

Statement of Environmental Effects

Proposed Solar Farm with Ancillary Works



Figure 1.1. The site (Source: Six Maps)

ADDRESS

Lot 8 DP 1244273

Five Mile Creek Road, Gundagai

Prepared under instructions from DPCM PTY LTD

Ref: 19229

May 2020



SURVEYORS & PLANNERS



Statement of Environmental Effects

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Study Limitations and Disclaimer

This report has been prepared on behalf of DPCM PTY LTD for the purpose of supporting a development application to Cootamundra-Gundagai Regional Council for a proposed solar farm at Lot 8 DP 1244273.

Information provided in this report has been obtained from currently available public sources, including the Council and the Department of Planning and Environment website, as acknowledged within the document. While reasonable measures have been undertaken to verify the currency and validity of the information taken within these sources, no liability is accepted for errors or omissions within the source documentation provided by these agencies, as accessed at the date of publication.



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1 Introduction

This application is for a proposed Solar Farm to be known as Coolac Solar Farm (CFS) and is proposed to be located at the area locally known as the Five Mile, situated 9km north of Gundagai Township NSW.

The Coolac Solar Farm (CSF) includes the installation of solar photovoltaic modules, steel racking and piled supports, electrical transformers and inverters, electrical cabling, telecommunications equipment together with storage containers, substation and perimeter fencing.

The site has a good solar resource and there is available capacity in the existing electricity network. Once built, it is projected that the Coolac Solar Farm will generate 4 MWh of clean electricity a year, which is enough to power approximately 1200 homes annually during the life of the farm and will also reduce approximately 8 000 tonnes of greenhouse gas emissions annually.

The generated electricity is proposed to be exported into the electrical supply network through augmentation works to Essential energy's existing 22kva overhead transmission line that currently terminates at the Northwestern corner of Lot 8. Opportunities for feedback into the Transgrid network are also available as a 132kva line passes through the Northwestern corner of the allotment.

Harvesting sunlight is a passive land use with a community and ecological benefit that has also been shown to provide benefits to soil health. The project is expecting to bring economic benefits to the local community benefits in the form of local jobs in the construction phase. Post-construction, the ongoing maintenance of the facility will involve the periodic cleaning of the solar panels and ground maintenance. The infrastructure, including the inverters, battery bank and substations will require more specialised inspections by a qualified technician.



2 Context & Site Description

This Statement of Environmental Effects has been prepared to support a development application to Cootamundra – Gundagai Regional Council for a proposed solar farm to be known as the **Coolac Solar Farm (CSF).**

The project proposes to generate 4MW of power annually which is proposed to be feed into the grid via a battery bank to provide for the energy needs of approximately 600-800 dwellings. It is proposed to feed power back into the TransGrid network and Essential Energy networks.

The estimated cost of the project is less than \$3 million and as such, the delegated authority to assess the application is the Cootamundra – Gundagai Regional Council.

The proposed solar farm is located on Lot 8 in DP1244273 which is situated at the end of Five Mile Creek Road, Gundagai

The site is currently used for agricultural purposes including the grazing of stock including sheep and cattle. The site is devoid of any significant trees.

2.1 Local Context

The Folio number of the subject site is Lot 8 DP 12244273. The deposited plan of the subject allotment was registered in March 2019. Currently, the property has not been allocated a street number.

The site is zoned as RU1 - Primary Production.

The site is located to the south-west of an existing Service Centre consisting of a Shell Service Station, which also contains food retail outlets including, but not limited to, Subway and KFC. To the north of the service centre, is Olivers' Restaurant. In recent years, Oliver's Restaurant, installed power banks for electric cars at the rear of the facility to enable patrons to re-charge their electric vehicles whilst dining in the restaurant.

Moving further north of Olivers' Restaurant is the site of a famous monument being 'The Dog on the Tucker Box'. The 'Dog on the Tucker Box' is a culturally significant site to the town of Gundagai and surrounding villages and Australia as a whole. The site has been identified as a site with Heritage significance in the Gundagai LEP 2011.

The Service centre, Oliver's and the 'Dog on the Tucker Box' site, have been zoned SP3 – Tourist.



Figure 2.1.a Source: SixMaps

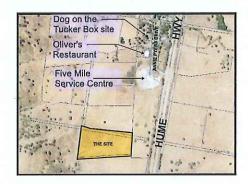


Figure 2.1.b Source: SixMaps

Generally, the land adjacent to the subject allotment is used for primary production purposes, mainly grazing of stock.



The nearest sensitive receptor (residential dwelling) is situated 240m north of the development.

2.2 Site Analysis

The site is located on Five Mile Creek Road, Gundagai in New South Wales, approximately 380km from Sydney via the M31 and 160km from Canberra via the Hume Highway and Barton Highway. Gundagai is surrounded by the Townships of Jugiong, Tumut, Junee and Cootamundra and is located 84kms from Wagga Wagga as shown in **Figure 2.2.1.**

The site is was previously used for agricultural purposes including the grazing of stock including sheep and cattle and is devoid of any native vegetation. Since the acquisition by the current proprietor, the land has been left vacant. The land had previously been cleared for grazing of cattle and sheep. There are no significant trees located on the parcel.

The site is undulating with the land generally falling towards the East. Further detail of the topography of the site can be found in the Level and Detail Survey prepared by CMS Surveyors as shown in figure **Figure 2.2.2**. An A3 copy has been provided in the appendix of this report.

The site has frontage to and can be accessed from Five Mile Creek Road which is classified as a local road. The road is a sealed formation. The road was extended in recent years to provide access to both Lots 7 and 8 in DP12244273.

The site can be seen from the Hume Highway corridor, due to the site being elevated above the road. While the site can be seen from the highway, there is an existing 140m buffer zone comprising of Lot 7 in DP854192 which would soften the visual impact of the development when viewed from the highway.



Figure 2.2.1 Source: Google Maps



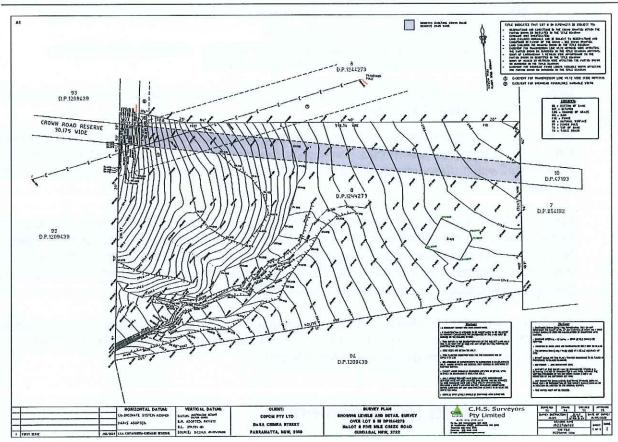


Figure 2.2.2 Detail and Level Survey prepared by CMS Surveyors over Lot 8 in DP1244273

The site has a pre-existing Dam which will be retained for water storage on site. There is a natural overland flow path in the form of a gully which leads into the property from the south-west corner and dissipates as it traverses towards the middle of the subject allotment. Upstream of the gully on the adjoining allotment, a substantial dam has been constructed. The recently constructed dam would assist in the control of surface water running across lot 8 and therefore, inhibiting the future erosion of the existing gully formation.

