APPLICATION ON NOTIFICATION – CATEGORY 3

Applicant:	Mannum Solar Farm Pty Ltd
Development Number:	711/L016/19
Nature of Development:	Construction of a 25MW solar farm and associated infrastructure
Type of Development:	Merit
Zone / Policy Area:	River Murray Zone, Primary Production Policy Area Rural Zone, Murray Plains Policy Area
Subject Land:	135 Mannum Road (CT 5236/836 H170300 S610) Lot 901 Piggery Road (CT 6154/554 D82628 A901) 45 Piggery Road (CT 6154/553 H170300 S609); and 146 Piggery Road CT 6216/448 D119204 A10)
Contact Officer:	Sharon Wyatt
Phone Number:	7109 7132
Start Date:	15 August 2019
Close Date:	29 August 2019
During the notification period, hard copies of the application documentation can be viewed at the Department of Planning, Transport and Infrastructure, Level 5, 50 Flinders St, Adelaide, during normal business hours. Application documentation may also be viewed during normal business hours at the local Council office (if identified on the public notice).	

Written representations must be received by 29 August 2019 and can either be posted, faxed, hand-delivered or emailed to the State Commission Assessment Panel.

Any representations received after the close date will not be considered.

Postal Address:

The Secretary
State Commission Assessment Panel
GPO Box 1815
ADELAIDE SA 5001

Street Address:

Planning and Land Use Services
Department of Planning, Transport and Infrastructure
Level 5, 50 Flinders St
ADELAIDE SA 5000

Email Address:

scapreps@sa.gov.au

South Australian
DEVELOPMENT ACT, 1993
REPRESENTATION ON APPLICATION – CATEGORY 3

Applicant:	Mannum Solar Farm Pty Ltd
Development Number:	711/L016/19
Nature of Development:	Construction of a 25MW solar farm and associated infrastructure
Development Type:	Merit
Zone / Policy Area:	River Murray Zone (Primary Production Policy Area) Rural Zone (Murray Plains Policy Area)
Subject Land:	135 Mannum Road, Lot 901 Piggery Road, 45 Piggery Road and 146 Piggery Road, Mannum.
Contact Officer:	Sharon Wyatt
Phone Number:	7109 7132
Close Date:	5:00 PM Thursday 29 August 2019

My Name: _____ **My phone number**: _____

Primary method(s) of contact: **Email:** _____

Postal Address: _____ **Postcode:** _____

You may be contacted via your nominated PRIMARY METHOD(s) OF CONTACT if you indicate below that you wish to be heard by the State Commission Assessment Panel in support of your submission.

My interests are: *(please tick one)*

- ☐ owner of local property
- ☐ occupier of local property
- ☐ a representative of a company/other organisation affected by the proposal
- ☐ a private citizen

The address of the property affected is: _____ **Postcode** _____

My interests are: *(please tick one)*

- ☐ I support the development
- ☐ I support the development with some concerns
- ☐ I oppose the development

The specific aspects of the application to which I make comment on are: _____

I: *(please tick one)*

- ☐ wish to be heard in support of my submission
- ☐ do not wish to be heard in support of my submission *(Please tick one)*

By: *(please tick one)*

- ☐ appearing personally
- ☐ being represented by the following person *(Please tick one)*

Signature: _____

Date: _____

Return Address: The Secretary, State Commission Assessment Panel, GPO Box 1815, Adelaide, SA 5001 /or
Email: scapreps@sa.gov.au

STATE COMMISSION ASSESSMENT PANEL

A COMMITTEE OF THE STATE PLANNING COMMISSION

Why have I received this notice?

The role of the State Commission Assessment Panel (SCAP) is to independently assess and determine specified kinds of development applications in South Australia in accordance with the *Development Act 1993*.

Some types of development application require public notification. This is determined by the relevant Development Plan and Schedule 9 of the *Development Regulations 2008*. Development applications fall into one of the following categories:

- Category 1: No public notification
- Category 2: Notice of the application to be given to an owner/occupier of adjacent land to where the development is proposed. A person contacted in this way has the right to make a written representation to the SCAP. Representations from those with a right to be heard must be taken into consideration by SCAP when assessing the development application.
- Category 3: Written notice of the application to be given to an owner/occupier of adjacent land to where the development is proposed and to any owner/occupier of land which the SCAP believes would be directly affected to a significant degree if the development were to proceed. Notice by newspaper advertisement to be given to the general public.

What is a valid representation?

Your representation must be made within the public notification period as described upon the notice you have received. Pursuant to the *Development Act 1993*, this period is 10 business days from the date notice is given.

Your representation must be signed, dated, set out the reasons for the representation and include your full name and address contact details.

What can I comment on?

It is important to be mindful that your representation should avoid raising matters that are not relevant to the planning assessment of the application. A planning assessment can only have regard to the relevant provisions of the Development Plan. A representation can raise issues both in support and in opposition to a development.

You can access the relevant Development Plan here: https://www.sa.gov.au/topics/planning-and-property/development-plans

What happens next?

All valid representations received through either a Category 2 or Category 3 process are forwarded to the applicant for a response and taken into consideration by a Planning Officer from the Department of Planning, Transport and Infrastructure in preparing their assessment.

Pursuant to the *Freedom of Information Act 1991* and *Development Act 1993* any information provided may become part of a public document and may be published as an attachment to the Planning Officer's report.

If you have indicated that you wish to be heard you will receive an invitation to appear personally before the SCAP, or be represented by counsel, solicitor or agent. This invitation must give five (5) business days notice of the meeting but, dependent on other issues to be assessed, this meeting may not occur for an indefinite period of time after your representation is made. Unfortunately, the meeting time and date cannot be adjusted to accommodate all attendees.

If you have not indicated that you wish to be heard in support of your submission, you will not receive any further correspondence on this matter until a decision is made.

What is a SCAP meeting?
SCAP meetings are generally held on the second and fourth Thursdays of each month in the Kardi Munaintya meeting room on the ground floor at 50 Flinders Street, Adelaide.

The SCAP will be assessing the development application against the relevant Council Development Plan. To assist, an assessment report will be prepared by a Planning Officer from the Department of Planning, Transport and Infrastructure. This report is publicly available from https://www.saplanningcommission.sa.gov.au/scap/agendas_minutes on the Monday afternoon prior to the meeting. This report will include a copy of your representation.

Representors wishing to be heard will be given the opportunity to make a short (5 minute maximum) verbal presentation to the SCAP. Please note that Representors are only provided with the opportunity to make a verbal presentation at the initial hearing of an application. At this meeting, the SCAP may also hear comments from the applicant, relevant agencies, and Council.

How do I know what decision is made?
You will be able to ascertain the outcome of the SCAP's deliberation when the meeting minutes are made available on the SCAP website on the afternoon of the day after a meeting.

Once a decision is made by the SCAP, valid representors will be sent a copy of the Decision Notification Form which includes any conditions relevant to the application.

Note: Dependent on the assessment process for the application, and if no Representors indicate that they wish to be heard, a decision may be made by a Delegate of the SCAP without the application being heard at a SCAP meeting.

Appeal rights
If the proposal is a Category 3 application, then you can appeal a decision made by the SCAP if you have made a valid representation

Such an appeal must be lodged at the Environment, Resources and Development Court fifteen (15) business days from the date of decision. The Court is located in the Sir Samuel Way Building, Victoria Square, Adelaide (telephone number 8204 0300).

Representors do not have a right of appeal in relation to Category 2 development applications.

For more information
Contact the SCAP Secretariat on:

Telephone: 1800 752 664 (Select Option 4)
Direct: 7109 7061
E-mail: scapadmin@sa.gov.au

Postal: GPO Box 1815, Adelaide SA 5001

Street: Level 5, 50 Flinders Street, Adelaide SA 5000

Website: https://www.saplanningcommission.sa.gov.au/scap

Government of South Australia

Department of Planning, Transport and Infrastructure

DEVELOPMENT ACT 1993

CATEGORY 3

NOTICE OF APPLICATION FOR CONSENT TO DEVELOPMENT

Notice is hereby given that an application has been made by **Mannum Solar Farm Pty Ltd** for consent to construct a 25MW solar farm and associated infrastructure and civil works, including an optional 4MW battery energy storage system. **Development Number: 711/L016/19.**

The subject land is situated at: 135 Mannum Road, Mannum (s610, HP170300: CT 5236/836), Lot 901 Piggery Road, Mannum (a901, DP82628: CT 6154/554); 45 Piggery Road, Mannum (s609, HP170300: CT 6154/553) and 146 Piggery Road, Mannum (a10, DP119204: CT 6216/448).

The development site is located within the River Murray Zone (Primary Production Policy Area) and the Rural Zone (Murray Plains Policy Area) of the Mid Murray Council Development Plan (Consolidated 23 August 2018).

The application may be examined during normal office hours at the office of the State Commission Assessment Panel (SCAP), Level 5, 50 Flinders Street, Adelaide and at the Principal Office of the Mid Murray Council, 49 Adelaide Road, Mannum. Application documentation may also be viewed on the SCAP website https://www.saplanningportal.sa.gov.au/public_notices.

Any person or body who desires to do so may make representations concerning the application by notice in writing delivered to the Secretary, State Commission Assessment Panel, GPO Box 1815, Adelaide SA 5001 **NOT LATER THAN 29 August 2019.** Submissions may also be emailed to: scapreps@sa.gov.au

Each person or body making a representation should state the reason for the representation and whether that person or body wishes to be given the opportunity to appear before the SCAP to further explain the representation.

Submissions may be made available for public inspection.

Should you wish to discuss the application and the public notification procedure please contact Sharon Wyatt on (08) 7109 7132 or sharon.wyatt@sa.gov.au

Alison Gill
SECRETARY
STATE COMMISSION ASSESSMENT PANEL

PUBLISHED IN : The Advertiser; The Murray Vallay Standard
PUBLICATION DATE : Thursday 15 August 2019

DEVELOPMENT APPLICATION FORM

PLEASE USE BLOCK LETTERS

COUNCIL: Mid-Murray Council

APPLICANT: Mannum Solar Farm Pty Ltd

Postal Address: 44 Stephenson St, Cremorne, Victoria 3121

Owner: Mannum Solar Farm Pty Ltd

Postal Address: 44 Stephenson St, Cremorne, Victoria 3121

BUILDER: TBC

Postal Address:

Licence No:

CONTACT PERSON FOR FURTHER INFORMATION

Name: Frank Boland

Telephone: 0423 778 125 [work] [Ah]

Fax: [work] [Ah]

EXISTING USE: Solar farm (under construction), piggery, cropping

FOR OFFICE USE

Development No:

Previous Development No:

Assessment No:

❒ Complying	Application forwarded to DA
❒ Non Complying	Commission/Council on
❒ Notification Cat 2	/ /
❒ Notification Cat 3	Decision:
❒ Referrals/Concurrences	Type:
❒ DA Commission	Date: / /

	Decision required	Fees	Receipt No	Date
Planning:				
Building:				
Land Division:				
Additional:				
Development Approval				

DESCRIPTION OF PROPOSED DEVELOPMENT: Construction of a 25MWac Solar PV project and associated infrastructure.

LOCATION OF PROPOSED DEVELOPMENT: In the vicinity of 135 Mannum Road, Mannum

House No: 135 Lot No: Street: Mannum Road Town/Suburb: Mannum

Section No [full/part] 610 Hundred: Finnis Volume: 5236 Folio: 836

Section No [full/part] 901 Hundred: Finnis Volume: 6154 Folio: 554

LAND DIVISION: <Note: there are two other titles included, please refer to Page 3 of the Planning report>

Site Area [m^2] N/A Reserve Area [m^2] No of existing allotments

Number of additional allotments [excluding road and reserve]: Lease: **YES** ❒ **NO** ❒

BUILDING RULES CLASSIFICATION SOUGHT: N/A Present classification:

If Class 5,6,78 or 9 classification is sought, state the proposed number of employees: Male: Female:

If Class 9a classification is sought, state the number o persons for whom accommodation is provided:

If Class 9b classification is sought, state the proposed number of occupants of the various spaces at the premises:

DOES EITHER SCHEDULE 21 OR 22 OF THE DEVELOPMENT REGULATIONS 2008 APPLY? **YES** ❒ **NO** ☒

HAS THE CONSTRUCTION INDUSTRY TRAINING FUND ACT 2008 LEVY BEEN PAID? **YES** ❒ **NO** ☒

DEVELOPMENT COST [do not include any fit-out costs]: $ 2,750,000

I acknowledge that copies of this application and supporting documentation may be provided to interested persons in accordance with the Development Regulations 2008.

SIGNATURE: Dated: 07 / 05 / 2019


2

MANNUM SOLAR & STORAGE PROJECT STAGE 2

Project Memo to DPTI

07 May2019

Mannum Solar Farm Pty Ltd

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Overview of Project

Mannum Solar Farm Pty Ltd ('Mannum Solar') has identified an opportunity to develop an integrated solar PV and storage project on the land in the vicinity of the Mannum Substation.

It is proposed to develop the Project in two stages, firstly a 4.95MW$_{AC}$ and then a second 25MW$_{AC}$. The combined solar PV generating facility will generate an estimated 80,000 MWh of clean, renewable energy into the Mid-Murray region. Combining that with the option of Battery Storage to smooth the output and the network stability.

The first 4.95MW$_{AC}$ project has received Development Consent from the Mid-Murray Council and an Offer to Connect from SAPN. It is currently under construction and is expected to be completed by Q3-2019.

We are pleased to submit this Development Application for a 25MW$_{AC}$ solar photovoltaic (PV) generation facility and an optional 4MW battery storage ("the Project") to be located at the site surrounding the Mannum substation in proximity to 135 Mannum Road, Mannum.

This development application has been prepared by Tetris Energy Pty Ltd which is with the specialist planning input from Frank Brennan Consulting Services and Page Street Services.

Stakeholder Summary

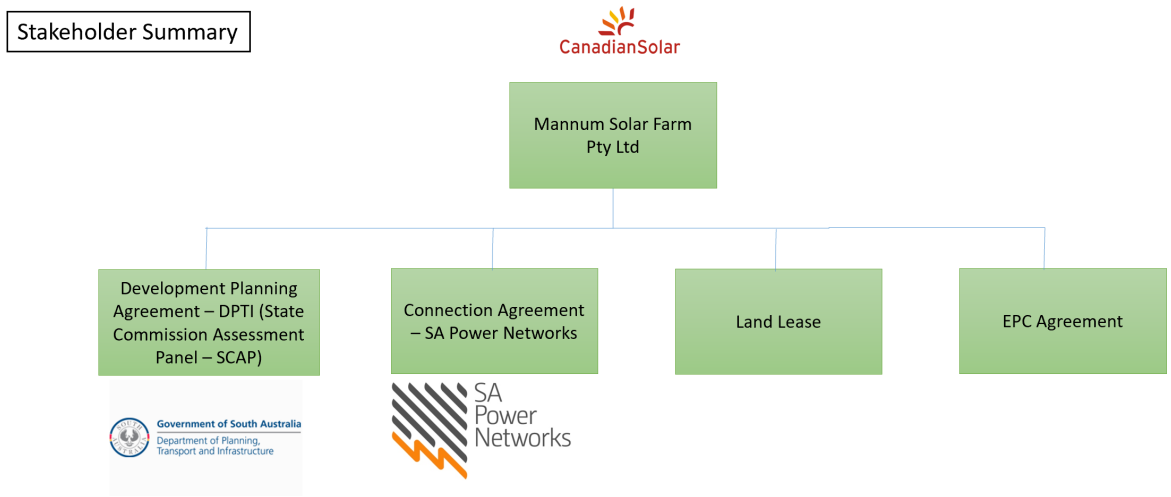


Figure 1 Stakeholder summary

Mannum Solar Farm Pty Ltd – This is a wholly owned subsidiary of Canadian Solar (Singapore) Ltd, which is a global leader in solar photovoltaics. Canadian Solar will be responsible for design, connection, equipment procurement, and investment. They will be supported by Tetris Energy Pty Ltd who are the original developer and they will focus on planning, offtake and finance. It will be also supported by other specialist consultants and engineers.

