STATEMENT OF ENVIRONMENTAL EFFECTS
GIDGINBUNG SOLAR FARM

PREPARED FOR
EPHO PTY LTD

MARCH 2016

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TABLE OF CONTENTS

GLOSSARY **1**

INTRODUCTION **1**

1.1 ADVANCING RENEWABLES PROGRAMME 1
1.2 JUSTIFICATION 1
1.3 PROPONENT 2

STATUTORY PLANNING **4**

2.1 PERMISSIBILITY 4
2.2 CONSENT AUTHORITY 4
2.3 INTEGRATED DEVELOPMENT 4
2.4 STATE ENVIRONMENTAL PLANNING POLICIES 5
2.4.1 INFRASTRUCTURE 5
2.4.2 REMEDIATION OF LAND 5
2.5 DRAFT PLANNING INSTRUMENTS 5
2.6 STRATEGIC PLANS 5
2.7 DEVELOPMENT CONTROL PLAN 5

DEVELOPMENT SITE **6**

3.1 REGION 6
3.2 CLIMATE 6
3.3 SITE 7
3.4 LOCALITY 8
3.5 SUITABILITY 8
3.5.1 SITE SELECTION CRITERIA 8
3.5.2 ENERGY OUTPUT MODELLING 8
3.5.3 FORECAST GENERATION 11

DEVELOPMENT **12**

4.1 OVERVIEW 12
4.2 INFRASTRUCTURE 12
4.3 PHOTOVOLTAIC PANELS 12
4.4 INVERTER STATIONS 13
4.5 SUBSTATION 14
4.6 SECURITY FENCE 15
4.7 LANDSCAPING 15
4.7.1 LOCATION 15
4.7.2 COMPOSITION 16
4.8 SERVICES 16
4.9 CONSTRUCTION 17
4.9.1 INSTALLATION PHILOSOPHY 17
4.9.2 CONSTRUCTION TIMELINE 17
4.9.3 CONSTRUCTION WORKFORCE 18
4.9.4 CONSTRUCTION HOURS 18
4.9.5 CONSTRUCTION TRAFFIC 18

CONSULTATION **19**

5.1 COMMUNITY 19
5.2 AGENCY STAKEHOLDERS 19

ENVIRONMENTAL IMPACTS 20

6.1 GLARE 20

6.1.1 INTRODUCTION 20
6.1.2 REFLECTIVITY 20
6.1.3 POTENTIAL IMPACTS 21
6.1.4 GLARE HAZARD ANALYSIS 23
6.1.5 ASSESSMENT RESULTS 25
6.1.6 TEMORA AERODROME 26

6.2 VISUAL AMENITY 26

6.2.1 INTRODUCTION 26
6.2.2 LANDSCAPE SETTING 26
6.2.3 LANDSCAPE VALUES 26
6.2.4 VISUAL CATCHMENT 27
6.2.5 IMPACTS 27
6.2.6 MITIGATION MEASURES 28
6.2.7 CONCLUSION 28

6.3 WATER RESOURCES 29

6.3.1 FLOODING 29
6.3.2 DRAINAGE 29
6.3.3 QUALITY 29
6.3.4 GROUNDWATER 30
6.3.5 POTENTIAL IMPACTS 30
6.3.6 MITIGATION MEASURES 30

6.4 TRAFFIC 31

6.4.1 EXISTING TRAFFIC VOLUMES 31
6.4.2 DEVELOPMENT RELATED TRAFFIC 31
6.4.3 REQUIRED UPGRADES 32

6.5 HERITAGE 35

6.5.1 ABORIGINAL HERITAGE 35
6.5.2 HISTORICAL HERITAGE 36

6.6 NOISE 36

6.6.1 EXISTING ENVIRONMENT 36
6.6.2 RECEPTORS 36
6.6.3 OPERATIONAL NOISE 36
6.6.4 CONSTRUCTION NOISE 38
6.6.5 MITIGATION MEASURES 38

6.7 BIODIVERSITY 39

6.7.1 VEGETATION COMMUNITIES 39
6.7.3 SIGNIFICANCE OF IMPACT 43
6.7.4 COMMONWEALTH REFERRAL 46
6.7.5 MITIGATION MEASURES 46

6.8 AIR QUALITY 47

6.8.1 CONSTRUCTION IMPACTS 47
6.8.2 OPERATIONAL IMPACTS 48

6.9 BUSHFIRES 48

6.9.1 RISK 48
6.9.2 DESIGN 48
6.9.3 CONSTRUCTION 48
6.9.4 OPERATIONS 49

6.10 SOCIAL & ECONOMIC 49
6.10.1 COMMITMENT TO SOURCE LOCAL 49
6.10.2 EMPLOYMENT GENERATION 50
6.10.3 SKILL DEVELOPMENT 50
6.10.4 TOURISM INTEGRATION 50
6.10.5 EDUCATION INTEGRATION 50
6.10.6 BROADER BENEFITS 50
6.11 WASTE MANAGEMENT 51
6.12 ELECTROMAGNETIC FIELDS 51
6.13 LAND USE 51
6.14 DECOMMISSIONING 52
6.15 DEVELOPMENT CONTROL PLAN 52
MITIGATION MEASURES 53
7.1 INTRODUCTION 53
7.2 DESIGN 53
7.2.1 DESIGN REFINEMENT 53
7.2.2 DETENTION BASIN 53
7.2.3 ACOUSTIC AMENITY 53
7.3 PRE-CONSTRUCTION 54
7.4 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN 54
7.4.1 LANDOWNER CONSULTATION 54
7.4.2 SOIL AND WATER MANAGEMENT 54
7.4.3 INCIDENT MANAGEMENT 54
7.4.4 WEED MANAGEMENT 54
7.4.5 FAUNA PROTECTION 55
7.4.6 HABITAT ESTABLISHMENT 55
7.4.7 ABORIGINAL HERITAGE 56
7.4.8 FUEL AND CHEMICAL STORAGE 56
7.4.9 WASTE MANAGEMENT 56
7.4.10 NOISE AND VIBRATION 57
7.4.11 AIR QUALITY 57
7.4.12 BUSHFIRES 57
7.4.13 INDUCTION 58
7.5 OPERATIONS ENVIRONMENT MANAGEMENT PLAN 58
7.6 DECOMMISSIONING MANAGEMENT PLAN 58
CONCLUSION 59
REFERENCES 60

DRAWINGS

Drawing EV01 – Site Location
Drawing EV02 – Development Site
Drawing EV03 – Site Environs
Drawing EV04 – Solar Farm Layout
Drawing EV05 – Site Hydrology
Drawing EV06 – Relationship to Airport

FIGURES

Figure 1 ARENA Large Scale Solar PV Shortlisted Proposals by State (in MW) 1
Figure 2 Gidginbung Solar Farm Consortium 2
Figure 3 Temora Locality 6
Figure 4 Temora Elevation 6
Figure 5 Climate Data 7
Figure 6 Irradiance Variation at Temora 10
Figure 7 Average Daily Sunshine Hours 11
Figure 8: Indicative Panels and Tracker Arrangement 13
Figure 9: Indicative Inverter Station 13
Figure 10: Indicative Sub-Station 14
Figure 11: Security Fence 15
Figure 12: Indicative Construction Schedule 17
Figure 13: Typical Material Reflectivity with Sunlight Angle (Spaven, 2012) 20
Figure 14: Comparative Reflection of PV Solar Panels (Sandia National Laboratories) 21
Figure 15: Visual Comparison of Glint and Glare (Power Engineers, 2010) 22
Figure 16: Potential Ocular Impacts and Hazard Ranges (Sandia National Laboratories) 23
Figure 17: Observation Points 24
Figure 18: Taylors Road looking east near proposed site entrance 33
Figure 19: Goldfields Way looking south from Taylors Road 34
Figure 20: Goldfields Way looking north from Taylors Road 35

APPENDICES

APPENDIX A
Photomontages

APPENDIX B
CASA Consultation

TABLES

Table 1.1 – GSFC Experience and Roles 3
Table 3.1 – Comparison of Irradiance Data 9
Table 3.2 – Average Monthly Mean Daily Global Exposure 10
Table 3.3 – Temora Forecast Households and Dwellings 11
Table 6.1 – SGHAT Observation Point Coordinates and Elevation 24
Table 6.2 – SGHAT Analysis Input Data 25
Table 6.3 – Typical SGHAT Analysis Input Data 25
Table 6.4 – SGHAT Assessment Results 25
Table 6.5 – XP-RAFTS Model Results 29
Table 6.6 – RMS Goldfields Way Traffic Volumes 31
Table 6.7 – Expected Traffic Volumes 31
Table 6.8 – Indicative Project Related Monthly Vehicle Movements 32
Table 6.9 – Peak Hourly Traffic Volumes on the Goldfields Way 33
Table 6.10 – Sound Power Levels 37
Table 6.11 – Full Farm Plant Noise 37
Table 6.12 – Predicted Noise Levels at Receptors 37
Table 6.13 – Construction Plant 38
Table 6.14 - Observed Flora List 40
Table 6.15 - Observed Fauna List 42

Glossary

ac	Alternating Current
ARP	Advancing Renewables Programme
ARENA	Australian Renewable Energy Agency
BOM	Bureau of Meteorology
CASA	Civil Aviation Safety Authority
CEMP	Construction Environmental Management Plan
CO_2e	Carbon Dioxide Equivalent
DA	Development Application
dc	Direct Current
DCP	Development Control Plan
DMP	Decommissioning Management Plan
DPE	Department of Planning and Environment
GHG	Greenhouse Gas
GSF	Gidginbung Solar Farm
GSFC	Gidginbung Solar Farm Consortium
GW	Gigawatt
GWh	Gigawatt Hour
HV	High Voltage
SEPP	State Environmental Planning Policy
kW	kilowatt
kWh	Kilowatt hour
LEP	Local Environmental Plan
LSSPV	Large Scale Solar PV
MW	Megawatt
MWh	Megawatt Hour
MWp	Megawatt peak
OEH	Office of Environment and Heritage
MV	Medium Voltage
NER	National Electricity Rules
OEMO	Operations Environmental Management Plan
PV	Photovoltaics
RMS	Roads and Maritime Service
SEE	Statement of Environmental Effects
SGHAT	Solar Glare Hazard Analysis Tool
S-JRPP	Southern - Joint Regional Planning Panel
TSC	Temora Shire Council
YLALC	Young Local Aboriginal Land Council

Introduction

1.1 ADVANCING RENEWABLES PROGRAMME

In September 2015 the Australian Renewable Energy Agency (ARENA), as part of its Advancing Renewables Programme (ARP), requested expressions of interest (EOI) for large scale photovoltaics (PV) proposals to increase the existing number of large scale solar PV plants across Australia by 200 megawatts (MW). A significant number of submissions were received during this period and only those submissions with high merit were invited to proceed to the next stage of a full application.

On 16 December 2015 the 15 megawatt (MW) Gidginbung Solar Farm (GSF) consortium was successful in being shortlisted and invited by ARENA to further develop the proposal and submit a full application on 15 June 2016.

In total, 22 projects were shortlisted across Australia. The 242.3 MW allocation for NSW is comprised of eight proposals located in Central Western NSW, which represents 173 MW or 71 % of NSW's total allocation (refer to **Figure 1**).

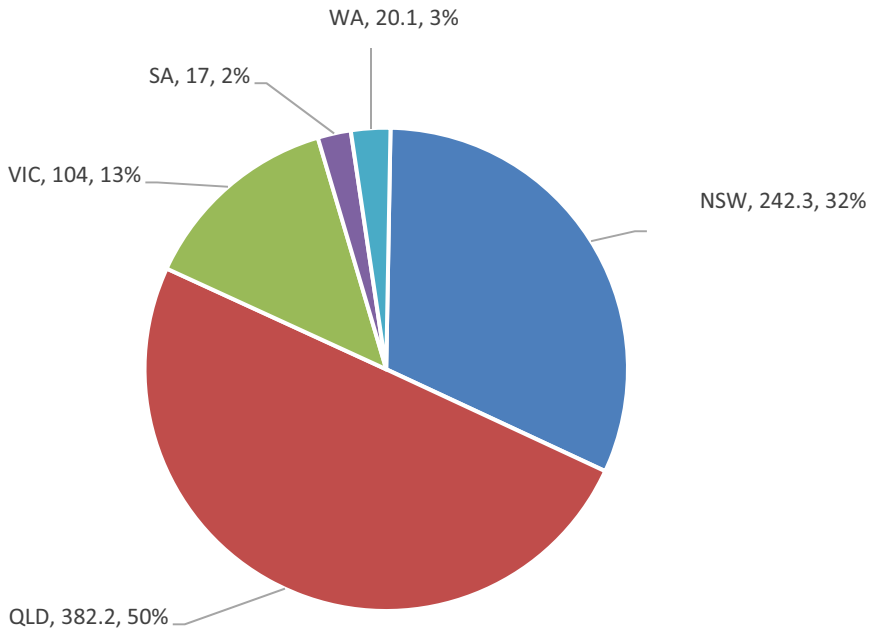


Figure 1 ARENA Large Scale Solar PV Shortlisted Proposals by State (in MW)

The next stage of the ARENA programme is competitive and only successful submissions will be awarded funding with a view to these solar plants being installed in 2017.

1.2 JUSTIFICATION

The Commonwealth Government has recognised that Australia's reliance on carbon-based fuels is not a viable means of securing energy production into the future and that renewable energy alternatives can play a significant role. These renewable energy alternatives may include solar PV, solar concentrated thermal, geo-thermal and wind.

The importance of ARENA investing $100 million dollars into Large Scale Solar PV (LSSPV) is significant. It recognises the requirement to provide viable alternatives to carbon-based fuels as well as securing future energy sustainability by decreasing the cost of LSSPV.

The power generated from the GSF will contribute towards reducing a reliance on carbon-based electricity generation, such as by coal-fired power stations, through providing a cleaner form of electricity generation through a proven and reliable renewable energy source.

The Gidginbung solar farm will generate approximately 30 Gigawatt hours (GWh) of clean electricity each year; equivalent to powering 4,615 homes and reducing greenhouse gas (GHG) emissions by 35,400 tonne of carbon dioxide equivalent (CO_2e) annually.

1.3 PROPONENT

Epho Pty Ltd is the lead applicant for the Gidginbung solar farm Development Application (DA) on behalf of the Gidginbung Solar Farm Consortium (GSFC), a special purpose vehicle made up of the following companies: IB Vogt GmbH, Saferay Gmbh, Hydro Power Pty Ltd and Epho Pty Ltd.

The GSFC is experienced in renewable energy projects, both within Australia and internationally, with over 1.5 GW of solar PV installed. IB Vogt and Saferay are experienced in the design, construction and operation of large-scale solar PV plants throughout Europe, North America, South America and the United Kingdom.

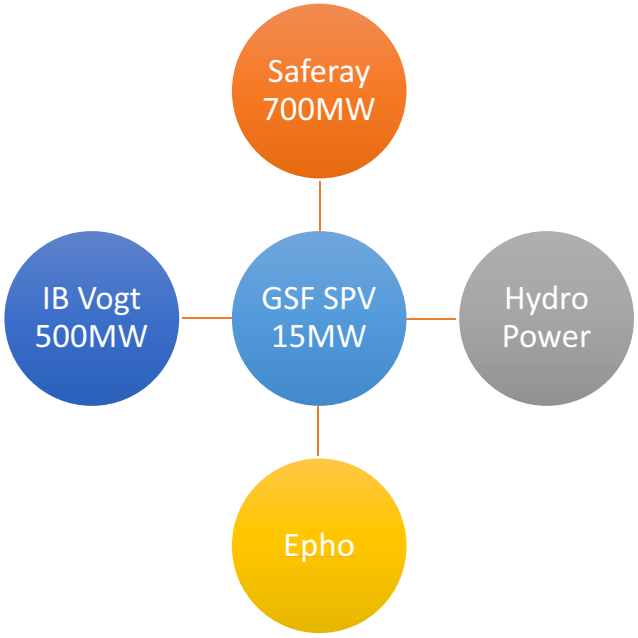


Figure 2 Gidginbung Solar Farm Consortium

An overview of the experience these companies in renewable energy and their respective roles in relation to the Gidginbung solar farm is provided below.

Table 1.1 – GSFC Experience and Roles

Company	Experience	Roles and Responsibilities
Hydro Power Pty Ltd	Hydro Power Pty Ltd was incorporated in 1989 for the purpose of constructing an 18 megawatt generator on Wyangala Dam, near Cowra in Central-West New South Wales. The company began operation in April of 1991 and it has operated successfully since. In 2004 a second smaller 4.5 megawatt generator was constructed at the site. All electricity produced is sold directly into the National Electricity Market (NEM) following Hydro Power's registration as a direct market participant in January 2015. For the past five years electricity produced was sold to AGL. Hydro Power intends to be a long-term owner of the Gidginbung Solar Farm.	Hydro Power as a company based in Central NSW will be responsible in managing site acquisition, community engagement, and Development Application with the Council. As a successful power plant operator in the region, Hydro Power will also engage with Essential Energy, the local network provider, and manage the grid application
Epho Pty Ltd	Epho Pty Ltd is a company specialised in the development of commercial solar system across Australia. The company has one of the most experienced solar teams in the country and designs, engineers, constructs and operates solar systems Australia wide for clients like the Commonwealth Bank of Australia and Aldi Stores Australia. Epho is successful with these high profile clients due to its impeccable track record on project management, WHS and stakeholder management.	Epho will be the Principal Project Manager. The company will be responsible for WHS management, construction, environmental management, site logistics, work force management, quality control management, procurement of Australian components and resources as well as design and engineering reviews. Epho will also be responsible for managing all contractual, legal and administrative requirements.
IB Vogt GmbH	Established in 2002, IB Vogt GmbH has been focusing on the development of solar power plants in the UK and Germany, as well as the South-East Asian and Indian markets since 2009. IB Vogt's activities cover project development, financing, engineering, procurement, construction, operation and maintenance, as well as ownership and asset management of its portfolio. As a manufacturer-independent integrated developer, the company focuses on tailor made solar power plant solutions that maximise lifecycle performance. IB Vogt employs over 80 experts in all areas of the PV power plant value chain. The company operates from offices in Germany, United Kingdom, Eastern Europe, India and South East Asia. IB Vogt has built over 500 MWp of solar power plants worldwide and currently has a pipeline of over 500 MWp. IB Vogt is amongst the most successful utility-scale development and EPC companies in the world.	IB Vogt will be the engineering company of the solar farm itself, leveraging its vast experience in this area. IB Vogt will also manage the procurement and provide the project manager for the actual construction of the project
Saferay GmbH	Saferay is on an equal level to IB Vogt in terms of experience and track record with regard to development and EPC of large scale solar power plants. The Saferay team has built over 700 MW of solar farms. Amongst them the first large-scale solar project in Chile, a 50 MW generator. Saferay intends to remain a long-term owner of the Gidginbung solar farm, which will add to its impressive balance sheet of $ 0.5 billion AUD.	Saferay will provide engineering and procurement support for the solar farm.

Statutory Planning

2.1 PERMISSIBILITY

The development site is zoned RU 1 – Primary Production under the *Temora Local Environmental Plan 2010*. Under this local planning instrument the development is prohibited – as an 'electricity generating works' is not specifically identified as a type of development that is either permissible with or without development consent.

Notwithstanding, pursuant to cl.34(7) of *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) development for the purpose of a solar energy system may be carried out by any person with consent on any land.

Accordingly, the proposed solar farm (which is a photovoltaic electricity generating system) is permissible subject to securing development consent.

2.2 CONSENT AUTHORITY

Pursuant to Schedule 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) electricity generating works with a capital investment value of more than $5 million are a development category for which a Joint Regional Planning Panel (JRPP) may be authorised to exercise the consent authority functions of Council.

The development as proposed has a capital investment of greater than $5 million and accordingly the Southern Joint Regional Planning Panel (S-JRPP) is the consent authority.

2.3 INTEGRATED DEVELOPMENT

The solar farm is integrated development because it is proposed to construct a new access to the development site off Taylors Road. Pursuant to s.138 of the *Roads Act 1993* works in, on or over a public road can not be undertaken without the consent of the appropriate roads authority. Taylors Road is a local road for which Temora Shire Council (TSC) is the appropriate roads authority.

No works are proposed to the Goldfields Way/Taylors Road intersection given the temporary and modest traffic generated during construction (refer **Section 6.4**). Goldfields Way is a classified road (State Road No: 57) for which the Roads and Maritime Service (RMS) is the appropriate roads authority.

The solar farm does not require any approval/permit/licence/authorisation under the:

- *Fishers Management Act 1994;*
- *Heritage Act 1977;*
- *Mine Subsidence Act Compensation Act 1961;*
- *Mining Act 1992;*
- *National Parks and Wildlife Act 1974*
- *Petroleum (Onshore) Act 1991;*
- *Protection of the Environment Operations Act 1997;*
- *Rural Fires Act 1997; or*
- *Water Management Act 2000.*

2.4 STATE ENVIRONMENTAL PLANNING POLICIES

2.4.1 INFRASTRUCTURE

Grid Connection

Clause 45 of *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) relates to the determination of a DA that has the potential to affect an electricity transmission line. Before determining a DA which meets the relevant criteria provided by cl.45 the consent authority must first notify the relevant electricity supply authority and take into consideration any comments made by the authority within 21 days of the notice.

Given the intention to connect the solar energy system to Essential Energy's existing 66 kV line that traverses the site, Clause 45 is applicable.

Traffic Generating Development

Clause 104 of the ISEPP relates to development that constitutes traffic generating development. Schedule 3 of the ISEPP provides a list of developments that must be referred to the Roads and Maritime Services (RMS). Electricity generating works are not listed as a referrable development in Schedule 3.

Clause 104 also applies where a development has capacity to accommodate 200 or more vehicles. The development does not require the capacity to accommodate 200 or more vehicles either during construction or operation and therefore does not represent traffic generating development.

2.4.2 REMEDIATION OF LAND

Pursuant to *State Environmental Planning Policy No 55—Remediation of Land* a consent authority must not consent to the carrying out of any development on land unless:

i. it has considered whether the land is contaminated, and

ii. if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and

iii. if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.

The NSW EPA Contaminated Land Record and List of NSW Contaminated Sites notified to the EPA does not identify any contaminated sites on or near the development.

2.5 DRAFT PLANNING INSTRUMENTS

No draft environmental planning instruments are known to affect the site.

2.6 STRATEGIC PLANS

No strategic plans are known to affect the site.

2.7 DEVELOPMENT CONTROL PLAN

The *Temora Shire Development Control Plan 2012* (DCP) relates to the proposed solar energy system. **Section 6.16** addresses compliance with the DCP.

Development Site

3.1 REGION

Temora was originally occupied by the Wiradjuri Nation and today is a thriving rural agricultural town, centrally located between Sydney and Melbourne and situated on the South West Slopes/Riverina area. The Temora Local Government Area covers 2,803 square kilometres, located within the sheep/wheat belt and its diverse agriculture is the primary driver of the local economy.

