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West Mokoan Solar Farm - Planning Application
892 Yarrawonga Development Ltd
13-May-2021

West Mokoan Solar Farm

Traffic Impact Assessment Report

West Mokoan Solar Farm

Traffic Impact Assessment Report

Client: 892 Yarrawonga Development Ltd

ABN: 63 628 034 300

Prepared by

AECOM Australia Pty Ltd
Level 10, Tower Two, 727 Collins Street, Melbourne VIC 3008, Australia
T +61 3 9653 1234 F +61 3 9654 7117 www.aecom.com
ABN 20 093 846 925

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Appendix A

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) have been commissioned to produce a Traffic Impact Assessment (TIA) for South Energy on behalf of 892 Yarrawonga Development Pty Ltd, for the proposed West Mokoan Solar Farm, which is located on private land near Benalla-Yarrawonga Road, Benalla, Victoria.

The TIA will support a planning permit application for the use and development of a photovoltaic solar farm.

1.1 Scope

This TIA will review the existing road and transport network near the site, consider the site access and potential traffic impacts of the Solar Farm on the local road network and identify any required mitigation measures to safely facilitate construction and operational vehicle movements to and from the West Mokoan Solar Farm.

1.2 Report structure

Following this introduction this TIA is structured as follows:

- Chapter 2.0 provides details of the existing road and transport network near the site.
- Chapter 3.0 outlines the development proposal.
- Chapter 4.0 outlines the vehicle access proposals and potential traffic impacts on the local road network.
- Chapter 5.0 identifies the required mitigation measures to safely facilitate the movements of vehicles to and from the development site.
- Chapter 6.0 concludes the TIA report.

1.3 References

The following reports and/or parties have been referenced or consulted in the preparation of this TIA report:

- Victoria Government Gazette – Road Management Act 2004, Code of Practice, Worksite Safety, Traffic Management 2010
- Road Management Act 2004
- Department of Transport (Regional Roads Victoria) – General Guidance
- Department of Transport (Regional Roads Victoria) Heavy Vehicle Network Maps in Victoria
- National Heavy Vehicle Regulator (NHVR) website / journey planner
- Benalla Road Management Plan.

2.0 Existing conditions

This section of the report characterises and summarises the existing road network, traffic conditions and findings from the desktop review and site inspection in the study area to provide context for the remainder of the study. As the AECOM' site observations dates from 2019, localised changes to the road conditions may have since occurred.

2.1 Site location

The proposed West Mokoan Solar Farm site is located approximately 10 kilometres north-east of the town centre of Benalla and approximately 200 kilometres northeast of Melbourne's CBD. The Solar Farm is located on the eastern side of Benalla-Yarrawonga Road and has a frontage to Benalla-Yarrawonga Road and Lake Mokoan Road.

The West Mokoan Solar Farm development boundaries are shown in Figure 1, encompassing land within the Rural City of Benalla at the following addresses at 892 Yarrawonga Road, Goorambat, Benalla-Yarrawonga Road, Benalla, and 616 Benalla-Yarrawonga Road, Benalla.

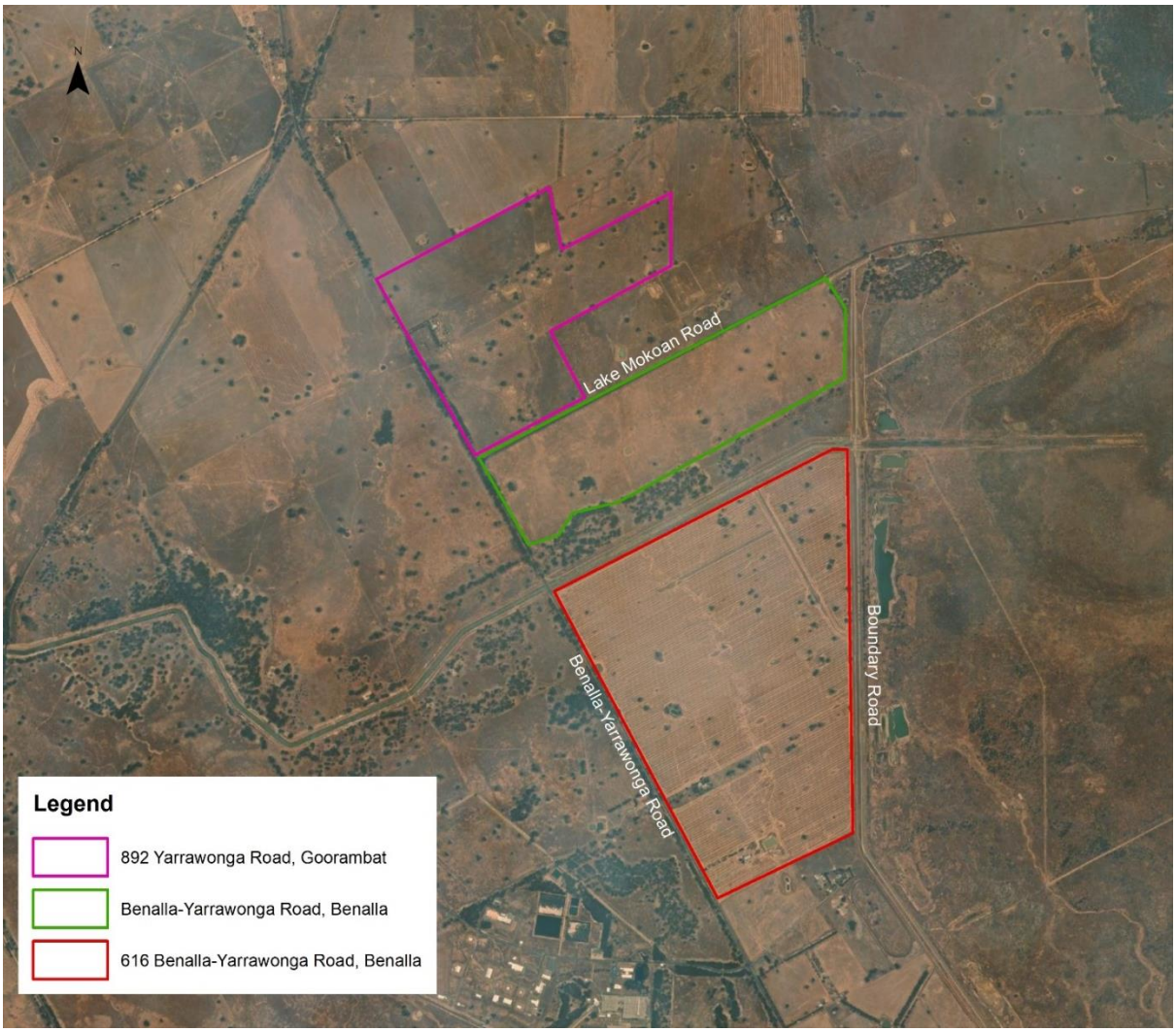


Figure 1 West Mokoan Solar Farm location

2.2 Local road network

2.2.1 Sydney Road

Sydney Road (see Figure 2) is an arterial road managed by Department of Transport (Regional Roads Victoria). This C-class road has two sealed lanes (approximately 7.4 metres wide) with unsealed shoulders of varying width (approximately 1 to 2.5 metres wide near the Hume Freeway interchange). For most of its length Sydney Road has a posted speed limit of 100 km/h, reducing to 80 km/h on approach to its crossroad priority intersection with the Hume Freeway.

