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Traffic & Transportation Direction



Lancefield Solar Farm

313 Collivers Road, Lancefield

Traffic Impact Assessment

November 2022

Reference: 396 rep 221125 draft

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313 Collivers Road, Lancefield

Traffic Impact Assessment

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1. Background

1.1 Background

Amber Organisation Pty Ltd has been engaged by BNRG-Leeson to conduct a review of the traffic implications of the Lancefield Solar Farm and prepare a Traffic Impact Assessment.

The solar farm is located approximately 3 kilometres southwest of Lancefield and is proposed to have a capacity of 5MW. Access to the site during construction is proposed via a new access to Rochford Road which fronts the western boundary of the site. Following construction, the access would be removed and all access would be provided via Cullys Road. Staff are expected to primarily be located in Melbourne with all plant expected to be delivered from GeelongPort or Port of Melbourne.

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

Figure 1: Site Layout



Source: BNRG-Leeson

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. The assessment details how road impacts of the project traffic, particularly from heavy vehicle use, will be avoided or managed using road-use management strategies.

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 soil erosion and dust generated by traffic volumes; and
- Details of access roads and how these connect to the existing road network and ongoing operational maintenance.

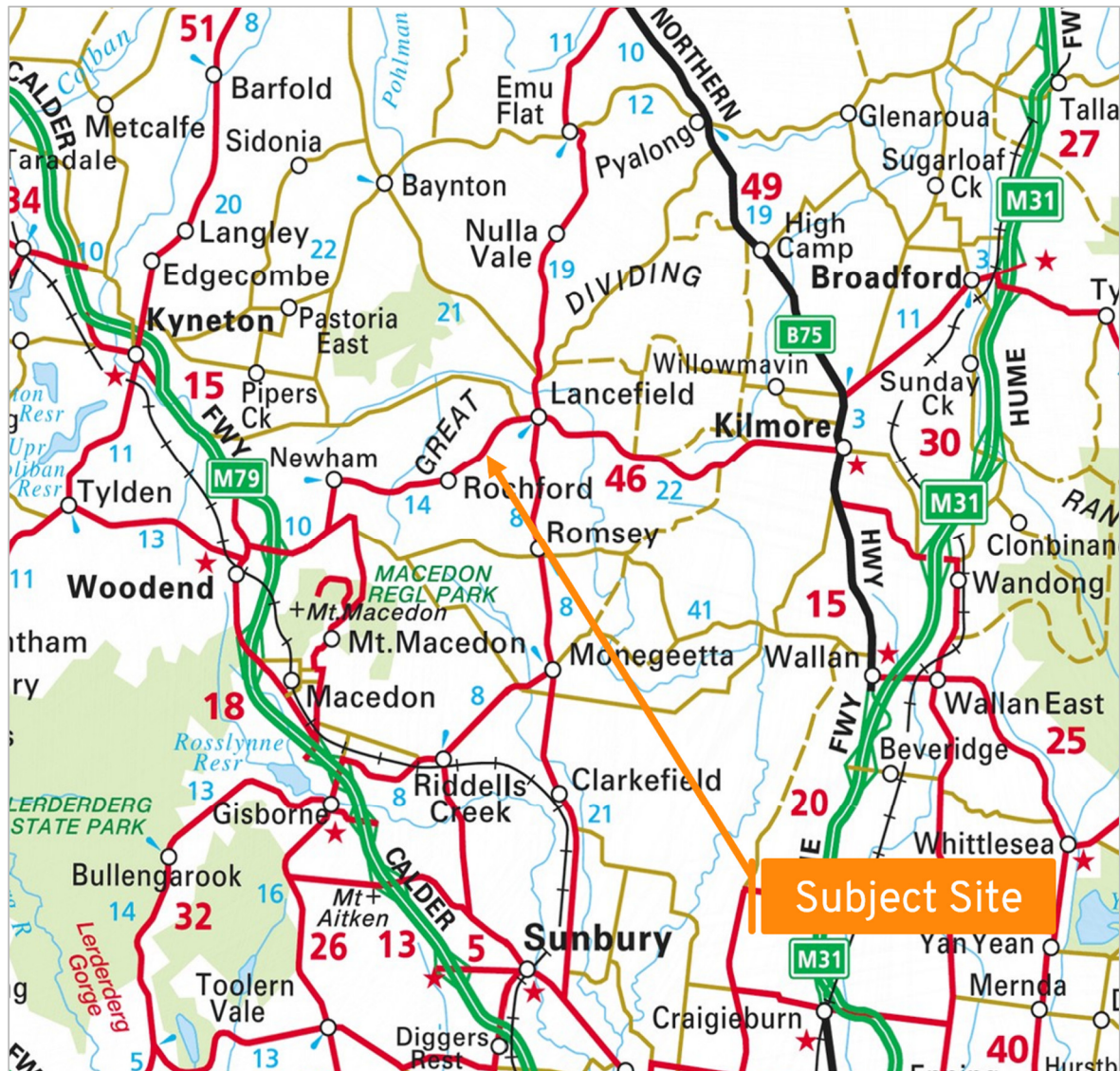
The traffic assessment has been undertaken in conjunction with consultation with Department of Transport and Macedon Ranges Shire Council. It also responds to the requirements outlined within the *Department of Environment, Land, Water and Planning Solar Energy Facilities Design and Development Guideline*.

2. Existing Conditions

2.1 Site Location

The site forms Lot 1 TP168495 and is located approximately 3.0km southwest of Lancefield on the eastern side of Rochford Road. Figure 2 shows the location of the site in relation to the surrounding transport network.

Figure 2: Site Location



Source: Melways

The site is zoned as Farming Zone (FZ) and is occupied by agricultural land and a dwelling near the southeast corner of the site. It has a frontage to Collivers Road at its northern boundary, Cullys Road at its southern boundary, and Rochford Road at its western boundary. No formal access is provided to the site.

2.2 Road Network

Rochford Road is a Secondary State Arterial Road under the care and management of Department of Transport and is classified as a TRZ2 Principal Road Network Zone. It runs in a general northeast-southwest alignment between Parks Road and Colwells Road. Within the vicinity of the site, it has a carriageway width of approximately 7 metres accommodating one lane of traffic in each direction and has a speed limit of 100km/hr.

Cullys Road is a municipal local road which runs in an east-west alignment between Rochford Road and Parks Road. It has an unsealed surface with a width of approximately 3.0 metres and accommodates two-way vehicle movement.