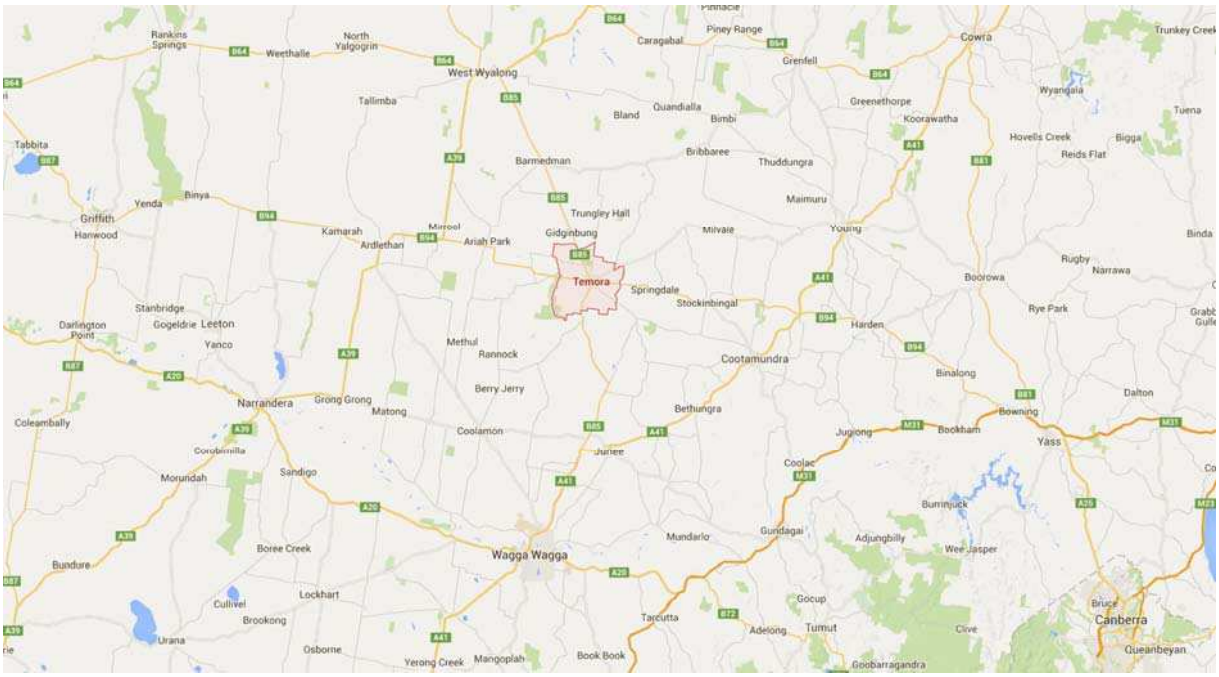


Figure 3 Temora Locality

3.2 CLIMATE

Temora is elevated at 270m above sea level and has a temperate climate, reflected in its average daily values for temperature, humidity, rainfall and wind as recorded by the Australian Bureau of Meteorology (BOM).

Site information

Site name: TEMORA RESEARCH STATION
Site number: 073038
Latitude: 34.41 °S **Longitude:** 147.52 °E
Elevation: 270 m
Commenced: 1934 **Status:** Open
Latest available data: 31 Mar 2011

Additional information

Additional site information

Nearest alternative sites

1. 073151 TEMORA AIRPORT (2.7km)
2. 073058 MORANGARELL (45.0km)
3. 073019 JUNEE TREATMENT WORKS (48.8km)

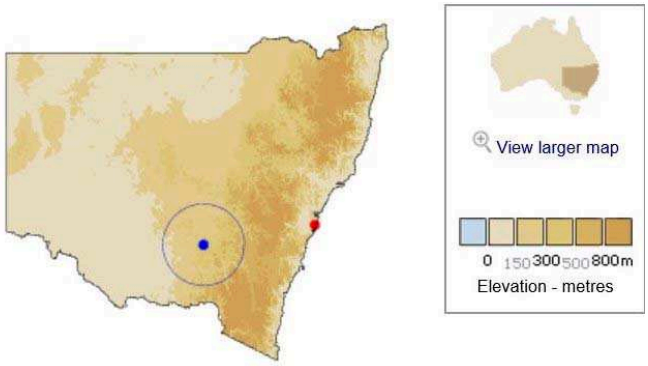


Figure 4 Temora Elevation

The average maximum daily temperature range from 14°C in winter to 34°C in summer. Average minimum temperatures range from between 2°C in winter to between 17°C in summer.

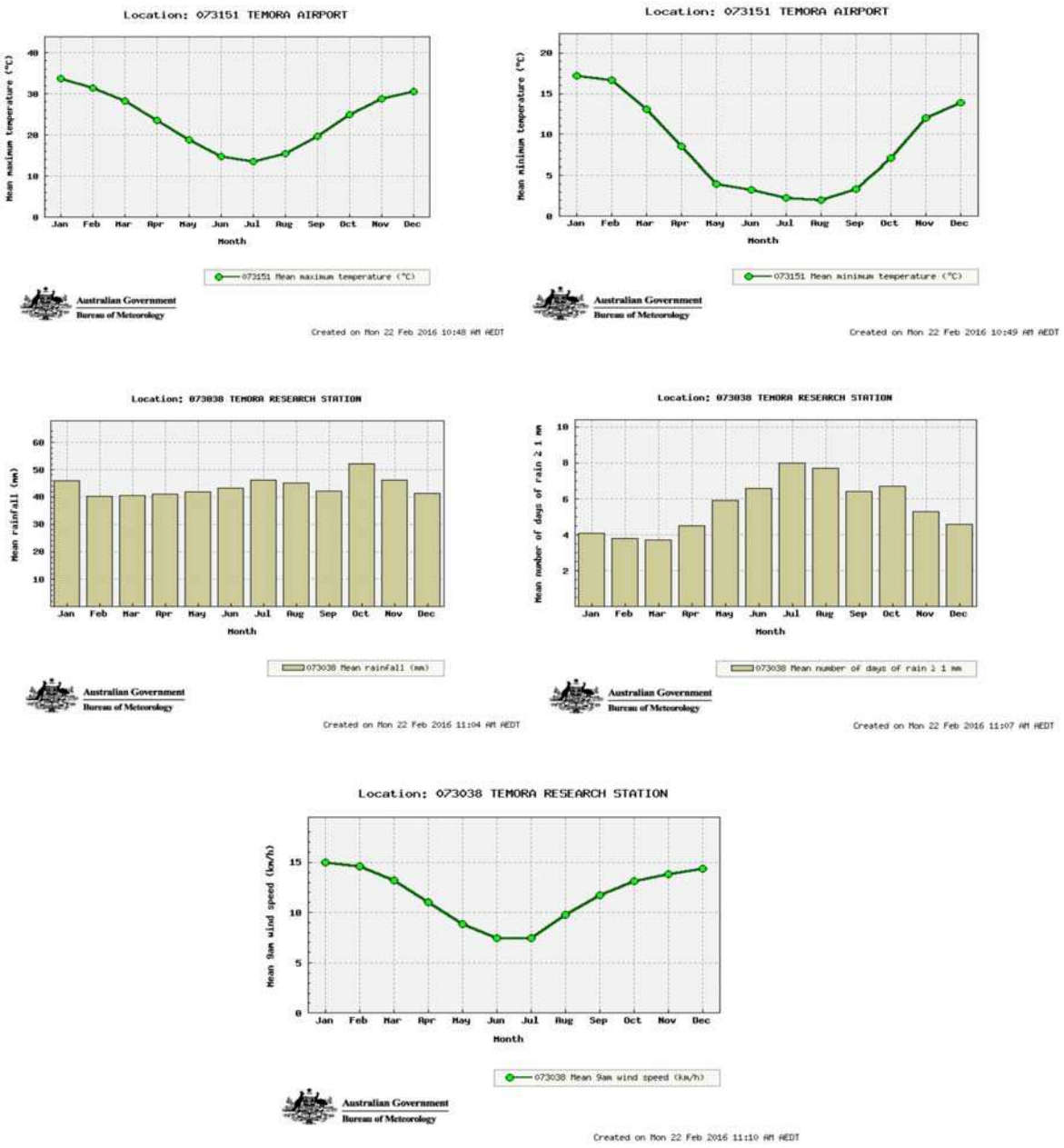


Figure 5 Climate Data

3.3 SITE

The development site is located approximately 13 kilometres north-east of Temora, NSW. The site is on land described as Lot 158 DP 750621, Parish of Thanowring, County of Bland. This lot is 65.16 ha, rectangular in shape, falls very gently to the west, and has frontage to Taylors Road.

Refer to **Drawing EV02** for a detailed site survey.

3.4 LOCALITY

Lands surrounding the development site are primarily used for agriculture, including farming and grazing. There are eight residential dwellings within a 2 km radius of the site.

Access to the site is provided from Taylors Road via Goldfields Way. Goldfields Way (Barmedman Road) is a State Road (No: 57) for which the Roads and Maritime Service (RMS) is the appropriate roads authority. Taylors Road is a local road for which Temora Shire Council (TSC) is the appropriate roads authority.

The site is not affected by any known environmental constraints. Specifically, the site does not contain any constraints mapped in Council's Local Environmental Plan (LEP) as being:

- restricted by heritage considerations;
- subject to flood planning constraints;
- bushfire prone; or
- containing land with natural resources sensitivity (water or biodiversity).

A portion of the north east corner of the lot is mapped as sensitive land in terms of biodiversity. Two things are noted with respect to this. First, the development footprint is located west of the electricity transmission lines (ETL) that traverse the lot and as such is removed from this mapped area. Second, site inspection as part of the ecological assessment undertaken for this Development Application confirm this is a mapping error. The portion of the site so mapped does not contain any native vegetation.

3.5 SUITABILITY

3.5.1 SITE SELECTION CRITERIA

The site at Gidginbung was selected from a number of potential sites over an extended period of research by the GSFC. Gidginbung was chosen for a number of specific reasons:

- The very high solar resource which increases solar PV electricity generation.
- The close proximity to Essential Energy's existing 66kV distribution and 132kV transmission power lines which run across the north east corner of the site.
- The gentle topography of the land and its sparse coverage of vegetation, which negates the need for significant earthworks or disturbance to any areas of biodiversity value.
- The positive and supportive response by Temora Shire Council.

3.5.2 ENERGY OUTPUT MODELLING

As noted above Gidginbung was chosen, among other reasons, for its solar resource; that is the amount of energy from sunlight across a year. This concept is referred to as irradiance and is measured in kWh/m^2.

When assessing different sites the GSFC compared irradiance measurements from different weather databases to understand the likely irradiance at Gidginbung.

Understanding the irradiance in an area is fundamental for modelling the solar farm and forecasting how much energy it will produce each year. This modelling takes into account the farm position, aspect, array orientations and system losses.

The GSFC maintain it is good practice to use multiple sets of data because there is often some variance between the data-sets. This enables data-sets to be cross-checked, analysed and checked for accuracy and consistency.

Local long term weather data is important to generate a reliable energy output forecast. The GSFC compared the weather data of three reliable sources (Meteonorm database, NASA and the online data base of the Australian Bureau of Meteorology) to obtain local long term averages of irradiance and ambient temperature. The results for Temora (the closest measurement point to Gidginbung) were then compared with the surrounding villages of Barmedman and Ariah Park. The long term averages of all three sources for Temora were found to be within 3.29% of each other, giving confidence about the weather related impact on irradiance (refer **Table 3.1**).

Table 3.1 – Comparison of Irradiance Data

Source	Meteonorm		NASA		BoM
Location	Gidginbung, NSW		Gidginbung, NSW		Average of 3 x Weather Stations in Temora, NSW: Temora Research Station (73038) Temora Airport (73151) Temora Ambulance Station (73037)
Height [m]	282		282		279
Longitude [°]	147.49		147.49		~ 147.535
Latitude[°]	-34.33		-34.33		~ -34.4484
Data	**Irradiance/ Month (kWh/m²)**	**Average Temperature (°C)**	**Irradiance / Month (kWh/m²)**	**Average Temperature (°C)**	**Average Irradiance / Month (kWh/m²)**
January	240.3	23.8	228.2	24.2	238.8
February	189.9	22.7	184.0	23.8	185.1
March	179.7	19.7	173.3	20.5	176.2
April	131.8	14.7	123.0	16.3	124.4
May	94.8	10.1	91.5	11.7	92.1
June	67.0	7.8	70.2	8.3	67.5
July	76.7	6.8	78.1	6.8	75.8
August	105.0	8.0	104.2	8.0	103.6
September	139.2	10.9	135.6	11.1	138.9
October	180.0	14.1	182.6	14.9	186.9
November	209.8	18.7	204.0	19.1	207.2
December	247.1	21.2	225.4	22.6	236.5
Year Total:	1,861.3	14.9	1,800.1	15.6	1,833.1

The data provided by the BoM database was ultimately selected for the performance forecast.

The energy output forecast for the GSF is based on the long term average of this data. The energy output of the solar farm will vary from year-to-year with the variation of irradiance and ambient temperature.

Figure 6 outlines the variation of global horizontal irradiance at Temora over the last 25 years.

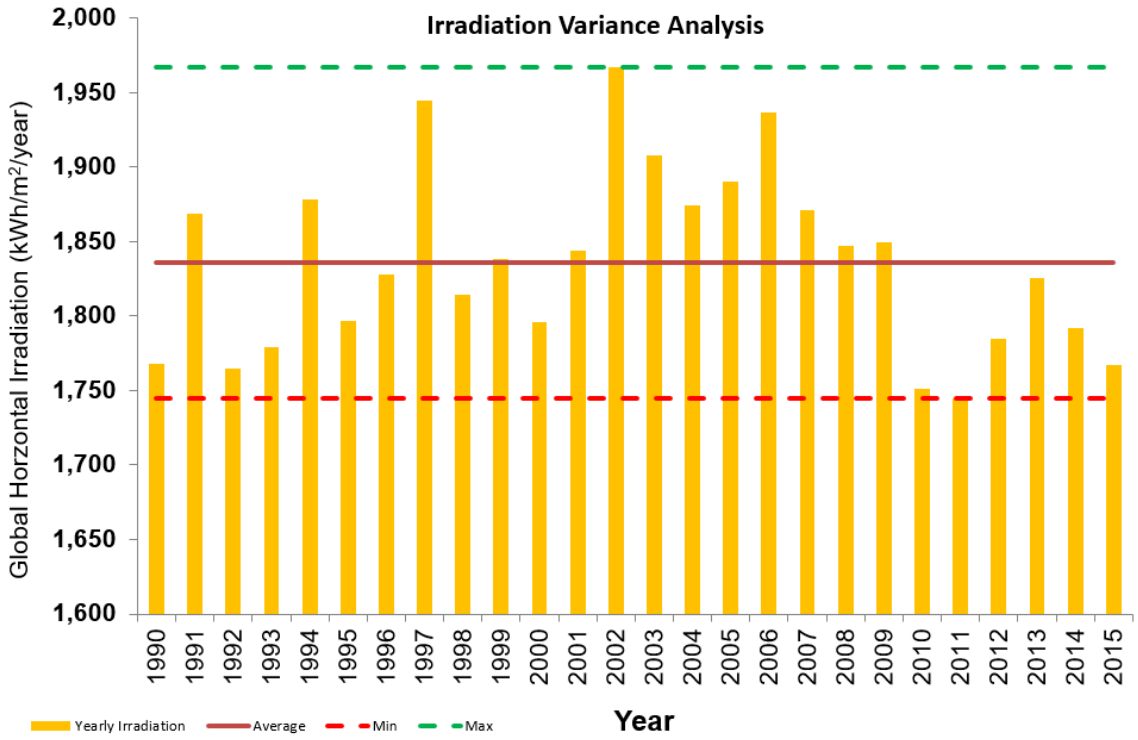


Figure 6 Irradiance Variation at Temora

Temora also is ideally situated geographically for strong solar energy from the sun and receives approximately a monthly average mean daily global exposure of 5 kW/m^2 of irradiance annually (refer **Table 3.2**).

This is further highlighted by the average daily sunshine hours as estimated from satellite data (refer **Figure 7**).

Table 3.2 – Average Monthly Mean Daily Global Exposure

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	7.7	6.6	5.7	4.1	3.0	2.3	2.4	3.3	4.6	6.0	6.9	7.6	5.0
Lowest	6.4	5.8	4.8	3.1	2.3	1.8	2.0	2.8	3.9	5.3	5.6	6.4	4.8
Highest	8.6	7.6	6.4	4.8	3.4	2.6	2.9	4.3	5.3	7.0	7.6	8.6	5.4

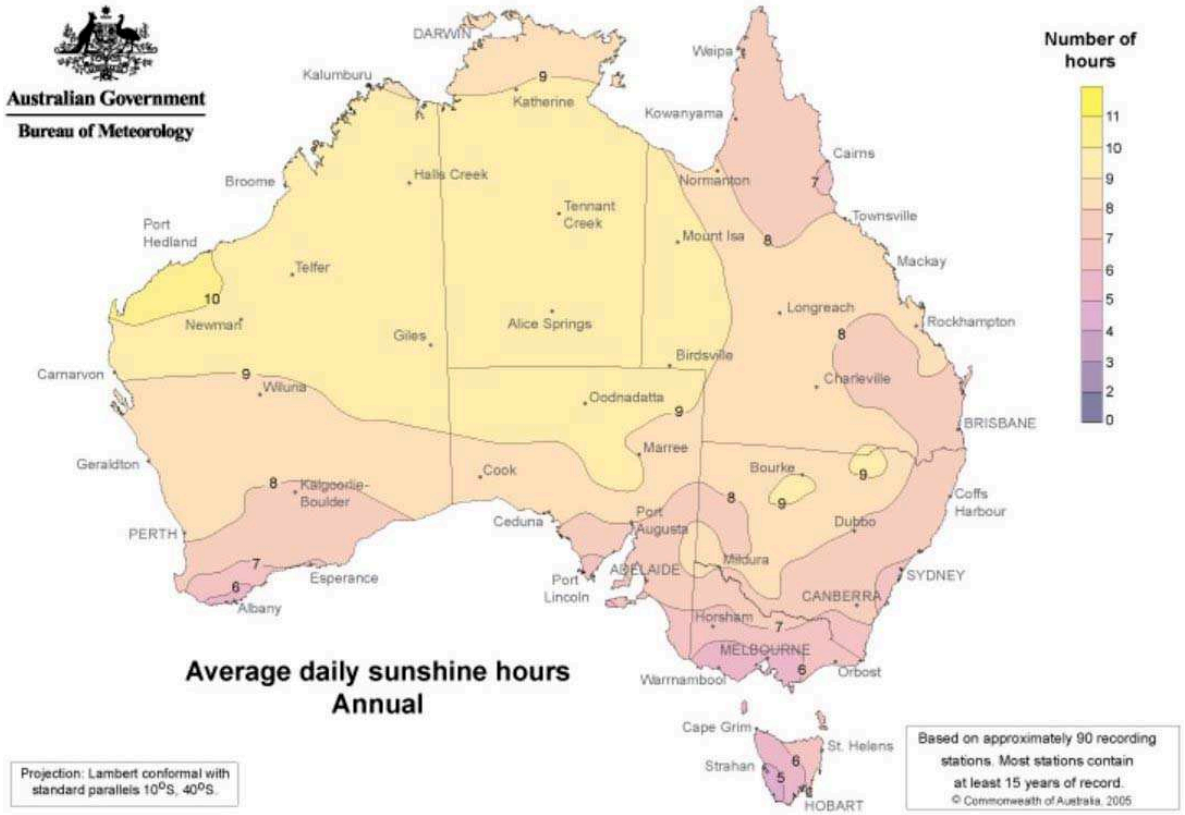


Figure 7 Average Daily Sunshine Hours

3.5.3 FORECAST GENERATION

Based on the analysis undertaken the GSFC estimate that the Gidginbung solar farm will generate 30 GWh of energy annually, which is enough to power 4,165 average Australian homes.

For context, this generation forecast provides significantly more electrical power than that required for all homes in the Temora Local Government Area (LGA).

In fact, even allowing for population growth across Temora LGA over the next 20 years, all of the project 2,859 households in the year 2036 would only consume less than 70% of the Gidginbung solar farm's output.

Table 3.3 – Temora Forecast Households and Dwellings

	2011	2016	2021	2026	2031	2036
Population	5,943	6,087	6,209	6,408	6,574	6,754
Households	2,444	2,526	2,610	2,692	2,776	2,859

Source: http://forecast.id.com.au/riverina-cities/population-households-dwellings?WebID=310

Development

4.1 OVERVIEW

The development encompasses the construction and operation of a solar farm with a generating capacity of approximately 15 MW.

The Gidginbung solar farm will utilise multi-crystalline solar PV panel technology and horizontal single axis trackers. The trackers assist in maximising higher yields in the morning and afternoon. This is in contrast to a fixed-tilt alternative that can only maximise yields in the middle of the day.

The power conversion from direct-current (dc) to alternating-current (ac) will be through central inverters which will immediately step up to 22 kV and connect directly to an on-site substation and then Essential Energy's existing 66 kV distribution network that traverses the site. This approach offers high conversion efficiencies and reduced AC reticulation losses.

The farm will be designed in accordance with all applicable standards as well as the requirements of Essential Energy and the National Electricity Rules (NER).

4.2 INFRASTRUCTURE

Key infrastructure associated with the solar farm includes:

- Solar Photovoltaic (PV) panels on single-axis trackers.
- Inverters and step-up transformers to convert direct current (dc) electricity produced by the solar PV panels into alternating current (ac) capable of being connected to the electrical grid.
- Aboveground and underground electrical conduits and cabling to connect the solar PV panels to the inverters and transformer.
- A single 22/66 kV transformer substation and switchgear to enable on-site connection to the electricity network.
- Access from Taylors Road.
- Internal access tracks to allow for on-going site maintenance.
- Perimeter security fencing and landscaping.

4.3 PHOTOVOLTAIC PANELS

The solar farm will utilise the latest solar panel, tracker and inverter technologies to ensure maximum efficiency and energy generation. An important aspect of the solar farm technology is the use of horizontal single-axis solar trackers. With solar PV panels mounted in a single horizontal plane these trackers track the sun's path in an east west direction increasing energy generation (Refer **Figure 8)**.

Figure 8: Indicative Panels and Tracker Arrangement

The solar farm will utilise ~48,960 photovoltaic panels made of tempered glass with an anti-reflective coating. The panels will be secured onto rows of north-south aligned trackers. There will be 80 panels on each tracker row with a self-contained motor to power each row. The trackers will be galvanized and stainless steel and provide a tracking range up to 120° (± 60°). The height of the panels at full tilt will be ~2.19 m above ground level and an aisle width of 4.5 m will be provided between the tracker rows.

All infrastructure associated with the solar farm will be contained within a 44.8 ha fenced area.

4.4 INVERTER STATIONS

The central inverters convert dc power into ac power. This is achieved by connected multiple strings of PV panels together via dc combiner boxes which are then connected to the inverter at the required dc input voltage.