Figure 2 Sydney Road looking towards the Hume Highway interchange

Source: AECOM – photo taken on Wednesday 20 February 2019

2.2.2 Benalla-Yarrawonga Road

Benalla-Yarrawonga Road is a C-class arterial road managed by Department of Transport (Regional Roads Victoria) with sealed lanes in each direction (approximately 6.6 to 7 metres wide) and unsealed shoulders (approximately 0.3 to 1 metre wide). The road is in good condition with line markings and signage present. The posted speed limit is 100km/h.

It should be noted that access to the southern part of the proposed West Mokoan Solar Farm is anticipated to be via Benalla-Yarrawonga Road, Goorambat, as shown in Figure 3.

Figure 3 Benalla-Yarrawonga Road looking southbound near one of the proposed West Mokoan Solar Farm site entrances

Source: AECOM – photo taken on Wednesday 29 October 2019

2.2.3 Sydney Road, Benalla-Yarrawonga Road and Pearson Road priority intersection

Sydney Road forms a crossroad priority intersection with Benalla-Yarrawonga Road and Pearson Road, as shown in Figure 4.

All project traffic is anticipated to use this intersection to access the site via Benalla-Yarrawonga Road and Murray Road.

Benalla-Yarrawonga was upgraded in the vicinity of its intersection with Sydney Road at the beginning of 2019.

Figure 4 Sydney Road, Benalla-Yarrawonga Road and Pearson Road priority intersection

Source: AECOM – photo taken on Wednesday 20 February 2019

2.2.4 Lake Mokoan Road

Lake Mokoan Road (see Figure 5) is a local road which provides access to farming land use in Goorambat. This sealed road runs through the middle of the northern section of the West Mokoan Solar Farm site. It is a two-way road with a total carriageway width of approximately 6 metres, with no shoulders along its length. Lake Mokoan Road has a 100 km/h posted speed limit.

A total of three site entry gates to the West Mokoan Solar Farm are to be located via Lake Mokoan Road.

Figure 5 Lake Mokoan Road

Source: AECOM – photo taken on Wednesday 20 February 2019

2.2.5 Benalla-Yarrawonga Road and Lake Mokoan Road priority intersection

Lake Mokoan Road forms a priority intersection with Benalla-Yarrawonga Road (see Figure 6 to Figure 8).

Project related traffic travelling to the site access points on Lake Mokoan Road is assumed to primarily come from the Hume Freeway, therefore construction traffic will turn right from Benalla-Yarrawonga Road to Lake Mokoan Road, and undertake the reverse left out manoeuvre. The intersection allows for a large turning radius from Lake Mokoan Road into Benalla-Yarrawonga Road.

With a posted speed limit of 100 km/h on Benalla-Yarrawonga, the safe intersection sight distances (SISD) should be unrestricted for 248 metres in accordance with Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections design guide requirements (Table 3.2). This appears to be non-conforming northbound from a set-back distance of 3 metres (poor aerial imagery of the area has not allowed for certainty on achievable SISD). This seems to be due to the offset of the give-way line markings from the carriageway and existing vegetation in the northbound direction (see Figure 7). Based on a high-level review approximately 200 metres of SISD can be achieved in this direction. SISD in the southbound direction seems to be satisfactory based on site observations and desktop review against standards (see Figure 8).

Figure 6 Lake Mokoan Road looking westbound at its crossroad priority intersection with Benalla-Yarrawonga Road

Source: AECOM – photo taken on Wednesday 20 February 2019

Figure 7 Intersection of Lake Mokoan Road and Benalla-Yarrawonga Road looking northbound

Source: AECOM – photo taken on Wednesday 20 February 2019

Figure 8 Intersection of Lake Mokoan Road and Benalla-Yarrawonga Road looking southbound

Source: AECOM – photo taken on Wednesday 20 February 2019

2.3 Level crossing

The Albury to Melbourne train line (V/Line) traverses a level crossing (see Figure 9) located on Benalla-Yarrawonga Road approximately 800 metres south east of Murray Road, connecting with the towns of Benalla and Wangaratta. This service operates at a frequency of three trips per weekday in each direction.

Several V/Line coach routes connect with this train service at Benalla Station from Shepparton and Bright/Mount Beauty.

The at-grade level crossing at this location provides adequate sight distances and active controls such as roadside warning equipment with boom, audible warning devices and flashing lights therefore ensuring that this level-crossing is suitable for construction traffic movement.

Given that passenger trains traverse this level crossing six times per day (both directions on two tracks) this will be considered further as part of the Transport Management Plan (TMP) as required under planning permit condition and prior to the commencement of construction.

Figure 9 Level crossing on Benalla-Yarrawonga Road

Source: AECOM – photo taken on Wednesday 20 February 2019

2.4 Existing sustainable modes of transport

2.4.1 Active transport

No shared pedestrian and cyclist paths are provided along most roads in the local area. However, Lake Mokoan Road is shared with cyclists as indicated by a sign near its priority intersection with Benalla-Yarrawonga Road.

Land use surrounding the proposed West Mokoan Solar Farm is generally agricultural in nature. However, there are some residential and farming dwellings within a two-kilometre radius of the site. As such, pedestrians and cyclists may interact with vehicles coming in and out of the site. Any interaction or conflict should therefore be considered as part of the TMP for the project (e.g. in the form of reduced speed limits and advanced warning signage for the movement of trucks associated with the construction of the Project).

2.4.2 Public transport

The PTV Benalla bus network does not provide any bus services operating on the local road network discussed in Section 2.2.

V/Line provides a regional coach service that operates from Melbourne to Mulwala (NSW) via Benalla and Seymour. V/Line also provides coach services that operate from the town of Benalla to Wangaratta, as summarised below:

- Albury – Melbourne via Seymour (twice a day)
- Albury – Bendigo via Shepparton and Wangaratta (operates approximately three to five times a day on a weekday and once a day during the weekend)
- Mount Beauty – Melbourne via Bright (operates approximately twice a day Monday to Friday)
- Sydney – Adelaide via Albury (operates once a day except Saturday)

These regional buses are anticipated to be utilising Sydney Road and will go past the intersection of Sydney Road and Benalla-Yarrawonga Road and near the Hume Freeway interchange.

