



## Planning Application – Scoping Study

25 November 2015

Commercial-in-Confidence

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## Abbreviations

ABS	Australian Bureau of Statistics
AC	Alternating Current
AEMO	Australian Energy Market Operator
AEMC	Australian Energy Market Commission
AETA	Australian Energy Technology Assessment
CASA	Civil Aviation Safety Association
CleanGen	CleanGen Projects Pty Ltd
COD	Commercial Operation Date
Council	Narrabri Shire Council
DC	Direct Current
DSCR	Debt Service Cover Ratio
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EP&A	Environment Planning and Assessment
EPBC	Environment Protection and Biodiversity Conservation Act
EPC	Engineering, Procurement & Construction
ETL	Electricity Transmission Line
FC	Financial Close
FIT	Feed-in-Tariff
ha	Hectares
GWh	Gigawatt hours
HV	High Voltage
kL	Kiloliter
km/hr	Kilometer per hour
kV	Kilovolt
KW	Kilowatt
KWh	Kilowatt hours
LCOE	Levelised Cost of Electricity
LEP	Local Environment Plan
LGA	Local Government Area
LGC	Large-scale generation certificates
LOI	Letter of Interest
LOS	Letter of Support
LRET	Large-Scale Renewable Energy Target
O&M	Operations and Maintenance
m	Meter
MJ/M <sup>2</sup>	Mega joules per meter squared
MLF	Marginal Loss Factors
mm	Millimeters
MW	Megawatt
MWh	Megawatt hours
NEM	National Electricity Market
NYSE	New York Stock Exchange
PPA	Power Purchase Agreement
PV	Photovoltaic
RET	Renewable Energy Target
RFS	Rural Fire Services
RMS	NSW Roads and Maritime Services

## Executive Summary

CleanGen is proposing the development of a large scale solar farm called the Narrabri Solar Farm (Project) in Narrabri, NSW. The proposal would have a capacity of up to 120MW (AC) and will connect to the nearby Narrabri 132/66kV substation. The Project will use solar photovoltaic (PV) panels with trackers.

The purpose of this report is to provide supporting information to lodge a request to the Department of Planning and Infrastructure (DP&I) for Director-General's Requirements (DGRs) which will guide the preparation of an Environmental Impact Statement (EIS) for the proposal under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The report outlines the Project proposal, key environmental issues, the statutory framework and the benefits of the Project.



Figure 1 Map of Narrabri

## Environmental Issues

The proposed Project will have an overall positive impact on the environment as it is a solar farm that will displace up to 274,000 tonnes of carbon emissions from the atmosphere. The site requires some tree clearing which will be more than offset by the solar farm's clean energy generated. The site aesthetics will be improved with fencing and native vegetation trees screening the site from the main road and any neighbours.

The project is currently in the planning stage. Only once contracts are finalised and all planning details are known, a full Environment Management Plan (EMP) with its sub plans will be completed. The Project will submit EMP Statements of Commitments to be included in the EIS. Sub plans will include:

- Soil, Water and Flood Management Plan
- Dust Management Plan
- Noise, Vibration Management Plan
- Weed Management Plan
- Fire Management Plan
- Waste Management and Reuse Management Plan
- Resources and Service Management Plan
- Traffic Management Plan
- Flora and Fauna Management Plan (if required)
- Indigenous and Non-Indigenous Cultural Heritage Management Plan (Plan) (if required)
- Hazardous Materials Management Plan

To date, the following studies were conducted with low impact and will be confirmed with further studies in an EIS and EMP Statement of Commitment to be submitted for final assessment:

- Cultural Heritage Issues – No issues and no plan required
- Traffic Management – Low impact

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- Flora and Fauna – Low impact
- Height – No impact
- Glare – No impact
- Noise – Low impact during construction with work to be done as per guidelines. No impact during operations.
- EMF – No impact
- EPBC – Referral if required

### Benefits

The Project is a capital investment of approximately \$170 million. It will create jobs, diversify income and increase revenue to ancillary services such as food, lodging and tourism for the local area.