2.3 Legal Encumbrances

The second schedule on the certificate of title for lot 8 in DP1244273 has the following items listed against the title

- Reservations and conditions in the crown grant(s) within the part(s) shown so indicated in the title diagram
- Land excludes minerals and is subject to reservations and conditions in favour of the crown within the part(s) shown so indicated in the title diagram
 see crown grant
- Land excludes the road(s) shown in the title diagram
- H899347 Easement for transmission line 45.72 metre(s) wide affecting the part(s) shown so burdened in the title diagram
- 2356319 Easement vested in New South Wales electricity transmission authority
- DP854192 Right of carriageway 3 metre(s) wide appurtenant to the part(s) shown so benefited in the title diagram



- DP1209439 Right of access 20 metre(s) wide affecting the part(s) shown so burdened in the title diagram
- **DP1244273** Easement for overhead power line(s) variable-width affecting the part(s) shown so burdened in the title diagram

Deposited plans showing the relationship of the easements listed above to the subject land can be found in the appendix of this report.

As shown in the Detail Survey and the Deposited Plan 1244273, the land is currently burdened by a Crown Road Reserve, which does not have a formed road within the corridor. The closure of the Crown road within the confines of lot 8 would not prevent legal passage to adjoining allotments to the west.

While the land is under the custody of the Crown, no structures are permitted to be permanently installed over the burdened area. As a consequence, the proponent has lodged applications to the NSW Crown Lands Department, seeking the closure and acquisition of the section of Crown road within the confines of lot 8 in DP1244273. Crown Lands has acknowledged the application and are beginning the process to advertise the proposed closure.

As discussed below in clause 3.1, the proponent will develop the current lot 8 as 'Stage 1' and 'Stage 2' will involve the acquisition of the Crown Land and expansion/infill of the solar array over the land currently set aside as Crown Road Reserve

3. Proposed Development

3.1 Overview of Proposal

This application seeks approval for the following works in two stages:

Stage 1

- Use of the land Lot 8 DP 12244273 as a Solar Farm.
- Installation of 21 280 x JA Solar JAP6(k)-72 solar panels with dimensions of approximately 0.99m x 1.996m on the land
- The installation includes solar photovoltaic modules, steel racking and steel supports driven into the ground, electrical transformers and inverters, electrical cabling, telecommunications equipment.
- Placement of 1 x onsite Cabin for intermittent use by staff (approximately 19m²).
- 1 x Storage Container (see 19229arch 1 in the appendix)
- Placement of 8 battery housing units
- Construction of a substation if required
- Construction of perimeter fencing for security purposes

Stage 2

- Close the current road reserve, acquire the newly created allotment
- In-fill newly created allotment to complete the array with an additional 11 200 panels.

The proposed solar panels are proposed to be installed as per the site plan in Figure 3.1.a.

The edge of the proposed array will be generally offset from the boundary a minimum 5m from Northern, Eastern and Southern boundaries of lot 8 and 20m from the western Boundary. The offset



will allow for vehicular access to the perimeter of the site, particularly along the southern, eastern and part of the northern boundaries.

Due to the Easement for Transmission line 45.72 wide (Transgrid), the panels are required to be installed outside the confines of the existing easement. No panels or structures are permitted within the easement area.

The generated electricity is proposed to be exported into the electrical supply network through augmentation works to Essential Energy's existing 22kva overhead transmission line.

The proponent has received the Design Information Pack from Essential Energy, where approval in principle has been given, subject to Essential Energy conditions.

The applicant is also looking to connect in with Transgrids 132kva line which runs East-West. Enquires to Transgrid is currently on-going.

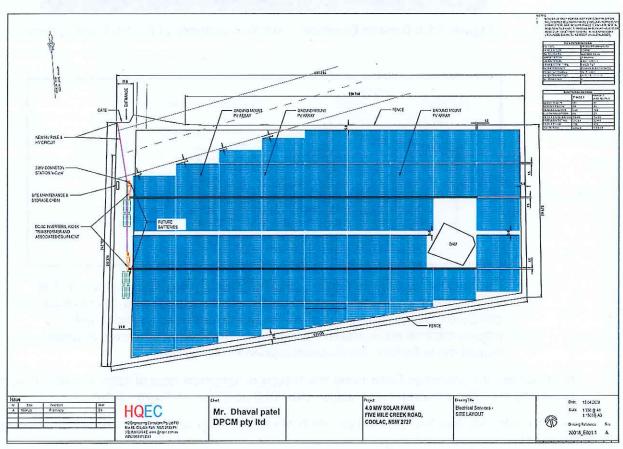


Figure 3.1.a Site Plan – Area shaded blue depicts the extent of the proposed solar array. Note offsets to boundaries and easements as discussed above. An A3 copy has been included in the appendix for review.





Figure 3.1.b Source Belectric - Installed example of PG PV Plant system

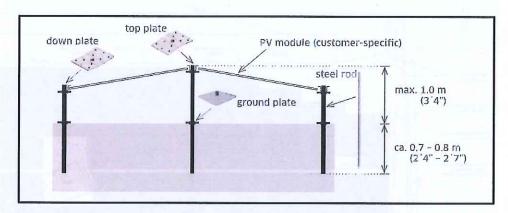


Figure 3.1.c Source Belectric – PG PV Plant Typical Section through the frame system. Note steel rods are driven into the ground and do not require concrete footings, resulting in a low-impact development, which would require minimal remediation of the site (i.e. Removal of Concrete footings) should the solar farm be de-commissioned in the future.

As indicated, the proposed Solar Farm will occupy a combined area of approximately 6.42 hectares (including the 1.5m pedestrian pathways), over lot 8 as shown in **Figure 3.1.a**

The site currently has two constraints which will have a degree of influence on the proposed layout on the solar array, these being:

- Easement for overhead transmission lines
- Crown Road Reserve 30.175 wide As discussed earlier, the proponent is making the appropriate applications to Crown Lands to close the Crown Road Reserve and acquire the land within the current reserve. The installation of panels within this area will be Stage 2.

The proposed plan by DPCM PTY LTD in **Figure 3.1.a** indicates there will be approximately 32 480 panels to be installed, each being 1.996m long by 0.992m. They will be generally arranged into blocks being 40 panels wide x 19 panels long. However, site constraints will see 11 blocks having a reduced number of panels due to the block's proximity to the boundaries / Easements or due to the existing topography.



3.2 Site Access and Services

Access to the site is obtained from Five Mile Creek Road. Five Mile Creek Road is considered as a local road. Access is obtained by turning off the Hume Highway onto Annie Pyers Drive.

Annie Pyers Drive was formerly part of the Old Hume Highway, however, since the upgrading of the highway into a dual carriageway, Annie Pyers Drive has now become a service road, providing safe access off the Hume Highway to the 'Dog on the Tucker Box' site, Olivers' Restaurant and Shell Service Centre

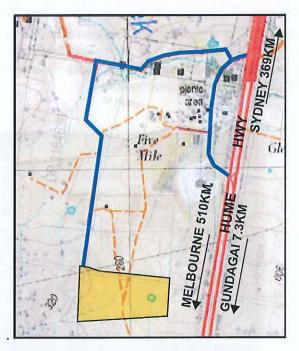


Figure 3.2.1. Base Image - Source Six Maps Topo - Image depicting possible access route to the proposed solar farm (shown in blue) from the existing Hume Highway

The implementation of the right-hand turning bays for the southbound traffic at the southern end of the precinct was a direct result of the development of the Service Centre which now exists. As a result, a majority of traffic accessing the precinct, do so at the southern end.