Public bus and school routes are expected to be confirmed prior to construction commencement during the development of the TMP with timetabling rechecked prior to recommencement of the school term to ensure that construction vehicles do not operate at the same time. The local school bus routes and stops are shown in Figure 10.

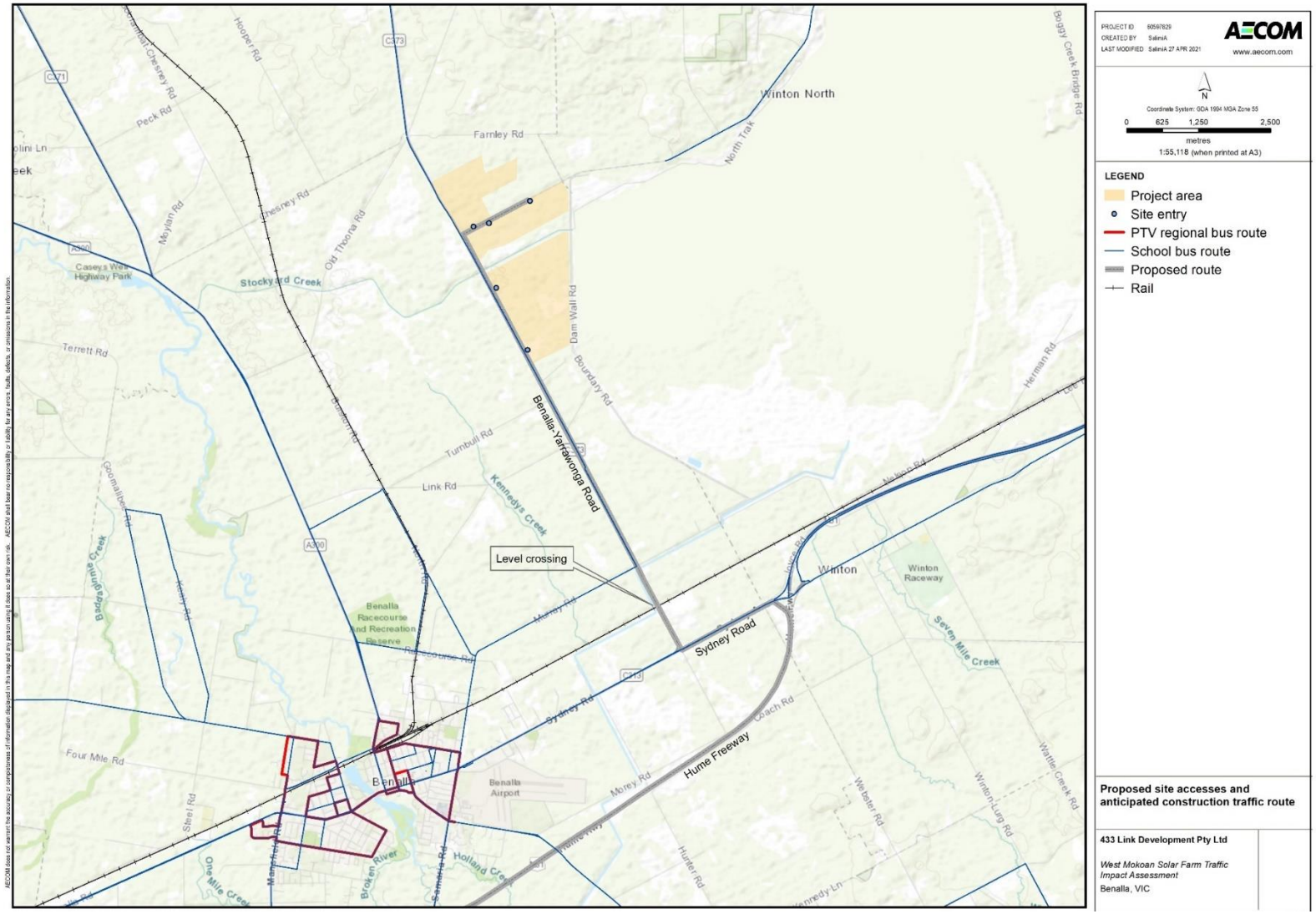


Figure 10 PTV and school bus routes near proposed West Mokoan Solar Farm

2.5 Traffic conditions

2.5.1 Sydney Road

The traffic growth pattern on Sydney Road (between the Hume Highway off-ramp and Benalla-Yarrawonga Road) has been extracted from the Department of Transport (Regional Roads Victoria) Traffic Volume Data and Open Data Hub (prepared by Information Management and Technology), April 2018 and May 2021, and is provided in Table 1.

Table 1 Sydney Road traffic growth pattern

Sydney Road	Annual Average Daily Traffic Data (AADT)[1]									
	2014	% Change	2015	% Change	2016	% Change	2017	% Change	2020	% Change
Westbound	3,000 (410)	+17% (-10%)	3,000 (350)	0% (-17%)	3,200 (380)	6.3% (8%)	3,300 (400)	3% (5%)	3,400 (395)	3% (-1.25%)
Eastbound (KML 2017)	-	-	-	-	-	-	3,200 (470)	-	-	-

Note: Numbers in brackets are Heavy Vehicle volumes.

As shown above, Sydney Road has experienced steady but relatively low traffic growth in recent years.

Assuming consistent low traffic growth, Sydney Road currently carries approximately 6,800 two-way vehicle trips per day, with approximately 790 of these being heavy vehicles, or 12 percent.

It is typically considered that a road's peak hour volume is around 10 percent of the AADT volume, accordingly Sydney Road can be estimated to have a peak hour traffic volume of approximately 680 two-way vehicle trips (or 340 one-way vehicle trips).

2.5.2 Benalla-Yarrawonga Road

The traffic growth pattern on Benalla-Yarrawonga Road has been extracted from the Department of Transport (Regional Roads Victoria) Traffic Volume Data and Open Data Hub (prepared by Information Management and Technology), April 2018 and May 2021, and is provided in Table 2.

Table 2 Benalla-Yarrawonga Road traffic growth pattern

Mansfield Road	Annual Average Daily Traffic Data (AADT)[2]									
	2014	% Change	2015	% Change	2016	% Change	2017	% Change	2020	% Change
Northbound	420 (30)	10% (-100%)	420 (30)	0 (0%)	460 (30)	9% (0%)	460 (30)	0% (0%)	470 (35)	2.2% (17%)
Southbound	410 (40)	10% (-25%)	410 (30)	0 (-33.5%)	440 (30)	7% (0%)	440 (40)	0% (25%)	-	-

Note: Numbers in brackets are Heavy Vehicle volumes.

As shown above, Benalla-Yarrawonga Road has experienced little or no traffic growth in recent years.

