habitat planning

Development Application Statement of Environmental Effects

Broughans Road, Finley
4.95MW Solar Facility and Associated Infrastructure

June 2020
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TOWN PLANNING + URBAN DESIGN CONSULTANTS

Prepared for

BE Pro G Pty Ltd

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1 Introduction

1.1 Overview

This Statement of Environmental Effects (SEE) has been prepared by Habitat Planning on behalf of Bison Energy and is submitted to Berrigan Shire Council in support of a Development Application (DA) for a 4.95 Megawatt solar facility and associated infrastructure and works ("the proposal") at Broughans Road, Finley.

The DA and this report have been prepared in accordance with the *Environmental Planning and Assessment Act 1979* ("EP&A Act") and the *Environmental Planning and Assessment Regulation 2000* ("EP&A Regs").

1.2 Purpose

This report addresses the relevant heads of consideration under Section 4.15(1) of the EP&A Act and provides an assessment of the proposed development against the relevant Environmental Planning Instruments (EPIs) and other planning controls applicable to the site and to the proposal. It also describes the site, its environs, the proposed development, and provides an assessment of the environmental impacts and identifies the steps to be taken to protect or lessen the potential impacts on the environment.

1.3 The Proponent

BE Pro G Pty Ltd is a subsidiary of Bison Energy leading international company specialising in renewable energy. The company has many years of experience in developing, building and operating solar power projects in different countries, such as Germany, Italy, Spain, UK, and Japan, and has been operating in Australia since 2017, with regional offices in Albury. The proponent is currently establishing a series of solar farms across NSW and Victoria.

1.4 Project justification

The development of renewable solar energy development is well underway in NSW and across Australia. The continued growth and development of solar in regional New South Wales provides a significant boost for these economies and will lead to additional employment and investment.

This development ensures that impacts will be reduced through a number of measures, including:

- Preservation of biodiversity features through use only of heavily cleared and modified rural lands and retaining existing vegetation on the property
- Minimise impacts to soil and water, through pile driven panel mounts rather than extensive soil disturbance and excavation;
- Preserve agricultural production values through retention of agricultural use of the subject site and enabling the land to be used for agriculture following decommissioning of the use; and
- Minimise visual impacts to neighbours by locating the facility within a smaller footprint and with large setbacks to surrounding roads.

2 Site Description and Context

2.1 The Site

The subject site is described as Lot 126 in DP752299 and addressed at Broughans Road, Finley. The site comprises a rectangular shape with a total area of approximately 190 hectares, however the portion of the site to be occupied by the proposed solar facility is contained to approximately 17 hectares at the eastern extent of the land.

The site is located approximately 4.5 kilometres south west of the Finley town centre. It is accessed via Broughans Road, which extends along the southern boundary and Canalla Road, which extends along the western boundary.

The location of the site is shown at **Figure 1** below.

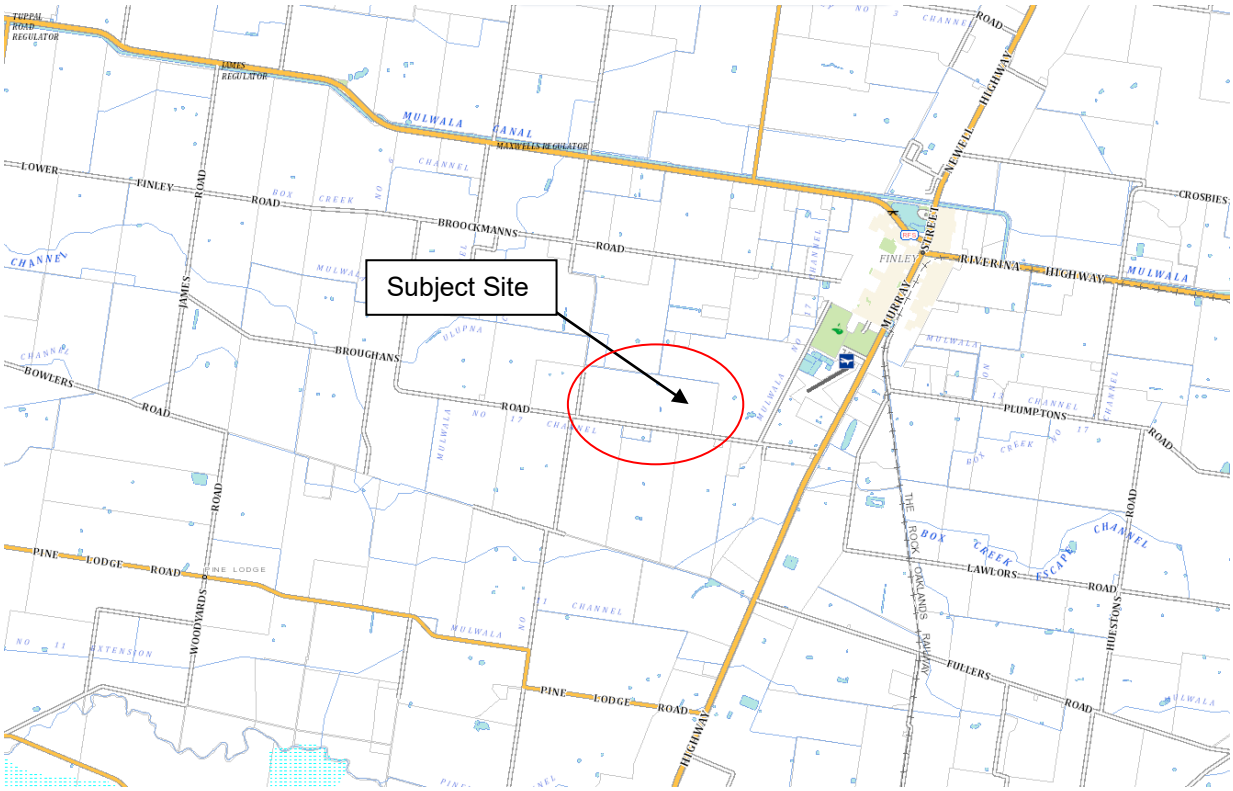


Figure 1 Site context

2.2 Site Description

It is located within a rural context and has been used historically for agricultural purposes, primarily irrigated cropping production as well as stock grazing and animal husbandry. It is presently divided into a number of paddocks and is being utilised for grazing and cropping. As a result, most of the land has been cleared and is heavily modified, particularly across the development area.

The landscape conditions of the site are defined by a very flat topography and limited vegetation coverage. The ground layer conditions of the site are observed to be exposed and short dried grasses and ground cover. A stand of native vegetation towards the centre of Lot 126 appears as the only major landscape feature of the site.

An narrow constructed open irrigation channel traverses the site and extends along the southern boundary of the investigation area intersecting with Broughans Road in the south east. A channel extends along Broughans Road and crosses beneath the road at the south east corner of the site.

An aerial view of the overall extent of Lot 126 is provided at **Figure 1**. Photographs illustrating the conditions of the subject site are also provided in the following sections.

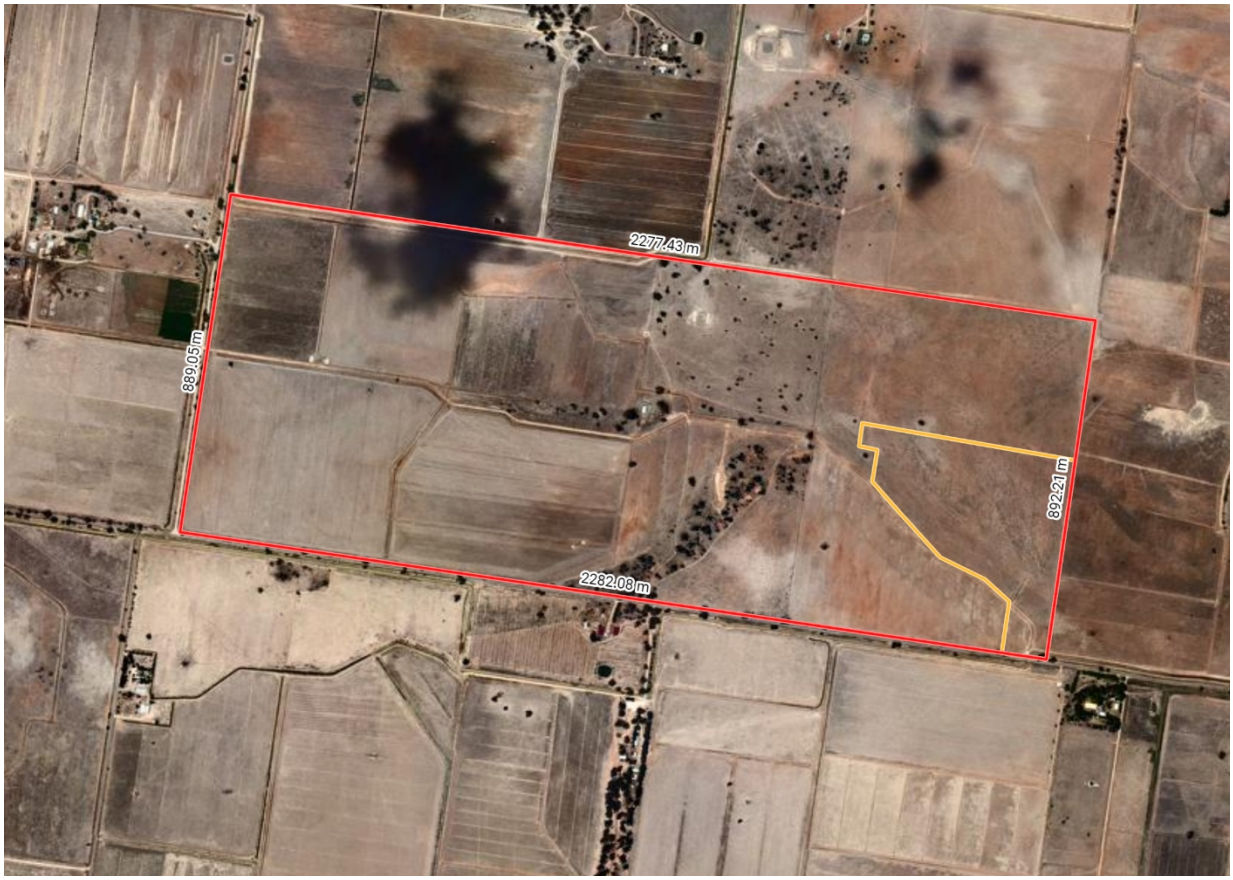


Figure 2 Aerial view of Lot 126 (red outline) and the development area (yellow outline).

Figure 3 Aerial view of the proposed development area.

Figure 4 View east along Broughans Road from the proposed access. The subject site is located to the left.

Figure 5 View east along Broughans Road beyond the existing channel crossing adjacent to the site.

Figure 6 Existing channel at the south east corner of the site, with Broughans Road visible beyond.

Figure 7 View west along Broughans Road at the frontage to the site (on right) at the proposed access point.

Figure 8 View north from Broughans Road at the proposed property access with the proposed solar development in the background (Indicated).

Figure 9 Existing conditions inside the property at the proposed access point from Broughans Road.

Figure 10 Existing conditions of the subject site as viewed from Broughans Road.

Figure 11 View west along the site boundary with Broughans Road.

Figure 12 View north towards the development area along the existing internal channel.

Figure 13 View south towards Broughans Road, around the site of the proposed entrance

Figure 14 Existing conditions of the internal channel, with the development area to the left.

Figure 15 Existing conditions along the internal channel, with the development area to the right.

Figure 16 View north across the development area.

Figure 17 View north west across the development area towards the centre of Lot 126 (outside of the development area).

2.3 Context

The surrounding context consists of rural land with cropping, grazing, and irrigation being the dominant land use. Predominantly, the land surrounding the site is used for dryland agriculture and produces a range of crops as well as supporting grazing of sheep and cattle.

Properties immediately surrounding the property generally consist of large rural holdings which are used for agricultural purposes with associated dwellings. Two dwellings are located immediately south of the subject land along Broughans Road. Two further dwellings are located approximately 800-900-metres north of the proposed development area and are accessed from Broockmanns Road and Canalla Road.

Land to the east represents a transition from rural to urban uses, with a concentration of dwellings located at the corner of Dales Road and Broughans Road, approximately 1 kilometre from the site. This also represents the southern extent of the Finley urban area, with land further north of this area comprising the Finley Airport, Finley Sportsground and golf course.

Land to the west of the subject site consists of rural land, consistent with the agricultural character of the area. A previously constructed solar facility occupies a large portion of land adjacent to Lot 126 and generally extends to the Ulupna Channel, Broughans Road, Canalla Road and Broockmanns Road.

The Finley electrical substation is located at the corner of Broockmanns Road and Canalla Road, approximately 3 kilometres north west of the site.

Figure 18 View east along Broughans Road towards Dales Road and the Newell Highway.

Figure 19 View west towards the subject site with an adjacent dwelling opposite (indicated), with extensive landscape screening.

Figure 20 View west along Broughans Road from the intersection with the Newell Highway.

Figure 21 Intersection of Broughans Road with the Newell Highway.

Figure 22 Existing properties at the intersection of Broughans Road and Newell Highway.

Figure 23 View north west from Broughans Road towards the rear of properties addressing Dales Road.

3 Description of Proposal

3.1 Overview

The proposal seeks to develop a portion of the subject land for solar renewable energy development with capacity of up to 4.95 Megawatts ("MW") to generate renewable electricity. The proposed facility is to be established within a triangular portion of the subject site of approximately 17 hectares, with access from Broughans Road

The facility will comprise installation of 16,500 solar photovoltaic panels to be mounted in arrays on single axis trackers, cabling from the solar arrays to panel inverters and substation and connection into the local electricity network in the north west corner of the development area.

The facility will also include construction of unsealed perimeter and internal access tracks, a new access culvert to the internal irrigation channel, parking and laydown areas, substation and perimeter fencing. A new access will be constructed at Broughans Road, and an internal access track will cross the internal channel traversing the site. A new culvert will be constructed over the channel, as discussed below.

The proposed facility is expected to take approximately 6 to 12 months to complete construction. It will operate for a period of up to 30 years, after which it will be subject to further operation or decommissioning and removal of all components.

Optimisation is a key requirement in designing a solar facility, being that it will produce a desirable quantity of energy as efficiently and cost effectively as possible. The aim for this system is to efficiently use the available land to generate the most amount of power possible.

Section 3.2 below summarises the key components of the project and Section 3.3 and 3.4 details the construction and operational stages of the proposal respectively. Section 3.5 details the components that make up the proposed solar PV system. The remaining sections at 3.6 to 3.11 describe the various components of the development in further detail.

3.2 Project Details

Specifically, the proposal involves:

- New rural-type road access point and associated works from Broughans Road at the southern boundary
- Internal unsealed rural access track from Broughans Road to the proposed solar facility, including constructed culvert crossing to the internal channel
- 4 metre wide internal access tracks within the development and between the panel arrays as shown
- Installation of approximately 16,500 solar panels, to be mounted on single axis trackers and pile driven into the ground
- Aboveground and underground cabling between panel arrays to combiner boxes and inverters
- Central inverters within the panel arrays on skids to invert DC power from the panel arrays into AC power
- Substation and underground cabling and electrical connections between the panel inverters substation
- Laydown, construction staging, waste and parking areas at the south eastern corner of the development;

- Provision of internal turning area sufficient for construction vehicles;
- Internal access tracks between solar arrays to provide access for construction, maintenance and inspection, including internal swale drains with capacity for storage and conveyance of stormwater;
- 5 metre wide landscaping to perimeter of the development;
- Internal drainage detention basin and outfall;
- Internal 4 metre wide swale drainage to internal road and construction area;
- Perimeter landscaping to the eastern and southern side boundaries
- Perimeter security fencing (2 metre height) comprising steel posts and transparent mesh

A proposed site plan of the development is attached and reproduced at **Figure 24** below.