A total of nine inverter stations will be installed. Each central inverter will attach directly to a step-up transformer which will increase the output voltage to 22 kV. This will reduce losses between the central inverters and the on-site substation.

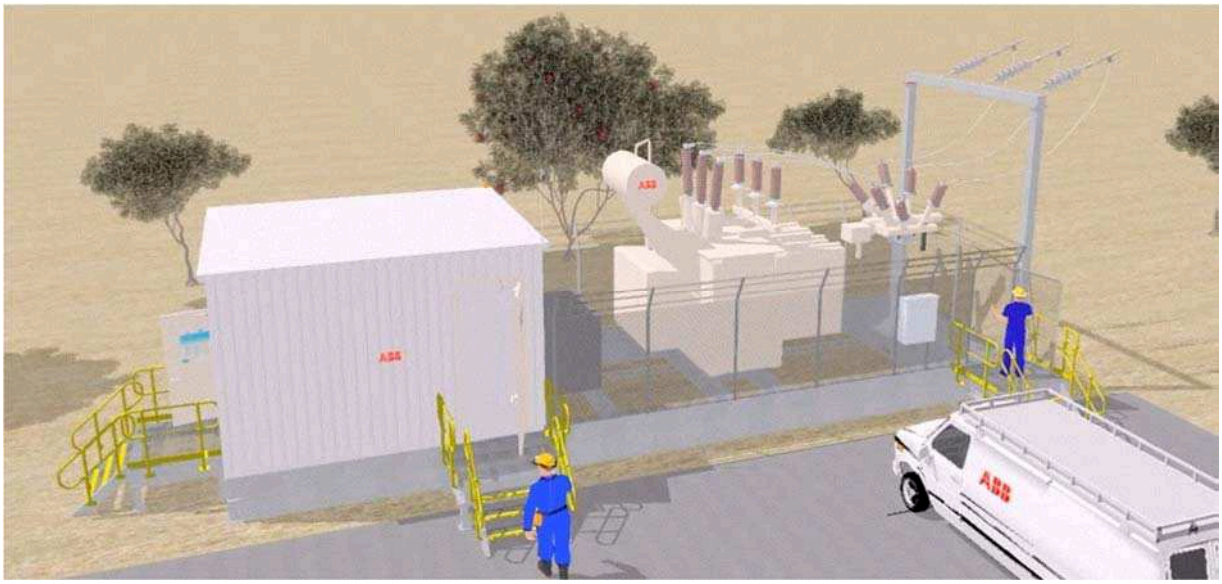
Figure 9: Indicative Inverter Station

4.5 SUBSTATION

The solar farm will be connected to Essential Energy's transmission/distribution network by means of a substation located on-site. The substation will be located on the north eastern side of the site for connection to the 66 kV line that traverses the site.

The substation on-site will interface between the solar farm and Essential Energy's 66 kV distribution network. The substation will include step-up transformers (which will increase the voltage from 22 kV to 66 kV) as well as protection equipment (such as circuit breakers).

The high voltage switch gear will be controlled through a data communications and monitoring network allowing the farm to be managed during periods of peak demand to better suit Essential Energy's network requirements.



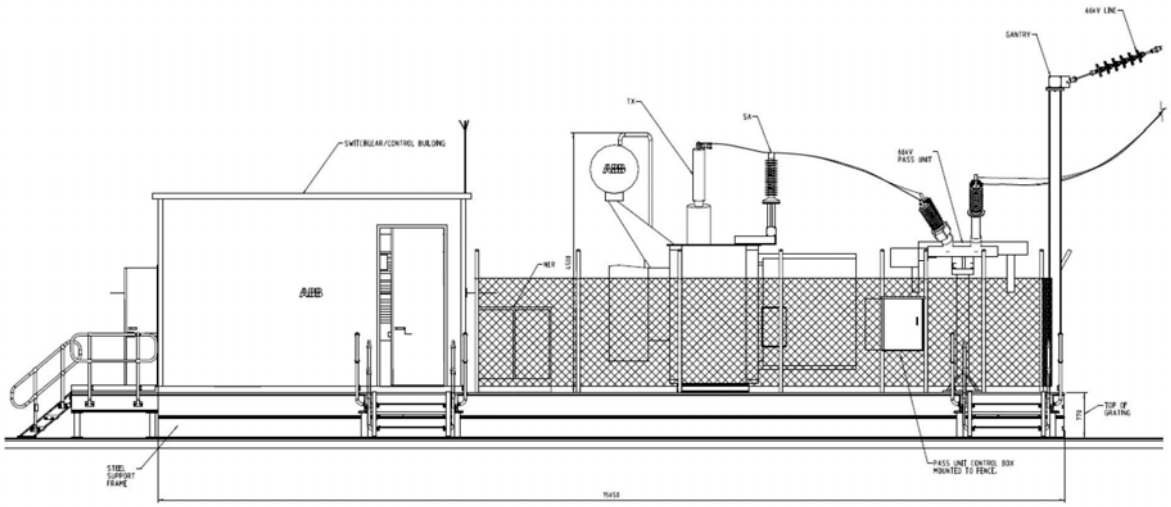


Figure 10: Indicative Sub-Station

4.6 SECURITY FENCE

All infrastructure associated with the solar farm will be enclosed within a security fence. This fence will be an open mesh steel panel fence with barbed top wire. The fence will be galvanised and polyester powder coated green finish.

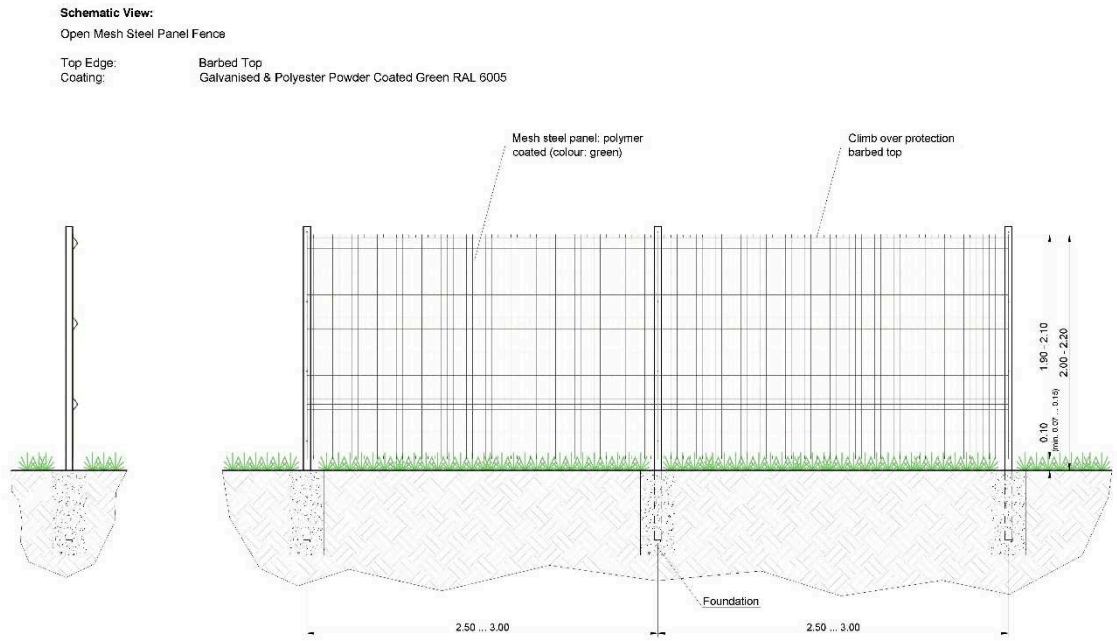


Figure 11: Security Fence

4.7 LANDSCAPING

4.7.1 LOCATION

Part of the solar farm development includes establishment of ~two hectares screen plantings in the south western corner of the development site. These plantings are intended to provide a visual screening for the residence to the south west of the site. The extent and composition of what is proposed is outlined below and shown on **Drawing EV04**.

The proposed tree/shrub plantings would comprise two pockets. Plantings would be moderately spaced with individual trees not spaced closer than 5 metres and no further apart than 10 metres. Locally endemic species would dominate the plantings, providing a layered stratum of varying height and speed of establishment. The tallest trees would have a mature height of approximately 12 to 18 metres. The planting structure would be comparable to the open woodland present along road corridors and timbered islands in the locality.

A lower shrub stratum would be included to provide habitat diversity and also provide additional density to the vegetation. Site preparation involving spraying and deep ripping would be required to promote seedling establishment.

Trees and shrubs would be planted along deep-ripped lines with weed mat, mulch and tree guards. Seedlings would be watered in at planting time and have follow-up watering during the early settling stages (3 to 4 months) if dry conditions required this.

Plantings would be tended to until establishment (at least two seasons). Management would include weed control and supplementary watering to avoid losses during dry periods. Replacement of lost trees would be undertaken after the first and second year.

4.7.2 COMPOSITION

The following trees have been selected due to their hardiness and suitability to the soils, drainage and climatic conditions of the site, and because all species are available as tube stock.

Trees

- Western Grey Box *Eucalyptus macrocarpa.* Height 10 to 20 metres with a spreading crown. Common paddock tree in the locality.
- Blakelys Red Gum *Eucalyptus blakleyi.* Height 10 to 20 metres with a tall crown. Upright tree in good soils. Occasional trees found in locality.
- Mugga Ironbark *Eucalyptus sideroxylon* Height 10 to 20 metres with grey foliage and characteristic dark fissured bark. Occurs on elevated sites in the immediate locality.
- Dwyers Red Gum *Eucalyptus dwyeri.* Height to 15 metres. Partially smooth, creamy barked tree. Open canopy with short crooked trunk.
- Drooping Sheoak *Allocasuarina verticillata.* Height 4 to 10 metres. Small tree with fine foliage and rough grey bark. Extremely tolerant of frost, drought and wind.
- Bulloak *Allocasuarina luehmannii.* Height 5 to 10 metres. Small tree with fine foliage and rough grey bark. Tolerant of frost, drought, windy sites and saline conditions.

Shrubs

- Wedge-leaf Hopbush *Dodonaea viscose subsp. cuneata.* Height 1 to 3 metres Compact, spreading shrub. Tiny sticky wedge shaped leave flowering in winter or spring. Excellent low cover in windbreaks.
- Wyalong Wattle *Acacia cardiophylla.* Height 1 to 4 metres. Erect to spreading shrub or small tree. Very drought hardy. Dense foliage providing good screening properties.
- Deane's Wattle *Acacia deanei.* Height 2 to 7 metres. Can often form small dense thickets.
- Drooping Wattle *Acacia difformis.* Height 1 to 6 metres. Erect or spreading small tree or shrub. Suckers freely providing small thickets. Good for fauna refuge and soil stabilisation.
- Hakea Wattle *Acacia hakeoides.* Height 1 to 6 metres. Wide growing shrub with reddish brown branches. Good low cover and windbreak species. Long lived. May form small dense thickets.
- Streaked Wattle *Acacia lineate.* Height 1 to 3 metres. Dense low shrub, hardy to drought and frost. Good wildlife refuge species.

Mature shrub width varies with the planting density. Close plantings (<5m) promote a more upright growth form, where openly spaced shrubs (>5m) tend to have a lower spreading foliage and promotes self-generation.

4.8 SERVICES

The solar farm does not require connection to reticulated water or sewerage infrastructure. Accommodation for construction workers will be off-site in Temora. Post construction there will not be a permanent on-site presence or office building for amenities.

During the operation of the farm water will be procured as a service to clean the solar PV panel glass surfaces. It is anticipate that would be on an annual basis, however this will be monitored throughout the first year of operation and if necessary increased to a bi-annual basis.

4.9 CONSTRUCTION

4.9.1 INSTALLATION PHILOSOPHY

The solar farm installation philosophy will adopt a cascade approach of phases and utilise a standard block comprising solar PV panels, horizontal single axis trackers and a central inverter. There will be three standard blocks per phase and three phases. The intention of the standard blocks is to roll-out the installation in waves to maximise efficiency of installation activities, starting with the horizontal single axis trackers.

4.9.2 CONSTRUCTION TIMELINE

Construction is estimated to take between three to six months. The intention is to maximise the use of local employment in various aspects of the construction subject to the required work health and safety (WHS) standards and technical requirements of voltage levels and components.

The key stages of the construction of the farm will include:

- Mobilisation/site establishment
- Construction (in phases with pre-commissioning)
- Commissioning (including final grid connection)
- Site restoration/demobilisation

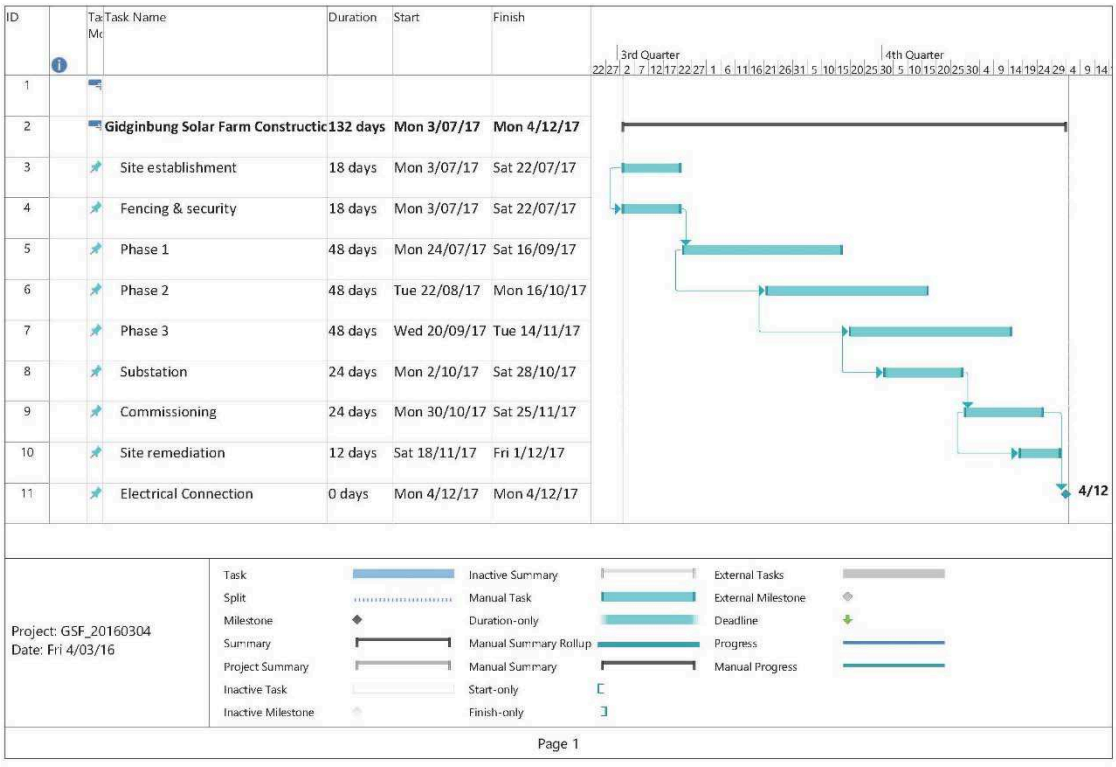


Figure 12: Indicative Construction Schedule

The construction works will be phased utilising a standard block approach which allows for the cascading of these blocks across the phases. A standard block allows for repetitive activities before rollout, such as foundations, mounting systems, dc installation and inverters.

There will be site establishment activities required to prepare the site before phases commence. Site establishment activities include establishment of the construction compound and laydown area, perimeter fencing, formation of internal roads and the installation of erosion and sediment controls.

There will be six steps in a standard block including foundations, trenches and dc cabling, mounting system assembly, string cabling and combiner boxes, module assembly and string connection and testing (pre-commissioning). In addition to these steps a separate step is required for the central inverter on delivery to site, this includes foundations, electrical interconnection and start-up testing prior to commissioning.

4.9.3 CONSTRUCTION WORKFORCE

It is expected that there will be three dedicated teams to support the installation of the standard blocks, a foundation team, an assembly team and an electrical team. The foundation team specialises in the ground screw or pile foundations for the horizontal single access trackers, but does not perform assembly of the horizontal single axis trackers. Plant will be used to assist in the installation of the screw or piles in accordance with standards and the outcomes of geotechnical investigations.

The assembly team specialises in the assembly of the horizontal single axis tracker components that connect to the tracker foundations as well as the mounting and interconnection of the solar PV panels.

The electrical team requires qualified electricians to manage low, medium and high voltage activities as well as unskilled labourers to support with cable layout and logistics aspects.

A separate civil team will be required for the construction of the roads, cable trenches, and foundational requirements for the inverters and substation.

It is expected that the construction workforce at its peak will be between 20 to 30 workers on-site.

4.9.4 CONSTRUCTION HOURS

Construction activity will be restricted to the *Interim Construction Noise Guideline* (DECC, 2009) recommended standard hours. That is, works would be limited to 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday: with no works on Sundays or Public Holidays.

4.9.5 CONSTRUCTION TRAFFIC

The construction traffic will consist of both light vehicles (such as a mini-bus to transport construction workers to and from Temora), to standard heavy articulated vehicles. No over-mass or over-dimensional vehicle delivery will be required.

Further detail on the traffic generated from construction is provided in **Section 6.4**.

Consultation

5.1 COMMUNITY

Consultation with various stakeholders has been undertaken by the Gidginbung Solar Farm Consortium (GSFC) to date and will continue. The GSFC maintain that the consultation process is an important aspect of the development approach in order to facilitate transparency and ensure maximum understanding with all parties involved or affected.

To date the GSFC have had a number of key meetings with Temora Shire Council, adjoining neighbours and the Young Local Aboriginal Land Council.

The dominant issue raised by neighbours has been glare and visual impact.

A number of community engagement meetings are planned by the GSFC, with the assistance of Council, to present the proposed project to the wider community as the project develops. It is anticipated that there will be at least two public sessions to keep the local community updated and provide an avenue for feedback.

To further assist in the consultation process a website will be launched to provide up to date information on the status of the development as it progresses.

The intention of the community consultation process is to increase the level of understanding of the solar farm, including its location, scale and potential benefits and impacts to the community.

5.2 AGENCY STAKEHOLDERS

As part of the preparation of this Statement of Environmental Effects Geolyse has consulted with:

- Temora Shire Council;
- Office of Environment and Heritage;
- Department of Planning and Environment;
- Civil Aviation Safety Authority; and
- Roads and Maritime Service.

Environmental Impacts

6.1 GLARE

6.1.1 INTRODUCTION

The issue of reflectivity from solar panels and associated potential safety and/or nuisance impacts for neighbours, motorists or pilots is consistently identified as an issue warranting consideration.

6.1.2 REFLECTIVITY

The amount of light reflected by a PV panel depends on the amount of light hitting the surface, the time of year, amount of cloud cover, the surface reflectivity, and whether the array is fixed or tracking.

When the sun is directly overhead of a fixed PV array, the angle of incidence (AOI) is the lowest but increases early and late in the day as the angle of rays from the sun increase relative to the fixed panel angle. The proposed PV array at Gidginbung is a single-axis tracking array. In a PV tracking array the light hitting the panel surface is maximised by orienting the surface so that the solar radiation AOI is minimised (Marion & Dobos, 2013).

The percentage of sunlight reflected by PV solar panels is similar to that of water and less than most other materials, as illustrated in **Figure 14** and **Figure 13**. The low reflectivity design of the solar PV panels maximises the absorption of solar energy and therefore minimises the extent of solar energy reflected.

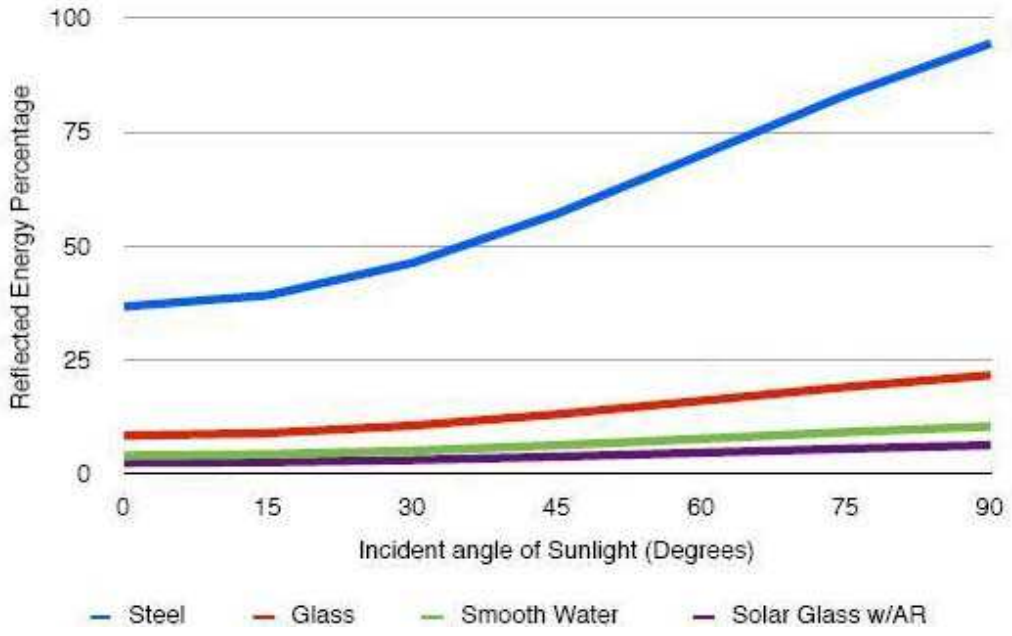


Figure 13: Typical Material Reflectivity with Sunlight Angle (Spaven, 2012)

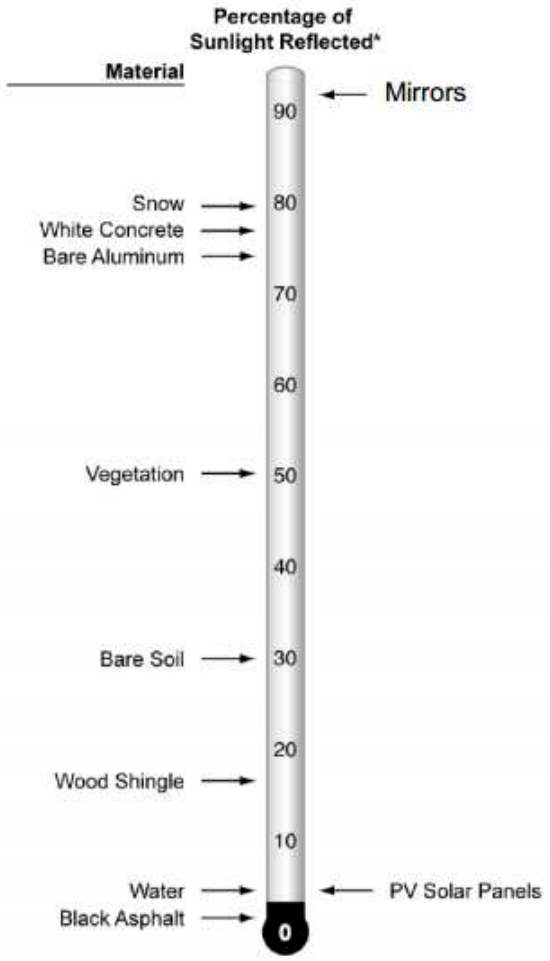


Figure 14: Comparative Reflection of PV Solar Panels (Sandia National Laboratories)

6.1.3 POTENTIAL IMPACTS

Glare and glint are a potential hazard/nuisance generated by solar panels. Ho *et al* (2009) defines glint as a momentary flash of light, and glare as a more continuous source of excessive brightness relative to ambient lighting.

