

Stantec Ref: 15861

28 March 2019

Sarah Hillis
Senior Environmental Consultant
NGH Environmental Pty Ltd
WAGGA WAGGA
NSW 2650

Via email: sarah.h@nghenvironmental.com.au

Dear Sarah,

Proposed Solar Farm, Yanco, NSW - Traffic Assessment

Stantec has reviewed the access arrangements for the proposed solar farm in Yanco, NSW. It is proposed that all construction vehicles will access the site via Irrigation Way, McQuillan Road, Canal Street and Toorak Road. Access to the site is proposed to be via four separate site accesses, located approximately four kilometres south of the existing Whitton Road bridge crossing between Canal Street and Toorak Road. The concept site layout plan is shown within **Appendix A**.

The proposed vehicle access points are as follows:

- Access Point 1 is located on Toorak Road, approximately 1.7 kilometres north of Research Road;
- Access Points 2 and 3 are also located on Toorak Road, approximately 180 metres north of Research Road¹; and
- Access Point 4 is located on Research Road approximately 650 metres east of Toorak Road.

Roads and Maritime Environmental Assessment Requirements

Roads and Maritime Services (RMS) issued a letter addressed to the Department of Planning & Environment, dated 17 August 2018, regarding the environmental assessment requirements for proposed Yanco solar farm. The following traffic and transport related issues were raised:

Given the scale and operational characteristics of the proposed development RMS considers that the traffic related issues relevant to the development should be considered and addressed in 2 distinct stages as follows:

- *Construction and decommission phase – the transport of materials and equipment/components for the establishment of the facility and ancillary infrastructure, the movement and parking of construction related vehicles, including personal vehicles, during the construction of the facility;*
- *Operational phase – the ongoing traffic generation due to the operation, maintenance and servicing of the various elements of the project.*

¹ IB Vogt is proposing to move the western access (Access Point 2) approximately 40 metres to the north.

The TIA shall detail the potential impacts associated with the phases of the development, the measures to be implemented to maintain the standard and safety of the road network, and procedures to monitor and ensure compliance. Where road safety concerns are identified at a specific location along the haulage route/s, the TIA may be supported by a targeted Road Safety Audit undertaken by suitably qualified persons.

For guidance in the preparation of the TIA the applicant is referred to section 2 of the "Guide to Traffic Generating Developments" prepared by the RTA and the Austroads publications, particularly the Austroads Guide to Traffic Management Part 12: Traffic Impacts of Development and Austroads Guide to Traffic Management Part 3 – Traffic Studies and Analysis. The TIA should contain information such as the expected traffic generation, vehicle numbers and types of vehicles, and travel routes for vehicles accessing the development site.

Secretary's Environmental Assessment Requirements (SEARS)

Department of Planning and Environment issued a letter, dated 30 August 2018, regarding the environmental assessment requirements for the proposed solar farm. The following transport requirements were raised:

An assessment of the site access route (including Sturt Highway, Newell Highway, Irrigation Way, Research Road, Main Avenue, Audley Street and Toorak Road), site access point, rail safety issues and likely transport impacts (including peak and average traffic generation, over-dimensional vehicles and construction worker transportation) of the development on the capacity and condition of roads (including on any Crown land), a description of the measures that would be implemented to mitigate any impacts during construction (including cumulative impacts from nearby developments), and a description of any proposed road upgrades developed in consultation with the relevant road and rail authorities (if required).

The assessment that follows addresses all of the above issues. It is noted that the proposed development will not have any impact on rail safety.

Leeton Shire Council – SEARS Input

Leeton Shire Council issued a letter, issued 28 August 2018. The following Transport requirement was raised by Leeton Shire Council, as part of the input for SEARS:

1. Transport
The Transport assessment report is to also include a review on the possible use and impact on the following additional local roads; Houghton Road and Binyah Street. The proposed inclusion of Audley Street is considered to not be warranted at this stage.

A site visit was conducted on 19 October 2018, alongside Leeton Shire Council's Roads and Drainage Manager to investigate and assess the optimal access route for the proposed solar farm. Several access routes were considered, however it was concluded that Houghton Road and Binyah Street are not suitable access roads to the site.

An assessment of the traffic and access arrangements of the proposed solar farm is provided below.

