Amber

Traffic & Transportation Direction

Hillston Solar Farm

10738 Kidman Way, Hillston

Traffic Impact Assessment

January 2024

Reference: 631 rep 240125 final

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Traffic Impact Assessment

Prepared for: NGH Pty Ltd

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C	25/01/24	Corrected Appendix A/B	O.Mihaila	M.Willson	M.Willson

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Table of Contents

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 Hillston 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 project area is proposed via a connection with Norwood Lane to the north (Option 1) or via an access track connecting with Kidman Way to the west (Option 2), with the final access location yet to be determined.

Staff are expected to primarily be located in Hillston with all plant expected to be delivered from Port Botany.

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

1.2 Purpose of Document

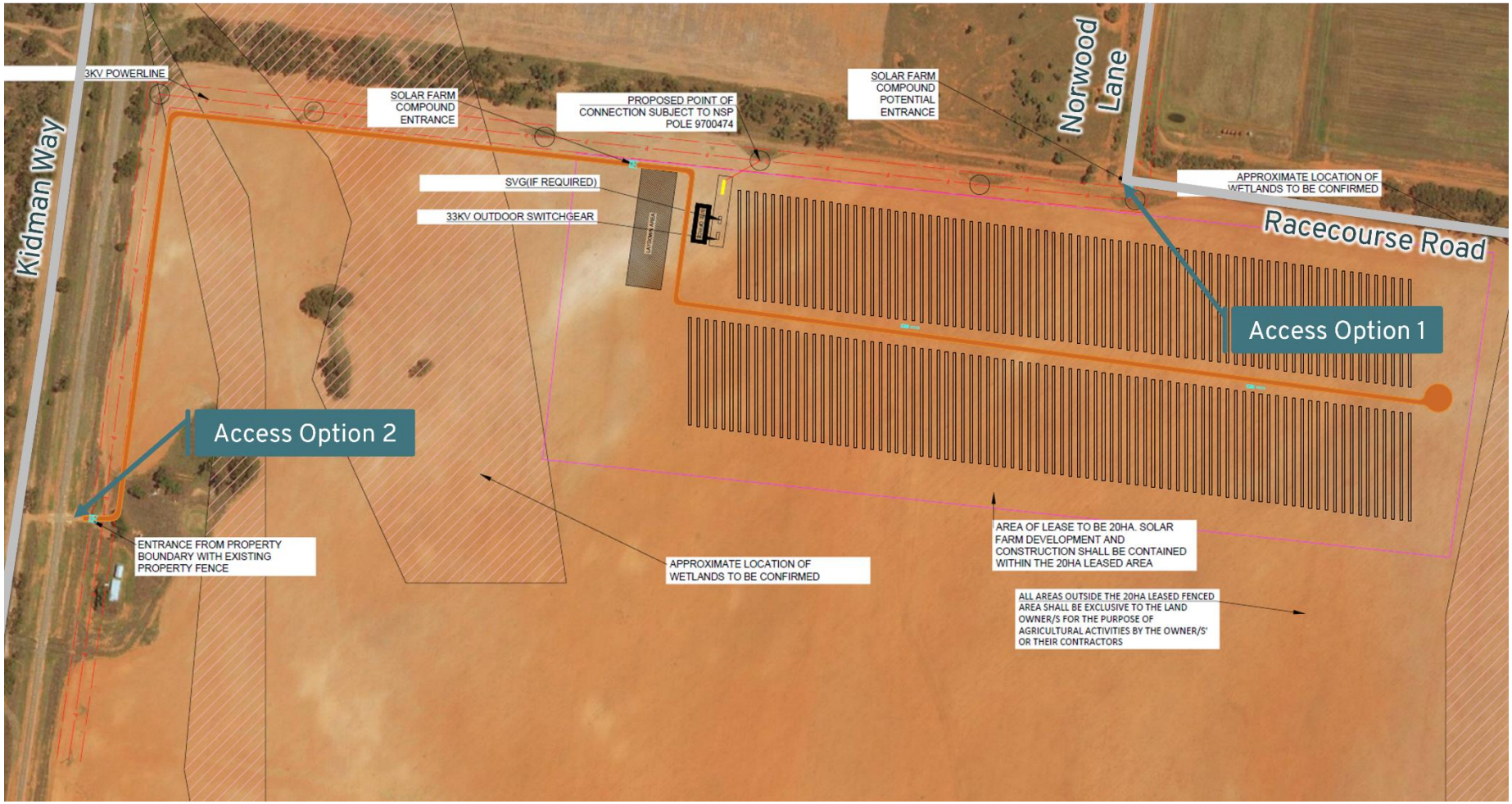
This Traffic Impact Assessment has been prepared to assess the construction and operational traffic impacts, and the access arrangements of the solar farm. It is based on observations at the project area and our experience of similar developments elsewhere.

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 and Transport for New South Wales.

Figure 1: Project Area Layout



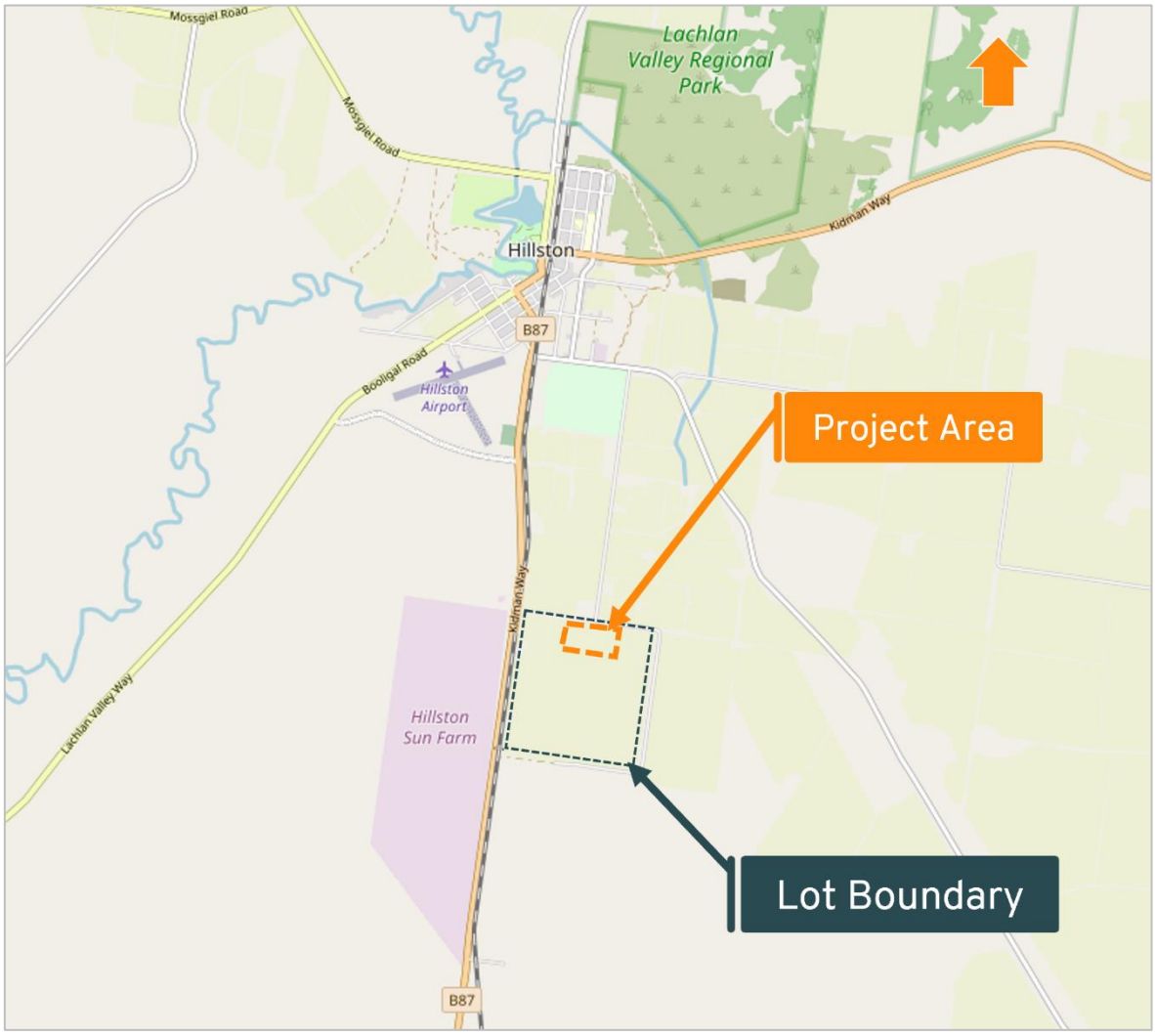
Source: NGH Pty Ltd

2. Existing Conditions

2.1 Site Location

The project area is situated within Lot 63 in DP664722 and is located approximately 3km south of Hillston on the eastern side of Kidman Way. Figure 2 shows the location of the project area in relation to the surrounding transport network.