Assuming continuation of low traffic growth rates, Benalla-Yarrawonga Road currently carries approximately 940 two-way vehicle trips per day, with approximately 70 of these being heavy vehicles, or 7.5 percent.

It is typically considered that a road's peak hour volume is around 10 percent of the AADT volume, accordingly Benalla-Yarrawonga Road can be estimated to have a peak hour traffic volume of approximately 94 two-way vehicle trips (or 47 one-way vehicle trips).

[1] Department of Transport (Regional Roads Victoria) Traffic Volume Data are estimates only. Volume in brackets is number of HGV vehicles.
[2] Department of Transport (Regional Roads Victoria) Traffic Volume Data are estimates only. Volume in brackets is number of HGV vehicles.

2.5.3 Lake Mokoan Road

A site visit was conducted by AECOM on Tuesday 28 October 2019 at approximately midday. Although not during the peak operational hours, Lake Mokoan Road was viewed to be lightly trafficked with approximately one vehicle every 10 minutes leaving Lake Mokoan Road onto Benalla-Yarrawonga Road.

2.6 Local crash history

The Department of Transport (Regional Roads Victoria) 'Crashstats' database was interrogated to assess the crash history of the local road network in the vicinity of the West Mokoan Solar Farm site over the last five years of available data (2015 – 2020).

In summary the following has been found:

- A total of nine crashes were found to be recorded.
- Of the nine crashes recorded, three crashes occurred on the Hume highway off-ramp, two occurred due to a collision with a fixed object or another vehicle and one occurred due to due to loss of control
- Three crashes were recorded in the general vicinity of the Benalla-Yarrawonga Road and Sydney Road crossroad priority intersection which were classified as a collision with another vehicle (single vehicle crash) or with a fixed object (two recorded crashes)
- Two crashes were recorded within the vicinity of the Benalla-Yarrawonga Road and Link Road intersection which were classified as a collision with a fixed object.
- In the immediate vicinity of the proposed West Mokoan Solar Farm site, one crash in 2017 led to a fatality on Benalla-Yarrawonga Road due to a collision with another vehicle, approximately 300 metres south from its intersection with Lake Mokoan Road.
- None of these recorded crashes were found to occur in the vicinity of the proposed site access via Lake Mokoan Road and Benalla-Yarrawonga Road.

3.0 Proposed project

3.1 Overview

An overview layout of the proposed West Mokoan Solar Farm is provided in Appendix A.

The concept layout for the proposed Solar Farm solar modules and associated mounting structures, will be comprised of a Single Axis (see Figure 11) Tracking System.

The final layout and component selection for the proposed West Mokoan Solar Farm would be subject to a detailed design process, which occurs after the planning application process is completed.

Figure 11 Typical Single Axis Tracking System

In addition to the above the following would also be required:

- Power conversion units (PCUs)
- Cabling
- Grid connection
- Control room
- Laydown
- Switchyard
- Site access tracks
- Landscaping
- Native vegetation removal
- Security fencing
- CCTV and infra-red lighting
- Business identification signage.

3.2 Construction and operation

3.2.1 Construction activities

The construction process for the proposed West Mokoan Solar Farm will likely include the following activities:

- Site access and establishment
- Civil works, including clearing of land, limited grading, compaction, stormwater drainage, sediment controls and dust suppression
- Footings for construction to be determined
- Installation of the solar panels onto the mounting structures
- Installation and connection of the solar panels to the electrical control cabinets
- Installation of the power conversion units
- Connection of the electrical control cabinets to the power conversion units and underground cabling and connection of the power conversion units to form the onsite power reticulation system to evacuate power from the site.

Project commencement will be subject to the outcome of the planning process and grid connection agreements, estimated for the second half of 2022. Construction activities would be undertaken during standard hours for building and works and take approximately 18 months. Ongoing communication with local residents would occur to inform them of the timing and duration of proposed activities, prior to the commencement of any works.

The construction timing is subject to the outcome of the planning process and grid connection agreements. Construction activities would be undertaken during standard hours for construction works. Any affected local residences would be consulted and informed of the timing and duration of the proposed activities, prior to the commencement of any works.

Construction is expected to be managed through a Construction Environment Management Plan (CEMP) as proposed by the PEMP.

3.2.2 Operation

The West Mokoan Solar Farm is anticipated to operate for up to 30 years. This estimated project life is based on the lifespan of the solar panels, which degrade over time.

A minimal number of personnel would be required for the operation and maintenance of West Mokoan Solar Farm.

The West Mokoan Solar Farm will employ up to six full-time employees, which would result in regular visits to the site. Daily operational activities are expected to be limited to remote monitoring of equipment, whilst full servicing of power conversion units and switchyard equipment would occur on a quarterly basis. It is anticipated that the cleaning of solar panels will also occur quarterly, however this would be dependent on how the panels perform in various weather conditions. There will be no storage of hazardous or dangerous goods or materials on site during the operation of the solar farm.

3.2.3 Decommissioning

Following decommissioning of the West Mokoan Solar Farm, rehabilitation of the site will ensure that it continues to be viable for farming purposes or alternatively could be redeveloped for residential purposes depending on the appropriate planning controls at the time of decommissioning.

3.3 Construction and operation traffic

The following tasks and vehicular requirements are typical of the construction of a solar farm:

- Site set up and demobilisation (semi-trailer and low loader)
- Road and hardstand material construction equipment delivery (truck, dog and low loader)
- General equipment delivery (low loader and semi-trailer)
- AC Cable installation (semi-trailer and low loader)
- Overhead line installation (semi-trailer, low loader and Restricted Access Vehicle (RAV))
- Switchyard construction (concrete agitator, low loader, semi-trailer, RAV and truck)
- Other employee movements, waste, consumables etc. (light vehicle, van and truck).

It is estimated that there will be 10-15 heavy vehicle movements to and from the subject site per day during construction to undertake the construction activities and account for deliveries. It is anticipated that approximately 600 truck movements would occur over the construction period.

The program and construction volumes would be confirmed once a contractor is hired for the project and a traffic management plan (TMP) is produced.

During operation, West Mokoan Solar Farm is anticipated to generate traffic movements of around 1-3 vehicles per day.

4.0 Vehicle access and traffic impact

4.1 Vehicle access

4.1.1 Site access

There are proposed to be a total of five site accesses to the West Mokoan Solar Farm, which are outlined below and shown in Figure 12.

- Three access points are proposed via Lake Mokoan Road.
- Two site access entries are proposed via Benalla-Yarrawonga Road to access the southern section of the West Mokoan Solar Farm.

4.1.2 Personnel and construction vehicle access

4.1.2.1 Personnel vehicle access

Personnel are expected to reside locally within a 50-kilometre radius (Benalla, Shepparton or Wangaratta) or travel from the south via Melbourne. Due to the size of the development land, all car parking can be accommodated on site during the various stages of construction.

