

Kennedys Creek Solar Farm - Traffic Impact Assessment

Traffic Impact Assessment

25-Jan-2023
Kennedys Creek Solar Farm
Doc No. Document No
Commercial-in-Confidence

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Kennedys Creek Solar Farm - Traffic Impact Assessment

Traffic Impact Assessment

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25-Jan-2023

Job No.: 60597929

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1.0 Introduction

In September 2019, AECOM Australia Pty Ltd (AECOM) was engaged by South Energy on behalf of 433 Link Development Pty Ltd to undertake a Traffic Impact Assessment (TIA) for the proposed Kennedys Creek Solar Farm (the Project). On 22 September 2021, ownership of the Project Applicant (433 Link Development Pty Ltd) was transferred from South Energy to Lightsource bp. Previous iterations of this report refer to South Energy, however all new information within this report refers to Lightsource bp to reflect current ownership of the Project Application.

Lightsource bp subsequently proposed changes to the concept designs for the Project, therefore this TIA has been updated to support an application under Section 72 of the *Planning and Environment Act 1987* (P&E Act) to amend the Planning Permit (PA1900684) for the Project (the amendment). The amendment seeks to:

- Rearrange the layout of Kennedys Creek Solar Farm to:
 - Connection to new transmission infrastructure
 - Make minor updates and design changes as a result of the above.
- Include a new transmission line from the Kennedys Creek Solar Farm to the network connection point at West Mokoan Solar Farm.

This TIA has been updated to reflect Revision 14 of the Concept Design and include additional land associated with the 1.2-kilometre transmission line connecting the West Mokoan and Kennedys Creek Solar Farms.

1.1 Scope

The proposed Kennedys Creek Solar Farm is located approximately four kilometres north-east of the town centre of Benalla and is located within the Rural City of Benalla (see Figure 1-1).

This TIA will assess and consider the existing road network, proposed development and its traffic impact and any required mitigation measures to provide access to the development.

1.2 Summary of updates

This TIA has been updated to reflect the changes to the Project as follows:

- Overall report structure: updated to include the new transmission line and updated traffic generation based on information provided by Lightsource bp. Notable changes include Chapter 3.0 - Proposed project overview and Chapter 4.0 – Construction impact assessment.
- Chapter 2.0 – Existing Conditions: updated to reflect potential changes to the local road network since the previous iteration of the report in 2019.
- Chapter 7.0 – Cumulative impact assessment: this section has been included to consider the potential impact from the West Mokoan Solar Farm, owned by Lightsource bp and anticipated to be constructed and operated concurrently with Kennedys Creek Solar Farm.

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1.3 Report structure

Following this introduction this TIA is structured as follows:

- Chapter 2.0: Provides details of the existing road and transport conditions near the site
- Chapter 3.0: Outlines the development proposal
- Chapter 4.0: Outlines the construction impact assessment and includes potential traffic impacts on the local road network and required mitigation measures to safely facilitate the movements of vehicles to and from the development site
- Chapter 5.0: Provides the operational impact assessment
- Chapter 6.0: Provides the decommissioning impact assessment
- Chapter 7.0: Provides the cumulative impact assessment
- Chapter 8.0: Concludes the TIA report and outline proposed mitigation measures for the Project.

1.4 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.
- VicRoads – General Guidance.
- VicRoads Heavy Vehicle Network Maps in Victoria.
- National Heavy Vehicle Regulator (NHVR) website / journey planner.
- Benalla Road Management Plan 2021 - 2025.

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Figure 1-1 Kennedys Creek Solar Farm location

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2.0 Existing conditions

2.1 Site location

The proposed Kennedys Creek Solar Farm site is located approximately four kilometres north-east of the town centre of Benalla and is within the Rural City of Benalla. The proposed solar farm is located on Murray Road, Nelson Road and Benalla-Yarrowonga Road in Benalla. The site location is shown in Figure 1-1.

2.2 Local road network

2.2.1 Sydney Road

Sydney Road is an arterial road managed by VicRoads. Sydney Road has a sealed two lane carriageway measuring approximately 7.4 metres wide with unsealed shoulders of varying width, as shown in Figure 2-1.

Sydney Road has a 100 kilometres per hour posted speed limit, with the posted speed limit reducing to 80 kilometres per hour on approach to its crossroad priority intersection with the Hume Freeway.



Source: AECOM – photo taken on Wednesday 20 February 2019

Figure 2-1 Sydney Road - looking towards the Hume highway interchange

2.2.2 Benalla-Yarrowonga Road

The proposed solar farm will be accessed via Benalla-Yarrowonga Road, Benalla which bisects the solar farm site.

Benalla-Yarrowonga Road is a B-Double approved road managed by VicRoads.

Benalla-Yarrowonga Road is an arterial road with an approximately sealed carriageway width of 7 metres with unsealed shoulders present either side of approximately 0.3 to 1 metre wide. The road is in good condition with appropriate line markings and signage.

Figure 2-2 shows Benalla-Yarrowonga Road looking southeast bound towards the proposed solar farm site.

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Source: AECOM – photo taken on Wednesday 9 November 2022

Figure 2-2 Benalla-Yarrowonga Road - looking southeast in the vicinity of the proposed Solar Farm site

2.2.3 Intersection of Sydney Road and Benalla-Yarrowonga Road

Sydney Road forms a priority intersection with Benalla-Yarrowonga Road (shown in Figure 2-3).

Benalla-Yarrowonga was upgraded near its intersection with Sydney Road in 2019 and the road surface at the intersection was observed to be in good condition. The posted speed limit on approach to the intersection with Benalla-Yarrowonga Road is 80 km/h. Several heavy vehicles were observed using the intersection during the site visit in November 2022.