Estimated job numbers are approximately 280 full time equivalent (FTE) construction jobs and 10-14 FTE operational roles.

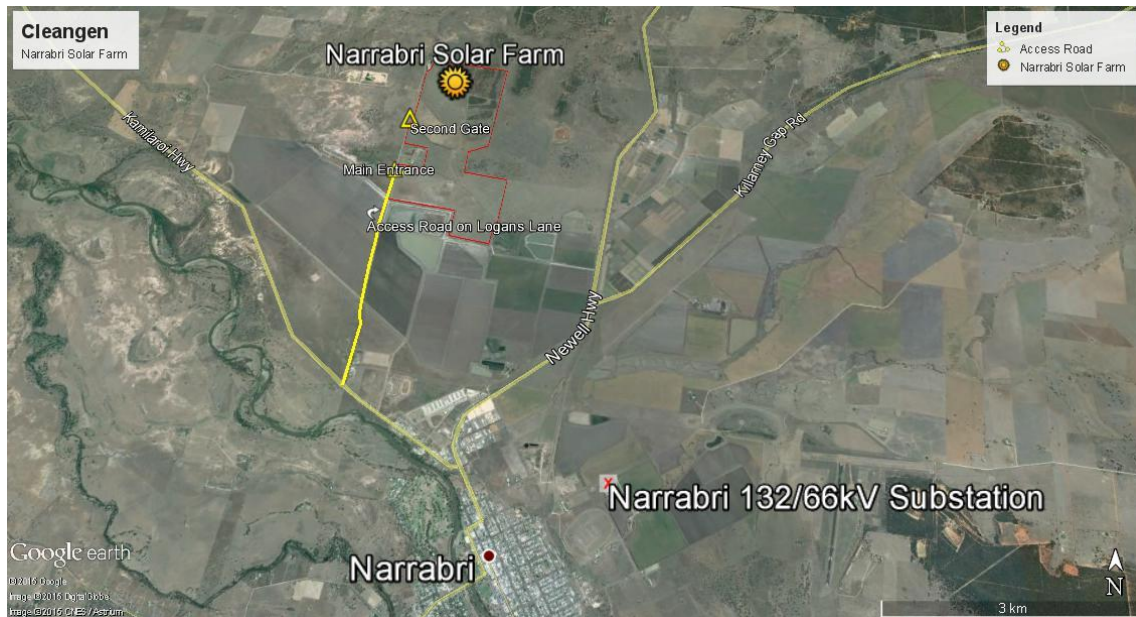
The Solar Farm will produce up to 315,165 MWh in year 1, enough to power at least 46,000 homes and offsets 274,000 tonnes of CO<sub>2</sub>e pa.



## Project Proposal

### Location

The proposed site is 4 km north west of the Narrabri town centre and lies between the Newell Highway on the east and Kamilaroi Highway on the west. The Project falls under the Local Government Area of the Narrabri Shire Council. It will connect to the Narrabri 132/66kV substation 4km south east of the Project.



### Site

The proposal is on 330 ha of rural grazing land, under Rural Zone 1 – Primary Production. The registered plan ID is DP 1174848, Lot 21/PM 106331, Lot 22/PM 871430 and Lot 23/PM 157119.

The main entrance is on Logan's Lane which is a Council owned road with no through access. A second gate is 1 km north on Logan's Lane.



Figure 2 Site Plan

## Project

The Project will include the installation of solar panels and associated equipment that will be up to 120 MW (AC) in size. Preliminary key components include:

- Solar PV modules with trackers;
- Inverters and medium voltage step up transformers;
- Underground electrical conduits and cabling to connect the arrays to the inverters and transformers;
- >33kV step-up transformer station and switchgear;
- Overhead or underground lines to connect into existing electrical network;
- A supervisory control and data acquisition (SCADA) control system;
- A site office and maintenance building;
- Main Gate;
- Second gate;
- Security cameras;
- Internal access tracks;
- Laydown area;
- Perimeter security fencing; and
- Native vegetation hedges.