The intersection of Rochford Road, Cullys Road, and Otts Lane is priority controlled with vehicles exiting Cullys Road provided with Give Way signage and linemarking.

2.3 Traffic Volumes

Traffic volume data from the Department of Transport Open Data Hub indicates Rochford Road is estimated to be carrying in the order of 519 vehicle movements per day. Assuming 10% of vehicle trips are generated in the peak hour the road is expected to be accommodating 52 vehicle movements in the peak hour. The vehicle movements are expected to be relatively evenly distributed between north and southbound movements and the data indicates 11% are associated with heavy vehicles.

No traffic volume data is available for Cullys Road which is expected to be accommodating a minimal level of traffic given it only services a small area of agricultural land.

2.4 Public Transport Services

No public transport services are provided within the vicinity of the site.

2.5 Crash History

Amber has conducted a review of the DoT Crashstats database for all injury crashes within the following search area:

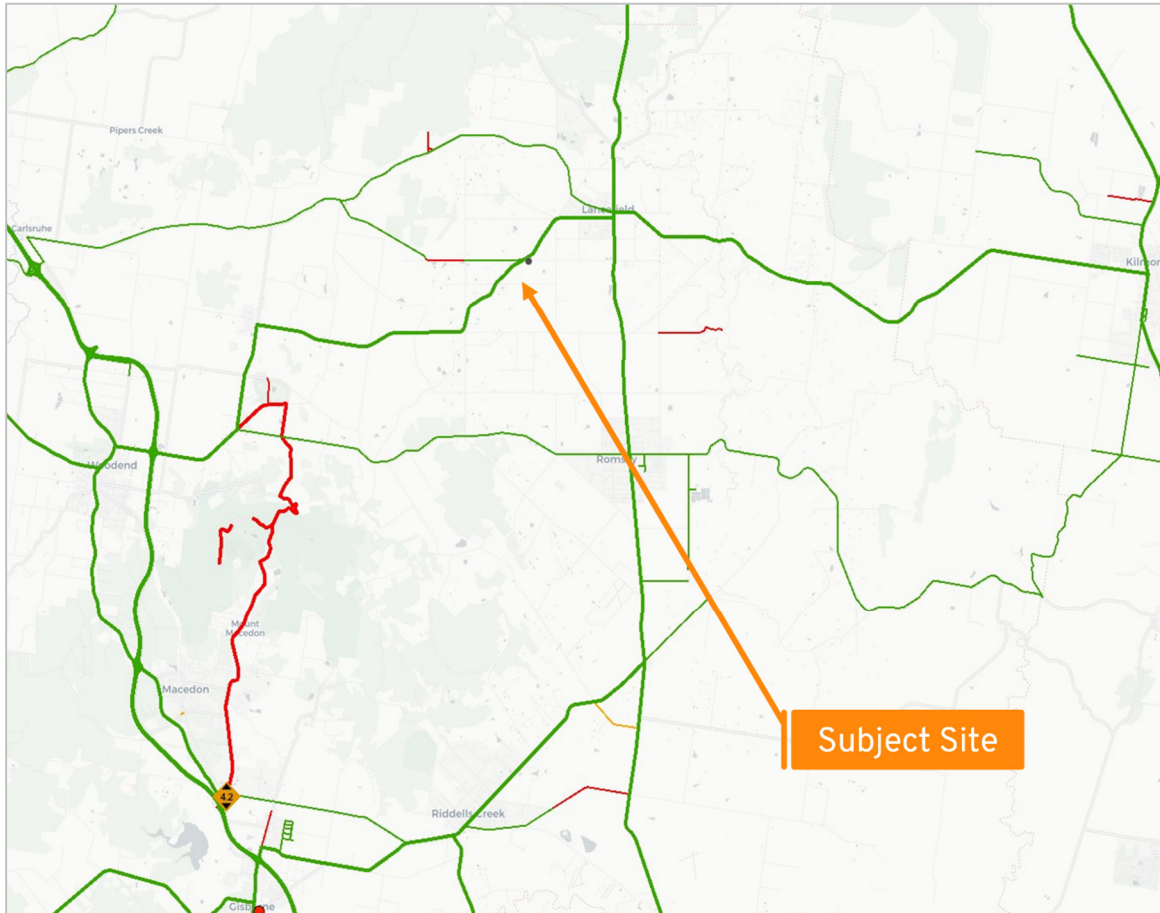
- Rochford Road between Collivers Road and Monument Road; and
- The full length of Cullys Road.

The crash database provides the location and severity of all injury and fatal crashes for the five-year period from 2015 to 2019. The crash search revealed one serious injury crash at the intersection of Rochford Road and Cullys Road. Given the road classification and associated traffic volumes, it is concluded that the road network is currently operating in a relatively safe manner.

2.6 Restricted Vehicle Access

The DoT Gazetted Roads for B-Doubles Map for the surrounding area is provided within Figure 3. The green lines indicate B-Double declared roads while the orange lines represent conditionally approved roads. As can be seen from the figure, Rochford Road is a B-Double declared road and Cullys Road is undeclared.

Figure 3: DoT Gazetted Roads for B-Doubles Map



Source: VicRoads Gazetted Roads for B-Doubles Map

3. Traffic Assessment

3.1 Traffic Generation

3.1.1 Construction

The solar farm construction is expected to take approximately 6 months, with the peak construction period expected to take 1-2 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 of 50 staff will be on-site during peak construction periods. It is understood that shuttle buses will be provided that can accommodate the majority of staff, with the remaining staff to access the site using private vehicles.

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

- Light vehicles associated with transporting staff to/from the site, including shuttle buses and personal vehicles;
- Medium and Heavy Rigid Trucks (MRV and HRV as defined within AS 2890.2:2018) will be used to deliver raw materials and smaller plant; and
- Articulated Vehicles and B-Doubles (AV and B-Double as defined within AS 2890.2:2018) will be used to transport larger plant.

Restricted Access Vehicles / oversized and overmass (OSOM) vehicles may be required for the delivery of larger plant to the site such as the substation transformer and are subject to separate permit applications and regulations. The impacts of the OSOM vehicles are discussed within Section 4 with the following assessment focusing on the impacts of the light and heavy vehicles which generate the bulk of the traffic and represent the typical traffic impact of the project on a day-to-day basis.

The construction traffic volumes for the project have been provided by the Applicant. It is anticipated that during peak construction the site could generate up to 38 heavy and 108 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 1 summarises the traffic movements generated during the construction period of the solar farm.

