

EPURON

# Environmental Impact Statement

NEVERTIRE SOLAR FARM



FEBRUARY 2017



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## Certification

For submission of an environmental impact statement (EIS) under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979*.

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### Proposed Development:

The Nevertire Solar Farm proposal includes the construction, operation and decommissioning of a photovoltaic (PV) solar farm that would produce up to 105 Megawatts (MW AC) of electricity, and associated infrastructure.

### Land to be developed:

The proposed solar farm is Lot 26 DP 755292. The proposed transmission line would occur within the road reserve of Belerenga Street and intersect the Nevertire Warren railway line, Lot 100 DP 1179330, Lot 37 DP 755292 and Lot 1 DP 830042.

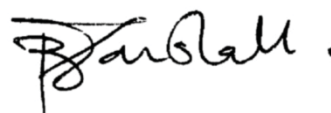
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I certify that I have prepared the contents of this Environmental Impact Statement in accordance with Schedule 2 of the *Environmental Planning and Assessment Regulations 2000*. To the best of my knowledge, this assessment contains all available information that is relevant to the environmental assessment of the development, activity or infrastructure, and that information in the EIS is neither false nor misleading.

Name: Jane Blomfield

Brooke Marshall

Signature:



Date: 06 February 2017

06 February 2017

# CONTENTS

<b>TERMS AND DEFINITIONS</b> .....	<b>viii</b>
<b>EXECUTIVE SUMMARY</b> .....	<b>xvi</b>
PROPOSAL OBJECTIVES .....	xvi
PROPOSAL NEEDS AND BENEFITS .....	xvi
PROPOSAL DESCRIPTION .....	xvii
KEY ENVIRONMENTAL ASSESSMENT ISSUES .....	xviii
Summary of higher risk issues .....	xviii
Lower risk issues .....	xx
MANAGEMENT OF IMPACTS .....	xx
CONCLUSION.....	xx
<b>1 INTRODUCTION</b> .....	<b>1</b>
1.1 PURPOSE AND SCOPE OF THIS DOCUMENT.....	1
1.2 PROPOSAL OVERVIEW.....	1
1.2.1 Terminology.....	1
1.2.2 The proponent.....	1
1.2.3 Site location .....	2
1.2.4 The Nevertire Solar Farm.....	4
<b>2 JUSTIFICATION AND BENEFITS OF THE PROPOSAL</b> .....	<b>6</b>
2.1 PROJECT OBJECTIVES .....	6
2.2 PROJECT NEED.....	6
2.3 PROPOSAL BENEFITS .....	6
2.4 ALTERNATIVES CONSIDERED.....	7
2.4.1 Alternative sites considered .....	7
2.4.2 Alternative technology considered.....	7
<b>3 PROPOSAL DESCRIPTION</b> .....	<b>9</b>
3.1 PROPOSAL SITE.....	9
3.2 KEY INFRASTRUCTURE COMPONENTS .....	14
3.2.1 Solar arrays .....	15
3.2.2 Inverter Stations .....	18
3.2.3 Underground cabling .....	19
3.2.4 Transmission line .....	20
3.2.5 Substation.....	22

---

3.2.6	Access and internal tracks .....	22
3.2.7	Ancillary facilities and construction compound.....	23
3.2.8	Perimeter security fencing.....	24
3.3	<b>CONSTRUCTION AND COMMISSIONING .....</b>	<b>24</b>
3.3.1	Indicative timeline .....	24
3.3.2	Construction activities .....	25
3.3.3	Hours of operation during construction.....	25
3.3.4	Resourcing requirements during construction .....	25
3.3.5	Operation.....	27
3.3.6	Decommissioning.....	27
<b>4</b>	<b>STAKEHOLDER CONSULTATION .....</b>	<b>29</b>
4.1	<b>AGENCY CONSULTATION .....</b>	<b>29</b>
4.1.1	Secretary’s environmental assessment requirements (SEARs) .....	29
4.1.2	Relevant guidelines.....	32
4.1.3	Agencies additional comments.....	34
4.2	<b>ABORIGINAL COMMUNITY CONSULTATION .....</b>	<b>39</b>
4.3	<b>COMMUNITY CONSULTATION .....</b>	<b>40</b>
4.3.1	Community consultation plan .....	40
4.3.2	Visual impact assessment requirements .....	40
4.3.3	Community consultation activities to date.....	41
4.3.4	Results of community consultation .....	41
4.3.5	Continued engagement .....	42
<b>5</b>	<b>PLANNING CONTEXT .....</b>	<b>43</b>
5.1	<b>ASSESSMENT CONTEXT .....</b>	<b>43</b>
5.1.1	Permissibility.....	43
5.1.2	State Significant Development (SDD) .....	43
5.2	<b>EVALUATION OF THE DEVELOPMENT .....</b>	<b>43</b>
5.3	<b>NSW LEGISLATION.....</b>	<b>45</b>
5.3.1	Environmental Planning and Assessment Act 1979.....	45
5.3.2	State Environmental Planning Policy (Rural Lands) 2008 .....	46
5.3.3	State Environmental Planning Policy No. 55 - Remediation of Land .....	47
5.3.4	State Environmental Planning Policy No. 44 – Koala Habitat Protection .....	47
5.3.5	Warren Local Environmental Plan 2012 .....	47
5.3.6	Roads Act 1993 .....	49

---

5.3.7	Crown Lands Act 1989 .....	49
5.3.8	Threatened Species Conservation Act 1995 .....	49
5.3.9	Protection of the Environment Operations Act 1997 .....	50
5.3.10	Water Management Act 2000 .....	51
5.3.11	Fisheries Management Act 1994 (FM Act) .....	51
5.3.12	National Parks and Wildlife Act 1974 .....	51
5.3.13	Native Vegetation Act 2003.....	52
5.3.14	Heritage Act 1977 .....	52
5.4	COMMONWEALTH LEGISLATION .....	52
5.4.1	Environmental Protection and Biodiversity Conservation Act 1999 .....	52
5.4.2	Native Title Act 1993.....	54
5.4.3	Renewable Energy (Electricity) Act 2000.....	55
5.5	OTHER RELEVANT POLICIES AND MATTERS.....	55
5.5.1	Ecological Sustainable Development (ESD) .....	55
5.6	SUMMARY OF LICENSES.....	57
<b>6</b>	<b>ENVIRONMENTAL IMPACT ASSESSMENT.....</b>	<b>58</b>
6.1	IMPACT ASSESSMENT APPROACH .....	58
6.2	BIODIVERSITY .....	59
6.2.1	NSW Framework for Biodiversity Assessment.....	59
6.2.2	Commonwealth Matters of National Environmental Significance (MNES) .....	67
6.2.3	Potential impacts .....	68
6.2.4	Safeguards and mitigation measures .....	69
6.3	ABORIGINAL HERITAGE .....	70
6.3.1	Approach .....	70
6.3.2	Archaeological context .....	71
6.3.3	Survey results.....	71
6.3.4	Potential impacts .....	72
6.3.5	Safeguards and mitigation measures .....	72
6.4	NOISE IMPACTS .....	73
6.4.1	Approach .....	73
6.4.2	Existing environment .....	73
6.4.3	Noise monitoring .....	73
6.4.4	Construction noise impact assessment .....	76
6.4.5	Operational noise assessment.....	79

---

6.4.6	Vibration assessment.....	81
6.4.7	Road traffic noise assessment .....	82
6.4.8	Safeguards and mitigation measures .....	83
6.5	VISUAL IMPACT .....	84
6.5.1	Approach .....	84
6.5.2	Results.....	84
6.5.3	Potential impacts .....	91
6.5.4	Safeguards and mitigation measures .....	102
<b>7</b>	<b>ASSESSMENT OF ADDITIONAL ISSUES.....</b>	<b>104</b>
7.1	SOILS.....	104
7.1.1	Existing environment .....	104
7.1.2	Potential impacts .....	106
7.1.3	Safeguards and mitigation measures .....	107
7.2	HYDROLOGY, WATER USE AND WATER QUALITY (SURFACE AND GROUNDWATER) .....	109
7.2.1	Existing environment .....	109
7.2.2	Potential impacts .....	114
7.2.3	Safeguards and mitigation measures .....	117
7.3	TRAFFIC, TRANSPORT AND ROAD SAFETY.....	118
7.3.1	Existing environment .....	118
7.3.2	Potential impacts .....	119
7.3.3	Safeguards and mitigation measures .....	122
7.4	LAND USE IMPACTS (INCLUDING MINERAL RESOURCES) .....	123
7.4.1	Existing environment .....	123
7.4.2	Potential impacts .....	124
7.4.3	Safeguards and mitigation measures .....	126
7.5	RESOURCE USE AND WASTE GENERATION .....	127
7.5.1	Existing environment .....	127
7.5.2	Potential impacts .....	128
7.5.3	Safeguards and mitigation measures .....	129
7.6	MAGNETIC FIELDS .....	130
7.6.1	Existing Environment .....	130
7.6.2	Potential impacts .....	133
7.6.3	Safeguards and mitigation measures .....	134
7.7	CLIMATE AND AIR QUALITY.....	134

---

7.7.1	Existing environment .....	134
7.7.2	Potential impacts .....	136
7.7.3	Safeguards and mitigation measure .....	137
7.8	HISTORIC HERITAGE .....	137
7.8.1	Approach .....	137
7.8.2	Results.....	138
7.8.3	Potential impacts .....	139
7.8.4	Safeguards and mitigation measures .....	139
7.9	BUSH FIRE RISK.....	139
7.9.1	Existing environment .....	139
7.9.2	Potential impacts .....	140
7.9.3	Safeguards and mitigation measures .....	141
7.10	COMMUNITY AND SOCIO-ECONOMIC .....	142
7.10.1	Background .....	142
7.10.2	Potential impacts .....	146
7.10.3	Safeguards and mitigation measures .....	147
7.11	CUMULATIVE IMPACTS .....	147
<b>8</b>	<b>ENVIRONMENTAL MANAGEMENT.....</b>	<b>149</b>
8.1	ENVIRONMENTAL FRAMEWORK.....	149
8.2	MITIGATION MEASURES .....	149
<b>9</b>	<b>CONCLUSION .....</b>	<b>158</b>
<b>10</b>	<b>REFERENCES.....</b>	<b>160</b>
<b>APPENDIX A</b>	<b>SECRETARY’S ENVIRONMENTAL ASSESSMENT REQUIREMENTS.....</b>	<b>A-I</b>
<b>APPENDIX B</b>	<b>CONSTRAINTS MAP.....</b>	<b>B-I</b>
<b>APPENDIX C</b>	<b>CONSULTATION .....</b>	<b>C-II</b>
<b>APPENDIX D</b>	<b>BIODIVERSITY ASSESSMENT .....</b>	<b>D-III</b>
<b>APPENDIX E</b>	<b>ABORIGINAL CULTURAL HERITAGE ASSESSMENT .....</b>	<b>E-IV</b>
<b>APPENDIX F</b>	<b>NOISE ASSESSMENT .....</b>	<b>F-V</b>
<b>APPENDIX G</b>	<b>VISUAL IMPACT ASSESSMENT .....</b>	<b>G-VI</b>