The Project has a few options to connect to the Narrabri 66/132kV substation with a preferred option being to co-locate with the existing 66kV or 132kV line that runs alongside existing powerlines diagonally across Logan's Lane (Figure 3 and below Figure 4) less than 1.5km from the main gate. An easement from Council will be required to run the powerline along Logan's lane and follow the existing easements as shown in the map below.

The site has an Essential Energy 11kV easement that runs through it (Figure 4). An operational solar farm is illustrated in Figure 5.



Figure 3 Powerline Easements



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Figure 4 Power Lines running through the area



Figure 5 30MW Solar farm with Single axis trackers



## Justification

### Project Need

Climate change from man-made emissions such as electricity consumption is a global problem. Australia is the biggest emitter of carbon emissions per capita. It is one of the sunniest countries in the world with enough solar to power the country more than 10,000 times over annually. Australia has less than 10% renewable energy and solar is less than 1% of annual energy consumption. Energy costs have increased by over 50% in the last few years and are forecast to increase by a further 37% over the next three years, largely due to network upgrades to meet growing peak summer demand.

Australia now has over 4532MW of solar PV as at June 2015<sup>1</sup> with large scale solar making up approximately 17%. The demand for renewable energy is set by legislation in the RET at 33,000GWh.

The Narrabri Solar Farm will produce approximately 316,000 LGCs (316,000 MWh or <1% of the RET) in the first year of operations and approximately 8 million LGCs over the Project life. It will offset approximately 274,000 tonnes carbon emissions from the atmosphere per year.

### Alternatives

During the site selection process, a number of alternatives were considered. Key selection criteria includes all of the features below:

- Generally flat topography;
- Rural grazing land;
- Close proximity to electricity network connection and powerlines;
- Mainly cleared land;
- No rare flora and fauna;
- No cultural heritage issues;
- No EPBC issues;
- Good road access; and
- Out of the flood zone.

After extensive consultation with Council, a few sites were shortlisted in the surrounding area and Project site was chosen.

### Benefits

The Project will have numerous benefits for the Narrabri area including:

- Produces renewable energy
  - Up to 316,165 MWh pa

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<sup>1</sup> <http://pv-map.apvi.org.au/analyses>

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- Enough to power at least 46,000 homes; and
  - Offsets 274,000 tonnes of CO<sub>2</sub>e pa.
- Creates jobs for the area
  - 280 in construction and
  - 10-14 operations pa. full time equivalent
- Increases revenue in ancillary services such as tourism and hospitality;
- Diversifies revenue for the local area and the land owner;
- Strengthens the network;
- Reduces power bills valued at up to \$20 million over the life of the assets (30 years); and
- Avoids network upgrades.

## Consultation

To date, CleanGen has had extensive consultation with Narrabri Shire Council and Council is supportive of the Project. CleanGen has also consulted with the NSW Department of Planning, Resource Assessments, Energy.

A Community Consultation Plan will be prepared to inform the community and key stakeholders of the proposed project. Stakeholders will be identified as those potentially being impacted by the proposal or those that may have an interest in the Project. The plan will point out key consultation requirements and interested parties such as neighbours, government agencies, local groups and communities.

The plan may include:

- Background information about the Project;
- Benefits;
- Impacts;
- Local paper ads advertising the Project;
- Database to manage all enquiries and response; and
- Website and hotline to answer questions.

The purpose of the plan is to ensure ongoing and effective communication with the community. This would ensure that positive and negative impacts, if any are managed with minimal impact to the community. The plan will be in accordance in accordance with DGRs requirements.

## Legislation Requirements

The relevant planning guidelines are listed in the table below.