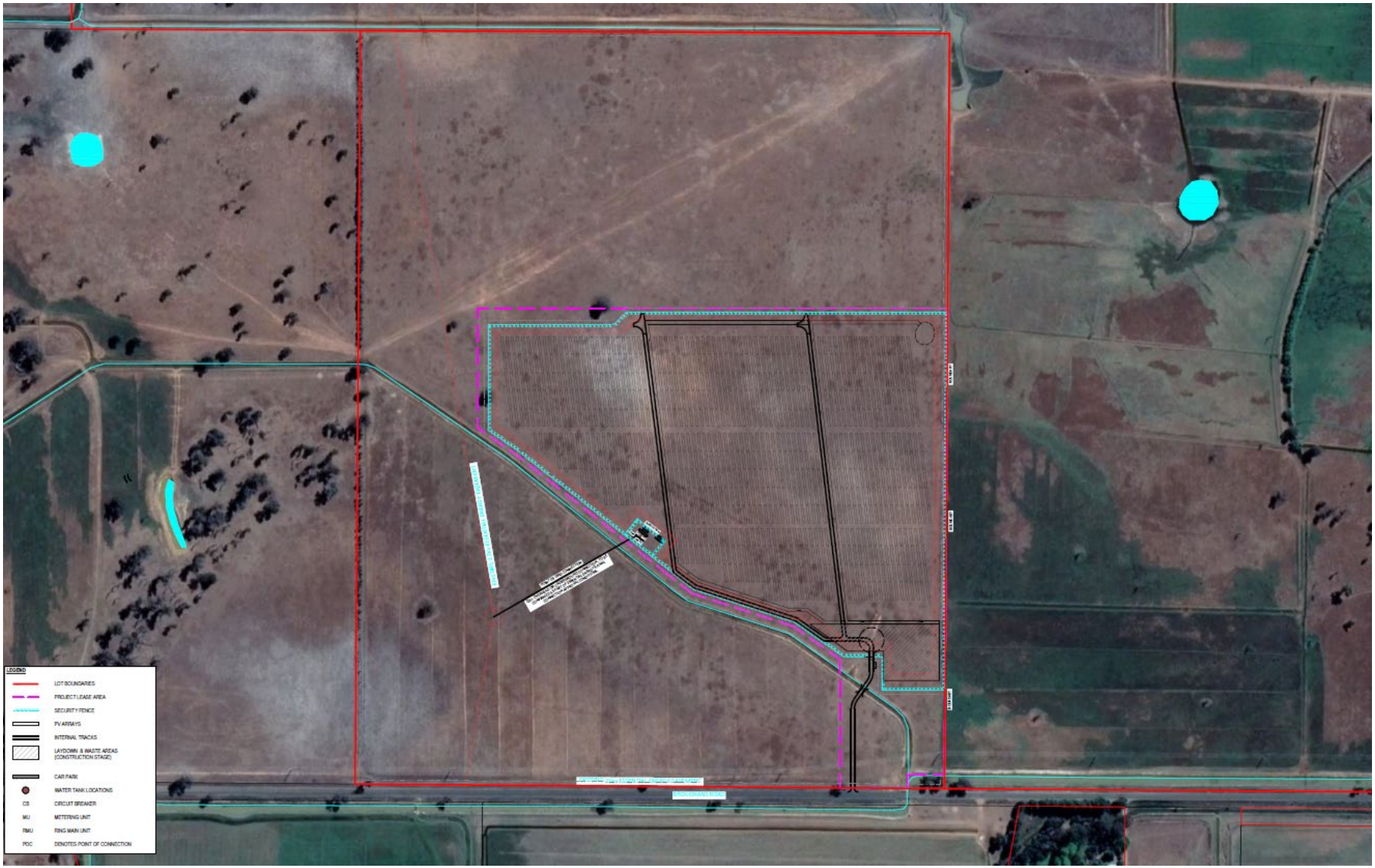


Figure 24 Proposed site plan, showing development in context of the overall Lot

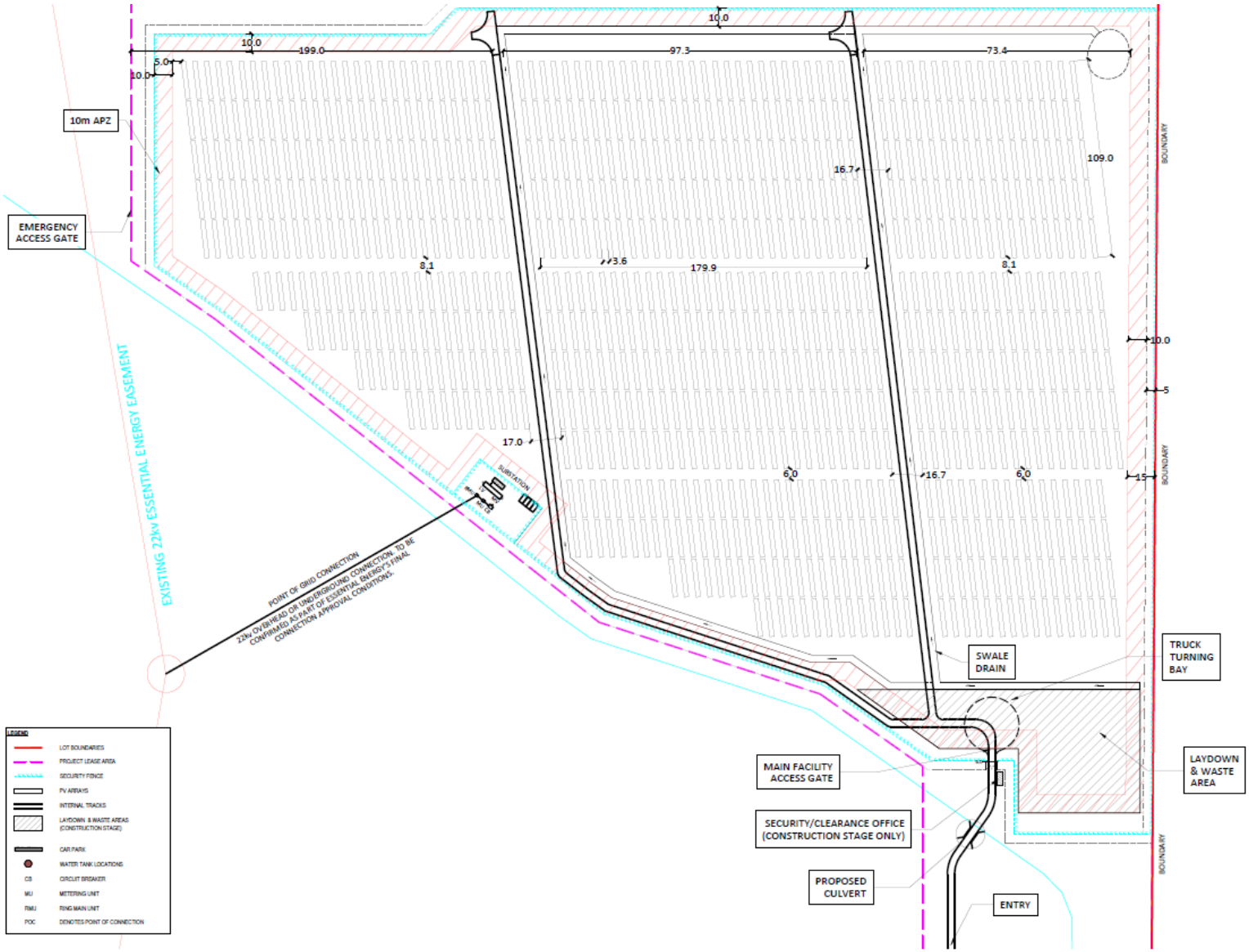


Figure 25 Proposed site plan, showing detail of Lease Area

3.3 Construction Summary

The following details the operational matters and components of the proposed facility during the construction stage. The construction phase is expected to comprise a period of up to 6 months, from project approval to energising of the facility.

Table 1 Summary of construction phase of the project

Component	
Site establishment	▪ Removing existing internal fences and gates along irrigation channel ▪ Establish new property access from Broughans Road to access the subject site ▪ Construct new culvert crossing to the internal channel within the property. ▪ Internal grading to establish new internal access tracks from the property access to the proposed substation location and the solar panel arrays; ▪ Establish new bus and parking area, loading and delivery areas inside the southern boundary; ▪ Establishment of a temporary site office at the southern frontage of the property at Broughans Road ▪ Establishment and implementation of a Construction Traffic Management Plan (CTMP) ▪ Establishment and implementation of an Environmental Management Plan (EMP) ▪ Establishment of sediment control devices to perimeter of works area. ▪ Establishment of temporary construction signage and directional signage as required along Broughans Road ▪ Construction of new internal fencing.
Solar infrastructure construction works	▪ Direct pile driving using vibrating pile driver for installation of mounting poles. ▪ Open trenching excavation for installation of underground cabling ▪ Grading and compaction of areas for placement of inverters on skids ▪ Grading and compaction and installation of concrete slab-on-ground (if required) for establishment of new substation ▪ Site grading and placement of gravel material for internal tracks between the property access, substation and panel arrays ▪ Grading and placement of materials for establishment of perimeter access tracks
Fencing	Construction of new post and wire fencing along the western side of the proposed facility to enclose access track up to substation. Construction of perimeter security fencing to the area containing the proposed panel arrays

Component	
Site Office	A construction site office is to be established in the southern portion of the development, adjacent to the proposed property access from Broughans Road. The office will be used for administrative functions and management during construction, including managing access and egress from the property.
Amenities	Temporary toilet and wash room facilities will be placed on the site during construction. Wastewater from the temporary facilities will be held in tanks within the facilities, which will be regularly removed and replaced on site. Temporary water supply for services will be established by way of a portable tank or cart.
Parking and Drop-off Area	A new construction parking area is to be constructed inside the property boundary from Broughans Road, enabling parking and drop off for construction personnel. This location is adjacent to the temporary construction site office for suitable control of access to the site.
Laydown Area (Construction)	Establishment of a defined construction laydown point at the southern extent of the proposed development. The laydown area will be used during construction for: ▪ delivery and set down of construction equipment, machinery and material; ▪ dedicated storage areas for equipment; ▪ locked and secured area for storage of machinery, fuels, oils and other equipment.
Hours of work	Monday to Friday, 7am – 6pm Saturday, 8am – 1pm
Workforce	50-100

Component	
Machinery/equipment	Equipment required for the establishment of the solar farm will comprise various heavy machinery and plant, power tools and hand tools, including but not limited to: ▪ Truck and dog combinations ▪ Bulldozer ▪ Grader ▪ Skid Steer ▪ Vibrating roller ▪ Water cart ▪ Piling rig and associated equipment ▪ Crane ▪ Trenchers and boring rig ▪ Diesel generators ▪ Power tools ▪ Hand equipment
Traffic	Average of 8 light vehicles per day (i.e. passenger and light utility vehicles), comprising construction workers. Expected to involve four inbound vehicles in the afternoon and four outbound vehicles in the afternoon. Average of 8 medium/heavy vehicles including semi trailer, truck and dog, rigid truck combinations and bus access. This includes movements undertaken for buses that will transport some construction workers to the property. Construction traffic will generally travel between Finley and the site via the Newell Highway and Broughans Road. Deliveries of plant and equipment, PV components, and related construction materials expected to occur by semi trailer and rigid truck combinations Materials and other components used in construction expected to occur by semi trailer, truck and dog or rigid truck combinations.
Noise	Construction noise from machinery and equipment, including excavation, pile driving and movements. Traffic access and egressing the property, including heavy vehicles.
Vibration	Minor localised impacts, to be contained to within the internal areas of the site, resulting from pile driving works and compaction of roads and construction areas by vibrating rollers.

Component	
Waste	Construction works will produce general packaging and construction waste, including plastics, recyclable cardboard, off-cut metals and steel, excess cable and the like. A dedicated waste collection point is to be established in the south east corner of the site, and will be provided with all necessary receptacles for collection and disposal off-site. A detailed Waste Management Plan (WMP) to be prepared and endorsed prior to works commencing on site.

3.4 Operational Summary

The following summarises the operational matters of the proposed solar facility once constructed and energised. The operational phase of the facility is expected to be up to 30 years.

Table 2 Summary of operational phase of the project

Operational Item	
Hours of operation	The facility will generate power during daylight hours, with all infrastructure being operational at all times. Staff will only generally access the site during daytime periods. In emergency events, staff may be required to access the property.
Operations & Management	Daily inspection and monitoring of the facility by full-time employed staff. Maintenance and operational checks daily/weekly/monthly as per on-site operational guidelines Off-site maintenance crews and contractors to be employed as required to undertake repairs.
Workforce	2 persons are to be employed for ongoing operation of the site. Not all personnel will be on-site at any one time.
Traffic	On average, the operation of the facility will generate two vehicles per day, a maximum of seven days per week, resulting in 14 vehicles per week. The rate of traffic expected form the site will be one vehicle per hour in the morning peak period, travelling inbound to the site; and one vehicle per hour in the afternoon peak period, travelling outbound from the site. Very infrequent deliveries may be necessary to the site by large vehicles delivering parts, plant or equipment. Operational traffic will generally travel between Finley and the site via the Newell Highway and Broughans Road. Access will be required from time to time by TransGrid to the substation on site. Internal access will be enabled by the internal access track.
Car parking	A parking area is to be established adjacent to the proposed substation and will be accessible from the internal access track.
Maintenance	Solar panels may require cleaning up to two times during per year. Cleaning will be undertaken with water, to be sourced from water trucks brought to site. Any repairs to panels or other equipment or infrastructure will be undertaken on an as needs basis either by employed staff or contractors.
Security	The site will be secured by fencing and gate access. A post and wire fence will be established to the external boundaries of the development area, securing the access and substation. An internal fence will be erected to secure the solar panel arrays and other equipment. The facility may utilise CCTV monitoring of access points and substation areas. Security patrols of the property may also be carried out by contractors.

Operational Item	
Lighting	Directional flood lighting to be provided to substation and surrounding parking area.
Noise sources	Approximately 40db from solar inverters. Intermittent traffic and machinery noise as a result of movements to and from the property and maintenance works.
Storage	There will be no storage of hazardous or dangerous goods or materials on site during the operation of the Project
Waste	Minimal waste is to be generated during operation and will be limited to: ▪ General waste from site office, including paper, plastic and glass and putrescible waste including food waste, bottles, cans and paper; ▪ Waste resulting from maintenance work, including packaging, and decommissioned/removed equipment. All waste will be stored in bin or otherwise stockpile areas near the site office, which will divide waste into landfill and recycling streams. These waste materials will then be taken to off-site waste management facilities. A detailed Waste Management Plan (WMP) to be prepared and endorsed prior to works commencing on site, which will include management of any waste generated during operation.

3.5 Solar Infrastructure

3.5.1 Photovoltaic Panel Arrays

It is proposed to install approximately 16,500 photovoltaic modules (solar panels) which will have a multicrystalline, monocrystalline, or thin film technology. The panels are to be arranged in groups which are known as arrays. The proposed plan attached indicates the alignment of the proposed arrays on the property.

The proposed solar panels are to be arranged in double-portrait format and installed on a single axis tracking system to follow the sun from east to west each day and maximise solar exposure. They are to be mounted to a fixed structure which is installed on mounting posts. The posts are to be direct pile driven into the ground at widths of up to 7 metres with the panels then bolted to the top of the structure. The final height of the top most part of the panels from the ground is to be approximately 4 metres.

3.5.2 Inverters

The electricity generated by the proposed panel arrays are directed to inverters within the development along aboveground and underground cabling in strings. These strings will pass through combiner boxes and then to the inverters, which are to be spaced through the development as required.

The inverters are used to convert the low voltage DC power into low voltage AC power which can then be transformed to higher voltages. This allows for a step up of the voltage from the solar panels and conversion so that it can be connected to the grid.

The proposed inverters will comprise an area of approximately 2.8 metres wide, 1.6 metres wide and 2.4 metres high. There are to be two inverters installed within the Central Power Station within the substation yard of the proposed development.

Below shows the typical inverter to be used in the proposed development.

Figure 26 Typical inverter

3.5.3 Substation

A new substation is proposed in the north western corner of the development area, which has been positioned as close as possible to the electrical distribution line which traverses the subject site. The substation is to be constructed on a levelled and compacted area of land and will incorporate associated internal space for monitoring and management of equipment. The purpose of the substation is to convert power from the photovoltaic system to the electrical network.

Figure 27 Concept layout of proposed substation area

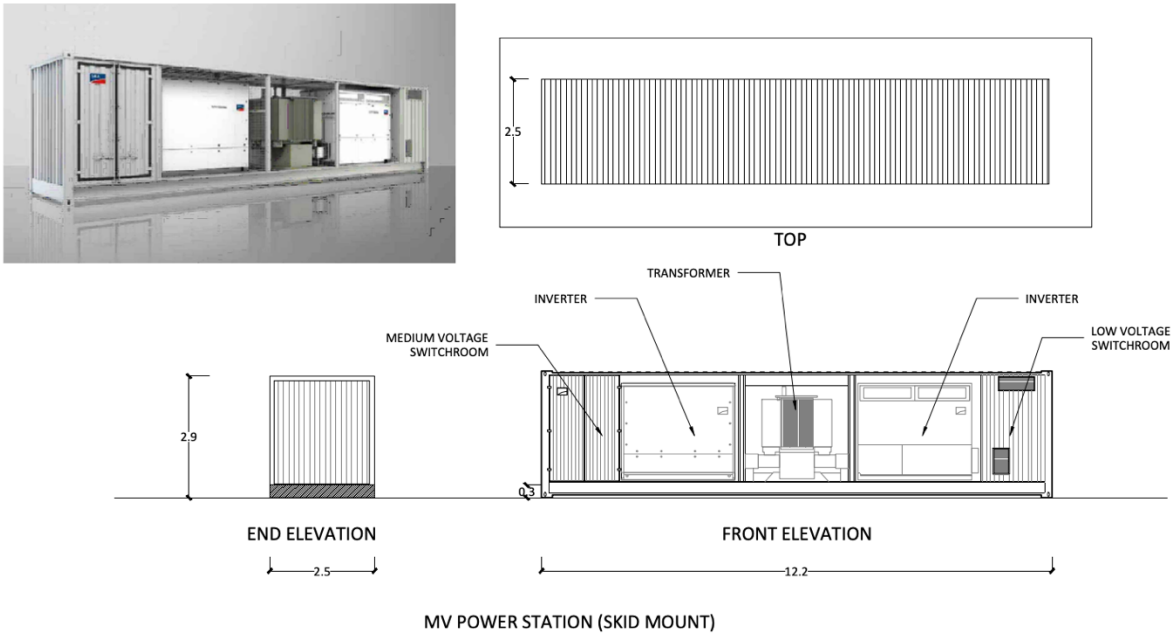


Figure 28 Elevations showing the proposed central Power Station unit containing the transformer and inverter for connection to the 22kV power line

The proposal will comprise approximately a network of aboveground and underground cabling throughout the development. This will consist of DC cabling extending from the solar arrays to the inverters and AC cabling from the inverters to the substation.

Underground cabling will be installed between 0.5-1.0 metre below the surface and will be provided by trenching, installing cabling and conduit and backfilling. The disturbed area will be compacted to match the adjacent ground level.