Figure 2: Project Area Location



Source: OpenStreetMap

The figure indicates the project area has access to the State road network via Kidman Way which is located approximately 500 metres to the west. An access track run along the boundary of the lot which provides connections between the project area, Kidman Way and Norwood Lane.

The project area and surrounds are zoned Primary Production (RU1) and predominantly occupied by agricultural land. Land to the west of the lot is zoned Rail Facilities (SP2) associated with the Temora-Roto Railway Line which runs along the eastern side of Kidman Way. The Hillston town centre has a mixture of zones permitting industrial, commercial and residential uses.

Hillston Showground is located approximately 2.5 kilometres north of the project area on the south side of The Springs Road.

Figure 3 provides an aerial photograph of the project area and surrounds. It shows that the surrounding area is predominantly agricultural or vegetated land and that the project area is situated to the south of the Hillston town centre. An existing 85MW solar farm is situated west of the project area, on the western side of Kidman Way.

Figure 3: Aerial Photograph of Site and Surrounds

Source: Google Earth

2.2 Road Network

An overview of the surrounding road network is provided in Table 1.

Table 1: Road Network

Road	Classification	Surface	Typical Width	Speed Limit	Alignment
Kidman Way	State	Sealed	7.0m	100 km/hr	North-south between Bourke and its connection with Newell Highway near Jerilderie.
The Springs Road	Municipal	Sealed	7.0m	100 km/hr	Northwest-southeast between Kidman Way and its continuation as Ninti Street in Rankins Springs.
Norwood Lane	Municipal	Unsealed	6.0m	100 km/hr	North-south between The Springs Road and Racecourse Road.
Racecourse Road	Municipal	Unsealed	3.5-5.0m	100 km/hr	Loop around lot boundary connecting from Kidman Way to Norwood Lane.

The road network in the vicinity of the project area consists of Kidman Way as a State Road which runs along the western boundary of the lot and connects with The Springs Road to the north and Racecourse Road to the south. Norwood Lane connects between The Springs Road and Racecourse Road.

An overview of the relevant intersections is provided in Table 2.

Table 2: Intersection Summary

Intersection	Configuration	Control
Kidman Way / The Springs Road	T-intersection	'Give Way' linemarking and signage installed for The Springs Road approach.
The Springs Road / Norwood Lane	T-intersection	Priority control.
Norwood Lane / Racecourse Road	90-degree	Priority control.
Kidman Way / Racecourse Road	T-intersection	Priority control.

2.3 Traffic Volumes

Traffic volume data has been collected from the TfNSW Traffic Volume Viewer for Kidman Way, approximately 100 metres south of The Springs Road intersection. A summary of the traffic volumes is provided within Table 3. 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.

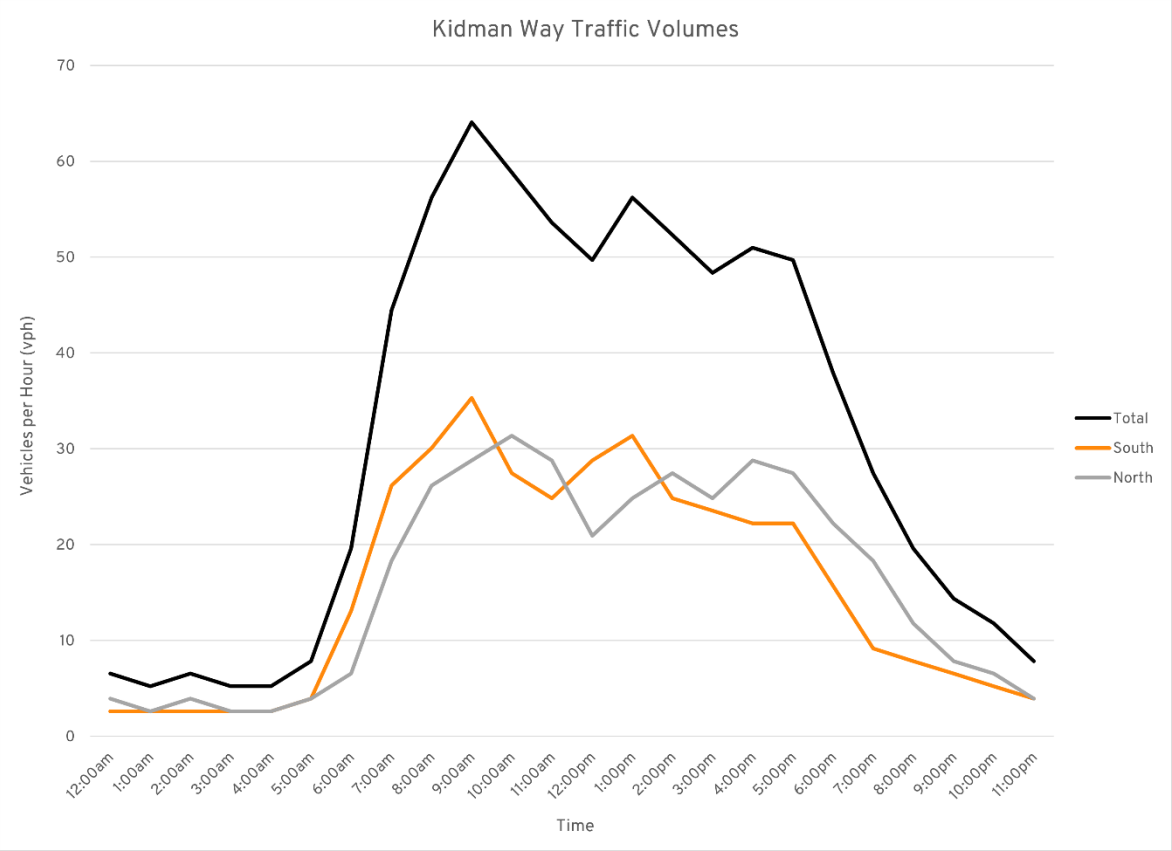
Table 3: Kidman Way Traffic Volumes

Road	Survey Location	Station ID	Survey Year	Recorded Volumes	Growth Factor	Estimated Current Volumes
Kidman Way	100m South of The Springs 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 pronounced morning peak and a relatively flat distribution between the peak hours.

No traffic volume data is available for Norwood Lane which is estimated to be carrying less than 50 vehicle movements per day.

Overall, the survey results indicate Kidman Way and Norwood Lane currently accommodate a low level of traffic for the respective road classifications and are 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 Crash History

Amber has conducted a review of the TfNSW Road Safety database for all injury crashes within the following search area:

- Kidman Way within 2.0 kilometres of the project area;
- The Springs Road between Kidman Way and Norwood Lane;
- The entire lengths of Norwood Lane and Racecourse Road; and
- All respective intersections.

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 12 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 30 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 project area;
- Shuttle buses are proposed to transport the majority of the workforce between the project area and nearby towns;
- Medium and Heavy Rigid Trucks (MRV and HRV) would be used to deliver raw materials and smaller plant; and
- 19 metre long Articulated Vehicles (AV) would be used to transport larger plant.

The applicant has advised that no B-Doubles or oversize/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 project could generate up to 34 heavy and 16 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 project area would generate one movement towards the project area and one movement away when it departs).

Table 4 summarises the traffic movements generated during the average and peak construction period of the solar farm.

Table 4: 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	10	5	16	8
Heavy Vehicle	Shuttle Bus	2	1	4	2
	MRV/HRV	2	1	2	1
	AV	20	4	28	4
Total		**34**	**11**	**50**	**15**

Overall, the project is expected to generate approximately 15 vehicle movements during the morning and evening peak hours during the peak construction period, which would reduce to 11 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 period 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 project area but only as required for maintenance.

3.2 Traffic Distribution

If Access Option 1 is adopted, traffic accessing the project area via would do so via Kidman Way and then Springs Road and Norwood Lane before entering the project area using the proposed access point at the northern boundary of the lot. For Access Option 2, traffic would access the project area via an internal access track that connects with Kidman Way at the south-western corner of the lot.