Retail – As per stage 1, we will look to secure a retail off-taker for the volume produced by Stage 2.

Development Approvals – Department of Planning, Transport and Infrastructure South Australia 'DPTI' via State Commission Assessment Panel (SCAP) will be the responsible planning authority for the project. The planning applications have been prepared and submitted by both Tetris Energy with the support of specialist planning consultant Frank Brennan Consulting Services.

Connection Agreement – Both SA Power Networks (SAPN) and ElectraNet own and operate the distribution and transmission lines connecting Mannum Substation. It is proposed that Stage 2 of the project will connect into the 33,000 Volt Bus Bar of the Mannum Substation. An active connection application is underway with SAPN.

Land Lease – There are four separate properties involved in the project. The existing land use is a piggery, cropping and the soon to be constructed solar farm.

EPC – Mannum Solar has been in discussions with several contractors for the project. A commercial process will continue in order to ensure the project has the lowest cost of energy and the most suitable equipment for the site.

Figure 2 Example Single-axis Tracking Solar PV Array – pile mounted

Preliminary Site Design

Site Selection

The project site selection included the following key assessment criteria:

- Located in close proximity to a viable connection point at the Mannum Substation
- Flat land with favourable slope
- Avoiding low lying land/land prone to flooding/inundation/riparian corridors
- Able to achieve independent access to the site with good transport
- Separated from existing residential/public areas
- Favorable orientation to the north to maximise solar output
- Complimentary to existing land uses
- Avoiding shading from near objects, for example, hills, trees and power poles.

Plans

Concept designs have been prepared to determine the suitability of the site. The site has been modelled on two stages – stage 1 as a 4.95MW_{AC} facility and stage 2 as a 25MW_{AC} facility. Both stages will likely use single axis tracking solar PV technology and will be designed to have optional battery storage. The project capacity was selected as it fits well with the current loading on the Mannum 33kV connection point at the SAPN substation.

Stage 1 will utilise the paddock closest to the substation that slopes gradually to the north. Stage 2 will utilise the balance of the land, the land surrounding the piggery and the property to the south. Following the successful stage one, the proponent has welcomed the interest from the neighbouring properties that have joined. During the detailed design phase the configuration will be optimised based on resource, planning constraints, ground conditions and land use preference. The design may also include a component of battery storage to optimise the reliability and security of the network.

The design has also sought to protect all remnant native vegetation and will only be located on the disturbed cropping land.

A summary of the key project specifications are outlined in Table 1.

Table 1 Project Specifications

Specification	Stage 1	Stage 2
Technology	Single axis tracking Solar PV	Single axis tracking Solar PV
Mounting	Piling / Screw / Ballast	Piling / Screw / Ballast
Size	4.95MW_{AC} (up to 7MWdc)	25MW_{AC} (up to 37MWdc)
Approximate Capacity Factor	28%	28%
Expected Annual Generation	13,000 MWh	73,000 MWh

Mannum Solar has assumed that the solar farm will connect into the 33kV distribution network via a direct feeder into SAPN-owned substation. As part of a more detailed study and design, the project would be optimised which may result in some changes to the system capacity and preferred mounting technology. The project currently has an executed connection agreement for stage 1 and an active connection application with SAPN for stage 2.

The baseline plant design includes single axis tracking as this should provide the most cost-effective proposal for the Project. Whilst a fixed axis design is less expensive to build and maintain, the tracking technology ensures a greater amount of electricity generation in the morning and evenings. This is

particularly important for late summer afternoons when electricity prices are often higher; as a single axis tracking system will generate more power during this period of the day. The relatively high solar irradiation at the site results in more than enough increased generation from a single axis PV system to compensate for its somewhat higher costs.

Every solar PV system will very slowly lose efficiency over time due to gradual degradation of the PV modules. By utilising panels from reputable manufacturers, the risk of unexpectedly high degradation rates is very low and performance guarantees are available. Mannum Solar would procure PV modules from a supplier with a long term (30-year) design life and performance warranty.

Site Layout

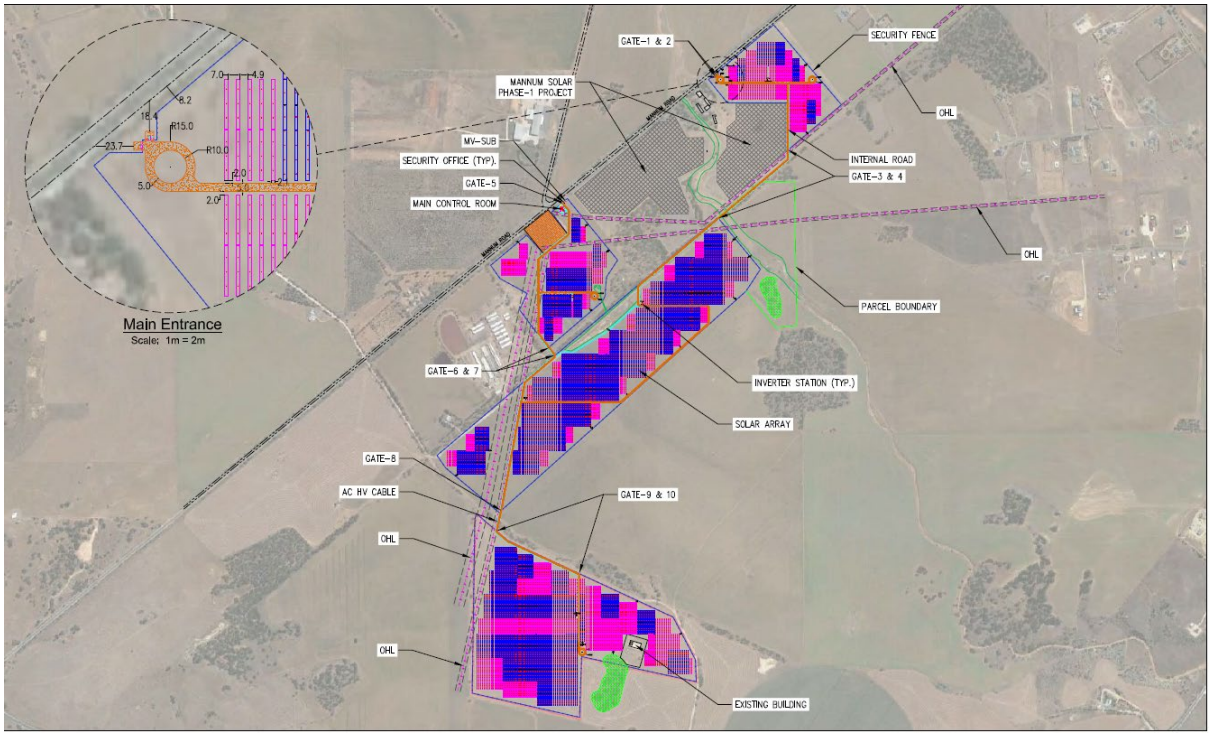


Figure 3 Mannum Solar Farm site plan

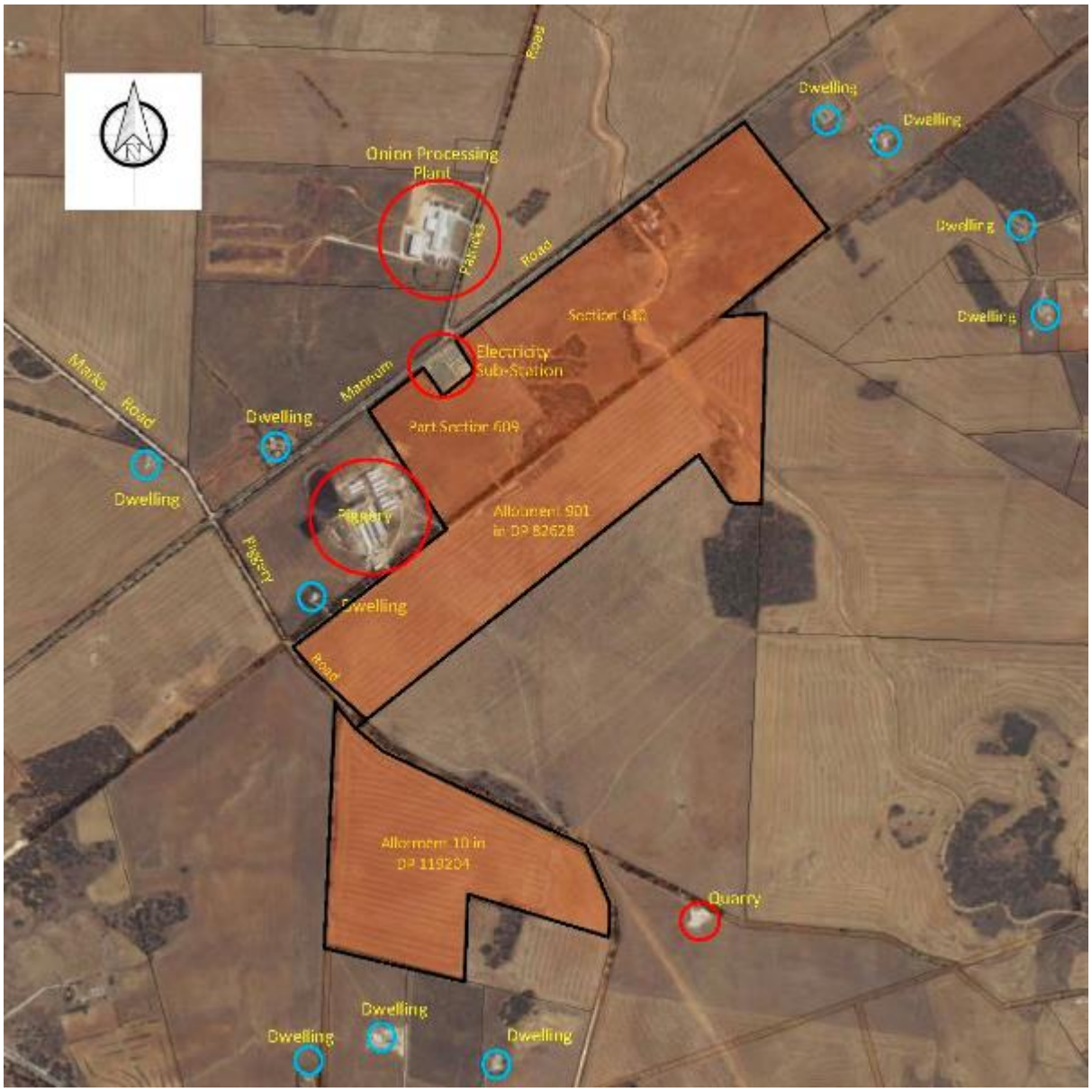


Figure 4 Subject lot and surrounding infrastructure

Existing Land Use and Site Conditions

Geography

The site comprises of gently undulating farmland that has been used for grazing and cropping for many years. On the higher part of the site is a local piggery. Most of the site has been cleared with limited remnants of original vegetation preserved.

Neighbouring properties are mainly used for cereal cropping with opportunistic grazing by sheep. Included within the site is some intensive agriculture land (piggery) and adjacent is some agricultural processing (onions). Closer to the Murray River there is irrigated dairying.

The site is above the Murray River flood plain. The project has been designed above the flood levels of the drainage creek running through the site.

Figure 5 location of the proposed solar farm amongst mostly cleared farmland

Figure 6. Annual spring pastures

Geology

The soil is a typical solonised brown soil or Mallee soil. It has a variable topsoil above a calcrete pan underlain by various sedimentary materials. It is a reddish brown, light sandy loam, slightly alkaline, free draining and suitable for cropping and grazing.

There is a dry creek running south-east through the site that is subject to intermittent flows following major rainfall events. There is some minor erosion on the banks of the creek.

A full geotechnical assessment has been undertaken across the site. This involved 5 test pits and 15 3m core samples. Below is the Investigation Test Layout Plan as reference to the site-specific geotech works completed and a sample from the laboratory analysis. Results from these studies confirming suitable ground conditions for the solar pv array and the piles.

Figure 7.1 Test Layout Plan

Figure 8.2 Example cross section Borehole 1

Figure 7.3 Example Soil profile

Ecology

Most of the site has been cleared for cropping and grazing. The most common crops are cereals and canola. There are some remnant pockets of native vegetation which have been preserved and these will be retained. These areas are broadly described as Mallee Woodlands and are typical of the native vegetation of the area – see figure 9.

There is also intensive pig farming located within the project site. This facility also includes waste ponds and heated sheds.

Figure 9 cleared land with a recent crop of vetch and oats

Figure 10 area of typical remnant native vegetation (Mallee Woodlands)

Fig.10. Finniss Park Piggery is located within the project site.

Cultural and European Heritage

The Aboriginal inhabitants and traditional owners of the vicinity now called Mannum were the Nganguruku (Nganguruga), part of the larger Ngayawung community. Based on the deskstop survey there are no known indigenous sites of significance associated with the project site.

One of the properties contains a homestead (see figure 10) which is an excellent example of early twentieth pastoral architecture. A heritage search was undertaken and there were no listed local or state heritage recordings within the site boundary. The nearest sites are:

- Reedy Creek Homestead and outbuildings (3.4km)
- Mannum Stone Water Tank (2.9km)
- E&WS Pumping Station (3.07km)

Figure 11 'Forecast' Homestead

Visual Amenity

The site is typical of commercial farming properties in the area. It is situated between Mannum Road and Piggery Lane with a vista of cleared paddocks, pig sheds and some remnant vegetation. Nearby is an electrical substation and an onion- processing plant. The inclusion of the solar PV array will not adversely impact on the visual amenity of the area. There are already 100kW solar PV systems installed at the Piggery and RivaPak.

The project will be set back from the boundary fences and there will be a vegetation screening planted along the Mannum road and towards the northern and eastern boundaries. Below are some example views of other solar farms and battery storage during both operating and construction.

Figure 12 A) Example solar farm under construction, and B) Example view of operating solar farm (ACT)

Figure 13 A) Example operating solar farm (ACT) and B) Example operating battery storage (Hornsdale)

In order to provide an overview of potential view sheds, we have provided a sectional layout to show the changes in elevation and the different features. The layout runs from Adelaide-Mannum Road to Marks Road and dissects approximately through the middle of the proposed project area. The dwelling locations and other infrastructure are approximate and only intended to be illustrative.