Areas of aboveground cabling will be required at the solar panel arrays, with DC cabling being fed along the mounting structures to aboveground combiner boxes, before being fed to underground conduits.

3.6 Construction

The proposed solar panels are to be mounted on a steel structure with mounting posts to be driven into the ground using a vibrating pile driver. The piles will be driven approximately 1 to 2.5 metres into the ground, as to be confirmed by a geotechnical and structural engineer.

The internal site cabling will be installed by trenching up to 1 metre in depth, laying of electrical wiring and conduits and backfilling and compacted to natural ground level.

Combiner boxes and the proposed central power station are to be installed above ground. The inverters and combiner boxes are to be established at the end of panel arrays, with the larger inverters installed on pre-built skids that enable easy placement on the site.

During construction there is expected to be up to 50 to 100 personnel undertaking various construction processes and will vary throughout the total construction process. The works are to be carried out between the hours of 7am to 6pm Monday to Friday and 8am to 1 pm on Saturdays. The construction is expected to take approximately 6 to 12 months.

3.7 Property Access and Internal Movements

Primary access to the site for both construction and operational stages is to be from Broughans Road, approximately 1.9km west of the Newell Highway. This access will utilise an existing farm gate access which is used by the landowner to access the rural property. The new access point is to be upgraded to an all-weather access rural standard crossover, capable of accommodating construction and operational vehicles to the site.

Broughans Road is a sealed rural road with a suitable sealed carriageway and a wide road reserve. It has excellent sight distances to the east and west, with a very flat and long approach in either direction. There are no visual obstructions at either approach.

Internal all-weather access tracks are to be constructed within the site, with a main access extending north from the Broughans Road entry towards the solar arrays and along the north side of the internal channel to the proposed substation area. A further network of internal tracks will extend along the perimeter of the property and within the panel arrays as shown on the submitted plans.

The internal track network will proposed to be of a gravel standard and capable of accommodating heavy vehicles and ensuring all vehicles to enter and exit the site in a forward direction. A new culvert crossing is to be established over the internal irrigation channel, and will be constructed to a standard capable of accommodating all construction and operational vehicles.

Access tracks will allow for two-way movements and will be unsealed and formed to allow all-weather access by site operation and maintenance crews.

3.8 Stormwater and Drainage

To adequately collect, convey and discharge runoff from the site, the development will include new swale drainage along the internal access roads and a detention basin capable of accommodating peak flows and discharging to pre-developed rates. A Concept Stormwater Management Plan (refer to **Attachment E**) has been prepared and sets out the design requirements for the proposed stormwater design of the facility.

The runoff from the gravel access roads and hardstand areas of the property will be collected and conveyed to new swale drains. The runoff will be conveyed via swale drains to a proposed detention basin. This swale drain and detention basin network will be designed to collect and discharge runoff from the property at pre-developed levels. The swales will have capacity for 0.037m^3/sec of runoff and will discharge to a proposed stormwater detention basin within the northern eastern corner of the site.

The basin is intended to comprise a shallow basin with a small bank, enabling a more natural basin design. Proposed outfall from the basin will be provided with rock beaching to allow runoff at pre-developed levels to be made without increasing erosion risk. Internal swales and the basin will comprise appropriate surface treatments, including grass and other landscaping as required to prevent erosion and assist with treatment.

3.9 Maintenance

Once operational, the facility will involve daily monitoring of plant and all associated infrastructure which will be carried out by staff. Staff will access the site on a daily basis for monitoring and management of equipment.

Where required, minor repairs and maintenance of components of the facility will be undertaken by either staff or contractors. Other occasional maintenance tasks will include washing panels, controlling grass and weeds on site, maintaining internal access tracks, general waste collection and disposal.

Regular inspections of the site will be carried out to ensure that grassland is managed to reduce the risk of bushfire to surrounding land and to control weeds. Mowing or slashing between rows of PV panels and in the area immediately surrounding the arrays would be carried out as required.

3.10 Landscaping

The proposal includes nominated landscape buffers to all perimeters of the site. Given the irregular shape of the boundaries of the proposed development, it is proposed to establish the landscape buffers along the existing lot boundaries to the south (Broughans Road) and the east and north and integrate with an existing planting strip to the west within the site. The landscaping areas are intended to reduce visual impacts from sensitive receivers and the adjacent Broughams Road.

The proposed landscape outcome is intended to enable a long term landscaping solution whereby it will suitably accommodate the development in the short term and also enable the site to be sustainably returned to rural activities in the event that the solar facility is decommissioned in the future.

The landscaping for the site is detailed by the attached Landscape Plans.

3.11 Security

Security of the solar facility will be critical to operations and ensuring safety of the public.

Existing perimeter rural post and wire fencing will be retained and repaired as necessary, to enclose the access tracks to the proposed substation. A new 1.8 – 2 metre high security fencing is to be established surrounding the perimeter of the proposed solar panel arrays as shown on the site plan. A plan of the typical security fence is shown in the submitted plans.

The fencing will include double 6 metre gate openings as required, also detailed on the site plans.

All proposed access gates will have a consistent height and include keypad controlled locks.

3.12 Decommisioning

The facility is intended to remain in operation for a period of up to 30 years in order to contribute to the sustainable electricity power supply to the state of NSW. This period of time represents the useable life of a solar facility, after which the infrastructure and components would need to be upgraded to latest technologies for ongoing efficient operation.

If the facility ceases operations at this point, all infrastructure, panels, mounting frames including footings, inverters, cabling and other sub-surface materials would be disassembled and removed from the site to enable the site to be re-cultivated for cropping or grazing purposes. All gravel surfacing of accessways would be removed unless required for a future use.

If necessary, a condition of consent may be imposed that requires a decommissioning plan to be prepared and approved prior to decommissioning.

4 Consultation

4.1 Overview

Bison Energy has undertaken preliminary consultation with immediate neighbours and relevant agencies as summarised below.

4.2 Community Consultation

Community consultation has been undertaken to identify the surrounding landowners and present details of the proposed project with an opportunity to provide feedback and identify any issues or concerns.

A project information sheet was prepared for the project which included an overview of the development and provided opportunities to contact the project team. The information summarised the development location, scale and size, duration and other relevant details.

The information sheet was distributed to all landowners within a 3 kilometre radius of the development area.

Bison Energy met with several of the closest landowners during 2019 to introduce the project and discuss any concerns or feedback. Due to the impact of COVID-19, further direct meetings with landowners was not undertaken, however interested parties were encouraged to contact the project team by phone or email.

It is anticipated that the development application would be advertised by Council and notified to the local community

4.3 Authority Consultation

During preparation of the planning report and associated documentation, consultation has been undertaken with Berrigan Shire Council, NSW Department of Planning and Environment and NSW Roads and Maritime Services.

4.4 Consideration of Issues

A summary and response to the comments made during the initial consultation phase is provided below.

Comment	Response
Supportive in principle of the project trusting that community concerns will be positively addressed	Noted. The applicant is committed to carrying out construction and operation of the facility in a co-operative manner with the surrounding community and welcomes further contact and engagement with the community.

Comment	Response
Potential for dust generated by the proposed works to impact on nearby properties and rural operations. Concern that prevailing winds may direct dust to nearby residences.	Noted. The applicant proposes to utilise construction and dust suppression techniques during works on the property. This will include pile driving of posts into the ground, grading and compacting of internal roads and use of water carts.
Potential for impacts related to vibration during construction works on nearby dwellings.	The construction activities will involve driving and screwing the posts into place to fix the panels in place. These works will be undertaken at reasonable distances from nearby residences and will be carried out in accordance with appropriate construction noise management protocols to minimise noise emissions.
Request that all construction traffic is made from the Newell Highway and adequate provision is made for any pre-construction safety improvements and post construction remediation.	It is confirmed that all construction traffic will be made from the Newell Highway. The submitted TIA has considered the suitability of the road and recommended appropriate improvement works as required.
Dales Road is local access road, narrow with deep drainage channels each side and of low design loadings. There are no slip entry provisions to Broughans Road and as the Newell Highway is a heavily double b utilised 100km/hr road I image traffic authorities will require attention to this, particularly during delivery of product.	No construction traffic is to access the site via Dales Road.
Support use of buses to transport workers from Finley to the development area.	The proponent proposes to utilise bus transport for workers to the property wherever possible to minimise traffic movements to and from the site.
Concerns regarding presentation of workers during the construction phase when visiting local businesses. Encourage good community standards be observed.	The proponent agrees with the comments made and considers presentation and conduct of staff to be paramount. All contractors engaged in the process will be required to maintain high levels of staff management.
Consider vehicle wash down to be essential for the construction and operation of the facility to avoid clay being tracked along roads.	Appropriate treatments can be provided at the site during construction to prevent tracking or movement or soils or mud during construction works.

4.5 Future Consultation

Project information will remain on the project website at http://www.bisonenergy.net/Project/Project1.aspx. The website includes an overview of the project, key timeframes and will allow interested stakeholders the opportunity to review information and contact the project team.

The proponent will continue to liaise and work with surrounding landowners during the construction phase to ensure that no further issues arise. Relevant information and detail will continue to be posted on the project website as it is made available.

5 Planning Assessment

This section considers the planning issues relevant to the proposed development and provides an assessment of the relevant matters prescribed in Section 4.15(1) of the Environmental Planning and Assessment Act 1979 (EP&A Act).

5.1 Environmental Protection and Biodiversity Conservation Act 1999

The *Environmental Protection and Biodiversity Conservation Act 1999* ("EPBC Act") is the Commonwealth legislation which relates to the protection of the environment and the preservation of national biodiversity. It is relevant to there is potential for the proposal to harm Matters of National Significance.

An assessment for biodiversity was completed, including considerations of Matters of National Significance as addressed in **Section 6.4** of this report. Given the cleared and disturbed nature of the site and no threatened species or threatened ecological communities identified within development area, it is consequentially considered that harm on Matters of National Significance are not likely.

The proposal would not have an impact on Matters of National Significance, and accordingly, approval from the Commonwealth Minister for the Environment is not required.

5.2 Biodiversity Conservation Act 2016

The NSW *Biodiversity Conservation Act 2016* ("the BC Act") is the NSW state legislation which seeks to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development. This legislation includes the requirements considerations regarding biodiversity conservation.

Part 7 of the BC Act provides the environmental assessment requirements for activities being assessed under Part 5 of the EP&A Act 1979. Clause 7.2 of the BC Act states that a development is likely to significantly affect threatened species if:

(a) it is likely to significantly affect threatened species or ecological communities, or their habitats, according to the test in section 7.3, or

(b) *the development exceeds the biodiversity offsets scheme threshold if the biodiversity offsets scheme applies to the impacts of the development on biodiversity values, or it is carried out in a declared area of outstanding biodiversity value.*

The subject site is not an area identified on the biodiversity values map or within a *declared area of outstanding biodiversity value.*

An assessment for biodiversity was completed, including considerations of Matters of National Significance as addressed in **Section 6.4** of this report. Given the cleared and disturbed nature of the site and no threatened species or threatened ecological communities identified within development area, impacts are considered unlikely. Section 7.3 of the BC Act contains the 'Test of Significance' to determine whether a development will impact the ability of threatened species or ecological communities under this Act to be affected. These provisions are set out below and an assessment covering these items is provided at **Section 6.4** of this report.

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of

the species is likely to be placed at risk of extinction,

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The assessment determines that the proposed works will have no significant impact and will not trigger the BOS. The proposed development does not exceed the Biodiversity Offset Scheme (BOS) and is not expected to have a significant adverse impact on a threatened species or ecological community.

5.3 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* ("the EP&A Act") is the principal piece of legislation governing the use and development of land in NSW. The objects of the Act are:

(a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,

(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,

(c) to promote the orderly and economic use and development of land,

(d) to promote the delivery and maintenance of affordable housing,

(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,

(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),

(g) to promote good design and amenity of the built environment,

(h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,

(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,

(j) to provide increased opportunity for community participation in environmental planning and assessment.

The objects of the EP&A Act are intended to guide land planning and management. Section 4.15 (discussed below) of the Act lists matters for consideration when assessing and determining an application for development.

Section 4.15 of the EP&A Act sets out the statutory matters for consideration against which the proposed development is to be evaluated. The matters for consideration under Section 4.15 are as follows:

(1) Matters for consideration—general

In determining a development application, a consent authority is to take into consideration such of the following matters as are of relevance to the development the subject of the development application:

(a) the provisions of:

(i) any environmental planning instrument, and

(ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and

(iii) any development control plan, and

(iiia) any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4, and

(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph), and

(v) any coastal zone management plan (within the meaning of the Coastal Protection Act 1979),

that apply to the land to which the development application relates,

(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,

(c) the suitability of the site for the development,

(d) any submissions made in accordance with this Act or the regulations,

(e) the public interest."

The matters for consideration identified in Section 4.15(1) of the EP&A Act 1979 are addressed in the following section. Subsections (b) to (e) of Section 4.15(1) of the EP&A Act 1979 are addressed in Section 5 of this SEE

5.3.1 Consent Authority

Section 4.5 of the EP&A Act establishes the applicable consent authority. The proposal meets the thresholds for Regionally Significant Development (refer to Section 5.4.4 below) and therefore the Joint

Regional Planning Panel is the consent authority for this proposal. Berrigan Shire Council will however undertake the relevant assessment and administration functions.

5.4 State Environmental Planning Policies

5.4.1 State Environmental Planning Policy No. 55 – Remediation of Land

State Environmental Planning Policy No. 55 – Remediation of Land ("SEPP 55") sets out considerations relating to land contamination across the state. The intention of the SEPP is to establish 'best practice' guidelines for managing land contamination through the planning and development control process.

Council can require an applicant for development to conduct a preliminary investigation and a subsequent more detailed investigation if warranted. Where contamination exists and remediation is necessary, Council must be satisfied that the remediation will take place before the land is used for the proposed purpose.

The property has been cleared and farmed for many years and is not known to be listed on a Council register of potentially contaminated land. There has been no known historical usage that would cause the land to be contaminated. The use of farm chemicals such as pesticides and fertilisers is not considered to contaminate soils to the extent that mediation is required. It is considered that a preliminary investigation is not required for the development of a solar farm.

5.4.2 State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 ("ISEPP") provides a consistent and flexible planning system to facilitate the delivery of services. The policy identifies environmental assessment categories for types of infrastructure, matters to consider when assessing development adjacent to infrastructure and provides for consultation with relevant public authorities.

ISEPP contains provisions relating to approval processes and assessment requirements for infrastructure proposals according to the type or sector of infrastructure. It outlines land use zones where types of infrastructure are permissible with or without consent and identifies certain works as exempt and complying development.

Part 3 Division 4 of the policy relates to electricity generating works or solar energy systems. Clause 34 states:

1) *Development for the purpose of electricity generating works may be carried out by any person with consent on the following land—*

    a. *in the case of electricity generating works comprising a building or place used for the purpose of making or generating electricity using waves, tides or aquatic thermal as the relevant fuel source—on any land,*

    b. *in any other case—any land in a prescribed rural, industrial or special use zone.*

The proposal is for an electricity generating works and the RU1 Primary Production zone is a prescribed rural zone. The proposed development is therefore permitted with consent by SEPP (Infrastructure) 2007.

Clause 45 of the ISEPP refers to "Development likely to affect an electricity transmission or distribution network". This part applies to a development application (or an application for modification of a consent) for development that is carried out within proximity to or will affect an electricity transmission line. It is considered that this clause applies given the proposal to connect to the existing 22kV line which traverses the subject site. Before determining a development application, the consent authority

must notify the relevant electricity supply authority and take consideration of any comments made by this authority.

5.4.3 State Environmental Planning Policy (Rural Lands) 2008

SEPP (Rural Lands) 2008 ("the Rural SEPP") applies to all rural LGAs of NSW and sets out Rural Planning Principles and Rural Subdivision Principles to implement measures that are intended to reduce land use conflicts and to identify State significant agricultural land. The development site is not listed in a schedule to the policy as being state significant agricultural land.

5.4.4 State Environmental Planning Policy (State and Regional Development) 2011

State Environmental Planning Policy (State and Regional Development) 2011 ("the SRD SEPP") identifies whether a development is regarded State significant or regionally significant development.

Clause 20 of Schedule 1 identifies electricity generating works and heat and co-generation state significant development and identifies development that:

> *Development for the purpose of electricity generating works or heat or their co-generation (using any energy source, including gas, coal, biofuel, distillate, waste, hydro, wave, solar or wind power) that—*
>
> *a) has a capital investment value of more than $30 million, or*
>
> *b) has a capital investment value of more than $10 million and is located in an environmentally sensitive area of State significance.*

The proposal does not meet the threshold for state significant development as per the above.

Part 4 of the SRD SEPP sets out 'regionally significant development' and clause 20 states that development specified in Schedule 7 is declared to be regionally significant development. Schedule 7 of the SRD SEPP sets out "Private infrastructure and community facilities over $5 million" and states the following:

> *Development that has a capital investment value of more than $5 million for any of the following purposes—*
>
> *a) air transport facilities, electricity generating works, port facilities, rail infrastructure facilities, road infrastructure facilities, sewerage systems, telecommunications facilities, waste or resource management facilities, water supply systems, or wharf or boating facilities,*
>
> *b) affordable housing, child care centres, community facilities, correctional centres, educational establishments, group homes, health services facilities or places of public worship.*

As the proposed development has a capital investment of greater than $5 million (but less than $30 million) and comprises an electricity generating works, the proposal is identified a regionally significant development and the relevant provisions for regionally significant development therefore apply.