The workforce is expected to predominantly be located within Hillston, with all plant expected to be delivered from Port Botany. The following provides a breakdown of the access distribution for each of the vehicle classifications outlined within Table 4:

- 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;
- Shuttle Buses: It is anticipated that one shuttle bus would travel to/from the north and one would travel 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: Plant would be transported from Port Botany to the project area along Kidman Way from the south.

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

During the morning peak all vehicle movements would be towards the project area and in the evening peak all vehicle movements would be away from the project area. 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 79 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 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 one kilometre west of the project area. The project is completed and fully operational, and therefore only a small number of maintenance and staff vehicles are associated with the project.

The Daisy Hill Solar Farm is a proposed 10MW solar farm located to the north of the project area, on the western side of Norwood Lane. The project is expected to accommodate up to 8 light vehicle movements and 15 heavy vehicle movements per day. The traffic volumes have been sourced from Carrathool Shire Council's Final Assessment Report dated September 2020.

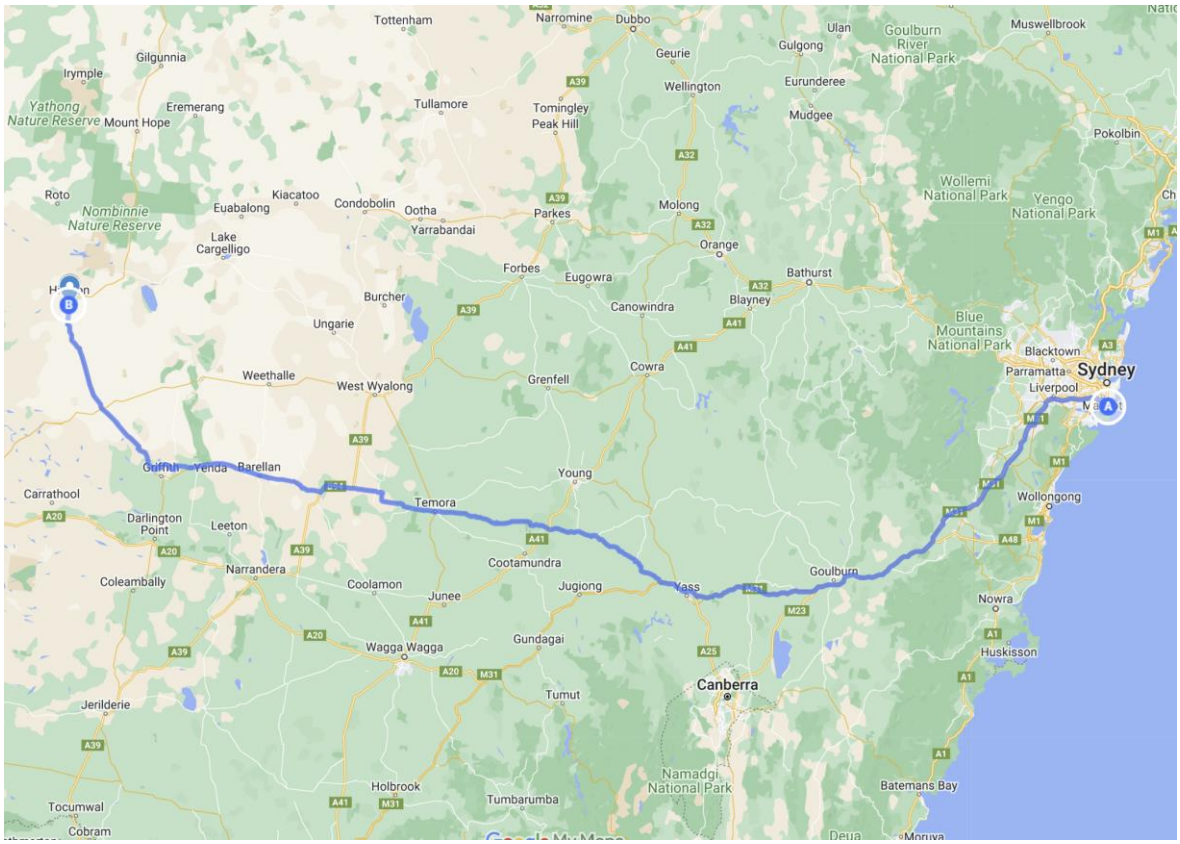
These vehicle movements are expected to have a minimal cumulative impact on the operation of the road network.

4. Route Assessment

4.1 Access Route

Port Botany has been identified as the port where the solar farm plant will be imported. Figure 5 shows the proposed access route, which is the proposed route to be undertaken for all transport vehicles from the port.

Figure 5: Access Route from Port Botany to Project Area



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

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

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

- Norwood Lane,
- Site Access.

It is noted that Access Option 2 would connect with the lot access on Kidman Way and would not utilise the remainder of the route outlined above.

The access route predominantly utilises the State Road network and is considered suitable to accommodate the construction vehicle traffic generated by the project.

4.2 Unsealed Road Network

Access Option 1 would require the use of Norwood Lane which services surrounding agricultural and residential use and connects between The Springs Road and the proposed access on the northern boundary of the lot. The road is maintained by Council for approximately 2.4 kilometres between the Springs Road intersection and the southernmost property access and has an unsealed width in the order of 6.0 metres throughout this section. It is understood that the section between the southernmost property and the project area is not maintained by Council or properly formed to cater for regular traffic.

The *Australian Road Research Board Best Practice Guide for Unsealed Roads 2* (ARRB Guide), dated October 2020, provides a breakdown of the unsealed road classifications based on a functional classification system which is reflective of the approach taken within the Austroads Guidelines. A summary of the classifications outlined within Table 3.9 of the ARRB Guide is provided below.

Table 5: Unsealed Roads Classification System (ARRB Guide)

Road Class	Class Type	Service Function Description	Road Type Description
4A	Main Road > 150 vpd	This type of road is used for major movements between population centres and connection to adjacent areas. High traffic volumes occur, and the road can carry large vehicles.	• All weather road, predominantly two-lane and unsealed. Can be sealed if economically justified. • Operating speed standard of 50–80 km/h according to terrain. • Minimum carriageway width is 7m.
4B	Minor Road 50-150 vpd	This type of road is used for connection between local centres of population and links to the primary network.	• All-weather two-lane road formed and gravelled or single-lane sealed road with gravel shoulders. • Operating speed standard of 30–70 km/h according to terrain. • Minimum carriageway width is 5.5m.
4C	Access Road 10-50 vpd	Provides access to low use areas or individual rural property sites and forest areas. Caters for low travel speed and a range of vehicles and may be seasonally closed.	• Substantially a single lane two-way, generally dry weather, formed road. • Operating speeds standard of < 20–40 km/h according to terrain. • Minimum carriageway width is 4m.
4D	Tracks < 10 vpd	Mainly used for fire protection purposes, management access and limited recreational activities.	• Predominantly a single-lane two-way earth track (unformed) at or near the natural surface level. • Predominantly not conforming to any geometric design standards. • Minimum cleared width is 3m.

The existing traffic volumes along Norwood Lane are conservatively estimated to be in the order of 50 vehicles per day based on the adjoining land use and catchment area. The road is expected

to accommodate approximately 50 additional vehicles per day during the peak construction period, resulting in a total of 100 vehicles per day.

Unsealed roads would typically be considered for sealing when they accommodate between 200 and 500 vehicle movements per day. The ARRB Guide notes that roads may warrant paving when maintenance costs increase to unacceptable levels, in wet climates, or when economic or social benefits are evident. Given the expected traffic volume on the road is in the order of 100 vehicles per day and the increase in traffic is only temporary, it is considered acceptable for Norwood Lane to remain unsealed.

Furthermore, it is understood that Norwood Lane has been approved to provide access for the Daisy Hill Solar Farm application to the north of the project area, with Council's position for the road to be maintained to a good gravel standard. The section between the southernmost property and the project area (approximately 400 metres) which is currently not maintained by Council or properly formed to cater for regular traffic is proposed to be upgraded to an all-weather unsealed road surface to accommodate the traffic expected to be generated by the site.

Norwood Lane has a typical unsealed carriageway width of 6.0 metres. It is considered that the straight alignment of the road would allow vehicles travelling the route to be able to see oncoming vehicles and act accordingly. The majority of traffic is expected to travel toward the site in the morning and away from the site in the afternoon, with around one vehicle movement per hour during the day. Accordingly, the existing road width is considered appropriate to accommodate the traffic volumes expected along the road.

4.3 Mitigation Measures

A CTMP would be prepared prior to construction of the project. 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.