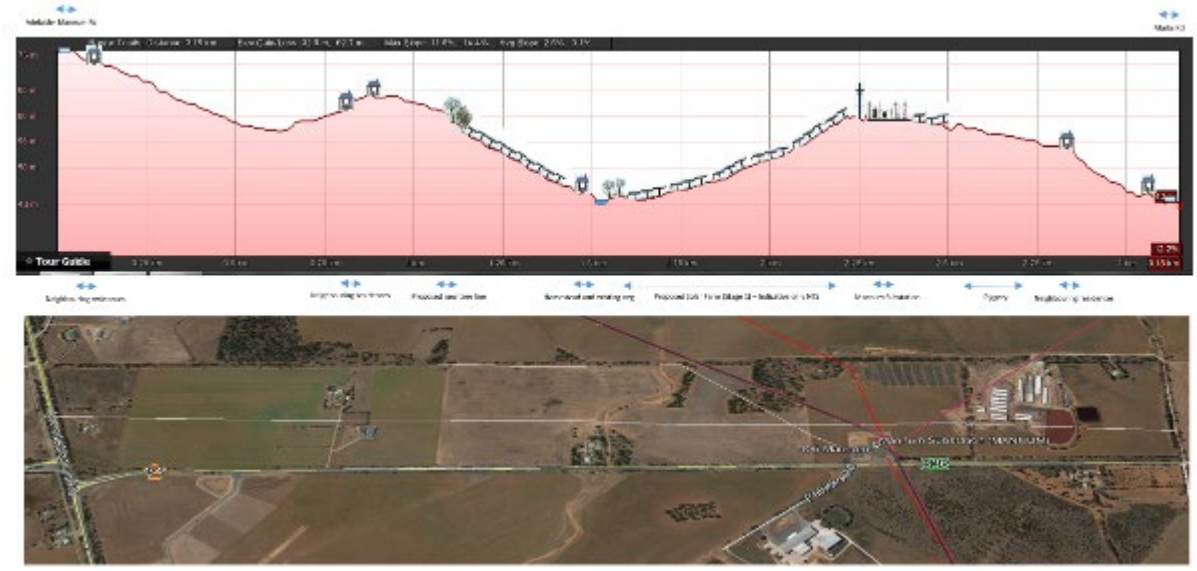


Figure 14 Sectional layout of site area

The visual amenity impact of the solar farm on neighbouring dwellings is expected to be negligible. Due to the terrain, orientation of the houses, fences and existing vegetation – it is unlikely that many dwellings will have much visibility of the array. A desktop assessment has been completed and an estimate of each dwellings viewshed is provided below. The dwelling at 135 Mannum Road will have the highest impact however due to the native bush and orientation, it will screen most of the view. The two dwellings at the top of the hill will be able to see array from the edge of the property boundary however unlikely from the dwelling. To mitigate any visual amenity and as part of the Stage 1 conditions of consent, some native vegetation will be planted towards the boundary to screen the view – the types of species will be selected in consultation with neighbours.

Along Mannum Road the array will be visible. It is proposed that the existing vegetation be increased to screen the array from passing traffic. The location of the batteries and substation has been selected to be near to the existing Mannum Substation. This will mean that the visual amenity impact is kept consistent with existing land uses on that boundary.

The dwellings to the south east will be shielded by both the piggery and the hill. It is unlikely that they will be able to see the array or connection infrastructure.

Figure 15 Desktop assessment of the view sheds from nearby dwellings

Planning Context

A specialist planning report has been prepared by Frank Brennan Consulting Services – please refer to Appendix One – Planning Report.

Technology Overview

The Project's design will be similar to other approved solar projects within the region and will be sited to ensure minimal environmental impacts, in keeping with the sustainable nature of the Project. The process to select this proposed location for the PV facility has been ongoing with landowners and engineers. It has been carefully undertaken to ensure the highest design standards and location for the Project, as well as minimal impact to be imposed on the surrounding community.

Accordingly, the Project has been designed to minimise the impact on the landscape and surrounding environs as much as possible, with respect to a range of factors such as: the existing environment; agricultural land and activities occurring on-site and off-site; proximity to existing electricity infrastructure; storm water; and visual impact considerations. The Project comprises of several interlinked and integral components for the operation of the equipment and generation of electricity from solar radiation.

The proposed solar and storage project will comprise five principal parts being the photovoltaic (PV) array, the inverters, the connecting infrastructure (either 33kV or 132kV underground or overhead and switchboard) into the power distribution network, battery storage system and the access roads. Mannum Solar is seeking development consent for all the above-mentioned infrastructure.

PV Modules and Arrays

Each PV module is made up of a number of PV cells sealed in an environmentally friendly protective laminate which converts sunlight into electricity and are seen as the building blocks of PV systems. A number of modules (one or more - pending on the design) make up a panel which are prewired field installed units. The panels being contemplated at Mannum might be bifacial which means the cells are capable of converting sunlight into electricity on both sides of the panel. A number of these panels are joined together to form an array, which is a complete power generating unit.

The arrays are connected to a single axis tracking system. Typical these arrays are arranged in rows normally in a north/south direction with access tracks between the rows for maintenance purposes and to avoid shading issues.

Figure 16 Single Axis Solar PV Array mounted on a concrete ballast (note: Mannum will likely be piles)

Tracking System

A single axis tracking system is proposed (will be confirmed during detailed design) which rotates the arrays from east to west each day to ensure optimal exposure to the sun. The tracking system will be designed and constructed in accordance with the Australian Standards and will have a maximum height of close to 3 metres.

Inverters

The energy generated by the PV modules will be converted from direct current (DC) to alternating current (AC) energy by the inverters and increased to medium voltage via integrated transformers. The inverters and transformers will be housed either in standard shipping containers, in small buildings, or in an outdoor “skid” configuration. The exact type and number of inverters that will be required for the Project will not be known until the detailed design phase, which will determine the electricity generating capacity of the facility. Due to the size of the lot and their location throughout the Project Area between the PV modules ensure any visual impacts are likely to be low.

Grid Connection

The Project is likely to connect directly into the Mannum Substation or into the 33kV distribution line. In order to facilitate this connection, there might be a small switchyard within the Project Area and is likely to be constructed adjacent to the existing distribution line. The size and design of this will depend on the ultimate generating capacity and grid connection arrangements. This will be located either underneath the line or towards the existing Mannum Substation.

The 33kV or 132kV underground or overhead cable may run from the solar farm step up transformers back to the substation where a switchboard and other minor electrical works will be required to connect the solar farm. A connection agreement is currently being prepared with SA Power Networks.

Figure 17 Mannum SAPN and ElectraNet Substation

Battery Storage

The Project may make provision for battery storage throughout the site. While the specific design and type of storage will be finalised prior to construction (due to the rapid changes in technology), these are typically skid mounted, in small containers, or steel-clad buildings. The site elevation plans are included in Appendix 3. This allows for the storage of power during peak generating times (optimal sunlight conditions) for use later when generating capacity is low or at night. This improves the efficiency and reliability of the facility. They can also be used to provide network support for the local grid.

The technology being considered here is similar to that currently being operated by Tesla at Hornsdale Wind Farm in South Australia.

Figure 18 Example Battery Storage System

Site Office and Maintenance

The Project may utilise the existing buildings from Stage 1 for the site office. The proponent is also seeking approval to have a new site office and maintenance warehouse onsite in the event additional space and facilities are required.

Figure 19 Example Site office

Utilities

The Project Area is connected to reticulated water or sewerage infrastructure. Rainwater may be collected and stored via water tanks and used on-site for maintenance purposes. The construction offices will have temporary toilet facilities.

Road Access and Parking

A traffic and transport report was prepared and endorsed for stage 1 by DPTI. Access to the facility will be provided via that same approved access point or via the existing Piggery Road. During construction a lay-down area and on-site facilities provided adjacent to the proposed substation/switchyard. Access tracks will also be constructed throughout the Project Area to provide access to the PV modules and switchyards for maintenance purposes. Below is an image showing the existing farm site entrance. In

accordance with the current approvals, a new access point will be established 150m to the south of the existing dwelling for stage 1 and there is a second access point via Piggery Lane.

Figure 20 Existing site Access Point from Mannum Road

Figure 21 Location of approved site access for stage 1 from Mannum Road (150m south of Fig.19)

Figure 22 Optional site access via Piggery Lane for stage 2

Turn Paths

Figure 22 provides an illustrative turn path for a 19m semi-trailer entering and exiting onto Mannum Road. The truck length for stage 2 will be either 19m or a B-double – the new approved access should be sufficient for either vehicle type.

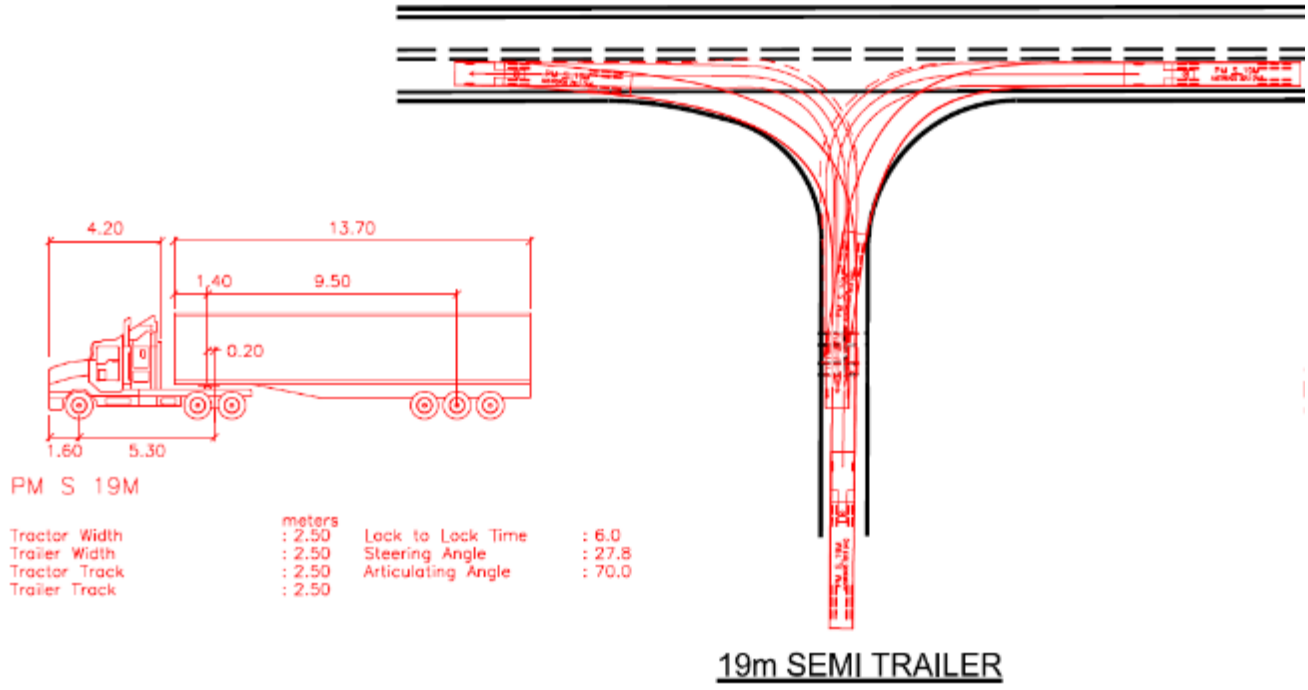
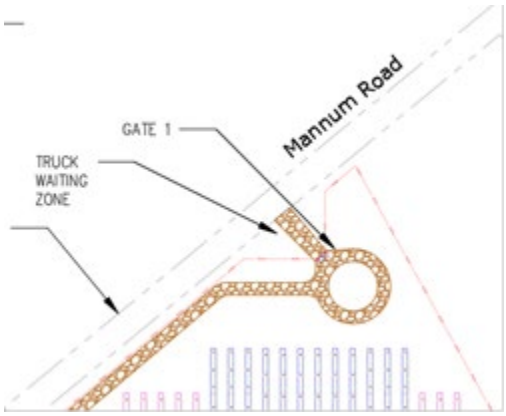


Figure 23 Turn path showing access from Mannum Road



Fencing

The facility will be fenced for security purposes. The fencing plan can be seen in the full site plan.

Contribution to the Local Economy

The development of the Mannum Solar and Storage project will contribute to the local community through multiple channels. Below are some of the key ways in which the project will benefit the region:

- Employment and upskilling opportunities during construction and operation
- Leading project with combined technologies. Mannum can pioneer these types of projects and gain valuable market exposure
- Energy reliability and security for Mid-Murray region
- Option to aggregate loads to negotiate lower power costs through project offtake discussions
- Possibility to replicate on a smaller scale for diesel reliant agriculture loads
- Potential tourism benefit

Appendix One – Planning Report

FRANK BRENNAN
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2 May 2019

PLANNING REPORT

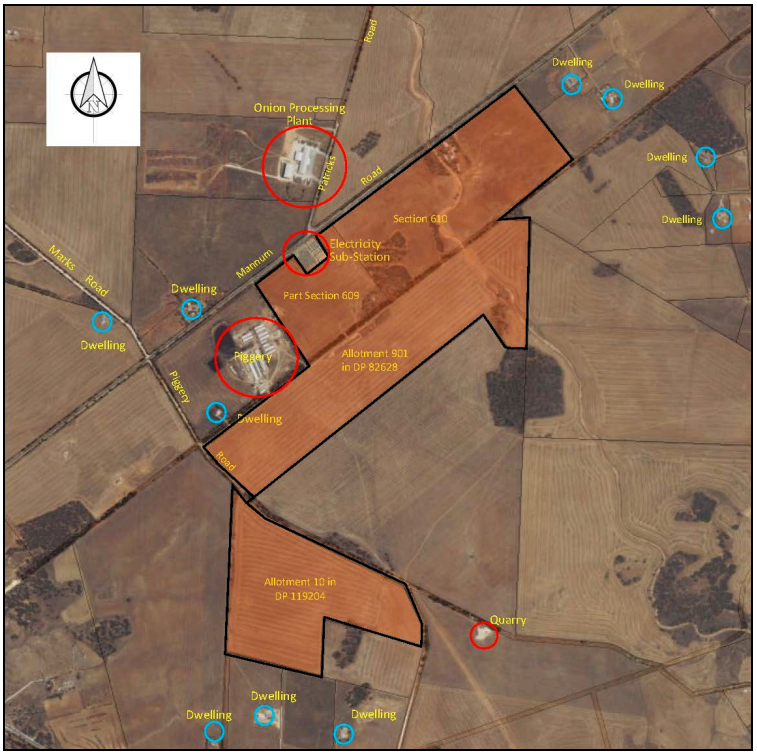
DEVELOPMENT OF A PROPOSED 25 MW ac SOLAR FARM and 4 MW Battery Storage Facility

