the 2023 traffic volumes.

Figure 4: Kidman Way Traffic Volume Data



The TfNSW survey data indicates that Kidman Way currently experiences most traffic movements between the hours of 8:00am and 5:00pm with a relatively flat distribution between the peak hours.

Overall, the survey results indicate the surrounding road network currently accommodates a low level of traffic for the respective road classifications and is able to accommodate an increase in vehicle movement.

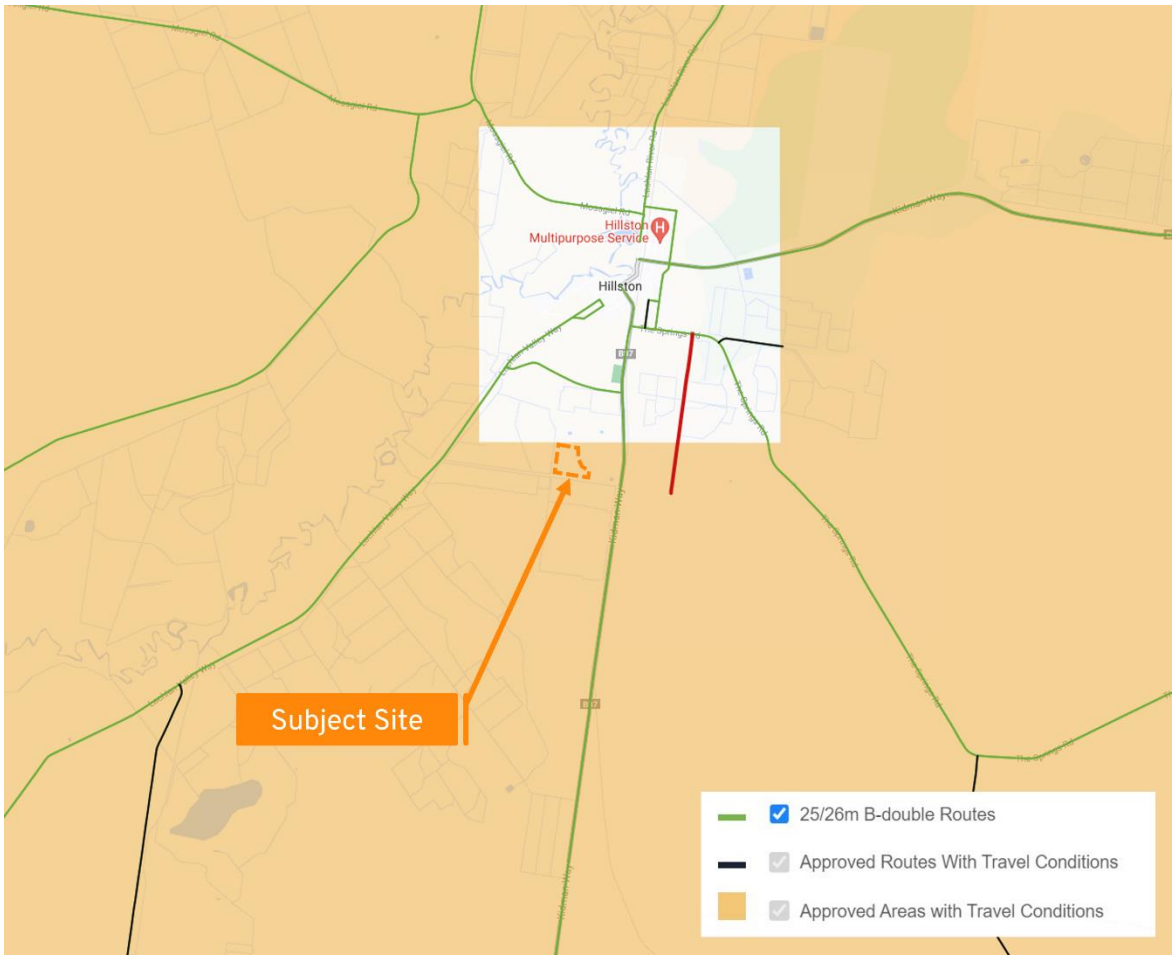
2.4 Public Transport Services

No public transport services are provided within the vicinity of the site. The Merriwagga to Hillston school bus service operates along Kidman Way and passes the project area between approximately 8:00-8:30am for the school pick-up service and 3:30-4:00pm for the drop-off service.