Act	Description	Compliance	Action
<b>Environmental Planning and Assessment Act 197</b>	NSW planning act which sets the framework for approvals	This Project proposal would be assessed under the NSW EP&A Act, Part 4.	Assessable
<b>State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP)</b>	NSW Planning guidelines	State Significant Development (SSD) <ul style="list-style-type: none"> <li>Capital Value is approximately \$170 million</li> </ul>	Requires the approval of the Minister of Planning and Infrastructure and may be delated to a relevant authority
<b>Narrabri Shire Council Local Environmental Plan 2012 and State Significant Environment Planning Policy (Infrastructure) 2007 (ISEPP)</b>	Narrabri Shire Council Planning Guidelines. Consent authority to have regard for the objectives for development in a zone when assessing the development application RU1 Zone – Primary production <sup>2</sup> .	<ul style="list-style-type: none"> <li>The solar farm meets objectives (b) and (c) <ul style="list-style-type: none"> <li><i>b) To encourage diversity in primary industry enterprises and systems appropriate for the area.</i></li> <li><i>c) To minimise the fragmentation and alienation of resource lands.</i></li> </ul> </li> <li>The Project life is 30 years unless extended and is reversible by decommissioning the Project and restoring the land to its original use. This will maintain the use of the land as primary production in the medium to long-term.</li> <li>LEP prohibits electricity generation but the ISEPP 2007, clause 34 (7) stipulates that development for the purpose of a solar energy system may be carried out by any person with consent on any land (except land in a prescribed residential zone)</li> </ul>	Meets the objectives (b) and (c). It allows for diversity in land use and will not fragment resource lands. Permissible with consent
<b>Roads Act 1993</b>	Section 132, approval will be required from Council or the	The main entrance is on Logan's Lane which is owned by Council No works on Logan Lane or any other roads	May require an easement for power

<sup>2</sup> <http://www.legislation.nsw.gov.au/maintop/view/inforce/epi+636+2012+cd+0+N>



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Act	Description	Compliance	Action
	Roads and Maritime Services (RMS) for both classified and unclassified roads, to erect a structure or carry out a work in, on or over a public road		lines to run on Logan's Lane which will fall under the NSP
<b>Native Vegetation Act 2003</b>	Regulates the clearing of native vegetation	The Project is not expected to clear any native vegetation. A desktop search of the NSW planning portal shows no presence of either existing native vegetation or of a native vegetation retention area <sup>3</sup>	Will be addressed in the EMP as ongoing management
<b>Threatened Species Conservation Act 1996</b>	Provides for the conservation of threatened species, populations and ecological communities of animals and plant	State planning maps and consultation with Council show no threatened species listed	EIS to validate after monitoring
<b>National Parks and Wildlife Act 1974</b>	Regulates care, control and management of all national parks, historic sites, nature reserves, reserves, Aboriginal and state game reserve in NSW	Project is not a national park and has no reserves	No Action
<b>Heritage Act 1977</b>	Conservation of heritage values	Desktop search done on <a href="http://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx">http://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx</a> Show no places listed	No Action
<b>Native Title Act 1993</b>	Protection of common law and native title acts	Desktop search shows no current claims <a href="http://www.nntt.gov.au/searchRegApps/NativeTitleRegisters/Pages/Search-Register-of-Native-Title-Claims.aspx">http://www.nntt.gov.au/searchRegApps/NativeTitleRegisters/Pages/Search-Register-of-Native-Title-Claims.aspx</a>	No Action
<b>Environment Protection and Biodiversity Conservation (EPBC Act 1999)</b>	Conservation of areas of National Significance that would need the Minister's approval	Desktop search in shows the presence of threatened species are 'likely to occur which is inconsistent with consultation with Council and state searches on NSW planning portal Refer to next section on EPBC Act under Environmental Risk	EIS to verify with independent ecological study
<b>The Historic Shipwrecks Act 1976, Aboriginal Torres Strait Islander Heritage Protection</b>	Australian Heritage conservation	No heritage places listed on conservation database <a href="http://www.environment.gov.au/heritage/ahdb/">http://www.environment.gov.au/heritage/ahdb/</a>	No Action

<sup>3</sup> NSW Planning and Environment

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Act	Description	Compliance	Action
Act 1984, Australian Heritage Council Act 2003			

## Environmental Impact

The proposed Project will have a positive impact on the environment as it will displace up to 274,000 tonnes of carbon emissions from the atmosphere. The site requires some tree clearing which will be more than offset by the solar farm. The site aesthetics will be improved with fencing and native vegetation trees screening the site from the main road and any neighbours.