Source: AECOM – photo taken on Wednesday 20 February 2019

Figure 2-3 Intersection of Benalla-Yarrowonga Road and Sydney Road

2.2.4 Murray Road

Murray Road (see Figure 2-4) is a local road which provides access to farming land in Benalla and forms the southern boundary of the proposed solar farm site.

Murray Road is a sealed two-way road, with a carriageway width of approximately 5.5 metres with unsealed shoulders (approximately 1.0 metre wide). The road surface was observed to be generally good though some potholes were observed. Murray Road has a posted speed limit of 80 kilometres per hour.



Source: AECOM – photo taken on Wednesday 9 November 2022

Figure 2-4 Murrays Road - looking east

2.2.5 Nelson Road

Nelson Road is a local road managed by the Benalla Rural City Council (shown in Figure 2-5) which forms the south east boundary of the proposed solar farm site. This is an unsealed two-way one lane road, with a carriageway width of approximately 5 metres. The road is sealed on approach to the intersection with Benalla-Yarrowonga Road and Murrays Road. The road becomes a limited access road east of Kindilan Park, mostly providing access for fire access. The road condition generally allows traffic on these sections of Nelson Road in dry weather only.

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Source: AECOM – photo taken on Wednesday 9 November 2022

Figure 2-5 Nelson Road - looking east

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2.2.6 Snowy Lane

Snowy Lane is a local access road managed by the Benalla Rural City Council. This unsealed two-way one lane road has a carriageway width of approximately 4-5 metres. The road surface was observed to be uneven with potholes along some sections (see Figure 2-6). Located north of the solar farm, this road provides access to Boundary Road.



Source: AECOM – photo taken on Wednesday 9 November 2022

Figure 2-6 Snowy Lane – looking east

2.2.7 Boundary Road

Boundary Road is an unsealed local road that runs to the east of the solar farm and has a varying width of approximately 2.6 – 4m. The road condition varies along its length with the road surface transitioning from gravel in the northern sections to dirt tracks with heavy roadside vegetation in the southern sections of the road near the solar farm as shown in Figure 2-7. Access to this road is noted to be restricted and is understood to be used for utility maintenance and emergency access. The transmission line is proposed to run along the southern end of Boundary Road, between the two solar farms, and is expected to be used by the Project traffic during construction.



Source: AECOM – photo taken on Wednesday 9 November 2022

Figure 2-7 Boundary Road – looking southeast

2.2.8 Intersection of Benalla-Yarrowonga Road, Murray Road and Nelson Road

Benalla-Yarrowonga Road forms a crossroad priority intersection with Murray Road and Nelson Road (see Figure 2-8). Sight distances for vehicles exiting Murray Road appear to be conforming. However, sight distances from Nelson Road for vehicles turning left onto Benalla-Yarrowonga Road were observed to be restricted due to heavy roadside vegetation.

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Source: AECOM – photo taken on Wednesday 9 November 2022

Figure 2-8 Nelson Road facing Murray Road and intersecting with Benalla-Yarrawonga Road

2.3 Level-crossing

The Albury to Melbourne train line (V/Line) traverses a level crossing (shown in Figure 2-9) located on Benalla-Yarrawonga Road approximately 800 metres southeast of Murray Road, connecting with the towns of Benalla and Wangaratta. Train services operate 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.

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 Traffic Management Plan (TMP) which will be prepared prior to the commencement of construction.

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Source: AECOM – photo taken on Wednesday 9 November 2022

Figure 2-9 Level-crossing on Benalla-Yarrowonga Road

2.4 Sustainable transport

2.4.1 Pedestrians and cyclists

No pedestrian and cyclist paths are present along the local roads to the solar farm.

It should be noted that during both site visits, no pedestrian or cyclist movements were observed.

2.4.2 Public transport

The local V Line and school bus routes are shown on Figure 2-10 and discussed subsequently.

V-Line provides coach services that operate from the town of Benalla to Wangaratta, as outlined below:

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

These regional buses utilise Sydney Road and will go past the intersection of Sydney Road and Benalla-Yarrowonga Road and near the Hume Freeway interchange.

Local school bus routes also operate in the area and will typically operate Monday to Friday during school drop off (8 am to 9am) and pick-up (3:30 pm) times. During preparation of the Worksite Traffic Management Plan, hours of construction traffic movements should aim to avoid these time periods and/or be suitably managed.

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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 taken from the DoT Open Data Hub, May 2020, and is provided in Table 2-1.

Table 2-1 Sydney Road AADT and growth patterns

Sydney Road	Annual Average Daily Traffic Data (AADT) ¹						
	2015	2016	% Change	2017	% Change	2020	% Change
Westbound	3,000 (350)	3,200 (380)	7% (8%)	3,300 (400)	3% (5%)	3,200 (395)	- 3% (-1.25%)
Eastbound (KML 2017)	-	-	-	3,200 (470)	-	-	-

Note: numbers in brackets are Heavy Vehicles Volumes.

As shown from Table 2-1 Sydney Road has experienced steady but relatively low traffic growth in recent years.

Assuming traffic growth is similar to recent years, Sydney Road currently carries approximately 6,600 two-way vehicle trips per day, with approximately 800 of these being heavy vehicles, or 12%.

It is typically considered that a road peak hour volume is around 10% of the AADT volume, accordingly Sydney Road has a peak hour traffic volume of approximately 660 two-way vehicle trips (or 330 one-way vehicle trips).

2.5.2 Benalla-Yarrawonga Road

The traffic growth pattern on Benalla-Yarrawonga Road (between the Hume Highway off-ramp and Benalla-Yarrawonga Road) has been taken from the DoT Open Data Hub, May 2020, and is provided in Table 2-2.