AT

PART SECTION 609, SECTION 610, PART ALLOTMENT 100 in DP 119204 and PART ALLOTMENT 901 in DP 82628 HUNDRED OF FINNIS

AT

MANNUM ROAD & PIGGERY ROAD MANNUM SA 5238



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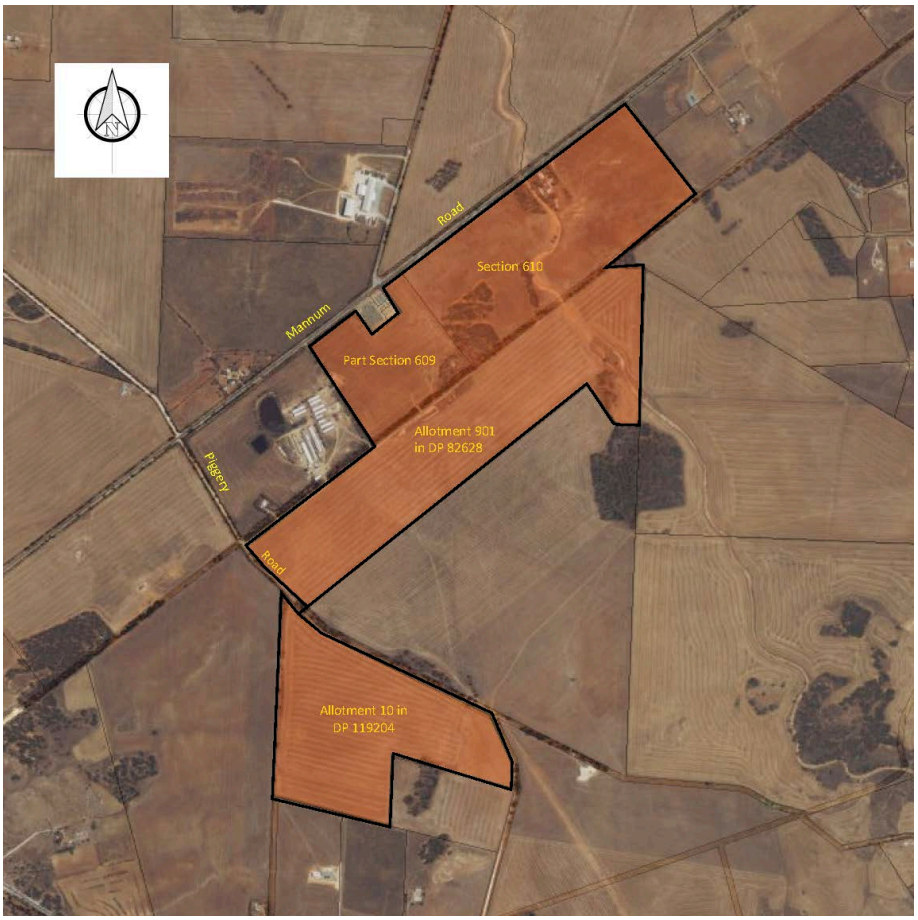
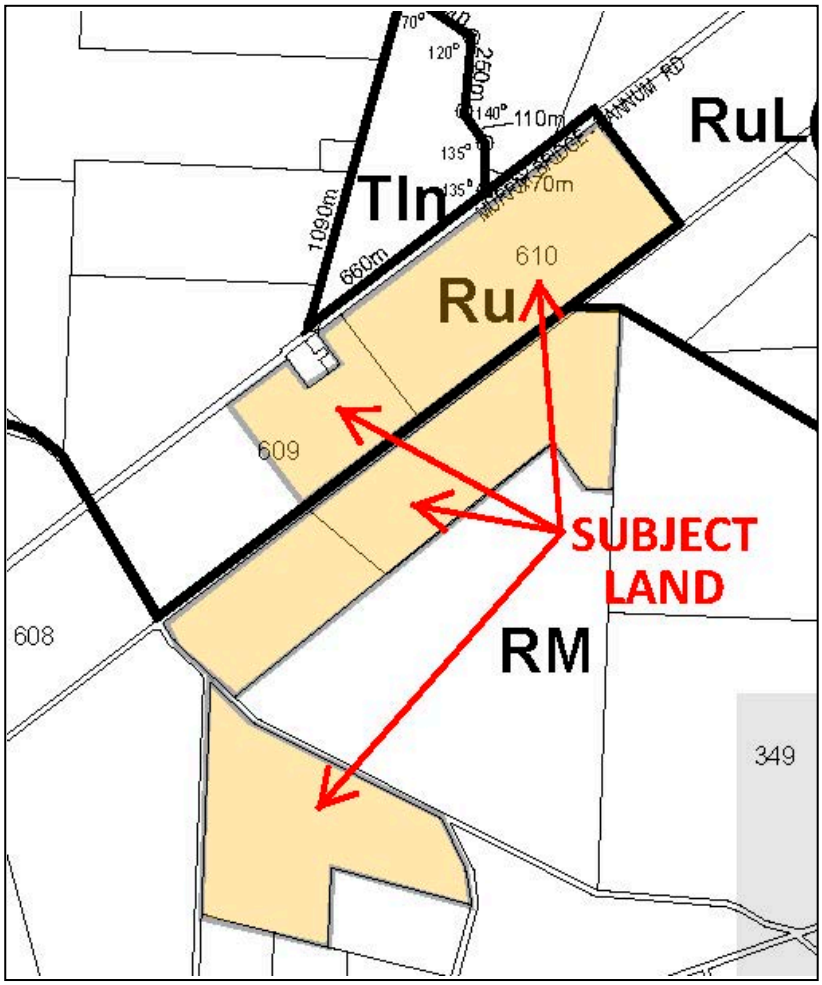
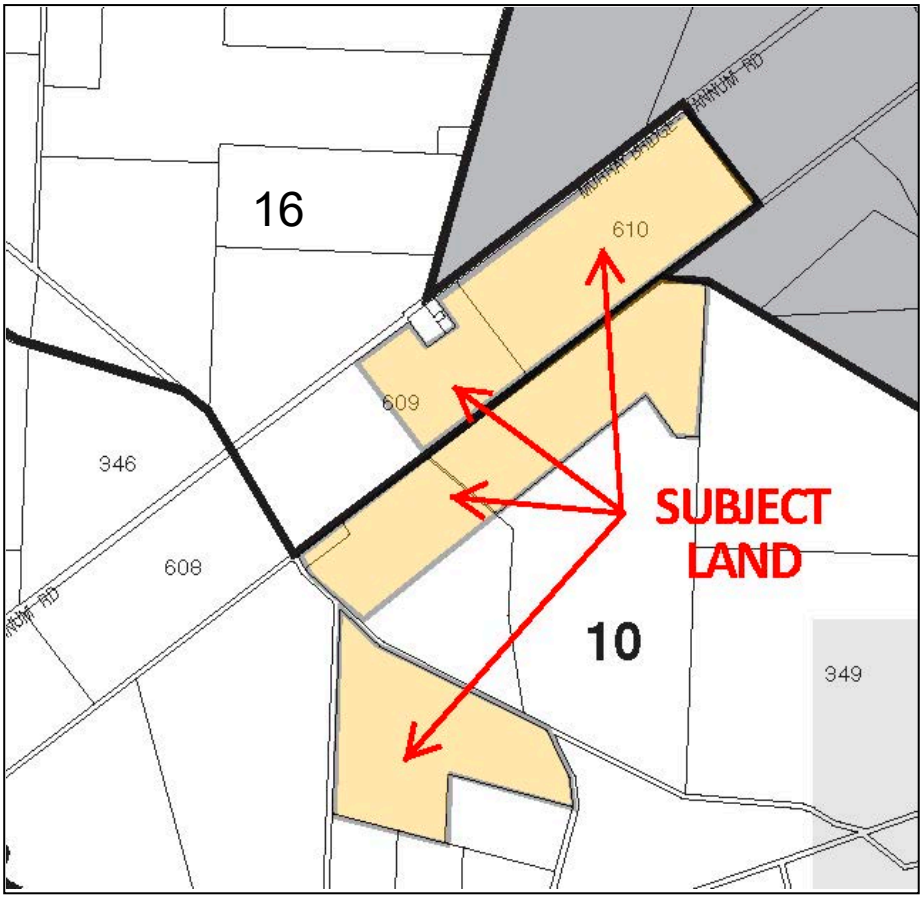
   4.1 Rural Zone & Murray Plains Policy Area 10
   4.2 Council Wide Provisions 11
   4.3 Planning Assessment 14
5. Conclusion 15

1. Subject Land Details

The following are the key details of the subject land –

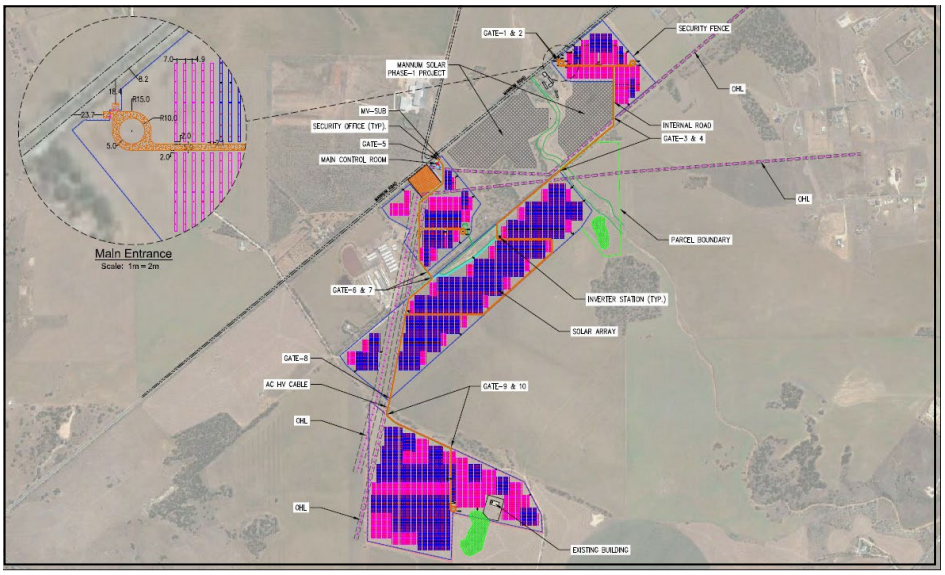
Property Description	The subject land is described as Part Section 609 and Section 610 (Mannum Road) and Allotment 10 in DP 119204 and Allotment 901 in DP 82628 (Piggery Road), hundred of Finnis.  The subject land has an area of 154.80 hectares with frontages to Mannum Road and to an unmade road reserve off Piggery Road. The subject land is arable land that is currently cropped for cereal production.
Certificates of Title	▪ Section 609 – Volume 6154 Folio 553 ▪ Allotment 901 – Volume 6154 Folio 554 ▪ Section 610 – Volume 5236 Folio 836 ▪ Allotment 10 – Volume 6216 Folio 448
Registered Owner	▪ Section 609 – GJ & JM Tiss and AW & AL Goss, Lot 6 Barossa Valley Way, Gawler 5118 ▪ Allotment 901 – GD & HJ Simons, PO Box 86, Mannum 5238. ▪ Section 610 – FJ Boland and MJ & KF Boland, Unit 1, 2 Queenscliff Road, Queenscliff, NSW 2096. ▪ Allotment 10 – DJ Nowak, 146 Piggery Road, Mannum
Easements & Notations	Section 609 is subject to registered easements for water supply purposes and a free and unrestricted right of way.

Easements & Notations	Allotment 901 is subject to registered easements to the Transmission Lessor Corporation and Electranet Pty Ltd for electricity transmission lines and to registered easements for water supply purposes and a free and unrestricted right of way.
Local Government	Mid Murray Council
Development Plan	Development Plan (Mid Murray Council) – consolidated on 23 August 2018
Zoning	The subject land is located within the following Zones – ▪ Sections 609 & 610 – in the Rural Zone and within the Murray Plains Policy Area 16 – refer to Zone Map MiMu/36 and Policy Areas Map MiMu/97. ▪ Allotments 10 & 901 – in the River Murray Zone and within the Primary Production Policy Area 10 – refer to Zone Map MiMu/36 and Policy Areas Map MiMu/97. The maps below show the zoning which applies to the locality surrounding the subject land.  The map below shows the Policy Areas which applies to the locality surrounding the subject land – noting the grey shaded area is not located in a Policy Area.


16
610
609
346
608
SUBJECT
LAND
10
349

2. Development Description

The proposed development involves the establishment of a new solar farm (adjacent the existing 5 MW solar farm) with a total capacity of 25 MW (AC) and a 4 MW Battery Storage Facility comprises the following components –

Solar Panel Array	The installation of approximately 95,000 solar panels mounted on ground level foundations or piles. The panels will be generally most likely be on a single axis tracker going east to west and laid out in a linear array running perpendicular to Mannum Road. They may also be bifacial in design. An example of the type of solar panels to be used on the site is shown below.  The concept layout of the solar farm array is shown on the following aerial plan. 
Switch Yard & Compound	The solar panels will be interconnected by 33 kV underground cables and be connected directly to the national electricity grid at the existing Mannum electricity sub-station facility on Mannum Road. A small switch station (sub-station) being a fenced compound is proposed to be constructed within the solar farm footprint area. Its location will be determined to optimise transmission efficiency to the existing Electricity Sub-Station. The small switch yard is where the voltage will be increased from to allow for connection to the national electricity grid.

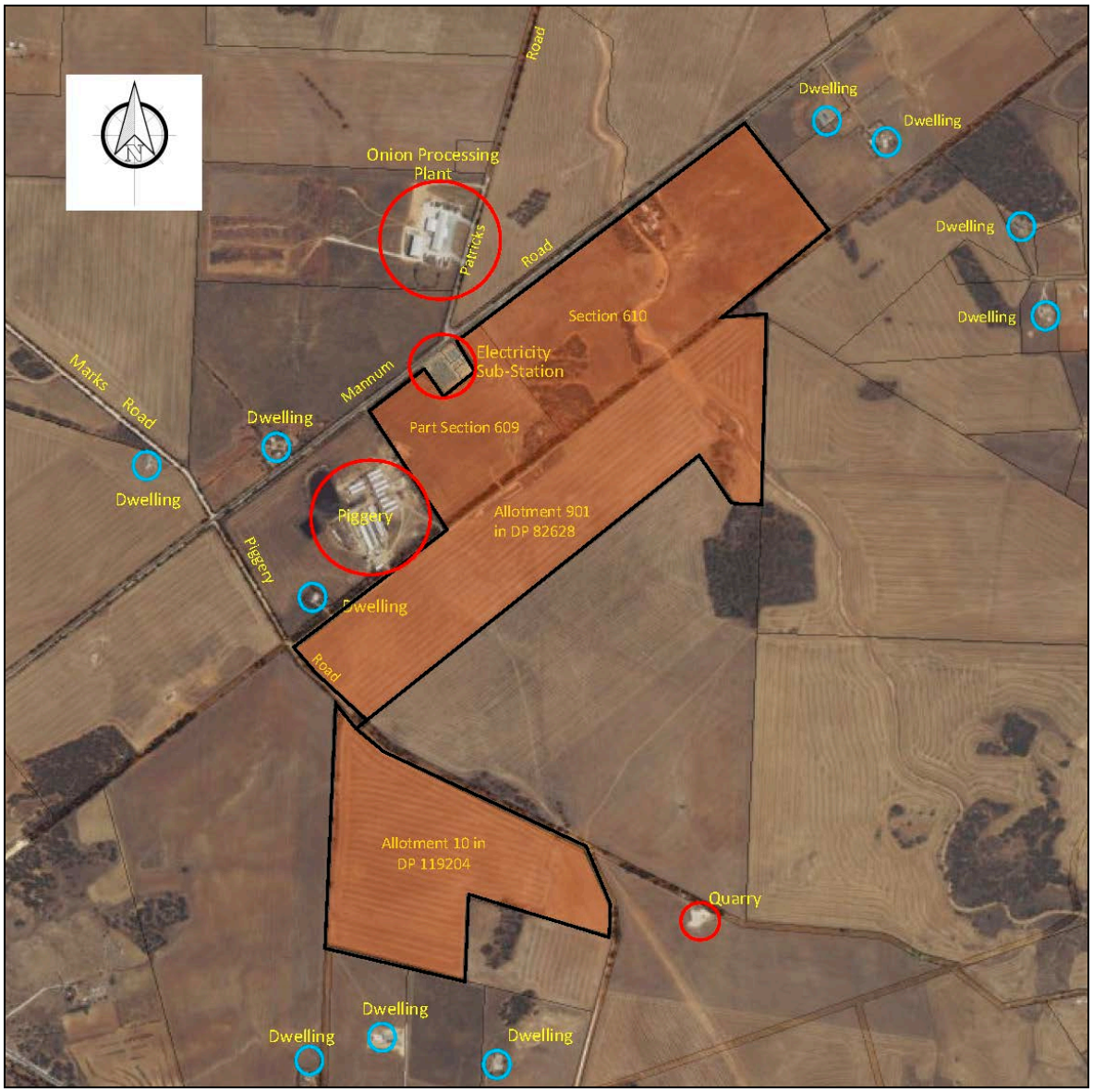
Battery Energy Storage System (BES)	The solar farm's Battery Energy Storage System, comprising a modular sheds (containers) and a fenced compound is to be located to optimise transmission efficiency to the existing Electricity Sub-Station. An example of the battery storage system is shown below. 
Grid Connection	The solar farm will preferably connect directly to the national electricity grid via an overhead transmission line running from the solar farm's proposed Sub-Station to the existing SAPN / ElectraNet Electricity Sub-Station located on the Mannum Road and adjacent the subject land. The following photograph shows the existing SAPN / ElectraNet Electricity Sub-Station facility on the Mannum Road. 
Native Vegetation	All the existing native vegetation on the subject land is to be retained.