2.5 Restricted Vehicle Access

The TfNSW Restricted Vehicle Access Map for the surrounding area is provided within Figure 5. The green lines indicate approved B-Double routes while the black lines represent approved routes with travel conditions. The figure shows that Kidman Way and the surrounding State road network are B-Double approved routes.

Figure 5: TfNSW Gazetted Roads for B-Doubles Map



Source: TfNSW Gazetted Roads for B-Doubles Map

The travel conditions outlined within the portal are as follows:

- *Road train length must not exceed 36.5 metres.*

- *On unsealed roads and single lane narrow roads, travel is suspended during periods of prolonged rain and up to 1 day for every 5mm of rain within the 24 hour period after the rainfall event. Access may be further restricted or deferred in the event of a significant rainfall event. Contact must be made with the relevant traffic management information sources on such occasions.*
- *In the event the permitted heavy vehicle damages assets or infrastructure, contact must be made with Carrathool Shire Council via 02 6961 7600 to advise of the damage.*
- *The heavy vehicle is restricted to a maximum speed limit of 60km/h on the approved council roads, except where a traffic sign indicates a lower speed.*
- *Operators are responsible for any damage to Carrathool's road infrastructure.*
- *Operators are to carry out their own risk assessment of that route prior to travel.*
- *Operators are to check with Council for road closures.*
- *Travel is not permitted on the roads shown as Exception Routes in the legend within Carrathool LGA.*

Accordingly, the site has access to the B-Double approved road network via Kidman Way.

2.6 Crash History

Amber has conducted a review of the TfNSW Road Safety database for all injury crashes along Kidman Way within 2.0 kilometres of the site. The crash database provides the location and severity of all injury and fatal crashes for the five-year period from 2017 to 2021. The search revealed no crashes within the search area. Given the road classification and associated traffic volumes, it is concluded that the road network is currently operating in a relatively safe manner.

3. Traffic Assessment

3.1 Traffic Generation

3.1.1 Construction

The solar farm construction is expected to take approximately 7 months, with the peak construction period expected to take 3 months. Construction activities would be undertaken during standard daytime construction hours, as follows:

- Monday to Friday: 7am – 6pm
- Saturday: 7am – 1pm
- No work on Sundays or public holidays.

Any construction outside of these normal working hours would only be undertaken with prior approval from relevant authorities.

A maximum workforce of 20 personnel would be on-site during peak construction periods with one shift proposed per day.

Construction traffic generated by the solar farm can broadly be separated into the following categories:

- Light vehicles associated with transporting the workforce to/from the site;
- Medium and Heavy Rigid Trucks (MRV and HRV) would be used to deliver raw materials and smaller plant; and
- 19 metre long Articulated Vehicles and 26 metre long B-Doubles (AV and B-Double) would be used to transport larger plant.

The applicant has advised that no oversize or overmass (OSOM) vehicles would be utilised for the project.

Traffic volumes for the project have been provided by the Applicant. It is anticipated that during peak construction the site could generate up to 10 heavy and 40 light vehicle movements per day. It is noted that a vehicle movement is classified as a vehicle travelling in one direction (i.e. a truck accessing the site would generate one movement towards the site and one movement away from the site when it departs).

Table 2 summarises the traffic movements generated during the average and peak construction period of the solar farm.