Table 2-2 Benalla-Yarrawonga Road AADT and growth patterns

Benalla-Yarrawonga Road	Annual Average Daily Traffic Data (AADT) ²						
	2015	2016	% Change	2017	% Change	2020	% Change
Northbound	420 (30)	460 (30)	10% (0%)	460 (30)	0% (0%)	471 (35)	3% (17%)
Southbound	410 (30)	440 (30)	0 (-33.5%)	440 (40)	0% (25%)	455 (39)	3.4% (56%)

As shown from Table 2-2 Benalla-Yarrawonga Road has experienced little or no traffic growth in recent years.

Assuming traffic growth is similar to recent years, Benalla-Yarrawonga Road currently carries approximately 920 two-way vehicle trips per day, with approximately 60 of these being heavy vehicles, or 7%.

It is typically considered that a road peak hour volume is around 10% of the AADT volume, accordingly Benalla-Yarrawonga Road has a peak hour traffic volume of approximately 92 two-way vehicle trips (or 46 one-way vehicle trips).

¹ VicRoads Traffic Volume Data are estimates only. Volume in brackets is number of HGV vehicles.

² VicRoads Traffic Volume Data are estimates only. Volume in brackets is number of HGV vehicles.

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2.5.3 Murray Road

A site visit was conducted by AECOM on Wednesday 9 November 2022 at approximately midday. Although not during the peak operational hours, Murray Road was viewed to be lightly trafficked with only a single vehicle viewed approximately every 5 minutes leaving Murray Road onto Benalla-Yarrawonga Road.

2.5.4 Snowy Lane

Snowy Lane is a gravel urban access road which primarily provides direct access to abutting residential and farming properties. Snowy Lane typically has minimal to no through traffic. No traffic was observed during the site visit on Wednesday 9 November 2022.

2.5.5 Nelson Road

Nelson Road is a rural access road which provides access to abutting farmland along its length. There is typically minimal to no through traffic on Nelson Road. Nelson Road was observed to be lightly trafficked during the site visit on Wednesday 9 November 2022.

2.6 Local crash history

The VicRoads 'Crashstats' database was interrogated to assess the casualty crash history of the local road network in the vicinity of the site for the last five years of available data from 2017 to 2021. A detailed breakdown of the recorded crashes is provided in Table 2-3. In summary the following was found from the recorded data:

- A total of seven crashes have been recorded over the last five years on the local road network within approximately three kilometres of the solar farm site entrance
- Of the seven crashes, five were serious injury accidents and two other injury accident. None of these crashes were fatal.
- All serious injury accidents were collision with a fixed object
- Two serious crashes occurred on the Hume highway on-ramp and Benalla-Winton Road near the on-ramp
- A serious injury accident was recorded on Nelson Road in the vicinity of its intersection with Benalla-Yarrawonga Road
- No crashes were recorded in the vicinity of the proposed entry points to the solar farm.

Table 2-3 Summary of crashes in the last five years

Crashes no.	Date	Time	Vehicles involved	Crash type	Speed limit	Severity
1	28/06/2017	Night	1 LV	Collision with a fixed object	100 km/hr	Serious injury accident
2	4/08/2019	Night	1 LV	Collision with a fixed object	100 km/hr	Other injury accident
3	11/06/2019	Dusk	1 LV	Collision with a fixed object	100 km/hr	Serious injury accident
4	24/10/2017	Day	1 LV	Collision with a fixed object	80 km/hr	Serious injury accident
5	26/03/2017	Night	1 LV	Collision with a fixed object	100 km/hr	Serious injury accident
6	2/07/2017	Day	2 LV	Collision with vehicle	80 km/hr	Serious injury accident

7	20/11/2017	Day	1 motorcycle	No collision and no object struck	40 km/hr	Other injury accident
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3.0 Proposed project

3.1 Overview

An overview layout of the proposed Kennedys Creek Solar Farm is provided in Appendix A.

The application considers two potential layouts for the proposed Solar Farm solar modules and associated mounting structure, which will comprise Single Axis Tracking System (refer to **Figure 3-1** for example). The final layout and component selection for the proposed Solar Farm would be subject to a detailed design process, which occurs after the planning application process is completed.



Figure 3-1 Typical Single Axis Tracking System with two modules in portrait orientation

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

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- Business identification signage.

In addition, a new 220kV transmission line is proposed to connect the Kennedys Creek Solar Farm to the network connection point at West Mokoan Solar Farm, which will also be developed by Lightsource bp and is located north of Kennedys Creek Solar Farm. Construction and operation for both solar farms and the transmission alignment are planned to occur concurrently. An overview of the proposed development is shown in Figure 3-2.

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Figure 3-2 Kennedys Creek Solar Farm development

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3.2 Construction phase overview

3.2.1 Site access

The solar farm is anticipated to have a total of five access points (shown in Figure 3-3). These include:

- Three primary access gates located on Benalla-Yarrowonga Road. The northernmost access point has an existing access gate providing access to the eastern section of the site. However, the other two access points will need to be formalised during development. Benalla-Yarrowonga Road runs straight from north to south and therefore there are unrestricted sight distances from the proposed access points onto the road.
- One secondary access gate located on Nelson Road. While there is an existing gate entrance, this will also need to be formalised. This entrance is anticipated to be used as a secondary entry point. Sight distances were observed to be unrestricted along Nelson Road.
- An emergency access is also provided on Murray Road. The entrance would use an existing access point that will need to be formalised. Sight distances were observed to be unrestricted along Murray Road.