Glint is produced as a direct reflection of the sun in the surface of a PV solar panel. Glare is not a direct reflection of the sun, but rather a reflection of the bright sky around the sun. Glare is significantly less intense than glint (Power Engineers, 2010). The difference between glint and glare is depicted in **Figure 15**.

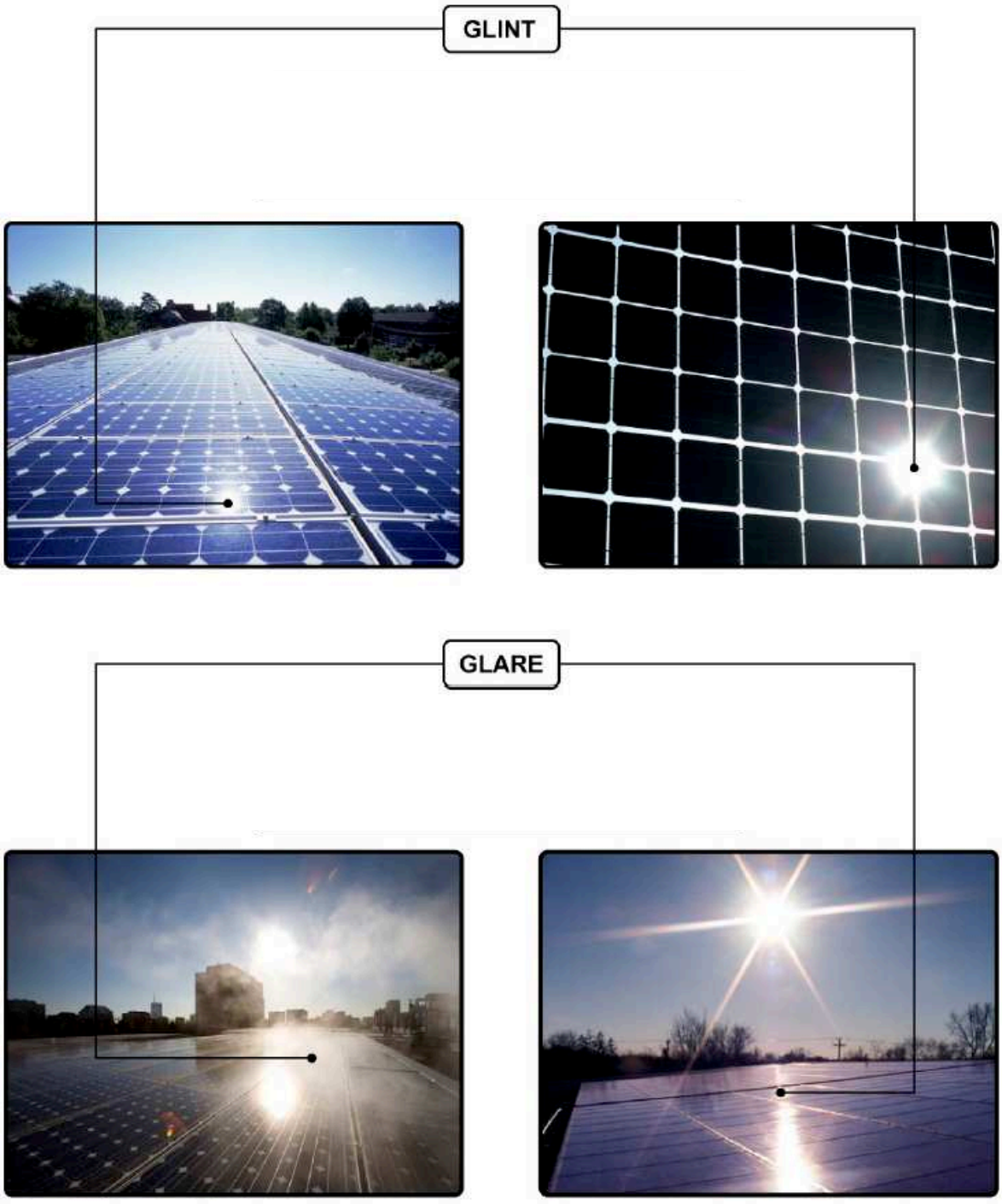


Figure 15: Visual Comparison of Glint and Glare (Power Engineers, 2010)

6.1.4 GLARE HAZARD ANALYSIS

The Solar Glare Hazard Analysis Tool (SGHAT) is a model used to identify the potential occurrence of glare to observation points in the surrounding landscape. It is noted that SGHAT does not consider obstacles (either man-made or natural) between the observation points and the prescribed solar installation that may obstruct observed glare (i.e. buildings and vegetation). It is therefore conservative.

The outputs of the SGHAT report against potential ocular impacts; ranging from temporary distraction and temporary disability (i.e. after image) to, in its most extreme, permanent eye damage (i.e. retinal burn). (refer **Figure 16**).

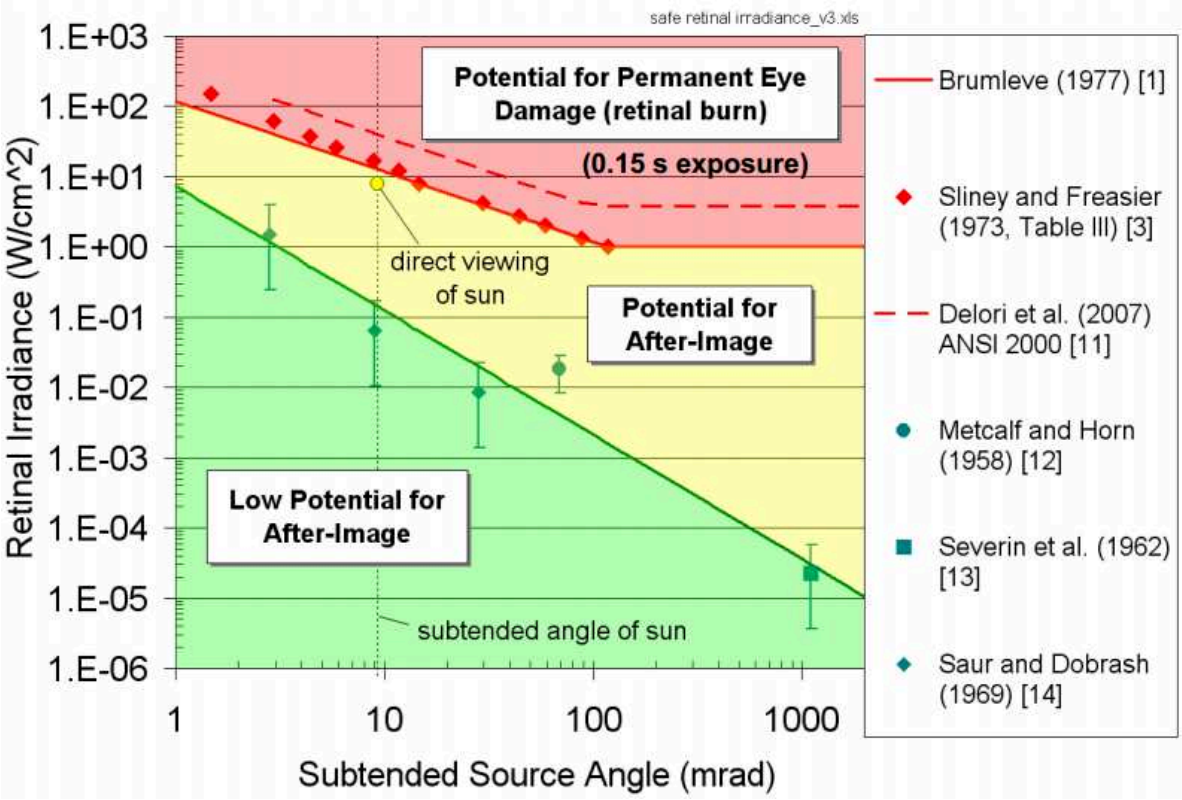


Figure 16: Potential Ocular Impacts and Hazard Ranges (Sandia National Laboratories)

Observation points used in the SGHAT analysis for the Gidginbung solar farm are identified in **Figure 17**. Observation point coordinates are provided in **Table 6.1.** The site-specific parameters used in the SGHAT model are provided in **Table 6.2** and the typical values used by SGHAT analysis are identified in **Table 6.3**.

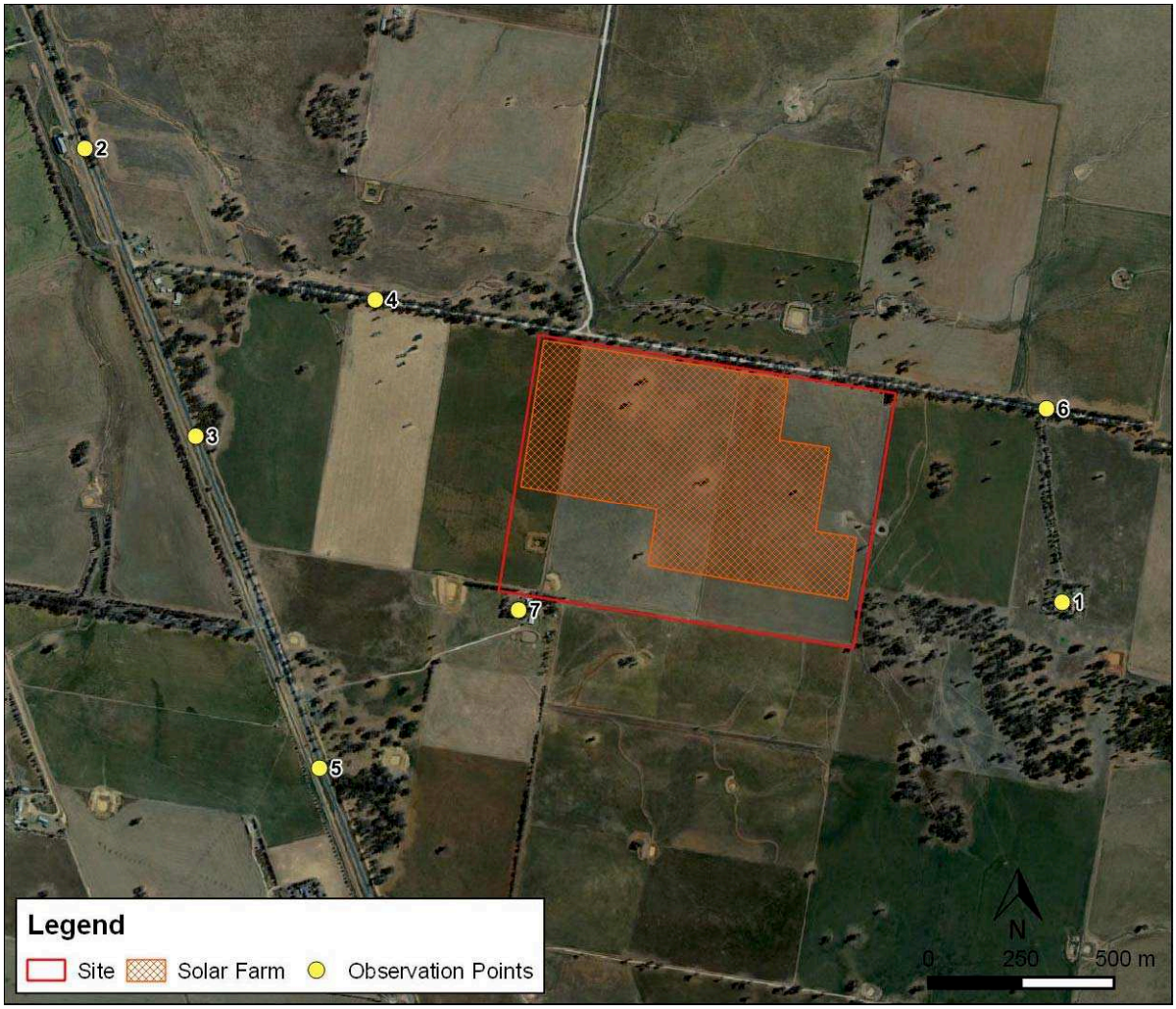


Figure 17: Observation Points

Table 6.1 – SGHAT Observation Point Coordinates and Elevation

ID	Latitude (°)	Longitude (°)	Ground Elevation (ft)	Eye-level above ground (ft)
1	-34.3343511979	147.500964145	986.98	5.9
2	-34.3234489403	147.472196089	882.57	4.3
3	-34.3305725587	147.475365824	905.64	4.3
4	-34.3272057497	147.480856988	900.47	4.3
5	-34.3384397329	147.47926912	917.17	4.3
6	-34.3294739306	147.500510216	944.27	4.3
7	-34.3344353626	147.485404015	906.1	5.9

Table 6.2 – SGHAT Analysis Input Data

SGHAT Model Parameters	Values
Time Zone	UTC+10
Axis Tracking	Single
Tilt of Tracking Axis	0°
Orientation of Tracking Axis	9°
Offset Angle of Module	0°
Maximum Tracking Angle	60°
Module Surface Material	Smooth glass without anti-reflective coating (ARC)
Height of panels above ground	7.2 feet (2.2m)
Rated Power[1]	14,932.8 kW
Observation Point Eye-Level Height Above Ground	5.9 feet (1.8m) 4.3 feet (1.3m) for road users

1. Based on 305 watt peak (Wp) capacity solar PV panels multiplied by the number of panels (48,960).

Table 6.3 – Typical SGHAT Analysis Input Data

SGHAT Model Parameters	Values
Subtended angle of the sun (mrad)	9.3
Ocular transmission coefficient	0.5
Pupil diameter (m)	0.002
Eye focal length (m)	0.017
Time interval (min)	1

6.1.5 ASSESSMENT RESULTS

Modelling of potential glare impacts using the SGHAT indicates that there is no potential for glint or glare nuisance (ie. temporary distraction and temporary disability) or hazard (ie. permanent eye damage) to occur for the observation points assessed (nearby residential dwellings and road users).

Table 6.4 – SGHAT Assessment Results

Observation Point	Sensitive Receptor	Result
1	Residential dwelling 570 east of the solar farm	No glare found
2	Goldfields Way road users – 1.3 km north west of the solar farm.	No glare found
3	Goldfields Way road users – 870 m west of the solar farm.	No glare found
4	Taylors Road users – 450 m west along Taylors Road from the solar farm.	No glare found
5	Goldfields Way road users – 1 km south west of the solar farm.	No glare found
6	Taylors Road users – 700 m east along Taylors Road from the solar farm.	No glare found
7	Residential dwelling outside the south-western corner of the site boundary. At the closest point, the solar farm is ~315 m from the dwelling.	No glare found

6.1.6 TEMORA AERODROME

Consultation with the Civil Aviation Safety Authority (CASA) has also established that there would be no operational or environmental consequences from this development that might affect aviation safety.

The development is located over 5 nautical miles (9.26 km) from the Temora Aerodrome reference location and as such is outside the airport environment and negates the need for CASA to undertake any pilot notification.

A copy of CASA correspondence is provided in **Appendix B**.

6.2 VISUAL AMENITY

6.2.1 INTRODUCTION

6.2.1.1 Objective

This section of the SEE defines the existing landscape and visual baseline environment; discusses their quality and sensitivity to change; describes the key landscape and visual related aspects of the proposed development; describes the nature of the anticipated change upon both the landscape and visual environment; and describes the mitigation measures that have been incorporated within the design process to assist in reducing effects upon sensitive receptor groups.

6.2.1.2 Approach

The process of managing and assessing visual impacts involved the following steps:

- GSFC meeting with neighbours during the design refinement process to help mitigate potential landscape and visual impacts.
- Meeting with neighbours representatives from the NSW Heritage Office to discuss the regional location and Council's draft *Windfarms and Heritage Policy* (NSW Heritage Council, 2003).
- Checking for the existence of any recognised landscape conservation areas, as listed in local, State or Commonwealth heritage registers and listings.
- Discussions with Council about the number and location of representative viewpoints within the study area.
- The production of photomontages from two representative viewpoints showing the anticipated view of the proposed solar farm.
- An assessment of the existing views of the site from these two representative locations, establishing the quality and sensitivity of each view.

6.2.2 LANDSCAPE SETTING

The lands forming and surrounding the solar farm site are working agricultural properties. The land is largely cleared and supports a range of infrastructure associated with a rural landscape. This includes fence lines, existing overhead power lines, residences, yards, sheds and pockets/corridors of vegetation.

6.2.3 LANDSCAPE VALUES

Landscape value is concerned with the relative value that is attached to different landscapes. In a policy context the basis for recognising highly valued landscapes is through either registration or listing in a local, State or Commonwealth heritage register. Neither the Gidginbung site nor any surrounding landscape is recognised through registration or listing as significant landscape value.

Notwithstanding, a landscape may be valued by different communities for many different reasons without any formal listing. There are intangible and emotive values associated with judgements about what makes the landscape important for different people and how sensitive it is to change. Whether the impact is considered acceptable or desirable is ultimately a subjective issue and opinions would differ between individuals. The values people place on the landscape varies, as will their opinions as to the significance of the visual impacts associated with the solar farm.

It is assumed that neighbours and landowners in the immediate locality undoubtedly value the landscape.

6.2.4 VISUAL CATCHMENT

A variety of visual receptors can reasonably be anticipated to see the solar farm. This includes local residents, those working outdoors on adjoining properties and motorists on Goldfields Way and Taylors Road. These three main visual receptor groups are considered in more detail below.

6.2.4.1 Residents

It is generally accepted that local residents have a high level of sensitivity to changes in their landscape and visual environment. The most important views are those available from their own homes. Views from their own homes, whilst private, are judged to be the most sensitive as these are views which are consistently available and they may be views that residents dwell upon for longer periods of time and defines their home in terms of personal appeal.

It is important to note that the aspect of homes for residents in the immediate vicinity are such that nobody east of Goldfields Way looks out or over the proposed solar farm site. Views of the solar farm infrastructure will certainly be visible from parts of their properties, but not from their homes.

6.2.4.2 Travelling Public

This category of visual receptor group includes both local residents and those who pass through the area. These include motorists on Taylors Road and the Goldfields Way; noting that vehicle traffic on Taylors Road would be largely restricted to landowners that utilise this road for property access.

Users of the road routes identified above would vary in their level of sensitivity to the development, depending primarily upon the purpose for which they are travelling. For example, local residents may be more preoccupied with achieving their destination than in enjoying the scenery along their trip. In contrast, day trippers and longer term visitors to the area are likely to be more concerned with the views they enjoy as they travel.

6.2.5 IMPACTS

The solar farm would have a visual impact and add a new feature to the landscape. In depicting the extent, scale and type of impact photomontages have been prepared from two viewing locations. These locations were chosen on the basis of representing the visual impact from the most sensitive (neighbour) and exposed (Goldfields Way) perspectives.

Photomontages of the proposed development have been prepared to give a digital representation of the visual impact of the development from specific vantage points. The photomontages can be seen as a guide to what the real world impact of the development may be.

The process of creating the photomontages is outlined below:

- Topographical survey data has been translated into a 3-dimensional digital terrain model of the site. The survey contained cadastral information such as property boundary data referenced to Australian height datum and Australian Map Grid data.

- AutoCAD 2016 and Trimble SketchUP 2016 were be used to develop the terrain model of the proposed development site and the immediate environs.
- The proposed development was modelled in 3 dimensions using AutoCAD 2016 and Trimble SketchUP 2016. The 3-dimensional model was placed on the terrain model.
- Thea (rendering software) was used to apply textures to the model that replicate the proposed finishes and treatments of the development and to apply light settings to the model that match the date and time at which the photos, to be used as base images in the photomontages, were taken.
- Selected views are taken of the model from the identified significant vantage points. The selected view locations are matched to locations of digital photographs taken on site using the Easting, Northing height and data collected at the time of taking the photograph.
- Photoshop CC was used to combine the base photographs with the rendered views of the 3 dimensional computer model. The rendered view of the model is superimposed on the base photograph with only enough manipulation to stitch the model view into the photograph.

These montages are provided in **Appendix A**.

6.2.6 MITIGATION MEASURES

The design for the Gidginbung solar farm site includes several mitigation measures that have been incorporated into the design layout.

- Part of the solar farm development includes establishment of ~two hectares screen plantings in the south western corner of the development site. These plantings are intended to provide a visual screening for the residence to the south west of the site. The extent and composition of what is proposed is outlined in **Section 4.7**.
- Every effort has been made to maximise the arrays buffer to the southern lot boundary. The initial distance of the arrays to the neighbour's boundary was 250 metres and the plant was oriented towards True North for maximum energy generation. The GSFC revised the farm layout by changing the arrays orientation to be in alignment and parallel to Taylors Road. As well, the electrical interconnection of the plant was reconfigured with a reduction in the cascaded nature of the arrays rows, reducing the overlap of the rows in the east and west direction, making it more compact. The net effect of revising the site layout to maximise the buffer to the neighbour's property has meant a decrease in the estimated energy generation of the farm but an increase of 50 metres from the neighbour's north eastern boundary. The maximum distance of the farm to the neighbour's north eastern boundary was therefore increased to 300 metres.

6.2.7 CONCLUSION

No landscape feature associated with an area of local or regional conservation significance would be impacted. The solar farm would not obscure landscape features for any receptors nor detract from existing views from any residence. The farm would be visible but not intrusive.

While the solar farm would become a visible landscape feature, it would not result in the loss or major change to key elements, features or characteristics of the broader existing landscape such that the post development landscape character would be fundamentally changed.

6.3 WATER RESOURCES

6.3.1 FLOODING

The site drains generally in a westerly direction with a small catchment upstream to the east of the site. An assessment of the expected surface water flows during rainfall events was conducted to inform the design of the facility. The approximate extent of surface water inundation during a 1% Average Exceedance Probability (AEP) event is shown on **Drawing EV06**. Surface water flows were calculated using an XP-RAFTS model and the extent of inundation was mapped using HEC-RAS and 12D software.

The maximum calculated depth was 0.29 m and the maximum velocity was 0.85 m/s. Erosion is therefore unlikely on the site even during the 1% AEP event, especially once the site is revegetated.