1 Existing Conditions

1.1 Road Network

Irrigation Way (Main Avenue) is classified as a state arterial road under the care and management of RMS, which generally runs in a north-south alignment in the vicinity of Yanco. It has a varying carriageway width along its length, accommodating one traffic lane in each direction. Near the intersection of Irrigation Way / McQuillan Road, Irrigation Way has a posted speed limit of 60km/h.

McQuillan Road is a collector road under the care and management of Leeton Shire Council (Council) that runs in an east-west alignment between Irrigation Way and Racecourse Road. It has a road width of approximately nine metres, accommodating one traffic lane of approximately 3.5 metres width in each direction. McQuillan Road has a posted speed of 60km/h.

Canal Street (*Poplar Avenue / Racecourse Road*) extends on from McQuillan Road and has a general north-south alignment. Canal Street also has a road width of approximately nine metres, with one traffic lane of approximately 3.5 metres wide in each direction. Canal Street has a posted speed of 60km/h, with a school zone of 40km/h during school days from 8:00-9:30am and 2:30-4:00pm located adjacent to the MET private school.

Toorak Road is a local road under the care and management of Council, that generally runs in a north-south alignment. It has a road width of approximately seven metres, accommodating one lane of traffic in each direction. Toorak Road has a posted speed of 80km/h. There are two canal crossings located along Toorak Road, each with a road width of approximately seven metres.

Research Road is a local road under the care and management of Council, that runs in an east-west direction within the vicinity of the site. In the vicinity of the site, it has a sealed road width of approximately 7.5 metres, accommodating one traffic lane each direction. To the east of the site between Back Yanco Road and Irrigation Way, Research Road has a narrower width of approximately 4.6 metres. To the west of the site, Research Road has a tight 80 degree bend leading toward Houghton Road. Research Road has posted speed of 100km/h.

There is a bridge crossing which connects Canal Street and Toorak Road, controlled via unsignalised intersections on each end of the bridge. The crossing has a road width of approximately 7.2 metres, with one traffic lane in each direction.

East of the site, there is another bridge crossing that connects Irrigation Way and Research Road, and is priority controlled on each end of the bridge. The crossing has a road width of approximately 5.4 metres, with one traffic lane in each direction. Near this intersection, the sealed road width of Research Road is reduced to approximately 4.6 metres.

1.2 Traffic Volumes

Traffic volumes were obtained from RMS traffic volume viewer for Irrigation Way, with the most recent volumes available being recorded in 2010. The volumes were recorded on Irrigation Way, between McQuillan Road and Maiden Avenue, and recorded an Average Annual Daily Traffic (AADT) volume of 3,746 vehicles per day (vpd) travelling along this section of Irrigation way.

Assuming a growth rate of 1% per annum since 2010, it is estimated that Irrigation Way currently carries in the order of 4,056 vpd, which would result in an approximate two-way peak hourly volume of 507 vehicles per hour (vph)².

Traffic volume data for Toorak Road is unknown, however based on on-site observations, and given the rural and agricultural nature of the land uses on either side of the road, it is not expected that daily traffic volumes are of considerable levels.

² 16% AADT peak hour flow estimate taken from Section 2.3.6 of Austroads' Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings

2 Traffic Generation

2.1 Construction Phase

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

As shown in Table 2-1, it is anticipated that the delivery of PV panels will occur over an approximate 40 week construction period, generating up to 10 light vehicles, 36 trucks and two over-mass vehicle daily during the peak construction period. The largest design vehicle expected to access the site is a 19m AV (Articulated Vehicle as defined in AS 2890.2:2002), and the typical mass associated with a vehicle of that size and nature. It is noted that while the majority of construction vehicles are expected to be 19m AVs or smaller, anything exceeding the general mass limit will require a permit from the National Heavy Vehicle Register (NHVR).

The total expected peak construction traffic generation resulting from the proposed development is 96 vpd, comprising 20 light vehicle movements per day and 76 heavy vehicle movements per day. It is understood that the heavy vehicle movements will be scheduled throughout the day, resulting in a steady distribution of construction traffic to/from the site, and minimising simultaneous heavy vehicle movements. Assuming an eight-hour delivery window, this results in approximately nine heavy vehicle movements to/from the site during peak construction periods, or 9 vph.

The majority of light vehicle movements are expected to occur prior to and following the delivery window, with a tidal flow of arrivals during the morning and departures during the afternoon / evening.

Table 2-1 shows the maximum expected daily trip generation during the peak construction and typical operational phases of the proposed development. The estimated delivery schedule for the construction phase is attached in **Appendix B**.