### Managing Environmental Risks

The Project is currently in the planning stage. Once the planning permit is issued, key contracts will be tendered to the market. Final design details will be known on final contracts. A full Environmental Management Plan (EMP) and sub plans will be provided to council for approval prior to construction commencing.

The EMP will provide contingent requirements for ongoing environmental response planning to key issues. This approach allows planning and management techniques of all impacts as response strategies are developed.

The EMP will cover, the three key phases and EMP goals are:

- Construction - Minimising pollution, waste generation and other potential environmental impacts during construction stages of the project
- Operations - Minimising potential environmental impacts during operational stages, managing site interface issues, and good neighbour relations.
- Decommissioning - Removal of site facilities. Minimising legacy issues and arrangements for make-good with any project decommissioning.

The EMP sub plans include:

- Soil, Water and Flood Management Plan
- Dust Management Plan
- Noise, Vibration Management Plan
- Weed Management Plan
- Fire Management Plan
- Waste Management and Reuse Management Plan
- Resources and Service Management Plan
- Traffic Management Plan
- Flora and Fauna Management Plan (if required)
- Indigenous and Non-Indigenous Cultural Heritage Management Plan (not required)
- Hazardous Materials Management Plan

## Key Environmental Risks

### Ecology

An environmental consultant will be engaged in the EIS process to verify the presence of any rare species, flora or fauna. Consultation with council, a site assessment (Figure 6) and desktop studies of the area under the NSW planning portal show no presence of native vegetation or rare species.



Figure 6 Ground Cover on site

### EPBC Act

The EPBC Act identifies 8 areas of National Significance which include and a desktop search was conducted showing the following results tabled below.

The Ramsar wetlands listed are over 1000km away from site and not be impacted by the Project. Threatened species are listed as 'likely to occur' however the NSW State Planning checks show threatened species in the area. The site is grazing land that is predominantly grassy with some trees. The initial site visit and consultation with the Council and land owner indicate a low risk of threatened species in the area which is consistent with State planning maps. Under the EIS, an environmental consultant will monitor and assess the site to confirm the presence of threatened species.

Areas of National Significance	Listings	Applicable	Action Required
World Heritage Properties	0		
National Heritage Places	0		
Wetlands of International Importance	3	Lists 3 areas over 1000km away in South Australia	No action
Great Barrier Reef Marine Park	0		
Commonwealth Marine Area	0		



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Listed Threatened Ecological Communities	5	Community likely to occur	EIS to assess and specify impact if any and management plan
Listed Threatened Species	15	Community likely to occur	EIS to assess and specify impact if any and management plan
Listed Migratory Species	8	Community likely to occur	EIS to assess and specify impact if any and management plan

### Tree Clearing

The site has some small trees and remnant vegetation that will need to be cleared. The trees are not listed as protective native vegetation and the solar farm development will more than offset the emissions by producing approximately 316 GWh pa offsetting 274,000 tonnes of CO<sub>2</sub>e pa.

### Visual

The site aesthetics will be improved with fencing and native vegetation trees screening the site from the main road and any neighbours and the property manager of the site. Neighbours and any passing traffic will not see the solar farm from the road. Closest neighbours are shown in Figure 7 and include:

- N1 – less than 20 meters away.
- N2 – AirCair, an aerial agricultural business
- N3 – over 2km away
- N4 - over 2km away

AirCair borders the north western side of the property and is not expected to be impacted by the solar farm (refer to section on Glare). Panels are north facing tracking the sun. Planes take off from north to south with the solar farm bordered by a fence and native vegetation hedges 2-3 m high. Planes land from south to north.