6.3.2 DRAINAGE

The site is currently used for broadacre cropping and grazing of livestock. The proposed development will change the hydrologic characteristics of the site. To model the change in hydrologic characteristics an XP-RAFTS model was set up with an existing scenario and a developed scenario. The developed scenario included a lower initial loss for areas with solar panels (20mm reduced to 13.2mm). The XP-RAFTS model showed that the peak flows from the site increased slightly in the post developed scenario over the existing scenario. To ensure post development peak flows leaving the site are no greater than existing peak flows it is proposed to convert the existing farm dam on the western boundary of the site into an on-site detention basin. The existing farm dam will be converted by reshaping the existing dam embankment, adding additional earth embankments either side of the existing embankment, the addition of a low flow pipe outlet and high flow spillway within the proposed earth embankment.

When the detention basin was included in the model the peak flows from the site for a range of AEP events were lower than existing peak flows. A summary of the XP-RAFTS modelled flows for the whole site (including upstream catchments) is provided in **Table 6.5** below.

Table 6.5 – XP-RAFTS Model Results

AEP	Existing Peak Flow (m^3/s)	Post Development Peak Flow (m^3/s)
10	1.898	1.628
2	5.244	5.081
1	6.960	6.840

Flows leaving the site will drain either directly to Taylors Road or to the west of the site following the existing drainage paths in the area. No surface water flows from the proposed development will be directed towards the existing residence adjacent to the southwest corner of the site.

The following should also be noted. The array trackers can accommodate 3.5 degrees of slope. The maximum slopes within the site are restricted to isolated areas where the slope is 2 degrees (ie. comfortably within the tracker tolerance). Construction of the solar farm will therefore not require extensive earthworks and there will be no change to the site landform.

6.3.3 QUALITY

As noted, the existing site is used for broad acre cropping and grazing of livestock. The proposed development will include solar panels, access roads and substation with residual areas allowed to revegetate naturally. No grazing of livestock is proposed within the developed site with grassed areas being slashed as required to reduce fire hazard.

With the removal of livestock, ploughing and herbicide application associated with the current land use and establishment of permanent grassed areas over much of the site it is expected that overall quality of surface water leaving the site will improve.

6.3.4 GROUNDWATER

A review of available groundwater data within a 5 km radius of the site from the NSW Office of Water *All Groundwater Map* indicates that groundwater is not likely to be intercepted by the proposed development. The average depth to the water bearing zone is 70.4 metres.

6.3.5 POTENTIAL IMPACTS

Given the largely passive nature of the solar energy system, impacts to the local surface and groundwater environments in relation to ongoing operations is considered to be limited.

Minor construction impacts to run-off surface water are possible in relation to site clearing and construction works for the solar energy system. During the operational phase, due to the change in land use and conversion of the existing farm dam to an on-site detention basin it is expected that the overall quality of surface water runoff leaving the site will improve.

No water is proposed to be extracted from groundwater sources for construction purposes for any project element. Construction would not impact groundwater.

6.3.6 MITIGATION MEASURES

The existing farm dam will be converted to an on-site detention basin to ensure peak flows leaving the site are no greater than the existing scenario. The on-site detention basin will also provide water quality improvement through capture of suspended solids in surface water runoff.

The proposed works should not result in the pollution of land/waters so long as best management practices for erosion and sediment control are undertaken during construction, and appropriate remediation measures are implemented on a progressive basis. Priority should be given to achieving a high standard of erosion and sediment control and general site housekeeping throughout the construction period.

The way this is achieved is through developing and implementing construction activities in accordance with *Managing Urban Stormwater: Soils and Construction, 4th Edition* (Landcom, 2004).

A Soil and Water Management sub-plan that complies with these guidelines must form part of the CEMP. Four principle measures must be adhered to during construction.

1. At all times, in all locations, the area of ground disturbance should be limited to that which is the smallest possible footprint that is practicably possible.

2. Erosion and sediment controls must be suitably maintained, including regular monitoring to ensure the measures and controls in place are effective.

3. Immediate stabilisation of worked sections complemented by progressive rehabilitation.

4. Erosion and sediment control measures only to be removed once the area is successfully rehabilitated.

6.4 TRAFFIC

6.4.1 EXISTING TRAFFIC VOLUMES

Traffic volumes were requested from RMS for the Goldfields Way in the vicinity of Taylors Road in February 2016. RMS supplied data for Station 95151- 20m N Minter Rd Barmedman and Station 95154- 100m N Kitchener Rd Temora. The RMS data was supplied as raw data and the latest data is summarised in **Table 6.6** below as Average Daily Traffic (ADT).

Table 6.6 – RMS Goldfields Way Traffic Volumes

Location	ADT
Station 95151- Barmedman	1,104
Station 95154- Temora	639

Source: RMS

For the purposes of this assessment a conservative approach has been taken and the traffic volumes for Station 95151- Barmedman adopted.

Traffic volumes were also requested from Council for Taylors Road in February 2016. Whilst Council do not have any count data for Taylors Road the advice given was that vehicle movements would be around 15-20/day.

The school bus to and from Temora along the Goldfields Way runs between 8:15 and 8:20 in the morning and 3:45-3:50 in the afternoon in the vicinity of Taylors Road. Project related traffic movements will be scheduled outside of these times.

6.4.2 DEVELOPMENT RELATED TRAFFIC

All project related traffic will approach the site from the south including workers who will be accommodated within Temora, components which will be trucked from either Sydney, Melbourne or Brisbane, and locally sourced construction equipment and materials will come generally from Temora.

A summary of the vehicle movement data is provided in **Table 6.7** below.

Table 6.7 – Expected Traffic Volumes

Type	Origin	Size/Type of Vehicle	Frequency (per day)	Total Number of Trucks
Materials	Sydney/Temora	42.5t max <19m	1.79vpd/3.59vmpd	167
Workers	Temora	Light vehicle with GCM<4.5t	5.83vpd/11.67vmpd	NA
Peak Daily Movements	29			
Peak Hourly Movements	18 (6-7am and 5-6pm Monday to Friday and 7-8am and 1-2pm Saturday)			

Source: Epho

The intended site construction hours are between 0700 and 1700 Monday to Friday and 0800 and 1300 Saturday. The peak hourly traffic volumes are expected in the hour before and after the intended construction hours.

The construction timing is expected to be the second or third quarter but yet to be confirmed, however indicative vehicle movements are as follows.

Heavy vehicle deliveries will occur over the period July 2017 to October 2017 (93 days). Light vehicle movements are expected over the whole construction period being July 2017 to December 2017 (144 days).

The total vehicle movements are expected to be 334 for heavy vehicles and 1,680 for light vehicles giving a project total of 2,014.

A monthly breakdown of expected vehicle movements is provided below in **Table 6.8**.

Table 6.8 – Indicative Project Related Monthly Vehicle Movements

Month	Heavy Vehicle Movements	Light Vehicle Movements	Total Vehicle Movements
Jul-17	62	207	269
Aug-17	94	399	493
Sep-17*	114	431	545
Oct-17	64	468	532
Nov-17	0	170	170
Dec-17	0	5	5

Source: Epho

The data in **Table 6.8** shows that the indicative expected peak in monthly vehicle movements is to occur in September 2017 with a total of 545 movements. Post construction the project related traffic is expected to be negligible.

No over-mass or over-dimensional vehicle delivery will be required.

6.4.3 REQUIRED UPGRADES

6.4.3.1 Taylors Road

Taylors Road is currently a two-lane two-way unsealed road (see **Figure 18**) and is maintained by Temora Council in generally good condition. Given the low expected project related traffic movements and short construction phase no upgrade of Taylors Road is proposed.

A dilapidation report should be prepared prior to construction and the state of Taylors Road post construction should be compared to confirm whether any works are required to reinstate the road to its previous condition.

Figure 18: Taylors Road looking east near proposed site entrance

6.4.3.2 Goldfields Way

The existing hourly southbound traffic movements on Goldfields Way for 6-7am and 5-6pm (the proposed peak hourly construction phase periods) are provided in **Table 6.9** below.

Table 6.9 – Peak Hourly Traffic Volumes on the Goldfields Way

6-7am Hourly Southbound Traffic on Goldfields Way(veh/hr)	5-6pm Southbound Traffic on Goldfields Way (veh/hr)
12	34

The figures in **Table 6.9** show that even during the peak construction period (18 peak hourly construction related movements) the potential for conflict between Goldfields Way motorists and project related traffic is minimal. The hourly northbound traffic movements on Goldfields Way are 12 and 41 for the same time periods.

No formal turning treatments are provided at the Taylors Road intersection; however unsealed shoulders are available on both sides of the road. Given the low existing traffic volumes on Goldfields Way and the low expected project related traffic movements and short construction phase no upgrade of the Goldfields Way is proposed. The existing intersection is shown in **Figures 19** and **20** below.

The section of Goldfields Way at the Taylors Road intersection is located on a straight and relatively flat section with adequate sight distances in both directions. Taylors Road is sealed for approximately 250 m from the intersection reducing the dust nuisance to the adjacent residences.

A dilapidation report should be prepared prior to construction and the state of Goldfields Way at the Taylors Road intersection post construction should be compared to confirm whether any works are required to reinstate the road to its previous condition.

Figure 19: Goldfields Way looking south from Taylors Road

Figure 20: Goldfields Way looking north from Taylors Road

6.5 HERITAGE

6.5.1 ABORIGINAL HERITAGE

6.5.1.1 Sites and Constraints

An extensive search using the Aboriginal Heritage Information Management System (AHIMS) on 4 February 2016 identified one Aboriginal heritage site within a 500 m radius of the site. The site is a scarred tree (Site ID 50-1-0006) located immediately north of the site on the southern side of Taylor's Road. This site is outside the zone of disturbance and would not be impacted in any way as a result of the development.

On 29 February 2016 a survey was conducted over the development site by a representative of the Young Local Aboriginal Land Council (YLALC). No Aboriginal heritage sites were found.

6.5.1.2 Mitigation Measures

The following measures are proposed to ensure no impact to the known site of Aboriginal heritage significance and unknown sites:

- Site 50-1-0006 (scarred tree) is to be identified in advance of construction commencing and must not be harmed.
- If something is discovered that could be an Aboriginal object during the course of construction, all work in the vicinity of that area will immediately cease and both the Young Local Aboriginal Land Council and the Office of Environment and Heritage would be contacted.

6.5.2 HISTORICAL HERITAGE

A review of the Temora Local Environmental Plan (Schedule 5- Environmental Heritage) and the State Heritage Register reveals no sites of non-Aboriginal heritage within or near the development site.

6.6 NOISE

6.6.1 EXISTING ENVIRONMENT

The development site and surrounding land is dominated by agricultural land use and represent a rural environment. Background noise monitoring has not been undertaken and instead, consistent with the EPA's Industrial Noise Policy, a background level of 30 dB(A) has been assumed. This represents the most conservative basis for assessment.

Project specific noise levels for the Gidginbung solar farm are therefore 35 dBA L_{Aeq} for day, evening and night time periods.

6.6.2 RECEPTORS

The closest potentially sensitive receptors to the farm are located to the east and south west (refer **Drawing EV03**).

For the eastern property a gentle ridge runs between the farm and this residence, providing topographic shielding. The buffer to the farm is approximately 500 m.

The resident to the south west has a buffer of approximately 300 m from the closest array.

6.6.3 OPERATIONAL NOISE

6.6.3.1 Noise Sources

Sources of plant noise associated with the operation of the solar farm would be restricted to the:

- 1 x 22/66 kV substation;
- 9 x air conditioned Inverter Stations (each housing two inverters and a transformer) /transformer; and
- 612 x 24 volt direct current tracker motors.

It is also relevant to note that plant noise is restricted to sunlight hours only. At night time the solar farm will be silent.

Ongoing maintenance requirements would be negligible and is likely to require no more than one or two technicians in a light utility occasionally using hand tools.

6.6.3.2 Sound Power Levels

Whilst plant and equipment selection with preferred suppliers has yet to be finalised, typical manufacturer noise specifications for the plant to be used is available. The L_{Aeq} Sound Power Level (SWL) of all the plant to be used is identified in **Table 6.10**.

Table 6.10 – Sound Power Levels

Equipment	L_{Aeq}SWL	Source
Tracker Motor	70	NextTracker® (NX Horizon)
Air Conditioning units for Inverter Stations	76	Ingecon M400 Inverter
Inverters house inside Inverter Station	70	
MV transformer housed inside Inverter Station	75	
High voltage transformer in 22/66kV substation	75	Industry standard

The solar farm will comprise a number of these items of plant. A summary is provided below along with the combined SWL.

Table 6.11 – Full Farm Plant Noise

Equipment	Number	Equivalent SWL
Tracker motors	612	103
Inverter Stations Each Inverter Station will house 2 inverters and one MV transformer housed inside an enclosure constructed of galvanised steel and an air conditioning unit	9	85
High voltage transformer in 22/66 kV substation. Note: Noise emanating from the high voltage transformer has the potential to contain tonality characteristics and has dominant low-frequency content. In accordance with the INP, a maximum correction of 10dBA penalty has been applied.	1	85

6.6.3.3 Methodology

Operational noise predictions have been modelled using the CONCAWE algorithms implemented in the "CadnaA" acoustic noise prediction software.

Topographic data for the site and immediate surrounds is gently undulating. A gentle ridge runs between the farm and the residence to the east, providing topographic shielding. The residence to the south west is located below the solar farm.

The noise model assumed 20 degrees air temperature and 50 per cent relative humidity.

6.6.3.4 Meteorology

Notwithstanding that plant at the solar farm will only operate once the sun is up, at which times temperature inversions have largely dissipated, modelling of off-site noise impacts due adverse meteorological conditions has been undertaken. Specifically, consistent with the *Industrial Noise Policy's* inversion table, the worst case for a 3 degree Celsius per 100 m and 2 m/s wind enhancement is 5 dBA.

6.6.3.5 Predicted Levels

Noise levels were predicted at each of the both residential receptors assuming receiver heights of 1.5 m above local ground level (refer **Table 6.12**).

Table 6.12 – Predicted Noise Levels at Receptors

Receptor	Noise Goal L_{Aeq}	Predicted Noise L_{Aeq} Level	
		Neutral Meteorological Conditions	Adverse Meteorological Conditions
East ("Dunboy")	35	24	29
South West ("Lyndhurst")	35	29	34

6.6.4 CONSTRUCTION NOISE

Construction of the solar farm would be completed over a six month period. Typical plant and equipment to be used is outlined in **Table 6.13**.

Table 6.13 – Construction Plant

Construction Stage	Plant/Equipment
Stage 1 – Civil Works	Grader
	Dump truck
Stage 2 – Deliveries and Assembly	Tracked excavator (screw auger/post driver)
	Trucks
	Front end loader
	Pneumatic hand tools (e.g. ratchet air gun)
	Air Compressor
	Water Cart
Stage 3 – Grid Connection	Telescopic Loader
	Hand tools

6.6.5 MITIGATION MEASURES

6.6.5.1 Community Consultation

GSFC will make available detailed and constantly updated information about the progress and scheduling of works to neighbours.

Potentially impacted receptors would be notified in advance of construction commencing and be provided with contact details for reporting any noise related issue.

6.6.5.2 Standard Construction Hours

Works will be restricted to approved construction hours. That is, construction activities associated with the project that would generate an audible noise at any sensitive receptor will be restricted to the following hours:

- 7:00 am to 6:00 pm, Mondays to Fridays, inclusive;
- 8:00 am to 1:00 pm on Saturdays; and
- at no time on Sundays or public holidays.

6.6.5.3 High Noise Impact Activities

If the outcomes of the geotechnical investigation indicate that the array posts need to be pile driven rather than auger screwed, these works would be undertaken with the following constraints as they are impulsive in nature.

- Between the hours of 8:00am and 6:00pm Monday to Friday;
- Between the hours of 8:00am and 1:00pm Saturday; and
- In continuous blocks of no more than three hours, with at least a one hour respite between each block of work generating high noise impact, where the location of the work is likely to impact the same receivers.

Pile driving of the steel supports for the arrays is an activity with the potential to generate impulsive noise.

6.6.5.4 Complaints Handling

In the event that a complaint is made, a GSFC representative will immediately investigate the source of the noise and investigate measures to avoid recurrence.

Any complaint received will be documented.

6.6.5.5 Best Practice

- As part of a general induction all employees and contractors would be informed of noise management measures, construction hours, the location of sensitive receptors, and the protocol for handling any complaint.
- Equipment and plant would be operated and maintained in accordance with the manufacturer's instructions including replacement of engine covers, repair of defective silencing equipment, tightening rattling components, repair of leakages in compressed air lines and shutting down equipment when not in use.

6.7 BIODIVERSITY

6.7.1 VEGETATION COMMUNITIES

6.7.1.1 Disturbed Grassland-Pastureland

Disturbed grassland dominates the development site. The site has a long history of grazing and farming practices with extended rotational management between cropping and grazing. The site currently consists of cereal grain stubble being grazed by sheep. It contains seven mature isolated paddock trees, including four Grey Box (*Eucalyptus microcarpa*), a Mugga Ironbark (*E. sideroxylon*), a White Cypress Pine (*Callitris glaucophylla*) and a planted Salmon Gum (*E. salmonopholia*). These trees (with the exception of the Salmon Gum) are remnant from the original parent Box-Ironbark woodland community.

The trees are mature, isolated individuals and contain hollows. Tree health is average to poor with all showing signs of upper canopy storm damage, insect attack or copic growth as a result of nutrification by stock camps and modified soil biota. These trees are not connective to other woodland communities. Natural regeneration is not occurring and the understorey is dominated by exotic groundcover species.

6.7.1.2 Open Woodland

Open woodland occurs as a remnant corridor along Taylors Road located along the northern boundary of the site. This woodland contains components reminiscent of the original parent community. The woodland is dominated by mature Grey Box, White Cypress pine and contains scattered Blakey's Red Gum (*E. blakelyi*). A scattered and clumped shrubby mid-storey is present.

Shrub species includes Wedge-leaf Hop-bush (*Dodonaea viscose*), Sticky Cassinia (*Cassinia uncata*), Eastern Cottonbush (*Maireana microphylla*) and Drooping Wattle (*Acacia difformis*). The understorey contains Purple Burr Daisy (*Calotis cuneifolia*), Climbing Saltbush (Einadia nutans), Rough Speargrass (*Austrostipa scabra*), Corkscrew Grass (*A. setacea*), Common Wheatgrass (*Enteropogon acicularis*) and Curly Windmill Grass (*Chloris truncata*).

The proposed access to the solar farm from Taylors Road has been located where there is an existing opening in the corridor. Establishing this access would not involve the clearing of any trees or removal of significant ground vegetation. Ground vegetation at this location is comprised predominantly of exotic and native grasses and scattered low shrubs comprising of acacia, cassinia, cottonbush and hop-bush. The works would not break or widen existing gaps in the canopy of this corridor.

A total of 61 flora species was recorded, of which 40 (66.6%) are native and 21 (34.4%) are introduced. A list of observed flora species is provided in **Table 6.14** below.

Table 6.14 - Observed Flora List

Family Name	Botanical Name	Common Name
SINOPTERIDACEAE	*Cheilanthes sieberi*	Rock Fern
PORTULACACEAE	*Portulaca oleracea*	Common Pigweed
CHENOPODIACEAE	*Chenopodium pumilio*	Small Crumbweed
	Einadia nutans	Climbing Saltbush
	Maireana microphylla	Eastern Cottonbush
CUPRESSACEAE	*Callitris glaucophylla*	White Cypress Pine
	Callitris endlicheri	Black Cypress Pine
AMARANTHACEAE	*Alternanthera denticulata*	Lesser Joyweed
POLYGONACEAE	*Polygonum aviculare* *	Wireweed
CUCURBITACEAE	*Citrullus lanatus* *	Camel Melon
BRASSICACEAE	*Brassica rapa* *	Bird Rape
	Lepidium africanum *	Peppercress
	Capsella bursa-pastoris *	Shepherd's Purse
MYRTACEAE	*Eucalyptus blakelyi*	Blakely's Red Gum
	Eucalyptus sideroxylon	Mugga Ironbark
	Eucalyptus microcarpa	Grey Box
MIMOSOIDEAE	*Acacia melanoxylon*	Blackwood
	Acacia decora	Western Golden Wattle
	Acacia difformis	Drooping Wattle
FABOIDEAE	*Glycine clandestina*	Twining Glycine
	Trifolium arvense *	Haresfoot Clover
	Trifolium angustifolium *	Narrow-leaf Clover
	Trifolium subterraneum *	Subterranean Clover
OXALIDACEAE	*Oxalis corniculata* *	Yellow Wood Sorrel
MYOPORACEAE	*Eremophila debilis*	Amulla
LAMIACEAE	*Prostanthera denticulata*	Rough Mint Bush
LOMANDRACEAE	*Lomandra multiflora*	Many-flowered Mat-rush
MALVACEAE	*Marsilea drummondii*	Corrugated Sida
APIACEAE	*Daucus glochidiatus*	Australian Carrot
CAMPANULACEAE	*Wahlenbergia graciis*	Sprawling Bluebell
	Wahlenbergia sp.	Bluebell
ASTERACEAE	*Xanthium spinosum* *	Bathurst Burr
	Arctotheca calendula *	Capeweed
	Onopordum acanthium *	Scotch Thistle
	*Carthamus lanatus**	Saffron Thistle
	Chondrilla juncea *	Skeleton Weed
	Cassinia uncata	Sticky Cassinia
	Lactuca serriola *	Prickly Lettuce
BORAGINACEAE	*Echium plantagineum* *	Patterson's Curse
OLEACEAE	*Olea sp*	Olive Tree
ANTHERICACEAE	*Dichopogon strictus*	Chocolate Lily
JUNCACEAE	*Juncus usitatus*	Common Rush

Table 6.14 - Observed Flora List

Family Name	Botanical Name	Common Name
CYPERACEAE	*Cyperus sp.*	Nutgrass
POACEAE	*Paspalum dilatatum* *	Paspalum
	Panicum effusum	Hairy Panic
	Pennisetum cladestinum *	Kikuyu
	Chloris truncata	Windmill Grass
	Cynodon dactylon	Couch Grass
	Austrodanthonia sp.	Wallaby Grass
	Avena fatua *	Wild Oats
	Hordeum leporinum *	Barley Grass
	Elymus scaber	Common Wheatgrass
	Vulpia sp.	Vulpia
	Lolium perenne *	Perenial Ryegrass
	Poa sieberiana	Tussock Grass
	Rytidosperma spp.	Wallaby Grass sp.
	Austrostipa sp.	Speargrass
	Austrostipa scabra	Rough Speargrass
	Austrostipa setacea	Corkscrew Grass
	Austrostipa densiflora	Foxtail Speargrass
SAPINDACEAE	*Dodonaea viscosa*	Wedge-leaf Hopbush

* denotes Introduced Species

6.7.1.3 Threatened Flora Species

Two threatened flora species listed under the *Threatened Species Conservation Act 1995* (TSC Act) have been recorded within 15 kilometres of the development site. These species include Wooly Ragwort (*Senecio garlandii*) and Spiny Peppercress (*Lepidium aschersonii*). Despite targeted searches neither of these, nor any other threatened flora species were identified on the site.