If Access Option 1 is utilised, it is recommended that the section of Norwood Lane between the southernmost property and the project area (approximately 400 metres) is upgraded to a good gravel standard consistent with the remainder of the road to accommodate the traffic expected to be generated along this section of the road.

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, subject to the road upgrades and mitigation measures listed above.

5. Site Access

The layout of the project area and the proposed access location options are shown within Figure 1. The following provides an assessment of each option against the relevant design and sight distance requirements, noting that only one access option would be adopted which would be confirmed prior to construction.

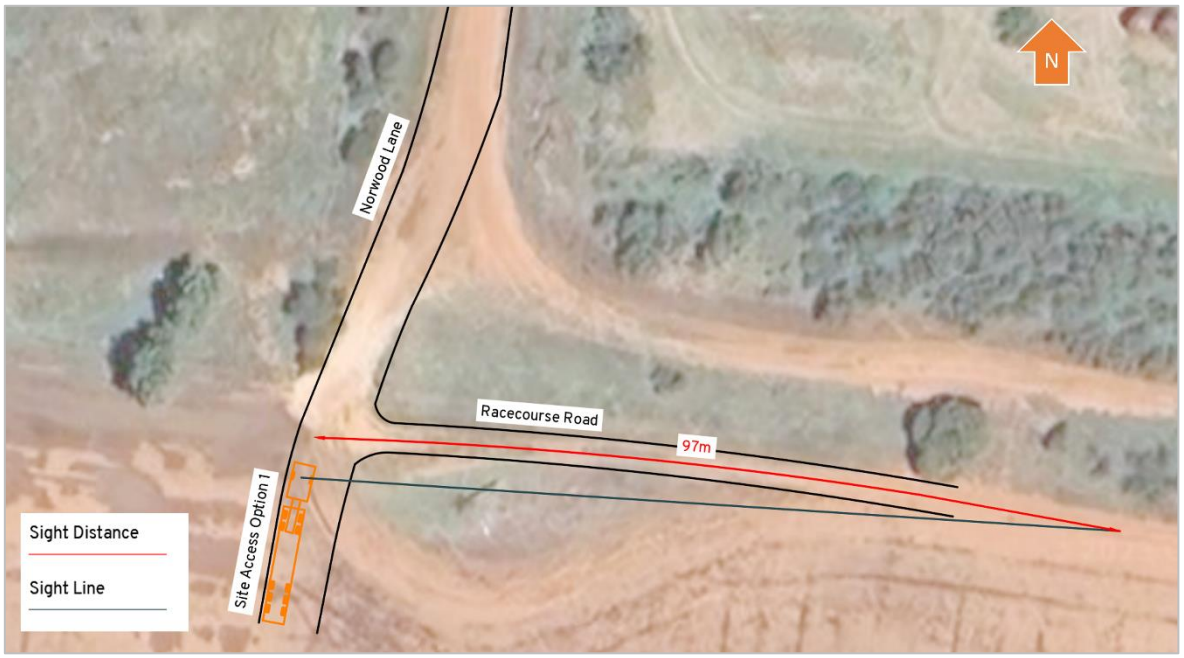
5.1 Access Option 1

Access Option 1 provides access to the project area via the southern end of Norwood Lane. A swept path assessment has been undertaken for the access which is provided within Appendix A and demonstrates the access is designed to accommodate two-way vehicle movement for 19 metre Articulated Vehicles.

The Safe Intersection Sight Distance (SISD) required at intersections is specified within the Austroads Guide to Road Design – Part 4A: Unsignalised Intersections. Based on the narrow width, unsealed surface and 90 degree bend, a design speed of 50 km/hr has been conservatively adopted for Racecourse Road which results in a sight distance requirement of 97 metres.

The sight distance available at the access is shown within Figure 6 and exceeds the Austroads requirements given the relatively straight and flat alignment of the Norwood Lane and Racecourse Road.

Figure 6: Sight Distance Assessment - Access Option 1



A swept path assessment has also been undertaken for the intersection of The Springs Road and Norwood Lane. The assessment demonstrates the intersection is designed to accommodate one-way vehicle movement for 19 metre Articulated Vehicles. It is proposed to widen the eastern side of Norwood Lane at the intersection to allow vehicles to pass. The swept path assessment and proposed widening is included within Appendix A.

5.2 Access Option 2

5.2.1 Turn Treatment Assessment

An assessment has been undertaken for the required turn treatments on Kidman Way at the lot access in the event access Option 2 is adopted. *Austroads Guide to Traffic Management Part 6: Intersections, Interchanges, and Crossings* specifies the turning treatments required at intersections.

The requirement to provide turn facilities along Kidman Way would primarily be generated during the morning peak hour when staff access the project area which occurs from 6:00am to 7:00am. Table 6 identifies the expected traffic volumes at the intersection which 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.

The speed limit along Kidman Way at the access Option 2 is 100 km/hr. Figure 3.25 of the guide specifies the required turn treatments on the major road at unsignalised intersections and is provided below in Figure 7 for a design speed of 100 km/hr or greater, with the associated volumes from Table 6 plotted on the chart.

Figure 7: Figure 3.25 of Austroads Guide to Traffic Management Part 6

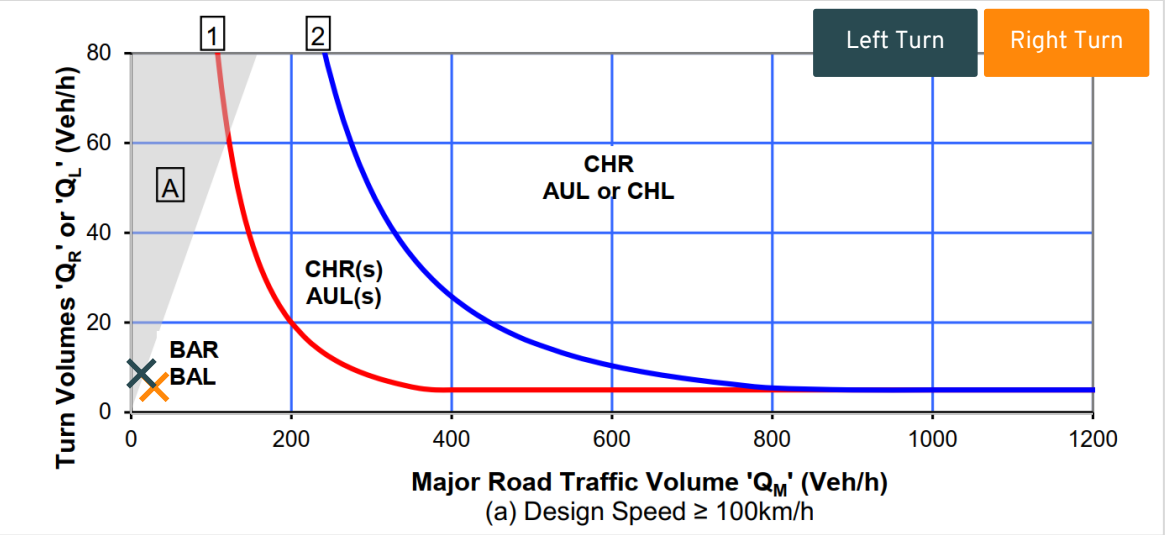


Table 6: Turning Volumes for Turn Treatment Calculations

Turning Treatment	Traffic Volume (vph)		Requirement
	Turn Volume	Major Road	
Right Turn	6	29	BAR
Left Turn	9	13	BAL

Therefore, the access intersection would require a Basic Right Turn (BAR) and Basic Left Turn (BAL) treatment as shown in Appendix B. The BAR treatment provides a width of 7.0 metres to accommodate road train vehicles which travel along Kidman Way.

It is noted that this access option crosses the Temora-Roto Railway Line which is managed by UGL and runs along the eastern side of Kidman Way, approximately 30 metres from the edge of the road carriageway. Consultation has been carried out with UGL and TfNSW with a summary provided within Section 8.