Table 1: Traffic Generation During Peak Construction Periods

Vehicle Type	Average Vehicle Movements per Day		Peak Vehicle Movements per Day	
	Daily (vpd)	Peak Hour (vph)	Daily (vpd)	Peak Hour (vph)
Light Vehicle (car / 4WD)	30	15	100	50
Shuttle Bus	4	2	8	2
MRV/HRV	6	1	8	2
AV	4	1	20	2
B-Double	4	1	10	1
Total	48	20	146	57

Overall, the site is expected to generate approximately 57 vehicle movements during the morning and evening peak hours during the peak construction period, which will reduce to 20 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 5 staff resulting in a traffic generation of up to 10 vehicle movements per day which would result in a negligible change to the traffic environment.

3.1.3 Decommissioning Traffic

At the end of the operational life of the project all above ground infrastructure will be dismantled and removed from the project site. Internal roads, if not required for ongoing farming purposes or fire access, would be removed and the site reinstated as close as possible to its original state.

Traffic generation during decommissioning would be similar to traffic generation during the average construction period. A comprehensive Construction Traffic Management Plan would be prepared prior to the decommissioning phase in conjunction with the relevant road authorities. This would aim to ensure adequate road safety and road network operations are maintained.

3.2 Traffic Distribution

Traffic accessing the site will do so via Rochford Road which is a Secondary State Arterial Road. Staff will primarily be located in Melbourne with all plant expected to be delivered from the GeelongPort. The following provides a breakdown of the access distribution for each of the vehicle classifications outlined within Table 1:

- Light Vehicles: It is anticipated that most staff will travel from Melbourne, with 90% of staff travelling from the south and 10% travelling from the north.
- MRV/HRV: These vehicles will predominantly be water trucks and vehicles transporting materials such as concrete and fencing supplies which will be sourced within the surrounding area. The Applicant has advised that 60% will be travelling from the south and 40% travelling from the north.
- AV/B-Double: Plant will be transported from GeelongPort or Port of Melbourne to the site along Rochford Road from the south.



The peak hour for the solar farm will occur at the start and end of the day when staff are transported to/from the site. During the morning peak all vehicle movements will be towards the site and in the evening peak all vehicle movements will be away from the site. Heavy vehicle movements will be distributed throughout the day and will be split evenly between inbound and outbound movements.

3.3 Traffic Assessment

The traffic volumes expected to be accommodated on the surrounding road network during the peak hour are shown within Table 2.

Table 2: Expected Peak Hour Traffic Volumes During Construction

Road	Existing Peak Hour Traffic Volume	Expected Peak Hour Traffic Volume
Rochford Road Northbound	26 vph	77 vph
Rochford Road Southbound	26 vph	32 vph

These traffic volumes can be readily accommodated on the road network and all roads are expected to continue to operate with a good level of service. Accordingly, it is concluded that the road network is able to accommodate the traffic generated by the solar farm during the construction period.

During operation all vehicles are proposed to access the site via Cullys Road. The traffic generated during operation is expected to be able to be readily accommodated on the road network given Cullys Road currently accommodates a minimal level of traffic.

3.4 Cumulative Traffic Impacts

A review has been undertaken for any other renewable projects in the surrounding area. The VicPlan Map Tool indicates that there are no other renewable projects proposed in the surrounding area.

4. Route Assessment

4.1 Access Route

GeelongPort has been identified as a potential location where the solar farm plant will be imported. The proposed construction traffic access route from the port to the site is expected to be via Corio Quay Road, Princes Highway, M1, Western Ring Road, Tullamarine Freeway, Sunbury Road, Lancefield Road, Chauncey Street, and Rochford Road.

Port of Melbourne may also be utilised which would adopt a transport route via Docklands Highway, Citylink, Tullamarine Freeway, Sunbury Road, Lancefield Road, Chauncey Street, and Rochford Road.

The arterial roads are designated for B-Double vehicles as outlined within the DoT Gazetted Roads for B-Doubles Map provided within Figure 3. Accordingly, the access route is able to accommodate the loads and type of vehicle movement to be generated during construction of the solar farm.

It is also noted that some oversize and overmass vehicles will be required to deliver larger plant to the site such as the sub-station transformer and earthmoving equipment. The vehicles are subject to specific road permits that will be applied for by the contractor once the dimensions of the load and the specific delivery vehicle are known.

4.2 Unsealed Road Network

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 3: 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.	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> • 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.
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Cullys Road is expected to accommodate in the order of 10 vehicle movements per day during operation. Therefore, the road is expected to operate as a ‘track’ and the current unsealed width of 3.0 metres is concluded to be acceptable and aligns with the requirements of the ARRB Guide.

4.3 Mitigation Measures

A Construction Traffic Management Plan (CTMP) will 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 roads:

- Prior to construction, a pre-condition survey of the relevant sections of the existing road network 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 the consistent condition as at the start of construction.
- Vehicles are recommended to drive at slower speeds when travelling on unsealed roads. This can reduce the amount of dust created and the amount of dirt tracked onto the public road network. Standard mitigation measures such as a water trucks to dampen the roads and reduce the amount of dust in the air, can also be considered to reduce dust levels.
- Neighbours of the solar farm be consulted and notified regarding the timing of major deliveries which may require additional traffic control and disrupt access.

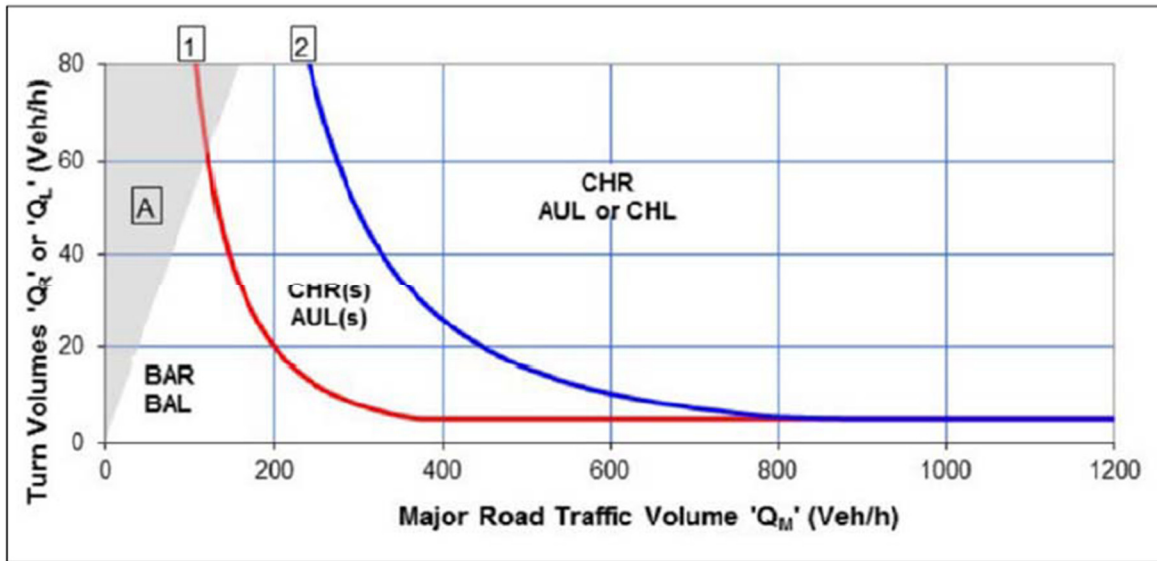
Therefore, it is concluded that the surface of the roads with the inclusion of the proposed upgrades, are suitable to accommodate the future traffic volumes.