## TABLES

Table 3-1 Indicative timeline. ....	24
Table 4-1 SEARs issue summary.....	29
Table 4-2 Guidelines relevant to this EIS .....	32
Table 4-3 Agency consultation summary.....	34
Table 5-1 Matters of consideration .....	44
Table 5-2 Summary of Matters of National Environmental Significance (10km search radius). ....	53
Table 5-3 Summary of other matters protected by the EPBC Act (10km search radius).....	53
Table 5-4 Summary extra information (10km search radius). ....	53
Table 5-5 ESD Principles.....	55
Table 5-6 Summary of licenses required.....	57
Table 6-1 Risk analysis of environmental issues .....	59
Table 6-2 Vegetation zones for the development site.....	65
Table 6-3 Species impacted at the development site.....	66
Table 6-4 Safeguards and mitigation measures for biodiversity impacts.....	69
Table 6-5 Identified risk to known sites.....	72
Table 6-6 Safeguards and mitigation measures for Aboriginal heritage .....	72
Table 6-7 Results of background noise monitoring and noise management levels .....	74
Table 6-8 Noise Management Levels at residential receivers .....	76
Table 6-9 Construction Noise Management Levels at Residential Receivers .....	76
Table 6-10 Construction equipment sound power levels.....	77
Table 6-11 Predicted $L_{Aeq\ 15\ min}$ construction noise levels at receiver locations .....	77
Table 6-12 Relative Effectiveness of Various Forms of Noise Control, dB(A) .....	78
Table 6-13 NSW Industrial Noise Policy Proposal Specific criteria .....	79
Table 6-14 Applicable operational noise criteria.....	79
Table 6-15 Sleep Disturbance Criteria dB(A) .....	79
Table 6-16 Typical operational plant and equipment and sound power levels for the proposal.....	80
Table 6-17 Predicted $L_{Aeq\ 15min}$ Operational Noise Levels at Receiver Locations, dB(A) .....	81

Table 6-18 Potential vibration Impacts for Identified receivers. ....	81
Table 6-19 Summary of estimated construction traffic volumes during peak. ....	82
Table 6-20 Predicted road traffic noise contribution levels along public roads, dB(A). ....	83
Table 6-21 Safeguards and mitigation measures for noise impacts ....	83
Table 6-22 Landscape Characteristic Units within 16km of the proposed Nevertire Solar Farm.....	86
Table 6-23 Representative viewpoints (ID) with reference to the proposed Nevertire Solar Farm.....	88
Table 6-24 Visual impact at representative viewpoints with high and medium impact, with reference to the Nevertire Solar Farm.....	92
Table 6-25 Safeguards and mitigation measures for visual impacts ....	102
Table 7-1 Soil types and descriptions (OEH 2016). ....	104
Table 7-2 Safeguards and mitigation measures for soil impacts ....	107
Table 7-3 Water requirements during construction.....	115
Table 7-4 Safeguards and mitigation measures for water quality impacts ....	117
Table 7-5 Summary of the estimated construction traffic volumes during peak.....	120
Table 7-6 Safeguards and mitigation measures for traffic, transport and road safety impacts.....	122
Table 7-7 Safeguards and mitigation measures for land use impacts.....	126
Table 7-8 Resource requirements for the proposed Nevertire Solar Farm. ....	127
Table 7-9 Safeguards and mitigation measures for resource use and waste generation ....	129
Table 7-10 Summary of the Interim guidelines on limits of exposure to 50/60 Hz electric and magnetic fields. ....	130
Table 7-11 Typical magnetic fields from overhead powerlines. ....	132
Table 7-12 Typical electric and magnetic fields from overhead powerlines. ....	132
Table 7-13 Magnetic field levels from underground 33kV cabling. ....	133
Table 7-14 Safeguards and mitigation measures for magnetic fields.....	134
Table 7-15 Comparison of CO <sub>2</sub> equivalent emissions produced per kilowatt hour.....	135
Table 7-16 Safeguards and mitigation measures for climate and air quality impacts.....	137
Table 7-17 Summary of heritage listed items in the Warren LGA.....	138
Table 7-18 Safeguards and mitigation measures for Non-Aboriginal Heritage.....	139
Table 7-19 Safeguards and mitigation measures for bush fire risk. ....	141

Table 7-20 Community profile snapshot (REMPAN 2016a) ..... 144

Table 7-21 Safeguards and mitigation measures for Community and Socioeconomic impacts..... 147

**FIGURES**

Figure 1-1 Location of the proposal.....3

Figure 1-2 Proposed layout.....5

Figure 3-1 View of the proposal site from the south eastern corner from the (Mitchell Highway) access point.....10

Figure 3-2 View across the proposal site to the north from the eastern boundary.....10

Figure 3-3 Boggy Cowal along the western boundary of the proposal site.....11

Figure 3-4 View of Mitchell Highway looking east, approximately 700m east of the proposal site. ....12

Figure 3-5 Nevertire Substation.....13

Figure 3-6 Belerenga Street, Nevertire.....14

Figure 3-7 Example of poles driven into the ground .....16

Figure 3-8 Example of tracker mounting system installation .....16

Figure 3-9 Example of module assembly .....17

Figure 3-10 Example of solar array .....17

Figure 3-11 Example of tracking unit and solar module position .....18

Figure 3-12 Example of a containerised inverter station.....19

Figure 3-13 Example of trench.....19

Figure 3-14 Example of cable trench .....20

Figure 3-15 Typical trench cross-section 33-132kV underground cable .....21

Figure 3-16 Example 132kV powerline and pole. ....21

Figure 3-17 Example substation.....22

Figure 3-18 Internal track .....23

Figure 3-19 Typical fencing to be used. ....24

Figure 6-1 PCTs at the development site .....63

Figure 6-2 Example of moderate to good (poor) condition Poplar Box - Belah woodland in the development site. ....64

Figure 6-3 Example of moderate to good (medium) condition Poplar Box - Belah woodland derived grassland in the development site.....64

Figure 6-4 Example of low condition Poplar Box - Belah woodland derived grassland in the development site (foreground).....64

Figure 6-5 Residential receivers and noise monitoring locations adjacent to the proposal site.....75

Figure 6-6 Location of representative viewpoints and array infrastructure ZVI .....90

Figure 6-7 Panorama of ID 13, showing the horizontal extent of array infrastructure that would be visible from this location.....95

Figure 6-8 Panorama of ID 30, showing the horizontal extent of array infrastructure that would be visible from this location.....96

Figure 6-9 Panorama of ID 39, showing the horizontal extent of array infrastructure that would be visible from this location.....96

Figure 6-10 Panorama of ID 14, showing the horizontal extent of array infrastructure that would be visible from this location.....96

Figure 6-11 Panorama of ID 27, showing the horizontal extent of array infrastructure that would be visible from this location.....97

Figure 6-12 The location of the five panorama viewpoints: 13, 14, 27, 30 and 39 .....98

Figure 6-13 Proposed onsite screening..... 100

Figure 7-1 Salt scalding on proposal site ..... 105

Figure 7-2 Water inundation on proposal site..... 105

Figure 7-3 Cracking clays adjacent to proposal site..... 105

Figure 7-4 Waterways surrounding the proposal site. .... 110

Figure 7-5 Boggy Cowal on proposal site..... 110

Figure 7-6 Manmade dam onsite..... 110

Figure 7-7 informal drainage channels to be intersected by the proposed transmission line..... 111

Figure 7-8 Groundwater bores in relation to the proposal site (orange boundary)..... 112

Figure 7-9 GDEs in regards to proposal site, red (BOM 2016)..... 113

Figure 7-10 Flood Risk Information Map (Geoscience Australia 2016). .... 114

Figure 7-11 Comparative reflection analysis (Spaven 2011) ..... 125

Figure 7-12 Typical magnetic fields from overhead powerlines (Source: EMFs.info 2016). .... 131

Figure 7-13 Typical electric fields from overhead powerlines (Source: EMFs.info 2016). .... 132

Figure 7-14 Warren Bush Fire Prone Land, (Warren Shire Council 2006). ..... 140

## TERMS AND DEFINITIONS

4WD	Four Wheel Drive
ABS	Australian Bureau of Statistics
AC	Alternating Current
ACHAR	Aboriginal Cultural Heritage Assessment Report
ACHCRP	<i>Aboriginal cultural heritage consultation requirements for proponents 2010</i>
AHIMS	Aboriginal Heritage Information Management System
ANZECC	Australian and New Zealand Environment Conservation Council
ARENA	Australian Renewable Energy Agency
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
BAR	Biodiversity Assessment Report
BCC	BioBanking Credit Calculator
BLM	Bureau of Land Management
BOM	Bureau of Meteorology
CCP	Community Consultation Plan
CEMP	Construction Environmental Management Plan
CHMP	Cultural Heritage Management Plan
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DA	Development Application
dB(A).	A measure of A-weighted ( <i>c.f.</i> ) sound levels
DC	Direct current
DE	Development Envelope
DECCW	Refer to OEH
DoE	Department of the Environment (Commonwealth)
DP	Development Plan
DPE	Department of Planning and Environment
DPI	Department of Primary Industries
EECs	Endangered Ecological Communities

EIA	Environmental impact assessment
EIS	Environmental Impact Statement
ELF	Extremely Low Frequency
EMFs	Electromagnetic fields
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ESD	Ecological Sustainable Development
FBA	Framework for Biodiversity Assessment
FFMP	Flora and Fauna Management Plan
FM Act	Fisheries Management Act 1994
GDE	Groundwater Dependant Ecosystem
GHGs	Greenhouse Gases
ha	hectares
HAZMAT	Hazardous Material
Hz	Hertz
IBRA	Interim Biogeographic Regionalisation for Australia
IF	Isolated Find
ICNG	Interim Construction Noise Guideline
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IEA	International energy Agency
INP	Industrial Noise Policy
ISEPP	<i>State Environmental Planning Policy (Infrastructure) 2007</i>
Island GP	Island Green Power
kL	kilolitre
km	kilometres
kV	kilovolts
LCU	Landscape character units
LEP	Local Environment Plan

LGA	Local Government Area
m	Metres
mm	Millimetres
MNES	Matter of National Environmental Significance
MW	Megawatt
NEM	National Electricity Market
NHMRC	National Health and Medical Research Council's
NMLs	noise management levels
NPW Act	National Parks and Wildlife Act 1974
NSW	New South Wales
EPA	Environmental Protection Authority
OEH	Office of Environment and Heritage
OEMP	Operational Environmental Management Plan
PCT	Plant Community Type
POEO Act	<i>Protection of the Environment Operations Act 1997 (NSW)</i>
PV	Photovoltaic
QLD	Queensland
RBL	Rating Background Level
RE Act	<i>Renewable Energy (Electricity) Act 2000 (Commonwealth)</i>
RMS	(NSW) Roads and Maritime Services, formerly Roads and Traffic Authority (RTA)
RNP	Road Noise Policy
SEARs	Secretary's Environmental Assessment Requirements
SEIFA	socio-economic indexes for Areas
SEPP	State Environmental Planning Policy (NSW)
SEPP (Infrastructure)	<i>State Environmental Planning Policy (Infrastructure) 2007 (NSW)</i>
SHI	NSW State Heritage Inventory
SRD SEPP	<i>State Environmental Planning Policy (State and Regional Development) 2011 (NSW)</i>
SSD	State Significant Development, as defined by section 89C of the EP&A Act (c.f.)