5.5 Berrigan Local Environmental Plan 2013

Berrigan Local Environmental Plan 2013 ("the LEP") is the principal planning instrument that guides development within the LGA. The below provides an overview of consistency and compliance of the proposal against the relevant provisions.

5.5.1 Land Use and Permissibility

The subject site is zoned RU1 Primary Production by the LEP. The objectives of the RU1 zone are as follows:

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
- *To permit development that enhances the agricultural and horticultural production potential of land in the locality.*
- *To permit low-key tourist and visitor accommodation that is compatible with the scenic amenity, and promotes the character, of the area.*
- *To enable function centres to be developed in conjunction with agricultural uses.*

The objectives of the RU1 generally refer to productive use of the land. Although the proposed solar facility does not directly relate to a productive use, it will not compromise the agricultural potential of the broader property or the surrounding rural properties. The nature of the solar farm is such that it will only occupy a small portion of the total agricultural property and will not substantially degrade the land, which can be returned to agricultural use after decommissioning.

Electricity generating works, including a solar facility, is a prohibited use in the RU1 zone, however, under the ISEPP, development of electricity generation works is permissible on prescribed rural land which includes the RU1 zone. The proposed development is therefore permitted with consent.

5.5.2 Earthworks

Clause 6.1 of the LEP refers to earthworks and aims to ensure that earthworks for which development consent is required will not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land.

This clause states that development consent is required for earthworks unless the earthworks are exempt development under this Plan or another applicable environmental planning instrument, or they are ancillary to development that is permitted without consent under this Plan or to development for which development consent has been given. The proposal includes the trenching of the site for installation of subsurface cabling, which may extend to a depth of up to 1 metre.

Clause 6.1(3) states before granting development consent for earthworks (or for development involving ancillary earthworks), the consent authority must consider the following:

(a) the likely disruption of, or any detrimental effect on, drainage patterns and soil stability in the locality of the development,

(b) the effect of the development on the likely future use or redevelopment of the land,

(c) the quality of the fill or the soil to be excavated, or both,

(d) the effect of the development on the existing and likely amenity of adjoining properties,

(e) the source of any fill material and the destination of any excavated material,

(f) the likelihood of disturbing relics,

(g) the proximity to, and potential for adverse impacts on, any waterway, drinking water catchment or environmentally sensitive area,

(h) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.

Overall, the earthworks required include minimal disturbance and are not considered to result in any significant adverse impacts on drainage structure or soil stability. The site is very flat and the works are not located in an area of instability or close to main watercourses. The impacts in regard to soil, as well as the proposed mitigation measures, are addressed in Section 6 of this report.

5.5.3 Essential services

Clause 6.10 of the LEP requires the consent authority to be satisfied that any of the following services that are essential for the development are available or that adequate arrangements have been made to make them available when required:

(a) the supply of water,

(b) the supply of electricity,

(c) the disposal and management of sewage,

(d) stormwater drainage or on-site conservation,

(e) suitable vehicular access.

The supply of reticulated water and sewerage services is not required for the proposed development as it will not occupy any new facilities requiring water supply or producing wastewater. Toilet facilities during construction and for occasional staff use during occupation will be provided for by way of temporary toilet facilities with in-built wastewater disposal.

Water supply by way of a portable tank or water cart during construction and as required during operation. Electrical services are available to the site as described elsewhere. Stormwater management will continue to runoff as per existing arrangements to nearby watercourses.

Road access is provided to the site via Broughans Road.

5.6 Berrigan Development Control Plan 2014

The Berrigan Development Control Plan 2014 (“the DCP”) provides specific requirements for development within the LGA, including the subject site.

The purpose of the DCP is:

- *to reflect the objectives of the Environmental Planning and Assessment Act 1979;*
- *to assist in the administration of Berrigan Local Environmental Plan 2013; and*
- *to provide good planning outcomes for development in the Shire.*

There are no specific DCP controls for solar farms or development on agricultural land. Generally, the proposal is considered to respond to the broad intent to the DCP by establishing a new use on the land which considers appropriate planning outcomes and will not lead to any adverse impacts.

6 Assessment of Environmental Impacts

This section of the SEE identifies potential impacts which may occur as a result of the proposed development and are relevant matters for the consideration of the DA under Section 4.15(1)(b) to (e) of the EP&A Act 1979.

6.1 Context and Setting

The subject land is located to the south west of the Finley urban area but is set within an entirely rural context. The character of the area is defined by a variety of rural properties which exist across large areas and comprise cropping and livestock grazing uses.

The site is suitable for the proposed development given it will occupy a smaller portion of the site and incorporates large setbacks from the main road frontage. The setback and partial screening of scattered vegetation softens the potential impact of the development from the surrounding receptors and main roads.

The larger landholding of the landowner, including the subject site, will continue to be used for agricultural purposes. Grazing is intended to operate as part of the normal routine by the current landowner and will assist in maintaining pasture height and ground cover, and will allow agriculture to continue on the site, although at reduced capacity. The site is considered suitable for sheep grazing and can be configured as part of the larger farm operations, utilizing internal gates connecting adjoining paddocks and livestock handling facilities. Livestock will be able to be able to graze in areas between the panel arrays and within the perimeter areas, however landscaping zones would be protected by fencing or similar treatment.

The development will ensure the establishment of a high quality and positive outcome within the surrounding context, without causing detrimental impacts to the surrounding context.

To mitigate against the potential impacts of development on the surrounding area, it recommended that prior to works commencing, a suitable Construction Environmental Management Plan (CEMP) or similar is to be prepared and submitted for approval by Council. This CEM should be generally consistent with the commitments provided within this SEE and the accompanying documentation, and include matters relating to:

- Aboriginal Heritage Management;
- Construction Traffic Management;
- Site Establishment
- Bushfire Management;
- Waste Management;
- Erosion and Sediment Control;
- Noise Management;
- Dust Management;
- Site Decommissioning;
- Operation Hours;
- Emergency, safety and security; and
- Weed Management and Biosecurity

6.2 Glint and Glare

Glint refers to the momentary flash of bright light that can be caused by the reflectivity of solar panels and glare refers to the continuous source of light and is generally associated with stationary objects. Glint and glare from PV panels can have potential safety or amenity impacts to surrounding sensitive receivers, including potential to impair observers through inducing an after image.

An assessment of the potential impact of the proposal has been undertaken using the GlareGauge Solar Glare Hazard Analysis Tool from Forge Solar. The results of this analysis are attached and are summarised and attached.

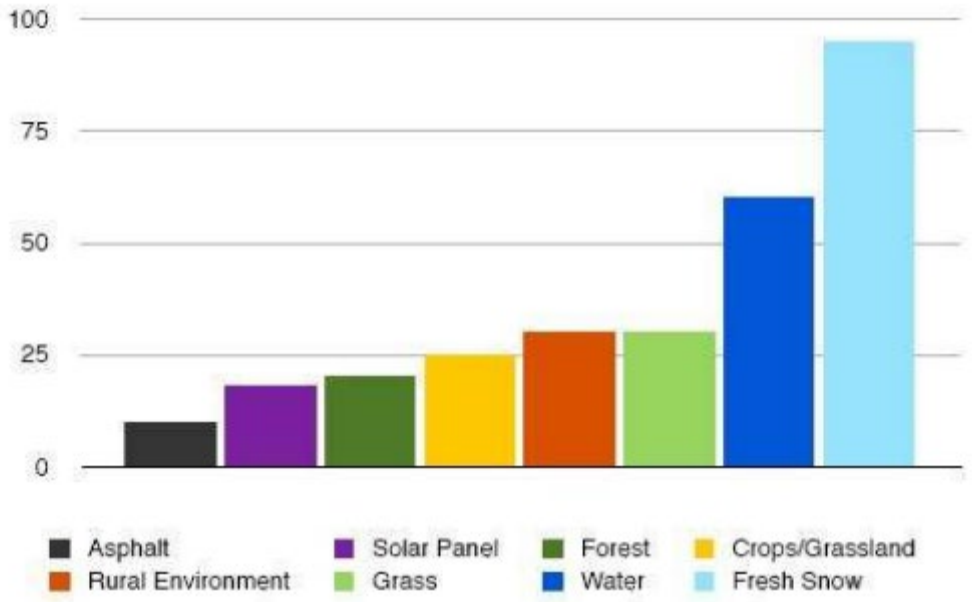
6.2.1 PV Panels Reflectivity

As construction of PV panels primarily utilises glass and steel there is a perception of glint and glare from the reflectivity of solar panels. This leads to potential issues of distractions to motorists, aircraft and eye damage.

Generally, solar panels will not create significant glint or glare compared with other surfaces. PV panels are designed to collect sunlight to convert to energy and therefore absorb the majority of light received. The panels are designed using anti-reflective coatings during manufacture to reduce reflection and will typically absorb 80-90% of the light received.

PV panels are also generally less reflective than other naturally occurring elements such as soils and crops and have been found to be generally less reflective that general rural environments and far less reflective that open water[1].

The angle of incidence of the sunlight is also relevant in considering the reflection of solar development. A fixed axis solar facility will have panels that do not move throughout the day and therefore the angle incidence varies with the time of day. A tracking system, such as that proposed for this development, will follow the sun through the day and can have the angle of incidence reduced. It is also possible to 'back track' panels at certain periods of the day to reduce potential impacts



[1] Spaven Consulting, Solar Photovoltaic Energy Facilities: Assessment of Potential for Impact on Aviation, January 2011

Figure 29 – Comparative reflection analysis of PV Panels to other surfaces (Spaven Consulting 2011, p.5)

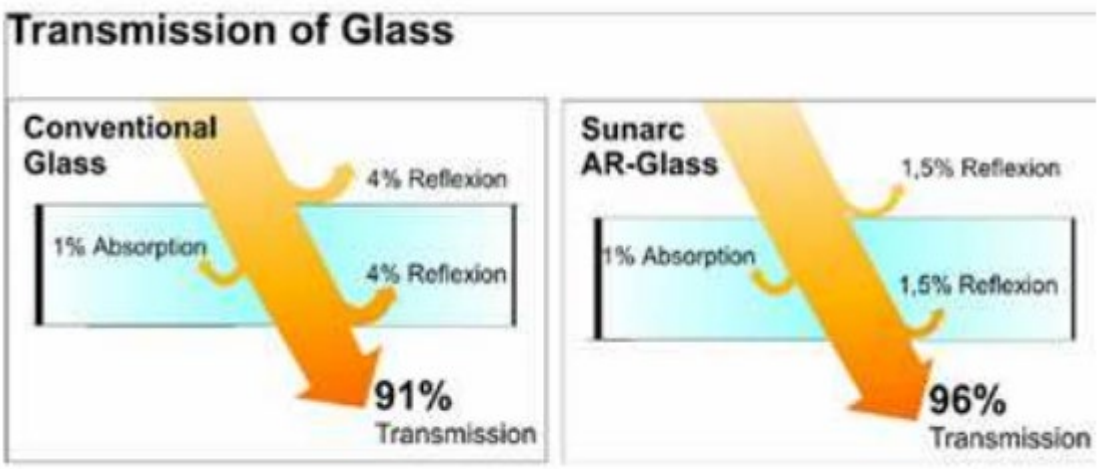


Figure 30 – Reflective values of conventional glass and typical treated glass (Spaven Consulting 2011, p.5)

As discussed, an assessment of the potential impact of the proposal has been undertaken using the GlareGauge Solar Glare Hazard Analysis Tool from Forge Solar. The tool enables the proposed solar facility to be mapped along with relevant data inputs and then uses the data consider the potential for temporary after-image or more significant retinal burn. The chart presented at **Figure 30** represents the possible severity of glare at receptor locations. In summary, red glare refers to potential for permanent eye damage from the observation location, yellow glare indicates the potential for after image effects and green glare refers to low potential for after image impacts.

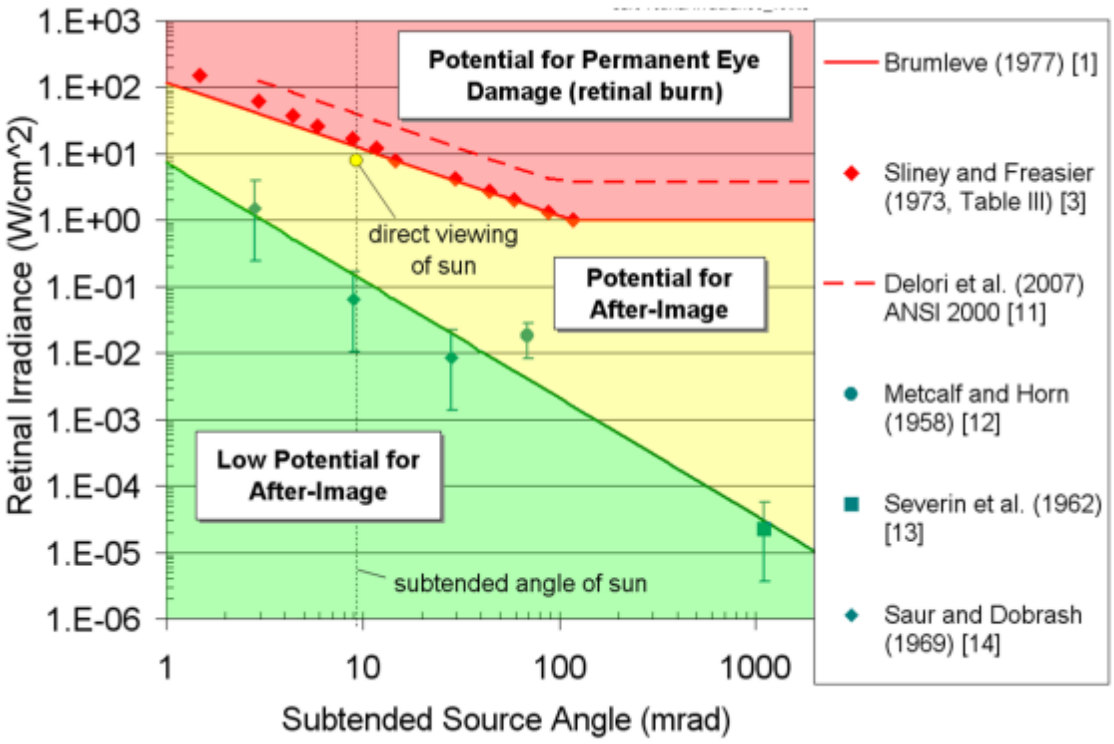


Figure 31 Summary of potential glare impact with regard to total minutes of glare for receptor.

The assessment relies on identifying the potential sensitive receptors surrounding the development and assessing the potential impacts on those receptors. The modelling for consideration of this

development utilises the specification and data of the proposed PV panels to be installed, the location of the panels relative to the receptors and the proposed angle of tilt for the panels.

The assessment has identified a range of road alignments and observation points for glare impact from the development. A small airport is also located on the fringe of the Finley township, approximately 2 kilometres from the development site. **Figure 31** below summarise the location of identified routes, flight paths and observation points within proximity to the site which may have potential impact from glare.

Figure 32 Observation points (dwellings), routes and flight paths in the surrounds of the proposed Finley Solar Facility

28 dwellings have been assessed with 18 predicted to be subject to some yellow glare or potential after image effect. “OP5”, located at the corner of Broughans Road and Dales Road was predicted to have the highest potential for yellow glare minutes at 914 minutes per year. “OP 2”, the nearest dwelling to the west was also predicted to receive potential yellow glare for 824 minutes per year. “OP 20”, which is located to the east of the PV array along Dales Road was also predicted to receive potential yellow glare for 618 minutes per year. The other observation points surrounding the development had generally low yellow glare exposure, all below 500 minutes per year with some below 100 minutes.

23 of the dwellings were identified as being subject to possible green glare, being for a low potential for after image effect, was also detected for 23 of the dwellings. All except 1 of these had minor exposure (i.e. generally less than 100 minutes per year), and range between 20-60 minutes of exposure per year. 5 dwellings modelled were subject to no green or yellow glare.

The analysis also modelled eight (8) route receptors, being Broughans Road, Broockman Road, Canalla Road, Dales Road, McMurrays Road, Newell Highway and two private access roads. Two of the assessed routes were subject to yellow and green glare. Broughans Road had a total of 32 minutes of yellow glare and 11 minutes of green glare per year. Dales road was subject to 82 minutes of yellow glare and 33 minutes of green glare. These amount of exposure to these routes per year is very low and it is not likely that travelling vehicles will be significantly affected. The internal accessway which

runs through the remaining western portion of the subject land also detected green glare exposure, however this was only recorded at 6 minutes and is not considered substantial.

The Finley Airport is located approximately 2 kilometres north east of the subject land, with the runway angled in a north-east, south-west alignment. The modelling has been carried out on Flight Path 1 (FP1), which refers to the approach path from the south-west and flight Path 2 (FP2) which is the approach from the north east. FP1 was found to have no green or yellow glare. FP2 was found to have 860 minutes of green glare per year and no yellow glare. This is considered to be acceptable as green glare represents a low potential for after image and the duration of exposure is low and confined to a generally low period of time per day for part of the year.

Overall, the assessment determines that the glare generated by the proposal is acceptable and can be adequately mitigated. The amount of glare calculated by this assessment was considered to be generally acceptable, however areas of yellow glare to adjoining properties is noted and appropriate mitigation measures should be imposed to minimise the potential impacts on those properties. Glare exposure can be mitigated through screening provided by landscaping along the boundaries to the properties that are likely to receive the highest extent of impacts (i.e to the east and south west). The proposal includes landscape treatments to all boundaries of the development and have been aligned to lot boundaries and with varying planting heights to provide suitable mitigation.