5. Intersection Assessment

5.1 Turn Treatments

Austrroads 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 4.

Figure 4: Figure 3.25 of *Austrroads Guide to Traffic Management Part 6*



During construction of the solar farm vehicle movements will be generated at the intersection of the site access and Rochford Road. The requirement to provide turn facilities is primarily generated during the morning peak hour when staff access the site which occurs from 6:00am to 7:00am. Table 4 identifies the required turning treatments based on the expected traffic volumes at the intersection.

Table 4: Turning Volumes for Turn Treatment Calculations

Turning Treatment	Traffic Volume (vph)		Requirement
	Turn Volume	Major Road	
Right Turn	51	58	BAR
Left Turn	6	26	BAL

Therefore, the access would require Basic Left Turn (BAL) and Basic Right Turn (BAR) treatments.

Following discussions with Department of Transport Officers it has been agreed that the site access is to be designed in accordance with Guideline Drawing *AGRD Part 4 - Typical Design to Rural Properties*. The proposed design is provided within Appendix A and provides an increased width from the standard drawing to allow two B-Doubles to pass at the entrance to the site. The design does not specify turn treatments which are not proposed at the access based on the following:

- The construction period is expected to occur for approximately 6 months with a peak construction period of 1-2 months which represents a temporary increase in traffic

volumes. Outside of the construction period the site is expected to generate a minimal level of traffic.

- The majority of turn movements into the site occur when staff access the site in the morning peak hour. During peak construction staff are expected to generate 50 vehicle movements to the site and during the average construction period they are expected to generate 15 vehicle movements. These vehicle movements occur before 7:00am which is outside of the peak time of the road network.
- Through the day the site is expected to generate a minimal number of turn movements into the site which is expected to be in the order of 2-3 vehicle movements per hour.
- The intersection has excellent sight distance for vehicles travelling along Rochford Road to see turning vehicles.
- A CTMP will be prepared prior to construction of the site. The CTMP will include measures to inform staff of the reduced turn treatment and to encourage suitable safety initiatives.

Accordingly, the site access is expected to be able to accommodate the traffic generated by the solar farm in a safe manner subject to the adoption of the guideline drawing.

5.2 Sight Distance

Austrroads 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 Rochford Road have a speed limit of 100km/hr a design speed of 110km/hr has been adopted which requires an SISD of 285 metres.

The available sight distance exceeds the requirements of the *Austrroads Guide* as demonstrated within Appendix C. Accordingly, the available sight distance at the intersection is expected to provide safe vehicle movement.

6. Construction 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.
 - Oversize and overmass 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.
- 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).

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 solar farm located approximately 3km southwest of Lancefield. Access to the site during construction is proposed via a new access to Rochford Road which fronts the western boundary of the site. Following construction, the access would be removed and all access would be provided via Cullys Road. Staff will primarily be located in Melbourne with all plant expected to be delivered from GeelongPort or Port of Melbourne. The above assessment determined the following:

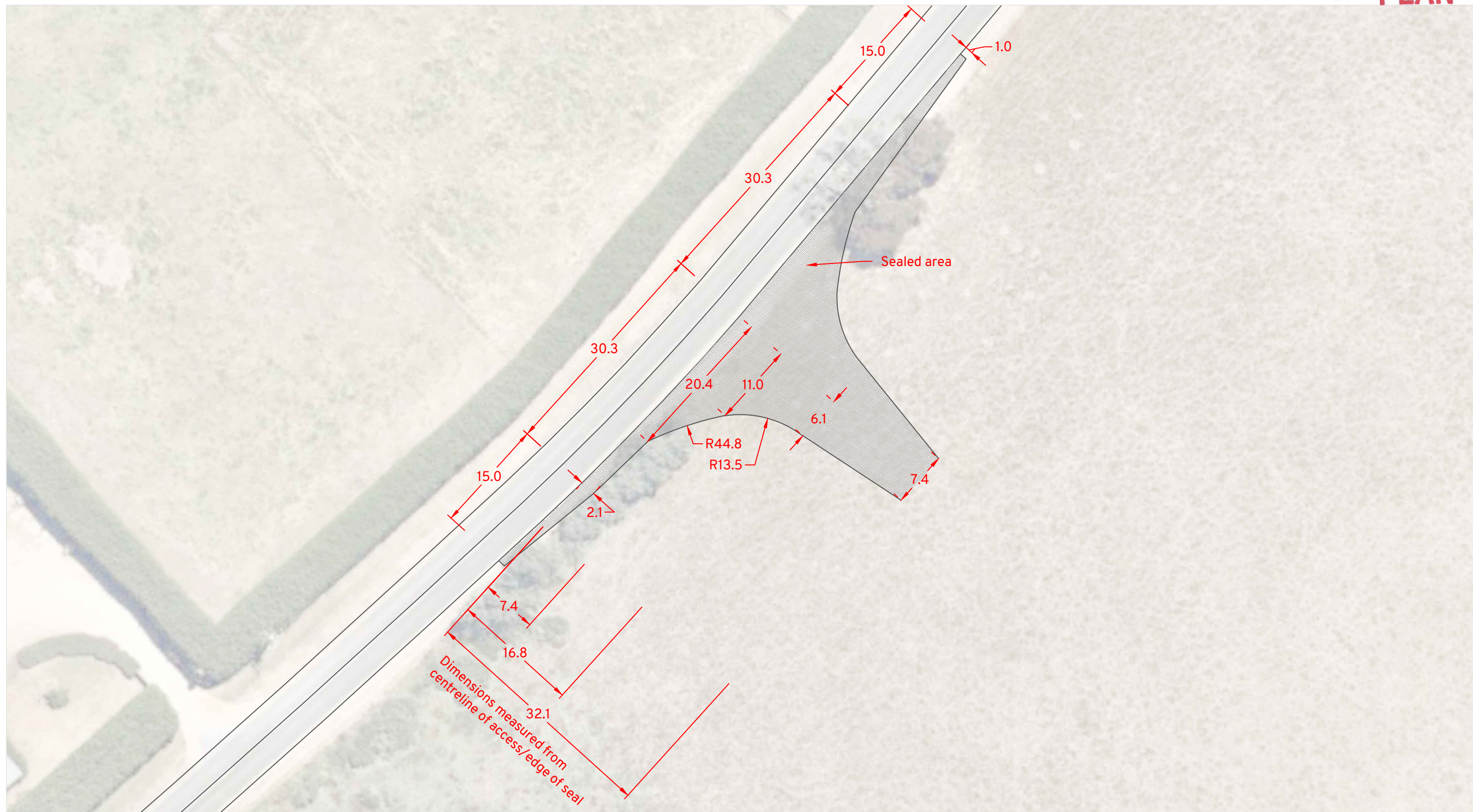
- The site will generate up to 108 vehicle movements per day during peak construction times, including 38 truck movements;
- The road network is able to accommodate the traffic generated by the development during the construction, operation and decommissioning stages;
- The site access is proposed to be constructed to accommodate B-Double vehicles and any OSOM vehicles;
- The construction traffic access route from the chosen delivery port to the site is proposed to utilise roads that are designated for B-Double vehicles and as such, the access routes are able to accommodate the loads and type of vehicle movement to be generated during construction of the solar farm;
- It is noted that some oversize and overmass vehicles will be required to deliver larger plant to the site such as the sub-station transformer and earthmoving equipment. The vehicles are subject to specific road permits that will be applied for by the contractor once the dimensions of the load and the specific delivery vehicle are known;
- Cullys Road is proposed to remain unsealed given the low level of traffic generated during operation; 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