TMP	Traffic Management Plan
TSC Act	<i>Threatened Species Conservation Act 1995 (NSW)</i>
TSR	Travelling Stock Reserve
TX	Transmission
VIA	Visual Impact Assessment
VLM	Visual Landscape Management
WARR Act	Waste Avoidance and Resource Recovery Act 2001
WM Act	Water Management Act
WMP	Waste Management Plan
WSP	Water Sharing Plans

## EXECUTIVE SUMMARY

This Environmental Impact Statement (EIS) identifies and assesses the environmental issues associated with the construction, operation and decommissioning of the proposed Nevertire Solar Farm (the “Proposal”). The proposed photovoltaic (PV) solar farm would produce up to 105 Megawatts (MW) of electricity. NGH Environmental has prepared this EIS on behalf of the proponent, Nevertire Solar Pty Ltd (‘Epuron’ or ‘the proponent’), a company established to progress the Nevertire Solar Project, owned by Epuron and Island GP.

This EIS has been prepared in accordance with Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) to support a Development Application (DA) to be lodged with NSW Department of Planning and Environment (DPE).

A preliminary constraints analysis was undertaken during the early stages of design for the proposed Nevertire Solar Farm. The findings of the constraints analysis resulted in a number of early design decisions to reflect the site’s constraints. these included:

- A buffer zone of 40m was applied to the centreline of the mapped Boggy Cowal, to be excluded from impacts. this reflects potential for higher soil and water, archaeological and biodiversity values.
- Mature native vegetation remnants on site were excluded from impacts.
- The proposed transmission line with the least amount of impact vegetation and potential fauna habitat was selected over alternatives that would have had greater biodiversity impact.
- Establishment of specific vegetation screening for visual impact was included in the project description

The preliminary constraints mapping was included in the scoping study submitted for this proposal and is provided again in Appendix B of this EIS.

## PROPOSAL OBJECTIVES

The objectives of the Nevertire Solar Farm are to:

- Select and develop a site which is suitable for commercial scale solar electricity generation which will assist the NSW and Commonwealth Governments to meet Australia’s renewable energy targets and other energy and carbon mitigation goals.
- Provide a clean and renewable energy source to assist in reducing greenhouse gas (GHG) emissions.
- Develop a project which is acceptable to the local community.
- Provide local and regional employment opportunities and other social benefits during construction and operation.
- Construct a project with minimal adverse environmental impacts.

## PROPOSAL NEEDS AND BENEFITS

The Australian Energy Market Operator’s June 2016 National Electricity Forecasting Report (NEFR) projects that the NEM electricity demand will stay constant for the next 20 years. The NEFR predicts further withdrawal of thermal power stations will take place as older power station reach the end of their working lives, which will contribute to Australia’s ability to meet its greenhouse gas emissions targets. New renewable electricity generation is expected to replace much of the retiring fossil fuel capacity. Solar power

generation provides predictable, lower energy costs into the future and additionally will assist Australia to greenhouse gas emissions targets.

Climate change continues as a global threat, presenting clear risks to the environment as well as to communities. In response, a historic global climate change agreement took place under the United Nations Framework Convention on Climate Change in Paris from 30 November to 12 December 2015.

The key mechanism for promotion of new renewable generation in Australia is the Renewable Energy Target which aims to provide at least 20% of Australia's electricity from renewable sources by 2020. Approximately half of the target has been met to date which entails approximately 6GW of new renewable energy generation being required by 2020.<sup>1</sup>

Therefore, new renewable energy projects, such as the Nevertire Solar Farm, are required to meet Australia's electricity demands, greenhouse gas emissions and renewable energy targets.

The proposal will result in a number of benefits such as:

- Generation of approximately 263,000 MWh per annum of renewable electricity which is enough to supply electricity for 44,000 average NSW households<sup>2</sup>.
- Displacement of approximately 221,000 tonnes of CO<sub>2</sub> equivalent greenhouse gas emissions per year<sup>3</sup>.
- Diversification of fuel sources for electricity generation on the NEM therefore increasing energy security.
- Creation of local job opportunities.
- Injection of expenditure in the local area.
- Development of a new land use thereby diversifying the regional economy.

In summary, there is a clear need for the project to meet Australia's greenhouse gas reduction, renewable energy and electricity needs. The proposal has been assessed as having a low and manageable environmental impact and will bring local benefits such as job opportunities and local expenditure.

## **PROPOSAL DESCRIPTION**

The proposal site is located approximately 1km west of Nevertire within the Warren Shire Council Local Government Area (LGA). The site is accessed directly off the Mitchell Highway (State highway), which forms the southern site boundary. The proposed solar farm would connect to the national electricity grid via an existing substation within Nevertire, approximately 1.5km east of the site.

The proposal site comprises approximately 255ha of freehold land, identified as Lot 26 DP 755292. It has been used for agriculture for several decades and is therefore highly modified through grazing and cropping activities including ploughing. Areas of remnant native vegetation are however, located along the western boundary, along the centre of the northern boundary, and in the north-east corner of the site. There are two existing transmission line easements through the property, one located within the south eastern area of the proposal site and the other travels north west through the proposal site from the eastern boundary. The closest residential receiver is 340m south of the proposal site.

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<sup>1</sup> "Progress and status of the renewable energy target", Clean Energy Council, June 2016.

<sup>2</sup> "Guidance on electricity consumption benchmarks on residential consumers", AER, December 2014.

<sup>3</sup> "National Greenhouse Accounts Factors", Department of Environment and Energy, August 2016.

Key infrastructure for the proposal would include:

- Solar arrays comprised of approximately 364,000 modules (solar panels).
- Mounting frames: single axis-tracker units or fixed mounting frames.
- Inverter stations: between 24 and 55 inverter stations, each containing an inverter between 2.2 and 4.92MW capacity and a 400V/22-33kV transformer.
- Cabling, electrical connections and switch-gear, attached to the mounting frame structures, to interconnect modules.
- Underground cabling interconnecting arrays and inverter stations.
- An onsite substation containing one 22-33/132kV transformer and associated switchgear.
- Internal access tracks to allow for proposal maintenance of modules, inverters and vegetation management.
- Permanent staff amenities and offices with a small number of permanent parking spaces for the minimal staff required and occasional visitors.
- Perimeter security fencing: a chain-link/ barbed-wire security fence up to 3m in height.
- Specific native vegetation screening from specific visual impact locations.
- A 132kV power line connecting the solar farm to the Nevertire zone substation approximately 1.5km east of the proposal.

The construction and commissioning phase of the proposal would take approximately 12 months. Approximately 20 workers would be required during the first month of construction, rising to approximately 300 workers during the peak construction period (between 6 and 9 months).

At the end of its operational life, the proposal site would be decommissioned, removing all above ground infrastructure. Underground infrastructure less than 500mm deep may be removed in consultation with the landowner; landowner preference may be to leave groundcover undisturbed. Internal access tracks would be rehabilitated or sections retained, in consultation with the landowner.

## **KEY ENVIRONMENTAL ASSESSMENT ISSUES**

Prior to detailed environmental investigations, a risk assessment was carried out to identify the key environmental risks of the proposal, to guide the depth of investigation in this EIS. The risk assessment identified four environmental aspects as key risks. Specialist investigations were subsequently undertaken in these areas as part of this EIS:

- Biodiversity.
- Aboriginal heritage.
- Noise.
- Visual amenity.

These issues are discussed in Section 6 of this EIS. Lower risk issues are discussed in Section 7, primarily by desktop assessment.

### ***Summary of higher risk issues***

#### **Biodiversity**

Biodiversity (flora and fauna) investigations included searches of relevant data bases and a site assessment in line with the *Framework for Biodiversity Assessment - NSW Biodiversity Offsets Policy for Major Projects* (Office of Environment and Heritage 2014). One Plant Community Type (PCT) was identified in the

development site, *Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW* (PCT 56). This vegetation is not listed as an Endangered Ecological Community. One threatened species, Sloane's Froglet (*Crinia sloanei*), is assumed to occur within the development site as survey timing was not suitable for this species and potentially suitable habitat for the species is present within the site. If impacted, areas of *Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW* and Sloane's Froglet habitat would require offsetting in accordance with the NSW Biodiversity Banking and Offsets Scheme. Alternatively, additional surveys for the Sloane's Froglet undertaken in winter have been recommended and if determined not to occur after these surveys, offsets would not be required for this species. Since the finalisation of the Biodiversity assessment, the proponent has confirmed all hollow bearing trees will be avoided by the proposal. This is now included as a commitment of the project.

### Aboriginal heritage

Aboriginal heritage investigations included Aboriginal community consultation, background research, a field survey and significance assessment. The consultation with Aboriginal stakeholders was undertaken in accordance with clause 80C of the *National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010*. The assessment was guided by the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011) and the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales* (OEH 2010a). The survey recorded three stone artefacts and one scarred tree across the proposal site.

It is possible that additional stone artefacts could occur within the proposed development footprint. However, based on the land use history of the proposal area, and an appraisal of the results from the field survey, there is negligible potential for the presence of intact subsurface deposits with high densities of objects or cultural material within the solar farm and powerline easement areas.

No additional archaeological investigations are considered to be required. The three isolated finds would be salvaged prior to development of the project by an archaeologist and/or the Warren LALC. The scarred tree would not be impacted by the proposal as its outside the development envelope.

### Noise

Noise investigations were undertaken in accordance with *NSW Industrial Noise Policy* (EPA 2000), *NSW Interim Construction Noise Guideline* (DECC 2009), *EPA's Assessing Vibration: A Technical Guideline* (DECC 2006) and *NSW Road Noise Policy* (DECCW 2011). Background noise monitoring was undertaken at the second nearest receiver to the proposal site, approximately 500m north of the site. The closest receiver, 340m south wasn't accessible to undertake monitoring. The monitoring location was used to model construction and operational noise impacts for the proposal.

The assessment predicted noise emissions would exceed relevant criteria during construction of the proposed solar farm for all the nearest affected receivers, except the second closest receiver (500m north). It is noted that construction noise levels at all receivers are predicted to be less than the highly noise affected level of 75dB(A). Receivers predominantly affected by the transmission line construction works are located far from the development envelope and potential exceedances would occur over a shorter duration than those closer to the proposal site. Mitigation measures including noise control measures such as distance and screening would limit the potential noise generated to within acceptable levels.