Table 2-1: Expected Development Trip Generation during Site Construction and Operation

Phase	Expected Maximum Number of Vehicles per Day	Number of Vehicle Movements per Day (vpd)
Construction	36 heavy vehicles	72 vpd
	10 light vehicles	20 vpd
	2 over-mass vehicles	4 vpd
Total:		96 vpd
Operation	2 heavy vehicles	4 vpd

2.2 Operational Phase

During the operational phase of the project, there is expected to be in the order of two light vehicles accessing each of the Toorak Road sites (the same two vehicles) per day, reducing to an expected average of one vehicle per day after the first year following completion of construction.

For the Research Road site, this is expected to be in the order of two vehicles per week for the first year, reducing to one vehicle per week afterward. This represents a daily traffic generation of less than one vehicle per day, which is understood will be the same maintenance vehicle that accesses the other sites.

The Research Road site currently has an existing orchard development, which under normal agricultural operations generates in the order of two vehicles per week, increasing to seven vehicles a week during

February and March. Accordingly, it is considered that the site traffic generation will remain unchanged following completion of the development, and then reduce to one vehicle per week following the first year of operation.

3 Proposed Access Route

3.1 Access Route

The proposed heavy vehicle access route is described below and illustrated in **Figure 1**.

Heading toward the site from Irrigation Way:

- Left turn onto McQuillan Road;
- Travel along McQuillan Road as it transitions to Racecourse Road, Poplar Avenue and Canal Street;
- Left turn onto the Whitton Road bridge; and
- Left turn onto Toorak Road.

The southern site, accessed via Research Road requires one additional left turn from Toorak Road onto Research Road.

For all heavy vehicle egress movements from the site, the reverse of the above route is proposed.



Figure 1: Proposed Heavy Vehicle Access Route

3.2 Access Roads

The following roads along the proposed construction traffic route described above are approved RMS routes for 19.0m vehicles with mass limits exceeding 50 tonnes:

- Irrigation Way;
- McQuillan Road; and
- Canal Street.

The use of these roads by larger vehicles delivering plant to the site would not be dissimilar to the existing use of the roads by trucks associated with other industrial uses in the surrounding areas.

It is understood that a development toward the southern end of Toorak Road currently has a permit with the NHVR to operate heavy vehicles along Toorak Road. The exact details of this permit are unknown, however

the heavy vehicle activity of the existing operations is considered to be similar to the proposed construction vehicle activity.

The heaviest construction vehicles expected to access the site could be up to 50 tonnes. Any over mass vehicles would require a NHVR permit to travel along the necessary sections of Toorak Road and Research Road.

3.3 Whitton Road Bridge

A swept path assessment has been undertaken for the AV for the Whitton Road bridge. The assessment was undertaken using the software package AutoTurn, to determine whether the design vehicle could safely travel from Canal Street to Toorak Road and vice versa without crossing the road centrelines, and is provided in **Figure 2** within **Appendix C**. Traffic management measures will be implemented where possible to mitigate the number of opposing heavy vehicles associated with the construction along Toorak Road, specifically by regulating the outbound vehicles during periods where no inbound vehicles are scheduled.

Notwithstanding this, it is recommended that traffic management measures are implemented to assist with the bridge crossing manoeuvres, in order to ensure safe and efficient vehicle movement, and minimise impact on the existing road network. As further explained in Section 4, construction traffic management measures will be implemented to ensure that only one inbound or outbound vehicle is along the section of road that would fall under the NHVR permit.

3.4 Toorak Road

Toorak Road for the majority of its length has a straight alignment, however, towards the northern end of the road there is an approximate 50 metre radius curve. A swept path assessment was undertaken for simultaneous 19m AV movements and it was found that road widening would be required in order to accommodate these movements.

While it is not likely that simultaneous opposing movements will occur (due to the above-mentioned traffic management measures), it is considered that both northbound and southbound movements should be able to be comfortably accommodated by the road geometry without impacting other road users.

The swept path assessment is provided in **Figure 3** of Appendix C.

3.5 Toorak Road / Research Road Intersection

Heavy vehicles accessing the Research Road site are required to travel through the Toorak Road / Research Road intersection. A swept path assessment has been undertaken for these movements, and is included in **Figure 4** of Appendix C. Traffic management measures will be implemented to ensure that only one inbound or outbound vehicle is travelling through this intersection. The traffic management measures proposed to be implemented are described in greater detail below.