Notes

1. The diagram is a guide for a typical layout of a driveway access for a rural property a 26m B-double.
2. This diagram is based on the VicRoads/DoT AGRD Part 4 Typical Access to Rural Properties GD No. GD4010A. The guide was developed in the interest of road safety and to protect the arterial road pavement at the access location.
3. Slight variations may occur after site inspection, analysis and approval of the location.
4. The pavement composition shall be in accordance with that shown on GDA4010A. Any proposed alternative pavement designs shall be undertaken in accordance with VicRoads.
5. Pavement materials and earthwork layers need to be in accordance with dot standard sections

and/or local government specification requirements.

6. A planning permit is required for a new access or alteration to an existing driveway and may be required for the removal of native vegetation.
7. A traffic management plan must comply with the road management act and applicable codes in relation to any works undertaken within the road reserve.
8. Truck warning signs & guide posts should be installed in accordance with Austroads Guide to Traffic Management & VicRoads supplements.
9. The driveway access construction and maintenance is the responsibility of the property owner. maintenance also includes associated drainage works.



Lancefield Solar Farm
313 Collivers Road, Lancefield
Access Design

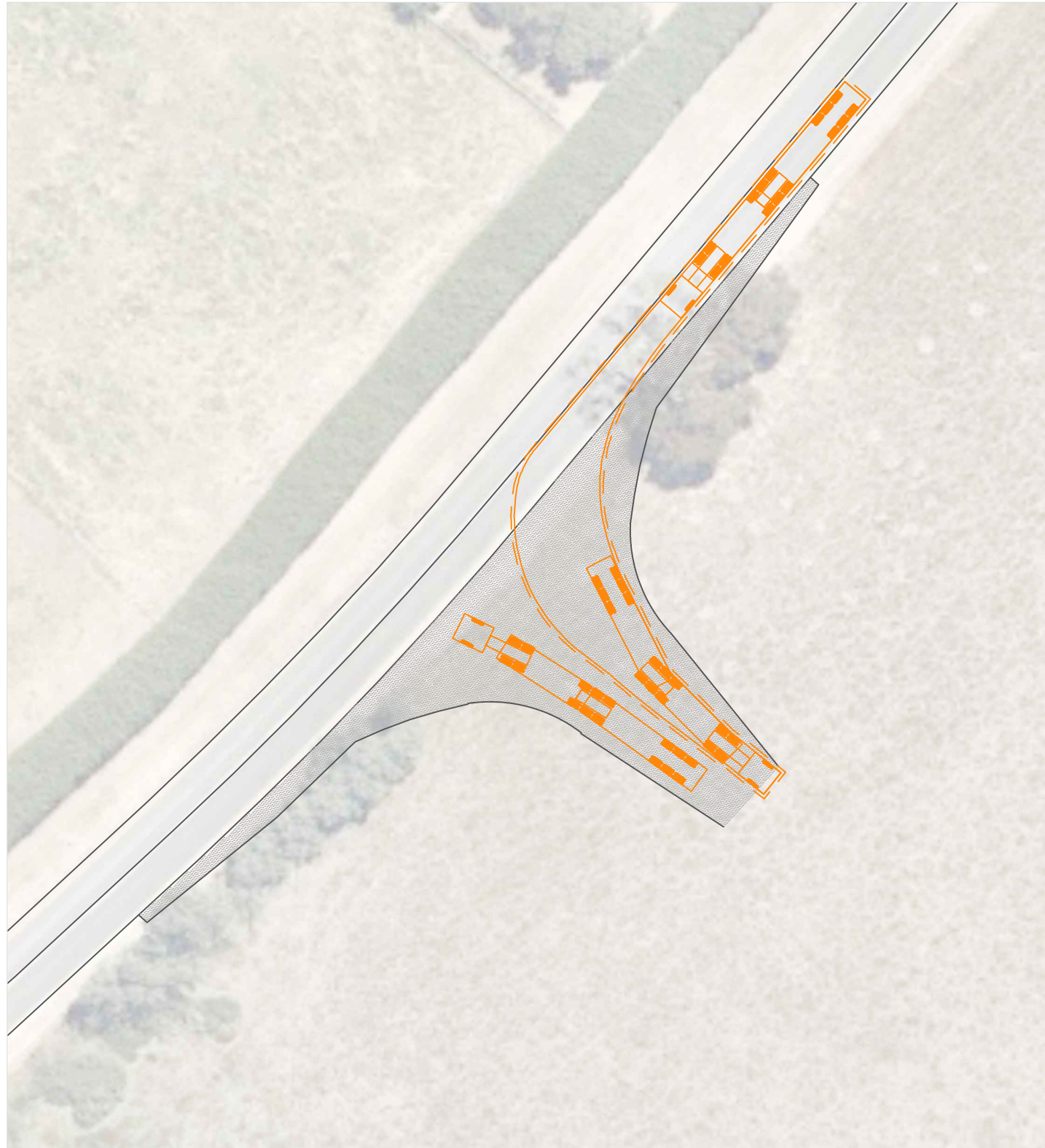
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DATE: 23/11/2022
DWG NO: 396-S01F
SCALE at A3: 1:500m