3. Locality of the Subject Land

The subject land is located in the following Zones and Policy Areas of the Development Plan (Mid Murray Council) consolidated on 23 August 2018 –

- Sections 609 & 610 – in the Rural Zone and within the Murray Plains Policy Area 16 – refer to Zone Map MiMu/36 and Policy Areas Map MiMu/97.
- Allotments 10 & 901 – in the River Murray Zone and within the Primary Production Policy Area 10 – refer to Zone Map MiMu/36 and Policy Areas Map MiMu/97.

The following aerial plan shows the form of development existing in the immediate vicinity of the subject land.



The pattern and form of development existing in the immediate vicinity of the subject land (as shown on the aerial plan above) is described as follows –

- To the west of the subject land and located on Patricks Road in the Rural Zone is extensive and established onion processing facility.
- To the south-west and immediately abutting the subject land and located in the Rural Zone on Mannum Road is an established piggery facility.

- To the west of the subject land and located in the Rural Zone on Mannum Road is an established SAPN / ElectraNet Electricity Sub-Station facility.
- To the north and north-west of the subject land is the stage 1 Solar Farm.
- To the immediate north-west of the subject land and on the opposite side of Mannum Road is land zoned as Transport Industry Zone. This land is currently vacant land and used for cropping.

  This land can be developed in the future for the following landuses envisaged for the Zone –
  - petrol filling station including specific truck services such as large vehicle manoeuvring space and parking/rest areas, overnight accommodation and roadhouse
  - road transport terminal
  - industry (except special industry).
- To the north-east located in the Rural Living (Mannum) Zone are 2 established rural living dwellings with the nearest being 1 kilometre from the subject land.
- To the north-east (generally) of the subject land is the Rural Living (Mannum) Zone on Ibis Drive, Magpie Crescent and Ramm Road, where development comprises large rural living allotments many of which contain dwellings. The nearest of these dwellings is located 1.2 kilometres from the subject land.
- To the south-east and abutting the subject land is the River Murray Zone and Primary Production Policy Area 10 where the land is currently used for cropping.
- To the south of the subject land there are a number of dwellings located in the River Murray Zone and within the Primary Production Policy Area 10.

In summary the area in the vicinity of the subject land is characterised by diverse Zoning & Policy Areas allowing a mixed form of development within proximity to the subject land, while there also a diversity of existing landuses within this same area comprising primary production (primarily cropping), intensive animal keeping (piggery); industry (onion processing & packing facility); rural living dwellings, renewable energy facility (solar farm) and utility service (electricity sub-station).

4. Planning Considerations

The following is an assessment of the proposed solar farm development against the relevant key Objectives and Principles of Development Control of the Development Plan for the Mid Murray Council area (Consolidated – 23 August 2018).

The policies for the Mid Murray Council area are expressed generally in relation to all development throughout the Council area, then in more detail for the various zones. All sections and all relevant provisions within each section of the Development Plan must be considered in relation to a Development Application.

In the event of any inconsistency between the Council-wide provisions and the Zone and Policy Area provisions, then the more detailed zone provisions would generally prevail.

4.1 Rural Zone & Murray Plains Policy Area 16

The most directly applicable provisions of the Development Plan in the Rural Zone & Murray Plains Policy Area 16 related to the proposed solar farm development are as follows –

Objectives

Sustainable Industry

Objective 1: Long-term operation and sustainability of rural production and primary industries.

Objective 2: Accommodation of wind farms and ancillary development outside of the Barossa Valley Character Preservation District as defined by Character Preservation legislation.

Stormwater

Objective 3: Maintenance of natural hydrological systems and environmental flows.

Vegetation and Landscape Character

Objective 5: Retention and maintenance of wetlands and existing native vegetation for its conservation, biodiversity, and habitat value and environmental management function.

Principles of Development Control

Form of Development

1 Development should not be undertaken unless it is consistent with the desired character and acceptable forms of development for the zone and the relevant policy area.

Landscape

4 Development should be designed and sited to respect and maintain the landscape character of an area which is of:

- *(a) historical (including archaeological) significance;*
- *(b) scientific interest;*
- *(c) scenic value or natural beauty;*
- *(d) other heritage significance; or*
- *(e) conservation significance.*

Soil

5 Development should not have an adverse impact on the natural, physical, chemical or biological quality and characteristics of soil resources.

Built Form and Design

18 Buildings and structures which have:

- *(a) a design scale, appearance and site to enhance the positive environmental qualities, built form and character of the locality;*
- *(b) a site which is unobtrusive and screened from public roads and adjoining properties by:*
  - *(i) natural landforms;*
  - *(ii) existing vegetation;*
  - *(iii) planting of appropriate vegetation;*

(c) *a requirement for minimal excavation or filling of land;*
(d) *a requirements for minimal removal of existing vegetation; and*
(e) *sites which are grouped together.*

19 *The external appearance and design of buildings and structures visible from a public road or waterway should minimise their visual obtrusiveness by:*

(a) *reducing the building's profile;*
(b) *reducing the mass of buildings into smaller components by variations in wall and roof lines; and*
(c) *using eaves, verandahs and similar techniques to create shadowed areas.*

20 *Sites should be provided with a safe and convenient means of access which:*

(a) *avoids unreasonable interference with the flow of traffic on adjoining roads;*
(b) *accommodates all types and the volume of traffic likely to be generated by the development or land use; and*
(c) *is located and designed to minimise any adverse impact on the occupants of visitors to neighbouring properties.*

Building Development

23 *Buildings should not be designed and sited so as not to be visually obtrusive.*

Rural Zone – Policy Area Number 16 – Murray Plains Policy Area

Desired Character

The majority of the Murray Plains is used for dryland farming although in proximity of the River Murray Zone where it is economical to reticulate River water, horticultural development of a variety of types is undertaken compared to other agricultural regions. There are a number of large stands of the original Mallee vegetation of the Plains which should be preserved.

Principles of Development Control

1 *Development should not be undertaken unless it is consistent with the desired character for the policy area.*

4.2 River Murray Zone & Primary Production Policy Area 10

The most directly applicable provisions of the Development Plan in the River Murray Zone & Primary Production Policy Area 10 related to the proposed solar farm development are as follows –

Desired Character

The Murray Valley has important environmental values which need to be protected and managed. Its natural features and primary production base provide a foundation for the region's recreational and tourist activities.

Objectives

Ecological Sustainable Development

Objective 1: *Ecologically sustainable development.*

Objective 2: *Development which recognises the variety in the land types and corresponding character differences.*

Environment

Objective 4: *Protection and improvement of the riverine landscape.*

Objective 5: *Prevention of land degradation.*

Primary Production

Objective 10: *Use of land for Primary Production as the prime economic use in the zone.*

Principles of Development Control

Electricity and Telecommunications Infrastructure

25 *Electricity and telecommunications lines should be installed underground except in areas within the 1956 floodplain of the River Murray.*

River Murray Zone – Primary Production Policy Area 10

Desired Character

This Policy Area is the location of the majority of agricultural production within the River Murray Zone. It includes irrigated orchards, vineyards and pasture, dairies, and dryland farming. The processing of agricultural product is also envisaged which, subject to strict compliance with environmental criteria, could include value-adding enterprises such as packing and processing works and wineries. Other forms of small-scale industry may be appropriate in association with existing residential development, on allotments which are not suited to primary production.

Land capability varies throughout the policy area. There are farming allotments and irrigated developments interspersed with allotments that have never been used for primary production due to varying land capability, poor rainfall or the presence of remnant bushland. The highly variable nature of each property is to be considered in determining development opportunities.

The following forms of development are acceptable in the Primary Production Policy Area:

- *solar panels or photo-voltaic cells/panels (roof based or on land supporting domestic premises, existing uses and tourism oriented development;*

Objectives

Sustainable Industry

Objective 1: *Operation and sustainability of rural production and primary industries.*

Infrastructure

Objective 18: *Economic provision of infrastructure in an environmentally sensitive manner.*

Objective 19: *Development provided with an adequate level of appropriate services and infrastructure without excessive cost to the community.*

Principles of Development Control

Form of Development

1 Development should not be undertaken unless it is consistent with the desired character and acceptable forms of development for the policy area.

Landscape

4 Development should be designed and sited to respect and maintain the landscape character of an area which is of:

(a) historical (including archaeological) significance;
(b) scientific interest;
(c) scenic value or natural beauty; or
(d) other heritage significance.

Built Form and Design

16 Buildings and structures which have:

(a) a design scale, appearance and site to enhance the positive environmental qualities, built form and character of the locality;
(b) a site which is unobtrusive and screened from public roads and adjoining properties by:
(i) natural landforms;
(ii) existing vegetation;
(iii) planting of appropriate vegetation;
(c) a requirement for minimal excavation or filling of land;
(d) a requirements for minimal removal of existing vegetation; and
(e) sites which are grouped together.

17 The external appearance and design of buildings and structures visible from a public road should minimise their visual obtrusiveness by:

(a) reducing the building's profile, generally involving single storey designs, or split level built form following the contours of the land;
(b) reducing the mass of buildings into smaller components by variations in wall and roof lines; and
(c) using eaves, verandahs and similar techniques to create shadowed areas.

18 Sites should be provided with a safe and convenient means of access which:

(a) avoids unreasonable interference with the flow of traffic on adjoining roads;

(b) *accommodates all types and the volume of traffic likely to be generated by the development or land use; and*
(c) *is located and designed to minimise any adverse impact on the occupants of visitors to neighbouring properties.*

4.3 Council Wide Provisions

The most directly applicable Council Wide provisions of the Mid Murray Council's Development Plan related to the proposed solar farm development are as follows –

OBJECTIVES

Appearance of Land and Buildings

Objective 18: Amenity of localities not impaired by the appearance of land, buildings and structures including landscape.

Objective 19: Development of a high architectural standard that responds to and reinforces positive aspects of the local environment and built form.

Interface Between Land Uses

Objective 25 Development located and designed to prevent adverse impact and conflict between land uses.

Rural Development

Objective 47: Retention of rural areas for agricultural and pastoral purposes.

Objective 48: Maintenance of the character of rural areas.

Natural Resources

Objective 51: Native flora, fauna and ecosystems protected, retained, conserved and restored.

Conservation

Objective 58: Retention of environmentally-significant areas of native vegetation.

Water Resources

Objective 59: Retention, protection and restoration of the natural resources and environment.

Bushfire Protection

Objective 94: Development should minimise the threat and impact of bushfires on life and property while protecting the natural and rural character.

Objective 95: Buildings and the intensification of non-rural land uses directed away from areas of high bushfire risk.

Renewable Energy

Objective 96: Development of renewable energy facilities that benefit the environment, the community and the state.

Objective 97: The development of renewable energy facilities, such as wind farms and ancillary development, in areas that provide opportunity to harvest natural resources for the efficient generation of electricity.

Objective 98: Location, siting, design and operation of renewable energy facilities to avoid or minimise adverse impacts on the natural environment and other land uses.

PRINCIPLES OF DEVELOPMENT CONTROL

Form of Development

5 Development which is incompatible with other uses within the locality of the proposed development should not be undertaken.

Interface Between Land Uses

87 Development should not detrimentally affect the amenity of the locality or cause unreasonable interference through any of the following:

(a) *the emission of effluent, odour, smoke, fumes, dust or other airborne pollutants;*
(b) *noise;*
(c) *vibration;*
(d) *electrical interference;*
(e) *light spill;*
(f) *glare;*
(g) *hours of operation; or*
(h) *traffic impacts.*

88 Development should be designed and sited to minimise negative impact on existing and potential future land uses considered appropriate in the locality.

91 Sensitive uses likely to conflict with the continuation of lawfully existing developments and land uses considered appropriate for the zone should not be developed or should be designed to minimise negative impacts.

Rural Interface

96 Existing primary production uses and mineral extraction should not be prejudiced by the inappropriate encroachment of sensitive uses such as urban.

Siting and Visibility

155 Development should be sited and designed to minimise its visual impact on:

(a) the natural, rural or heritage character of the area;

(b) areas of high visual or scenic value, particularly rural and riverine areas;

Biodiversity and Native Vegetation

168 Development should retain existing areas of native vegetation and where possible contribute to revegetation using locally indigenous plant species.

Renewable Energy Facilities

396 Renewable energy facilities, including wind farms and ancillary development, should be:

(a) located in areas that maximize efficient generation and supply of electricity; and

(b) designed and sited so as not to impact on the safety of water or air transport and the operation of ports, airfields and designated landing strips.

4.4 Planning Assessment

The subject land (being 154.8 hectares in area) is currently used for cereal cropping (primary production) purposes and adjoins the existing Mannum Electricity Sub-Station on Mannum Road.

The subject land is located on Mannum Road or has access to Mannum Road which is a designated secondary arterial road [refer to Structure Plan Map MiMu/1 (Overlay 1)] and once constructed the proposed solar farm will not generate any significant traffic volumes that would cause unreasonable interference with the flow of traffic on this road or adjacent road network – primarily Piggery Road.

The proposed solar farm will not have an adverse impact or create a conflict between landuses in this locality from its existence or passive operation.

The location, siting, design and operation of proposed solar farm (being a renewable energy facility) has been undertaken to –

- avoid and/or minimise adverse impacts on the natural environment by the retention of the existing native vegetation on the site
- avoid and/or minimise adverse impacts on the visual amenity in this locality or cause any nuisance, including glare, to adjoining properties
- provide for the continuation of existing landuses in the vicinity including primary production landuses
- maximize efficient generation and supply of electricity from the proximity of the site to the existing Electricity Sub- Station where it is proposed to connect to the national electricity grid

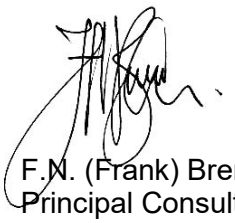
The location and topography of the subject land provides an ideal opportunity to harvest the natural sunlight for the production of a renewable electricity supply.