In the interim, prior to landscape reaching mature heights, it is recommended that suitable screening material be applied to the security fencing to appropriately mitigate any glare or visual impacts during the growth of vegetation.

The impact of the proposal on the adjacent flight paths is considered acceptable given the relatively short exposure times and being for green glare only. Again, implementation of the proposed landscaping and temporary perimeter screening will provide treatments to mitigate the impact of glare to surrounding receptors.

6.3 Visual Impacts

The visual impact of solar farms depends on the scale and type of infrastructure, the prominence and topography of the site relative to the surrounding environment; vegetation; and any proposed screening measures to reduce visibility of the site. In this instance, the proposal represents a small scale facility and has been proposed within an area of the site that maintains significant separation distances from the main road frontage and neighbouring dwellings.

Generally, solar panels will not create significant glare compared with other commonly existing surfaces. Likewise, photovoltaic solar panels are generally less reflective than other naturally occurring elements such as soils and crops.

The development will result in the placement of new solar panels and other aboveground infrastructure within a generally open landscape and presents risks to visual amenity.

The character of the landscape is predominantly an open modified agricultural landscape that has been shaped by farming and contains only scattered patches of native vegetation and other planted perimeter fencing. The landscape is very flat, with no areas of elevated viewpoints towards the site.

The proposed facility will comprise approximately 16,500 solar panels installed in a large number of rows through the property. The arrays are to be setback 200 metres from southern boundary (Broughans Road), approximately 370 metres from the northern boundary and 1.7 kilometres to the western boundary (Canalla Road). The panels are to be established along the eastern boundary, however no dwellings or sensitive receptors are noted at this interface. The sensitivity of private property and public roads to landscape change would be low given the predominantly agricultural

landscape. The magnitude of the project and impact on landscape character is also considered to be low for private property and public roads. An analysis of the surrounding context is provided at Figure 1 below indicating the immediate view corridor of 500 metres and sensitive dwellings located within the surrounding area.

Figure 33 – Visual catchment (500 metre) for the development area.

There is one existing dwelling within a 500 metre radius, with several more in close proximity beyond. The nearest dwelling to the south east is screened by extensive perimeter landscape planting to the lot boundary and provides an effective existing screen to the development site. Other nearby dwellings within approximately 500 metres to the west and south west are screened by remnant vegetation and roadside vegetation. There are a concentration of dwellings to the east of the site surrounding the Dales Road and Broughans Road intersection and along each road. These dwellings are beyond 1 kilometre of the site and are screened by scattered vegetation within the paddocks between the facility and the dwellings.

In the broader landscape, there are patches of vegetation to the east and west of the site (shown below) which assist in partially screening and softening the visual impact of development from surrounding existing residential properties.

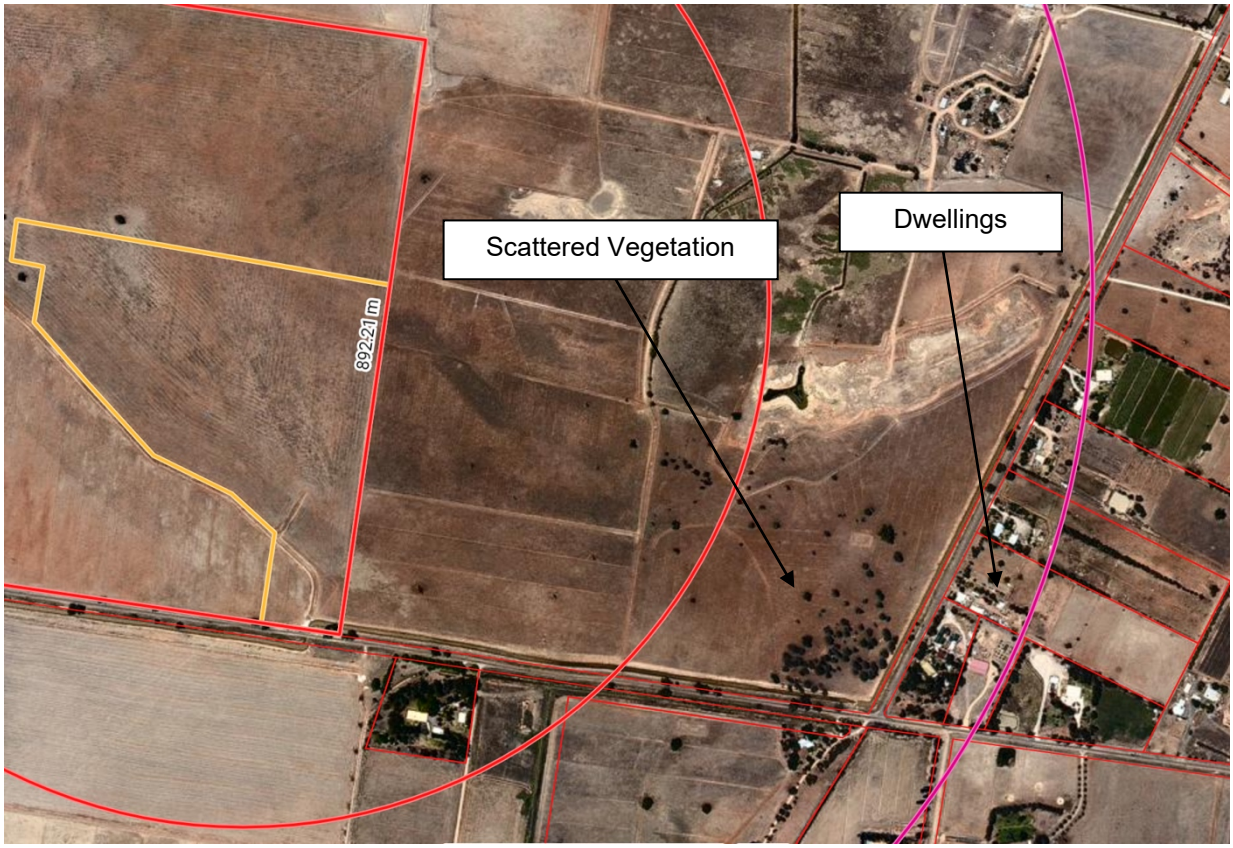


Figure 34 – Scattered vegetation to the east of development area

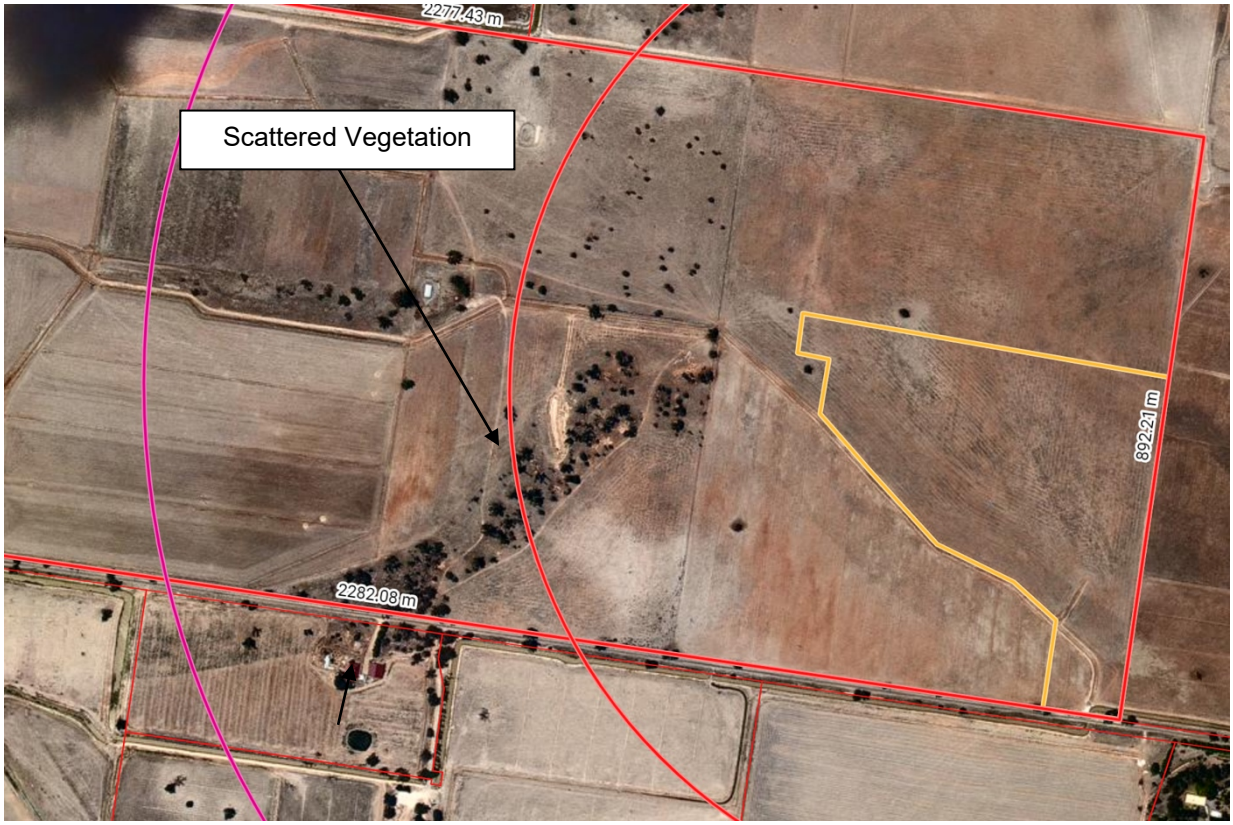


Figure 35 – Scattered vegetation to the west of development area

The visual impact of the proposed works are assessed to be low for the main sensitive viewpoints, being dwellings in the broader landscape and public roads. These impacts are considered acceptable given the nature of the proposed development and that it will contribute to renewable energy generation. The landscape is in a predominantly flat farming area and the development will incorporate large setbacks from primary road frontages. The landscape also includes scattered vegetation which offer partial screening to nearby dwellings.

To assist with the potential visual impact, it is proposed to establish landscape buffers along all boundaries of the development the submitted Landscape Plans.

6.4 Landscaping

Further to the discussion above in relation to visual impacts, the proposal includes landscape buffers to all site boundaries to screen and soften the development. The landscaping areas are intended to reduce visual impacts from sensitive receivers and the adjacent Broughams Road.

The proposed landscape outcome is intended to enable a long term landscaping solution whereby it will suitably accommodate the development in the short term and also enable the site to be sustainably returned to rural activities in the event that the solar facility is decommissioned in the future. In this regard, it has therefore been determined that this is most effectively achieved by aligning landscaping to existing lot boundaries, rather than the lease area of the development. The location inside the property boundary also ensures that the placement of landscaping does not form an impediment to ongoing rural function of the land, including beyond the operational life of the facility.

The landscaping for the site is detailed by the attached Landscape Plans.

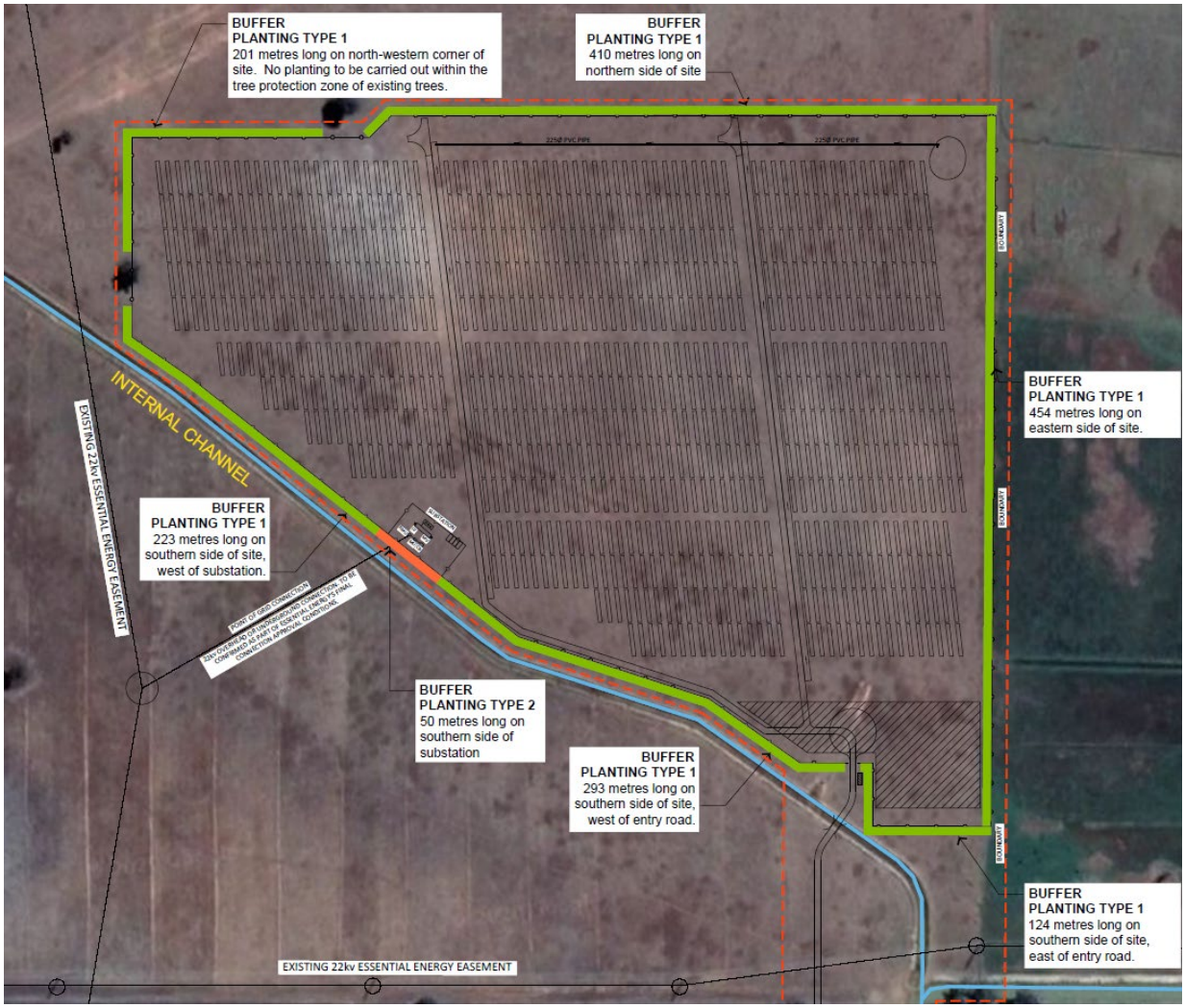


Figure 36 – Proposed Landscape Plan

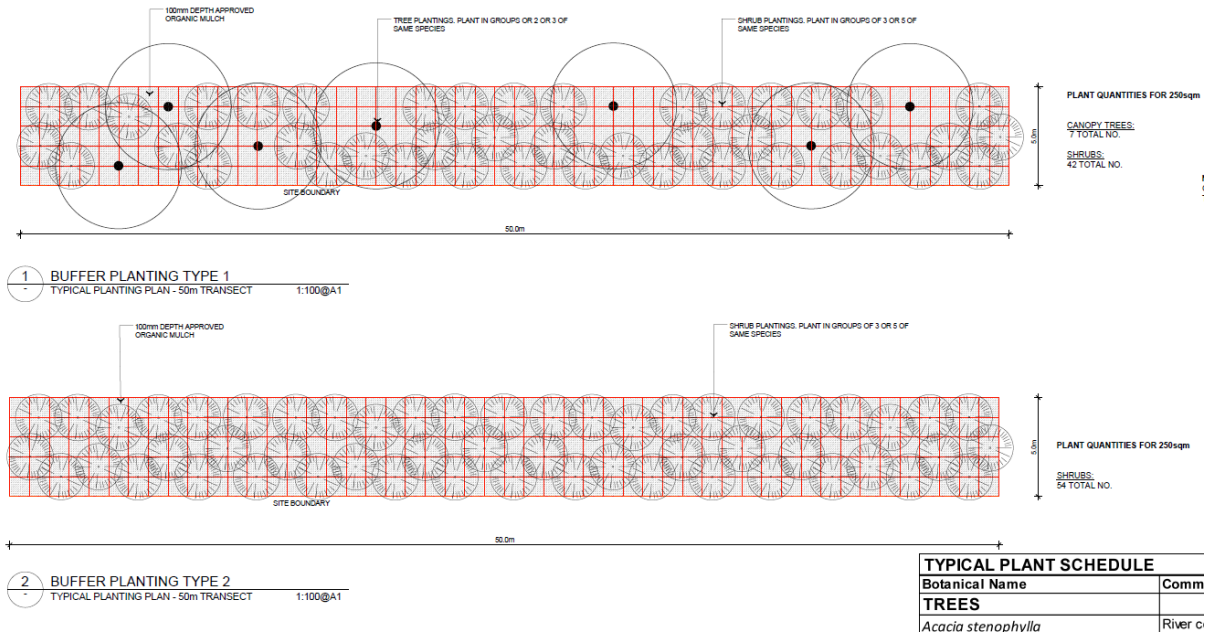


Figure 37 – Proposed Landscape Typical Sections (by type shown on plan)

6.5 Traffic & Access

Impacts regarding traffic have been considered through inspection of the existing road network and the present condition of the land. A Traffic Impact Assessment (TIA) has also been prepared to review the existing conditions in the vicinity of the site, including traffic, parking and servicing, as well as the performance of the surrounding network. The TIA then evaluates the required traffic and parking requirements for the proposed development, and the impacts on the surrounding road network.