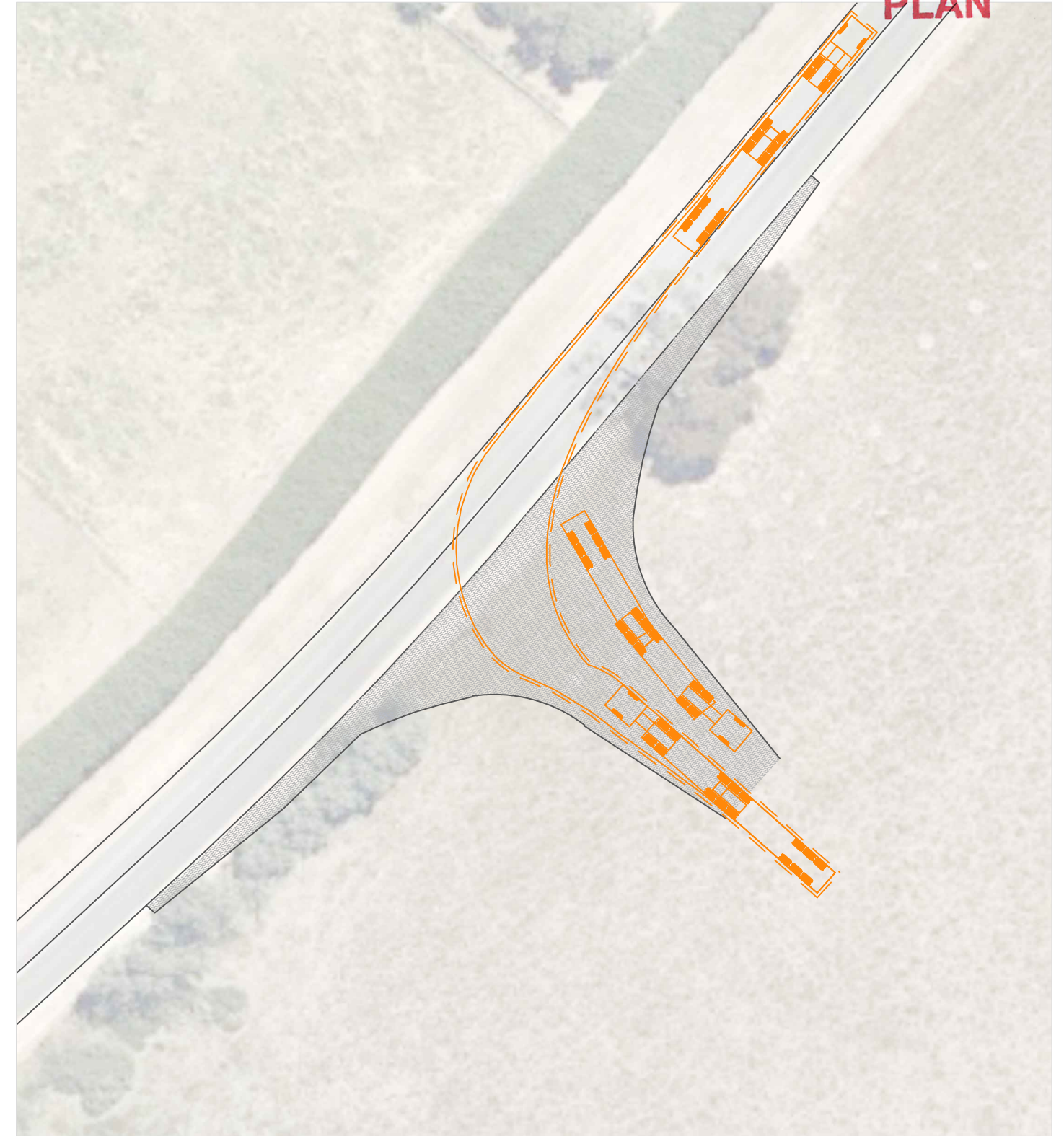
Appendix B

Swept Path Assessment

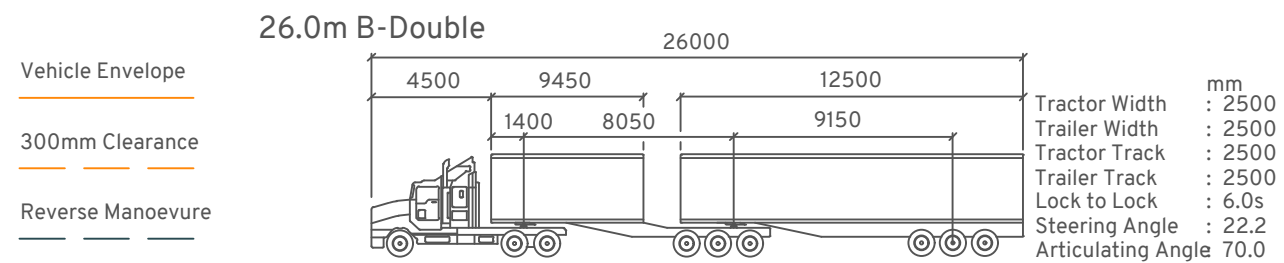




Entry Manoeuvre

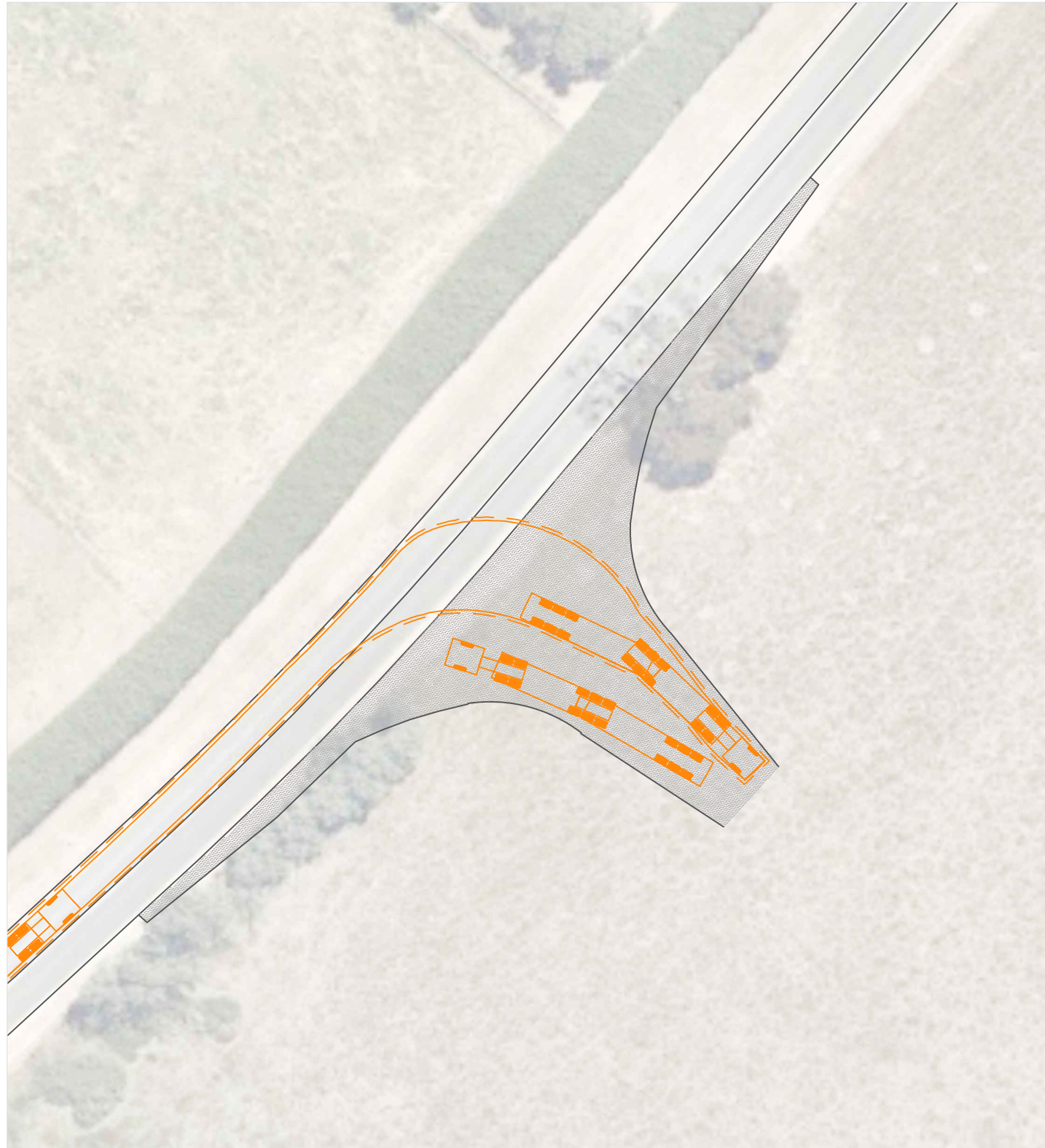