It is noted that temporary construction access will be provided from the solar farm using one of the primary access gates on Benalla-Yarrowonga Road to Boundary Road near the substation to facilitate construction of the transmission line. Alternatively, access to the transmission line on Boundary Road could be provided via Nelson Road. However, given its restricted access and current road condition, access via Benalla-Yarrowonga Road is recommended.



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Source: AECOM – photo taken on Wednesday 9 November 2022

Figure 3-4 Proposed access location to Solar Farm site on Benalla-Yarrowonga Road

3.2.2 Construction activities

It is anticipated that construction activities would occur for both solar farms and the transmission line over an 18-month period (subject to obtaining required approvals). The construction process for the solar farm is anticipated to involve the following activities:

- Preliminary site access for site set up and mobilisation to establish construction area

- Civil works, which may include clearing of the land, grading, compaction, stormwater drainage, sediment controls and dust suppression
- Installation of footings (final siting to be determined during detailed design)
- Installation of the solar panels onto mounting structures
- Installation and connection of the solar panels to solar farm infrastructure including electrical control cabinets
- Installation of the PCUs
- Connection of site infrastructure, including the electrical control cabinets, PCUs and underground cabling
- Construction of a substation on both solar farm sites
- Construction of control building and operation and maintenance area.

Similarly, construction activity requirements for the transmission line are expected to be generally similar and will include:

- Mobilisation
- Hardstand and access track construction
- Pole foundations
- Pole stand up
- Cable stringing.

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Project commencement will be subject to the outcome of the planning process and grid connection agreements. Construction activities would be undertaken during standard hours for building and works from 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm on Saturdays. Construction activities are not expected to be undertaken on Sundays or public holidays. Should this occur, appropriate approvals would be required. Ongoing communication with local residences would occur to inform them of the timing and duration of proposed activities, prior to the commencement of any works.

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

3.3 Operation phase overview

The solar farm and its transmission line are anticipated to operate for up to 30 years, though upgrades of the facility could extend the operational life beyond this. This estimated life is due to the degradation of solar panels over time, with solar panels currently having a lifespan of around 30 years before needing to be replaced. A minimal number of personnel would be required for the operation and maintenance of the solar farm, with up to five full-time equivalent jobs to be created for the operational phase on a long-term of permanent basis.

Monitoring is typically undertaken remotely. Cleaning of the modules will be required on an as needs basis and will be dependent on weather conditions (this may be required once every two years, or several times per year). Full servicing of PCUs and switchyard equipment will be undertaken on a quarterly basis. There will be no storage of hazardous or dangerous goods or materials on site during the operation of the solar farm.

3.4 Decommissioning

Decommissioning of the solar farm will include full rehabilitation of the site to ensure it can revert to its previous agricultural use. Alternatively, the site could be upgraded to continue to be used for renewable energy generation or redeveloped for other purposes, depending on the appropriate planning controls in place at the time of decommissioning.

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4.0 Construction phase impact assessment

Construction and operation of the Kennedys Creek Solar and transmission line is expected to take place concurrently with the West Mokoan Solar Farm and as such, there is potential for cumulative transport impacts. The following section contains the impact assessment for Kennedys Creek and the transmission line only. The impact assessment for West Mokoan Solar Farm and cumulative impact analysis are contained in Section 7.0.

4.1 Construction traffic generation

4.1.1 Workforce

Daily two-way traffic generation during peak construction of the solar farm and transmission line was determined based on estimates provided by Lightsource bp. During peak construction for such a size solar farm approximately 171 construction staff could be on-site at one time. Peak construction of the solar farm is understood to coincide with the construction of the transmission line. During that time, it is anticipated that 50 construction workers would be required for the construction of the transmission line.

It is expected that 80% of workers will travel via bus shuttles and the remaining workers are expected to travel in single-occupancy vehicles to and from the site. Each bus shuttle is understood to have a 14 person capacity. Based on proposed construction shifts, peak trips could be expected to occur between 5:30am and 6:30 am, with around 57 vehicle arrivals, and 6:00pm to 7:00 pm with 57 vehicle departures from the site on a typical weekday.

A summary of daily workforce traffic generation is during construction peak is provided in Table 4-1.

Table 4-1 Anticipated two-way daily traffic generation during construction

Type	AM peak (5:30am – 6:30am)	Daytime (6:30am-6pm)	PM (6 - 7pm)
Light vehicles	44	0	44
Bus shuttles	13	0	13
Total	57	0	57

4.1.2 Heavy vehicles

Heavy vehicle movements are anticipated to be generated by the various construction activities which include:

- Site set up and mobilisation (semi-trailer and low loader trucks)
- Road and hardstand material construction equipment delivery (truck, dog and low loader trucks)
- General equipment delivery (low loader and semi-trailer trucks)
- Substation equipment delivery (B-Doubles and OSOM trucks)
- AC Cable installation (semi-trailer and low loader trucks)
- Overhead line installation (semi-trailer, low loader trucks and Restricted Access Vehicles (RAV))
- Transmission line pipe transportation (semi-trailer trucks)
- Spoil and concrete transport (B-Double trucks)
- Switchyard construction (concrete agitator, low loader, semi-trailers, RAV and trucks).

Overall, it is estimated that there would be approximately 50 truck movements during the day, noting that these include truck movements associated with the construction of the transmission line. A summary of daily heavy vehicle traffic generation for the transmission line during construction peak is provided in Table 4-2.

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Table 4-2 Anticipated two-way daily heavy vehicle traffic generation during construction

Type	AM peak (5:30am – 6:30am)	Daytime (7am-6pm)	PM (6 - 7pm)
Light vehicles	0	0	0
Heavy vehicles	0	50	0
Total	0	50	0

4.2 Construction traffic distribution

4.2.1 Workforce

It is expected that construction workers will be residing in townships located within a one-hour driving radius from the proposed solar farm. It is subsequently anticipated that workers would be originating from Shepparton, Benalla, Euroa and Wangaratta. Traffic distribution was based on the estimated population for each of the townships and is shown in Table 4-4.