Figure 3.2.2. Image source – Google maps (Street View). Image showing a B-double departing (turning right) from the Shell Service Centre at the southern end to the Five Mile Precinct. Turning bays allowing and merging lanes facilitate safer access for vehicles to re-entering the highway





Figure 3.2.3. Image source – Google maps (Street view). Image showing a vehicle turning right at the northern entry point to the Five Mile Precinct. Turning bays allowing for deceleration and stopping before crossing the northbound lanes.



Figure 3.2.4. Image source – Google Earth Pro. Image showing the main entry into the Five Mile Precinct

South-bound traffic can still access Annie Pyers Drive from the northern end of the precinct as shown in **Figure 3.2.3** above, however, this is not as frequently used as the southern entry.

While the proposed solar farm will not have a significant effect on traffic volumes using the site during the life of the proposed farm, the construction of the farm may see a small increase in vehicular movements entering the precinct to access Five Mile Creek Road. However, with that being said, the anticipated vehicular movements required to service the construction phase of the farm could be deemed as insignificant when compared to the vehicular movements regularly entering and leaving the Five Mile precinct daily.

The start of Five Mile Creek Road intersects with Annie Pyers Drive at the northern end approximately 80m west of the intersection of the Hume Highway.



While Five Mile Road will experience an increase in traffic flow during the construction phase, it is envisaged that the solar farm itself, once operational, will not require any full-time staff to man the facility, rather periodic visits from maintenance staff to check on the batteries and clean the solar panels, amongst other duties, as required.

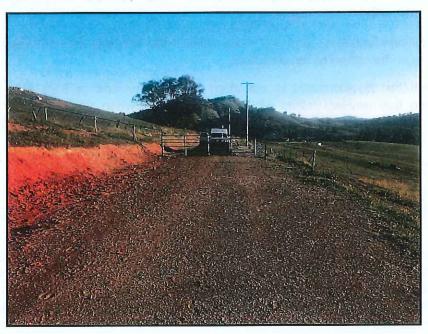


Photo 3.2. Photo was taken from inside lot 8, looking back towards Five Mile Creek Road

A Detail and Level Survey which was undertaken by CMS Surveyors has located the property boundaries in the course of the survey works. In respect to the current bitumen formation, the Detail Survey confirms that the sealed road formation extends across the existing crown road reserve and terminates at the entry gate to the property.

An access track on the property consists of an all-weather gravel formation, extending 30m into the property after entering the gate and then turns into a dirt track thereafter.

The construction phase will see road base brought to the site to form an all-weather road around the perimeter of the site.

A dilapidation report has been prepared to provide the assessing officer as a record of the current condition of the road as of 19th March 2020. Generally speaking, the road is in good condition and experiences light traffic as it currently services 4 rural dwellings. As mentioned previously, any increases in traffic movements will be restricted to the construction phase. Furthermore, the author cannot guarantee that the condition of the road will remain as is between now and the commencement of the project, should it be approved. It is recommended that another dilapidation report be prepared and submitted to the Council immediately before construction commences.

Anticipated vehicles using the road during the construction phase would consist of predominately trade vehicles (i.e. Light commercial trucks) and ranging to the occasional heavy-rigid vehicle, which would deliver vital components/materials to the site. The need for road closures along Five Mile Creek Road is not anticipated at this stage. Should a road closure be required, the appropriate permits will be applied for by the contractor as required.

It would be worth noting at this point, that the proprietor of the subject allotment also owns the adjoining allotment to the north of the subject site, being Lot 7 in DP1244273. Should it be required, lot 7 could be utilised as a staging area for the delivery of materials.



3.2.1 Traffic Management

During the construction phase of the development, it anticipated that vehicular movements including site workers, to and from the site will be in the vicinity of 40-60 movements per day during peak construction phases. This would mainly be trade vehicles accessing the site to undertake construction works.

Larger delivery vehicles, such as semi-trailers may access the site every second to third day, depending on the stage of development.

Given that the development is occurring at the very end of Five Mile Creek Road, it is not anticipated that general traffic will not be impeded when vehicles enter or leave the site. As mentioned earlier, lot 7 in DP12244273 could be utilised as a point of delivery. This would allow vehicles to enter and leave the sites in a forward direction.

3.3 Operations and Maintenance

Following the commissioning of the Coolac Solar Farm, it will begin operating with the production of electricity fed into the electricity grid. The solar modules will operate during daylight hours, seven days per week, and 365 days a year.

Maintenance staff will attend the site periodically to check on the condition of the equipment which is installed on-site. This would also include setting up the machinery which will clean the solar panels to ensure they run efficiently and maintain the undergrowth which may occupy the area under the panels. As the panels maintain a low profile, conventional mowers could no be used under the panels.

The applicant intends on using recycled a shipping container (see 19229arch 1 – appendix) to store equipment used for cleaning and spare parts. To service the storage needs, 1 \times 40ft shipping container will be utilised for Maintenance and Storage purposes.

A cabin, in the form of a converted shipping container, is also proposed for the site. The Cabin will function as an office area, lunchroom. The cabin itself will be equipped with the following;

- Sanitary facilities, i.e toilet, shower and vanity
- Common area/lunchroom fitted with a kitchenette
- Office area
- Small septic tank and Water Tank

As referenced above, the site office is pre-fabricated using a shipping container as the base frame and fitted with prefabricated panels which fold out to create usable areas on either side of the shipping container frame. See Figure 3.3.1. and 3.3.1. The cabin will be powered using electricity generated by the site.

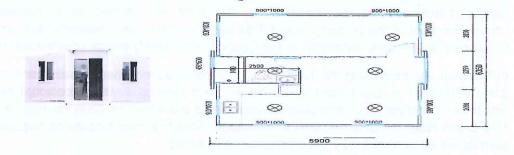


Figure 3.3.1 Source: https://www.allstar-sh.com Example floor plan of the proposed cabin



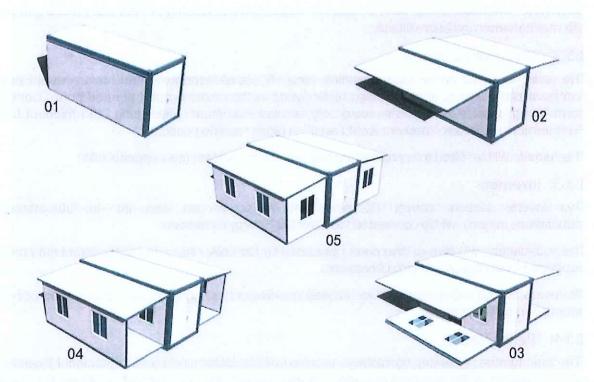


Figure 3.3.2 Source: https://www.allstar-sh.com Deployment sequence of Expandable Container Cabin

When staff are not on-site, the farm will also be monitored remotely from an off-site location and apart from a routine maintenance program, specialist operators will only visit the farm when responding to any performance issues (i.e. where actual output measured by the monitoring system deviates from generation forecasts and other key performance metrics).