Table 2: Traffic Generation During Peak Construction Periods

Vehicle Type	Vehicle Size	Average Vehicle Movements per Day		Peak Vehicle Movements per Day	
		Daily (vpd)	Peak Hour (vph)	Daily (vpd)	Peak Hour (vph)
Light Vehicle	Light Vehicle (car / 4WD)	20	10	40	20
Heavy Vehicle	MRV/HRV	4	0	6	0
	AV/B-Double	2	0	4	0
Total		**26**	**10**	**50**	**20**

Overall, the site is expected to generate approximately 20 vehicle movements during the morning and evening peak hours during the peak construction period, which would reduce to 10 vehicle movements over the typical construction periods.

3.1.2 Operational Traffic

During operation the solar farm is expected to generate a minimal level of traffic associated with maintenance and operation services. The solar farm is expected to be operated by up to 2 staff resulting in a traffic generation of up to 4 vehicle movements per day which would result in a negligible change to the traffic environment. There would also be occasional light commercial vehicles delivering parts to the site but only as required for maintenance.

3.2 Traffic Distribution

Traffic accessing the site would do so via the proposed access point on Kidman Way. The workforce is expected to predominantly be located within Hillston, with all plant expected to be delivered from Port Botany or Port of Melbourne.

The following provides a breakdown of the access distribution for each of the vehicle classifications outlined within Table 2:

- Light Vehicles: It is anticipated that 90% of the workforce would be located in Hillston and would travel to/from the north with the remaining 10% traveling to/from the south;
- MRV and HRV: These vehicles would predominantly be water trucks and vehicles transporting materials such as concrete and fencing supplies which would likely be sourced within the surrounding area. The Applicant has advised that 50% of movements would be to/from the north and 50% would be to/from the south.
- AV and B-Doubles: Plant would be transported from Port Botany or Port Melbourne to the site along Kidman Way from the south.

The peak hour for construction would occur at the start and end of the day when the workforce are transported to the site. The majority of the workforce typically arrive on-site between 6:00am and 7:00am.

During the morning peak all vehicle movements would be towards the site and in the evening peak all vehicle movements would be away from the site. The majority of heavy vehicle movements would be distributed throughout the day and would be split evenly between inbound and outbound movements.

3.3 Traffic Assessment

An important consideration in determining the impact of a development proposal on the road system is to assess the effect on traffic efficiency, the objective of which is to maintain the existing level of service. Level of Service is defined within the *Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis* as:

> *'... a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A level of service definition generally describes these conditions in terms of factors such as speed and travel time, freedom to manoeuvre, traffic interruptions, comfort and convenience, and safety.'*

Levels of service are designated from A to F from best (free flow conditions) to worst (forced flow with stop start operation, long queues and delays).

Table 4.5 of the *RTA Guide to Traffic Generating Developments* sets out two-way hourly road capacities for two-lane roads for different levels of service, with a design speed of 100 km/hr and based on different terrain types. Kidman Way currently carries in the order of 64 vehicles in the peak hour which would increase to approximately 84 vehicles per hour. Accordingly, it is expected that Kidman Way will continue to operate with a good level of service based on the RTA Guide.

During the middle of the day the traffic movements are expected to be predominantly associated with heavy vehicles with approximately 1 vehicle movement per hour. This increase in traffic can be readily accommodated on the road network given the existing low levels of traffic on the State and local network.

During operation the increase in traffic of up to 2 vehicle movements in the peak hour which would result in a negligible change to the traffic environment.

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

3.4 Cumulative Traffic Impacts

A review has been undertaken for the Major Projects website which indicates the Hillston Solar Farm Project is located approximately 150 metres south of the site. The project is completed and fully operational, and therefore only a small number of maintenance and staff vehicles are associated with the project. These vehicle movements are expected to have a minimal cumulative impact on the operation of the road network.