The subject land is bounded by Broughans Road to the south and Canalla Road to the west, both of which provide access to the larger property. Informal and formal vehicular access to the site is available from both Broughans Road (in two locations, approximately 1.9km and 2.9km west of the Newell Highway) and Canalla Road (500m north of Broughans Road).

Broughans Road is to be the primary road that is to be used for access to the proposed development. It is a two-lane, two-way rural sealed road within a 20 metre wide road reserve that runs east west for a distance of approximately 11km between the Newell Highway and James Road. It is classified as a Residential Access Rural Sealed Road and is authorised for travel by vehicles up to and including B-Doubles.

Traffic will increase during the construction as delivery trucks, construction personnel and associated vehicles and contractors vehicles are expected throughout the process. Construction traffic will generally travel between Finley and the site via the Newell Highway and Broughans Road and it is expected that on average there will be eight (8) light/passenger vehicle movements per day eight (8) light/passenger vehicle movements per day. Light vehicles will primarily involve construction personnel, whereas heavy vehicles will involve delivery of plant and equipment associated with the solar facility. It is also intended to transport some construction personnel to the site each day by bus.

The TIA anticipates that construction activities at the site will generate 16 vehicles per day, a maximum of six days per week, resulting in 96 vehicles per week. This will include five vehicles per hour in the morning peak period (four light plus one heavy), travelling inbound to the site; and five vehicles per hour in the afternoon peak period (four light plus one heavy), travelling outbound from the site. Given the expected rate of traffic and the existing lower rates of existing traffic, it is not expected that the proposal will result in any significant impacts.

Once operational, the facility will have a very low rate of traffic generation. Primarily, traffic generated during operation of the site would be movement of staff in light vehicles to and from the site, which is expected to occur between Finley and the site via the Newell Highway and Broughans Road. There may also be occasional large vehicles delivering parts, plant or equipment, however these will be much less frequent. The TIA anticipates that the operational activities of the site will result in two (2) vehicles per day on the road network, a maximum of seven days per week, resulting in 14 vehicles per

Week. This comprises one (1) vehicle per hour in the morning peak period, travelling inbound to the site; and one (1) vehicle per hour in the afternoon peak period, travelling outbound from the site. This rate of traffic can be managed by the existing road network and will have no impacts on the existing network.

Overall, the TIA determines that there will be no significant impact on roads in the vicinity of the site or further afield during the operation of the proposed development, and that impacts from construction can be appropriately managed through the development and implementation of an appropriate CTMP.

For access to the site, the proposal intends to construct a new all-weather rural style access point at Broughans Road. Sight distances along Broughans Road is excellent in both directions, exceeding the minimum SISD of 248m for a vehicle travelling at 100km/h under the Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections. The TIA recommends upgrading the existing site

access from Broughans Road to comply with the requirements of Berrigan Shire Council's Engineering Guidelines for Subdivisions and Development Part 2: Roads (2014).

To ensure impacts regarding access and traffic is minimised, the following mitigation measures are recommended:

- Prior to the commencement of works, a Construction Traffic Management Plan is to be developed in consultation with Council, and the RMS as necessary, and provided to Council for endorsement.
- Construction traffic should be managed through the development and implementation of a Construction Traffic Management Plan (CTMP) written in accordance with the requirements of Australian Standard AS1742.3 Manual of Uniform Traffic Control Devices – Traffic Control for Works on Roads and the RMS (TfNSW) Traffic Control at Work Sites – Technical Manual; and
- The primary access into the site from Broughans Road (approximately 1.9km west of the Newell Highway) be upgraded to comply with the requirements of Berrigan Shire Council's Engineering Guidelines for Subdivisions and Development Part 2: Roads (2014) and to a standard capable of accommodating construction and operational traffic as envisaged by the Traffic Impact Assessment.
- Grading and construction of the internal access network using gravel surfaces to ensure an all-weather standard can be maintained.

6.6 Drainage

The proposal will include a number of internal gravel access roads and new hardstand areas surrounding the proposed substation which will alter runoff from the property. Accordingly, the proposal includes new on-site swale and detention facilities to collect, convey and discharge stormwater from the site at pre-developed levels.

All runoff from the gravel access roads and the hardstand areas of the property will be collected and conveyed to a proposed on-site basin via new swale drains along the internal access roads. The runoff will be collected in the proposed basin and will discharge at pre-developed flows, as calculated by the submitted Concept Stormwater Management Plan. This swale drain and detention basin network will be designed to collect and discharge runoff from the property at pre-developed levels. The swales will have capacity for 0.037m^3/sec of runoff and will discharge to the basin with a surface area of approximately 500m^2, representing the required storage for the scale of the proposed facility

The basin is intended to comprise a shallow basin with a small bank, enabling a more natural basin design. Proposed outfall from the basin will be provided with rock beaching to allow runoff at pre-developed levels to be made without increasing erosion risk. Internal swales and the basin will comprise appropriate surface treatments, including grass and other landscaping as required to prevent erosion and assist with treatment.

It is proposed that runoff from the proposed panels will runoff to the ground and will be dissipated into the natural ground. The proposed panels will be a single axis tacking system. The runoff from the increased imperviousness of the solar panels is insignificant. As the entire solar array is not a continuous impervious surface, most of this runoff will infiltrate into the soil as per current conditions. The installation of the panels will not significantly alter the existing ground conditions beneath the arrays that would affect runoff.

Research carried out in relation to the impact of solar farms on stormwater runoff in the USA and the UK has concluded that solar panels will not have a significant impact on the hydrology of the site under a number of conditions such as:

- where the soil profile has not been overly compacted and maintains suitable opportunities for infiltration
- where there is some surface vegetation cover that can be maintained,
- where the site has good sheet flow across the surface rather than concentrated flows along narrow flow paths,
- where there is sufficient separation between each row of solar panels to allow runoff to spread across the surface and encourage vegetation growth

These principles have been considered in the design of the proposed facility, with the site having been farmed for a long period of time and having suitable opportunity for infiltration of stormwater runoff. The site is very flat and has uniform existing runoff via sheet flow and avoids channelling flows in particular paths. The design of the facility also includes suitable separation and spacing to ensure broader flows of runoff from the panels. The proposal is therefore considered to represent a responsive design to stormwater and drainage consideration.

A Concept Stormwater Management Plan (refer to **Attachment E**) has been prepared and sets out the design requirements for the proposed stormwater design of the facility.

6.7 Biodiversity

A desktop biodiversity assessment has been carried out to examine the likelihood of the proposal having a significant effect on any threatened species, populations or ecological communities. This desktop assessment has been supported by a site inspection carried out in November 2019 and March 2020.

Relevant literature, online resources and numerous databases were reviewed to provide an assessment of environmental, flora and fauna values associated with the investigation area. The following information sources were reviewed:

- OEH Bionet Atlas for species sighting recordings
- NSW Government State Vegetation Type Map to identify regional scape mapping of Plant Community Types (“PCT”)
- Department of the Environmental and Energy Protected Matters Search Tool (“PMST”) for predicted threatened species based on available habitat
- Aerial photography of the investigation area (via Nearmap)
- Property information available from NSW Land and Property Information
- Relevant environmental legislation and policies, including:
- Environment Protection and Biodiversity Conservation Act 1999
- Biodiversity Conservation Act 2016
- Previous ecological assessments within the Berrigan LGA.

Background research was utilised to assist in predicting flora species for identification purposes and in preparing a list of potential threatened species.

Site inspections were carried out on 25 November 2019 and 26 March 2020 within the area identified below at **Figure 29**. This area consists predominantly of the maximum impact area of the proposed facility, and was marginally extended to account for access, and potential impacts on nearby trees. The methodology consisted of a general flora survey, a significant flora study and an assessment of potentially affected trees. These methods are described in the following sections.

Figure 38 Portion of the site investigated (blue outline) with the footprint of the proposed solar facility (red shading).

The PMST identified potential for five (5) ecological communities, either endangered or critically endangered under the EPBC Act, to be present within the study area. It is noted that the PMST provides predicted records and does not account for factors such as land use and disturbance. It was not predicted that these communities would occur on site. The potential communities are as follows:

- *Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions*
- *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia*
- *Natural Grasslands of the Murray Valley Plains*
- *White Box-Yellow Box-Blakely's Red Gu Grassy Woodland and Derived Native Grassland*

In addition to the potential ecological communities, other Matters of National Environmental Significance that were identified by the PMST were considered as part of the background research.

The potential threatened species likely to occur in the area were determined from the Bionet Species siting records and the PMST. Records of potential threatened flora species occurring in the investigation area are set out within the following table. It is also noted that other exotic and non-threatened species, which were considered as part of the general flora survey, are included as part of the attached extracts from both these databases:

Table 3 Records of predicted threatened flora species based on review of databases and available site conditions.

Name	BC Act Listing	EPBC Act Listing
Austrostipa wakoolica	Endangered	Endangered
Amphibromus fluitans (Floating Swamp Wallaby-grass)	Vulnerable	Vulnerable
Brachyscome muelleroides (Mueller Daisy)	Not listed	Vulnerable
Sclerolaena napiformis (Turnip Copperburr)	Endangered	Endangered
Swainsona murryana (Slender Darling-pea)	Vulnerable	Vulnerable

Spatial databases including the NSW State Vegetation Type Map ("PCT Map") and aerial imagery were used to identify and verify the potential for habitat and the level of disturbance to the site.

The entire development area is identified as 'non-native' land by the PCT Map indicating a modified landscape condition., However, it is noted that the portion of vegetation to the west of the investigation area (within the centre of Lot 126) is identified as part of PCT 76 'Western Grey Box tall grassy woodland and clay soils in the SNW Western Slopes and Riverina Bioregions'. This is likely to be representative of indigenous conditions of the site, prior to modification.

The subject land is shown as being affected to a minor degree by biodiversity on the Terrestrial Biodiversity Map of Berrigan LEP as shown below. This aligns to a patch of vegetation retained through the centre of subject land, however is not within the area to be developed for the proposed facility.

Figure 39 – Extract from Berrigan LEP Terrestrial Biodiversity Map

The most detailed and latest available aerial imagery was taken from Nearmap records and is dated January 2010. The aerial imagery was considered and demonstrates that the land has been highly disturbed by agricultural activity over a long period.

The desktop assessment indicates a low likelihood of any substantial vegetation across the investigation area. However, areas immediately surrounding the investigation area includes three scattered trees and a more prominent stand of existing remnant vegetation towards the centre of the site.

A general flora survey was carried out across the site using the "Random Meander Technique" described by Cropper (1993). This method was used due to the high disturbance of the site, and its relatively low diversity and density of vegetation across the study area. The field survey was undertaken to ground truth the information identified via desktop review and to identify the presence of any threatened ecological communities. All species observed were identified as far as practicable to a species level. For those which could not be identified on site, a sample was collected and identified utilising nomenclature available from NSW PlantNET. At minimum, all dominant species were identified and recorded.

After the compilation of background information, targeted searches were then conducted over the subject land using the "Random Meander Technique" described by Cropper (1993). The predicted threatened species, as listed under the BC Act or EPBC Act, and identified as part of the background research were specifically targeted through field survey to determine and verify biodiversity conditions within the investigation areas.

The landscape of the investigation areas was found to be dominated by introduced grasses, consisting predominantly of degraded and dried grasses and various weeds. The area of the site around the fenced area of the channel was less disturbed by grazing and included rushes and weeds, predominantly consisting of distributions of *Marrubium vulgare*. The highly disturbed nature of the paddock presented low densities of the grasses identified in the table below. Much of the investigation area consists of bare ground.

Table 4 Species list of flora observed during the general survey

Scientific	Common	Exotic
Austrostipa aristiglumis	Plains Grass	
Avena fatua	Wild Oats	*
Chloris truncata	Windmill Grass	
Cirsium vulgare	Spear Thistle	*
Echium plantagineum	Pattersons Curse	*
Enteropogon acicularis	Curly Windmill Grass	
Juncus sp.	A rush	
Lolium rigidum	Wimmera Ryegrass	*
Marrubium vulgare	White Horehound	*

Scientific	Common	Exotic
Rytidosperma setaceum	Small-flowered Wallaby Grass	
Sclerolaena birchii	Galvanised burr	
Tribulus terrestris	Cat-head	*

To account for secondary impacts from future development, the investigation area was marginally extended, and included the three trees located outside the north-western extent of the defined development area. The species of these trees were identified, and assessment was made on their conditions and habitat value for the purposes of due diligence.

No trees were identified in the development area, however three (3) scattered trees are located beyond the site and were assessed in order to account for any edge effects of development or variation to future development area. The trees are native trees contained in an open paddock and are separated from one another and not supported by any significant ground layer. **Figure 31** below indicates the observed trees in the landscape and their spatial relationship.

Given the isolation of the trees, they are not assessed to provide any significant level of connectivity. Native Crested Pigeons (*Ocyphaps lophotes*) were observed utilising the trees as habitat, indicating that the trees provide habitat conditions for native bird species.

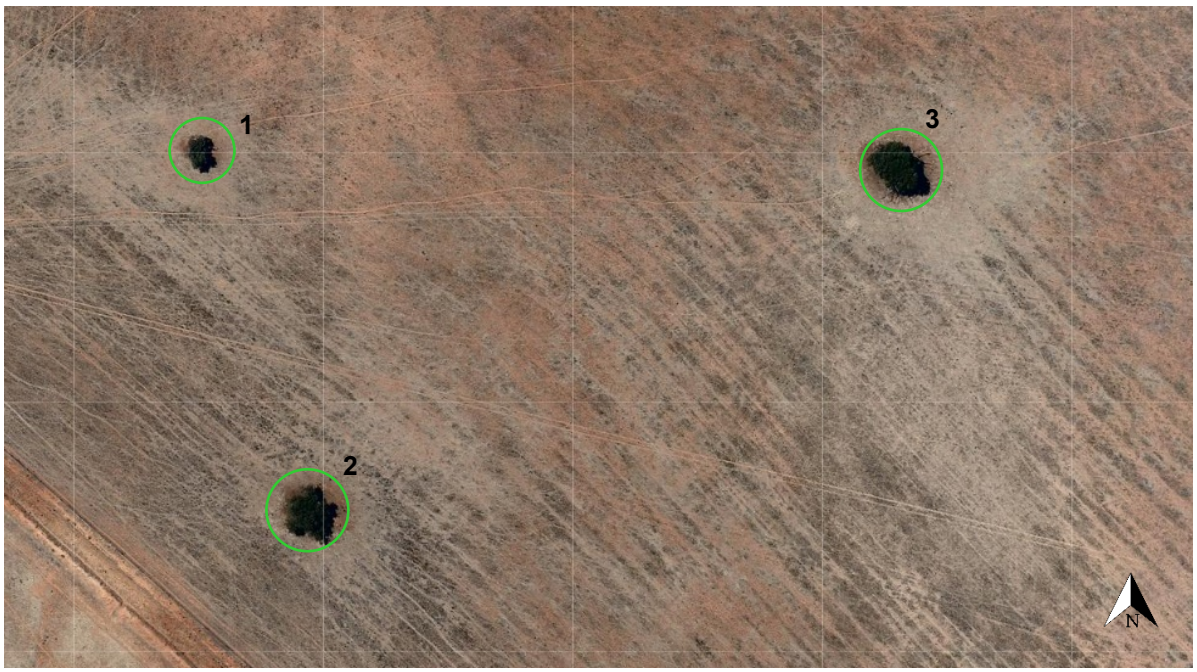


Figure 40 Scattered trees within the northwest of the investigation area

No.	Common

No.	Common	
1		*Allocasuarina luehmannii* (Buloke) ▪ Healthy ▪ Not hollow bearing ▪ Trunk width: approx. 70cm DBH
2		*Allocasuarina luehmannii* (Buloke) ▪ Healthy ▪ Not hollow bearing ▪ Trunk width: approx. 60cm DBH
3		*Eucalyptus albens* (White Box) ▪ Healthy ▪ Not hollow bearing ▪ Trunk width: approx. 110cm DBH

Having regard to the desktop and field survey results, along with consideration of the likely design of the proposed solar facility, the future development of the land is expected to have no significant biodiversity impacts. The area within the development area is highly disturbed and does not contain any identified ecological values.

Notwithstanding, the potential impacts from the development may have direct or indirect impacts on biodiversity within the site or adjacent areas during construction and operation, including increased

weed encroachment, and other edge effects from development. However, it is not expected that it will cause any increased impacts over the existing operation of the site as a grazing paddock. Potential indirect impact on scattered native trees and habitat for native bird species within the site due to 'edge effects' resulting from development works and operational matters associated with development. It is considered that any impacts can be adequately mitigated through the design and operational stages.

No impacts on wildlife corridors and areas of significant biodiversity or conservation value are expected. Likewise, no impacts on threatened species or ecological communities are expected due to the degraded condition of the ground layer and general absence of native species throughout the site.

The following mitigation measures are provided to ensure that no unintended impacts arise from the proposed development of the solar facility.

- Scattered trees located adjacent to the impact area and the electrical supply services traversing the site are to be protected by appropriate barriers, in accordance with AS4970 – Protection of trees on development sites.
- If threatened species are observed during works, works should cease immediately, and an appropriately qualified ecologist be contacted.

These above measures will be appropriately implemented as part of the construction and/or operation of the proposed development, to ensure that impacts on biodiversity are appropriately minimised.

6.8 Heritage

6.8.1 Aboriginal cultural heritage

The proposal will require earthworks required for cabling of each photovoltaic array to inverters and the substation, for piledriving of the supportive frames, and for the proposed perimeter road. As such, Aboriginal heritage was considered as part of the proposal to ensure that no harm would come from these works or the ongoing operation of the facility.