An overview of routes anticipated to be used by workers to the solar farm is provided in Table 4-3 and shown in Figure 4-1. Workforce origins would be confirmed upon contractor award and TMP development for the project. During construction designated parking areas will be established on-site, with car park anticipated to be located south of laydown areas.

Table 4-3 Anticipated workforce routes during construction

Origin	Anticipated route
Shepparton	Via Midland Hwy, Link Rd, Benalla-Yarrowonga Rd
Benalla	Via Sydney Rd
Euroa	Via Hume Fwy and Sydney Rd
Wangaratta	Via Hume Fwy and Sydney Rd

Table 4-4 construction workforce traffic distribution based on origin

Origin	Light vehicles	Bus shuttles
Shepparton	21	5
Benalla	8	3
Euroa	3	1
Wangaratta	13	4
Total	44	13

4.2.2 Heavy vehicles

Materials and equipment to construct the solar farm will be sourced locally where possible and could potentially come from the Ports of Melbourne which is located to the southwest of the site. Therefore, heavy vehicles would ultimately access the site from the Hume Freeway, before turning onto Sydney Road, Benalla-Yarrowonga Road which are all B-Double and OSOM approved roads. This route, shown in Figure 4-2, will therefore ensure through traffic impacts on Benalla are limited.

Site entry points on Benalla-Yarrowonga Road are expected to be utilised as the main access to the Kennedys Creek Solar Farm. All construction vehicles are anticipated to utilise the primary accesses on Benalla-Yarrowonga Road to enter the solar farm.

Raw material sources have yet to be confirmed and would be confirmed when the Traffic Management Plan is produced. The proposed traffic routes would be confirmed when the hired contractor is in place

and a formal Traffic Management Plan (TMP) has been produced, it can be difficult to predict at the early planning stages of the project.

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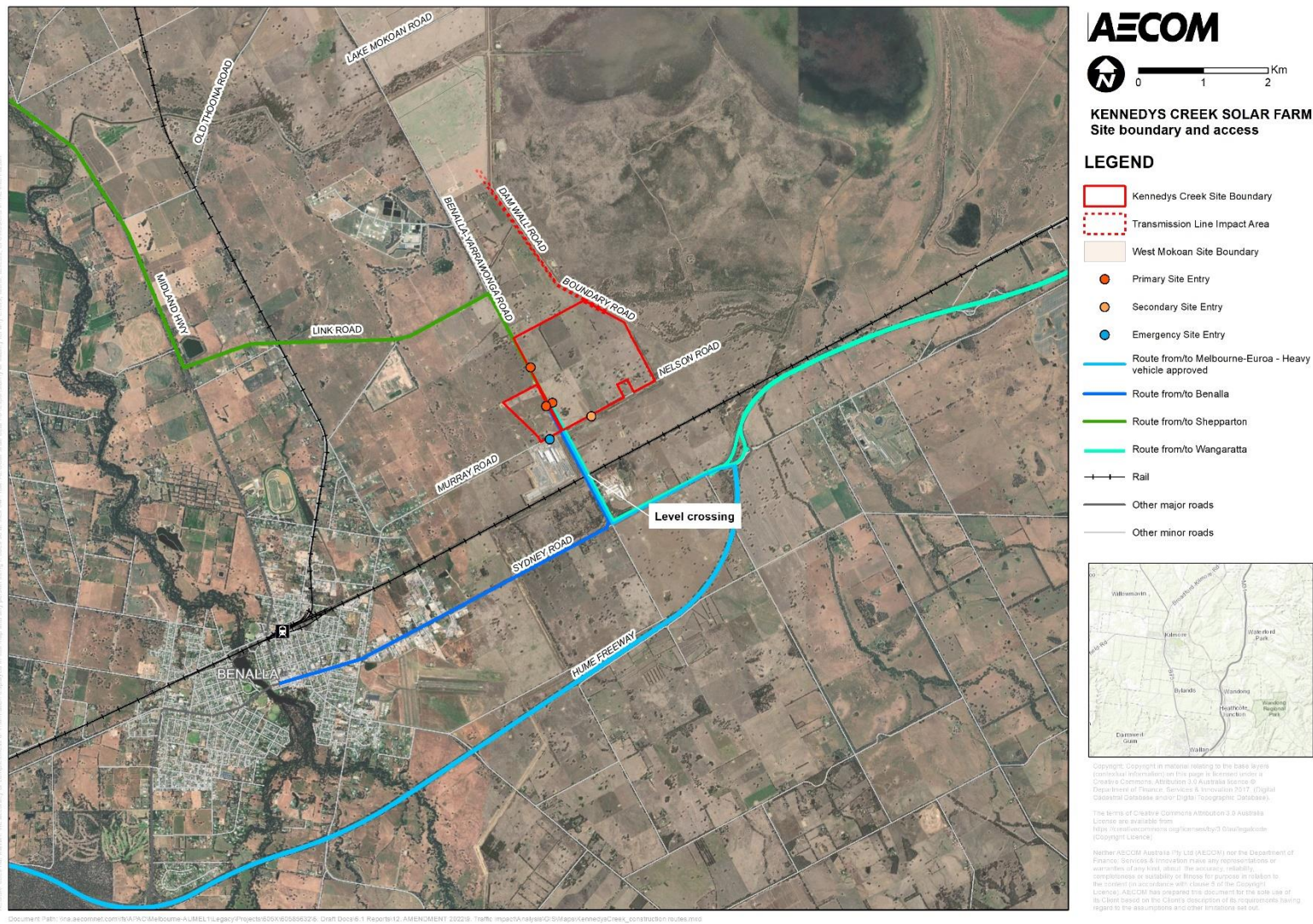


Figure 4-3 Anticipated route for construction traffic

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4.3 Network capacity

Sydney Road carries approximately 640 two-way vehicle trips (or approximately 330 one-way vehicle trips) during peak hour. In comparison, Benalla-Yarrowonga Road carries approximately 93 two-way vehicle trips (or approximately 46 one-way vehicle trips) during peak hour.