No exceedances of noise limits are predicted during operation or from traffic.

## Visual

Visual impact investigations were undertaken using a transparent, systematic evaluation based on the BLM Visual Resource Management System (Bureau of Land Management, US Department of the Interior n.d.), with reference to ARENA's *Establishing the social licence to operate large scale facilities in Australia* document (no date). These guidelines assisted in addressing the subjectivity of visual assessment and the importance of including community perceptions in the assessment, as much as possible. The assessment included topographical modelling, ground truthing, incorporates community consultation results and was informed by specific photomontages of the proposal.

A medium impact was determined for three representative viewpoints. Onsite vegetation screening is proposed to break up views of the proposed infrastructure from these locations. This would reduce the impact to a low and acceptable level. Generally, the low height infrastructure and onsite screening will minimise the view shed, and therefore visual impact will be low.

## Lower risk issues

Ten lower risk issues were investigated, primarily using desktop assessment, in Section 7 of this EIS and include:

- Soil.
- Hydrology, water use and water quality (surface and groundwater).
- Traffic, transport and road safety.
- Land use impacts (including mineral resources)
- Resource use and waste generation.
- Magnetic fields
- Climate and air quality.
- Historic heritage.
- Bush fire risk.
- Community and Socio-economic

These impacts were assessed as highly manageable.

## MANAGEMENT OF IMPACTS

Impact avoidance and minimisation measures have been incorporated into the design of the proposal. These measures are considered practical and achievable by the proponent. They are set out for each area of investigation in Sections 6 and 7 and summarised in Section 8.2 of this EIS.

All commitments and environmental safeguards would be managed through the implementation of a Project Environmental Management Plan, consisting of a Construction Environmental Management Plan, an Operation Environmental Management Plan and a Decommissioning Environmental Management Plan. These plans would be prepared sequentially and submitted to the Department of Planning and Environment (DPE), prior to each stage of works.

## CONCLUSION

This EIS identifies and assesses the environmental issues associated with the construction, operation and decommissioning of the proposed Nevertire Solar Farm, in accordance with Part 4 of the NSW EP&A Act and the Schedule 2 of the EP&A Regulation.

There is a clear need for the project to meet Australia's electricity needs, renewable energy and greenhouse gas reduction needs. Additionally, it will bring local benefits such as job opportunities and local expenditure to the local area, mostly during the construction phase.

A suite of management measures has been developed to address environmental impacts and risks to these and other physical, social and environmental impact areas. Key management strategies centre on management plans and protocols to minimise impacts and manage identified risks.

The impacts and risks identified are considered manageable with the effective implementation of the measures stipulated in this EIS. Impacts are considered justifiable and acceptable.

# 1 INTRODUCTION

## 1.1 PURPOSE AND SCOPE OF THIS DOCUMENT

This Environmental Impact Statement (EIS) identifies and assesses the environmental issues associated with the construction, operation and decommissioning of the proposed Nevertire Solar Farm (the “Proposal”). The proposed photovoltaic (PV) solar farm would produce up to 105 Megawatts (MW AC) of electricity. NGH Environmental has prepared this EIS on behalf of the proponent, Nevertire Solar Pty Ltd, a company established to progress the Nevertire Solar Project, owned by Epuron and Island GP.

This EIS has been prepared in accordance with Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) to support a Development Application (DA) to be lodged with NSW Department of Planning and Environment (DPE).

The objective of this EIS is to fulfil the requirements of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) and Section 79C of the EP&A Act. The structure and content of the EIS address the Secretary’s Environmental Assessment Requirements (SEARs), provided by NSW DPE on 5 December 2016 (refer Appendix A).

## 1.2 PROPOSAL OVERVIEW

### 1.2.1 Terminology

<b>Nevertire Solar Farm ‘Proposal’</b>	This refers to all infrastructure and activities required to construct, operate and decommission the proposed solar farm.
<b>Proposal site</b>	This refers to the main site containing most operational infrastructure, Lot 26 DP 755292. The site is 255 hectares. Excludes the transmission line.
<b>Development envelope</b>	The development envelope is the area within which all proposal infrastructure would be located. This includes the solar array, temporary construction facilities and access tracks and proposed transmission line route to the Substation. Includes impact buffer of the transmission line. This is the maximum area that may be developed. The final infrastructure footprint may however be less than this when final design stage is completed.

### 1.2.2 The proponent

Epuron and Island Green Power have formed a joint company called Nevertire Solar Pty Ltd. This company is currently working on a number of large scale renewable energy proposals.

The Epuron company that is a shareholder in Nevertire Solar is Epuron Projects Pty Ltd, which is a sister company to Epuron Pty Ltd. Epuron is an Australian-owned renewable energy company, established in 2003. Epuron has developed several wind farm energy proposals in NSW, including Gullen Range and Cullerin Range Wind Farms. These wind farms are currently operational. In the last five years, Epuron has grown the solar power side of its business. It has developed, and now own and operate a portfolio of solar projects of approximately 7MW aggregate output. In 2012 Epuron completed construction of three solar



power plants in remote communities in the Northern Territory. In 2013, Epuron acquired the 'Uterne 1' solar power station near Alice Springs and in July 2015 commissioned an extension to it, referred to as 'Uterne 2'. Earlier this year Epuron commissioned 1.8MW of solar capacity at the iconic Ayers Rock Resort at Yulara.

Island Green Power (Island GP) is a renewable energy developer focused exclusively on the development of Solar PV Plants. Island GP has developed a portfolio of solar plants in the United Kingdom with a total generation capacity of over 100MW. It also has proposals currently under development in UK, Spain, North America and Australia.

### **1.2.3 Site location**

The Nevertire Solar Farm proposal site is identified as Lot 26 DP 755292, and is located approximately 1km west of the Nevertire township and 90km west of Dubbo, within the Warren Shire Council Local Government Area (LGA). The site is accessed directly off the Mitchell Highway (State highway), which forms the southern site boundary.

The site is approximately 255ha, the majority of which has been cleared of native vegetation and is cultivated. The site is currently sown with wheat. The locality (defined as 5km from the proposal site) includes the village of Nevertire and agricultural farmland and industry.

The proposed solar farm would connect to the national electricity grid via an existing substation within Nevertire, approximately 1.5km east of the site. The proposed transmission line, east of the solar farm site would occur within the road reserve of Belerenga Street and intersect the Nevertire Warren railway line, Lot 100 DP 1179330, Lot 37 DP 755292 and Lot 1 DP 830042. It would be situated north of the Nevertire Community Park and Noel Waters Oval, and south of the Nevertire sewerage treatment plant.

The location of the proposal site is illustrated in Figure 1-1. Further information on the proposal site and the locality is provided in Section 3.

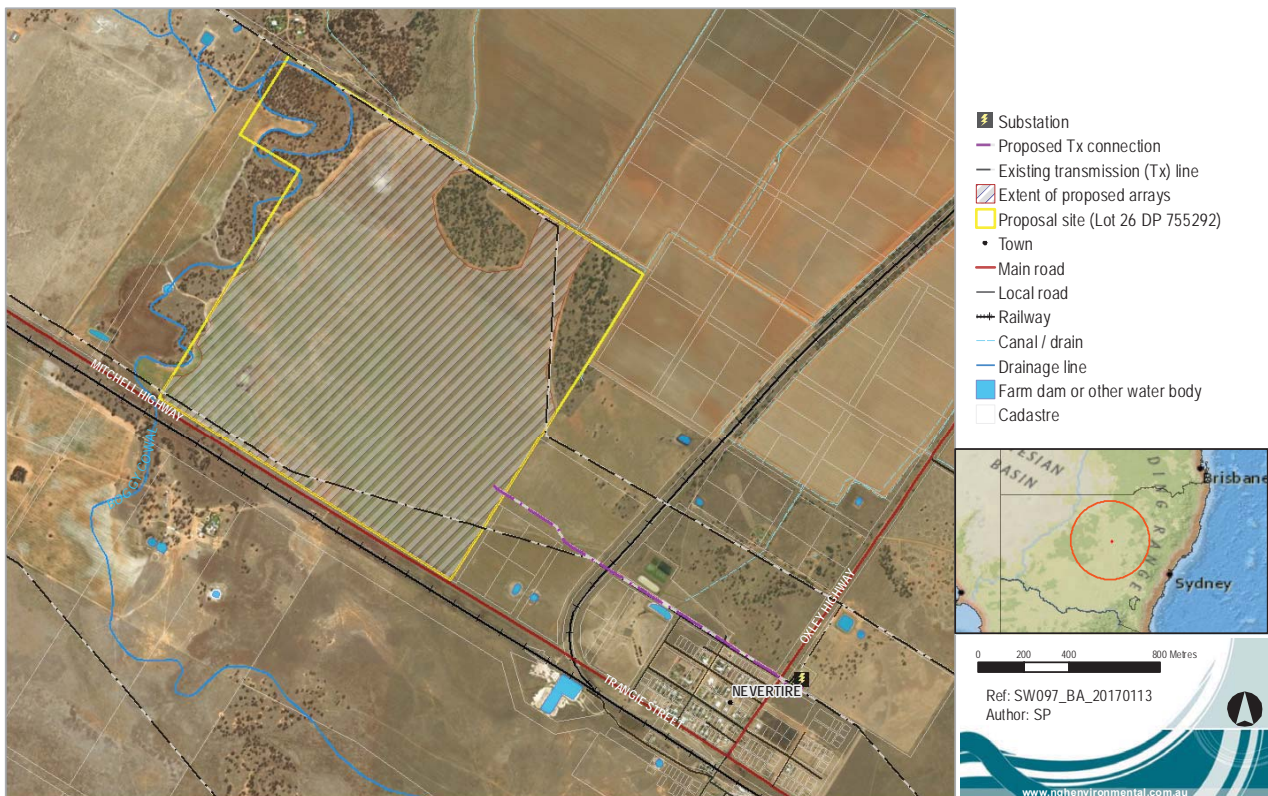


Figure 1-1 Location of the proposal.

### **1.2.4 The Nevertire Solar Farm**

The Nevertire Solar Farm proposal would comprise the installation of a solar plant with a capacity up to 105MW. This is enough electricity to power approximately 44,000 households within NSW<sup>4</sup>. The power generated will be fed into the National Electricity Market (NEM) at the transmission level from Essential Energy's Nevertire Substation.

Epuron proposes to develop approximately 200ha of the 255ha proposal site, retaining existing viable native vegetation remnants that occur on the array site. The Nevertire Solar Farm proposal would include the following elements:

- An access track off the Mitchell Highway.
- Flat plate PV modules in a fixed or tracking arrangement.
- Onsite 132kV substation.
- A site office and maintenance building.
- Internal inverter stations to allow conversion of DC module output to AC electricity.
- Underground electrical conduits and cabling to connect the arrays on the array site.
- Internal access tracks to allow for site maintenance.
- Perimeter security fencing.
- Grid connection to the existing substation approximately 1.5km east of the site via an overhead and underground line (132kv).
- Native vegetation screening, where required to break up views of infrastructure.