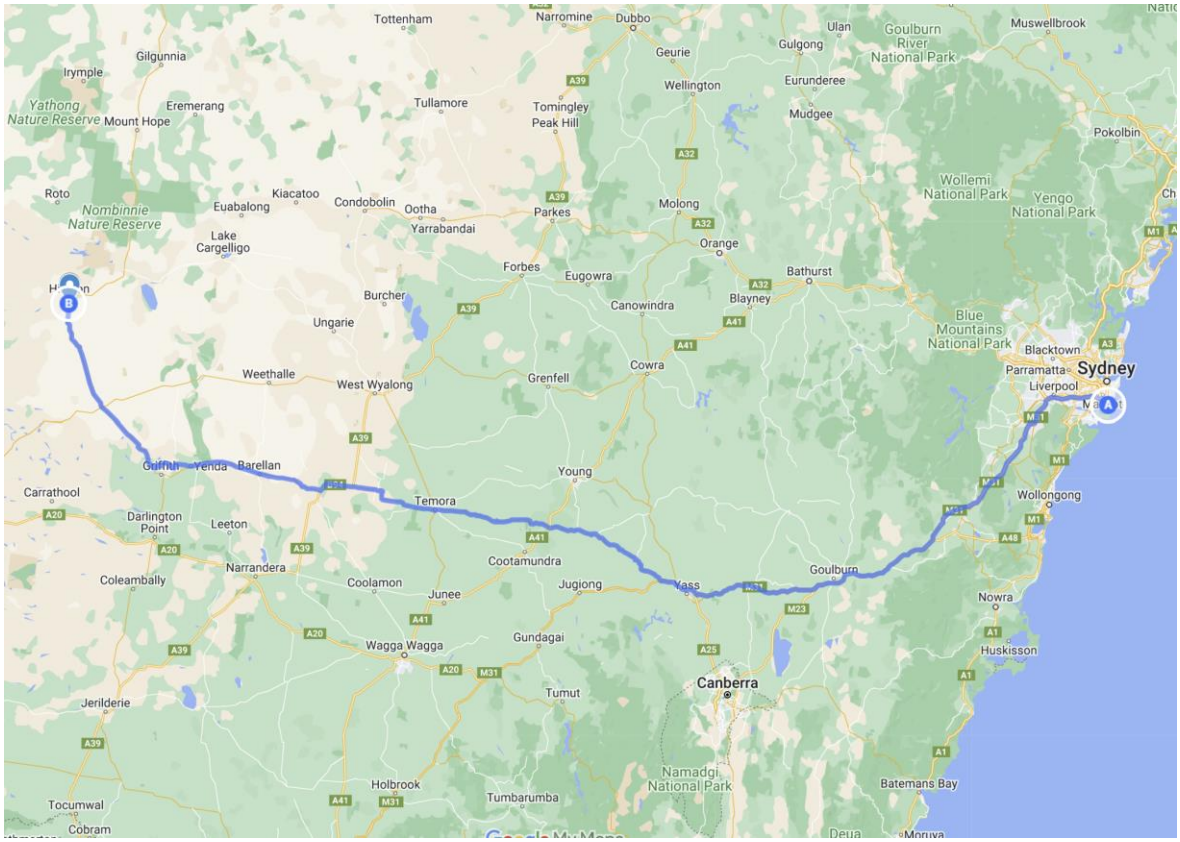
4. Route Assessment

4.1 Access Route

Port Botany and/or Port of Melbourne have been identified as the locations where the solar farm plant will be imported.

Figure 6 and Figure 7 show the proposed access routes from Port Botany and Port of Melbourne, respectively, which are the proposed routes to be undertaken for all transport vehicles from each port.