With construction personnel traffic volumes predicted to be at approximately 57 vehicles entering / exiting the site during morning and evening peak time periods, the combined traffic volumes can be accommodated, given that typical one-way capacity for a traffic lane is 900 vehicles per hour.

Accordingly, it is anticipated that there will be insignificant impacts to the local road network due to the construction of the Kennedys Creek Solar Farm and its transmission line. 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.

4.4 Site access

4.4.1 Intersection of Sydney Road / Benalla-Yarrowonga Road

Both roads are B-Double approved and therefore typically cater for B-Double and OSOM vehicles. Therefore, it is assumed this intersection allows for an adequate turning radius for construction vehicles that may require access during the construction phase of the project.

4.4.2 Intersection of Benalla-Yarrowonga Road / Solar Farm Accesses

Considering the relatively short-term construction period, the predicted low traffic volumes and the classification of the Benalla-Yarrowonga Road, the existing one-lane two-way road is considered wide enough to accommodate construction and operation traffic.

During further design development, it is recommended widened site accesses are provided to ensure two-way B-Double movements can be accommodated. Figure 4-4 shows the B-Double vehicle swept path entering the northernmost access on Benalla-Yarrowonga Road. The footprint of the proposed accesses may need to be reviewed during the detailed design process and preparation of the TMP to ensure that two-way movements of heavy construction vehicles can be catered.

Traffic management would also be an alternative option for managing two-way vehicle conflicts. This should be considered further at the development of the TMP for the project in consultation with Benalla Rural City Council and DTP.

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Figure 4-4 B-Double vehicle swept path on existing geometry of northernmost access located on Benalla-Yarrowonga Road

Source: AECOM developed swept path analysis, Google Earth 2019

4.4.3 Intersection of Benalla-Yarrowonga Road / Murray Road / Nelson Road

Considering the relatively short construction period, the predicted low traffic volumes and the classification of the Benalla-Yarrowonga Road, the existing intersection is considered wide enough to accommodate construction and operation traffic.

Though the sight distances are good in all directions, the widths of these roads are relatively constrained particularly for two-way heavy vehicles movements on Nelson Road during construction peak.

This intersection's footprint should be reviewed during the preparation of a TMP, when greater certainty of the project construction vehicle requirements are known to ensure that construction and local traffic can safely access and egress the site entries, particularly on Nelson Road. Temporary traffic management measures such as portable traffic signals, minor localised grass clearing and widening are expected to satisfy cross section design requirements.

4.4.4 Nelson Road

Although the primary site accesses will be located on Benalla-Yarrowonga Road, some construction vehicles may utilise Nelson Road. Figure 4-5 shows the B-Double swept paths entering and egressing Nelson Road. To ensure that construction and local traffic can safely use Nelson Road, its width near the intersection with the proposed entrance should be reviewed during the preparation of a TMP, when greater certainty of the project construction vehicle requirements are known. Access to this site entry may require temporary traffic management controls as discussed above to satisfy cross section and road limitations due to limiting width of the road as shown in Figure 4-5.

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Figure 4-5 B-Double vehicle swept paths on existing geometry

Source: AECOM developed swept path analysis, Google Earth 2019

4.4.5 Internal access

Subject to the development of the TMP for the project, it is expected that the project will provide a network of internal site access tracks within the development footprint of the proposed Kennedys Creek Solar Farm that will be in place to facilitate construction of the site and then ongoing maintenance. Tracks are expected to be constructed of crushed gravel and will be approximately 4 metres wide. A 4 metre-wide perimeter road will also be built in accordance with the specifications set out in the Country Fire Authority (CFA) guidelines, with passing bays every 600m which will each be 6 metres wide and 20 metres long. 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 and Planning (DTP) (previously Department of Transport) should there be 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 DTP are recommended.

4.5 Road upgrades

4.5.1 Boundary Road

As the transmission line is proposed to be built along Boundary Road, it is expected that the road will need to be upgraded to safely accommodate construction movements along the right-of-way of the transmission line.

As the road has restricted access, construction works along Boundary Road are not expected to impact road users and property access. However, it is noted that this road is used as a fire access track. Consultation with relevant road authorities would be undertaken to ensure road upgrade works are to the satisfaction of relevant road authorities. Additionally, engagement with emergency services is recommended to be undertaken to ensure that emergency access is maintained during construction. This would be undertaken as part of the TMP which will be developed for the Project. Upgrade works will be captured in the Project's TMP.

4.5.2 Snowy Lane

Potential road upgrade works may be required on Snowy Lane, should this road be utilised to provide an alternative access to the transmission line during construction.

Snowy Lane currently provides access to several local properties and farmland. It also provides restricted access to Boundary Road. Upgrade works to Snowy Lane would be required to ensure construction movements can safely be accommodated as its current width and road condition are inadequate to accommodate anticipated vehicle types and movements. However, at the time of this assessment, access to the transmission line is expected to occur via the proposed entry points off Benalla-Yarrowonga Road. Confirmation of construction vehicle access to both the solar farm and transmission line are subject to additional design development following consultation with relevant authorities. It is expected that road upgrade works will be captured in the Project's TMP.