In total, the construction phase of the proposal is expected to take 12 months. The Nevertire Solar Farm is expected to operate for around 30 years. Approximately 2-3 operations and maintenance personnel would operate the plant. The solar farm would be decommissioned at the end of its operational life; all above ground infrastructure would be removed and below ground infrastructure less than 500mm deep would be removed subject to consultation with the landowner, with the site to be returned to its existing land capability.

The Nevertire Solar Farm design and construction, operation and decommissioning requirements are described in more detail in Section 3. A proposed layout is shown in Figure 1-2. The final detailed design would be developed after the appointment of a construction contractor, addressing all environmental mitigation measures contained within this EIS and any additional consent conditions applied to the proposal.

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<sup>4</sup> "Guidance on electricity consumption benchmarks on residential consumers", AER, December 2014.



Figure 1-2 Proposed layout.

## 2 JUSTIFICATION AND BENEFITS OF THE PROPOSAL

### 2.1 PROJECT OBJECTIVES

The objectives of the Nevertire Solar Farm are to:

- Select and develop a site which is suitable for commercial scale solar electricity generation which will assist the NSW and Commonwealth Governments to meet Australia's renewable energy targets and other energy and carbon mitigation goals.
- Provide a clean and renewable energy source to assist in reducing greenhouse gas (GHG) emissions.
- Develop a project which is acceptable to the local community.
- Provide local and regional employment opportunities and other social benefits during construction and operation.
- Construct a project with minimal adverse environmental impacts.

### 2.2 PROJECT NEED

The Australian Energy Market Operator's June 2016 National Electricity Forecasting Report (NEFR) projects that the NEM electricity demand will stay constant for the next 20 years. The NEFR predicts further withdrawal of thermal power stations will take place as older power station reach the end of their working lives, which will contribute to Australia's ability to meet its greenhouse gas emissions targets. New renewable electricity generation is expected to replace much of the retiring fossil fuel capacity. Solar power generation provides predictable, lower energy costs into the future and additionally will assist Australia to greenhouse gas emissions targets.

Climate change continues as a global threat, presenting clear risks to the environment as well as to communities. In response, a historic global climate change agreement took place under the United Nations Framework Convention on Climate Change in Paris from 30 November to 12 December 2015.

The key mechanism for promotion of new renewable generation in Australia is the Renewable Energy Target which aims to provide at least 20% of Australia's electricity from renewable sources by 2020. Approximately half of the target has been met to date which entails approximately 6GW of new renewable energy generation being required by 2020.<sup>5</sup>

Therefore, new renewable energy projects, such as the Nevertire Solar Farm, are required to meet Australia's electricity demands, greenhouse gas emissions and renewable energy targets.

### 2.3 PROPOSAL BENEFITS

The proposal will result in a number of benefits such as:

- Generation of approximately 263,000 MWh per annum of renewable electricity which is enough to supply electricity for 44,000 average NSW households<sup>6</sup>.

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<sup>5</sup> "Progress and status of the renewable energy target", Clean Energy Council, June 2016.

<sup>6</sup> "Guidance on electricity consumption benchmarks on residential consumers", AER, December 2014.

- Displacement of approximately 221,000 tonnes of CO<sub>2</sub> equivalent greenhouse gas emissions per year<sup>7</sup>.
- Diversification of fuel sources for electricity generation on the NEM, therefore increasing energy security.
- Creation of local job opportunities.
- Injection of expenditure in the local area.
- Development of a new land use thereby diversifying the regional economy.

The 'do nothing' option would forego these benefits. The do nothing approach would also avoid the environmental impacts associated with the proposal, however these impacts are considered to be manageable and will not cause a significant social, environmental or economic disturbance.

In summary, there is a clear need for the project to meet Australia's greenhouse gas reduction, renewable energy and electricity needs. The proposal has a low environmental impact and will bring local benefits such as job opportunities and local expenditure.

## **2.4 ALTERNATIVES CONSIDERED**

### **2.4.1 *Alternative sites considered***

During the site selection process for the proposed solar farm, a number of alternative locations were considered. Minimising environmental and social impacts and maximising efficiency were major considerations in the evaluation of alternatives.

The site was selected based on the:

- Availability of an abundant solar resource.
- Proximity to an existing electricity substation with sufficient connection capacity.
- Close proximity to connection point thus minimising transmission loss and connection costs.
- Other network electrical efficiencies; low transition and distribution losses for generation at this connection point in the network.
- Availability of suitable land.
- Suitability of the land in terms of factors that affect solar yield and construction costs (minimal shading, accessible, close to existing townships, low relief topography, low flood risk).
- Suitability of the land in terms of environmental factors that constrain development (minimal native vegetation removal required, previously disturbed site, no previously identified heritage or other social values).

### **2.4.2 *Alternative technology considered***

Solar photovoltaic technology has been selected for this proposal due to the following benefits:

- Commercially proven, robust and low technical risk.
- Low environmental impact in comparison to other power generation technologies.
- Western NSW has one of the best solar resources in the world.

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<sup>7</sup> "National Greenhouse Accounts Factors", Department of Environment and Energy, August 2016.

- Fast deployment in comparison with other renewable and non-renewable power generation technologies.
- Solar projects are highly reversible at the end of the project's life which allows for the return of the land to agriculture.

A number of photovoltaic module technologies are being considered for use in the proposed project such as crystalline silicon technology, CdTe thin film or amorphous silicon thin film technology. All technologies under consideration have a strong global track record, are standard flat-plate modules with similar visual characteristics, and have long term warranties.

Two mounting options are being considered for use in the proposal being fixed-tilt north facing mounting or single-axis tracking mounting. Single axis tracking modules are aligned north-south and track the sun east-west, moving every minute or so to follow the sun. Both tracking options are lower than 3m in height when operational. The highest impact case of single axis tracking was assumed in this EIS, specifically for the potential operational noise impacts.

The final decision on the module technology and mounting system will be made during the detailed design phase.

## **3 PROPOSAL DESCRIPTION**

### **3.1 PROPOSAL SITE**

The proposal site comprises approximately 255ha of freehold land, identified as Lot 26 DP 755292 (Figure 1-1). It is bounded by agricultural land, mostly cropping, to the west, north and east. The Mitchell Highway is along the southern boundary and provides access to the eastern end of the site. An unsealed access track runs along the perimeter of the site boundary and around existing remnant vegetation. The track provides access across the paddock for agricultural purposes (to crops and dams) but also forms part of the electricity transmission line easements that intersect the property. There are two existing transmission line easements through the property, one located within the south eastern area of the proposal site and the other travels north west through the proposal site from the eastern boundary.

The site is mostly flat, with a slight gradient towards Boggy Cowal located along the western boundary of the site. Boggy Cowal is a tributary of the Macquarie River, however it is not an incised creek but rather a shallow swampy area that extends onto the south-west corner of the proposal site.

The proposal site has been used for agriculture for several decades and is therefore highly modified through grazing and cropping activities including ploughing. Areas of remnant native vegetation are, however, located along the western boundary, along the centre of the northern boundary, and in the north-east corner of the site. No buildings or structures, other than transmission line infrastructure are located onsite.

Figure 3-1 illustrates the proposal site from its south eastern corner at its access point from the Mitchell Highway. Figure 3-2 illustrates the existing electricity infrastructure onsite, current crop paddocks and patches of native vegetation on the north and eastern boundary of the site. Figure 3-3 illustrates Boggy Cowal, located along the western boundary of the proposal site.





Figure 3-1 View of the proposal site from the south eastern corner from the (Mitchell Highway) access point.



Figure 3-2 View across the proposal site to the north from the eastern boundary.



Figure 3-3 Boggy Cowal along the western boundary of the proposal site.

### **Mitchell Highway**

The Mitchell Highway is a State Highway managed by Roads and Maritime Services. It is a two lane road with a speed limit of 110 kilometres/hour in the vicinity of the proposal site. The Mitchell Highway connects central and south western regions of Queensland with central western regions of NSW. It is a key freight route in NSW and designated as a route suitable for heavy vehicles, including road trains and 4.6m high vehicles (RMS 2016). The Main Western Railway Line crosses the Mitchell Highway approximately 660 metres east of the proposal site. Figure 3-4 illustrates Mitchell Highway.



Figure 3-4 View of Mitchell Highway looking east, approximately 700m east of the proposal site.

### **Essential Energy substation**

The existing Nevertire 22/66/132kV Essential Energy substation, with a capacity of 139MVA, is located approximately 1.5km east of the proposal site (Figure 3-5). The substation is accessed from the Oxley Highway.



Figure 3-5 Nevertire Substation.

### **Proposal site locality features**

The locality (defined as the area within 5km of the proposal site) includes the village of Nevertire, surrounding agricultural farmland and local industries.

Nevertire, 1km east of the proposal site, is a small village, and is situated 26.2km south-west of Warren, at the junction of the Mitchell and Oxley Highways. Nevertire is a service centre to surrounding properties and a stopover point on the Mitchell and Oxley Highways for regional motorists. Infrastructure within the village includes a sewage treatment plant, electricity substation and infrastructure, and a railway line.

Boggy Cowal located along the western boundary of the proposal site, drains towards the Macquarie River over 19km north of the proposal site. Two other waterways are located within 10km of the proposal site, Beleringar Creek to the north and Trowan Cowal to the south.



Figure 3-6 Belerenga Street, Nevertire.

## **3.2 KEY INFRASTRUCTURE COMPONENTS**

Figure 1-2 provides a Proposed Infrastructure map showing the infrastructure footprint required for the Nevertire Solar Farm proposal which would accommodate the key proposal infrastructure components. Key infrastructure for the proposal would include:

- Solar arrays comprised of approximately 364,000 modules (solar panels).
- Mounting frames: single axis-tracker units or fixed mounting frames.
- Inverter stations: between 24 and 55 inverter stations, each containing an inverter between 2.2 and 4.92MW capacity and a 400V/22-33kV transformer.
- Cabling, electrical connections and switch-gear, attached to the mounting frame structures, to interconnect modules.
- Underground cabling interconnecting arrays and inverter stations.
- An onsite substation containing one 22-33/132kV transformer and associated switchgear.
- Internal access tracks to allow for proposal maintenance of modules, inverters and vegetation management.
- Permanent staff amenities and offices with a small number of permanent parking spaces for the minimal staff required and occasional visitors.
- Perimeter security fencing: a chain-link/ barbed-wire security fence up to 3m in height.
- Specific native vegetation screening from specific visual impact locations.
- A 132kV power line connecting the solar farm to the Nevertire zone substation approximately 1.5km east of the proposal.