Activities at the farm that will be part of a routine maintenance program will generally be limited to:

- Equipment, cabling, substation and communications system inspection, maintenance and testing, and repair and replacement as required.
- Fence, access and internal road, and control room maintenance and management.
- Vegetation (fuel load), weed and pest management.
- Possible solar PV module washing on an as-needed basis.
- Security monitoring.

The proposed operations and maintenance building is detailed in **Section 3.6** of this report.

3.3.1 Local Trades and Employment

The proponent intends to use both skilled and unskilled labour from the local community during;

- The construction phase
- Ongoing operational and maintenance

The proponent would also source preliminaries items such as temporary toilets and fencing from local businesses in the Cootamundra – Gundagai regional council. Engaging local trades and services would allow for the timely response in the construction and ongoing maintenance of the site.



Skilled labour would extend to the use of local electrical trades, builders and plumbers and land surveyors. Un-skilled labour can be used for tasks such as cleaning of the solar panels and general site maintenance and surveillance.

3.3.2 Photovoltaic panels

The solar farm will utilise monocrystalline solar PV panel technology and have a dual East/West configuration to assist in maximising higher yields in the morning and the afternoon. Conventional north-facing panels fixed panels would only achieve maximum yield during the middle of the day. Furthermore, multi-axis trackers would result in higher running costs.

The panels will be fitted to a proprietary peg and frame system (see appendix 04)

3.3.3 Inverters

Two inverter stations convert DC power into AC power and feed into the sub-stations. The substations, in turn, will be connected to Essential Energy's network

The substations will step-up the power generated by the solar farm and at the same time protect the equipment with the use of circuit breakers.

All inverters and substations will be situated on-site on high ground well above areas of potential inundation by floodwaters.

3.3.4 Battery Banks

The total number of battery containers required will be determined by the Electrical Engineer upon the finalisation of the proposal ensuring compliance with the requirements of Essential Energy. On the advice of the proponent, the anticipated number at the time of writing the report could be 5 battery storage units.

3.3.5 Solar PV Module Washing

Water use for regular washing of modules is not expected to be required in most instances. Automated machines (see appendices) which will sweep the solar panels will be employed to undertake the bulk of the cleaning of the solar panels. In the event of an abnormal soiling event (e.g. due to a particularly severe dust storm), water would be sourced from an existing dam to wash the solar panels. The washing of the panels could be undertaken by an operator using a vehicle with a slip-on tank and a pressure washer as a bare minimum.



The **GAL-IN SOLUTION** is specifically designed for the PEG design (V-shape) and works very efficient.

Source: 05_BEL_PEG_brochure_EN_ebook, page 23. See appendix 06

3.3.6 Ground Fuel Management

Fuel management will be a key ongoing activity targeting fire risk prevention. Groundcover within the solar farm will be proactively managed to avoid excessive fuel loads (which would also compromise the solar farm's performance) and prevent the proliferation of any noxious weeds.

Key management practices would include:



- Automated mowing machines which would cut the grass beneath the panels.
- Firefighting equipment kept and stored on site. Water, in the event of a fire, can be drawn from the existing dam.





The MOWING ROBOT is specially designed for the PEG system. The robot drives by remote and autonomously through the panel rows

Source: 05_BEL_PEG_brochure_EN_ebook, page 23. See appendix 06

3.4 Farm upgrading

Upgrading of the farm would include the augmentation and/or replacement of solar panels and ancillary infrastructure within the development footprint.

3.5 Solar Farm Decommissioning

It is proposed that no later than 12 months before the intent to decommission Solar Farm, the owner of Coolac Solar Farm will provide a Decommissioning Management Plan (DMP) to CGRC for approval.

The DMP would detail what decommissioning would entail and how it would be conducted. The primary objective of the DMP would be to restore the land capability to its pre-existing agricultural value and use.

3.6 Ancillary Structures

In addition to the solar panel arrangement, the following ancillary works are proposed:

Storage

Placement of 1 x 40ft shipping container

Office cabin

Placement of 1 x pre-fabricated site office as described in clause.3.3

Viewing Platform

Visual surveillance of the solar panels can be undertaken adjacent to the entry of the site, as the natural topography provides an excellent vantage point to see out over the solar farm.

Access Tracks

Construction of all-weather access gravel driveway along the edge and up each respective corridor between the arrays is recommended to ensure safe vehicular access.

The topography generally slopes down towards the adjoining allotment (Lot 7 in DP854192), which in itself, is generally inundated with surface runoff due to the topography to the west and



the Hume Highway to the east. The aforementioned lot 7 is vacant and used is for grazing of stock.

3.7 Utility Services

The site is not currently connected or serviced by any existing utilities. While there are overhead power lines currently traversing the Northwest corner of the site, no physical power connection exists on the site.

DPCM PTY LTD has previously been in contact with Essential Energy and Transgrid seeking the appropriate approval to facilitate the feed into their network.

The site is affected by an easement for Transmission Line 45.72 wide, however, the easement passes over the northwestern corner of the allotment, where the topography is steep. The applicant has been advised by Transgrid that the Solar Array is not to encroach the easement for the 132kva transmission line.

The site is also burdened by an Easement for Overhead Powerlines which burdens the north-western corner adjacent to the entry point and terminates at the northern boundary of the current crown road reserve. This easement will not be detrimental to the proposed array or ancillary structures.

3.8 Waste Management

The applicant has geared towards sustainable outcomes throughout the life of the project. The majority of refuse generated in the construction phase will be recyclable. Recyclable items include:

Pallets:

 The solar panels will be delivered to site on recyclable plastic pallets. The pallets will be either returned to the supplier or passed onto organisations such as sheltered work centres for upcycling or recycling.

Cardboard Packaging

 Cardboard/paper packaging can be stored in skip bins on site. Once full, the skip bins can be delivered to recycling to the council's waste transfer centre on Burra Road, Gundagai.

Timber:

 The timber used in the packing and delivery of the equipment will be sent to recycling centres for re-use or re-purposing.

Wiring / Metal offcuts

 Offcuts from wiring are to be saved and stored on-site in a skip bin, along with other metallic waste items. Once full, metal refuse can be sent to SIMS Metals for processing and recycling.

General Waste



General Waste generated during the construction phase will be stored onsite, either with a skip bin or a designated caged area with netting over to prevent debris escaping the garbage depot. Waste can then be collected and taken to the Gundagai Waste Transfer Centre for processing.

Once operational, the site is expected to generate minimal waste. Garbage generated post-construction will be collected and taken from the site when staff depart.

3.9 Security Measures

A security fence will be installed around the solar farm perimeter. This fence will be up to 2.1m chain link with two barbs on top, for a total height of up to 2.3m.