4.6 Sustainable transport

4.6.1 Pedestrians and cyclists

As no pedestrian or cycle paths are present in the vicinity of the solar farm, no impacts to pedestrians or cyclists are expected from the construction of the solar farm.

4.6.2 Public transport

While several regional buses routes operate along Sydney Road, no impacts to regional bus services are expected from the construction of the solar farm.

Local school bus routes also operate in the area and will typically operate Monday to Friday during school drop off (8 am to 9am) and pick-up (3:30 pm) times. During preparation of the TMP, hours of construction traffic movements should aim to avoid these time periods and/or be suitably managed.

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5.0 Operational phase impact assessment

During operation, the solar farm is anticipated to generate approximately ten service vehicle movements per day to account for general operation and maintenance activities. As the Kennedys Creek Solar Farm transitions to the operational stage, the previously discussed access tracks would remain, providing maintenance access.

It is understood that up to five plant operators are expected to attend site on weekdays between 6:00 AM and 4:00 PM and may occasionally need to attend site on weekends if necessary. Services to be carried out will be scheduled and unscheduled maintenances. Operational vehicles will likely be single cabin or dual cabin utility vehicle.

Given the traffic volumes generated during operations, the road network is subsequently expected to have ample capacity to accommodate the additional construction phase traffic volumes generated by the Project.

6.0 Decommissioning impact assessments

Decommissioning impacts are expected to be similar to the construction stage of the project. Given this stage would not occur until after the operational life cycle of the project, re-assessments would be required.

Potential impacts associated with decommissioning works of the project are expected to be the same or similar to those associated with the construction phase. However, the overall level of impact would be lower due to the nature of decommissioning activities. These impacts should also be managed with the implementation of the same mitigation measures as those proposed for construction impacts as part of a Decommissioning Management Plan. With recommended mitigation measures in place, the potential for impacts on the local road network within the vicinity of the project from decommissioning of the project would be minor.

Given this phase would not occur for some time a reassessment would be required at the time to consider the current and future road conditions and infrastructure present.

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7.0 Cumulative impact assessment

Construction and operation of the Kennedys Creek Solar and its transmission line is expected to take place concurrently with the West Mokoan Solar Farm and as such, there is potential for cumulative transport impacts. At the time of this assessment, traffic generation estimations were based on information provided by Lightsource bp but may be subject to changes once contractor(s) are nominated. Where no information was available, assumptions were made and conservative estimates based on the West Mokoan Solar Farm construction traffic generation data were used.

7.1 Construction phase

The following should be noted with regards to the West Mokoan Solar Farm construction phase traffic generation:

- All construction traffic would access the solar farm site via the five proposed site access points located via Lake Mokoan Road and Benalla-Yarrowonga Road
- 229 workers per day are anticipated to be required during construction peak
- Workers are assumed to travel to and from the construction area each day during construction. As for the Kennedys Creek Solar Farm, workers are expected to reside within a one hour driving radius from the West Mokoan Solar Farm. Workers are subsequently expected to be residing in Shepparton, Benalla, Euroa and Wangaratta.
- 80% of workers are assumed to be travelling to and from the site via bus shuttles. Each shuttle is expected to have a 14-person capacity. The remaining workers are assumed to be travelling in single-occupancy vehicles.
- As shift hours for the workforce was unknown at the time of this assessment, it was assumed that the workforce traffic would arrive at the same time than the Kennedys Creek workers in the morning peak between 5:30 am and 6:30 am and depart in the evening peak between 6:00 pm and 7:00 pm.
- Onsite car parking is expected to be provided within the site compound, with no over-spill into other areas
- 68 heavy vehicle movements are anticipated to be generated during the peak of construction works. However, these are expected to occur outside of construction peak hour periods during the daytime.
- Heavy vehicles are assumed to be coming from the west via Hume Freeway, Sydney Road and Benalla-Yarrowonga Road.

Table 7-1, Table 7-2 and Table 7-3 outline the estimated West Mokoan Project construction traffic distribution and generation on the local road network. Anticipated routes for construction traffic movements are shown in Figure 7-1.

Construction traffic volumes are predicted to be at approximately 59 vehicles entering / exiting the site during morning and evening peak time periods, generated by workforce movements. Subsequently, the local road network is expected to have ample capacity to accommodate the combined construction traffic volumes from both Kennedys Creek and West Mokoan Solar Farms, given that typical one-way capacity for a traffic lane is 900 vehicles per hour. Accordingly, it is anticipated that there will be insignificant impacts to the local road network due to the concurrent construction of the Kennedys Creek Solar Farm, transmission line and West Mokoan Solar Farm.

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Table 7-1 West Mokoan Solar Farm construction workforce traffic distribution during peak period

Origin	Distribution
Shepparton	Via Midland Highway, Old Thoona Road, Benalla-Yarrowonga Road and Lake Mokoan Road
Benalla	Via Sydney Road and Benalla-Yarrowonga Road
Euroa	Via Hume Freeway, Sydney Road and Benalla-Yarrowonga Road
Wangaratta	Via Taminick Gap Road, Glenrowan-Boweya Road and Lake Mokoan Road

Table 7-2 West Mokoan Solar Farm construction workforce traffic generation based on origin

Origin	Light vehicles	Shuttle buses
Shepparton	22	6
Benalla	8	2
Euroa	2	1
Wangaratta	14	4
Total	46	13

Table 7-3 West Mokoan Solar Farm overall construction traffic generation

Type	AM peak (6 - 7am)	Daytime (7am-6pm)	PM (6 - 7pm)
Light vehicles	46	0	46
Heavy vehicles	13	68	13
Total	59	68	59