Figure 6: Access Route from Port Botany to Site



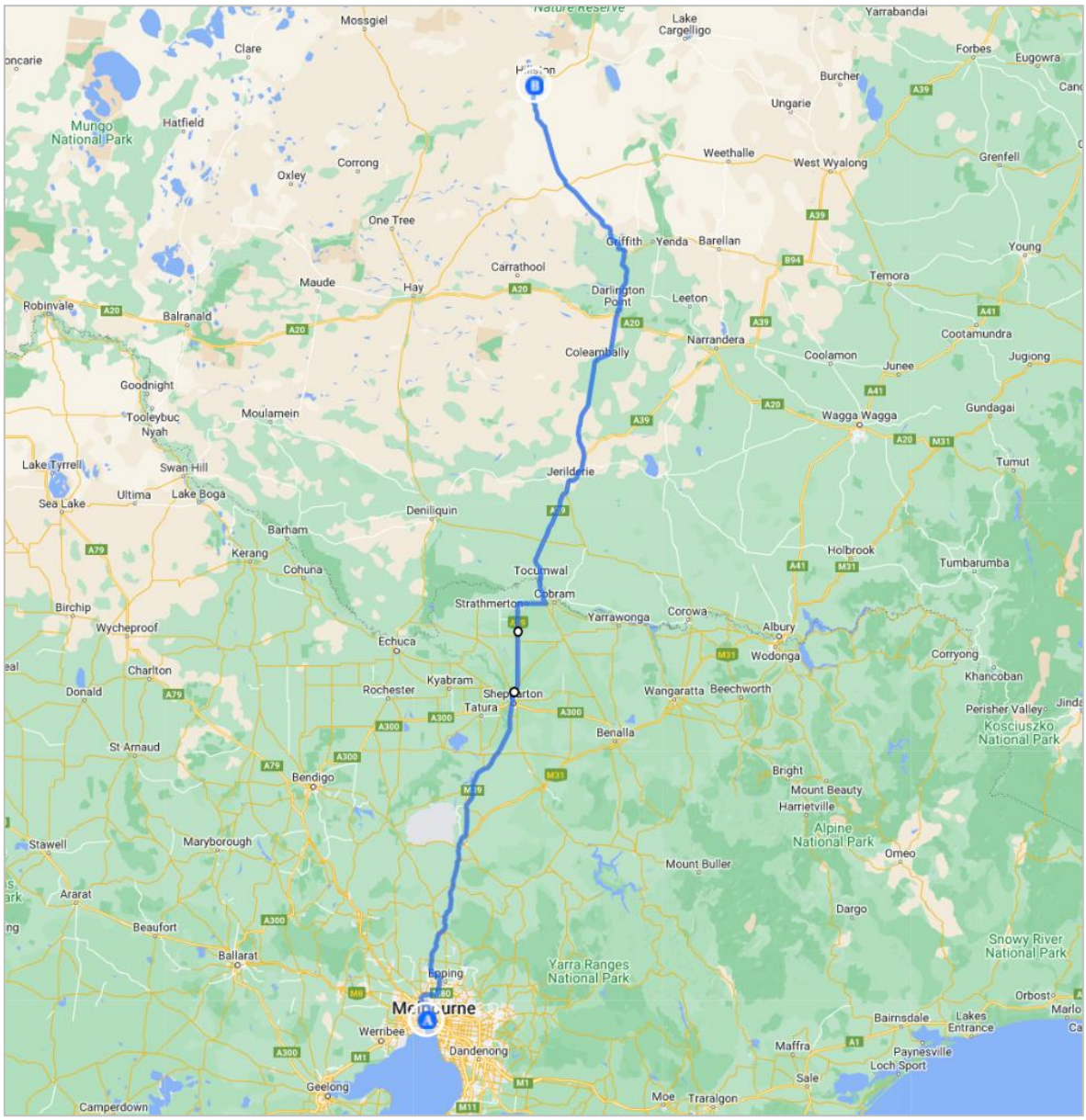
Source: Google Maps - https://goo.gl/maps/iYfQ5ucRpofNkWZz7

The proposed construction traffic access route from Port Botany to the site is as follows:

- Foreshore Road,
- South Western Motorway,
- Hume Highway,
- Burley Griffin Way,
- Beelbangera Road,
- Rifle Range Road,
- Jones Road,
- Lakes Road,

- Kidman Way,
- Site Access.

Figure 7: Access Route from Port of Melbourne to Site



Source: Google Maps - https://goo.gl/maps/rpAynMtzHximifVD8

The proposed construction traffic access route from Port of Melbourne to the site is as follows:

- Dock Link Road,
- Dynon Road,
- Citylink (M2),
- Tullamarine Freeway / Metropolitan Ring Road (M80),
- Hume Highway,
- Goulburn Valley Highway,
- Newell Highway,

- Kidman Way,
- Site Access.