6.7.1.4 Endangered Ecological Communities

The extensive history of agricultural land use has resulted in loss of native groundcover and mid-storey. Land use limits the potential for the rehabilitation of a native assemblage reminiscent of the original community.

The site assessment identified the presence of one Endangered Ecological Community (EEC) listed under the TSC Act. This community exists in the Taylors Road corridor; not on the development site. The determination of this EEC follows the 2007 NSW Scientific Committee determination for '*Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions'.* Based on the SEWPac (2012) guide, the woodland community also meets Commonwealth Threatened Ecological Community (TEC) status. This TEC is the *Grey Box (Eucalyptus macrocarpa) Grassy Woodlands and Derived Native Grasslands of South Eastern Australia.*

The open woodland community present within the Taylors Road corridors satisfies the condition thresholds for these TSC Act and *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) community listings. The development site, being an extensively modified grassland community with isolated paddock trees does not meet the criteria for TSC or EPBC community listings.

6.7.2 FAUNA HABITAT

There is no refuge or foraging habitat of significance for terrestrial native fauna on the site. The development would result in the loss of approximately 45 hectares of open farmland currently consisting of cropping and pastureland. Within this area three isolated Grey Box and a single White Cypress Pine paddock tree would be removed. Given the highly disturbed nature of this habitat, the absence fallen logs, large rocks, aquatic or riparian habitat, the removal of these trees would not represent a significant loss of habitat for native fauna.

A total of 21 fauna species were recorded in the locality at the time of the survey. All species identified are common to the area and landscape type. A complete list of observed fauna is provided in **Table 6.15** below.

Table 6.15 - Observed Fauna List

Scientific Name	Common Name
MAMMALS	
Mus musculus *	House Mouse
Vulpes *	Fox
Oryctolagus cuniculus *	Rabbit
Lepus capensis	Brown Hare
BIRDS	
Ocyphaps lophotes	Crested Pigeon
Cacatua pastinator	Little Corella
Eolophus roseicapilla	Galah
Platycercus eximius	Eastern Rosella
Psephotus haematonotus	Red-rumped Parrot
Colluricincla harmonica	Grey Shrike-thrush
Rhipidura albiscapa	Grey Fantail
Rhipidura leucophrys	Willy Wagtail
Cinclorhamphus cruralis	Brown Songlark
Smicrornis brevirostris	Weebill
Manorina melanocephala	Noisy Miner
Lichenostomus leucotis	White-eared Honeyeater
Sturnus vulgaris *	Common Starling
Grallina cyanoleuca	Peewee/Magpie-lark
Gymnorhina tibicen	Australian Magpie
Corvus coronoides	Australian Raven
Falco longipennis	Australian Hobby
* Denotes Introduced Species	

6.7.2.1 Avifauna

A total of 17 bird species were identified during the survey. Ten of these species were identified from the Taylors Road corridor and would rarely move onto the broader open paddocks for foraging or breeding resources. The farm dams located on the site (which are to be retained) may provide watering opportunities to highly mobile bird species, however the potential of these waterbodies for long term refuge and habitat for waterbirds is low due to the lack of waters-edge vegetation and connective timbered corridors.

Stick nests were observed in the isolated paddock trees. These nests were consistent with Australian Raven nests and large groups of Ravens were observed across the site and on surrounding farmland.

No threatened species were recorded during the field survey.

The isolated paddock trees may provide some threatened bird species with opportunistic foraging, but nesting habitat is not favourable. Further, the habitat quality of these trees is low due to high exposure and agricultural disturbance. The site does not present any unique or optimal habitat for any threatened species or populations. All species recorded were common to the surrounding rural dominated landscape.

6.7.2.2 Amphibian and Reptiles

It is unlikely that the site provides habitat of importance to reptile and amphibian species. Groundcover diversity is low and hollow bearing logs, leaf litter and rocky outcrops are not present. The farm dams have low habitat potential due to lack of habitat diversity and high levels of exposure.

6.7.2.3 Microchiropteran Bats

The paddock trees may provide sub-optimal refuge and roost habitat for bat species. However, the trees on the site do not provide preferred hollow habitat due to high competition from Starling occupation. It is unlikely that the site provides refuge or roost habitat for a diverse bat population. The timbered corridor along Taylors Road is likely to provide insectivorous bat species with a broader diversity of foraging habitat.

6.7.3 SIGNIFICANCE OF IMPACT

The development would not have a significant impact on biodiversity values. Better quality habitat for fauna species is provided in the timbered corridor of Taylors Road and the connectivity of this corridor would not be compromised.

Infrastructure associated with the solar farm would be located on land that is dominated by exotic groundcover and requires the removal of four isolated paddock trees in poor health.

No threatened species, individuals or populations listed on the TSC Act 1995 were recorded on site, although a number of threatened species have the potential to occur in the locality, based on database records of species recorded within 15 kilometres of the site. In determining whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats, seven factors must be taken into consideration. This assessment is referred to as the assessment of significance.

Given past recordings and the locality's features the following species and community have been included in an assessment of significance.

Avifauna

- *Climacteris picumnus victoriae* (Brown Treecreeper);
- *Lathamus discolour* (Swift Parrot)
- *Polytelis swainsonii* (Superb Parrot) and;
- *Pomatostomus temporalis temporalis* (Grey-crowned Babbler. eastern subspecies).

Bat Species

- *Miniopterus schreibersii oceanensis* Eastern Bentwing-bat;
- *Saccolaimus flaviventris* Yellow-bellied Sheathtail Bat
- *Nyctophilus corbeni Corben's* Long-eared Bat.

Endangered Ecological Community

Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions'

(a) In the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction

Avifauna

Flowering *Eucalyptus macrocarpa* (Grey Box) *and E. sideroxylon* (Mugga Ironbark) provide a foraging resource for the Swift Parrot and Superb Parrot. The proximity of the development site to the timbered Taylors Road corridor provides potential opportunistic foraging habitat for the Grey-crowned Babbler. No Grey-crowned Babbler nests or family groups were observed on or adjacent to the site.

Of the four trees to be removed, three have hollows sub-optimal for nesting by the Superb Parrot. The hollows are well elevated but are in isolated and in highly exposed trees. It could not be ascertained whether the hollows in these trees had been used for nesting by particular species, although starlings and galah feathers we identified in hollows at the base of the trees. Similar hollow bearing trees are present within the Taylors Road corridor. Superb Parrots prefer tall nesting sites, often greater than 15 metres off the ground in dead trees or large dead limbs. Brown Treecreepers nest in hollow trees, stumps or posts.

The reduction in foraging habitat will be limited to four isolated paddock trees. Given the limited disturbance to seasonal foraging habitat and the presence of abundant hollows-habitat in the immediate vicinity, any impact to the lifecycle of the Swift Parrot, Superb Parrot Grey-crowned Babbler or Brown Treecreeper would not be such that a local population of these species would be placed at risk of extinction.

Bat Species

The Eastern Bentwing-bat, Yellow-bellied Sheathtail Bat and Long-eared Bat inhabit a variety of vegetation types including Mallee, *Bulloke* and box eucalypt dominated communities. Each has the potential to be present within Box-eucalypt woodland corridors. Roost, foraging and movement habitat is present for all species. *Miniopterus schreibersii oceanensis* tend to use caves, mines and some man-made structures, however this species has also been recorded in woodland communities. The species are known to forage over open ground adjacent to woodland areas.

The removal of the four trees would not reduce foraging habitat for these species, nor would it create breaks in movement corridors or preferred foraging paths. The removal of the four trees has the potential to impact on sub-optimal roost habitat. Given the high number of similar hollow bearing trees in the Taylors Road corridor, and low habitat suitability of the isolated paddock trees, the development is unlikely to impact on the preferred roost availability for these bat species.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction

No terrestrial endangered populations listed under the TSC Act occur on site.

(c) In the case of a critically endangered or endangered ecological community, whether the action proposed

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

The *Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions* EEC is present within the Taylors Road easement.

Access to the site from Taylors Road would involve removal of common native and exotic groundcover species and less than ten acacia, cassinia and hop-bush shrubs. The canopy connectivity and existing distribution of trees within this community would not be impacted. The

extent of this ecological community would not be effected such that its local occurrence is placed at risk of extinction.

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

The composition of the community would not be modified such that its local occurrence is placed at risk of extinction.

(d) in relation to the habitat of a threatened species, population or ecological community:

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

The development will result in the removal of four isolated paddock trees from an agriculturally dominated landscape. The removal of these trees would not significantly degrade foraging, nesting or roost habitat in the immediate locality. No important or unique habitat would be lost from the open woodland EEC. No trees, hollow-bearing logs or stags would be removed. The development would not alter the extent of local foraging habitat such that any species would be placed at risk of extinction.

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

The impact footprint of the development consists of a cleared agricultural landscape flanked by a thinly timbered road corridor. This narrow roadside corridor is indirectly linked to small pockets of woodland and timbered reserves in the broader locality. The development will not impact on habitat connectivity. The clearing of isolated paddock trees would not create a barrier to movement between adjoining areas of habitat for any species. No connectivity of habitat would be lost from the Taylors Road corridor.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

The clearing of the four isolated paddock trees would not fragment or isolate any currently interconnecting or proximate areas of habitat. The removal of ground and understorey components from the proposed access would not impact upon significant or unique habitat. The long-term viability of the EEC within Taylors Road would not be effected. Interconnecting and proximate areas of similar habitat along Taylors Road would not be impacted.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

There is no critical habitat in or near the development site.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

The development would not compromise the objectives or actions of any recovery plan or threat abatement plan.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The loss of hollow beating trees is recognised as a key threatening processes. Of the four mature trees proposed to be removed three are hollow bearing. The habitat value of these hollows is modest due to the isolated nature of the trees, the absence of connective habitat and the presence of better quality habitat in the adjoining woodland corridor.

The development is not likely to result in a significant effect on threatened species, populations or ecological communities, or their habitats.

6.7.4 COMMONWEALTH REFERRAL

The *Environment Protection and Biodiversity Conservation Act 1999* requires that an action that will have, or is likely to have a significant impact on a matter of national environmental significance (NES) must be referred to the Minister. Matters of NES include World Heritage properties; National Heritage places; wetlands of international importance; listed threatened species and ecological communities; migratory species protected under international agreements; Commonwealth marine areas; the Great Barrier Reef Marine Park and nuclear actions.

One threatened ecological community is present. The *Grey Box (Eucalyptus macrocarpa) Grassy Woodlands and Derived Native Grasslands of South Eastern Australia* community is present within Taylors Road. The impact within this community would be restricted to the removal of groundcover and shrubs to construct an access to the development site. This access, at the location chosen and given it would be restricted to approximately 5m width, would not;

- reduce the extent of the community;
- fragment or increase fragmentation of the community;
- adversely affect habitat critical to the survival of the community;
- modify or destroy abiotic factors necessary for the community survival;
- cause a substantial change in the species composition of the community;
- cause a substantial reduction in the quality or integrity of occurrence of the community; or
- interfere with the recovery of the community

The development will not have a significant impact on a matter of national environmental significance and referral to the Commonwealth is not required.

6.7.5 MITIGATION MEASURES

6.7.5.1 Weed Control

Bathurst Burr *(Xanthium spinosum).* was identified on the development site. Bathurst Burr is a noxious weed and listed as Class 4 4 (Locally Controlled Weed) for the Temora LGA. Left unchecked it poses a threat to primary production and the environment and is likely to spread. Seeds are transported attached to animals, machinery and clothes. The burrs also float and can be moved by water. As a landowner, the growth of Bathurst Burr must be managed in a manner that reduces its numbers, spread and incidence and continuously inhibits its flowering and reproduction.

Other declared weed species that have potential to occur at the site include Noogoora Burr, African Boxthorn, Prickly Pear, Silverleaf Nightshade and St Johns Wort.

Construction activity without appropriate controls pose a risk for the introduction/dispersal of weeds.

Weed management principles must include:

- Stabilisation measures must be planned to optimise establishment of a healthy groundcover devoid of weeds.
- An inventory of noxious or declared weed species occurring within the development site must be compiled before works commence.
- All machinery, equipment and vehicles brought onto a property must be free of soil, seed or plant material. All soil and organic matter should be removed, including under the vehicle and in the cabin or trays.

- Restrict access of vehicles and personnel to areas of known noxious weed infestation. Vehicles exiting such areas may need to be re-cleaned.
- Declared noxious weeds must be managed according to the requirements stipulated by the *Noxious Weeds Act 1993*.
- Evidence of compliance with weed biosecurity requirements should be documented.

6.7.5.2 Felling Trees

The three Grey Box to be removed contain hollows that could be inhabited by birds or bats. The removal of these trees should therefore be undertaken in a manner that assumes they do provide habitat. This would include the following safeguards:

- Felling should be carried out either in late winter or late summer. These periods lower the likelihood of hollow nesting birds and bats in winter torpor being present.
- An ecologist with appropriate fauna handling licences should be in attendance when these trees are felled.
- The trees should be felled as late in the day as possible.
- Prior to felling the tree should be 'bumped' or 'knocked' with machinery to encourage any fauna to exist hollows.
- Felled trees should be inspected by the ecologist to check hollows and, if required, fauna relocated or the trees left in-situ for at least 24 hours to allow fauna to relocate themselves.
- Trees should preferably be 'soft-felled' with the use of an excavator pushing the tree at height and controlling the rate of fall.
- Large hollow bearing limbs should be relocated to the plantings area (see **Habitat Establishment** below) as a habitat resource for smaller terrestrial species and to provide niches for invertebrate populations.

6.7.5.3 Habitat Establishment

Part of the solar farm development includes establishment of screen plantings in the south western corner of the development site. Whilst these plantings are intended first and foremost to provide a visual screening, the extent and composition of what is proposed will result in the establishment of a self-generating pocket of habitat approximately two hectares in size (refer **Section 4.7**).

6.8 AIR QUALITY

6.8.1 CONSTRUCTION IMPACTS

Potential adverse air quality impacts associated with the solar farm are really restricted to the construction phase. Any activity that entails the use of plant and equipment on soil has the potential to generate localised dust emissions. These impacts can, however, be readily managed through the adoption of suitable mitigation measures. Such measures will include:

- Restricting vehicle movements and ground disturbance to the minimum area that is safely practicable.
- Undertaking dust suppression through strategic watering as required.
- Temporary cessation of works during excessively dry and windy conditions.
- Re-establishing a groundcover vegetation on areas disturbed by construction but not needed post-construction, as soon as is practicable (ie. the construction compound and lay down area).

It should also be noted that the solar farm can be built without significant earthworks. No bulk earthworks of landform modifications are required. The array trackers can accommodate 3.5 degrees of slope and the maximum slopes within the site are restricted to isolated areas where the slope is 2 degrees (ie. comfortably within the tracker tolerance). Construction of the solar farm will therefore not

require extensive earthworks and accordingly the risks associated with generating dust are readily manageable.

6.8.2 OPERATIONAL IMPACTS

The change in land use from cropping/grazing to a solar farm will reduce the potential for particulate emissions from this land. The principal source of dust is ground disturbance and wind exposure to un-vegetated ground surface. In this context cropping (inclusive of bed preparation, sowing and harvesting) provides a greater risk exposure than the solar farm. Vehicle movements on the solar farm will be limited to established access roads and groundcover over 95% of the 65ha site will not be disturbed.

As a source of particulates and localised dust emissions, the solar farm will, in comparative terms, be a land use that has the potential to improve local air quality.

In a broader perspective the Gidginbung solar farm will also reduce greenhouse gas (GHG) emissions by 35,400 tonne of carbon dioxide equivalent (CO_2e) annually.

6.9 BUSHFIRES

6.9.1 RISK

The development site is not mapped as bushfire prone land and is located 3.76 km from the closest land that is mapped as bushfire prone. Notwithstanding, the *Rural Fires Act 1997* places a 'duty of care' on all land managers/owners to prevent a fire spreading on or from their land.

This duty of care for the solar farm will be addressed through three elements, covering design, construction and operation.

6.9.2 DESIGN

The layout of the solar farm incorporates the following design features relevant to bushfire risk management.

- A 30 metre offset between the timbered Taylors Road corridor and the arrays on the northern side of the farm.
- A 4 m wide inspection road around the perimeter of the farm infrastructure.

6.9.3 CONSTRUCTION

- Prior to construction commencing contact will be made with the Local Brigade of the NSW Rural Fire Service and details about the construction schedule, contact numbers and site access arrangements will be shared.
- Two (2) 10 kL tanks, being Static Water Supplies dedicated exclusively for fire fighting purposes, will be located strategically around the site and appropriately plumbed.
- The fuel load over the site prior to and during construction will be monitored and reduction measures implemented as required. These measures will be restricted to mechanical slashing or stock crash grazing.
- The Construction Environmental Management Plan (CEMP) will include specific procedures and responsibilities for minimising bushfire risk through work practices. These would include:
  - No burning of vegetation or any waste material would take place on the construction site;
  - Fire extinguishers will be available in all vehicles;
  - All vehicle and plant movements beyond formed roads and trafficable hard stand areas will be restricted to diesel, not petrol vehicles;

- During the bushfire season the fire danger status would be monitored daily (through the RFS website http://www.rfs.nsw.gov.au) and communicated to personnel;
- Total Fire Ban rules will be adhered to. That is, the GSFC (and any of its contractors) will not:
  - (in any grass, crop or stubble land) drive or use any motorised machine unless the machine is constructed so that any heated areas will not come into contact with combustible matter;
  - carry out Hot Works (e.g. welding operations or use an angle grinder or any other implement that is likely to generate sparks), unless the necessary exemption from the NSW RFS Commissioner has been obtained and work complies with all requirements specified in the exemption; and
  - It is not anticipated that any fuel or flammable liquid will be stored on-site. If any is, this material would be stored in a designated area and will be sign posted "Fuel Storage Area." A register will be maintained that confirms the quantities and location of any flammable material stored on-site.

6.9.4 OPERATIONS

The performance measure for managing the bushfire risk will be to operate the GSF and maintain the site in a such a manner that no grass fire originates from the GSF site, and/or any approaching bushfire does not intensify as a consequence of entering the MSF site because of excessive fuel loads. Procedures for ensuring this outcome will be specified in an Operations Environmental Management Plan (OEMP) and will include, but not necessarily be limited to, the following types of measures.

Perimeter Fire Trail

Appropriate maintenance will comply with the NSW Rural Fire Service (un-dated) *Standards for Asset Protection Zones* with respect to hazard reduction methods and include a possible combination of:

- slashing and trittering – with cut grass either removed or allowed to decompose well before summer starts, and/or.
- ploughing and grading, and/or
- crash grazing by sheep.

Hazard reduction burning is not proposed.

Water Supply

The two 10 kL static water supply tanks will be dedicated for bushfire fighting purposes.

Fuel Reduction

The fuel load over the entire GSF property will need be constantly monitored and fuel load reduction measures will be implemented as required. These measures will be limited to either mechanical slashing or stock crash grazing (sheep).

6.10 SOCIAL & ECONOMIC

6.10.1 COMMITMENT TO SOURCE LOCAL

The GSFC will endeavour to procure local community resources during the construction of the solar farm, which is estimated to take up to six months.

6.10.2 EMPLOYMENT GENERATION

It is anticipated that up to 30 construction workers will be required and that the roles will vary from highly skilled electricians able to work with solar PV (low and high voltage) to general labourers.

At this stage there is some uncertainty as to the exact number of construction workers required that can be utilised from the local workforce in Temora and its surrounding villages. As the project progresses through the development stages this will be assessed in greater detail as local organisations will be engaged in order to assess skill levels and their availability.

Whilst it is anticipated local employment will be utilised for construction work, there will be other indirect requirements, such as with accommodation utilised by transport workers when delivering materials to site.

In the event the construction workforce cannot be supplied from within the local community because of skill level shortages or the availability of the local workforce in relation to the construction timeline, then an outside workforce will be utilised. The added benefit to the local community, if this occurs, is the requirement for local accommodation and other services during the construction period. However, it is the intention of the GSFC that some of the workforce can be supplied from the local community.

6.10.3 SKILL DEVELOPMENT

The intention of the GSFC is to utilise local employment as much as practicable as this will assist in developing regional skills in large-scale solar PV construction and operation. Further, with ongoing community and business engagement the GSF project offers the potential for diversification of the local workforce and building new skills in-line with the Council's economic growth strategy.

6.10.4 TOURISM INTEGRATION

Along with the well know aviation museum, also on the Goldfields Highway, the GSF can offer tourists a unique and up close look at a renewable energy power plant in operation. The GSF is considered a large-scale solar PV plant and there are only a few of these types of power plants in operation within Australia. Visitors can watch as the trackers, using a sophisticated algorithm, change the angle of the solar PV panels in relation to the sun's position in the eastern and western sky as it changes throughout the day.

The facility to arrange this viewing opportunity will be developed in consultation with Council following determination of the Development Application.

6.10.5 EDUCATION INTEGRATION

It is intended that between the GSFC and Council that education scholarships can be created to assist students in the study of renewable energy and clean power generation. If the GSFC is successful in the competitive round of the ARENA programme, then it is the intention of the GSFC to discuss this opportunity further with Council.

As well as a potential scholarship programme, it is also the intention to conduct an "open day" at the GSF site for the local primary school, where they can see what is required to operate a solar farm.

It is the intention to discuss these and other potential opportunities with Council as the project develops.

6.10.6 BROADER BENEFITS

The skills gained from the development and construction of the large-scale solar PV plant will provide a foundation for future large-scale solar PV plant projects in NSW. The skills developed include construction, electrical installation specific to large-scale solar PV, plant design, project management, financing and community engagement. The experience and expertise of the GSFC's international

partners will be leveraged to assist in best-practice as well as in the sharing of lessons learnt to ensure the best project outcomes.

6.11 WASTE MANAGEMENT

The GSFC will develop a waste and reuse management plan that addresses the requirement for the correct disposal of materials during the construction of the farm. This will form part of the CEMP.

The waste generated during the construction will predominantly occur during the module assembly stage and relates to the cardboard packaging of the solar PV panels. It is intended this cardboard packaging material will be recycled using a local recycling organisation or facility in Temora.

No wastes would be buried or burnt on-site and disposal (if recycling options are not available) will be to a lawfully operating waste disposal facility.

6.12 ELECTROMAGNETIC FIELDS

Electromagnetic fields (EMF) are present in a variety of natural and human-made sources. These EMF sources vary in strength and are comprised of both electric and magnetic fields, usually expressed in units of Tesla (T) or microtesla (μT) or commonly in Gauss (G) or milligauss (mG).

These electric and magnetic fields are invisible to humans and together are associated as a force of charged particles. These charged particles are produced by a range of sources such as magma flows below the Earth's surface as well as by human-made equipment involved in electricity production and distribution. Electricity production or distribution may be in the form of either direct-current (dc) or alternating-current (ac) and typical human-made equipment or appliance EMF sources include computers, refrigerators, mobile phones and televisions. The EMF strength varies according to the relative strength of both the voltage and current present in the source and degrades exponentially as the distance from the source increases.

The GSF will be designed to comply with the Australian Radiation Protection and Nuclear Safety Agency standards.