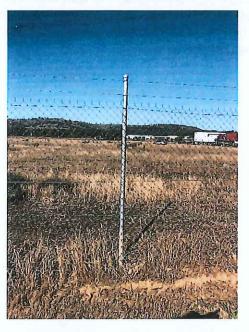


Figure 3.3 Indicative Perimeter Fencing Style

The site will also be under 24 video surveillance with cameras placed in strategic areas to monitor interference with the infrastructure. In addition to the camera system, the solar arrays will be fixed with electronic monitoring systems to alert the caretaker of a disturbance to the current flowing from any one of the solar arrays. Alerts from the system will be sent to the smartphone/tablet to isolate and identify the problem.

3.10 Dilapidation Report

A dilapidation report has been prepared to document the condition of council-owned assets mainly being Five Mile Creek Road. Photos compiled in the report submitted by CMS Surveyors Pty Ltd were taken on the 19th March 2020 and depict the current condition of the sealed road extending from the existing cattle grid to the gate leading into the subject site. Generally speaking, the road was in good condition at the time of the photographs being taken.

It is highly recommended that a second report is prepared, by an independent body, immediately before the commencement of works on the site to confirm the current condition of the road surface.



Continued monitoring of the road surface and documentation should continue over the construction phase to ensure that road is kept in a good state of repair.

3.11 Potential Solar Panel Impacts

3.11.1 Glare

Glare is a continuous source of excessive brightness relative to ambient lighting (Ho, 2009). Solar PV panels are specifically designed to absorb and not reflect solar energy. Reflected sunlight is lost energy and represents lost revenue. For this reason, the glass used in solar PV systems can reflect just 2% of the light received (Spaven, 2012). In comparative terms, this is significantly lower than the reflectivity of other materials as shown in the diagram below sourced from Sandia National Laboratories.

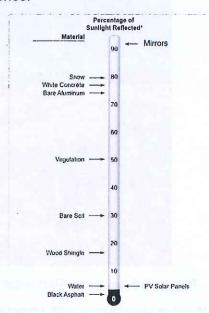


Figure 3.11.1 Reflectivity Index Source: Sandia National Laboratories

Sun farms have potential impacts in the form of glare which is to be managed to avoid safety issues for nearby motorists and neighbouring properties.

The panels will have a vertical tilt of 8° to obtain maximum exposure of the panel to the available sunlight. The position of the panels will face east and westerly direction. During the hours of 9 am – 4 pm the altitude of the sun during this period will result in potential glare to be directed towards the sky.

Figure 3.11.2, demonstrates how the sun's rays would be deflected upwards throughout the day (9 am – DP4 pm) on the winter and summer solstice and spring and autumn equinox. Figure 3.11.2 should be read in conjunction with **Figures 3.11.3 – 3.11.14** which depict the azimuth of the sun.

As such, potential glare is expected to be minimal and can be managed with the planting of trees to form a barrier between motorists and the farm if required, noting the need to have a distance between the trees and the panels to avoid any fire risks and safety issues.



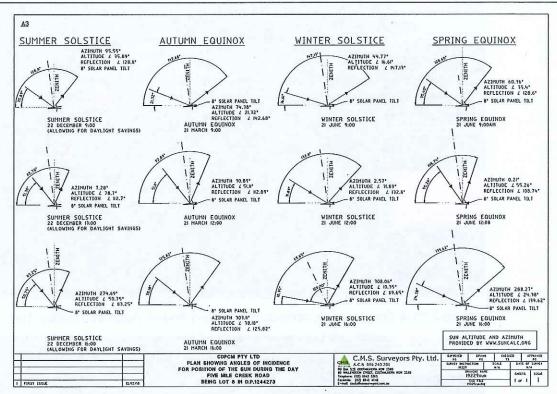


Figure 3.11.2 Sun Angles, Source: CMS Surveyors – Showing indicative angles of reflection. In conjunction with the possible reflection angles, the high light absorption of the solar panels would result in 2% of the light hitting the panel would be reflected. See Figure 3.4.