The proposed solar farm is considered to be a passive renewable energy facility that will not have any detrimental impacts on the adjoining properties and the continuation of the landuses currently on them or allowed to be undertaken in the future.

5. Conclusion

It is submitted that the proposed solar farm development incorporating a solar panel array, electricity sub-station and a Battery Energy Storage facility on the subject land is not significantly inconsistent with the respective Desired Character Statements, Objectives and Principles of Development Control in the Council-wide; River Murray Zone and Rural Zone sections of the Development Plan (Mid Murray Council – consolidated on 23 August 2018).

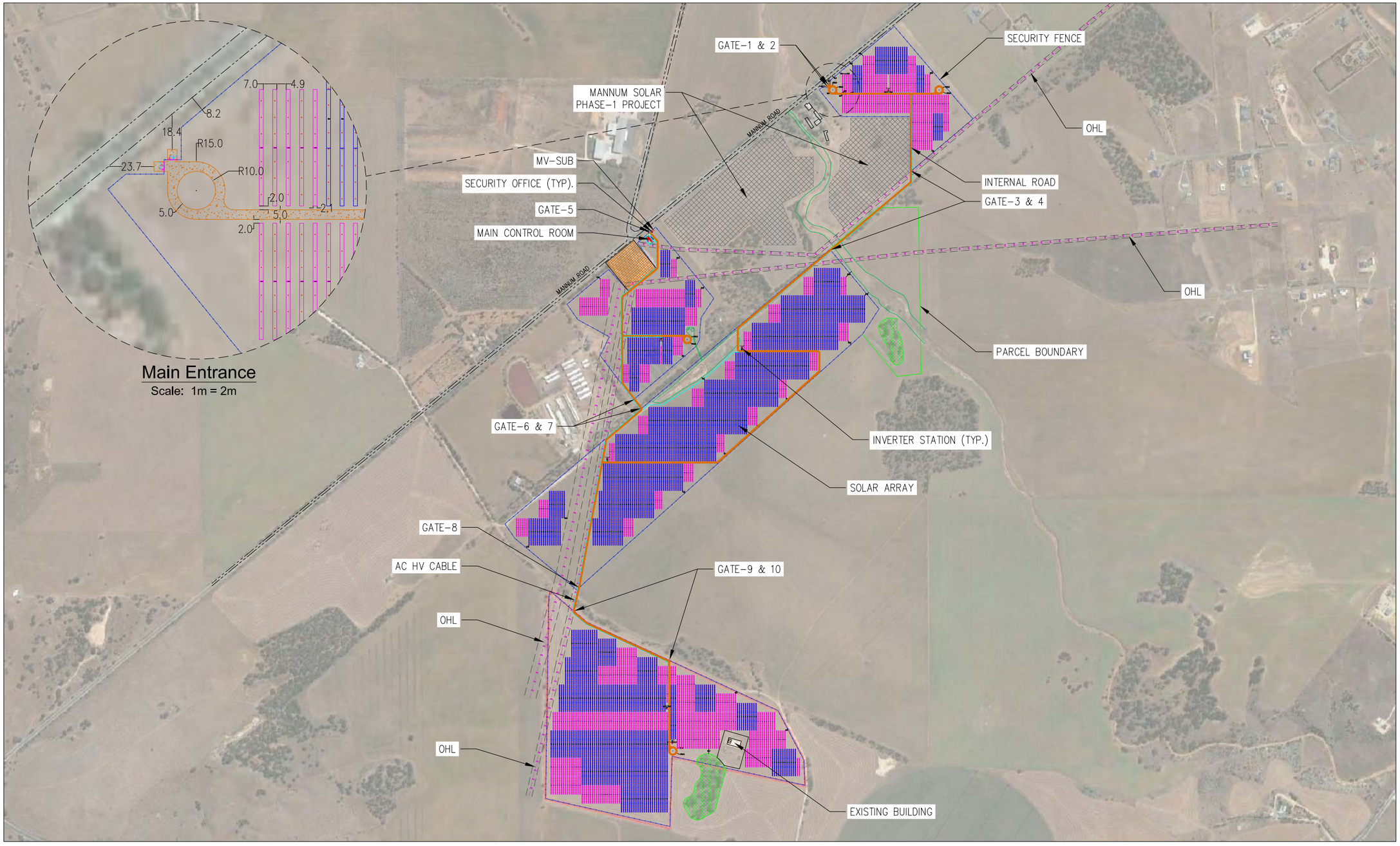
When assessed against the provisions of the Development Plan, the proposed solar farm development demonstrates sufficient merit and warrants the granting of Development Plan Consent.



F.N. (Frank) Brennan MPIA
Principal Consultant
FRANK BRENNAN CONSULTING SERVICES

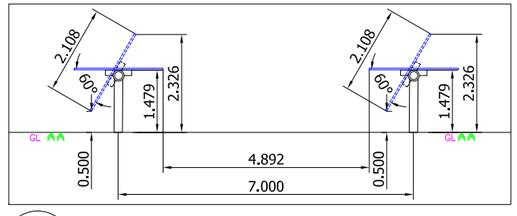
Diploma in Planning
Diploma in Local Government Administration
Planning Institute of Australia (Full Member)

Appendix Two – Site Layout Plan



1 PLAN VIEW: SOLAR ARRAY LAYOUT

SCALE: 1 mtr. = 13 mtrs.



2 SOLAR MODULE TILT & SPACING

PROJECT DETAILS:

1. RE RESOURCE: SOLAR PV

2. CAPACITY: 25.0 MWac / 36.425 MWdc

LEGEND:-

	SINGLE AXIS TRACKER
	5m WIDE INTERNAL ROAD
	OVERHEAD TRANSMISSION LINE
	MV STATION LOCATION
	AC HV CABLE
	PERIMETER FENCE

NOTES:-

ALL DIMENSIONS ARE IN METERS
1. AXIS AZIMUTH: 0°
2. PITCH: 7.0 METERS
3. PHI LIMIT: -60°/+60°

NOTES:-

1. STRING NUMBER IN EACH COMBINER BOX MAY CHANGE DURING DETAIL DESIGN.

2. TRANSFORMER CONNECTION MAY VARY DEPENDING ON ACTUAL EQUIPMENT SELECTION.

3. PARAMETER MAY GET CHANGE DURING DETAIL ENGINEERING.

PLANT DETAIL

01	SOLAR MODULE MFG.	CANADIAN SOLAR
02	TOTAL NUMBER OF MODULE 400 Wp	45248 Nos.
03	TOTAL NUMBER OF MODULE 405 Wp	45248 Nos.
04	MOUNTING SYSTEM TYPE.	SINGLE AXIS TRACKER
05	MODULE MOUNTING IN SERIES	28 Nos.
06	TOTAL NUMBER OF STRING	3232 Nos.
07	TOTAL NUMBER OF STRING COMBINER BOX	135 Nos.
07	TOTAL NUMBER OF INVERTER STATION (1X2500 kW)	4 Nos.
08	TOTAL NUMBER OF INVERTER STATION (2X2500 kW)	3 Nos.
09	INVERTER RATING	2500 kW
10	DC/AC RATIO	1.457
11	GCR	30%

SHEET SIZE:-

A0

CanadianSolar

PRELIMINARY
NOT FOR CONSTRUCTION

LOCATION:
34°54'55.35"S
139°16'06.98"E

DATE:	DESCRIPTION:	No.:
15/09/2018	DRAFT REVIEW	0
18/09/2018	COMMENTS INCORPORATED	1
19/09/2018	COMMENTS INCORPORATED	2
20/09/2018	COMMENTS INCORPORATED	3
27/09/2018	COMMENTS INCORPORATED	4
29/09/2018	COMMENTS INCORPORATED	5
25/01/2019	COMMENTS INCORPORATED	6
30/03/2019	COMMENTS INCORPORATED	7
02/04/2019	COMMENTS INCORPORATED	8
17/04/2019	COMMENTS INCORPORATED	9

DESIGNED BY:
GS

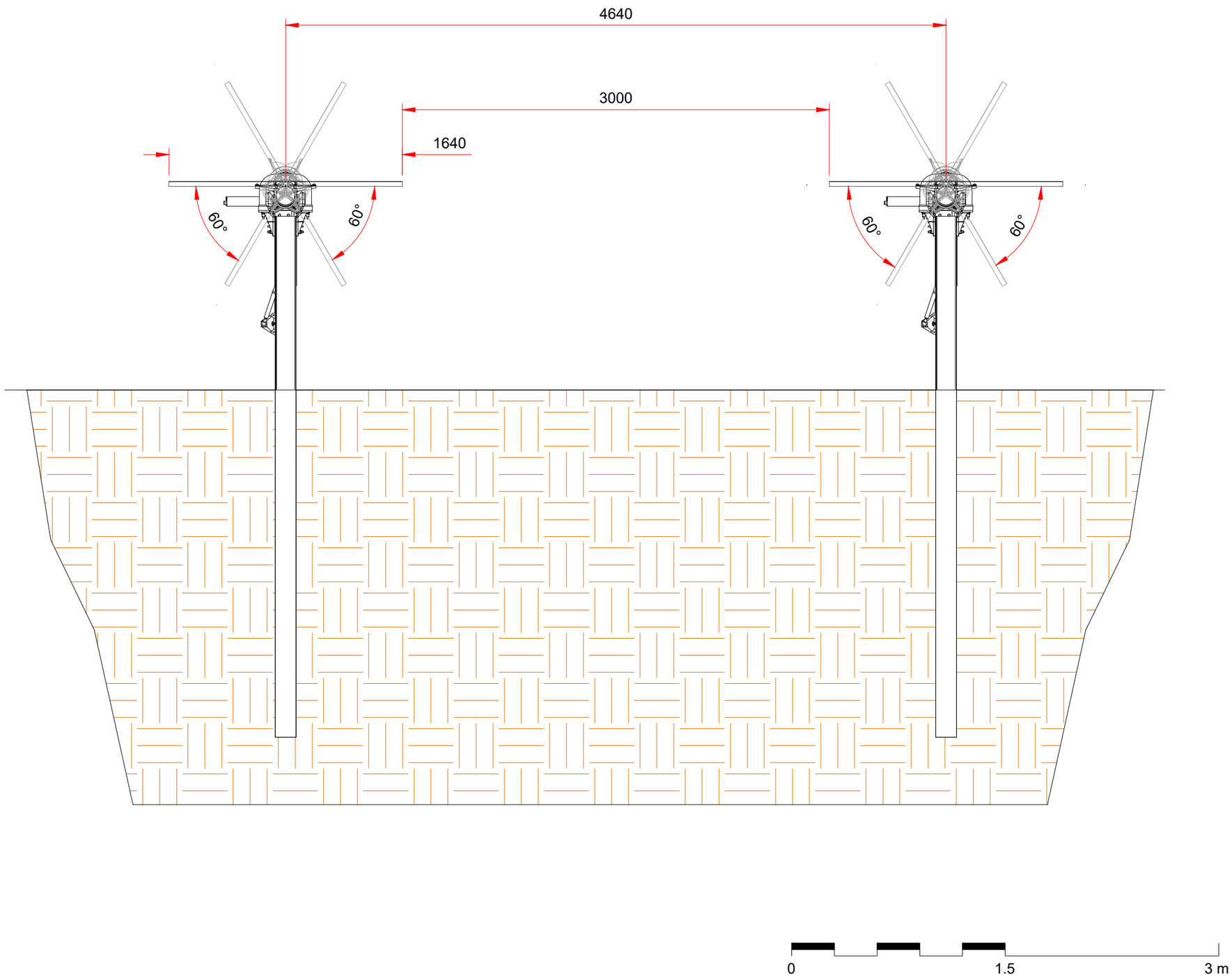
ENGINEERING CHECK BY:

DEVELOPMENT CHECK BY:

MANNUM SOLAR FARM PHASE-2 PROJECT

ARRAY LAYOUT

Appendix Three – Site Elevation Plans



Proposal Only

Notes:

Proposed location:

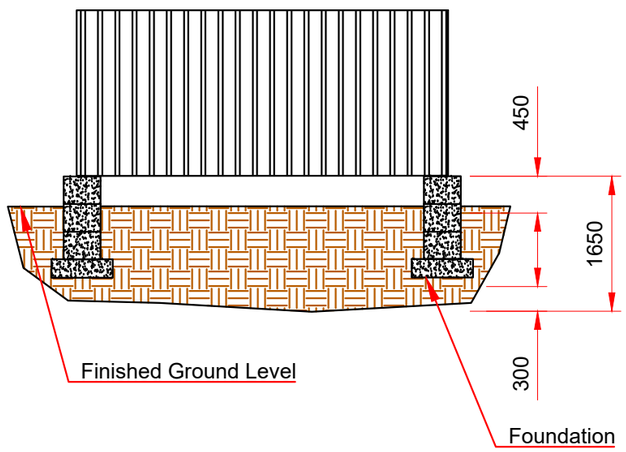
Client:	Mannum Solar Farm Pty Ltd
Location:	34°54'57.23"S 139°15'59.97"E
Title:	Tracker Side Elevation

Drawn:	DETRA	Checked:	FB
Scale:	1:30@A3	Date:	13/12/17
Drawing No:	FB1001-B-01	Rev:	--