Exit Manoeuvre

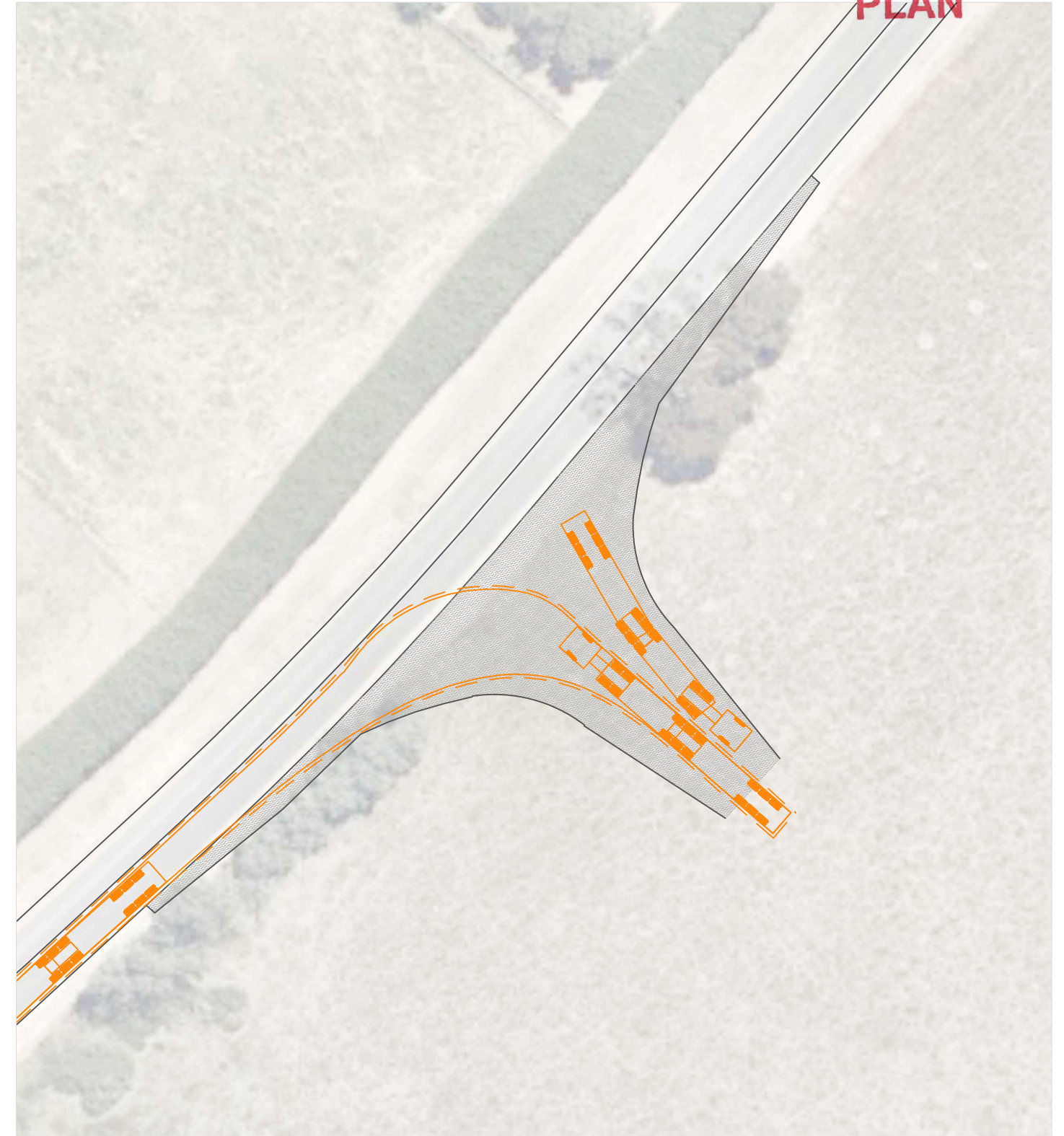


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313 Collivers Road, Lancefield
Swept Path Assessment