An Aboriginal Due Diligence Assessment has been carried out for the property by NGH Environmental for the land in accordance with the sequence of steps identified in the NSW Office of Environment and Heritage's *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW*. A copy of the Assessment is provided at **Attachment G**.

A search using the basic AHIMS search tool did not locate any Aboriginal sites or places within or around the subject land at a buffer of 50 metres. The report determined that the pre-European landscape in the proposal area has undergone significant modification with the installation of the Murray Irrigation Area and laser levelling of pastoral paddocks across the district. An initial desktop assessment, using satellite imagery and topographic data, indicated that the site appears to have low potential for Aboriginal Cultural Heritage to occur within the project area given that no natural watercourses are present and the landscape has been significantly modified from its pre-European state. A visual inspection was completed covering the entire proposal area with no sites of Aboriginal Cultural Heritage or areas of archaeological sensitivity or landforms with the potential to contain Aboriginal objects identified.

The Report concludes that:

No sites of Aboriginal Cultural Heritage or unmodified areas of archaeological sensitivity or landforms with the potential to contain Aboriginal objects were identified across the proposal site. This is due to the historic disturbances that were noted, resulting from the installation of channels to the north and south east of the proposal area and the laser levelling for previous cropping purposes. The south eastern channel extends across a small portion of the current assessment area but is no longer utilised for irrigation purposes. The channel locations may be modified natural creeklines that previously existed in the area, which may increase the potential for Aboriginal heritage sites to occur. The density of meandering trees in the paddock to the immediate west of the proposal site suggests that a depression and possibly a former creekline may have been present in this area which also raises the potential for Aboriginal sites to occur in the immediate landscape. The vegetation clearance has resulted in only scattered paddock trees remaining in the proposal site.

Despite the presence of possible landscape features in the immediate area, laser levelling of the paddocks within the solar farm project area has removed any micro-topographical landforms that may have been the focus of occupation by Aboriginal people in the past. The removal of these landforms is also likely to have removed the archaeological signature for this region, which is generally a low-density scatter of stone artefacts.

The lack of previously identified Aboriginal Cultural Heritage sites in the Finley region, suggests that despite the low ground surface visibility during the survey, the lack of sites within the proposal area is a true representation of the archaeological record at this location.

Despite not containing or having a likelihood of containing Aboriginal cultural heritage, the proposal is recommended to contain all areas of works of existing disturbance and any activity proposed outside of the current assessment area should also be subject to an Aboriginal heritage assessment. If in the

unlikely event that any items suspected of being Aboriginal in origin are discovered during the work, all work in the immediate vicinity must stop and BCD notified. The find will need to be assessed and if found to be an Aboriginal object an AHIP may be required.

6.8.2 Non-indigenous heritage

A search was undertaken for items of heritage significance in the area under the NSW Heritage Act and the Berrigan Local Environmental Plan. There are a number of items within the urban area of Finley, however none of these items are located within the vicinity of the subject land.

Figure 41 – Non-indigenous heritage within the Finley urban area

Due to the absence of any non-indigenous heritage and no buildings or structures which may have heritage potential, there are no recommended mitigation measures proposed in regard to heritage.

6.9 Natural Hazards

6.9.1 Flooding

A portion of the subject land is identified within the flood planning mapping for Berrigan Shire, however this is contained to the central portion of the land, outside of the proposed development area. The development area is flat and well drained and is not expected to be subject to any flooding impacts. The nature of development will also not be likely to generate any additional stormwater runoff that may contribute to flood risks on the site.

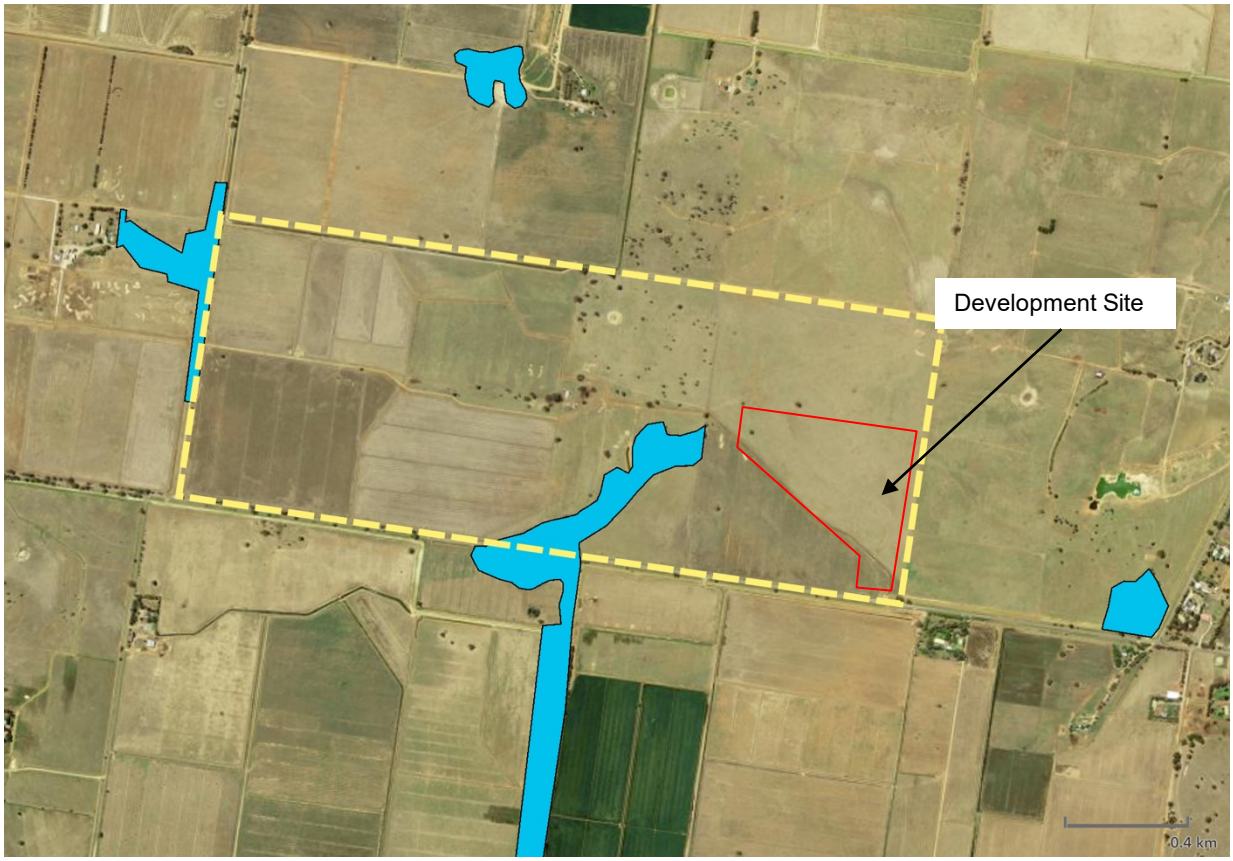


Figure 42 – Extract from Berrigan LEP Flood Planning Map

6.9.2 Bushfire

The development site is not mapped as being bushfire pone land. Infrastructure comprising electricity generating works is not a habitable building and is not listed as a special fire protection purpose under section 100B of the Rural Fires Act 1997. The subject land, particularly within the area of the proposed development, is generally clear of vegetation, as are surrounding properties.

Notwithstanding the above, the risks of potential bushfire is appropriate for consideration given the risk presented by electrical generating infrastructure and the rural landscape.

The land comprising the new development is cleared and the likelihood of vegetation intensifying around the facility is low. The immediate landscape within 140 metres of the facility is also best categorised as a grassland, consisting of farming paddocks. The nearest vegetation distributions in an open woodland formation is to the west of the development area.

Despite the land not being mapped and no requirements for fire protection, it is considered best practice for the facility to implement bushfire protection measures. This is to mitigate against the potential risks caused by grasslands surrounding the facility. These mitigation measures are as follows:

- Establish and maintain a 10 metre APZ area surrounding the entire development, ideally utilising the internal access tracks;
- The APZ should be managed to comprise minimal fuel at ground level, vegetation that does not provide a continuous path to building/s for the transfer of fire, shrubs and trees that do not form a continuous canopy and vegetation is planted/cleared into clumps rather than continuous rows, species that retain dead material or deposit excessive quantities of ground fuel are avoided, shrubs and trees are pruned or removed so they do not touch or overhang the

building/s, vegetation is located far enough away from the building/s so that plants will not ignite the building/s by direct flame contact or radiant heat emission.

- Buildings should be sited and designed to minimise the risk of bush fire attack and sited so that an APZ of 10 metres can be established.
- Property access roads should comply with the following requirements of section 4.1.3 (2) of Planning for Bush Fire Protection 2006, including:
    - a minimum carriageway width of 4 metres should be provided
    - A minimum vertical clearance of 4 metres to any overhanging obstruction, including tree branches should be provided.
    - - Curves should have a minimum inner radius of 6 metres to allow for rapid access and egress. The minimum distance between the inner and outer curves should be 6 metres.
    - Crossfall should not exceed 10 degrees.
    - Maximum grades for sealed roads should not exceed 15 degrees and should not be more than 10 degrees for unsealed roads
- Maintain a perimeter road to the facility in an all-weather condition that provides two way movements or passing bays at regular intervals.
- Establish an emergency evacuation plan detailing safety and protection measures for the facility.

6.10 Electro-magnetic radiation

The generation and use of electricity can produce extremely low frequency electro-magnetic fields (EMF). According to the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), which is the department which oversees emerging research into the potential health effects of EMF exposure, there is no established evidence of health effects from exposure to electric and magnetic fields from powerlines, substation, and other electrical sources, regardless of proximity.

The location of the prosed solar facility is considered appropriately separated from the nearby adjacent dwellings. No further mitigation measures are proposed.

6.11 Waste Management

The proposal will generate waste predominantly during the construction phase that would typically include off cuts, excess construction material and domestic and putrescible waste (including food waste, bottles, cans and paper). The primary waste will likely result from the establishment and construction works of the facility and installation of the arrays. It is not anticipated that the works will generate substantial amounts of waste providing that the appropriate management and mitigation measures are implemented. Any waste produced through the construction stage will be collected and appropriately stored on site and disposed at a facility which can lawfully accept the waste material produced.

It is expected that the solar farm will be operational for at least 20 to 25 years. Waste generated during operation of the facility is expected to be relatively low given the minimal occupation of the facility and the nature of the proposed activities. Operational waste is anticipated to include occasional waste generated by staff on the site and any excess materials used during management and maintenance works. On site waste storage bins will be provided and collected as required by waste removal contractors.

Upon decommissioning all infrastructure, including cabling and panels and mounting frames including footings and inverters would be disassembled and removed from the site.

A preliminary Waste Management Strategy is set out within Table 5 below. This preliminary Strategy sets out the anticipated waste that will be generated at the construction, operation and decommissioning phases of the development.

Table 5 Preliminary Waste Management Strategy

Stage	Anticipated Waste Material	Proposed Management
Construction	▪ Excess concrete from the setting of mounts and footings ▪ Off cuts and excess construction material ▪ Packaging materials including plastic wrapping, cardboard and wooden pallets ▪ Cable reels and other electrical waste ▪ Domestic and putrescible waste (including food waste, bottles, cans and paper) ▪ Unused or spent chemicals.	Construction waste will be sorted and stored in stockpiles and skip bins as required, located within a defined laydown area in accordance with the NSW EPA *Waste Classification Guidelines* for recycling and landfill, as follows: ***Recycling*** ▪ Steel & scrap metal ▪ Recyclable plastics ▪ Cardboard packaging ▪ Timber product (incl. cable reels & pallets ***Landfill*** ▪ General Waste ▪ Domestic & putrescible waste ▪ Non-recyclable plastics Recycling and landfill waste will be collected and taken to off-site waste management facilities which can lawfully accept the waste, as required.
Operation	▪ General waste from site office, including paper, plastic and glass. ▪ Waste resulting from maintenance work, including packaging, and broken equipment. ▪ Minor degree of domestic and putrescible waste (including food waste, bottles, cans and paper)	All waste will be stored in bin or otherwise stockpile areas near the site office, which will divide waste into landfill and recycling streams. These waste materials will then be taken to off-site waste management facilities.
Decommissioning	▪ Photovoltaic modules and supporting poles and mounts, ▪ PV boxes, skids, scrap metal. ▪ Glass for panels ▪ Silicon for wafers ▪ Inverters, batteries, transformers and electrical cables ▪ Fencing ▪ Storage containers	As with construction, waste generated from the dismantling of the solar facility infrastructure will be distributed to separate streams for recycling or general waste. Recycling and landfill waste will be collected and taken to off-site waste management facilities which can lawfully accept the waste, as required. The amount of material types that will be recyclable will be determined by the development of the waste recycling industry and their future capacity to process specific materials. Given the anticipated number of operational years, it is expected that the recycling industry will development new technologies and uses, as required.

It is recommended that a Waste Management Plan be produced to detail waste management guidelines for the construction, operation and decommissioning of the facility. This plan is to be developed prior to any works commencing on site, and is to detail the following:

- Provision and classification of waste streams including recycling and general waste in separated bins.
- Reporting procedures if any waste incident occurs.
- Waste minimisation strategies for both construction and operation of the facility.
- Location of bins, signage, and collection points.
- Considerations to recycling and/or disposal of infrastructure upon decommissioning.

6.12 Air Quality

The use of the subject land is for agricultural purposes likely consisting of regular tilling, sowing and harvesting or animal grazing. As is evident from the current condition of the land, this agricultural use has degraded much of the groundcover vegetation and left the ground exposed. The construction processes of the proposed solar farm will not involve substantial earthworks and only small scale excavation for footings, ancillary structure including the substation, and for the establishment of an unsealed perimeter road. Other ground disturbance may result from the passage of large vehicles for the delivery of the panels and driving machinery for the array footings.

Dust emissions may be generated as a result of earthwork activities, particularly during dry and windy conditions. Excessive dust generation may impact the amenity of surrounding properties and be detrimental to human health. Some of the environmental factors that must be considered when evaluating the risk of dust generation are the following:

- Soil type & structure – clay content influences the expected dust generation, with higher percentages correlating to decreased dust generation. Degradation of soil structure increases dust generation.
- Soil moisture – wetter soil decreases dust generation.
- Rainfall – as well as contributing to soil moisture, it also influences the potential suspension and drift of dust particles.
- Wind direction and speed – determines the potential drift and direction of dust particles.

These environmental factors will be monitored for each of the construction and operational stage of the development.

The rate of dust generation from the land once the facility is operational is expected to reduce from the former agricultural use do to their being less ground disturbance required for the operation of the facility.

The following mitigation measures are proposed to minimise dust generation for the construction and operational stages of the development:

<u>During Construction:</u>

- Minimise vehicle movements to defined paths and laydown areas.
- Supress dust emissions using watering carts, spraying water to supress dust as required.
- Daily monitoring of weather conditions and pause works during dry and windy weather.
- Construction will cease and be rescheduled if monitoring identifies windy weather in excess of 40-50km/hr
- Minimise the driving of the footings of the arrays through an appropriately designed layout.

- Ensure stockpiles of excavated material is bunded and protected from wind and vehicle movements
- Enforce an on-site speed limit of construction and contractor vehicles to limit vehicle dust generation
- Construction vehicles will be washed down, using on-site facilities, to minimise the transportation of mud and dirt onto roadways
- Any dirt that has tracked onto the adjacent roadway, from construction vehicles, will be cleaned and appropriately disposed of within 24 hours
- Visual inspection of the construction areas will be undertaken by the HSE Coordinator and construction personnel to identify any potential management issues.

<u>During operation:</u>

- Provide training as a part of site induction process to educate employees and contractors of air quality management.
- Regular monitoring of dust generation rates to ensure that low levels
- Revegetation and regeneration of site with appropriate ground cover species.
- Ensure all plant, storage areas and equipment is contained within a designated graded area.
- Grade and add gravel base to accessways and circulating roads, where appropriate.
- Ensure monitoring and maintenance protocols for the internal road network is followed to reduce dust generation
- Enforce a maximum speed limit on the internal road network to ensure operational traffic generates minimal dust.

The implementation of these mitigation measures will ensure that the impacts on air quality form dust generation is minimised. Throughout the construction and operational stages, the success of these measures will be monitored and reviewed as required.

6.13 Noise

The impacts of noise have been anticipated based on the surrounding receptors, being nearby dwellings. The surrounds of the impact area are largely undeveloped consisting of large farming areas and low density housing development on farming or lifestyle blocks. The closest of these receptors have been identified and are listed in the following table:

Description	Approx. Distance (m)
Single dwelling at 299 Broughans Road	750
Single dwelling at 167 Broughans Road	180
Single dwelling at 231 Broockmanns Road	950
Single dwelling at 311 Brockmanns Road	1020
Single dwelling at 134 Dales Road	900
Approximately 10 dwellings around intersection of Broughans Road and Dales Road.	900

The following potential impacts are anticipated from the construction works and operational stages of the facility:

Construction

Construction works will also include a period of noise generation during establishment. Works will occur over a very short period of time, and will be limited to appropriate hours of operation, as determined by Council and expressed through conditions of approved consent. Noise impacts will be of a minor nature and include vehicle movement and including delivery trucks and vehicles and other equipment or machinery including pile driving machinery and power tools.

Operation

The operation of the facility is expected to have minimal noise after the commencement of operation. Noise sources will be predominantly kept to vehicle movements, and maintenance crews. Given the nature of the facility, it is not expected that there will be significant noise pollution and the identified receptors are overall sufficiently removed.