Figure 7 Map Neighbours

### Airports and Glare

The proposed project is 6km south east of the Narrabri Airport and is next to AirCair an aerial agricultural business.

The primary function of PV panels is to absorb sunlight rather than reflect it. The technical process in manufacturing PV panels includes an anti-reflection, hydrophobic layers that minimises potential for sunlight reflection. Essentially sunlight reflection would be visible as either 'sun glint' or 'glare'. CASA have approved projects close to the airport reporting that more glare is expected from the local waterways and the sun itself.

A few airports around the world have solar installations located on their premises. Among those in Australia that have installed large arrays are Adelaide Airport, Alice Springs Airport, Newman Airport (WA), and Ballarat Airport. Internationally, solar arrays have been installed at or near airports in Singapore's Changi Airport, London's Gatwick Airport, California's San Jose Airport, Germany's Dusseldorf Airport, the US's Denver International Airport, Nellis Air Force Base in Nevada, and Ontario's Thunder Bay Airport, to name a few. <sup>4</sup>

Further detailed information on glare will be made available if required in the EIS.

### Traffic Management

<sup>4</sup> <http://www.solarchoice.net.au/blog/solar-panels-near-airports-glare-issue/>

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The main entrance to the site is via Logan's Lane which is a straight, dirt road more than 7 m wide and ends just after AirCair. The road is owned by Council. The road has clear site from the main gate of over 200m on either side (Figure 8).

No state roads will be directly impacted by the construction or operations of the Project. Entry and exit from the main gate has a have clear view and is safe.

Vehicle traffic will depend on the phase of the Project. Estimates are listed below based on experience with similar projects. A return trip in and out of the gate is counted as 2 movements of traffic per day. The main gate will be used as the main entry.

- Stage 1 of construction (based on 100FTE employees)
  - Less than 12 minimal heavy vehicle movements on site per day.
  - A shuttle bus will be used to transport the majority of employees to and from site during operational hours;
  - Without the shuttle bus there will be 66 light vehicles trips per day
- Stage 2 of Construction (based on 280 FTE maximum staff on site)
  - At least 800-1000 semi trailer truck movements each with a 40 foot container over 6 months which is approximately 9 heavy vehicles per day
  - A shuttle bus to be used for 75% of employees with 12 bus movements per day
  - Remainder of staff to create approximately 38 light vehicles entering and leaving per day and an additional trip per day totalling 133 light vehicles per day
- Operations (based on 10-14 FTE staff)
  - At least 30 vehicle trips are expected per day.

The Project will have a safe entry and exit to the site and minimal impact on the local area and landlord.



**Figure 8 Main Entrance from Logan's Lane**

### Bush Fire

The land is grazing land that will be cleared during construction and landscaped with native vegetation trees for screening. The area surrounding the Project is agricultural land.

The EMP to be submitted prior to construction commencing will include a Fire Management Plan to address the management of potential fires in construction, operations and decommissioning.

The Project operations will be monitored using real time data, an on-site manager and security cameras to pick up fires which will trigger notification of the local CFA as part of the Fire Management Plan.

The Proposal will not increase the risk of bushfires in the area.

### Height

The maximum height of all the panels, trackers and overhead powerlines would be no more than 6 meters high.

The key components and the respective heights are tabled below:

Equipment	Height
Solar PV panels with trackers	3-4m
Central Inverters	>3m
Site Office	3-4m
Powerlines	6m

CASA approval is not required for heights less than 65 m.

### Landscaping

The existing land is grazing land will require some tree clearing. The land has a generally flat topography. Landscaping will include the following:

- Fence around the perimeter;
- Three rows of screening using 2-3m native species trees where in direct view from neighbours;

Part of the site operations would be to ensure the site landscaping is maintained on a regular basis.