4 Construction Traffic Management

It is recommended that the following form part of the Construction Traffic Management Plan (CTMP) to minimise the impact of construction traffic along the proposed access route:

- All heavy vehicle movements to/from the site are to be managed to ensure that only one inbound or outbound vehicle is travelling along the access route in the vicinity of the site at a time. This can be implemented by use of delivery scheduling and radio / mobile phone communication.
- Prior to construction, a pre-condition survey of Toorak Road and the section of Research Road proposed to be utilised will be undertaken in consultation with Council. During construction, the sections of the road proposed to be utilised by the construction vehicles associated with the solar farm are to be monitored and maintained to ensure continued safe use by all road users, and any faults attributed to construction

of the PV plant required to be rectified. At the end of construction, a post-condition survey would be undertaken to ensure that the road network is left in a similar condition as per the start of construction.

- Heavy vehicle movements across bridge crossings be managed by appropriate traffic management for safe and efficient traffic movements.
- Heavy vehicle movements into and out of the southern site, accessed via Research Road, will be controlled via traffic management means, including a traffic controller, temporary lowered speed limit and additional road signage alerting vehicles of truck movements in the area.
- A Traffic Control Plan (TCP) be prepared detailing any traffic management measures required at each site access for the duration of the construction period.

The adoption of the above recommendations will assist to mitigate any impact to the road surface and surrounding road network.

5 Access Design

5.1 Construction Phase

It is proposed to provide access to/from the site via Toorak Road and Research Road, in the four locations identified in Appendix A. The proposed site accesses will be designed to accommodate the largest vehicle expected to access the site, which is understood to be a 19m AV.

Due to the scheduling of construction for each site, it is anticipated that only one of the four sites will be required to cater for deliveries at any one time, such that there would be no conflicting movements between heavy vehicle movements at different site accesses. As outlined in Section 3 above, all heavy vehicle movements will be arriving to the sites via Toorak Road (to the north) and exiting via the same route. All of these movements will be regulated as described in Section 4, in order to minimise simultaneous opposing heavy vehicle movements along Toorak Road and the Whitton Road bridge.

The accesses and on-site facilities will be designed such that all construction vehicles will be able to enter and exit the sites in a forward direction. Traffic management processes are also proposed to be implemented to coordinate movements into and out of each site, specifically at the Research Road site access where sight distance is limited by the existing canal crossing. It is anticipated that these movements would be controlled via a traffic controller to safely allow heavy vehicle movements to/from Research Road. These processes will be further detailed in the CTMP.

The site access for the southern site, accessed via Research Road, proposes to use the existing access point which is understood to currently serve as an access point for the existing agricultural use. The access connects to the on-site internal road network, which is informal and unsealed. A swept path assessment has been undertaken for the site access, and is shown in **Figure 5** in Appendix C.

6 Conclusion

Stantec has assessed the vehicle access arrangements of the proposed solar farm, located along Toorak Road and Research Road in Yanco, NSW. The assessment determined the following:

- The relatively low construction traffic volumes generated (approximately one vehicle every twelve minutes) are expected to be readily accommodated on the road network;
- Assessment of the unsignalised intersections on either side of the Whitton Road bridge connecting Canal Street and Toorak Road determined that no intersection upgrades are required.
- All construction traffic movements to/from the site will be scheduled and managed to minimise simultaneous heavy vehicle movements travelling along the access route in the vicinity of the site at a time; and
- As highlighted within the RMS letter mentioned above, a Construction Traffic Management Plan is required to address the temporary increase in traffic from the construction activities during the construction period.

Accordingly, it is considered that the heavy vehicle access route and site access arrangements for the proposed solar farm are suitable to accommodate the expected construction vehicle types and traffic volumes during the construction phase, and all vehicle access during the operational phase.

If you have any queries, please feel free to contact us.