If overspill of car parking is identified, then strategies to limit single vehicle / occupancy use can be reviewed during the TMP development stage (i.e. strategies including carpooling or mini-bus personnel transfers).

4.1.2.2 Construction vehicle access

Construction and personnel vehicles are anticipated to mainly access the West Mokoan Solar Farm from the south via the Hume Freeway, Sydney Road, Benalla-Yarrawonga Road and Lake Mokoan Road (see Figure 12).

Raw material sources are expected to be confirmed at the TMP stage of development.

4.2 Traffic impact assessment

4.2.1 Peak traffic generation

4.2.1.1 Personnel

During peak construction for a solar farm of this scale, approximately 40 construction staff could be expected to be on site at any one time. Peak site access traffic could be expected to occur from 6:00 am to 7:00 am, with around 40 vehicle arrivals, and 6:00 pm to 7:00 pm with 40 vehicle departures from the site on a typical weekday.

It is expected that construction workers (private vehicle trips) travelling to and from the site will originate within a 50-kilometre radius of the site.

4.2.1.2 Construction traffic

As outlined in Section 3.3, it is estimated that there will be 10-15 construction vehicle movements to and from the subject site per day to undertake the construction activities and to account for deliveries.

Materials and equipment to construct the solar farm could potentially arrive from the Ports of Geelong or Melbourne both of which are located to the south west of the site. Therefore, these vehicles would access the site via the Hume Freeway.

The program and construction volumes would be confirmed once a contractor is hired for the project and the associated traffic management plan (TMP) is produced.

4.2.1.3 Operation traffic

As outlined in Section 3.3, during operation, the West Mokoan Solar Farm is anticipated to generate traffic movements of around 1-3 vehicles per day pending required works.

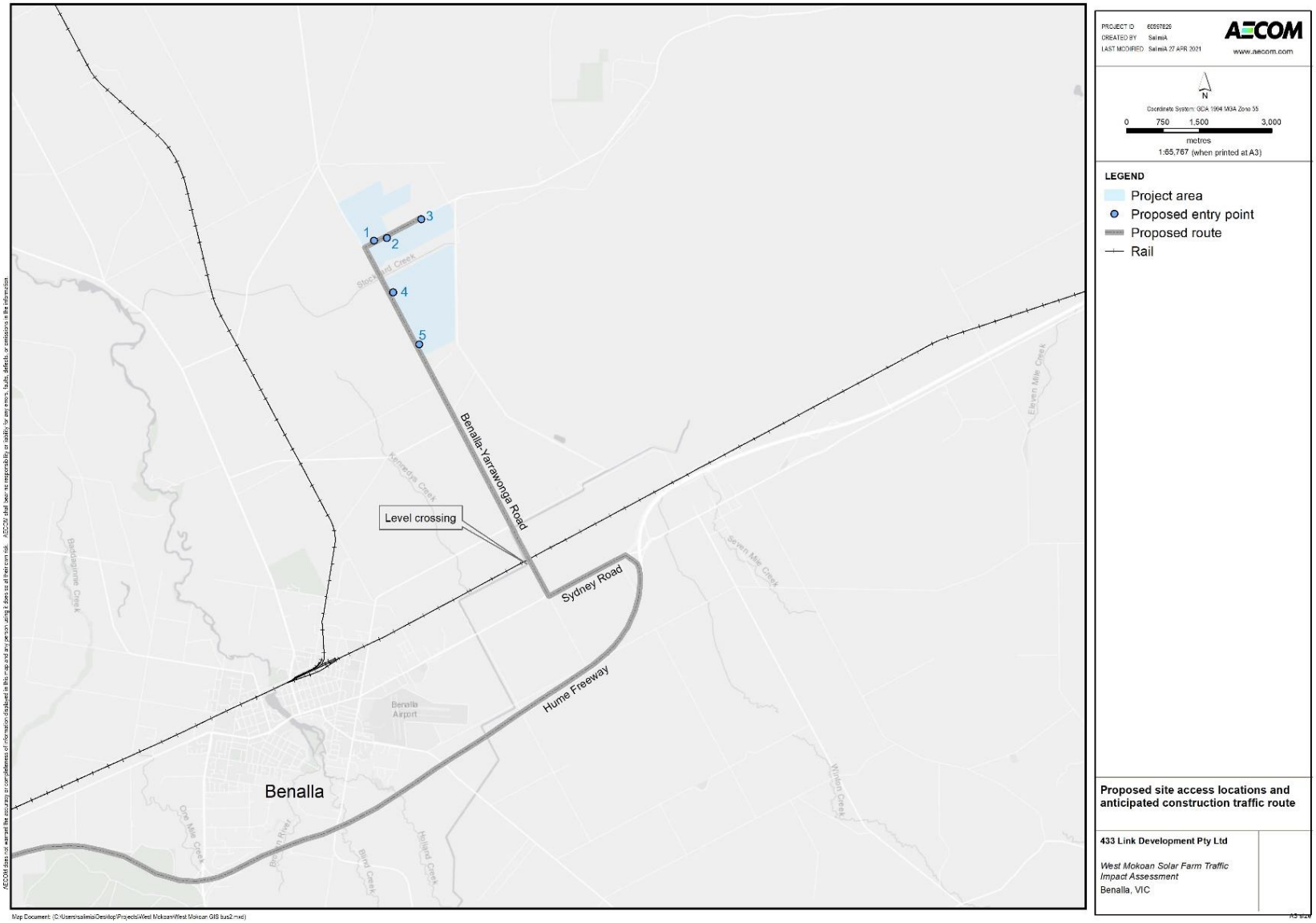


Figure 12 Proposed site access locations and anticipated construction traffic route

4.2.2 Traffic distribution

4.2.2.1 Personnel

It is expected that construction workers (private vehicle trips) travelling to and from the site will be split as follows:

- 40 percent from local areas
- 60 percent from south (Melbourne).

4.2.2.2 Construction

Materials and equipment to construct the solar farm could potentially arrive from the Ports of Geelong or Melbourne both of which are located to the south west of the site. Therefore, these vehicles would access the site from the Hume Freeway (designed B-Double route), before turning onto Sydney Road, Benalla-Yarrawonga Road and Lake Mokoan Road which are also part of the B-Double approved network. Another potential B-Double approved access route is also available via Hume Freeway before exiting onto Mansfield Road, Faithful Street, Goodwin Street, Midland Highway and then turning onto Link Road and Benalla-Yarrawonga Road.

The anticipated largest construction vehicle is anticipated to be a 26 metre B-Double vehicle, with no over-dimensional vehicles envisaged to be required at this stage.

The actual number and routes of construction vehicles are to be confirmed by the nominated contractor at the TMP development stage of the project, following review and confirmation of quantities, construction timing and location of materials.