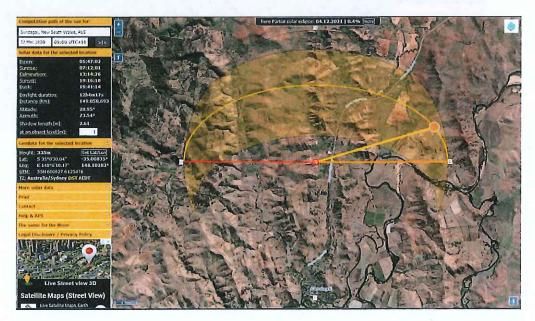


Figure 3.11.3 Source: www.solarcalc.org - Sun Angles Autumn Equinox 9am DST



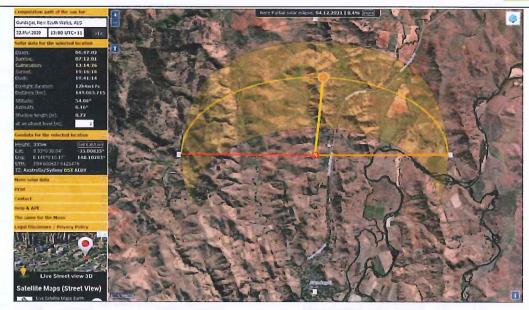


Figure 3.11.4 Source: www.solarcalc.org - Sun Angles Autumn Equinox 1pm DST

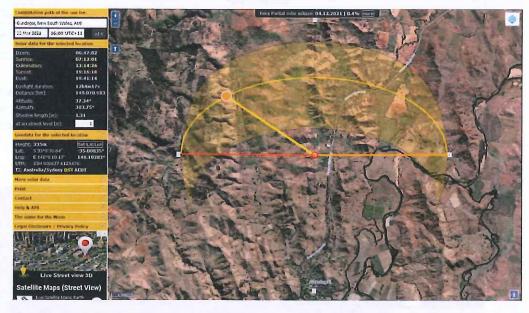


Figure 3.11.5 Source: www.solarcalc.org - Sun Angles Autumn Equinox 4pm DST





Figure 3.11.6 Source: www.solarcalc.org - Sun Angles Winter Solstice 9am EST

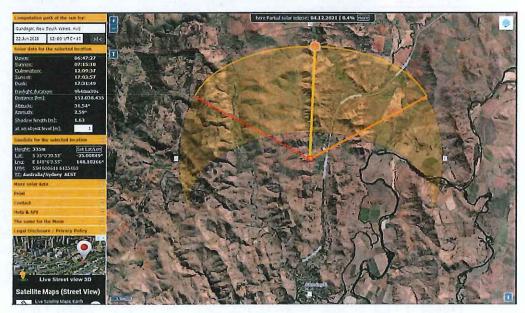


Figure 3.11.7 Source: www.solarcalc.org - Sun Angles Winter Solstice 12noon EST





Figure 3.11.8 Source: www.solarcalc.org - Sun Angles Winter Solstice 4pm EST



Figure 3.11.9 Source: www.solarcalc.org - Sun Angles Spring Equinox 9am EST



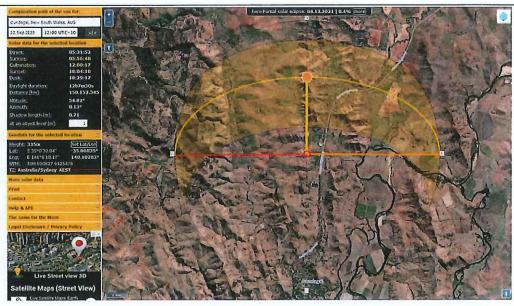


Figure 3.11.10 Source: www.solarcalc.org - Sun Angles Spring Equinox 12noon EST

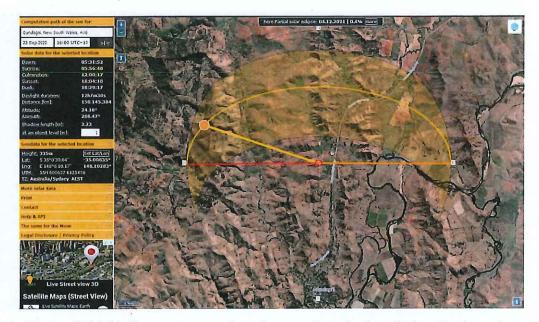


Figure 3.11.11 Source: www.solarcalc.org - Sun Angles Spring Equinox 4pm EST





Figure 3.11.12 Source: www.solarcalc.org - Sun Angles Summer Solstice 9am DST



Figure 3.11.13 Source: www.solarcalc.org - Sun Angles Summer Solstice 1pm DST





Figure 3.11.14 Source: www.solarcalc.org - Sun Angles Summer Solstice 4pm DST

DST - Daylight Saving Time

EST - Eastern Standard Time

3.12 Site Lighting

Targeted lighting is proposed at the front gate, inverter stations and substation. Full perimeter security lighting is not proposed.

Lighting would be designed and operated to comply with *Australian Standard AS4282 Control of Obtrusive Effects of Outdoor Lighting*. In so doing there would be negligible light spill above the horizontal plane and no impacts to adjoining properties.



4. Environmental Assessment

4.1 Site Zoning

The site has a zoning of RU1 - Primary Production under Gundagai LEP Local Environmental Plan 2011. Refer to **Figure 4.1** for the land-use zoning.

The site is surrounded by predominately Rural land uses, however it also abuts an SP3 – Tourists zoning at its eastern edge.

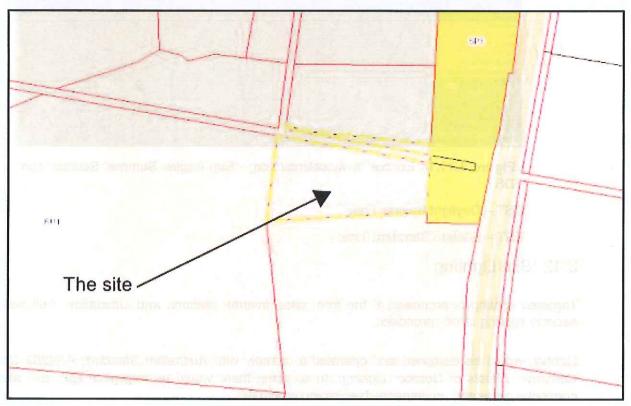


Figure 4.1 Source NSW E-planning Spatial Viewer

While the proposed solar farm adjoins an SP3 - Tourist designated area, as demonstrated in Figure 4.1, below the site does not adjoin any facility, rather a vacant paddock, which in turns offers a substantial buffer zone between the proposed solar farm and the Hume Highway.

4.1.1 Objectives of the Zones

Gundagai Local Environmental Plan 2011

Zone RU1 Primary Production

1 Objectives of zone

- 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 encourage the efficient use and conservation of water resources.
- · To protect significant scenic landscapes.
- To encourage development that does not adversely impact nearby agricultural activities.
- To protect, enhance and conserve the natural environment, including native vegetation, wetlands and wildlife habitat.
- To ensure development prevents or mitigates land degradation.

2 Permitted without consent

Extensive agriculture; Environmental protection works; Home occupations; Intensive plant agriculture

3 Permitted with consent

Aquaculture; Dwelling houses; Extractive industries; Farm buildings; Function centres; Intensive livestock agriculture; Open cut mining; Roads; Roadside stalls; Any other development not specified in item 2 or 4

4 Prohibited

Amusement centres; Attached dwellings; Business premises; Cemeteries; Centre-based child care facilities; Community facilities; Dual occupancies; Eco-tourist facilities; Entertainment facilities; Exhibition homes; Exhibition villages; Hardware and building supplies; Health services facilities; Home occupation (sex services); Industrial retail outlets; Industrial training facilities; Marinas; Mooring pens; Mortuaries; Multi dwelling housing; Office premises; Public administration buildings; Registered clubs; Residential flat buildings; Respite day care centres; Restricted premises; Semi-detached dwellings; Seniors housing; Service stations; Sex services premises; Shop top housing; Specialised retail premises; Storage premises; Timber yards; Vehicle body repair workshops; Vehicle sales or hire premises; Wharf or boating facilities; Wholesale supplies.

4.1.2 Land Use Permissibility

Solar farms are permitted with consent within an RU1 Zoning as it is not specified in items 2 or 4.

4.1.3 Strategic Intent

The development is consistent with the Commonwealth's Renewable Energy Target (RET) and both the NSW Government's Renewable Energy Action Plan and Climate Change Policy Framework. At a regional level the development complements the Riverina Murray Regional Plan's objectives of diversified energy production, promoting energy supply through renewable energy generation and encouraging renewable energy projects at locations with renewable energy potential and ready access to connect with the electricity network. At a local level the Coolac Solar Farm, at the location proposed, is not antipathetic to the zoning objectives of Council's Local Environmental Plan.

The site has a good solar resource and there is available capacity in the existing electricity network. Once built the Coolac Solar Farm will generate 4 MWh of clean electricity a year, which is enough to power approximately 1200 homes annually during the life of the farm.

In accordance with the 2016 Census*, there was at the time, 5340 homes in the Gundagai area. However, it does not specify the number of homes in the township of Gundagai. Based on the



above statistics, the CSF has the potential to supply power to 22.5% of the dwellings located in Gundagai annually.

The projected output of 4MW of power generated by the Solar Farm would result in a saving of approximately 3,28 tonnes of greenhouse gas emissions annually.

*https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/LGA13510?opendocument

4.1.4 Economic Impacts and Employment

The proposed solar farm will support the network subject to the Australian Energy Marker Operator acceptance, which will assist to stabilise the grid and reduce operating costs. This is expected to result in reduced costs to electricity consumers.

During the estimated twelve-month construction effort the build will require a peak workforce of up to 60 on-site workers and provide economic opportunities in the Gundagai district.

Ongoing employment opportunities would provide 4-5 positions which would be required to attend the site periodically to ensure the upkeep of the site and maintain the solar panels at their maximum efficiency, specialised staff may be required to carry out specialised upgrades to the infrastructure.

4.1.5 Environmental and Biodiversity Impacts

The site has already been cleared for grazing and is devoid of any significant trees.

The site has an existing naturally occurring gully to the South-Eastern corner, which channels surface water from the hill behind the site to the dam. A dam, recently constructed on the adjoining lot 93/1209439, will further reduce the overland flow by holding back groundwater. This will, in turn, reduce erosion to the gully beneath the dam.