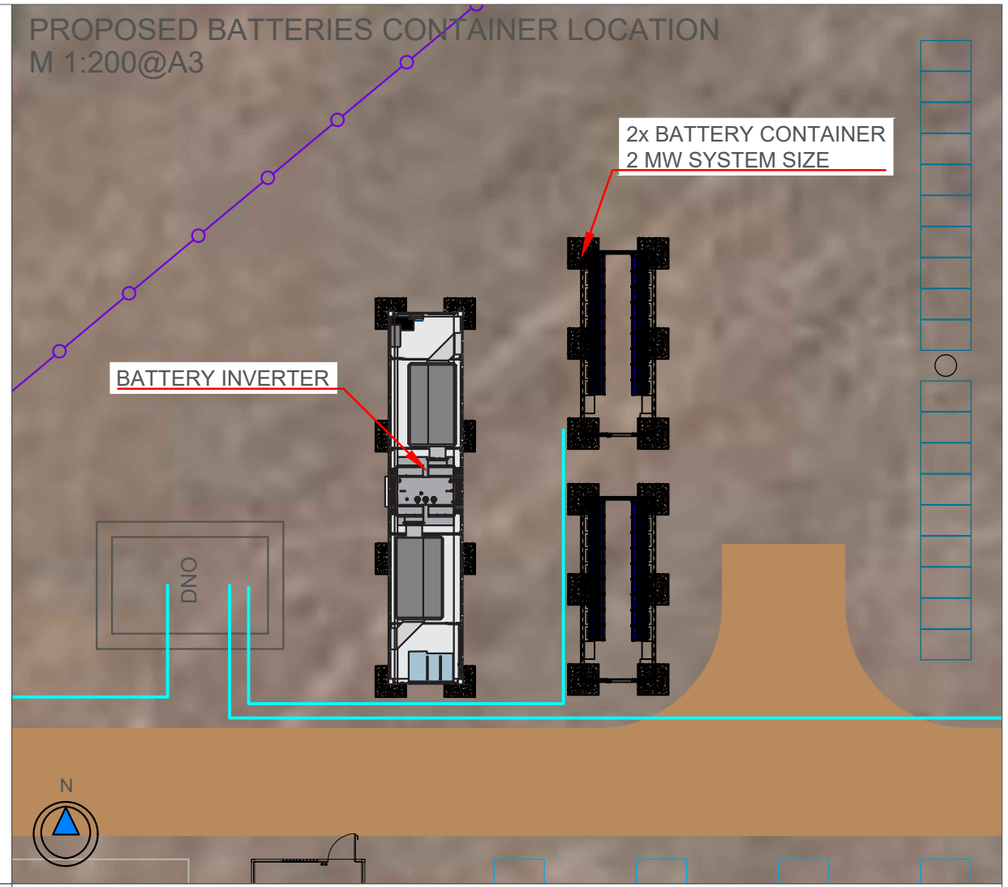
bolandfj@hotmail.com
0423 778 125

PLAN VIEW
M 1:100@A3

TYPICAL FRONT VIEW



PROPOSED BATTERIES CONTAINER LOCATION
M 1:200@A3

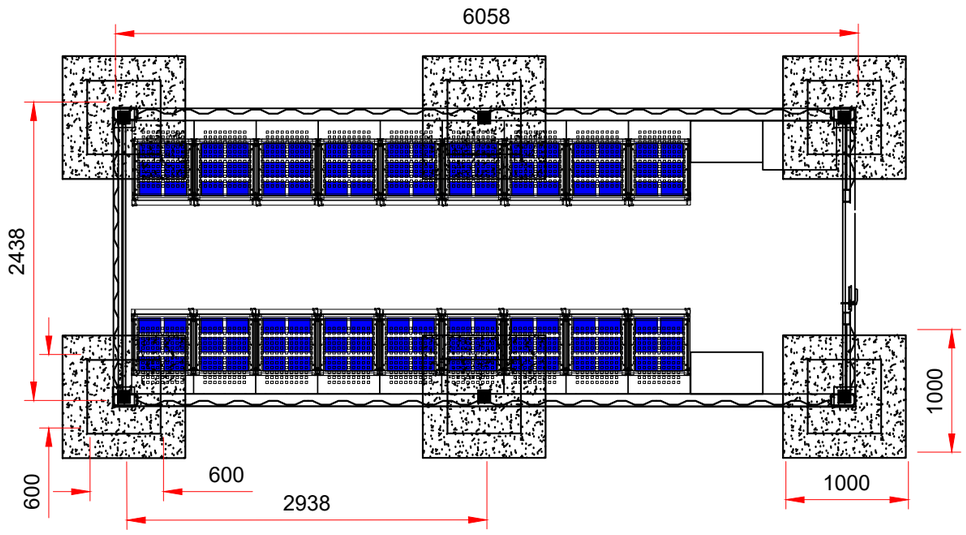


Proposal Only

Notes:

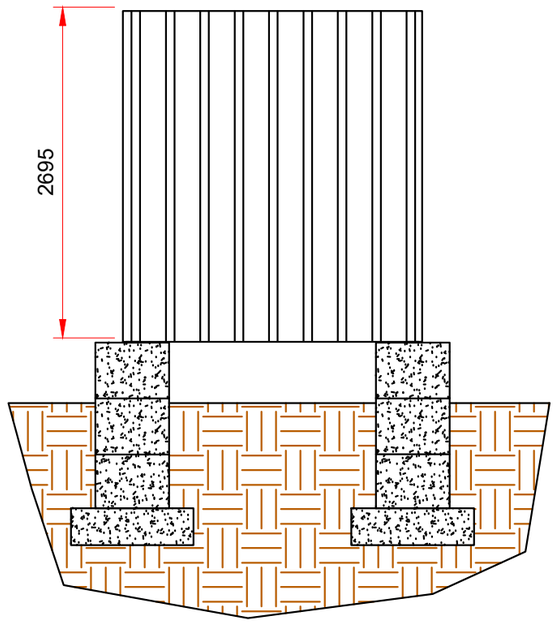
PLAN VIEW
M 1:50@A3

TYPICAL PLAN VIEW



PLAN VIEW
M 1:50@A3

TYPICAL SIDE VIEW



Proposed location:

Client:	Mannum Solar Farm Pty Ltd		
Location:	34°54'57.23"S 139°15'59.97"E		
Title:	Batteries Container Side Elevation		
Drawn:	DETRA	Checked:	FB
Scale:	As Shown@A3	Date:	13/12/17
Drawing No:	FB1001-C-01	Rev:	--

bolandfj@hotmail.com
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Mannum Solar Farm Pty Ltd

Traffic Management Plan

Southern Sustainable Electric

Revision History

Version	Author	Date	Description
0.1	A. Anderson	10/03/2019	Initial draft version
0.2	S. Phillips	14/03/2019	Draft version incorporating S. Coras comments from Canadian Solar and Mid Murray Council DA consent conditions
1.0	S. Phillips	17/03/2019	Draft version for review by SSE Australia
1.1	S. Phillips	18/03/2019	Included comments from A. Anderson of SSE Australia
1.2	D. Su	18/03/2019	Updated diagrams
1.3	S. Phillips	18/03/2019	Minor formatting changes
1.4	S. Phillips	21/03/2019	Changes based on review comments from S. Coras of Canadian Solar
1.5	S. Phillips & D. Su	09/04/2019	Modify site access to meet DPTI requirement for one gate and crossing point

Disclaimer

The preparation of this document has been in accordance with the project brief provided by the client and has relied upon the information, data and results provided or collected from the contracted third parties engaged to assess the site and conditions being acceptable for a utility-scale photovoltaic installation.

All the information contained within this Traffic Management Plan is prepared for the exclusive use of Southern Sustainable Electric Pty Ltd, trading as SSE Australia, Canadian Solar and Mannum Solar Farm Pty Ltd.

SSE Australia accepts no responsibility for any loss, damage suffered or inconvenience arising from any person or entity using the plans or information in this Traffic Management Plan for purposes other than those stated above.

Southern Sustainable Electric

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1. Introduction

Southern Sustainable Electric Pty Ltd, trading as SSE Australia, has been engaged by Canadian Solar, on behalf of Mannum Solar Farm Pty Ltd, to provide a Traffic Management Plan (TMP) based on an assessment completed by Page Street Services (application ref: 2018/01899/01 ID:500350), for a solar farm construction project at 135 Mannum Road, Mannum SA.

This assessment was submitted to the attention of Mr Vittorio Varricchio, Traffic Operations, of the Department of Planning, Transport and Infrastructure (DPTI) on 19 February 2019 in response to questions raised by DPTI in their *Request for Additional Information* issued by the DPTI on 02 February 2018.

This TMP is designed to meet the Mid Murray Council development plan consent conditions relating to development application number 711/486/17, as detailed in the *Decision Notification Form*, reference 711/486/17AB and dated 20 April 2018.

2. Overview

The construction and operation of the Mannum Solar Farm will be completed in four phases:

1. Mobilisation
2. Construction
3. Demobilisation
4. Operations

The traffic flow for each of these phases will be different and is discussed in more detail below.

3. Traffic Management Control Strategy

All vehicular access to the site will be at the approved designated access point, located 150 metres south of the existing access point serving the adjoining dwelling, as shown on the updated plans submitted to DPTI on 26 March 2018.

3.1 Designated Access Point

All vehicular traffic will be required to access the site at Gate 1 on Mannum Road. This is the only external access point for the site. All vehicles will enter and exit in a forward direction.

One gate will be constructed at this access point and the access road will be sealed and designed in accordance with the *Austroads Guide to Road Design Part 44 – Intersections and Crossings: General*.

The map below shows the designated access point in relation to the existing (old) access point.

Map 1 – Designated Access Point for Traffic

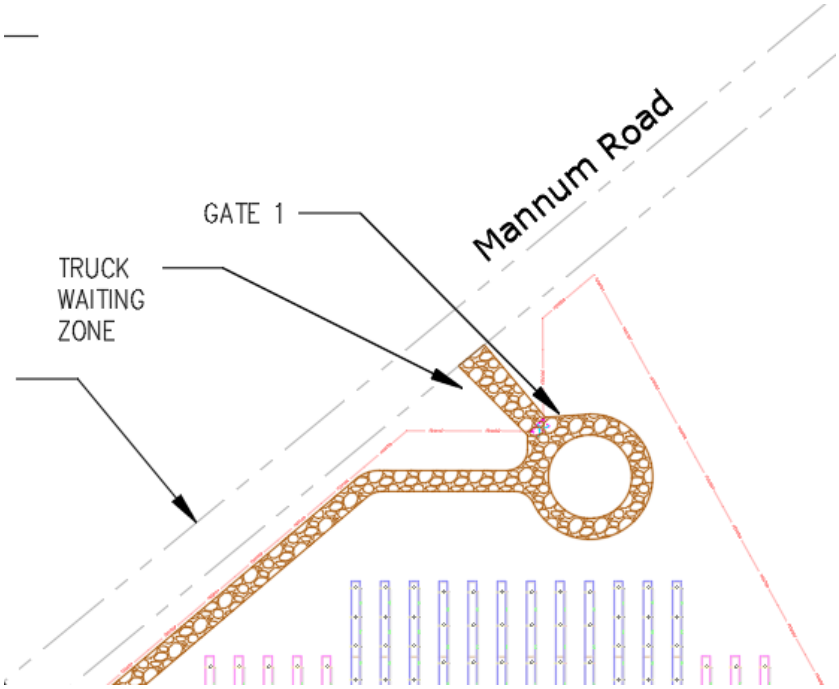


Diagram 1 – Detail of Gate 1 at the Designated Access Point

There will be a single gate at the access point to ensure compliance with condition 8 of the DNF, as in, a single crossing point that is generally consistent with Figure 7.4 of *Austroads Guide to Road Design Part 44 – Intersections and Crossings: General*. The gate will be set back so that large vehicles can be temporarily parked off the road, in the truck waiting zone, while waiting for the gate to open.

3.2 Driver Induction

All drivers will be inducted as per the CEMP (Construction Environmental Management Plan).

3.3 Permitted Vehicles

Only vehicles shorter than 19.0 metres will be permitted on site. Any vehicles greater than 19.0 meters in length will not be permitted access.

3.4 Types of Vehicles

The following images show examples of the types of heavy vehicles that will be performing deliveries and removals at the site.

3.4.1 Articulated 19m Semi-Trailer with 40 Foot Container

This is the largest permitted vehicle that will be on site.

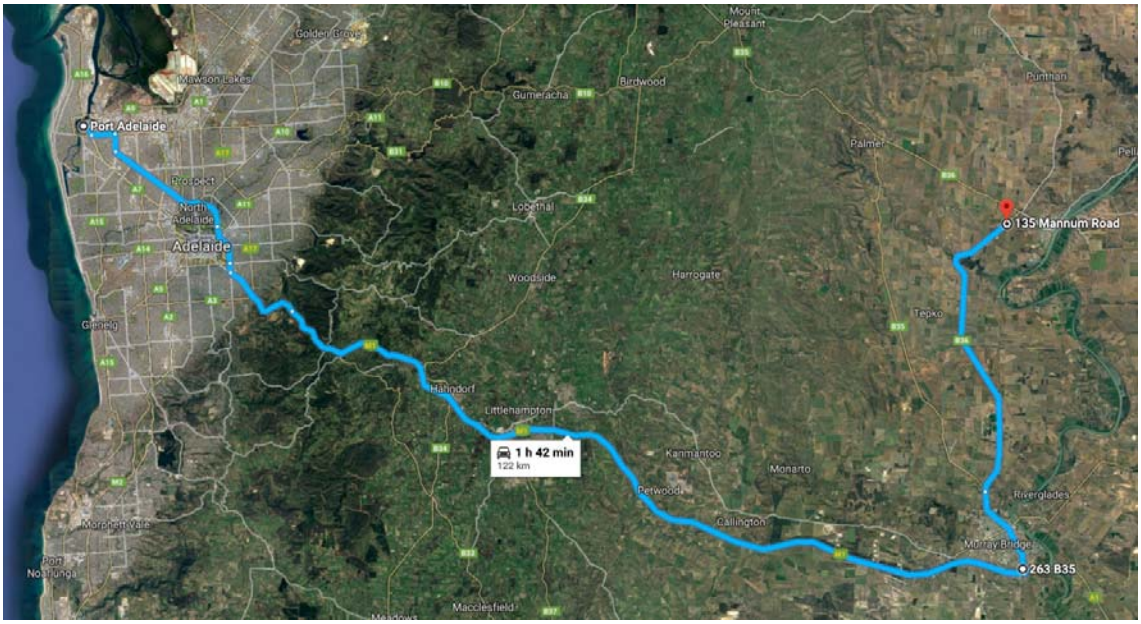
3.4.2 Low-Bed Semi-Trailer Carrying Excavator

3.4.3 Rigid Truck Carrying Solar Equipment

3.4.4 Service Vehicle for Personnel and Small Tooling

3.4.5 Delivery Vehicle Route

The route from Port Adelaide to the project site is to proceed south-east from Adelaide, via the M1, and then north from Murray Bridge, as shown below.



Map 2 – Delivery Route from Port Adelaide to Project Site

The trucks will turn around on site, at one of the internal roundabout turns, so they can leave the site in a forward direction. No reversing onto Mannum Road will be allowed for any vehicle exits.

Map 3 –Delivery Route along Mannum Road to Project Site

3.4.6 Vehicle Waiting Zone Turning Movements

The single-gate configuration for Gate 1 has been designed to allow a 19m semi-trailer to pull off the road and wait in the truck waiting zone, while waiting for the gate to open.

3.4.7 Expected Delivery Hours

Truck delivery times will be during on-site working hours, 6:00 AM to 6:00 PM, Monday to Saturday, excluding public holidays. There will be no out-of-hours deliveries.

3.5 Proposed Road Signage

As per the Page Street Services recommendations, SSE Australia will ensure that traffic control sign and marking schemes will be installed on either side of the site entry, following the *Guide to Traffic Management Part 10 (Austroads 2009d))*.

3.6 Proposed Road Upgrades

The access road will be sealed and designed in accordance with Figure 7.4 of *Austroads Guide to Road Design Part 44 – Intersections and Crossings: General*. No public roads are proposed to be upgraded.

3.7 Proposed Road Closures

There are no proposed road closures.

3.8 Vehicle Numbers

The number of vehicles accessing the site per day will vary with the phase of the project. Vehicle numbers for the four phases are details in the following sections.

3.8.1 Mobilisation Phase Vehicle Numbers

The mobilisation phase is required for early delivery of material that must be on site prior to construction. This will help alleviate traffic during the construction phase.

Mobilisation Phase (scheduled for March 2019)		
Vehicle Type	Use/Materials being delivered	Daily Trips (In & Out)
19m Articulated Vehicle	Machinery and construction materials/components	4
Large Rigid Vehicles	Machinery and general construction materials/components	1
Concrete/Water Trucks	Concrete	0
Light Vehicles	Staff transportation	3

Table 1 – Mannum Solar Farm Traffic Overview for Mobilisation Phase

Solar module and mounting components will be delivered by 19m articulated semi- trailers in 40-foot shipping containers. There will be a total of 19 containers for tracker mountings and a further 27 containers for solar modules. These will be staggered deliveries approximately 3 hours apart, of up to four containers per day using two trucks.