4.2.3 Traffic impacts

It is anticipated that there will be no traffic impacts due to the construction of the West Mokoan Solar Farm given negligible existing traffic volumes owing to the rural nature of the local road network.

Peak hour traffic volumes on Sydney Road is estimated to be at approximately 680 two-way vehicle trips (or approximately 340 one-way vehicle trips). Typical one-way capacity for a traffic lane is 900 vehicles per hour, therefore sufficient capacity is available.

Benalla-Yarrawonga Road has a peak hour traffic volume of approximately 94 two-way vehicle trips (or approximately 47 one-way vehicle trips). Similarly, this road has sufficient capacity to accommodate traffic generated by construction and operation of the West Mokoan Solar Farm.

5.0 Potential mitigation measures

This chapter outlines the potential mitigation measures to be considered further when a Traffic Management Plan (TMP) is developed for the project. At the TMP stage more certainty on the construction timeframes, vehicles to be used, and associated traffic management measures will be known as a contractor will have been hired for the project. The TMP would be developed in consultation with the Department of Environment, Land, Water and Planning (DELWP), Department of Transport (Regional Roads Victoria) and Benalla Rural City Council.

5.1 Site access

5.1.1 Construction stage

5.1.1.1 Local road access

As detailed in this TIA, construction vehicles are proposed to access the site via three access points (1-3) via Lake Mokoan Road and two access points via Benalla-Yarrawonga Road (4 and 5), as shown previously on Figure 12. The access roads have the following provisions:

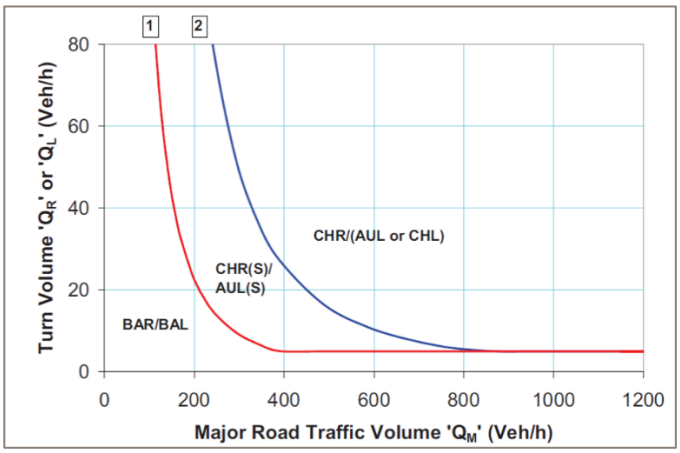
- Lake Mokoan Road is a two-way road (with no centre line road markings) with a total carriageway width of approximately 6 metres, with no shoulders along its length. The road has a 100 km/h posted speed limit.
- Benalla-Yarrawonga Road is a sealed two-way road (approximately 6.6 to 7 metres wide) and has unsealed shoulders (approximately 0.3 to 1 metre wide). The road has a 100 km/h posted speed limit.

Accordingly, during the construction phase of the project, the following will need to be considered as potential mitigation measures to facilitate safe access to and from the solar farm site:

Access type

The Austroads Guide to Road Design Part 4: Intersections and Crossings details the warrants for turning treatments on major roads at unsignalised intersections. These guidelines compare the number of turning vehicles into an intersecting road with the total number of vehicles on the major through road and provide a recommendation for basic left or right turn treatments (BAL / BAR), short channelised left or right turns (CHL(S)/CHR(S), shortened auxiliary left turns (AUL(S)), and full auxiliary or channelised turn treatments (AUL / CHL /CHR). The treatments are prescribed to separate through and turning traffic streams to improve safety while also minimising delay to through movements by queued turning vehicles.

Figure 13 outlines the turning requirements for a rural road for a design speed greater than 100 km/h.



Source: AustRoads Guide to Road Design Part 4

Figure 13 Austroads design guidelines for intersections (Design speeds ≥ 100km/hr)

As noted, the access roads to be used for this Project have a posted speed limit of 100 km/h, however no formal speed surveys have been undertaken to verify actual operating speeds of the road at the proposed access locations.

The following traffic volumes have been derived for the project:

- Lake Mokoan Road is predicted to carry only approximately 6 vehicles per hour
- Benalla-Yarrawonga Road is predicted to carry a peak hour traffic volume of approximately 92 two-way vehicle trips (or 46 one-way vehicle trips).
- It is estimated that there will be 10-15 construction vehicle movements to and from the subject site per day to undertake the construction activities and to account for deliveries.

With reference to Figure 13 against the above estimated construction period traffic volumes would result in both intersections requiring BAR/BAL turning treatments.

Although the access intersections are identified to require the prescribed turning treatments, further agreement with relevant stakeholders should be undertaken to understand if such mitigation measures are necessary given short-term construction phases requirements and if other traffic management measures should be explored such as speed limit reductions. In addition, specific TMP or worksite traffic management may be explored by the relevant works contractor during the detailed design stage of the project.

Construction vehicle accessibility

Indicative swept paths have been completed of the anticipated worst-case construction vehicle (26 metre B-Double) to enter via the five construction site access points, see Figure 14 to Figure 18.

At this stage it is assumed that a single construction vehicle would enter or exit via the respective access points at one time given the road width constraints of the main roads, as this is likely to incur further site access improvements. During detailed design and TMP development for the project the option to permit two-way worst-case construction vehicle access or traffic management of two-way vehicle conflicts can be explored (given the low expected daily construction traffic generation as discussed previously in this TIA).

Road width, markings and speed

As noted, Lake Mokoan Road is approximately 6 metres wide with no formal centre road line markings. This should be reviewed in line with the expected traffic volumes and vehicle turning movements once verified during TMP development with stakeholder input.

In addition, consideration should be given to reducing the speed of Lake Mokoan Road and Benalla-Yarrawonga Road in the vicinity of the site access points to improve safer movement of construction vehicles, with associated construction truck entry signage also implemented.