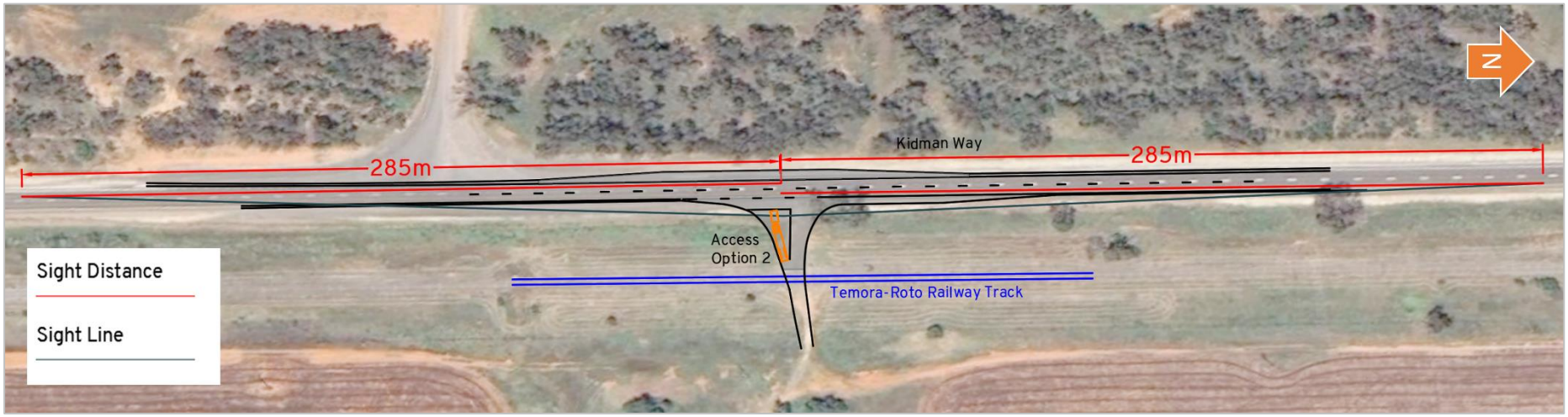
5.2.2 Sight Distance Assessment

Access Option 2 provides access to the project area via an internal road connecting with Kidman Way. A swept path assessment has been undertaken for the access which is provided within Appendix B and demonstrates the access is designed to accommodate two-way vehicle movement for 19 metre Articulated Vehicles.

The Safe Intersection Sight Distance (SISD) required at intersections is specified within the Austroads Guide to Road Design – Part 4A: Unsignalised Intersections. A design speed of 110 km/hr is applicable for Kidman Way which results in a sight distance requirement of 285 metres.

The sight distance available at the access is shown within Figure 8 and exceeds the Austroads requirements given the relatively straight and flat alignment of Kidman Way.

Figure 8: Sight Distance Assessment - Access Option 2



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 project area in a forward direction.
- Implementation of road dilapidation surveys and measures to control dust.
- Management of vehicular access to and from the project area 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 project area:
  - 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 project area 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. Road/Rail Authority Consultation

The traffic assessment has been undertaken in consultation with TfNSW, Carrathool Shire Council and UGL. A summary is provided within the following table.

Table 7: Road Authority Consultation

Road Authority	Correspondence
Transport for NSW	A meeting was held with TfNSW in June 2023 with the following comments provided: • Preferred access is via Council roads (Norwood Lane – Option 1). This option has been adopted for a previous solar farm application and no major road upgrades were required. • Strictly no vehicles larger than a 19 metre Articulated Vehicle are to use the Kidman Way access (Option 2) due to the available stacking. The access roadway would need to be sealed and provide for two-way vehicle movement between Kidman Way and the rail line at a minimum. • Design vehicle for Kidman Way is a road train so any BAR treatment will require 7 metres road widening instead of typical 6.5m. Use strategic design guidelines. • Often UGL request road sealing on both sides of the railway crossing to minimise wear and tear and provide an acceleration surface for vehicles. • Potential conflicts with rail traffic can be managed using traffic management measures. Accordingly, it is concluded that all of the matters identified by TfNSW have been addressed within this report.
Carrathool Shire Council	Council was contacted via phone in July 2023 with the following comments provided: • Norwood Lane services approximately 3 residential dwellings. • Approximate traffic volumes for Norwood Lane are less than 50 vehicles per day, and The Springs Road is estimated at 100-200 vehicles per day near the intersection of Norwood Lane. • The section of Norwood Lane between the southernmost property and the end of the road (approx. 400m) is not maintained or properly formed to cater for regular traffic. At a minimum, this section would need to be upgraded to an all-weather road (can be gravel) with a standard rural access onto the project area. • Dust suppression would be a key requirement. For other projects, the developer has opted to seal or part-seal the road as this can be more cost effective than dust suppression over longer periods of time. • The Springs Road / Norwood Lane intersection turning movements need to be assessed. • B-Doubles would be an issue with access via Springs Road. Accordingly, it is concluded that all of the matters identified by Carrathool Shire Council have been addressed within this report.
UGL	A meeting was held with UGL in April 2023 with the following comments provided: • Level Crossing Sighting Assessments have been carried out at level crossings for both access options. • The private level crossing near Kidman Way (Access Option 2) is suitable for a 19 metre Articulated Vehicle. No B-Doubles or larger to be utilised. • The level crossing on The Springs Road (Access Option 1) is suitable for vehicles up to a B-Triple. • The existing surfaces have been taken into account in sighting assessments. • Any intersection design to be carried out in accordance with Austroads guidelines. • Crossings are unlikely to require upgrade to provide boom gates / active crossing.

	• Formal application is required for access via Kidman Way (Option 2) which would be referred to TfNSW. Accordingly, it is concluded that all of the matters identified by UGL have been addressed within this report.

8. Conclusion

Amber has assessed the traffic impacts of the 5MW Hillston Solar Farm located approximately 3km south of Hillston. Access to the project area is proposed via Norwood Lane at the northern boundary of the lot (Option 1) or via Kidman Way to the west (Option 2), with only one access option to be adopted which would be confirmed prior to construction. Staff are expected to primarily be located in Hillston with all plant expected to be delivered from Port Botany.

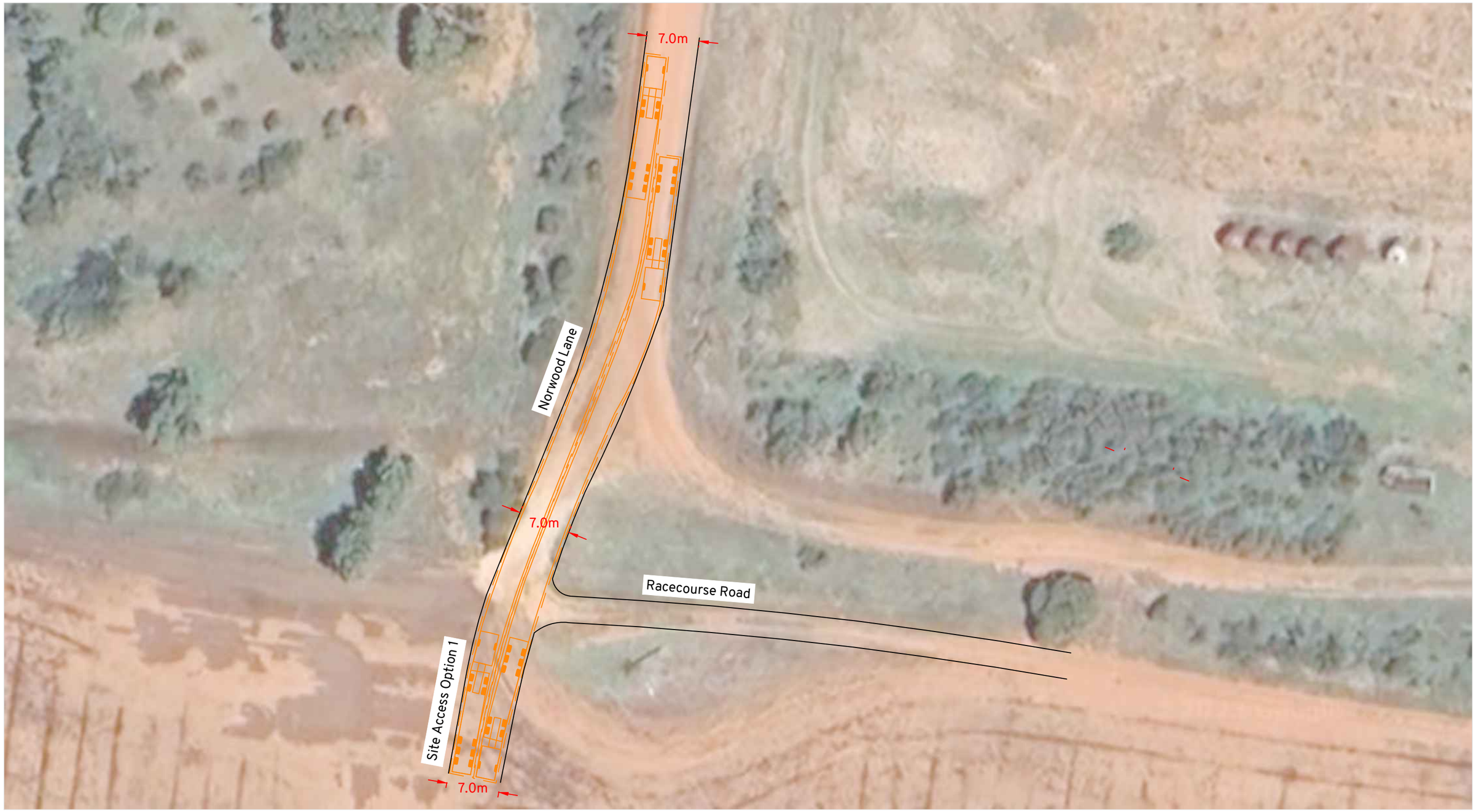
The above assessment determined the following:

- The project is expected to generate up to 50 vehicle movements per day during peak construction times, including 34 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 project traffic with nearby developments is expected to be minimal;
- The proposed construction traffic access route from Port Botany to the project area is able to accommodate the loads and type of vehicle movement to be generated during construction of the solar farm;
- If Access Option 1 is utilised, the traffic volumes along Norwood Lane during peak construction are expected to be less than the recommended loading for gravel roads and as such, the road is proposed to remain unsealed. The following road upgrades are proposed for this option:
    - The section between the southernmost property and the project area (approximately 400 metres) is proposed to be upgraded to an all-weather unsealed road surface to accommodate the traffic expected to be generated by the site.
    - The eastern side of Norwood Lane is proposed to be widened at the intersection of The Springs Road to allow vehicles to pass.
- If Access Option 2 is utilised, the intersection of Kidman Way and the access 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

Design & Swept Path Assessment – Norwood Lane / Access Option 1



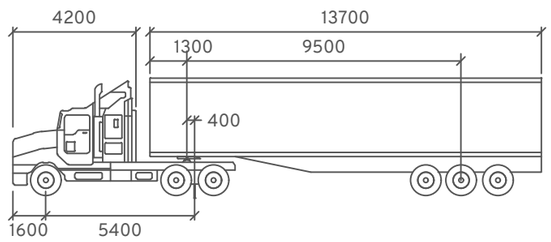
Vehicle Envelope

300mm Clearance

Reverse Manoevure

Min. Design Speed 5km/h

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

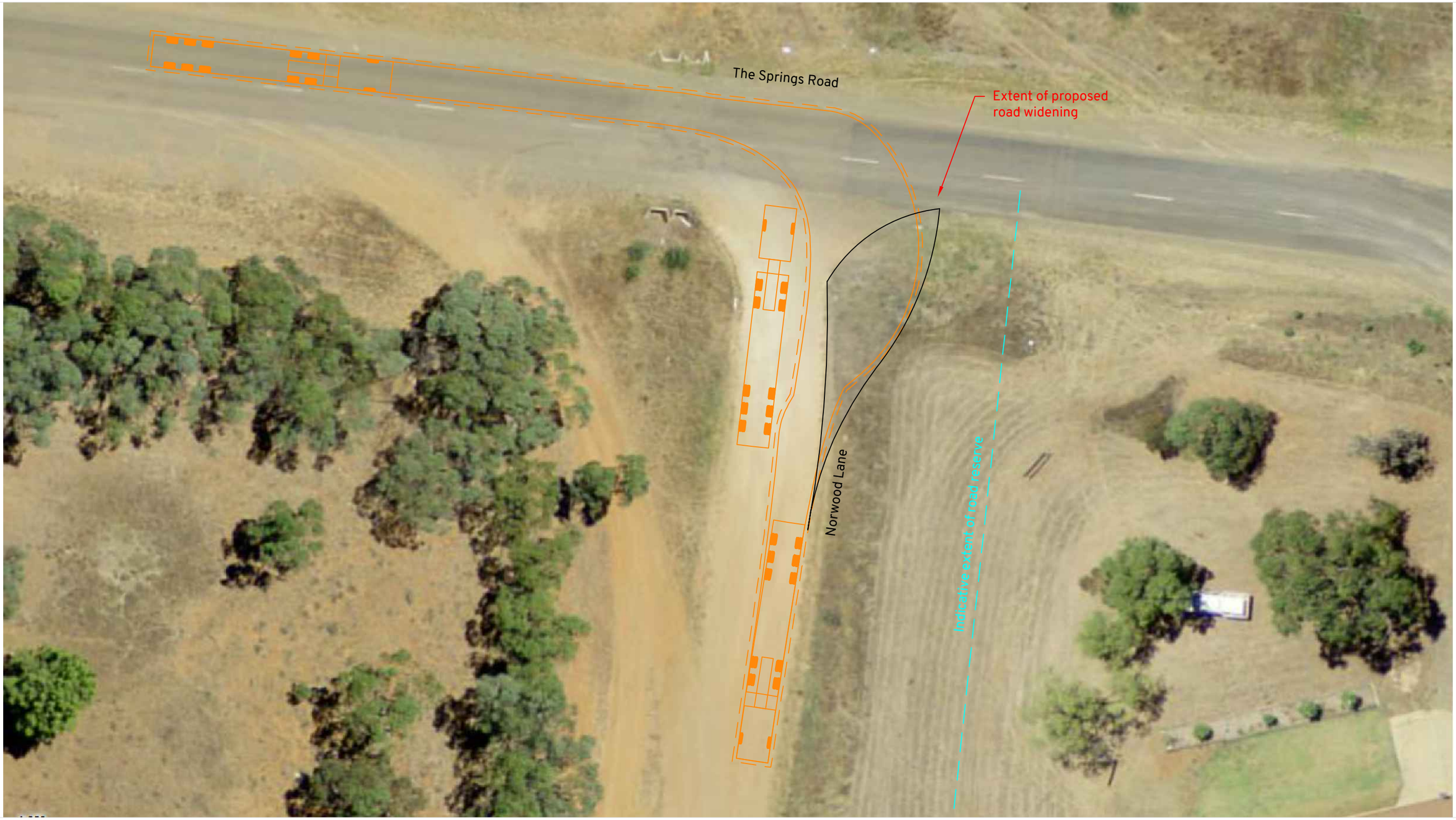
Hillston Solar Farm

10738 Kidman Way

Swept Path Assessment - Access Option 1

DRAWN: OM
DATE: 13/07/2023
DWG NO: 631 F01B
SCALE at A3: 1:500

Amber 04



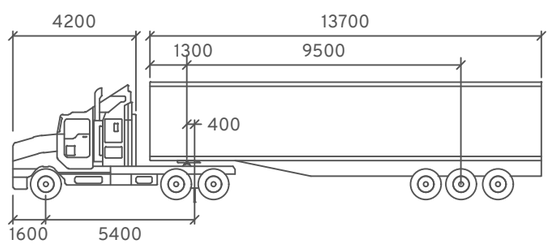
Vehicle Envelope

300mm Clearance

Reverse Manoevure

Min. Design Speed 5km/h

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

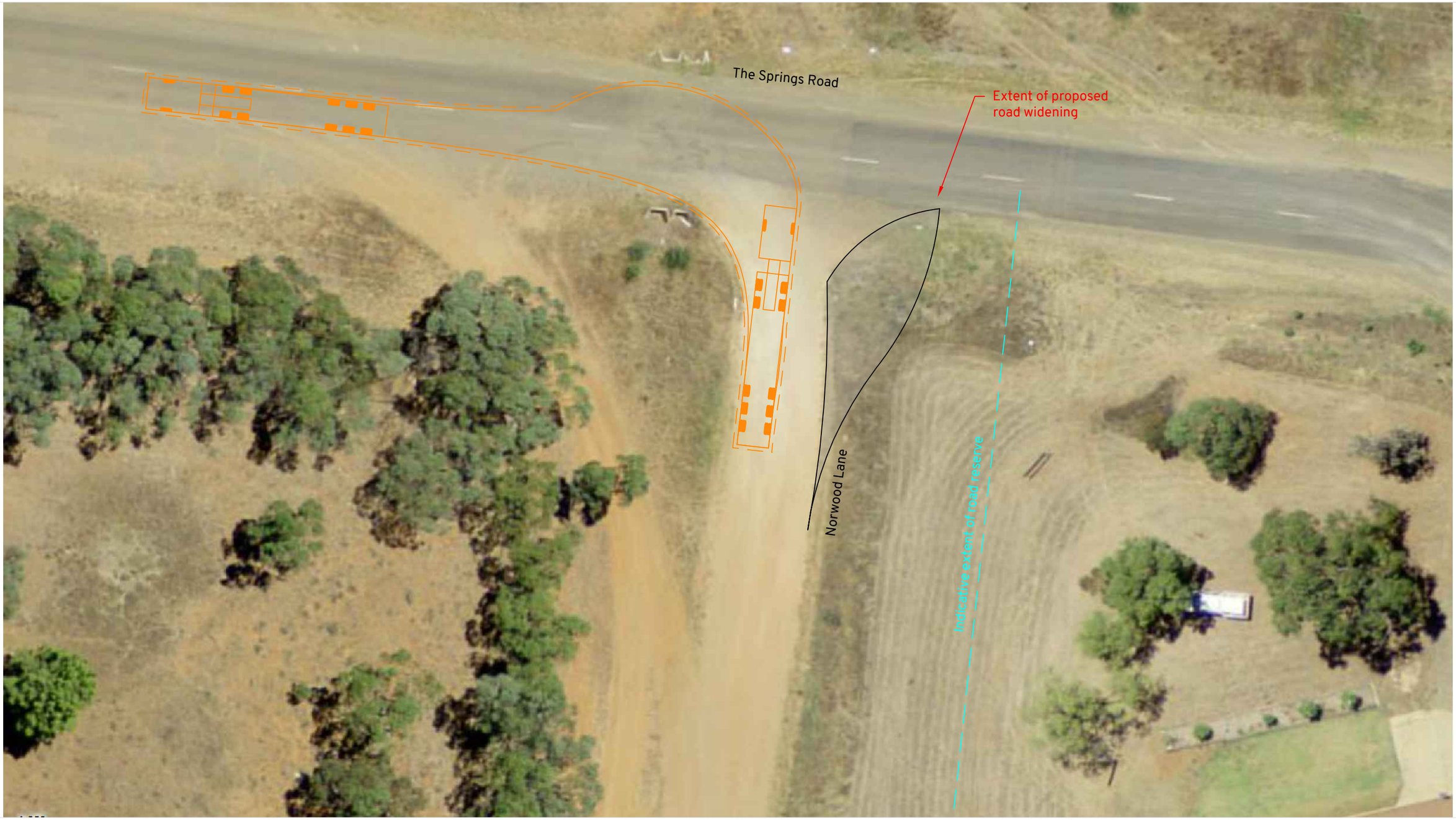
Hillston Solar Farm

10738 Kidman Way

Swept Path Assessment - Access Option 1

DRAWN: OM
DATE: 13/07/2023
DWG NO: 631 F01B
SCALE at A3: 1:300

Amber 05



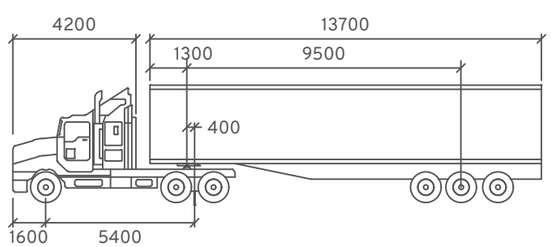
Vehicle Envelope

300mm Clearance

Reverse Manoevure

Min. Design Speed 5km/h

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

Hillston Solar Farm

10738 Kidman Way

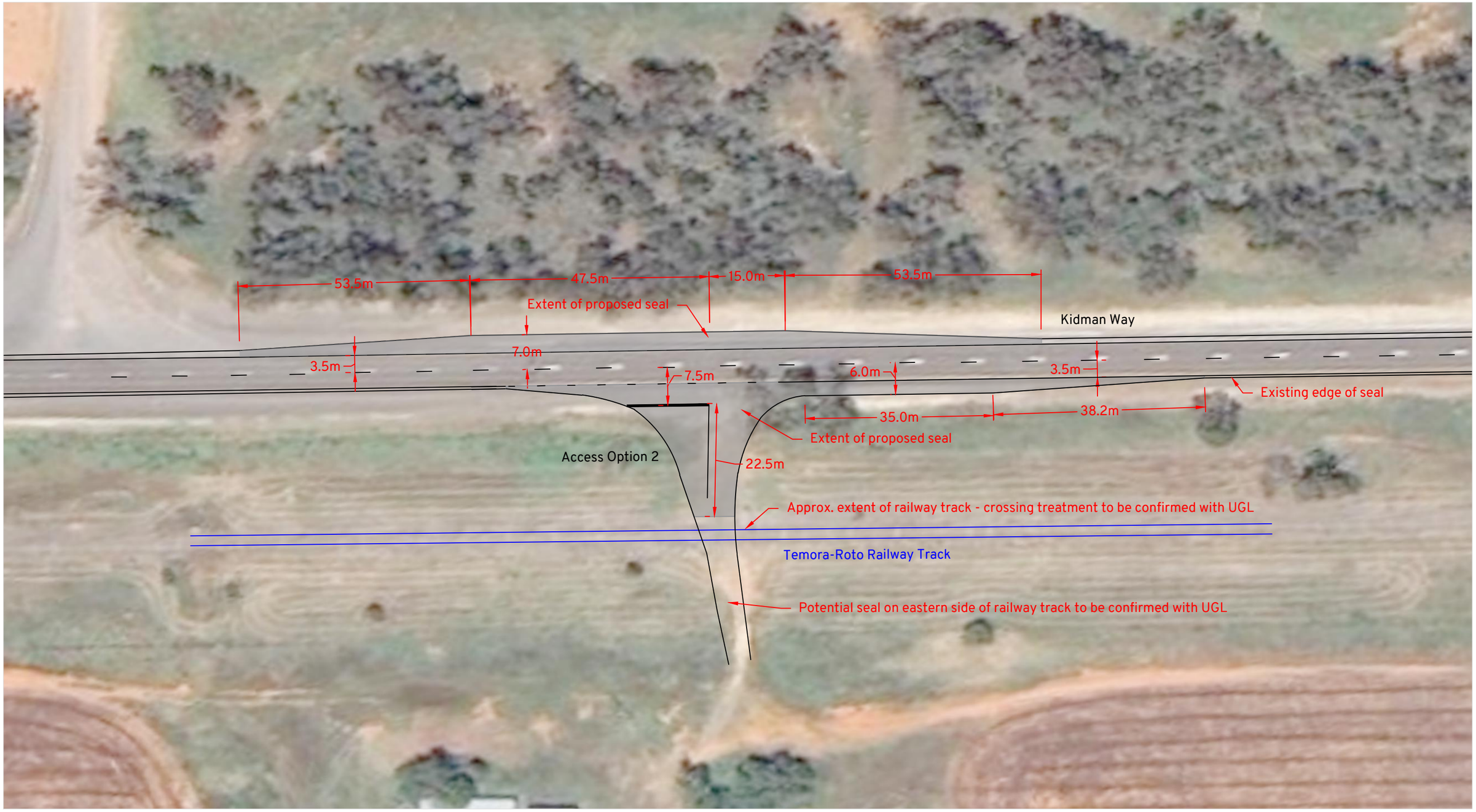
Swept Path Assessment - Access Option 1

DRAWN: OM
DATE: 13/07/2023
DWG NO: 631 F01B
SCALE at A3: 1:300

Amber 06

Appendix B

Design & Swept Path Assessment – Kidman Way / Access Option 2



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