Yours sincerely
Stantec Australia Pty Ltd



Desmond Ang
Traffic Engineer

desmond.ang@stantec.com

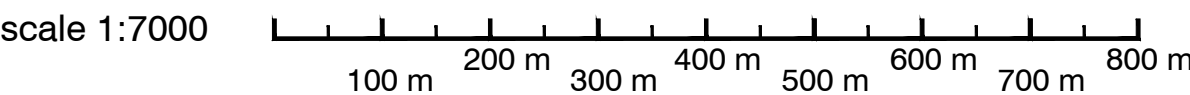







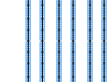

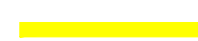




Tom Guernier
Senior Traffic Engineer

tom.guernier@stantec.com

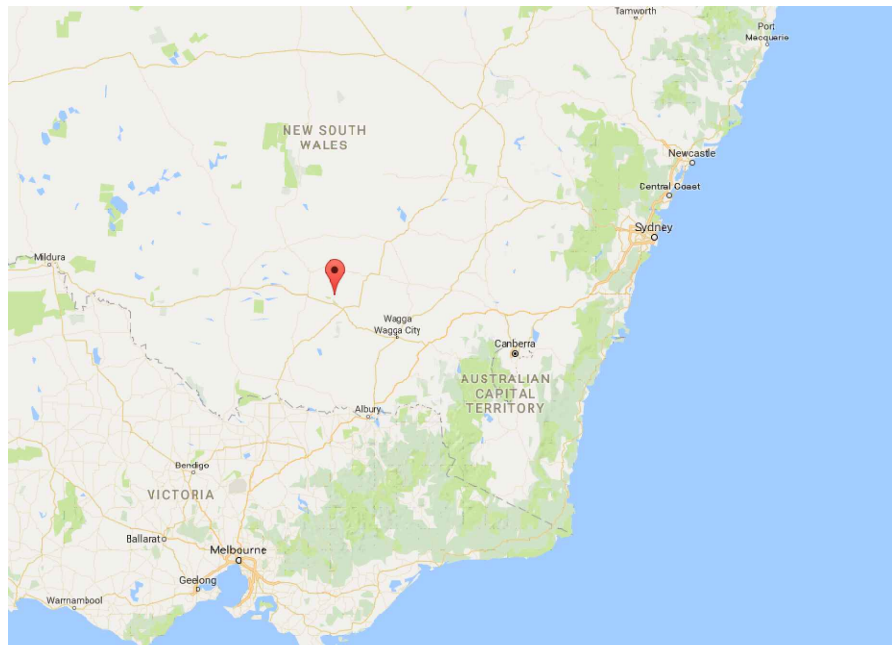
Appendix A: Concept Site Plan
Appendix B: Proposed Construction Vehicle Delivery Schedule
Appendix C: Swept Path Assessment

Appendix A: Concept Site Plan



LEGEND			
	Construction Compound [temporary] = 20,500 m² (3x 3,500; 1x 10,000m²)		Landowners Boundary
	Fenced Area (PV Rack Area)		Maintenance Road [to be built]
	Access Point		PV RacksOne Axis Tracker
	Gate		33 kV Powerline Gridconnection
	Inverter / Transformer Station		Control Room / Switchboard
	40ft Battery Container plus spacing for DC/DC converters		Indicative Powerline Crossing

C	7 Feb 19	MAB	MAB	OSA	Indicative Powerline Route updated
B	14 Jan 19	MAB	MAB	OSA	Indicative Powerline Crossings added
A	21 Nov 18	MAB	MAB	OSA	Powerline route amended
O	19 Nov 18	JED	MAB	OSA	Original drawing
Rev.	Date	Desi.	Chec.	Appr.	Revision Description