Figure 14 B- Double vehicle swept path on existing geometry of Lake Mokoan Road – Access Point 1

Source: AECOM developed swept path analysis, Google Earth 2021

Figure 15 B-Double vehicle swept path on existing geometry of Lake Mokoan Road – Access Point 2

Source: AECOM developed swept path analysis, Google Earth 2021

Figure 16 B-Double vehicle swept path on existing geometry of Lake Mokoan Road – Access Point 3

Source: AECOM developed swept path analysis, Google Earth 2021

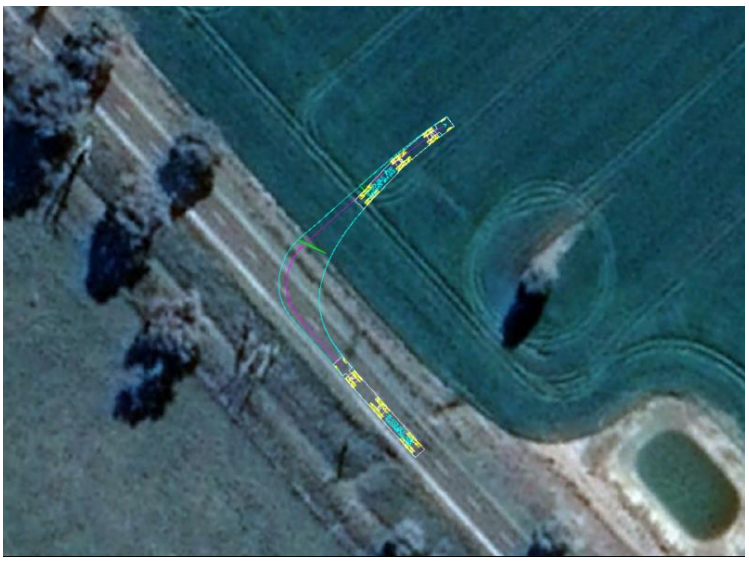


Figure 17 B-Double vehicle swept path analysis on existing geometry of Benalla-Yarrawonga Road – Access Point 4

Source: AECOM developed swept path analysis, Google Earth 2020

Figure 18 B-Double vehicle swept path analysis on existing geometry of Benalla-Yarrawonga Road (southernmost proposed entry) – Access Point 5

Source: AECOM developed swept path analysis, Google Earth 2020

5.1.1.2 Wider road access

Benalla-Yarrawonga Road and Lake Mokoan Road priority intersection

Generally, the intersection allows for an adequate turning radius for construction vehicles (worst case 26 metre B-Double) during the construction phase of the Project as shown in Figure 19. However, while Benalla-Yarrawonga Road is a B-Double approved route, Lake Mokoan Road was not designed to accommodate such heavy vehicles. Accordingly, traffic management may be required to ensure safe bidirectional movements should multiple heavy construction vehicles require access at the same time given that the width of Lake Mokoan Road is only 6 metres.

As discussed previously in subsection 2.2.5, the SISD from Lake Mokoan Road northbound to Benalla-Yarrawonga Road appears to be unsatisfactory. This should be further reviewed during the development of the TMP for the Project. Temporary traffic management measures such as truck warning signage, speed reduction or intersection control alterations (give-way to stop sign) could be considered to provide a safer arrangement during construction if SISD is confirmed to be non-conforming.

Figure 19 Two-way movement B-Double vehicle swept path on existing geometry of Benalla-Yarrawonga Road and Lake Mokoan Road intersection

Source: AECOM developed swept path analysis, Google Earth 2019

Sydney Road and Benalla-Yarrawonga Road priority intersection

Both Sydney Road and Benalla-Yarrawonga Road are B-Double approved roads and therefore typically cater for vehicles up to a B-Double in size. This was verified from site observations of the intersection. Consequently, no mitigation is anticipated to be required at this location.

5.2 Internal site vehicle access

5.2.1 Construction stage

Subject to the development of the TMP for the project, it is expected that the Project will provide a network of site access tracks to surround the proposed West Mokoan Solar Farm that will be in place to facilitate construction of the site and subsequent ongoing maintenance. Tracks are expected to be constructed of crushed gravel and will be approximately 3-4 metres wide sufficient for a light vehicle. The site is proposed to be accessed from three entry points located on Lake Mokoan Road and two entries on Benalla-Yarrawonga Road, south of Stockyard Creek. The access track layout and site access points are shown in Appendix A.

It should also be noted that permits are required from the Department of Transport (DOT) when any over dimensional (OD) vehicles crossing a railway line are greater than 4.9 metres in height, 3.0 metres wide, or 26.0 metres in length. Given that construction traffic is anticipated to passage a level crossing, discussions with DOT are recommended.

5.2.2 Operational stage

As the West Mokoan Solar Farm enters its operational stage, the above access tracks described in this section would remain, providing maintenance access. The existing state of the intersection of Benalla-Yarrawonga Road and Lake Mokoan Road is expected to be sufficient for the operational stage of the West Mokoan Solar Farm.

6.0 TIA findings and TMP development

6.1 TIA findings

This TIA has shown that there is unlikely to be a material traffic impact on the local road network during the construction of the proposed West Mokoan Solar Farm.

This TIA has highlighted some potential mitigation measures that may be considered to facilitate safe vehicle access to the site, which can be further considered and finalised during the development of the TMP in consultation with key stakeholders.