As illustrated on the Proposed Infrastructure map in Figure 1-2, the development envelope covers approximately 200ha of the 255ha proposal site. The 200ha area is already disturbed due to farming activities and is relatively flat. No grading works are required to level the site and ground disturbance will be minimal and limited to:

- Grass slashing, removal of rock and timber debris (by raking the site) as required in preparation for construction.
- The installation of the piles supporting the solar panels, which would be driven or screwed into the ground to a depth of approximately 1.5m.
- Construction of internal access tracks.
- Concrete foundations for the inverter stations, onsite substation and maintenance building.
- Trenches for the installation of cables.
- Establishment of temporary staff amenities and offices for construction.
- Construction of perimeter security fencing including.

The ground disturbance from pile foundations would be less than 1% (approximately 3.2ha) of the total site area. Panels within the solar array area would sit above the ground and existing ground cover would be maintained underneath the panels. Approximately 40% of the total site area ground cover will be affected by shading to varying degrees depending of time of year and time of day. Additional ground disturbance would result from construction of the internal access tracks, trenches for cabling and footings for other equipment. The one dam onsite may also be filled in. Apart from the permanent infrastructure footprint, any disturbed areas would be restored to grassed ground cover post construction.

Ancillary facilities would be located within the site boundary and would include:

- Material laydown areas.
- Temporary construction site offices.
- Temporary car and bus parking areas for construction workers transportation. Once the plant has been commissioned a small car park would remain for the minimal operational/maintenance staff required and occasional visitors.
- Staff amenities. Once constructed, the solar farm would be monitored and operated remotely and would therefore require a minimum number of maintenance personnel (1-2 full time equivalent staff) to be onsite.

It is noted that the location of the ancillary facilities is not specified on the Proposed Infrastructure map in Figure 1-2 and will be determined at the detailed design phase. They would be located within the proposal site boundaries.

### **3.2.1 Solar arrays**

The proposed proposal would be comprised of approximately 364,000 solar modules (solar panels) which are electrically connected and grouped into 'solar arrays'.

The PV modules would use industry standard technology; that is multi-crystalline or thin-film flat plate module technology as is common on residential rooftops. Typical modules are approximately 2,000mm long by 950mm wide by 9mm deep.

The panels would be mounted on either 5,300 (approximately) motor-driven tracking frames (which would be powered by the solar proposal) or 417 linear km of north-oriented fixed-tilt frames. The mounting frames consist of a horizontal and vertical components in order to secure the modules.

Approximately 160,000 piles would be driven or screwed into the ground in order to support the solar array's mounting system and solar panels. At their highest tilt angle, the panel structures would be up to 3m high.

Figure 3-7 to Figure 3-10, illustrates the construction and assembly stages of a solar PV array. Figure 3-11 is a diagram of the proposed tracker unit and solar panel position.



Figure 3-7 Example of poles driven into the ground



Figure 3-8 Example of tracker mounting system installation



Figure 3-9 Example of module assembly



Figure 3-10 Example of solar array



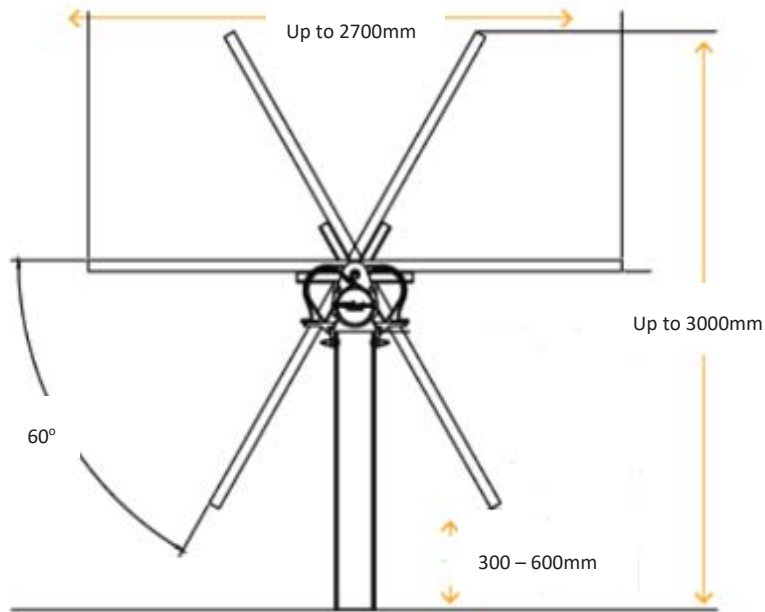


Figure 3-11 Example of tracking unit and solar module position

The multi-crystalline or thin-film solar PV panels installed on the mounting system would be interconnected so as to obtain a number of “strings” whose overall voltage would be adequate for the operating input voltage range of the inverters. These module interconnections would be as short as possible and would shorten the overall cabling loops thereby minimizing the lightning effects.

### 3.2.2 Inverter Stations

Between 24 and 55 inverter stations would be installed and located at regular intervals across the site. Each would contain an inverter of between 2.2 and 4.92MW size as well as a 400V/22-33kV transformer. The inverter stations (containerised) would measure up to 12.2 m long by 2.4m wide by 3.4m high (being sum of the 2.9 inverter station height plus up to 0.5m foundation height).

An example inverter station is illustrated in Figure 3-12.

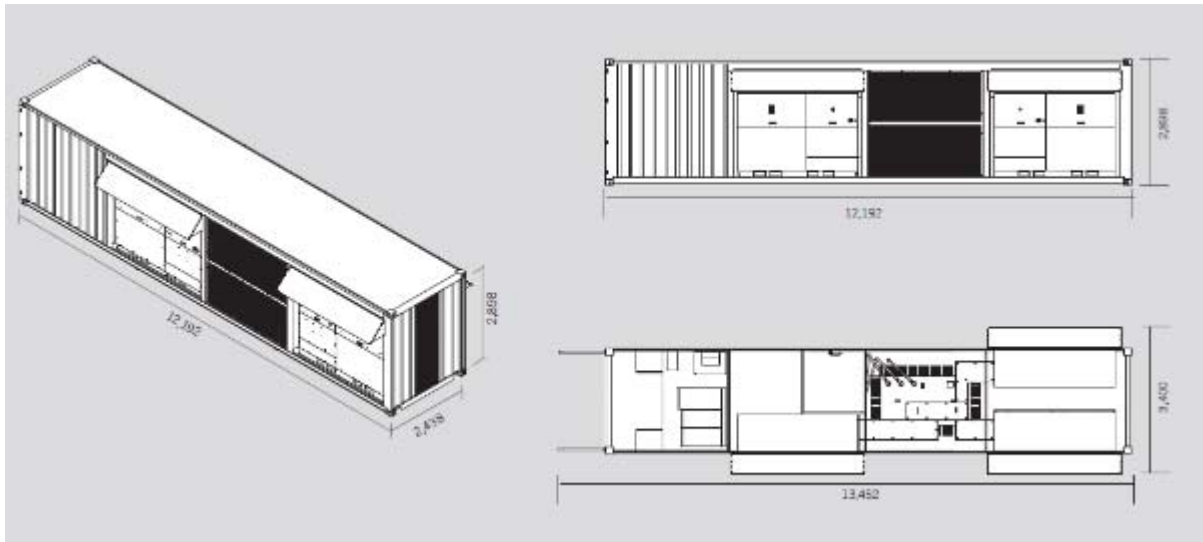


Figure 3-12 Example of a containerised inverter station

### 3.2.3 Underground cabling

Underground cabling on site would be designed in accordance with Australian and international standards, taking into account the temperature of the ambient environment in which the cables and ancillaries shall operate, the allowable currents compatible with an acceptable warming-up as stated in the standards, and as per manufacturers' recommendations.

The underground cabling would be installed in trenches, generally measuring approximately 800mm deep by 600mm wide (see an example in Figure 3-13). A sand bed would be placed under the cabling. Once the cables are installed, the cables would be covered by a layer of sand and the trench backfilled with existing fill obtained on site.



Figure 3-13 Example of trench



Figure 3-14 Example of cable trench

### **3.2.4 Transmission line**

The electrical connection from the site would be via a 132kV powerline running to the existing Nevertire Essential Energy substation, approximately 1.5km east of the site. The Proposed Infrastructure map in Figure 1-2 illustrates the route of the powerline.

The powerline would include approximately 600m of overhead line located within private property, crossing a railway and a road reserve. An example transmission line pole is provided in Figure 3-16. The overhead powerline would be installed on 15-35m high, steel, wood or concrete poles (the powerline structure will not be lattice design). While there is no existing vegetation within the proposed overhead powerline corridor, any future tall growing vegetation within the overhead electricity easement would be maintained to manage fire risk and allow safe operation of the powerline. Standard vegetation clearances for tall vegetation around a 132kV powerline are 40m wide (20m either side of the powerline). A 50m wide corridor was assessed and the easement would be micro-sited within the assessed area.

The underground section of powerline would be located within the road reserve adjacent to the railway reserve and continuing along Belerenga Street for approximately 900m. The powerline would be trenched approximately 1300mm wide and 1000mm deep (see Figure 3-15). A 6m wide easement will allow for the safe construction and maintenance of the powerline. The powerline has been located to avoid other existing infrastructure within Belerenga Street road reserve (a sewer-main, water-main and distribution feeders) and will be micro-sited following geotechnical assessment and survey.