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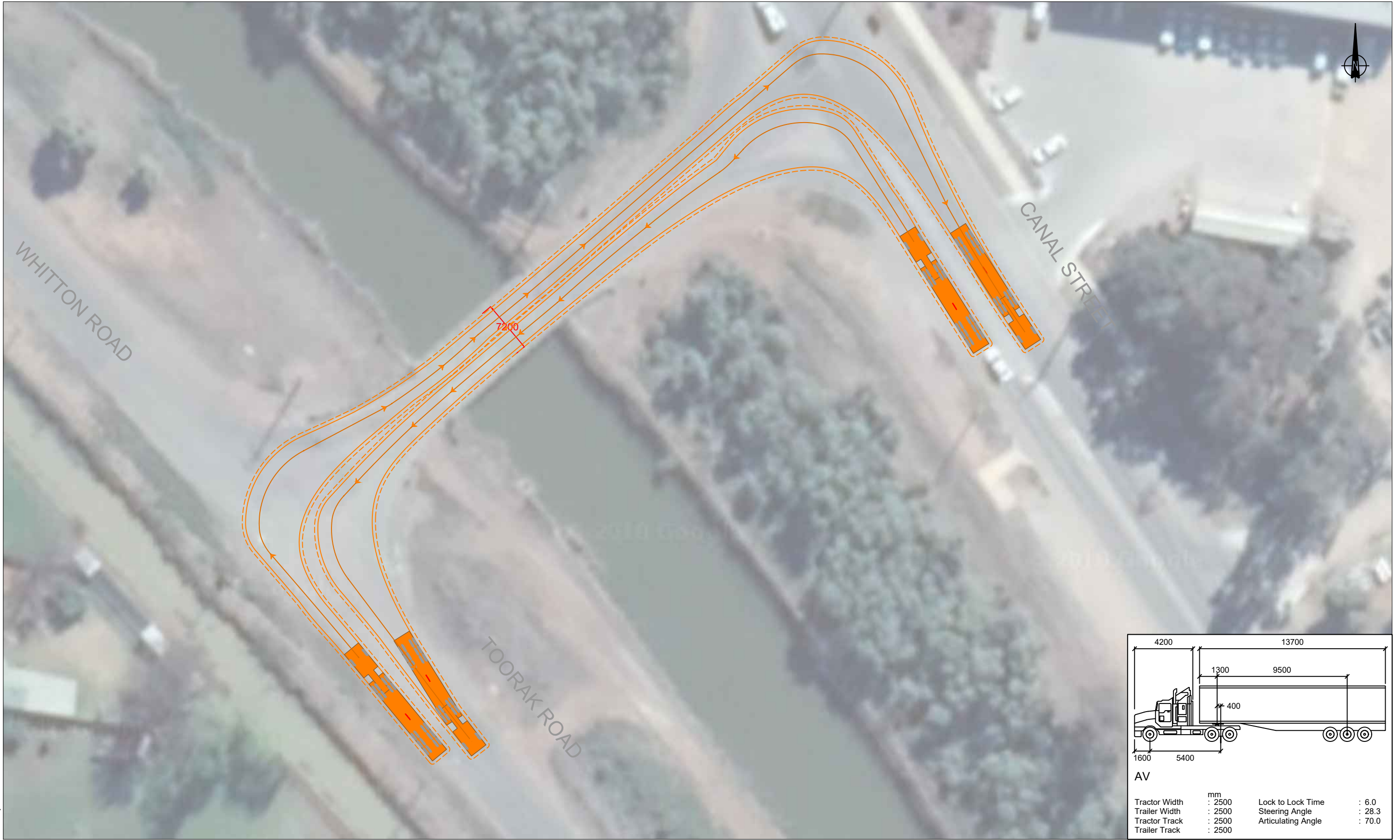
Appendix B: Proposed Construction Vehicle Delivery Schedule

	Week of construction period																																									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	Total	
Purpose																																										
Site facilities	4	4	2																																			5	5	20		
Ground works	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	70	50	50	50	50	50	50	50	50	50	50	50	20	20	20	20	20	20	20	20	2860
Fence	10	5	5	5	5	4																																1		35		
Mounting systems, racks etc.			20	20	20	20	20	20	20	20	20	20	15	15	15	15	10	10	10	10																					300	
Modules																				30	30	30	30	30	30	30	20	20	20	20										290		
Electrical installation, cables, trenching																																										
		30	20	20	20	20	20	20	20	20	5																														195	
Inverter stations and crane						5		5		5		5		2																												22
Substation works			5	5	5	5	5																																		25	
Site maintenance, waste disposal	15	15	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	15	15	15	15	15	15	15	10	5	5	5	5	5	5	5	5				565	
other / people movements	10	20	30	40	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	10	10	1820	
Water Supply	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	80	
Estimated deliveries per week	141	176	204	212	222	226	217	217	212	217	197	197	187	189	187	187	182	182	212	212	202	167	147	147	147	137	137	137	132	107	107	107	107	77	77	77	77	72	38	37	6212	
Estimated average deliveries per day	29	36	41	43	45	46	44	44	43	44	40	40	38	38	38	38	37	37	43	43	41	34	30	30	30	28	28	28	27	22	22	22	22	16	16	16	16	15	8	8	32	
Estimated average movements per day	58	72	82	86	90	92	88	88	86	88	80	80	76	76	76	76	74	74	86	86	82	68	60	60	60	56	56	56	54	44	44	44	44	32	32	32	32	30	16	16	64	