The machinery will be shipped on either 19m articulated semi-trailers truck in 40-foot containers or with machinery onboard low-bed articulated semi-trailers.

The following is an estimate of the traffic direction distribution for the mobilisation phase.

Direction	Percentage
From SW (Adelaide)	90%
From NE (Mannum)	10%
Total	100%

Table 2 – External Traffic Distribution for Mobilisation Phase

Most of the traffic will come from Adelaide (south-west direction), with local personnel coming from the Mannum township (north-east direction).

3.8.2 Construction Phase Vehicle Numbers

The construction phase will see fewer large vehicles, as the deliveries of the bulk of material will have been completed during the mobilisation phase. For example, the concrete truck deliveries will occur over a 10-day block at the very start of the construction phase, for fencing installation, and then another few days in the middle of construction for the foundation pouring.

Most traffic will be from personnel vehicles as most of the key components and machinery will have been mobilised in the mobilisation phase, which will help keep the traffic even and eliminate a peak period. Car-pooling will be used to minimise the amount of vehicular access along Mannum Road.

There will be a few singular deliveries such as cables, but this will all be contained on one single delivery event.

Construction Phase (scheduled for March 2019 to August 2019)		
Vehicle Type	Use/Materials being delivered	Daily Trips (In & Out)
19m Articulated Vehicle	Machinery and construction materials/components	2
Large Rigid Vehicles	Machinery and construction materials/components	2
Concrete/Water Trucks	Concrete	2
Light Vehicles	Staff transportation	10

Table 3 – Mannum Solar Farm Traffic Overview for Construction Phase

The following is an estimate of the traffic direction distribution for the construction phase.

Direction	Percentage
From SW (Adelaide)	20%
From NE (Mannum)	80%
Total	100%

Table 4 – External Traffic Distribution for Construction Phase

In the construction phase there will be a shift to local traffic as most materials required for construction will have been delivered in the mobilisation phase.

3.8.3 Demobilisation Phase Vehicle Numbers

The work at the site, and the associated traffic, will scale back significantly after commissioning in the demobilisation phase. The major equipment for construction will have been removed during construction phase.

It is expected at the demobilisation stage the total number of workers will drop to around ten.

De-mobilisation Phase (scheduled for August 2019		
Vehicle Type	Use/Materials being delivered	Daily Trips (In & Out)
19m Articulated Vehicle	Machinery and construction materials/components	1
Large Rigid Vehicles	Machinery and general construction materials/components	1
Concrete/Water Trucks	Concrete	2
Light Vehicles	Staff transportation	3

Table 5 – Mannum Solar Farm Traffic Overview for Demobilisation Phase

The following is an estimate of the traffic direction distribution for the construction phase.

Direction	Percentage
From SW (Adelaide)	90%
From NE (Mannum)	10%
Total	100%

Table 6 – External Traffic Distribution for Demobilisation Phase

The demobilisation phase will see the key machinery taken back to Adelaide and the balance of traffic will be for local personnel based in Mannum township.

3.8.4 Operations Phase Vehicle Numbers

After the construction is completed and the project transitions to the operations phase, there will be very few activities on-site, with typically four visits per year from a service vehicle, as illustrated above in section 3.4.4. This will be far less traffic than for the existing agricultural land use.

3.8.5 Impact to Existing Traffic

There will be minimal impact to existing traffic as there will be no road closures and heavy vehicle entry and exit will only be through Gate 1.

3.9 Required Permits

There are no permits required as there will be no oversized loads.

4. Internal Work-Site Traffic

Once a vehicle has entered the site, it will be managed in the following ways.

4.1 Sign-In

All vehicles visiting the site will be signed in with their details.

4.2 Speed Limits

The internal speed limit will be 10 km per hour to ensure good dust suppression and safety for all vehicles and workers on site.

4.3 Internal Traffic Paths

Internal traffic paths will be watered and compacted as required, to ensure they remain safe and do not create excessive dust.

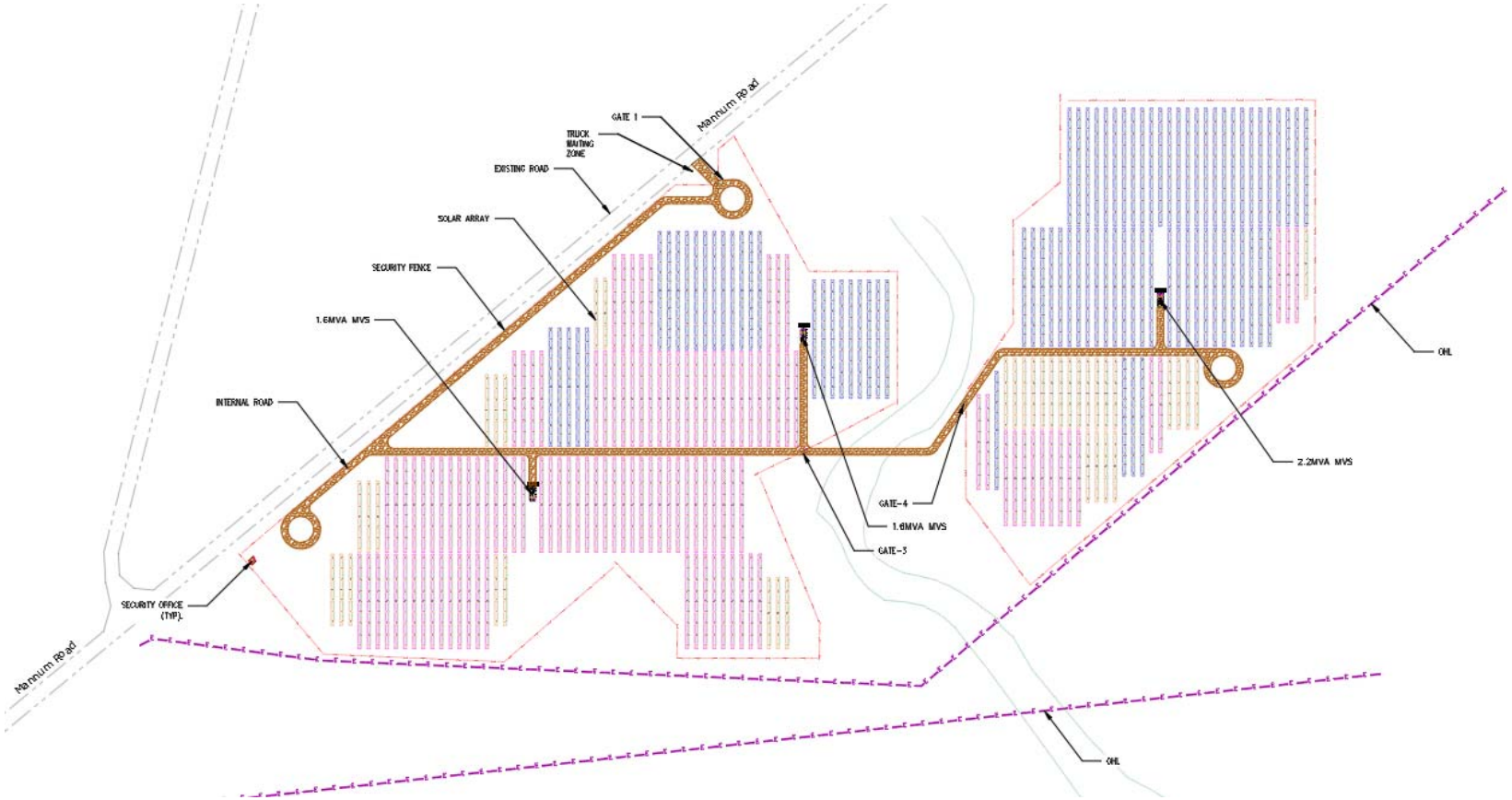


Diagram 3 – Designated Internal Traffic Paths

4.4 Car Parking

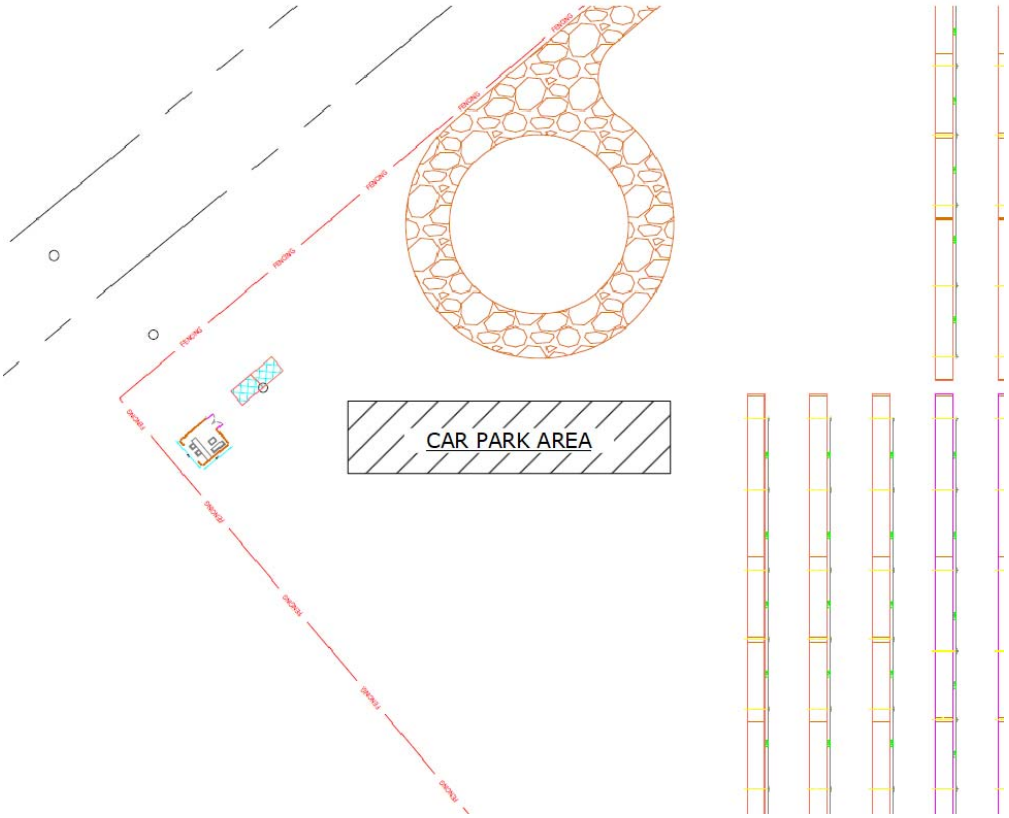


Diagram 4 – Detail of Designated Car Park Area

The car parking area will be in the south-west corner of the site.

4.5 Livestock Safety

There is livestock on the proponent's property, currently housed in a secure paddock. The completion of the site fencing will ensure no entry from any livestock to the construction site. Daily checks to ensure that livestock are no threat to internal traffic, and vice versa, will be carried out by the Quality and Environment manager and the Site Manager, as per the CEMP (Construction Environmental management Plan).

5. External Traffic Related Issues

5.1 Vegetation Screening

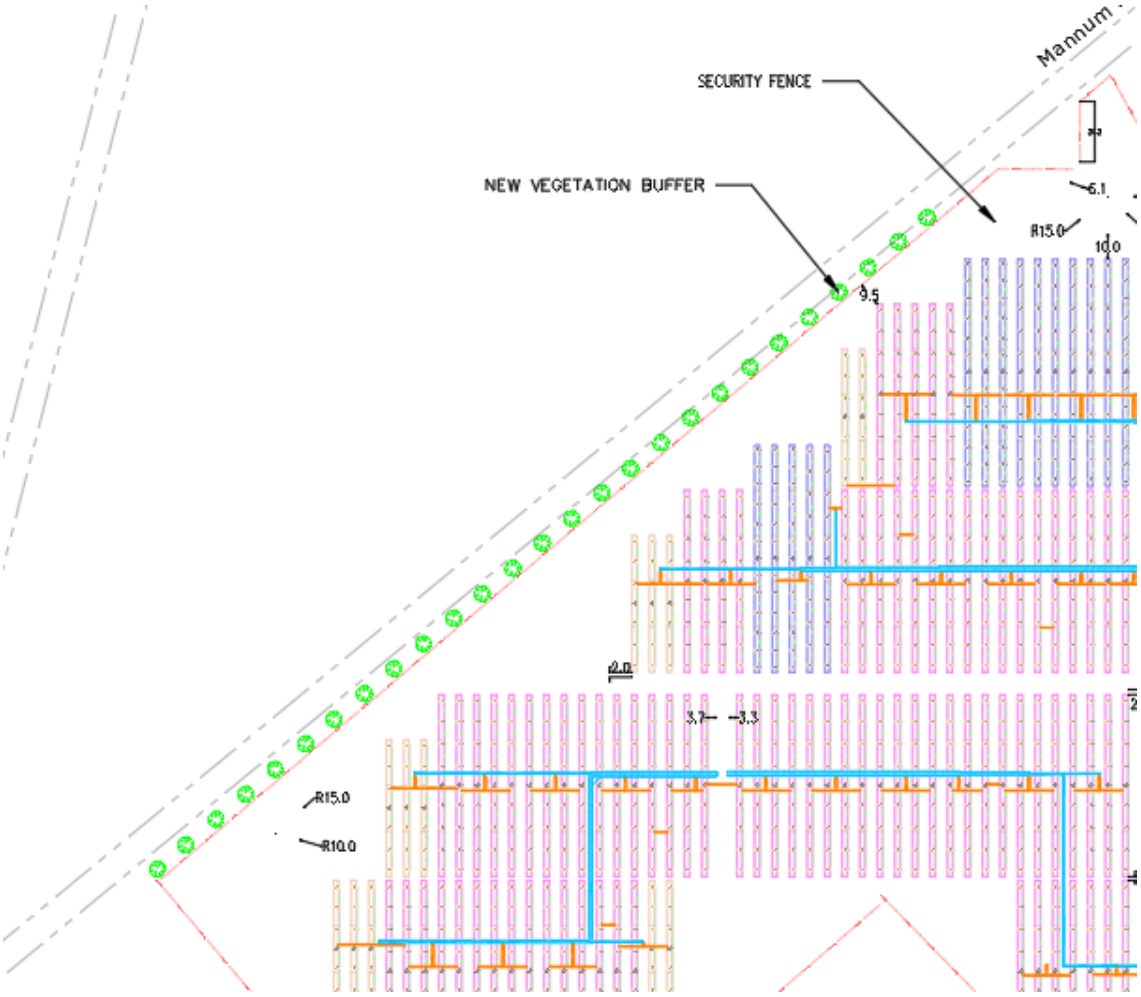


Diagram 5 – Vegetation Screening along Mannum Road

A vegetation buffer will be installed along Mannum Road as per the Development Consent.

5.2 Stormwater Runoff

The dry creek bed running through the site functions as a stormwater management drain and is sufficient to ensure there is no runoff onto surrounding roads. Any additional drainage that may be required in the future will be installed by the project team.

6. Monitoring and Review

The Quality and Environmental Manager together with the Site Construction Manager will monitor and periodically review the traffic management plan.