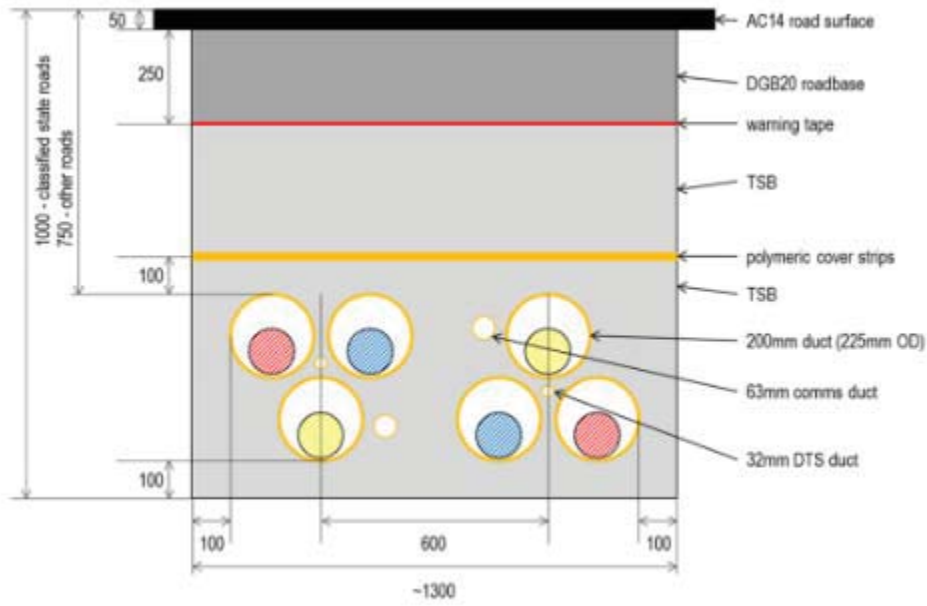


Figure 3-15 Typical trench cross-section 33-132kV underground cable

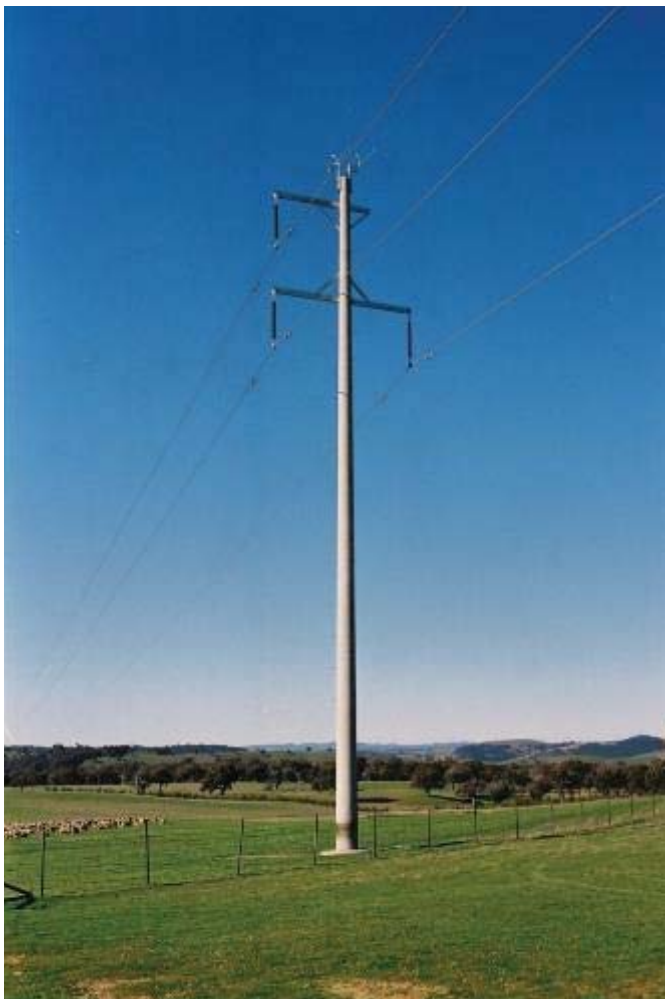


Figure 3-16 Example 132kV powerline and pole.

### **3.2.5 Substation**

An onsite substation would be located in the south-eastern area of the site, at least 300m north of the site boundary with the Mitchell Highway. Power generated in the solar plant would be transformed by the onsite substation to grid voltage via a 132kV transformer. A proposed new transmission line will connect to the existing Essential Energy Nevertire Substation, 1.5km east. The onsite substation would feature a busbar, circuit breakers, current transformers, voltage transformers, switchgear/ electrical protection and a 22-33/132kV transformer. It would be surrounded by security fencing and gravel to restrict vegetation growth. Refer to Figure 3-17 for an example.



Figure 3-17 Example substation.

### **3.2.6 Access and internal tracks**

A new access track off the Mitchell Highway, 1.2km west of Nevertire would be created to access the site during construction and operation. The road width at the intersection will be widened in order to create a basic intersection for a standard right hand turn from the Mitchell Highway. The location and form of the main access road intersection with the Mitchell Highway would provide adequate sightlines (> 1km) when vehicles enter and exit the site. A Transportation Management Plan will be developed in consultation with RMS and council prior to construction. The proposed new access track is approximately 6m wide and approximately 1km long. It will be sealed for 40m along from the Mitchell Highway junction, the remaining would be unsealed and compacted.

The onsite internal tracks are required to access modules onsite for maintenance. These would be approximately 6m wide and made of a compacted layer and, if required, gravel and a geotextile layer (to be laid between the soil and the gravel). Figure 3-18 illustrates a typical internal track design.

An external access track is required to construct and maintain the new overhead transmission line to the east of the site. The track would be unsealed, compacted and approximately 600m long and 6m wide.

A fire break will surround the perimeter fence which will facilitate the occasional need for emergency vehicle or fence maintenance access.

Water trucks will be used to suppress dust on unsealed tracks during construction. Stabilising techniques and/or environmentally acceptable dust palliatives would be utilised if the wetting down of surfaces proves to be ineffective.



Figure 3-18 Internal track

### **3.2.7 Ancillary facilities and construction compound**

Ancillary facilities would be located within the site boundary and would include:

- Material laydown areas.
- Temporary construction site offices.
- Temporary car and bus parking areas for construction workers transportation. Once the solar farm has been commissioned a small car park would remain for the minimal staff required and occasional visitors. This would be located within south eastern corner of the site.
- Staff amenities. Once constructed, the solar farm would be monitored and operated remotely and would therefore require a minimum number of maintenance personnel (2 full time equivalent staff) to be onsite. Staff amenities would include an office, lunch room, water tank and sanitary facilities.
- Parking for staff and visitors.

These facilities would be designed in accordance with the relevant Australian standards.

Temporary staff amenities would be designed to accommodate the number of workers at the peak of the construction period (estimated at 300 workers) and would include:

- Car park.
- Sanitary modules with septic tank.
- Water tank
- Changing rooms.
- Dining hall.

- Administrative office.
- Undercover storage area.
- Muster point in case of emergency.
- Genset for electrical supply.

### **3.2.8** *Perimeter security fencing*

The perimeter of the site would be fenced with up to 3m high security fencing along the site boundaries. It is expected that chain-link fencing with strands of barbed wire at the top would be used. Double gates would be constructed at the access point to the site. Refer to Figure 3-19 for an example.

A 10m wide internal fire break would be established between the perimeter fence and the array or any other infrastructure onsite.



Figure 3-19 Typical fencing to be used.

## **3.3 CONSTRUCTION AND COMMISSIONING**

### **3.3.1** *Indicative timeline*

An indicative timeline for the proposal is outlined in Table 3-1.

Table 3-1 Indicative timeline.

<b>Phase</b>	<b>Approximate commencement</b>	<b>Approximate duration</b>
Construction	October 2017	12 months
Operation	October 2018	30 years
Decommissioning	2048	2 months

Activities specific to each phase of the proposal are discussed below.

### **3.3.2 Construction activities**

The construction and commissioning phase is expected to last approximately 12 months. The main construction activities would include:

- Site establishment and preparation for construction (fencing, ground preparation, preliminary civil works and drainage).
- Installation of steel post and rail foundation system for the solar panels.
- Installation of underground cabling (trenching) and installation of inverter stations.
- Construction of the 132kV transmission line (underground and overhead), onsite substation and equipment, and interconnection to the existing Nevertire substation.
- Removal of temporary construction facilities and rehabilitation of disturbed areas.

As discussed in Section 3.3.2, the extent of ground disturbance across the site is low. This is primarily because the piles supporting the solar arrays' mounting system would be pile driven or screwed into the ground, minimising ground disturbance. Therefore, ground disturbance would be minimal, would not involve levelling and would be limited to discrete tracks, piles and other elements described above. Post construction, ground cover would be rehabilitated and maintained beneath solar array areas throughout the operational life of the solar farm.

### **3.3.3 Hours of operation during construction**

Works would be undertaken during standard working hours of:

- Monday – Friday 7am to 6pm
- Saturday 8am to 1pm

No night works or work on Sundays or public holidays are proposed. Any construction outside of standard construction hours would only be undertaken in consultation with relevant roads authorities, where required, and in consideration of audible noise impacts to nearby residents.

Any night lighting required during construction would be directed away from native vegetation remnants and from the Mitchell Highway.

### **3.3.4 Resourcing requirements during construction**

Key resourcing requirements for the proposal would include labour, machinery and equipment, steel, electrical components, water, gravel and landscaping materials.

#### **Labour, machinery and equipment**

It is anticipated that approximately 300 construction personnel would be required on site during the peak construction period (between 6 and 9 months). Construction supervisors and the construction labour force, made up of construction labourers and technicians, are intended to be hired locally where possible.

It is anticipated that workers would be accommodated at local existing accommodation such as in Nevertire, Warren, Trangie and Dubbo.

Equipment used during construction would include earth-moving equipment for civil works, diesel generators, trucks and cranes.



Pile driving of the solar panel foundations would be undertaken using a machine which screws or hammers poles into the ground, similar to that used for driving farm fence poles into the ground.

### **Traffic volumes and requirements**

Traffic management would be undertaken during the construction phase to manage haulage traffic. Preliminary plans for the site propose temporary parking for approximately 300 vehicles during construction and approximately 10 permanent parking spaces during operation.

In developing the Traffic Management Plan (TMP) in consultation with council and RMS, the potential use of staff busses to minimise traffic volumes will be considered. The proposed timeline for the proposal indicates that approximately 20 employees would be required in the first month of construction, increasing to 300 employees during the peak construction period (between 6 and 9 months).

Two to six piling or drilling machines would also be present on site during the peak construction period. Approximately 194 truck deliveries will transport equipment to site during the construction period. On average this equates to less than one truck delivery per day over the peak construction period (between 6 and 9 months). Up to 15 trucks in a single day may deliver equipment to site if a large equipment delivery is needed. A small number of oversize/ overmass vehicles will be required for equipment such as a mobile crane, transmission line poles (one delivery expected) and the 132kV transformer. These will be transported safely and accompanied by a special convoy.

Approximately 22 standard concrete trucks would also be required during the construction of the substation slab. This would occur over 14 days. Construction plant and equipment would primarily be restricted to onsite travel until the end of the construction program.

Traffic volumes and requirements are discussed in detail in Section 7.3.

While a detailed haulage program has not yet been developed, it is expected that the proposal's components are most likely to be delivered by road from either Sydney, Brisbane or Adelaide. These routes are major transport networks that connect to the site and have sufficient capacity to accommodate the haulage of components required for the construction of the solar farm and transmission line.

### **Materials**

In total, approximately 1200m<sup>3</sup> of gravel would be required for work and service tracks, while inverter stations, peripheral backfill and compaction would require around 1000m<sup>3</sup> of gravel.

Approximately 3400m<sup>3</sup> of sand would be required for the burying of cables into about 420km of trenches. Approximately 500m<sup>3</sup> of sand would likely be required for the installation of the inverter stations.

It is estimated that 827 tonnes of metal would be required for the mounting system, inverters and containers. Additionally, approximately 8,728 tonnes of glass contained within the panels would be required, these are delivered to site as complete self-contained units.

Approximately 44 concrete trucks would be required for the inverters, onsite substation and maintenance building foundations.

Water will be applied to roads for dust suppression on an as needed basis. Water for dust suppression will be sourced locally in consultation with Warren Shire Council. Potential sources include river and bore water from Nevertire and Warren areas. Up to 60,000 litres per day may be required during hot days in the peak of construction and will be transported to site via a water cart. The annual requirement during construction is estimated to be 21,600 kL per annum, however it is estimated to be less depending on the weather.