The access routes utilise roads that are designated for B-Double vehicles as outlined within the TfNSW Restricted Access Vehicle Map and VicRoads Heavy Vehicle Map.

4.2 Mitigation Measures

A CTMP would be prepared prior to construction of the site. It is recommended that the following form part of the CTMP to minimise the impact of construction traffic along the unsealed road:

- Prior to construction, a pre-condition survey of the relevant sections of the existing road network should be undertaken, in consultation with Council. During construction the sections of the road network utilised by the proposal are to be monitored and maintained to ensure continued safe use by all road users, and any faults attributed to construction of the solar farm would be rectified. At the end of construction, a post-condition survey would be undertaken to ensure the road network is left in a condition equivalent to that at the start of construction.
- Neighbours of the solar farm are to be consulted and notified regarding the timing of major deliveries which may require additional traffic control and disrupt access.

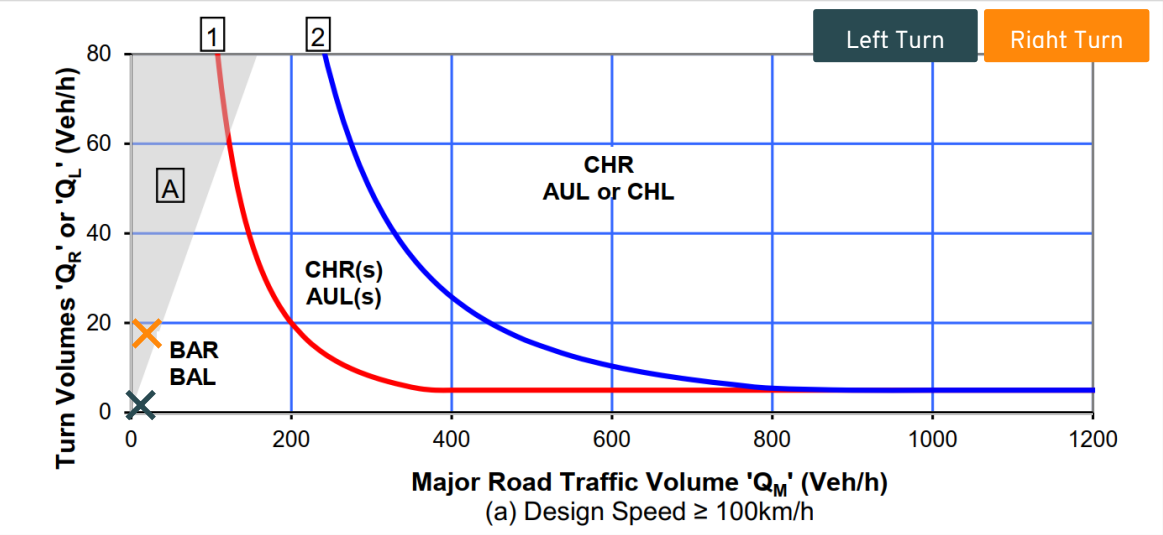
Therefore, it is concluded that the surface and widths of the roads are suitable to accommodate the future light and heavy vehicle traffic volumes generated by the solar farm.

5. Site Access

5.1 Turn Treatments

Austroads Guide to Traffic Management Part 6: Intersections, Interchanges, and Crossings specifies the turning treatments required at intersections. Figure 3.25 of the guide specifies the required turn treatments on the major road at unsignalised intersections and is provided below in Figure 8 for a design speed of 100km/hr or higher.

Figure 8: Figure 3.25 of Austroads Guide to Traffic Management Part 6



The requirement to provide turn facilities at the site access on Kidman Way is primarily generated during the morning peak hour when staff access the site which occurs from 6:00am to 7:00am. Table 3 identifies the required turning treatments based on the expected traffic volumes at the intersection and the associated volumes have been plotted within Figure 8.