The proponent is proposing the planting of 1200 trees to offset the visual impact of the proposal. These plantings would be concentrated around the development itself to provide a visual barrier, particularly from the Hume Highway and the nearest receptor, being the dwelling situated 240m north of the proposed development.

4.1.6 Terrestrial Biodiversity

The land is mapped as having Terrestrial Biodiversity on the Gundagai Local Environmental Plan 2011

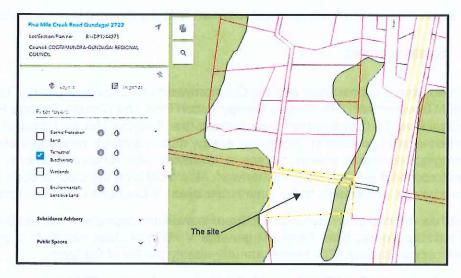


Figure 4.2 Source NSW E-planning Spatial Viewer



The proposal will see the reduction in opportunities for native fauna to pass through the site mainly due to the security fencing proposed for the site. Fauna which would be prevented from entering the site would include Kangaroos and Wallabies. Smaller species, which could pass through the mesh fencing would be benefitted, as the interior of the solar farm would provide sanctuary from predatory animals such as foxes, dogs and cats which would not be able to penetrate the security mesh. Predatory birds would also be limited in the opportunity to strike the small and usually vulnerable fauna due to the shelter provided by the panels.

Unfortunately, ground-based fauna, such as wombats and rabbits may cause ongoing concerns, as the burrowing may undermine the structural system of the panels. Continued surveillance by ground staff will need to monitor any burrows created and managed appropriately.

While ground-based fauna could potentially have a symbiotic relationship with the farm, continued monitoring should be carried to ensure infestations by exotic species, or native for that matter, do not take hold. With that being said, allowing native fauna to take up residence within the confines of the solar farm would aid in the reduction of fuel loads beneath the solar panels.

4.1.7 Neighbourhood Amenity

The Coolac Solar Farm will not compromise the capacity for neighbours to continue existing or future primary production land uses.

The site itself, after it has been developed, will limit grazing opportunities across the site due to the height of the solar panels above the ground. Opportunities

The build-up ground fuel, i.e. long grass, will be managed by employing a weed matting system beneath the Solar Panels. without the need to employ mechanical or chemical means to control vegetation under the solar panels.

The development of the site for the solar farm would not result in any significant reduction in the agricultural production capacity of the district and the land can be returned to primary production use if the solar farm is decommissioned at the end of the project life. Harvesting sunlight is a passive land use with a community and ecological benefit that has also been shown to provide benefits to soil health.

4.1.8 Signage

The proposed signage for the site will be dealt with separately as part of a development application for signage.

4.1.9 Riparian Lands and Water Courses

The site is identified as being Groundwater vulnerable in the Gundagai Local Environmental Plan 2011. The proposal is not expected to have any impact on groundwater as works are largely proposed on the surface of the land. Refer to **Figure 4.1.9**.

At the time of the report being prepared, a geotechnical report had not been prepared. It is the intent of the applicant, to commission a geotechnical report before the commencement of works to ensure compliance with the manufacturer's specifications.





Figure 4.1.9 Source NSW E-planning Spatial Viewer

4.1.10 Heritage

The Site is not a known heritage item and is not located close to any heritage items. The site is not known to have any Aboriginal heritage constraints and no significant excavation works are proposed as part of this application. The site is located outside of the heritage conservation zone as shown in **Figure 4.4**.



Figure 4.4 Source NSW E-planning Spatial Viewer

4.1.11 Flooding

The site is located outside of areas known to be flood-prone in the Gundagai Local Environmental riparian and watercourse mapping. As such, there is no constraint to the proposed development as a result of flooding. Refer to **Figure 4.3**, **clause 4.3 Riparian Lands and Watercourses**.



4.2 The Provisions of any Proposed Instrument

No proposed environmental planning instrument that is, or has been, the subject of public consultation under this Act and that has been notified to the consent authority is apparent at the time of writing.

4.3 Any Development Control Plan

Currently, there are no Development Control Plans under the Gundagai Local Environment plan 2011 which affect the subject land.

4.4 State Environmental Planning Policies

Investigation of the Department of Planning and Environment website indicates that the following State Environmental Planning Policies have general application:

- State Environmental Planning Policy (Affordable Rental Housing) 2009 : (pub. 2009-07-31)
- State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004: (pub. 2004-06-25)
- State Environmental Planning Policy (Exempt and Complying Development Codes) 2008: (pub. 2008-12-12)
- State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004: (pub. 2004-03-31)
- State Environmental Planning Policy (Infrastructure) 2007: (pub. 2007-12-21)
- State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (pub.2007-02-16)
- State Environmental Planning Policy (Miscellaneous Consent Provisions) 2007: (pub. 2007-09-28)
- State Environmental Planning Policy No 1-Development Standards: (pub. 1980-10-17)
- State Environmental Planning Policy No 21-Caravan Parks: (pub. 1992-04-24)
- State Environmental Planning Policy No 30-Intensive Agriculture: (pub. 1989-12-08)
- State Environmental Planning Policy No 33-Hazardous and Offensive Development : (pub. 1992-03-13)
- State Environmental Planning Policy No 36-Manufactured Home Estates: (pub. 1993-07-16)
- State Environmental Planning Policy No 50-Canal Estate Development : (pub. 1997-11-10)
- State Environmental Planning Policy No 55-Remediation of Land : (pub. 1998-08-28)
- State Environmental Planning Policy No 62-Sustainable Aquaculture: (pub. 2000-08-25)
- State Environmental Planning Policy No 64-Advertising and Signage: (pub. 2001-03-16)
- State Environmental Planning Policy No 65-Design Quality of Residential Apartment Development (pub. 2002-07-26)
- State Environmental Planning Policy (Rural Lands) 2008: (pub: 2008-05-09)
- State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017: Subject Land (pub. 2017-08-25)

The above State Environmental Planning Policies are not considered to be directly applicable to this application.

4.5 Planning Agreements

No planning agreements are currently applicable to the proposed development.



4.6 The Regulations

Relevant matters arising under the regulations have been addressed or will be addressed in the Council's consideration of this application.

4.7 Likely Impacts of Development

Considering the surroundings of the property and the nature of the proposed development, it is considered that impacts on the surrounding properties will be minimal given that glare impacts can be mitigated. Further, social and economic impacts on the locality will be positive. The proposal is also following the objectives of the zone and the overarching objectives of the Gundagai Local Environmental Plan 2011.

4.8 Suitability of Site for the Development

The subject site is situated within a rural zone and is considered to be a suitable form of development for the site. The proposal meets the objectives of the Gundagai Local Environmental Plan 2011.

Hence, the application's compliance with existing zoning controls and compatibility with the established character of the area demonstrates that the site is entirely suitable for the proposed development which will have significant benefits for the local community.

4.9 Any Submissions

No submissions are apparent at the time of writing this report.

The applicant has consulted with Cootamundra – Gundagai Council in the preparation of this application and met with Council for a pre-lodgement meeting on Wednesday 5th December 2018.