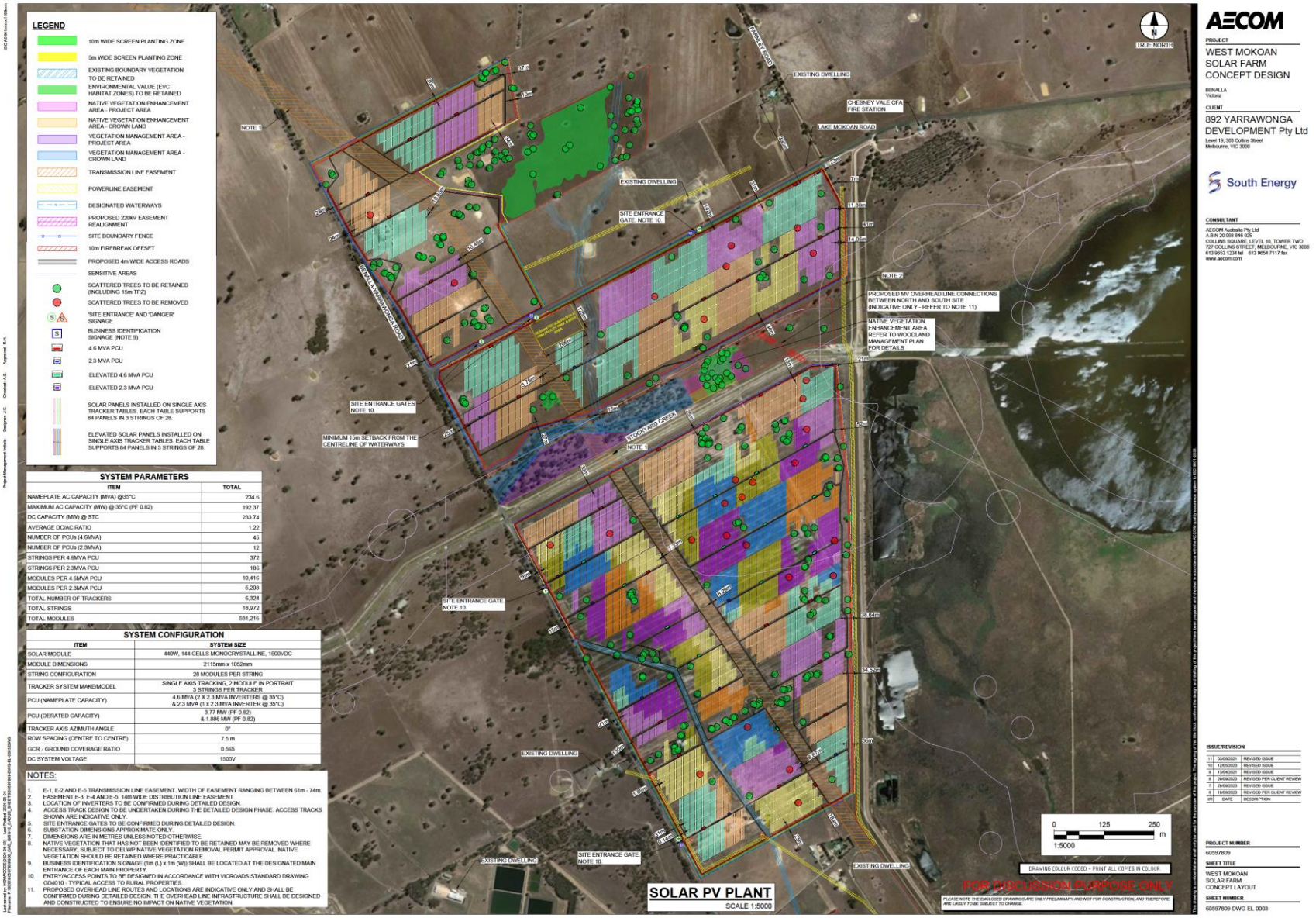
6.2 TMP development

Typically, on wind and solar farm projects, following planning approval, a condition of the permit will be to produce a TMP for the project. The TMP would be developed when a contractor is commissioned, and may consider the following:

- Key stakeholder inputs and requirements
- Confirmation of proposed construction program and volumes
- Origin of materials and personnel
- Final site access design and traffic management measures (speeds and signage) to facilitate the safe movement of vehicles to and from the site
- Pre-road condition surveys and maintenance agreements with key stakeholders
- Over dimensional load permit application for travel across railways
- Control measures including:
    - Roles and responsibilities
    - Training and site inductions
    - Vehicle access
    - Operating and working hours
    - Environmental measures
- Monitoring, inspection and auditing of the TMP.

D

Appendix A



SYSTEM PARAMETERS

ITEM	TOTAL
NAMEPLATE AC CAPACITY (MVA) @35°C	234.6
MAXIMUM AC CAPACITY (MW) @ 35°C (PF 0.82)	192.37
DC CAPACITY (MW) @ STC	233.74
AVERAGE DC/AC RATIO	1.22
NUMBER OF PCUs (4.6MVA)	45
NUMBER OF PCUs (2.3MVA)	12
STRINGS PER 4.6MVA PCU	372
STRINGS PER 2.3MVA PCU	186
MODULES PER 4.6MVA PCU	10,416
MODULES PER 2.3MVA PCU	5,208
TOTAL NUMBER OF TRACKERS	6,324
TOTAL STRINGS	18,972
TOTAL MODULES	531,216

SYSTEM CONFIGURATION

ITEM	SYSTEM SIZE
SOLAR MODULE	440W, 144 CELLS MONOCRYSTALLINE, 1500VDC
MODULE DIMENSIONS	2115mm x 1052mm
STRING CONFIGURATION	28 MODULES PER STRING
TRACKER SYSTEM MAKE/MODEL	SINGLE AXIS TRACKING, 2 MODULE IN PORTRAIT 3 STRINGS PER TRACKER
PCU (NAMEPLATE CAPACITY)	4.6 MVA (2 X 2.3 MVA INVERTERS @ 35°C) & 2.3 MVA (1 x 2.3 MVA INVERTER @ 35°C)
PCU (DERATED CAPACITY)	3.77 MW (PF 0.82) & 1.886 MW (PF 0.82)
TRACKER AXIS AZIMUTH ANGLE	0°
ROW SPACING (CENTRE TO CENTRE)	7.5 m
GCR - GROUND COVERAGE RATIO	0.565
DC SYSTEM VOLTAGE	1500V

NOTES:

1. E-1, E-2 AND E-5 TRANSMISSION LINE EASEMENT. WIDTH OF EASEMENT RANGING BETWEEN 61m - 74m.
2. EASEMENT E-3, E-4 AND E-5. 14m WIDE DISTRIBUTION LINE EASEMENT.
3. LOCATION OF INVERTERS TO BE CONFIRMED DURING DETAILED DESIGN.
4. ACCESS TRACK DESIGN TO BE UNDERTAKEN DURING THE DETAILED DESIGN PHASE. ACCESS TRACKS SHOWN ARE INDICATIVE ONLY.
5. SITE ENTRANCE GATES TO BE CONFIRMED DURING DETAILED DESIGN.
6. SUBSTATION DIMENSIONS APPROXIMATE ONLY.
7. DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
8. NATIVE VEGETATION THAT HAS NOT BEEN IDENTIFIED TO BE RETAINED MAY BE REMOVED WHERE NECESSARY, SUBJECT TO DELWP NATIVE VEGETATION REMOVAL PERMIT APPROVAL. NATIVE VEGETATION SHOULD BE RETAINED WHERE PRACTICABLE.
9. BUSINESS IDENTIFICATION SIGNAGE (1m (L) x 1m (W)) SHALL BE LOCATED AT THE DESIGNATED MAIN ENTRANCE OF EACH MAIN PROPERTY.
10. ENTRY/ACCESS POINTS TO BE DESIGNED IN ACCORDANCE WITH VICROADS STANDARD DRAWING GD4010 - TYPICAL ACCESS TO RURAL PROPERTIES.
11. PROPOSED OVERHEAD LINE ROUTES AND LOCATIONS ARE INDICATIVE ONLY AND SHALL BE CONFIRMED DURING DETAILED DESIGN. THE OVERHEAD LINE INFRASTRUCTURE SHALL BE DESIGNED AND CONSTRUCTED TO ENSURE NO IMPACT ON NATIVE VEGETATION.

AECOM

PROJECT
WEST MOKOAN SOLAR FARM CONCEPT DESIGN

BENALLA
Victoria

CLIENT
892 YARRAWONGA DEVELOPMENT Pty Ltd
Level 19, 303 Collins Street
Melbourne, VIC 3000

South Energy

CONSULTANT
AECOM Australia Pty Ltd
A.B.N 20 093 846 925
COLLINS SQUARE, LEVEL 10, TOWER TWO
727 COLLINS STREET, MELBOURNE, VIC 3008
613 9653 1234 tel 613 9654 7117 fax
www.aecom.com

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SHEET TITLE
WEST MOKOAN SOLAR FARM CONCEPT LAYOUT

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