The traffic volumes have been calculated as follows:

- Major road through traffic volumes have been determined from the estimated 2023 hourly traffic volumes along Kidman Way outlined in Figure 4.
- Left and right turn volumes have been determined based on the traffic distributions outlined in Section 3.2.

Table 3: Turning Volumes for Turn Treatment Calculations

Turning Treatment	Traffic Volume (vph)		Requirement
	Turn Volume	Major Road	
Right Turn	18	22	BAR
Left Turn	2	13	BAL

Therefore, the site access would require a Basic Right Turn (BAR) and Basic Left Turn (BAL) treatment with the proposed layout provided in Appendix A.

In order to confirm the intersection can accommodate B-Double vehicles a swept path assessment has been provided within Appendix B using the Autodesk Vehicle Tracking software. The

assessment demonstrates that the vehicle is able to suitably turn to/from Kidman Way with the inclusion of the proposed road upgrades. Accordingly, it is concluded that the intersection has been suitably designed and is able to accommodate the vehicles expected to access the site.

5.2 Sight Distance

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 Kidman Way has a speed limit of 100km/hr, a design speed of 110km/hr has been adopted which requires an SISD of 300m based on a 2.5 second reaction time.

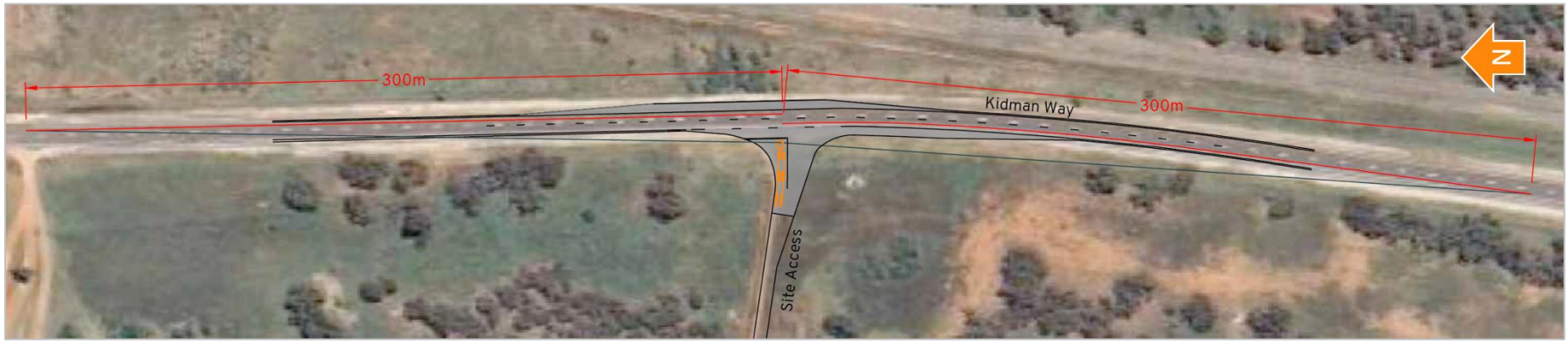
Amber Organisation staff carried out a site visit on 20 December 2023 to investigate the sight distance at the proposed access location. The available sight distance at the intersection exceeds the requirements of the Austroads Guide as shown in Figure 9.

Photographs 1 and 2 show the clear sight distance from the position of a driver who would be approaching the site from each direction along Kidman Way. Accordingly, vehicles are expected to be able to safely enter the State road network from the site access.

Photograph 1: South Approach

Photograph 2: North Approach

Figure 9: Kidman Way / Site Access - Sight Distance Assessment



6. Construction Traffic Management Plan

A Construction Traffic Management Plan (CTMP) will be prepared prior to construction commencing by the appointed contractor. The CTMP 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.

The following provides recommended measures that should be adopted within the CTMP 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.
- Heavy vehicle movements should avoid peak school bus times to limit the interaction of larger vehicles and vulnerable road users.
- Loading and unloading is proposed to occur within the work area. No street or roads will be used for material storage at any time.
- 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).
- Deliveries are coordinated throughout the day to avoid heavy vehicles meeting at the site entrance.