4.10 The Public Interest

The public interest would be served by the creation of a passive land use that is consistent with the objectives of the zone, allowing neighbouring properties to continue to carry out their primary production land uses. The use of the site as a solar farm has an ecological benefit and creates a community that is more self-sufficient whilst generating short term and long term employment opportunities in the district.

DPCM Pty Ltd intend to conduct a community consultation session in consultation with the Council to inform the community on the proposal and answer any questions.

The Coolac Solar Farm will assist the local community to work collaboratively in utilising a natural resource to generate electricity which in turn is likely to result in lower pricing for electricity, whilst generating local jobs and opportunities for research and education.



5. Conclusion

The proposed solar farm and associated works have been assessed against the heads of consideration specified in the *Environmental Planning and Assessment Act 1979*, including relevant provisions of the Gundagai Local Environmental Plan 2011.

The proposal is compliant with all relevant statutory controls and will not adversely impact upon the amenity of the adjoining properties, or upon the character of the surrounding area. This Statement of Environmental Effects has demonstrated that the proposal also appropriately addresses the aims and objectives of all relevant statutory and local planning controls, and will give rise to no unacceptable environmental impacts.

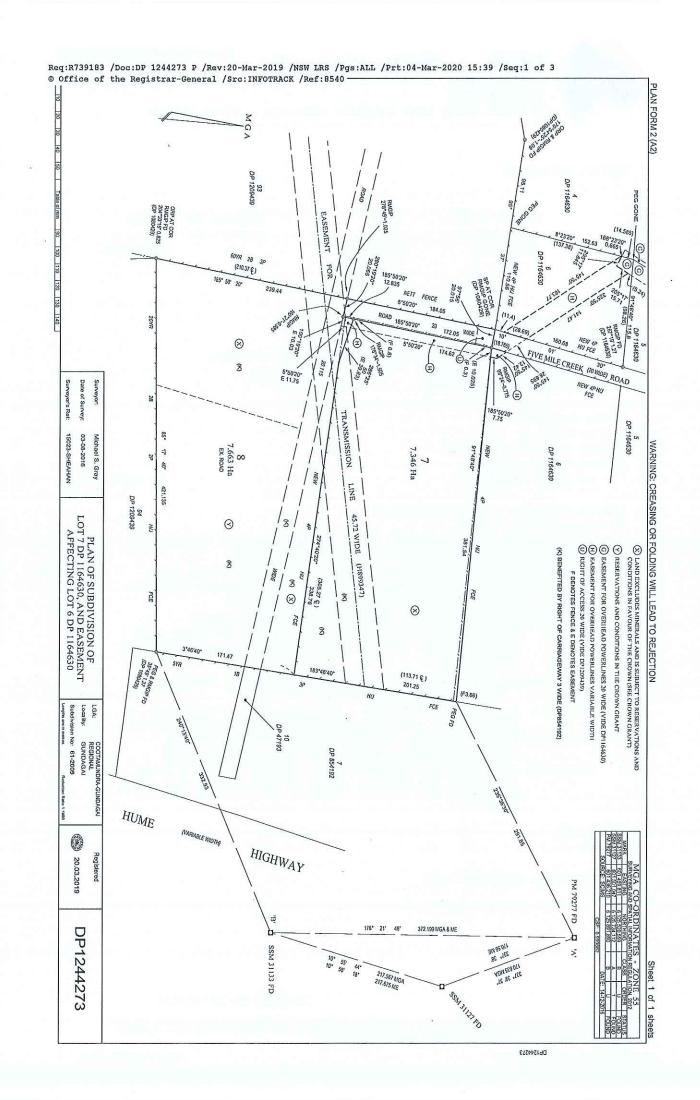
Importantly, the development of the site for the solar farm would not result in any significant reduction in the agricultural production capacity of the district and the land can be returned to primary production use if the solar farm is decommissioned at the end of the project life. Harvesting sunlight is a passive land use with a community and ecological benefit that has also been shown to provide benefits to soil health.

The proposal is therefore recommended for approval, with appropriate conditions.



6. Appendices

- 01. DP1244273 Deposited Plan
- 02. Certificate of Title 8/1244273
- 03. 19229detail 1 Detail and Level Survey prepared by CMS Surveyors Pty Ltd
- 04. 19229arch 1 Proposed maintenance and storage.
- 05. Proposed site plan and specifications prepared by HQ Engineering Consulting Pty Ltd PO
- 06. Array frame Engineering Certificate prepared by Gamcorp (example prepared for Kentucky Solar Farms Goondiwindi
- 07. PEG PV Plant Brochure
- 08. CDS Solar Energy Storage System
- 09. Three-phase String Inverter Data Sheet
- 10. SMA DC-DC Converter Data Sheet
- 11. Project cost break down supplied by DPCM PTY LTD
- 12. Essential Energy Preliminary Connection Enquiry Response
- 13. Essential Energy Design Information Package site-specific
- 14. Preliminary Feasibility Study prepared by YD Projects
- 15. 19229sun 1





REGISTRY Title Search

Information Provided Through Aussearch Ph. 02 9267 9728 Fax. 02 9267 9226

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 8/1244273

SEARCH DATE

TIME

EDITION NO

DATE

20/3/2020

10:52 AM

2

12/3/2020

LAND

LOT 8 IN DEPOSITED PLAN 1244273

AT GUNDAGAI

LOCAL GOVERNMENT AREA COOTAMUNDRA-GUNDAGAI REGIONAL PARISH OF NORTH GUNDAGAI COUNTY OF CLARENDON TITLE DIAGRAM DP1244273

FIRST SCHEDULE

DHAVAL PRAHLADBHAI PATEL KUNJAL DHAVAL PATEL

AS JOINT TENANTS

(T AP960980)

SECOND SCHEDULE (7 NOTIFICATIONS)

- 1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S) WITHIN THE PART(S) SHOWN SO INDICATED IN THE TITLE DIAGRAM
- 2 LAND EXCLUDES MINERALS AND IS SUBJECT TO RESERVATIONS AND CONDITIONS IN FAVOUR OF THE CROWN WITHIN THE PART(S) SHOWN SO INDICATED IN THE TITLE DIAGRAM SEE CROWN GRANT
- 3 LAND EXCLUDES THE ROAD(S) SHOWN IN THE TITLE DIAGRAM
- 4 H899347 EASEMENT FOR TRANSMISSION LINE 45.72 METRE(S) WIDE AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
 - 2356319 EASEMENT VESTED IN NEW SOUTH WALES ELECTRICITY TRANSMISSION AUTHORITY
- 5 DP854192 RIGHT OF CARRIAGEWAY 3 METRE(S) WIDE APPURTENANT TO THE PART(S) SHOWN SO BENEFITED IN THE TITLE DIAGRAM
- 6 DP1209439 RIGHT OF ACCESS 20 METRE(S) WIDE AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
- 7 DP1244273 EASEMENT FOR OVERHEAD POWER LINE(S) VARIABLE WIDTH AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

19229

PRINTED ON 20/3/2020

^{*} Any entries preceded by an asterisk do not appear on the current edition of the Certificate of Title. Warning: the information appearing under notations has not been formally recorded in the Register. Informack an approved NSW Information Broker hereby certifies that the information contained in this document has been provided electronically by the Registrar General in accordance with Section 96B(2) of the Real Property Act 1900.