### Noise and Vibration

The Project will have solar PV modules with trackers that produce no noise nuisance.



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Audible noise and vibration will be present during construction and decommissioning. The EPC contractor will be required to formulate an EMP which will include a sub plan of noise and vibration management during construction, operations and decommissioning in line with the State Planning Guidelines.

Noise and vibration will be kept to acceptable limits during construction. The risk of noise and vibration during operations is low to none. A detailed Noise and Vibration Management Plan will be submitted to council prior to construction commencing and maintained during operations. The EIS will address noise risk.

### Smell

The Project involves the installation and operation of solar panels which require non-hazardous material. The project will not increase the risk of smell for surrounding area. The EMP will manage any potential smell (should it occur) under the sub plan of Hazardous Materials Management Plan and others.

### Electromagnetic Interference

EMF exposure limits are governed by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). The strength of the magnetic field is expressed in units of Tesla (T) or microtesla ( $\mu\text{T}$ ) or Gauss (G) or milligauss (mG), where  $1 \text{ mG} = 0.1 \mu\text{T}$ .

The recommended magnetic field exposure limit for members of the public are:

- Public (24 hour exposure) is 0.1 millitesla (1,000 milligauss (mG))
- Occupational exposure (whole working day) is 0.5 millitesla (5,000 mG)

According to US research, solar panels provide very low EMFs, almost indistinguishable to ETLs. Power lines (transmission and distribution) carry very high voltages. It is the current and not the voltage that is associated with the strength of the magnetic field. Therefore, proximity to high voltage lines will not necessarily give a high reading unless those lines are also carrying a large current. Typical values of magnetic fields measured near power lines and substations are listed in the table below.

**Table 1 EMF Values**

Source <sup>5</sup>	Location of measurement	Range of measurements (mG)
<b>Distribution Line</b>	directly underneath	2 – 30
<b>Distribution Line</b>	10m away	0.5 – 10
<b>Substation</b>	at substation fence	1 – 8

<sup>5</sup> [http://www.arpansa.gov.au/radiationprotection/Factsheets/is\\_magFields.cfm](http://www.arpansa.gov.au/radiationprotection/Factsheets/is_magFields.cfm)

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Transmission line	directly underneath	10 – 200
Transmission line	at edge of easement	2-50

The effect of EMF reduces exponentially with distance. According to ARPANSA there is no evidence to prove any adverse health risk from EMF, except electrical shock.

The proposed site is surrounded by nearby transmission and distribution lines.

The power line will be a similar voltage than existing lines (22kV, 66kV and 132kV) and should not increase the EMF already at the location which is within the recommended limits.

The EMF from the Project is well within Australian limits with no risk to the site and its surrounding area. EMF levels will be managed under the EMP.

### Treatment of Waste

The Project will formulate a Waste Management and Reuse sub plan under the EMP which will be produced prior to construction commencing. The EIS will stipulate guidelines of waste management.

It is anticipated that all waste will be moved to the local transfer station.

### Resourcing and Servicing

The site currently has services connected. Services are required for construction and operation and available as listed below:

- Electricity – Essential Energy
- Telecommunications - Telstra

Bore water and Rain water tanks will be used for construction and operation. The site will also have water rights from the nearby channel which is to be negotiated with the landlord. This should provide access to 1-2 ML of water per year for use in construction and/or operation.

The site is remote from a sewerage mains. Full details of the resourcing plan will be provided in the EIS if required and EMP.

## Conclusion

The proposed Narrabri Solar Farm will be assessed under Part 4 of the EP&A Act and classed as State Significant Development under State Environmental Planning Policy (State and Regional Development) 2011. This report provides an outline of the Project and its planning issues that may be addressed either in an EIS and/or EMP. The EIS will be prepared based on this Scoping Study and the Director General's requirements recommended by the DP&I and will include Statements of Commitments to be included in the EMP.

~~~End~~~