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

7. Conclusion

Amber has assessed the traffic impacts of the 5MW Kidman Way Solar Farm located approximately 3km south of Hillston. Access to the site will be provided via Kidman Way. The workforce is expected to primarily be located in Hillston with all plant to be delivered from Port Botany or Port of Melbourne.

The above assessment determined the following:

- The site is expected to generate up to 50 vehicle movements per day during peak construction times, including 10 heavy vehicle movements;
- The road network is able to accommodate the traffic generated by the development during the construction and operation stages. Further, the cumulative impact of the site traffic with nearby developments is expected to be minimal;
- The proposed construction traffic access route from Port Botany and Port of Melbourne to the site is designated for B-Double vehicles and as such, the access route is able to accommodate the loads and type of vehicle movement to be generated during construction of the solar farm;
- The site access on Kidman Way is proposed to be upgraded with BAL and BAR turn treatments; and
- In order to mitigate the impacts of the development during construction a CTMP will be prepared which should include the recommendations provided within 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.

Appendix A

Intersection Design – Kidman Way / Site Access

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

Rural Basic Right-turn Treatment (BAR) Section 7.2.1.
1: Design speed of 110km/h.
2: Lane widths of 3.5m have been used.
3: Formation/carriageway widening is 3.5m.
4: Taper lengths calculate to 53.5m.
5: Storage length is 28.0m for one 26m design vehicle.

Rural Left-turn Treatment (BAL) Section 8.2.1.
1: Design speed of 110km/h.
2: Lane widths of 3.5m have been used.
3: Formation/carriageway widening is 3.5m.
4: Taper length calculates to 53.5m.
5: Minimum length of parallel widened shoulder used from Table 8.1 is 35m.

Kidman Way Solar Farm
Hillston NSW
Access Design - BAR/BAL

DRAWN: OM
DATE: 11/12/2023
DWG NO: 686 S03C
SCALE at A3: 1:750

Amber 01

Appendix B

Swept Path Assessment – Kidman Way / Site Access

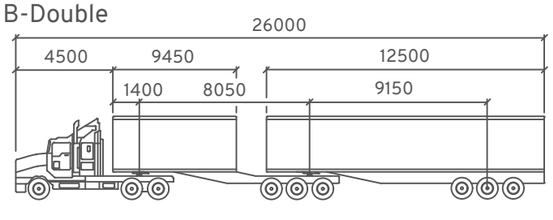
Vehicle Envelope

500mm Clearance

Reverse Manoevure

Min. Design Speed 5km/h

26.0m B-Double



	mm
Tractor Width	: 2500
Trailer Width	: 2500
Tractor Track	: 2500
Trailer Track	: 2500
Lock to Lock	: 6.0s
Steering Angle	: 22.2
Articulating Angle	70.0

Kidman Way Solar Farm

Hillston NSW

Swept Path Assessment

DRAWN: OM
DATE: 11/12/2023
DWG NO: 686 S03C
SCALE at A3: 1:750

Amber 02

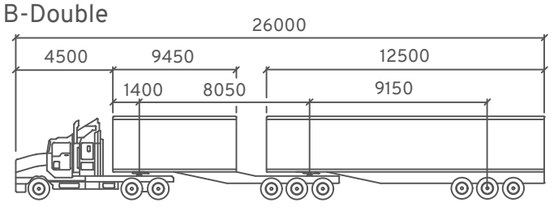
Vehicle Envelope

500mm Clearance

Reverse Manoevure

Min. Design Speed 5km/h

26.0m B-Double



	mm
Tractor Width	: 2500
Trailer Width	: 2500
Tractor Track	: 2500
Trailer Track	: 2500
Lock to Lock	: 6.0s
Steering Angle	: 22.2
Articulating Angle	70.0

Kidman Way Solar Farm

Hillston NSW

Swept Path Assessment

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