An Environmental Noise Impact Assessment has been prepared to assess the potential impact of noise from the facility on surrounding sensitive receptors. The assessment has regard for the NSW EPA's Noise Policy for Industry 2017.

Noise modelling and calculations show that the level of noise emission from the operational phase of the development is well below the EPA's project noise trigger levels at all receptor locations without the need for noise controls. This includes an additional 5 dB penalty for modifying factor adjustments applied to the transformer for potential tonal characteristics which is unlikely to be the case in practice, given the distances to each receptor.

There is potential for minor exceedances of the construction noise management level of 45 dBA (Leq, 15 minute) at the closest receptor to the site whilst works are undertaken in the south eastern extent of the land. Once works progress toward the north, construction noise levels will be within the noise management level at all receptors.

Recommendations are made within the Assessment to minimise the impacts of construction noise and vibration in accordance with the Guideline and Australian Standard. Prior to the commencement of works following the issue a Construction Certificate, a Construction Noise and Vibration Management Plan may be prepared and submitted for approval by Council.

The following mitigation measures are recommended to minimise the noise impacts during the construction phase and are in accordance with and derived from the Australian Standard AS 2436-2010 Guide to noise and vibration control on construction, demolition and maintenance sites and the EPA's Interim Construction Noise Guideline 2009.

- Construction hours should be as follows:-
  - Monday to Friday 7 am to 6 pm,
  - Saturday 8 am to 1 pm,
  - No work on Sundays or Public Holidays.
- If practicable, screw piles should be used for the installation of the mounting poles rather than driven piles.
- All other plant and machinery should be selected with consideration to low noise options where available. For example, a wheeled dozer or loader is preferable to a tracked dozer or excavator if it is practicable.
- Workers and contractors should be trained in work practices to minimise noise emission such as the following:-
  - Employ the use of broadband audible reversing alarms on all mobile plant – no tonal alarms should be used on this Site where practicable, if the contractor is able to retrofit broadband reversing alarms to mobile plant this should be done prior to the commencement of work to reduce tonal noise impacts,
  - Avoid dropping materials from a height,
  - Avoid shouting and talking loudly outdoors,
  - Avoid the use of radios outdoors that can be heard at the boundary of residences,
  - Turn off equipment when not being used,
  - Carry out work only within the recommended hours of operation,
- No vehicles including staff vehicles or delivery trucks should arrive at the Site prior to the operating hours.
- Keep truck drivers informed of designated vehicle routes, parking locations, acceptable delivery hours or other relevant practices (for example, minimising the use of engine brakes, and no extended periods of engine idling),
- Establish the site office and staff parking area as far from the residences as possible,
- Optimise the number of vehicle trips to and from the site – movements can be organised to amalgamate loads rather than using a number of vehicles with smaller loads,
- A Community Liaison Officer is to be appointed by the contractor prior to the commencement of any works,
- The officer will approach all potentially affected residents prior to the commencement of any works as an initial introduction and provide his or her contact details,
- The officer will explain the project, duration of works, potentially noisy periods as well as determine any particularly sensitive receivers or sensitive time periods and schedule works accordingly, as far as reasonably practical,
- A contact number will be provided for any residents to call with complaints or queries.
- Once works commence, communication with the community should be maintained by the officer. Communication should be maintained via a range of media including, for example,

continued individual contact, letter box drops or a clearly visible notice board at the entrance to the site.

- Consultation and cooperation between the contractor and the neighbours and the removal of uncertainty and rumour can help to reduce adverse reaction to noise.

6.14 Workforce & Accommodation

The proposal will result in an increased workforce which will be a generally positive impact positive impact on the local economy. Likewise, it is acknowledged that the increased workforce has the potential to place pressure on local housing market and accommodation providers and other businesses and industries in the local area.

The construction works are expected to generate an expected workforce of up to 100 persons over the 9 month works period, however the applicant estimates that the peak of workforce on site to average approximately 30 persons. The number of persons on site will fluctuate due to the nature of the construction program and that not all personnel will be required for the full project, with the activities for construction being carried out over a number of phases. For reference, the phases of the construction program are generally grouped as follows:

- Site fencing and establishment – repairs to rural fencing and construction of security fencing
- Civil works – construction of new road accesses, hardstand internal roads, drainage and other works as required
- Installation of posts and rack systems – pile/screw driven into place and connection of
- Civil works and set out of substation
- Delivery and fitting of panels to racking system
- Commissioning of substation and final works
- Landscaping and final establishment works

The applicant intends to utilise local workforce for the majority of the construction work, including for specialised technical contractors, subject to availability. The 'local' workforce may also be sourced from nearby centres surrounding Finley, such as Berrigan (24 kilometres east) or Tocumwal (24 kilometres south). Utilising a predominantly local workforce will reduce the demand of workers seeking temporary accommodation in the immediate area. In addition to any workforce drawn a reasonable commuting distance from the Finley area, such as those areas up to 30-60 minutes from the site would also travel from their place of residence rather than seeking temporary accommodating in Finley.

It will be necessary to use non-local workers and contractors for the construction work, and it is expected that these persons would arrive from other areas and utilise short term accommodation in Finley. There are a number of accommodation options available in Finley that would be used by non-local workers and based on the estimated peak personnel levels during construction, these persons could be accommodated within the town. The preference of the applicant is to have the workforce accommodated in Finley, however it is noted that other accommodation options are available in the nearby townships of Berrigan and Tocumwal.

During construction, the applicants will provide bus transport for the workforce, providing collection and drop-off from a defined location in the Finley township and the subject site, corresponding with the construction shifts. This will enable a more efficient arrangement for workers to access the site and reduce demand on local roads and other transport services.

During operation of the facility, 2 persons are to be employed for ongoing operation of the site and will attend the site on a regular basis. Maintenance of the facility will be required from time-to-time and the applicant is committed to utilising local contractors to undertake maintenance subject to availability.

Having regard to the above, the proposed development is expected to have a generally positive impact on the local economy and will not lead to an unreasonable impact on the local housing and accommodation providers. The applicant proposes to introduce a number of strategies to mitigate potential impacts that may result from the increased workforce during construction, as detailed below.

- Preparation of a detailed Construction Schedule for discussion with local community, service providers and accommodation providers;
- Engage the majority of the construction workforce from the local area, including both specialised contractors and other workers;
- Through tender and procurement processes, the applicant will give higher weighting to these individuals and companies that employ staff from the local area;
- Undertake initial and ongoing engagement with local housing and accommodation providers to determine availability of accommodation ahead of time and ensure that peak periods of those providers are not detrimentally affected.

6.15 Social & Economic Impacts

The social and economic impacts were anticipated based on the existing value of the land, and the anticipated social and economic effects which the facility will have. These impacts may result from the construction, operation and decommissioning of the facility.

The anticipated potential impacts are as follows:

- Loss of productive agricultural land.
- Alteration of rural landscape character and visual amenity, noise levels and air quality.
- Increase in traffic on roads from construction and delivery vehicles.
- Increased employment opportunities and ongoing benefits to local businesses and suppliers.

The capability of the land was assessed utilising the Land and Soil Capability Mapping for NSW. This mapping system grades land in a scale from 1-8 with 1 indicating slight to negligible limitation, and 8 indicating extreme limitations. The entirety of the subject land, including the development area is located with land capability class 3, indicating “moderate limitations”. Given the scale of the facility and the minimal ground disturbance, the loss of agricultural value will be minimal and temporary. The nature of the array will leave the majority of the impact area undisturbed.

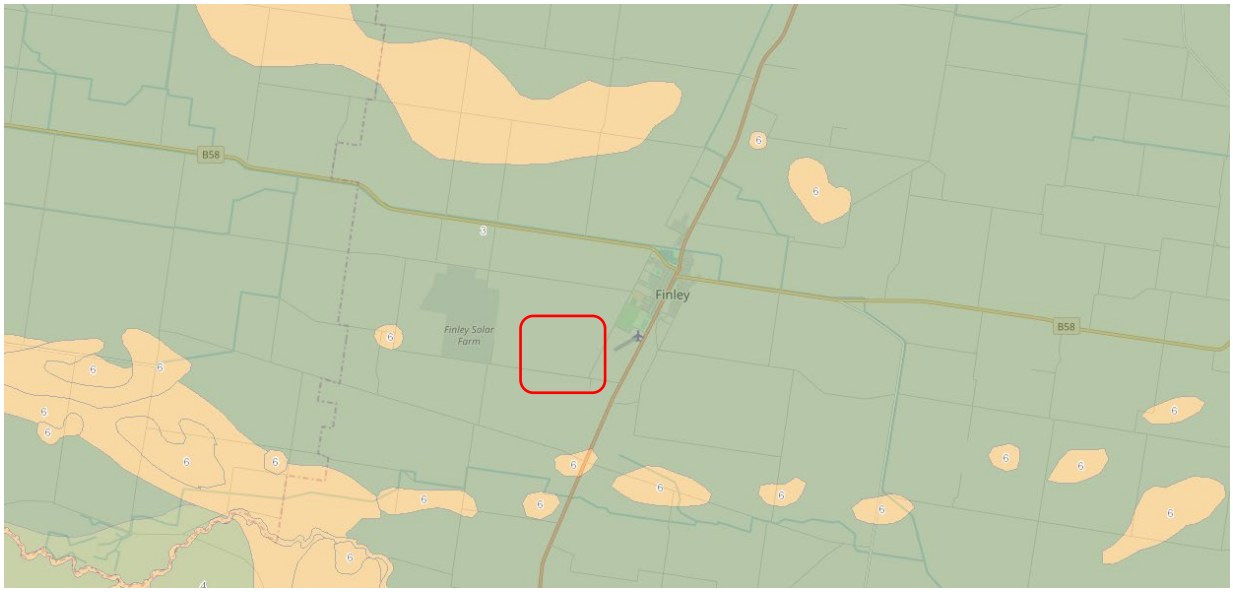


Figure 43 – Land capability map indicating the subject land with in land classified for 3.

The proposed facility will generate employment opportunities and opportunity for business with local suppliers. This will bring economic benefits to the local economy through wages and contracted payments, and other indirect benefits to the Finley township for accommodation and other businesses.

If necessary and appropriate, land around the arrays will be used for grazing.

- The decommissioning of the facility will restore the agricultural use of the land. It will be ensured that the arrays, other infrastructure and fencing will be appropriately remove to avoid inhibiting any future farming practices.
- Resources and labour will be sourced locally from within the Berrigan LGA as much as possible.

Overall, the land will assist towards goals to reduce emissions nationwide relating to climate change. It will also assist towards supplying land within the LGA with electricity, further contributing to its capacity and electrical infrastructure.

7 Conclusion

The DA seeks consent for the development of a 4.95 Megawatt solar facility and associated infrastructure on part of land described as Lot 126 in DP752299, Broughans Road, Finley.

The application seeks development consent under Part 4 of the EP&A Act and has been assessed against the provisions of Section 4.15(1) of the EP&A Act. As demonstrated by the detailed assessment above, the proposal satisfies the intent of the provisions of the applicable EPIs and will result in a positive development outcome in terms of social, environmental, and economic impacts.

The site has been selected due to the excellent solar exposure and access to the electrical transmission network. The site also has a low level of environmental impact, having been cleared and disturbed. The likely impacts of the development have been considered in this report and supporting documents, and have been found to be acceptable subject to appropriate mitigation measures.

It is considered that the site is suitable given the general rural context and minimal development in the immediate surrounds. The flat profile of the land will enable the facility to have minimal impacts on nearby dwellings and urban development. The site is also flat, free of development constraints and is accessible to large delivery vehicles during the construction phase and convenient for ongoing management and maintenance.

Having regard for the content of this report, the proposal deserves the support of Council because:

- it is consistent with the relevant legislation, environmental planning instruments and development control plan;
- it is considered to be appropriate given surrounding development and the context of the area;
- it will enhance the supply of a clean, zero-emission energy source to the area, contributing to the overall sustainability of the state;
- it will not permanently remove the potential of the site for use as productive farmland, as the construction and operational processes involve minimal ground disturbance, and the area can return to a productive use after decommissioning;
- it will contribute to the economy of Finley through providing employment opportunity, business to contractors and suppliers, and indirectly through accommodation providers of the township;
- it is adequately accessible from a well-constructed and sealed rural road (Broughans Road).

In light of the above considerations, it is our opinion that the proposal is appropriate from a planning point of view and is in the public interest. The proposed development warrants support by Council.

Attachment A

Title Details

Attachment B

~~Existing Site Plan~~

Proposed Site Plan and Lease Area

Attachment C

~~Proposed Site Plans~~

Proposed Development Plans

Attachment D

~~Panel and Support Plans and Elevations~~

Conceptual Civil Plans & Details

Attachment E

Concept Stormwater Management

Attachment F

Traffic Impact Assessment

Attachment G

Aboriginal Heritage Due Diligence Assessment

Attachment H

Environmental Noise Impact Assessment

Attachment I

Landscape Plans

Addendum – December 2020 Update

This addendum details the revisions made to the SEE in response to Record of Deferral issued by NSW Planning Panels dated 16 November 2020 and received by email on 18 November 2020.

The following additional information is provided for consideration:

Noise Impacts

Refer to amended:

- SEE Section 6.13 Noise
- Appendix H – Environmental Noise Impact Assessment prepared by Harwood Acoustics, dated 18 December 2020

In response to the request, an Environmental Noise Impact Assessment has been prepared which assesses the full impact of the proposed solar facility's development upon all sensitive receivers within the vicinity of the site. The Acoustic Report is submitted separately for consideration and has been summarised within the revised SEE addendum.

Section 6.13 of this SEE has been amended to reflect the discussion and recommendations of the Environmental Noise Impact Assessment.

Proposed Development Plans

Refer to amended

- SEE Section 3, Description of Proposal
- Appendix C – Revised and consolidated Development Plans prepared by Bison Energy, dated 18 December 2020.

The proposed plans for development have been updated to address the detail requested in the Record of Deferral. Further, the plans have been optimised in response to more recent comments of authorities and electricity providers.

The primary changes are summarised as:

- Rationalisation of circulation spaces, loading and laydown areas, waste and the like
- Rationalisation of the internal driveway access network and providing suitable turning areas
- Identification of setbacks and buffers from perimeters as required
- Identification of 10 metre Asset Protection Zones to all boundaries of the facility
- Appropriate scale and dimensions for key locations.
- Plans of proposed central power station (substation)
- Plans of proposed site office (typical)
- Typical tracker spacing and heights
- Typical array sections
- Typical fencing details
- Conceptual road cross sections
- Conceptual swale details
- Conceptual stormwater basin location/s and cross section

The SEE, and particularly Section 3, has been revised to reflect the amended plans.

Landscape and Visual

Refer to amended:

- SEE Section 3, Description of Proposal
- SEE Section 6.1, Context and Setting
- SEE Section 6.2, Glint and Glare
- SEE Section 6.3, Visual Impact
- SEE Section 6.4, Landscaping
- Appendix I – Landscape Plans prepared by Fiona Slade Landscape Architect, dated 18 December 2020

A full landscape plan set has been provided in support of the proposal and is attached. The landscape plan include provision of landscaping areas to all boundaries of the site.

It should be noted that the landscape plan has identified the existing boundary fencing of the lots on the northern, eastern and southern boundaries and an existing row of tree plantings to the west, rather than to the lease area. This alignment of landscaping is proposed to provide a more sustainable long term outcome, given that the plantings will remain in place beyond the typical lifespan of the solar facility. The landowners preference would be to have perimeter fencing for any future rural uses rather than plantings within open paddock areas.

Culvert Details and Civil

Refer to amended:

- SEE Section 3, Description of Proposal
- SEE Section 6.5, Traffic and Access
- Appendix D – Updated Civil Concept Plans to include General Arrangement Plans prepared by SJE Consulting dated 18 December 2020

A general arrangement plan showing the proposed culvert crossing has been provided attached to this response. The plans show the proposed arrangement for culvert crossing of the internal channel, and the associated design components to ensure that the culvert can accommodate B-double movements.

It is also confirmed that landowners consent is made to the associated works for the solar facility, including earthworks and culvert works. The Application Form has been amended to include reference to “associated infrastructure and works” and the plans and details have been reviewed by the landowner.

The SEE has been updated at Section 3 to reflect the proposed culvert details.

Grazing

Refer to amended:

- SEE Section 6.1, Context and setting

In response to the Record of Deferral, it is confirmed that the subject site will be used for opportunistic sheep grazing in small numbers by the current landowner. Grazing is intended to operate as part of the normal routine by the current landowner and will assist in maintaining pasture height and ground cover, and will allow agriculture to continue on the site, although at reduced capacity. The site is considered suitable for sheep grazing and can be configured as part of the larger farm operations, utilizing internal gates connecting adjoining paddocks and livestock handling facilities.

Livestock will be able to be able to graze in areas between the panel arrays and within the perimeter areas, however landscaping zones would be protected by fencing or similar treatment.

Section 6.1 of the SEE has been updated to reflect the above details.

Traffic Management Plan

Refer to Cover Letter to Council dated 18 December 2020.

As discussed, the applicant respectfully requests that the requirement for a Traffic Management Plan be imposed as a condition of consent, specifically required prior to any works commencing, or made as a deferred commencement condition.

It is the observation and experience of the applicant that for solar facility approvals, the TMP is generally required as a condition of consent prior to works commencing. The applicant acknowledges that this is an appropriate arrangement as the TMP is a detailed document that requires the input and approval of the civil contractors and other construction personnel. However, the nature of solar developments is also such that contractors are not appointed until after approval is granted.

The TMP is required to include details on specific measures and methods for the construction process which will not be fully known until a contractor is in place and these particular details can be worked through.