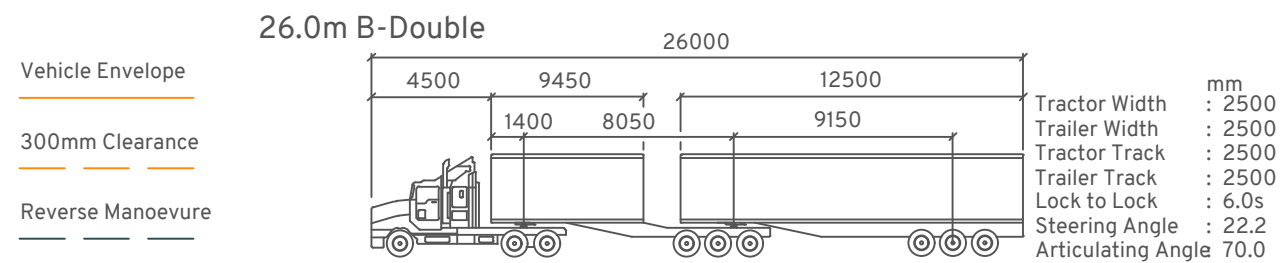
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DATE: 23/11/2022
DWG NO: 396-S01F
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Entry Manoeuvre



Exit Manoeuvre



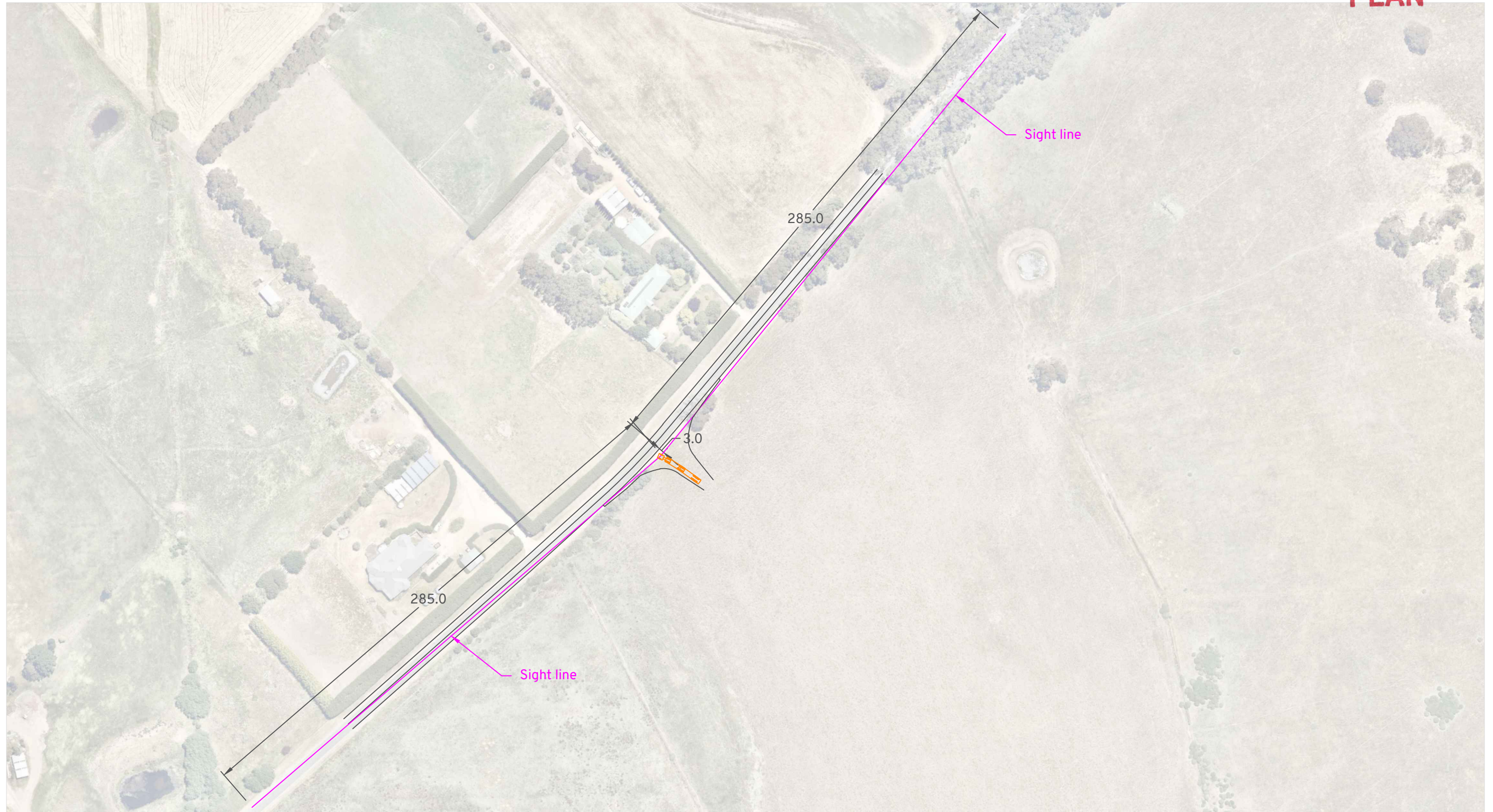
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DRAWN: MW
DATE: 23/11/2022
DWG NO: 396-S01F
SCALE at A3: 1:500m

Appendix C

Sight Distance Assessment





Lancefield Solar Farm
313 Collivers Road, Lancefield
Sight Distance

DRAWN: MW
DATE: 23/11/2022
DWG NO: 396-S01F
SCALE at A3: 1:2000m