6.13 LAND USE

The objectives of land zoned for Primary Production in Temora are:

- 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 minimise the degradation of natural scenery and rural landscapes.
- To encourage the conservation and efficient use and of water.
- To protect, enhance and conserve the natural environment, including native vegetation, wetlands and other natural features that provide wildlife habitat, protect flora and fauna, provide scenic amenity and that may prevent or mitigate land degradation.
- To encourage the provision of tourist accommodation in association with agricultural activities.

The proposed development is not antipathetic to any of the above land use objectives.

6.14 DECOMMISSIONING

The Gidginbung solar farm is intended to operate for up to 25 years, showcasing the ability of large scale solar PV to be built and integrated within regional NSW communities and existing distribution networks.

A Decommissioning Environmental Management Plan (DEMP) would be submitted to Council for approval two (2) years before decommissioning (if that is to occur). In broad principle, if decommissioning rather than upgrading is to occur in the future, the intention would be to remove all farm infrastructure and return the land to agricultural production.

6.15 DEVELOPMENT CONTROL PLAN

Consultation with Temora Shire Council has established that the Gidginbung Solar Farm, with respect to Council's *Development Control Plan 2012* (DCP), is considered a rural industry.

The DCP identifies controls for a rural industry and requires measures that protect the amenity of surrounding residents be incorporated into design. These include landscaping, sound attenuation and buffers.

The DCP states that the following should be considered in selecting a site for a rural industry:

- less exposure to neighbouring dwellings and noise sensitive areas,
- good vehicular access,
- suitable area to accommodate landscaping to screen the rural industry,
- suitable land capability, and
- sufficient area for expansion.

As it relates to the solar farm and the above considerations, the following is noted:

- The solar farm is not a noise generating activity and complies with the moist stringent noise criteria, in both neutral and adverse meteorological conditions.
- Good access and the proximity to Goldfields Way was a key criteria for site selection.
- Part of the solar farm development includes establishment of approximately two hectares of screen plantings in the south western corner of the development site. These plantings are intended to provide a visual screening for the residence to the south west of the site. The extent and composition of what is proposed is a suitable area to accommodate landscaping to screen the farm.
- The site provides suitable land capability. The array trackers can accommodate 3.5 degrees of slope. The maximum slopes within the site are restricted to isolated areas where the slope is 2 degrees (ie. comfortably within the tracker tolerance). Construction of the solar farm will therefore not require extensive earthworks and there will be no change to the site landform.

There are no plans or intent to expand the farm beyond the 15 MW capacity.

Mitigation Measures

7.1 INTRODUCTION

Potential environmental impacts will be minimised and managed through adoption of mitigation measures that will form an intrinsic part of the development. These measures will be incorporated into all phases of the project, including:

- detailed design;
- pre-construction activities;
- construction;
- operations; and
- decommissioning.

7.2 DESIGN

7.2.1 DESIGN REFINEMENT

The footprint of the solar farm and the position of associated infrastructure as shown in the **Schedule of Drawings** represents an accurate concept design that has been refined through field investigations and assessment designed to minimise disturbance, maximise buffers to neighbours and based on discussions with likely plant and equipment suppliers.

The project footprint and components described in this Statement of environmental Effects (SEE) will be refined during the detailed design phase. There is sufficient confidence, however, that any such refinement would not result in any meaningful change to the impacts, as assessed.

Any design refinements would not include significant changes to the solar farm.

The test for 'significant change' would be whether the refinement:

- would result in any of condition of any approval not being met;
- is consistent with the description of the solar farm as described in this SEE;
- would result in any potential environmental or social impacts of a greater scale or different nature than that considered in this SEE.

7.2.2 DETENTION BASIN

To ensure post development peak flows leaving the site are no greater than existing peak flows it is proposed to convert the existing farm dam on the western boundary of the site into an on-site detention basin. The existing farm dam will be converted by reshaping the existing dam embankment, adding additional earth embankments either side of the existing embankment, the addition of a low flow pipe outlet and high flow spillway within the proposed earth embankment.

7.2.3 ACOUSTIC AMENITY

Compliance with assumed Sound Power Levels for plant, which underpin the noise impact assessment, will be verified with plant suppliers as part of the procurement process.

7.3 PRE-CONSTRUCTION

Pursuant to s.138 of the *Roads Act 1993* a person must not erect a structure or carry out a work in, on or over a public road without the consent of the appropriate roads authority.

7.4 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

Prior to construction commencing a CEMP will be prepared and submitted to Council for approval. The scope of the CEMP will include, but may not necessarily be limited to the following.

7.4.1 LANDOWNER CONSULTATION

Early, regular and honest consultations with neighbours will be a core commitment.

7.4.2 SOIL AND WATER MANAGEMENT

The proposed works should not result in the pollution of land/waters so long as best management practices for erosion and sediment control are undertaken during construction, and appropriate remediation measures are implemented on a progressive basis. Priority should be given to achieving a high standard of erosion and sediment control and general site housekeeping throughout the construction period.

The way this is achieved is through developing and implementing construction activities in accordance with *Managing Urban Stormwater: Soils and Construction, 4th Edition* (Landcom, 2004).

A Soil and Water Management sub-plan that complies with these guidelines must form part of the CEMP. Four principle measures must be adhered to during construction.

- At all times, in all locations, the area of ground disturbance should be limited to that which is the smallest possible footprint that is practicably possible.
- Erosion and sediment controls must be suitably maintained, including regular monitoring to ensure the measures and controls in place are effective.
- Immediate stabilisation of worked sections complemented by progressive rehabilitation.
- Erosion and sediment control measures only to be removed once the area is successfully rehabilitated.

7.4.3 INCIDENT MANAGEMENT

- Adequate procedures should be established including notification requirement to the Appropriate Regulatory Authority and other relevant authorities for any incident that causes or has the potential to cause material harm to the environment.
- A procedure for receiving, investigation and reporting any complaint received.

7.4.4 WEED MANAGEMENT

Weed management principles must include:

- Stabilisation measures must be planned to optimise establishment of a healthy groundcover devoid of weeds.
- An inventory of noxious or declared weed species occurring within the development site must be compiled before works commence.
- All machinery, equipment and vehicles brought onto a property must be free of soil, seed or plant material. All soil and organic matter should be removed, including under the vehicle and in the cabin or trays.

- Restrict access of vehicles and personnel to areas of known noxious weed infestation. Vehicles exiting such areas may need to be re-cleaned.
- Declared noxious weeds must be managed according to the requirements stipulated by the *Noxious Weeds Act 1993*.
- Evidence of compliance with weed biosecurity requirements should be documented.

7.4.5 FAUNA PROTECTION

The three Grey Box to be removed contain hollows that could be inhabited by birds or bats. The removal of these trees should therefore be undertaken in a manner that assumes they do provide habitat. This would include the following safeguards:

- Felling should be carried out either in late winter or late summer. These periods lower the likelihood of hollow nesting birds and bats in winter torpor being present.
- An ecologist with appropriate fauna handling licences should be in attendance when these trees are felled.
- The trees should be felled as late in the day as possible.
- Prior to felling the tree should be 'bumped' or 'knocked' with machinery to encourage any fauna to exist hollows.
- Felled trees should be inspected by the ecologist to check hollows and, if required, fauna relocated or the trees left in-situ for at least 24 hours to allow fauna to relocate themselves.
- Trees should preferably be 'soft-felled' with the use of an excavator pushing the tree at height and controlling the rate of fall.
- Large hollow bearing limbs should be relocated to the landscape plantings area.

7.4.6 HABITAT ESTABLISHMENT

Part of the solar farm development includes establishment of screen plantings in the south western corner of the development site. Whilst these plantings are intended first and foremost to provide a visual screening, the extent and composition of what is proposed will result in the establishment of a self-generating pocket of habitat approximately two hectares in size .

The proposed tree/shrub plantings would comprise two pockets. Plantings would be moderately spaced with individual trees not spaced closer than 5 metres and no further apart than 10 metres. Locally endemic species would dominate the plantings, providing a layered stratum of varying height and speed of establishment. The tallest trees would have a mature height of approximately 12 to 18 metres. The planting structure would be comparable to the open woodland present along road corridors and timbered islands in the locality.

A lower shrub stratum would be included to provide habitat diversity and also provide additional density to the vegetation. Site preparation involving spraying and deep ripping would be required to promote seedling establishment.

Trees and shrubs would be planted along deep-ripped lines with weed mat, mulch and tree guards. Seedlings would be watered in at planting time and have follow-up watering during the early settling stages (3 to 4 months) if dry conditions required this.

Plantings would be tended to until establishment (at least two seasons). Management would include weed control and supplementary watering to avoid losses during dry periods. Replacement of lost trees would be undertaken after the first and second year.

The following trees and shrubs have been selected due to their hardiness and suitability to the soils, drainage and climatic conditions of the site, and because all species are available as tube stock.

Trees

- Western Grey Box *Eucalyptus macrocarpa.* Height 10 to 20 metres with a spreading crown. Common paddock tree in the locality.
- Blakelys Red Gum *Eucalyptus blakleyi.* Height 10 to 20 metres with a tall crown. Upright tree in good soils. Occasional trees found in locality.
- Mugga Ironbark *Eucalyptus sideroxylon* Height 10 to 20 metres with grey foliage and characteristic dark fissured bark. Occurs on elevated sites in the immediate locality.
- Dwyers Red Gum *Eucalyptus dwyeri.* Height to 15 metres. Partially smooth, creamy barked tree. Open canopy with short crooked trunk.
- Drooping Sheoak *Allocasuarina verticillata.* Height 4 to 10 metres. Small tree with fine foliage and rough grey bark. Extremely tolerant of frost, drought and wind.
- Bulloak *Allocasuarina luehmannii.* Height 5 to 10 metres. Small tree with fine foliage and rough grey bark. Tolerant of frost, drought, windy sites and saline conditions.

Shrubs

- Wedge-leaf Hopbush *Dodonaea viscose subsp. cuneata.* Height 1 to 3 metres Compact, spreading shrub. Tiny sticky wedge shaped leave flowering in winter or spring. Excellent low cover in windbreaks.
- Wyalong Wattle *Acacia cardiophylla.* Height 1 to 4 metres. Erect to spreading shrub or small tree. Very drought hardy. Dense foliage providing good screening properties.
- Deane's Wattle *Acacia deanei.* Height 2 to 7 metres. Can often form small dense thickets.
- Drooping Wattle *Acacia difformis.* Height 1 to 6 metres. Erect or spreading small tree or shrub. Suckers freely providing small thickets. Good for fauna refuge and soil stabilisation.
- Hakea Wattle *Acacia hakeoides.* Height 1 to 6 metres. Wide growing shrub with reddish brown branches. Good low cover and windbreak species. Long lived. May form small dense thickets.
- Streaked Wattle *Acacia lineate.* Height 1 to 3 metres. Dense low shrub, hardy to drought and frost. Good wildlife refuge species.

Mature shrub width varies with the planting density. Close plantings (<5m) promote a more upright growth form, where openly spaced shrubs (>5m) tend to have a lower spreading foliage and promotes self-generation.

7.4.7 ABORIGINAL HERITAGE

- Site 50-1-0006 (scarred tree) is to be identified in advance of construction commencing and must not be harmed.
- If something is discovered that could be an Aboriginal object during the course of construction, all work in the vicinity of that area will immediately cease and both the Young Local Aboriginal Land Council and the Office of Environment and Heritage would be contacted.

7.4.8 FUEL AND CHEMICAL STORAGE

- Storage, handling and use of hazardous materials in accordance with the WorkCover NSW *Storage and Handling of Dangerous Goods – Code of Practice* (2005).

7.4.9 WASTE MANAGEMENT

- Suitable waste disposal locations would be identified and used to dispose of litter and other wastes on-site. Suitable containers would be provided for waste collection.
- Work sites would be kept free of rubbish and cleaned up at the end of each working day.
- All waste will be disposed at a legally operating waste facility.

7.4.10 NOISE AND VIBRATION

- All associated construction activity would be restricted to standard day time hours consistent with the *Interim Construction Noise Guideline*. That is, construction would be limited to:
  - Monday to Friday 7.00 am to 6.00 pm
  - Saturday 8.00 am to 1.00 pm
  - No work on Sundays or Public Holidays
- Potentially impacted receptors would be notified in advance of construction commencing and be provided with contact details for reporting any noise related issue.
- In the event that a complaint is received the source would be immediately investigated and measures implemented to avoid recurrence. Any complaint received would be documented
- As part of a general induction all employees and contractors would be informed of noise management measures, construction hours, the location of sensitive receptors, and the protocol for handling any complaint.
- Equipment and plant would be operated and maintained in accordance with the manufacturer's instructions including replacement of engine covers, repair of defective silencing equipment, tightening rattling components, repair of leakages in compressed air lines and shutting down equipment when not in use.
- In the event that a complaint cannot be resolved noise monitoring would be undertaken with either attended or un-attended loggers. Precisely how the monitoring would be performed, where, for how long, and with what sort of equipment, would be determined on a case by case basis. The justification for the monitoring regime undertaken would be documented and the results made available.

7.4.11 AIR QUALITY

Implementation of the following mitigation measures during construction would minimise potential impacts to air quality:

- Limit the area of soil disturbance at any one time.
- Place and maintain all disturbed areas, stockpiles and handling areas in a manner that minimises dust emissions (including windblown, traffic-generated or equipment generated emissions).
- Where required, utilise dust suppression.
- Where required, minimise vehicle movement and speed.
- Avoid dust generating activities during windy and dry conditions.
- Ensure all construction plant and equipment are operated and maintained to manufacturer's specifications in order to minimise exhaust emissions.

7.4.12 BUSHFIRES

- Prior to construction commencing contact will be made with the Local Brigade of the NSW Rural Fire Service and details about the construction schedule, contact numbers and site access arrangements will be shared.
- Two (2) 10 kL tanks, being Static Water Supplies dedicated exclusively for fire fighting purposes, will be located strategically around the site and appropriately plumbed.
- The fuel load over the site prior to and during construction will be monitored and reduction measures implemented as required. These measures will be restricted to mechanical slashing or stock crash grazing.

- The CEMP will include specific procedures and responsibilities for minimising bushfire risk through work practices. These would include:
  - No burning of vegetation or any waste material would take place on the construction site;
  - Fire extinguishers will be available in all vehicles;
  - All vehicle and plant movements beyond formed roads and trafficable hard stand areas will be restricted to diesel, not petrol vehicles;
  - During the bushfire season the fire danger status would be monitored daily (through the RFS website *http://www.rfs.nsw.gov.au*) and communicated to personnel;
  - Total Fire Ban rules will be adhered to. That is, the GSFC (and any of its contractors) will not:
    - (in any grass, crop or stubble land) drive or use any motorised machine unless the machine is constructed so that any heated areas will not come into contact with combustible matter;
    - carry out Hot Works (e.g. welding operations or use an angle grinder or any other implement that is likely to generate sparks), unless the necessary exemption from the NSW RFS Commissioner has been obtained and work complies with all requirements specified in the exemption; and
    - It is not anticipated that any fuel or flammable liquid will be stored on-site. If any is, this material would be stored in a designated area and will be sign posted "Fuel Storage Area." A register will be maintained that confirms the quantities and location of any flammable material stored on-site.

7.4.13 INDUCTION

- All contractors undertaking any works on-site will, before commencing works, be inducted on the requirements of the CEMP and their specific responsibilities.

7.5 OPERATIONS ENVIRONMENT MANAGEMENT PLAN

An Operations Environmental Management Plan (OEMP) will be prepared prior to commissioning.

The OEMP will include operational procedures, reporting and the allocation of responsibilities designed to minimise environmental impacts.

A key element of the OEMP will be land management (fuel load and noxious weeds) and monitoring.

7.6 DECOMMISSIONING MANAGEMENT PLAN

A Decommissioning Management Plan (DMP) would be submitted to Council for approval two (2) years before decommissioning (if that is to occur).

In broad principle, if decommissioning rather than upgrading is to occur in the future, the intention would be to remove all farm infrastructure and return the land to agricultural production.

Conclusion

The Gidginbung Solar Farm is a significant renewable energy development. It is sited in a suitable location, selected through a rigorous application of planning guidelines and industry best practice.

The farm layout has been designed to minimise impacts on the environment and the community. It is consistent with government initiatives to promote renewable energy generation and it would deliver significant environmental and socio economic benefits to the local community, broader region and the nation.

The solar farm would not result in an unacceptable impact and is consistent with the principles of ecologically sustainable development:

- there are no threats of serious or irreversible environmental damage;
- the health, diversity and productivity of the environment would not be compromised for future generations;
- biological diversity and ecological integrity would not be degraded; and
- farming the sun's resource embodies the improved valuation and pricing of environmental resources.

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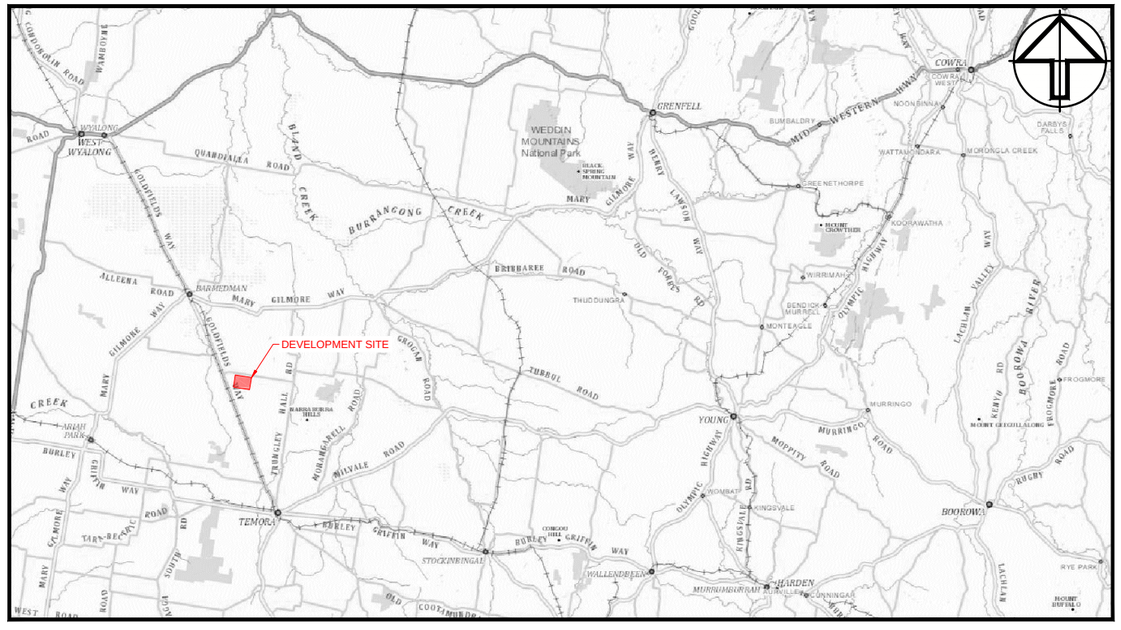
Drawing Schedule

GIDGINBUNG SOLAR FARM

STATEMENT OF ENVIRONMENT EFFECTS

EPHO PTY LTD

SCHEDULE OF DRAWINGS	
DRAWING	TITLE
EV01	TITLE SHEET
EV02	DEVELOPMENT SITE
EV03	SITE ENVIRONS
EV04	SOLAR FARM LAYOUT
EV05	SITE HYDROLOGY
EV06	RELATIONSHIP TO AIRPORT



SITE LOCALITY

NOT TO SCALE

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REV.	DATE	DFTD.	APPD.	DETAILS
A	03/03/2016	BH	AB	FOR DEVELOPMENT APPLICATION

DRAWING SCALE

DO NOT SCALE FROM THESE DRAWINGS. ALL MEASUREMENTS SHALL BE CONFIRMED ON SITE AND WITH GEOLYSE PTY. LTD. PRIOR TO CONSTRUCTION

PROJECT

GIDGINBUNG SOLAR FARM
STATEMENT OF
ENVIRONMENTAL EFFECTS

APPROVAL AUTHORITY

TEMORA
SHIRE COUNCIL

CLIENT

EPHO PTY LTD

DRAWING

TITLE SHEET

PROJECT NUMBER 215436	DRAWING FILE 215436_01A_EV01-EV06.dwg	SIZE A1
SOURCE:		SET 01A
IMAGE SOURCE: SIX MAPS		
STATUS DRAFT	SHEET EV01 OF EV06	

NOTE:
- SURVEY DATUM POINT PM 44406 RL 261.262 (AHD)
- CONTOUR INTERVAL 0.25m
- PLAN IS ON MGA ZONE 55

MGA

TRUNGLEY HALL GIDGINBUNG ROAD

CONCRETE CAUSEWAY

1 DP567778

2 DP567778

TAYLORS (GRAVEL ROAD)

ROAD

STN 9002

99° 14' 00"

902.84

279°15' 30.778

GATE 4m

GATE 7m

STN 9001

NO REGISTERED EASEMENT ON THIS 66kV POWER LINE STATUTORY EASEMENT 30 WIDE

EASEMENT FOR OVERHEAD 132kV POWERLINE 40 WIDE

GREY BOX

GREY BOX

GREY BOX

GREY BOX

WHITE CYPRESS PINE

GATE 4m

35"

26'

25'

696.320 (BY SURVEY-GROUND)
696.041 (BY TITLE-GROUND)

699.662 (BY TITLE-GROUND)
699.315 (BY SURVEY-GROUND)

105 DP750621

1 DP739076

158
DP750621
65.16ha BY TITLE
65.1ha BY SURVEY

DAM

SALMON GUM

MUGGA IRONBARK

STN 9000

189°

DAM

DAM

STN 9003

279°

933.822

25'

EASEMENT FOR WATER PIPE 3 WIDE

GATE 8.7m

GATE 7m

05"

GATE 4m

EXISTING DWELLING

106 DP750621

LEGEND

- PROPERTY BOUNDARY
- ADJOINING PROPERTY BOUNDARY
- EASEMENT
- GRAVEL ROAD CENTRE LINE
- OVERHEAD POWER LINE
- TELECOMMUNICATION LINE
- TOP OF BANK
- BOTTOM OF BANK
- INVERT OF CHANNEL
- DAM
- FENCE LINE
- TREE
- SCARRED TREE
- POWER POLE
- TELECOMMUNICATION PIT
- TELECOMMUNICATION ELEVATED CABLE JOINT
- GATE

SURVEY CONTROL TABLE
MGA GRID ZONE 55

MARK	EASTING	NORTHING	RL	DESCRIPTION
9000	545534.337	6200701.118	289.290	STAR PICKET
9001	545455.383	6201259.733	279.645	STAR PICKET
9002	544703.558	6201382.238	273.435	STAR PICKET
9003	544765.817	6200667.078	273.404	STAR PICKET

www.dialbeforeyoudig.com.au DIAL 1100 BEFORE YOU DIG

THIS PLAN IS PREPARED FROM A FIELD SURVEY FOR THE PURPOSE OF DESIGNING NEW CONSTRUCTIONS ON THE LAND AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE.