Notes

Appendix C: Swept Path Assessment

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00	12/02/19	DA	----	-----

Proposed Yanco Solar Farm
Swept Path Assessment
Whitton Road Bridge - 19m AV

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Proposed Yanco Solar Farm
Swept Path Assessment
Toorak Road - 19m AV

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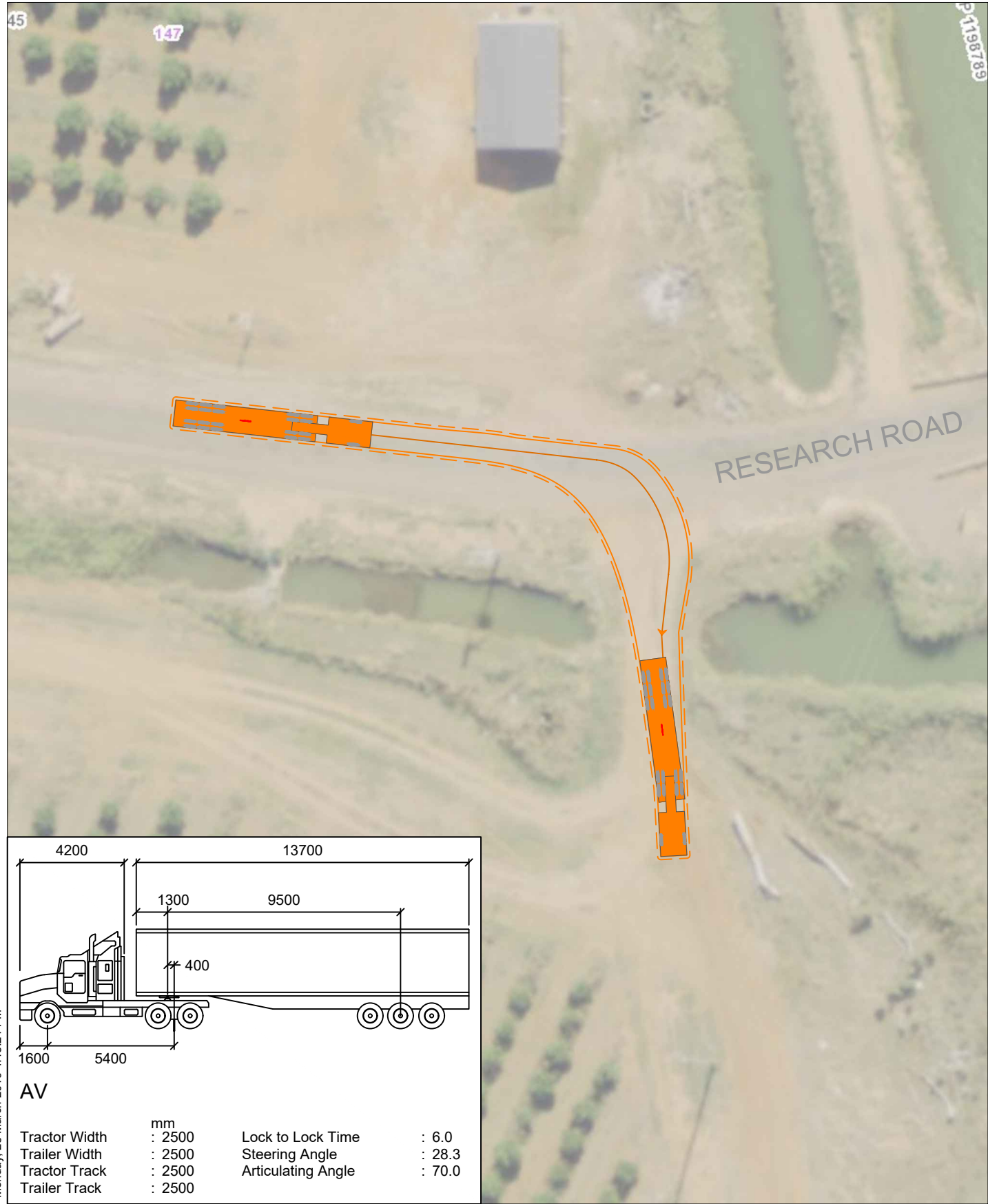
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Proposed Yanco Solar Farm
Swept Path Assessment
Toorak Road / Research Road - 19m AV

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Proposed Yanco Solar Farm
Swept Path Assessment
Research Road Site Access - 19m AV

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