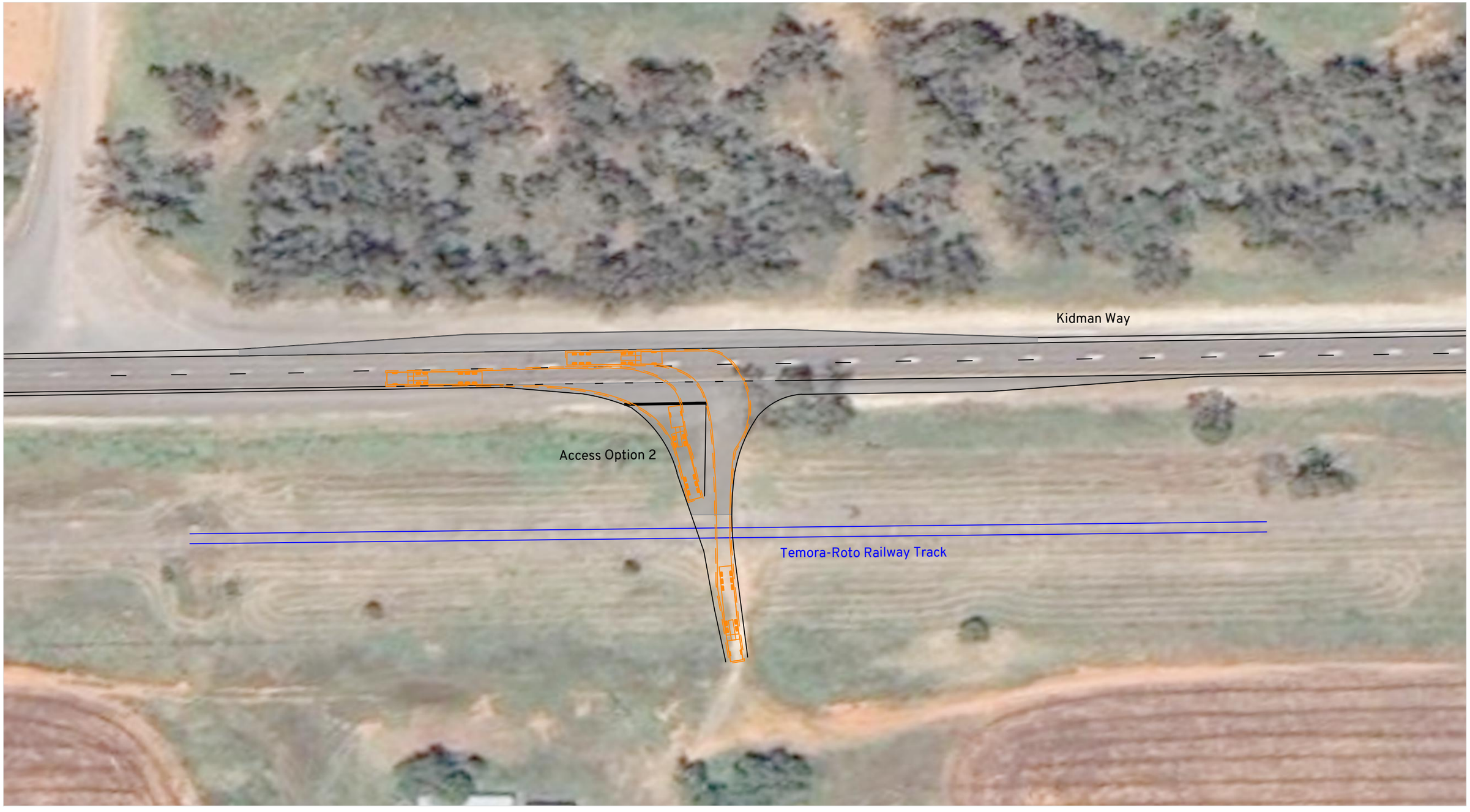
Rural Basic Right-turn Treatment (BAR) Section 7.5.1.
1: Design speed of 110km/h.
2: Lane widths of 3.5m have been used.
3: Formation/carriageway widening is 3.5m.
4: Taper lengths calculate to 53.5m.
5: Storage length is 22.5m for one 19m design vehicle.

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 2.5m.
4: Taper length calculates to 38.2m.
5: Minimum length of parallel widened shoulder used from Table 8.1 is 35m.

Hillston Solar Farm
10738 Kidman Way
Access Design - Option 2

DRAWN: OM
DATE: 13/07/2023
DWG NO: 631 F01B
SCALE at A3: 1:750

Amber 01



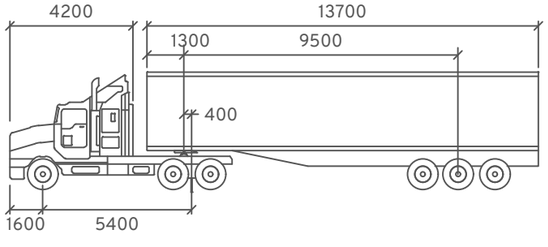
Vehicle Envelope

300mm Clearance

Reverse Manoevure

Min. Design Speed 5km/h

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

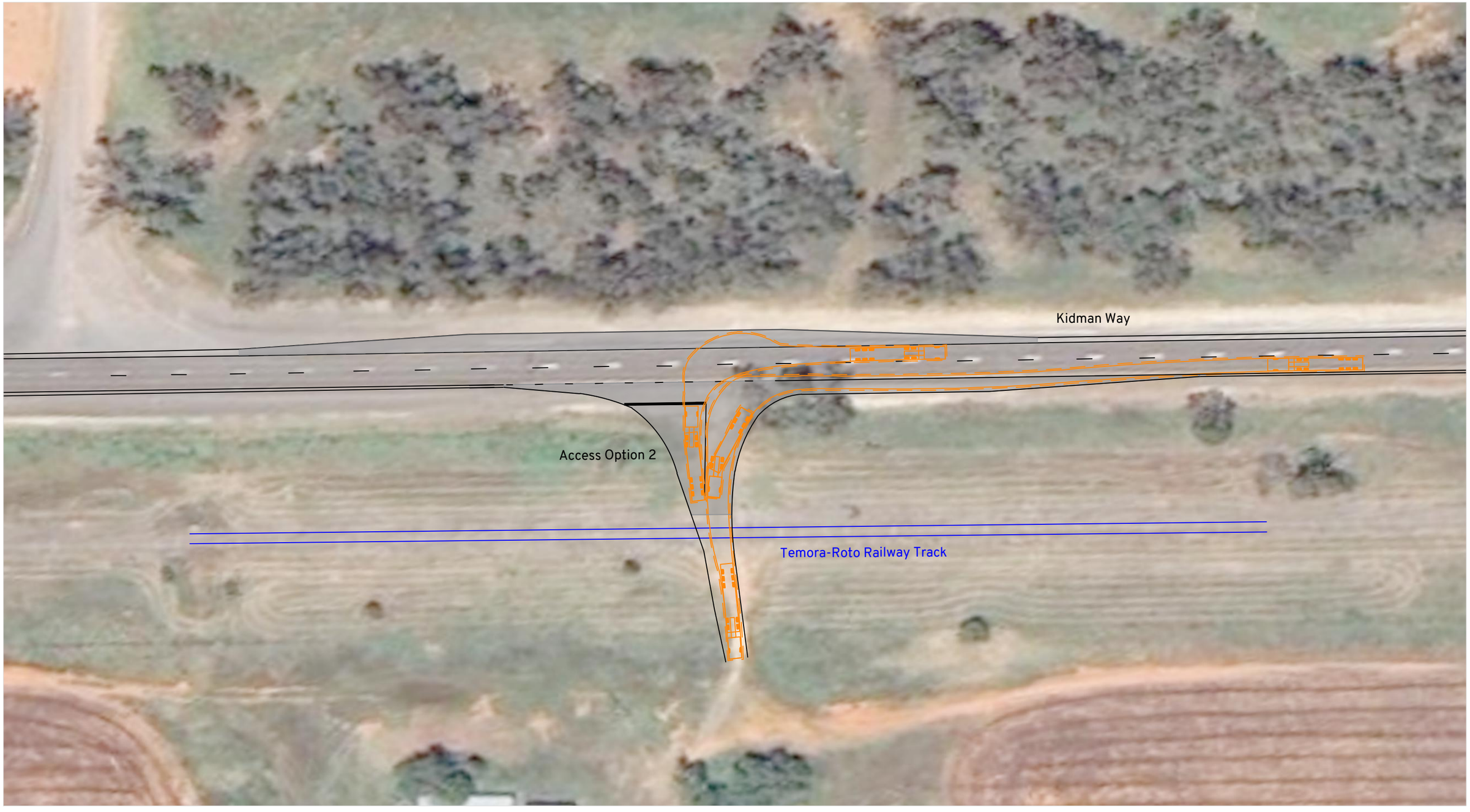
Hillston Solar Farm

10738 Kidman Way

Swept Path Assessment

DRAWN: OM
DATE: 13/07/2023
DWG NO: 631 F01B
SCALE at A3: 1:750

Amber 02



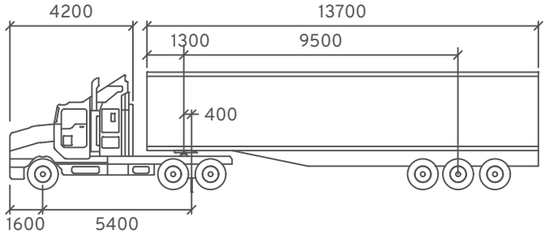
Vehicle Envelope

300mm Clearance

Reverse Manoevure

Min. Design Speed 5km/h

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

Hillston Solar Farm

10738 Kidman Way

Swept Path Assessment

DRAWN: OM
DATE: 13/07/2023
DWG NO: 631 F01B
SCALE at A3: 1:750

Amber 03