SOME SERVICES SHOWN HEREON HAVE BEEN LOCATED BY FIELD SURVEY.

VISIBLE SERVICES HAVE BEEN LOCATED ONLY. PRIOR TO ANY DEMOLITION, EXCAVATION OR CONSTRUCTION ON THE SITE, THE RELEVANT AUTHORITY SHOULD BE CONTACTED FOR LOCATION OF FURTHER UNDERGROUND SERVICES AND DETAILED LOCATIONS OF ALL SERVICES.

CAUTION: CONTOURS SHOWN HEREON ARE INDICATIVE ONLY PREFERENCE SHOULD BE GIVEN TO SPOT HEIGHTS AS SHOWN.

THIS NOTE IS AN INTEGRAL PART OF THIS PLAN

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A	03/03/2016	BH	AB	FOR DEVELOPMENT APPLICATION

DRAWING SCALE
0 50 100 150 200

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PROJECT
GIDGINBUNG SOLAR FARM
STATEMENT OF ENVIRONMENTAL EFFECTS

APPROVAL AUTHORITY
TEMORA SHIRE COUNCIL
TEMORA NSW Riverina

CLIENT
EPHO PTY LTD
epho ENERGY FUELLED BY PHOTONS

DRAWING
DEVELOPMENT SITE

PROJECT NUMBER 215436	DRAWING FILE 215436_01A_EV01-EV06.dwg	SIZE A1
SOURCE:		SET 01A
IMAGE SOURCE:		
STATUS DRAFT	SHEET EV02 OF EV06	

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A	03/03/2016	BH	AB	FOR DEVELOPMENT APPLICATION

DRAWING SCALE

0 100 200 300 400 500 600 700

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PROJECT

GIDGINBUNG SOLAR FARM
STATEMENT OF
ENVIRONMENTAL EFFECTS

APPROVAL AUTHORITY

TEMORA
SHIRE COUNCIL

CLIENT

EPHO PTY LTD

DRAWING

SITE ENVIRONS

PROJECT NUMBER 215436	DRAWING FILE 215436_01A_EV01-EV06.dwg	SIZE A1
SOURCE:		SET 01A
IMAGE SOURCE: SIX MAPS		
STATUS DRAFT	SHEET EV03 OF EV06	

TRUNGLEY HALL
GIDGINBUNG ROAD

CONCRETE CAUSEWAY

1
DP567775

2
DP567775

TAYLORS

ROAD

SUBSTATION

CONSTRUCTION
COMPOUND

EASEMENT FOR OVERHEAD 132kV
POWERLINE 40 WIDE

NO REGISTERED EASEMENT
ON THIS 66kV POWER LINE
STATUTORY EASEMENT 30 WIDE

DAM

105
DP750621

158
DP750621

PROPOSED
DETENTION BASIN

DAM

PROPOSED
DETENTION BASIN

PROPOSED
LANDSCAPING
ZONE

DAM

PROPOSED
LANDSCAPING
ZONE

EXISTING
DWELLING

10m BUFFER

106
DP750621

1
DP739076

LEGEND

- SITE BOUNDARY
- MAIN CABLE TRENCH
- MAINTENANCE ROAD
- INSPECTION ROAD
- CONSTRUCTION COMPOUND
- FENCE
- PV RACK
- INVERTER STATION
- OVERHEAD POWERLINE
- GRAVEL ROAD CENTRELINE
- TREE

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A	03/03/2016	BH	AB	FOR DEVELOPMENT APPLICATION

DRAWING SCALE

SCALE 1:2000 (A1)

0 50 100 150 200

SCALE 1:4000 (A3)

0 50 100 150 200

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PROJECT

GIDGINBUNG SOLAR FARM
STATEMENT OF
ENVIRONMENTAL EFFECTS

APPROVAL AUTHORITY

TEMORA
SHIRE COUNCIL

CLIENT

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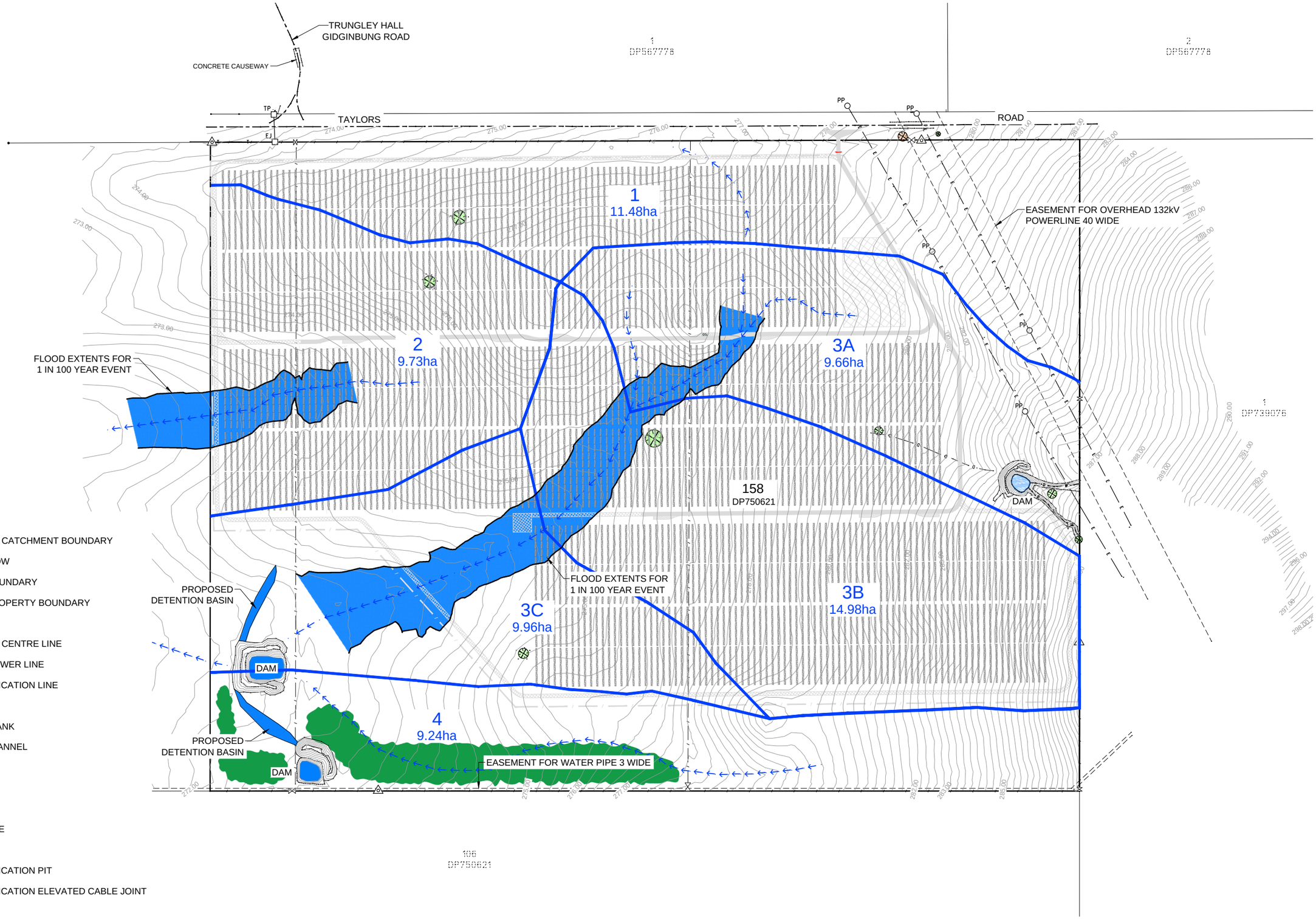
DRAWING

SOLAR FARM LAYOUT

PROJECT NUMBER 215436	DRAWING FILE 215436_01A_EV01-EV06.dwg	SIZE A1
SOURCE: 'ibvogt' 22AU.M0.001. 0 .C		SET 01A
IMAGE SOURCE:		
STATUS DRAFT	SHEET EV04 OF EV06	



LEGEND

- STORMWATER CATCHMENT BOUNDARY
- DRAINAGE FLOW
- PROPERTY BOUNDARY
- ADJOINING PROPERTY BOUNDARY
- EASEMENT
- GRAVEL ROAD CENTRE LINE
- OVERHEAD POWER LINE
- TELECOMMUNICATION LINE
- TOP OF BANK
- BOTTOM OF BANK
- INVERT OF CHANNEL
- DAM
- FENCE LINE
- TREE
- SCARRED TREE
- POWER POLE
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- GATE

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REV.	DATE	DFTD.	APPD.	DETAILS
A	03/03/2016	BH	AB	FOR DEVELOPMENT APPLICATION

DRAWING SCALE

0 50 100 150 200

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PROJECT

GIDGINBUNG SOLAR FARM
STATEMENT OF
ENVIRONMENTAL EFFECTS

APPROVAL AUTHORITY

TEMORA
SHIRE COUNCIL

CLIENT

EPHO PTY LTD

DRAWING

SITE HYDROLOGY

PROJECT NUMBER 215436	DRAWING FILE 215436_01A_EV01-EV06.dwg	SIZE A1
SOURCE: INTERNAL		SET 01A
IMAGE SOURCE:		
STATUS DRAFT	SHEET EV05 OF EV06	

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REV.	DATE	DFTD.	APPD.	DETAILS
A	03/03/2016	BH	AB	FOR DEVELOPMENT APPLICATION

DRAWING SCALE

0 500 1000 1500 2000 2500 3000

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PROJECT

GIDGINBUNG SOLAR FARM
STATEMENT OF
ENVIRONMENTAL EFFECTS

APPROVAL AUTHORITY

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SHIRE COUNCIL

CLIENT

EPHO PTY LTD

DRAWING

RELATIONSHIP TO AIRPORT

PROJECT NUMBER 215436	DRAWING FILE 215436_01A_EV01-EV06.dwg	SIZE A1
SOURCE:		SET 01A
IMAGE SOURCE: SIX MAPS		
STATUS DRAFT	SHEET EV06 OF EV06	

Appendix A

PHOTOMONTAGES

View Location 1 - Existing view

Note: Base photo taken from inside property boundary from top of dam wall

Photomontage created by:

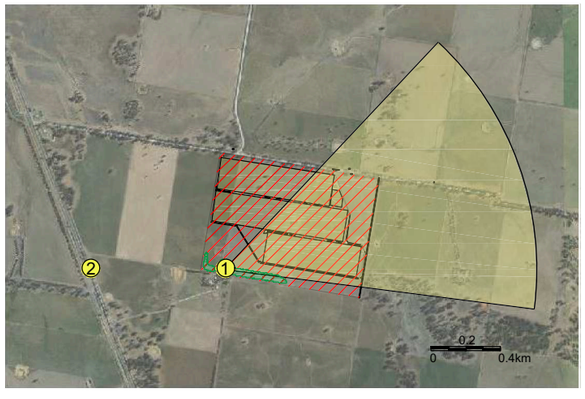
James Buckley - B.Arch(Hons) A.I.A
NSW Board of Architects registration No 8504

Photomontage Image created using:

AutoCAD 2016, Sketchup 2016, Thea Render, Adobe photoshop

Base photograph details:

Camera:	Nikon Coolpix S3500
Photo taken:	3.35pm on 28/01/2016
Location of photo:	E: 544685 N: 6200693
Height above ground:	1.6 m



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REV.	DATE	DFTD.	APPD.	DETAILS
A	25/02/2016	BH	AB	WORKING DRAFT
B	03/03/2016	JPB	AB	CLIENT ISSUE

DRAWING SCALE

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PROJECT
GIDGINBUNG SOLAR FARM
STATEMENT OF
ENVIRONMENTAL EFFECTS

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EPHO PTY LTD

DRAWING
VIEW_01_EXISTING

PROJECT NUMBER 215436	DRAWING FILE 215436_03A_A01-A05.dwg	SIZE A1
SOURCE:		SET 03B
IMAGE SOURCE: SIX MAPS		
STATUS FOR REVIEW	SHEET A01_ OF A05	

View Location 1 - View with Solar panel array installed

Note: Base photo taken from inside property boundary from top of dam wall

Photomontage created by:

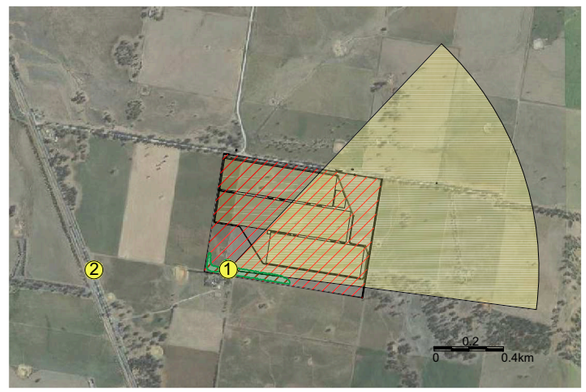
James Buckley - B.Arch(Hons) A.I.A
NSW Board of Architects registration No 8504

Photomontage Image created using:

AutoCAD 2016, Sketchup 2016, Thea Render, Adobe photoshop

Base photograph details:

Camera:	Nikon Coolpix S3500
Photo taken:	3.35pm on 28/01/2016
Location of photo:	E: 544685
	N: 6200693
Height above ground:	1.6 m



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orange@geolyse.com
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REV.	DATE	DFTD.	APPD.	DETAILS
A	25/02/2016	BH	AB	WORKING DRAFT
B	03/03/2016	JPB	AB	CLIENT ISSUE

DRAWING SCALE

DO NOT SCALE FROM THESE DRAWINGS. ALL MEASUREMENTS SHALL BE CONFIRMED ON SITE AND WITH GEOLYSE PTY. LTD. PRIOR TO CONSTRUCTION

PROJECT
GIDGINBUNG SOLAR FARM
STATEMENT OF
ENVIRONMENTAL EFFECTS

APPROVAL AUTHORITY
TEMORA
SHIRE COUNCIL
NSW

CLIENT
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DRAWING
VIEW_01_WITH PANELS

PROJECT NUMBER 215436	DRAWING FILE 215436_03A_A01-A05.dwg	SIZE A1
SOURCE:		SET 03B
IMAGE SOURCE: SIX MAPS		
STATUS FOR REVIEW	SHEET A02_ OF A05	

View Location 1 - View with Solar panel array installed and plant screening

Note: Base photo taken from inside property boundary from top of dam wall

Photomontage created by:

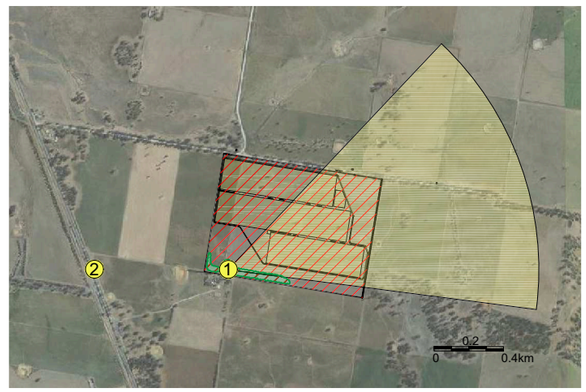
James Buckley - B.Arch(Hons) A.I.A
NSW Board of Architects registration No 8504

Photomontage Image created using:

AutoCAD 2016, Sketchup 2016, Thea Render, Adobe photoshop

Base photograph details:

Camera:	Nikon Coolpix S3500
Photo taken:	3.35pm on 28/01/2016
Location of photo:	E: 544685 N: 6200693
Height above ground:	1.6 m



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DRAWING
VIEW_01_WITH SCREEN

PROJECT NUMBER 215436	DRAWING FILE 215436_03A_A01-A05.dwg	SIZE A1
SOURCE:		SET 03B
IMAGE SOURCE: SIX MAPS		
STATUS FOR REVIEW	SHEET A03_ OF A05	

View Location 2 - Existing view

Photomontage created by:

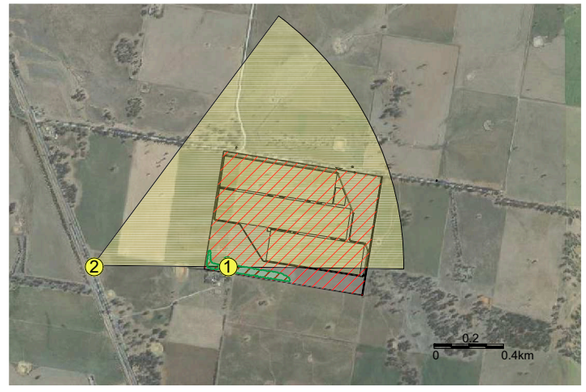
James Buckley - B.Arch(Hons) A.I.A
NSW Board of Architects registration No 8504

Photomontage Image created using:

AutoCAD 2016, Sketchup 2016, Thea Render, Adobe photoshop

Base photograph details:

Camera:	Cannon E0S 1200D digital SLR
Photo taken:	2.15pm on 29/02/2016
Location of photo:	E: 543918
	N: 6200678
Height above ground:	1.6 m



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DRAWING
VIEW_02_EXISTING

PROJECT NUMBER 215436	DRAWING FILE 215436_03A_A01-A05.dwg	SIZE A1
SOURCE:		SET 03B
IMAGE SOURCE: SIX MAPS		
STATUS FOR REVIEW	SHEET A04_ OF A05	

View Location 2 - View with Solar panel array installed

Photomontage created by:

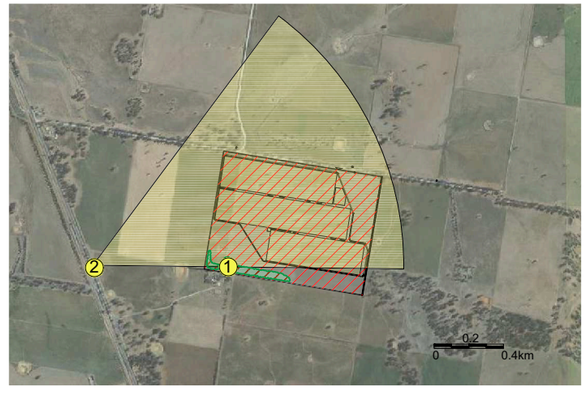
James Buckley - B.Arch(Hons) A.I.A
NSW Board of Architects registration No 8504

Photomontage Image created using:

AutoCAD 2016, Sketchup 2016, Thea Render, Adobe photoshop

Base photograph details:

Camera:	Cannon E0S 1200D digital SLR
Photo taken:	2.15pm on 29/02/2016
Location of photo:	E: 543918 N: 6200678
Height above ground:	1.6 m



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DRAWING
VIEW_02_WITH PANELS

PROJECT NUMBER 215436	DRAWING FILE 215436_03A_A01-A05.dwg	SIZE A1
SOURCE:		SET 03B
IMAGE SOURCE: SIX MAPS		
STATUS FOR REVIEW	SHEET A05_ OF A05	

Appendix B

CASA CONSULTATION

Andrew Brownlow

From: YATES, LEONARD <LEONARD.YATES@casa.gov.au>
Sent: 5 February 2016 9:23 AM
To: 'abrownlow@geolyse.com'
Cc: INFO OAR; SCRIMES, KAREN; De Bray, Serghei; Hain, Joe
Subject: RE: PROPOSED GIDGINBUNG SOLAR FARM [SEC=UNCLASSIFIED]

UNCLASSIFIED

Hi, Andrew . . .

CASA has reviewed the information you provided regarding the proposed Gidginbung Solar Farm, to be located approximately 10km north of Temora aerodrome, and has formed the view that there would be no operational or environmental consequences from this development that might affect aviation safety.

Regards,

. . . Leonard

Leonard Yates | Flying Operations Inspector
Operations Division | Sydney Region | Civil Aviation Safety Authority
Level 2, 260 Elizabeth Street Sydney NSW 2010
GPO Box 2005 Canberra ACT 2601 | Tel: 02 8651 3010 | Fax: 02 8651 3072 | Cell: 0419 464 521
Website: www.casa.gov.au | e-mail: Leonard.Yates@casa.gov.au

From: De Bray, Serghei
Sent: Thursday, 4 February 2016 11:03 AM
To: YATES, LEONARD
Cc: INFO OAR; SCRIMES, KAREN
Subject: PROPOSED GIDGINBUNG SOLAR FARM [SEC=UNCLASSIFIED]

UNCLASSIFIED

G'day Leonard,

I see no aircraft environmental implications associated with the proposed Gidginbung solar farm.

I've had a look at the DAP 3Mar'16 Temora AD and procedure charts. I assume no Temora procedures would be affected, and therefore not cause any change in aircraft noise levels/track miles/fuel use/emissions.

Regards
Serghei de Bray

Office of Airspace Regulation
Airspace & Aerodrome Regulation
Civil Aviation Safety Authority
GPO Box 2005
CANBERRA ACT 2601

Phone (02) 6217 1409
Mobile 0423 829 745

From: YATES, LEONARD
Sent: Wednesday, 3 February 2016 3:23 PM
To: De Bray, Serghei

Cc: INFO OAR; SCRIMES, KAREN
Subject: FW: PROPOSED GIDGINBUNG SOLAR FARM [SEC=UNCLASSIFIED]

UNCLASSIFIED

Hi, Serghei . . .

I've had an enquiry about a solar farm that is proposed for a site approximately 10km (5.5NM) north of Temora aerodrome. I don't believe there would be any concerns from an operational perspective with this proposal. However, I wonder if there might be any concerns from an environmental viewpoint?

Regards,

. . . Leonard

Leonard Yates | Flying Operations Inspector
Operations Division | Sydney Region | Civil Aviation Safety Authority
Level 2, 260 Elizabeth Street Sydney NSW 2010
GPO Box 2005 Canberra ACT 2601 | Tel: 02 8651 3010 | Fax: 02 8651 3072 | Cell: 0419 464 521
Website: www.casa.gov.au | e-mail: Leonard.Yates@casa.gov.au

From: Andrew Brownlow [mailto:abrownlow@geolyse.com]
Sent: Monday, 1 February 2016 11:26 AM
To: YATES, LEONARD
Cc: 'Matthew Clarke'
Subject: PROPOSED GIDGINBUNG SOLAR FARM

Mr Leonard Yates
Civil Aviation Safety Authority
Airspace Regulation

Leonard

Thank you for your time last week and your offer to look at the proposed Gidginbung Solar Farm.
The attached shows the proposed development site location in relationship to the Temora Airport.
As you will see it is some 9 km to the north so we envisage no issue with respect to pilot safety.
The detailed design of the solar farm has yet to be completed, but the technology to be employed will be horizontal single-axis solar trackers following the sun's path in an east-west direction.
As part of the development approvals process Temora Shire Council has asked that we consult with CASA to confirm that there are no issues from your perspective.
If there is anything further you require to assist please do not hesitate to give me a call.

With thanks

Andrew

Andrew Brownlow
Manager - Environmental / Director (CEnvP)
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Orange NSW 2800
Ph: 02 6393 5000
Fx: 02 6393 5050
Mob: 0417 210 253
Email: abrownlow@geolyse.com
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IMPORTANT