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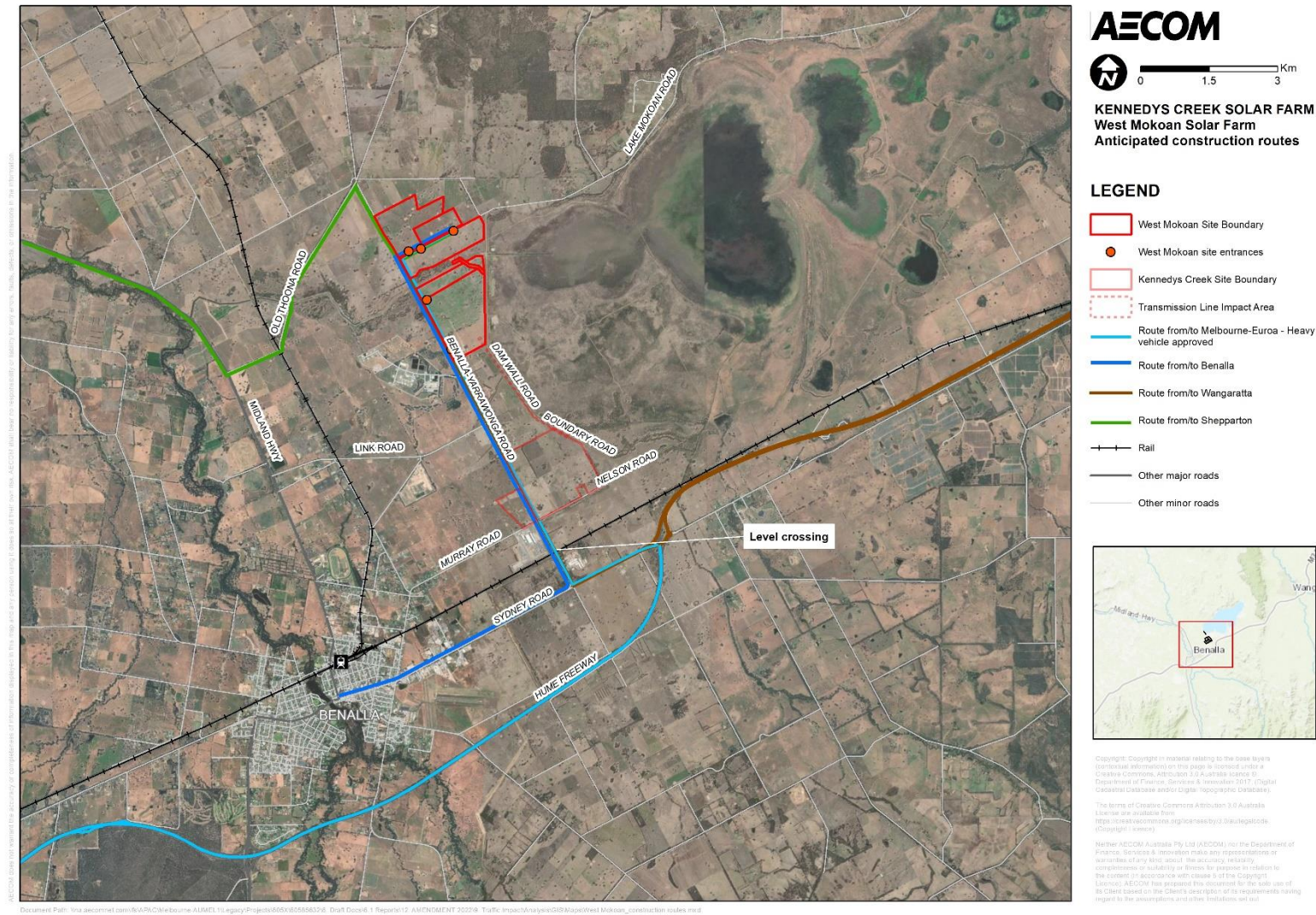


Figure 7-1 Anticipated route for the West Mokoan Solar Farm construction traffic

7.2 Operational phase

Traffic generation during the operation of the West Mokoan Solar Farm is expected to be minimal. It is understood that the general operation and maintenance workforce will be shared across both solar farms as the plant will generate and be operated as one facility, with one point of connection to the grid. This signifies that there would be up to ten service vehicle movements per day for general operation and maintenance activities of the West Mokoan Solar Farm. Operational vehicles are likely to be single cabin or dual cabin utility vehicle.

Given the traffic volumes generated during operations, the road network is subsequently expected to have ample capacity to accommodate the additional construction phase traffic volumes generated by both solar farms.

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8.0 Conclusion and TMP development

8.1 Conclusion

This Traffic Impact Assessment concludes that there is unlikely to be a material traffic impact on the local road network during the construction of the proposed Kennedys Creek Solar Farm.

The Traffic Impact Assessment 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 at the development of the TMP for the project in consultation with key stakeholders.

8.2 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. This includes consultation to obtain relevant approvals from Benalla Rural City Council and DPT.
- Ongoing communication with local residences to inform them of the timing and duration of proposed activities, prior to the commencement of any works and any impacts to the local road network
- Confirmation of proposed construction program and traffic volumes
- Confirmation of materials and personnel origins and routes
- 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 relevant road authorities
- Management of road upgrade works and associated impacts to local road users and residents
- Over dimensional load permit application for travel across railways
- Control measures including:
 - Roles and responsibilities
 - Training and site inductions
 - Vehicle access to the solar farm and the transmission line sites
 - Operating and working hours; where possible consideration should be made to ensure construction traffic movements avoid school bus time periods
 - Environmental measures.
- Outline monitoring, inspection and auditing of the TMP.

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Appendix A

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Concept Design

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