Drinking water requirements at the peak of construction is expected to be approximately 900 litres per day (243 kL per annum) which will be sourced locally and stored using a water-tank at site.

### **3.3.5 Operation**

The operational phase of the proposal is anticipated to commence in late 2018. Once operational, activities would include daily routine operations and maintenance. This would include:

- Routine visual inspections, general maintenance and cleaning operations of the solar arrays, use of 'drone' technology to enhance maintenance operations.
- Vegetation management including potential grazing. Ground cover vegetation would be maintained beneath panels to reduce erosion and weed infestation. A monitoring program would address any bare areas that develop. Management would include the use of seeding or armouring (i.e. jute mesh) to avoid erosion.
- Site security if a security event occurs.
- Replacement of equipment and infrastructure, as required.
- Between 2-5 maintenance personnel would be employed at the site for preventive maintenance.

During normal operation, it is likely that no vehicles would be present at the site on a permanent basis, with only occasional visits by standard vehicles. Between 2-5 maintenance personnel would be employed at the site to support routine plant operations and maintenance. During major maintenance operations, this number could increase to 20-30 vehicles at any one time for a limited period.

Water use volumes during operation would be minimal. Water would be required for staff amenities and may be required for panel cleaning. Panel cleaning may be required in dry conditions when cropping operations in the locality are generating dust. Generally, requirements would be minor and would be reduced in wetter conditions when rainfall collection and lower dust levels reduce water requirements. Water would be delivered to site by truck through commercial operations during operation. Water is unlikely to be sourced from onsite.

#### **Hours of operation during operation**

Daily operations and maintenance by site staff would be undertaken during standard working hours of:

- Monday – Friday 7am to 6pm
- Saturday 8am to 1pm

Outside of emergencies, night works or work on Sundays or public holidays are not proposed.

During summer months, the solar farm may continue to produce electricity after 6pm and prior to 7am while the days are longer. In the case that the panels installed are on tracker units, the solar farm would potentially operate outside standard working hours during summer months.

Night lighting will be used through the array during operation for security and safety purposes; this would be directed away from native vegetation remnants and from the Mitchell Highway.

### **3.3.6 Decommissioning**

During decommissioning, all above ground infrastructure would be removed. Key elements of proposal decommissioning would include:

- The solar arrays would be removed, including the foundation posts. Materials would be sorted and packaged for removal from the site for recycling or reuse. Much of the solar array panels would be recyclable.
- All site amenities and equipment would be removed and materials recycled or reused, wherever possible.
- Posts and cabling would be removed and recycled.
- Fencing would be removed including small concrete footings.

Above ground concrete slabs for the onsite buildings, inverter stations and substation would be left in place where there is no impact to the agricultural viability of the land.

In consultation with the landowner, any cables deeper than 500mm may be left *in situ* as this may entail lower disturbance and therefore lower impact to land capability.

All areas of soil disturbed during decommissioning would be rehabilitated in consultation with the landowner with the aim of meeting the existing (pre-construction) land capability.

Traffic required for decommissioning would be similar in type but of shorter duration than that required for the construction phase.

At the end of the proposal life, the transmission line and substation connection may be decommissioned or may continue to be operated by Essential Energy for public power supply. In the event that the transmission line is decommissioned, above ground infrastructure would be removed, posts removed and the land would be returned to its prior condition.

## 4 STAKEHOLDER CONSULTATION

### 4.1 AGENCY CONSULTATION

#### 4.1.1 Secretary's environmental assessment requirements (SEARs)

SEARs were provided by NSW DPE on 5 December 2016. The SEARs are intended to guide the structure and content of the EIS and reflect the responsibilities and concerns of NSW government agencies in relation to the environmental assessment of the proposal.

The following sections paraphrase the SEARs and cross reference where specific issues are addressed within this EIS. Additional consultation was undertaken with several of the agencies to clarify some of the issues raised in the SEARs or to seek further advice. This additional consultation with agencies is also summarised below.

Table 4-1 SEARs issue summary

Issue summary	Addressed in this EIS
<p>The (EIS) must be prepared in accordance with, and meet the minimum requirements of, Part 3 of Schedule 2 of the EP&amp;A Regulation and include the following:</p>	
<ul style="list-style-type: none"> <li>• a full description of the development, including:</li> </ul>	
<ul style="list-style-type: none"> <li>○ details of construction, operation and decommissioning;</li> <li>○ a site plan showing all infrastructure and facilities (including any infrastructure that would be required for the development, but the subject of separate approvals process);</li> <li>○ a detailed constraints map identifying the key environmental and other land use constraints that have informed the final design of the development;</li> </ul>	<ul style="list-style-type: none"> <li>• The proposal is described in Section 3.</li> <li>• A site plan is provided in Section 3. No required infrastructure is part of a separate approvals process</li> <li>• A constraints map used to inform the design is included in Appendix B.</li> </ul>
<ul style="list-style-type: none"> <li>• a strategic justification of the development focusing on site selection and the suitability of the proposed site;</li> </ul>	<ul style="list-style-type: none"> <li>• the proposal justification is provided in Section 2.</li> </ul>
<ul style="list-style-type: none"> <li>• an assessment of the likely impacts of the development on the environment, focusing on the specific issues identified below, including:</li> </ul>	
<ul style="list-style-type: none"> <li>○ a description of the existing environment likely to be affected by the development;</li> <li>○ an assessment of the likely impacts of all stages of the development which is commensurate with the level of impact), taking into consideration any relevant legislation, environmental planning instruments, guidelines, policies, plans and industry codes of practice;</li> <li>○ a description of the measures that would be implemented to avoid, mitigate and/or offset the impacts of the development (including draft management plans for specific issues as identified below); and</li> </ul>	<ul style="list-style-type: none"> <li>• Site context is provided in Section 1.2.3.</li> <li>• Detailed information regarding environmental legislation relevant to the proposal is outlined in Section 5.</li> <li>• Commensurate with the level of impact, detailed impact assessment, mitigation and monitoring is included in Section 6.1. A risk scoping table identifies the key environmental issues for this</li> </ul>

Issue summary	Addressed in this EIS
<ul style="list-style-type: none"> <li>○ a description of the measures that would be implemented to monitor and report on the environmental performance of the development;</li> </ul>	<p>proposal. Draft management plans or management outlines have been included for:</p> <ul style="list-style-type: none"> <li>○ Visual screening for specific receivers</li> <li>○ Groundcover management</li> <li>○ Biodiversity offsets</li> <li>○ Decommissioning rehabilitation plan</li> </ul>
<ul style="list-style-type: none"> <li>• a consolidated summary of all the proposed environmental management and monitoring measures, identifying all the commitments in the EIS; and</li> </ul>	<ul style="list-style-type: none"> <li>• A summary of all environmental management measures is included in Section 8.2 and forms part of the proposal description</li> </ul>
<ul style="list-style-type: none"> <li>• the reasons why the development should be approved having regard to the biophysical, economic and social costs and benefits of the development.</li> </ul>	<ul style="list-style-type: none"> <li>• The conclusion in Section 9 includes a summary of the key benefits and reasons why the proposal should be approved</li> </ul>
<p>The development application must be accompanied by:</p>	
<ul style="list-style-type: none"> <li>• a signed report from a suitably qualified person that includes an accurate estimate of the capital investment value of the development (as defined in Clause 3 of the Environmental Planning and Assessment Regulation 2000); and</li> <li>• the consent in writing of the owner of the land (as required in clause 49(1)(b) of the Environmental Planning and Assessment Regulation 2000).</li> </ul>	<ul style="list-style-type: none"> <li>• The capital investment report has been provided separately.</li> <li>• Landowners consent has been provided separately.</li> </ul>
<p>The EIS must address the following specific issues:</p>	
<ul style="list-style-type: none"> <li>• Biodiversity – including an assessment of the likely biodiversity impacts of the development (particularly in relation to the Boggy Cowal waterway), having regard to the NSW Biodiversity Offsets Policy for Major Proposals, and in accordance with the Framework for Biodiversity Assessment, unless otherwise agreed by the Department.</li> </ul>	<ul style="list-style-type: none"> <li>• An FBA assessment has been completed and is summarised in Section 6.2.</li> <li>• Boggy Cowal waterway is shown on the constraints mapping as an area to be avoided. Indirect impacts are discussed in Section 7.2.</li> </ul>
<ul style="list-style-type: none"> <li>• Heritage – including an assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the development, including adequate consultation with the local Aboriginal community;</li> </ul>	<ul style="list-style-type: none"> <li>• An ACHAR has been completed and is summarised in Section 6.3.</li> <li>• This includes consultation, summarised in Section 4.2.</li> </ul>
<ul style="list-style-type: none"> <li>• Land – including an assessment of the impact of the development on agricultural land and flood prone land, paying particular attention to the compatibility of the development with the existing land uses on the site and adjacent land (e.g. aerial spraying, dust generation, and risk of weed and pest infestation) during operation and after decommissioning, with reference to the zoning provisions applying to the land;</li> </ul>	<ul style="list-style-type: none"> <li>• An assessment of land use impacts is detailed in Section 7.4.</li> </ul>
<ul style="list-style-type: none"> <li>• Visual – including an assessment of the likely visual impacts of the development (including any glare,</li> </ul>	<ul style="list-style-type: none"> <li>• A visual assessment including specific photomontages for</li> </ul>

Issue summary	Addressed in this EIS
<p>reflectivity and night lighting) on surrounding residences, scenic or significant vistas, air traffic and road corridors in the public domain, including a draft landscaping plan for on-site perimeter planting (particularly along the Mitchell Highway), with evidence it has been developed in consultation with affected landowners;</p>	<p>the most affected viewpoints has been completed and is summarised in Section 6.5.</p> <ul style="list-style-type: none"> <li>• A draft landscaping plan is included identifying zones for screening treatments. It includes a requirement to consult with the most affected land owner in finalising the treatment.</li> <li>• A photo montage, representative of the most affected land owner residence, is being used as a consultation tool, however at this time the landowner has declined involvement.</li> </ul>
<ul style="list-style-type: none"> <li>• Noise – including an assessment of the construction noise impacts of the development in accordance with the Interim Construction Noise Guideline (ICNG) and sub-station noise impacts in accordance with the NSW Industrial Noise Policy (INP), and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria;</li> </ul>	<ul style="list-style-type: none"> <li>• A noise assessment has been completed and is summarised in Section 6.4.</li> <li>• A draft noise management plan is not required; mitigation measures would be included in CEMP.</li> </ul>
<ul style="list-style-type: none"> <li>• Transport – including an assessment of the site access route, site access point, rail safety issues and likely transport impacts of the development on the capacity, condition, a description of the measures that would be implemented to mitigate any impacts during construction, and a description of any proposed road upgrades developed in consultation with the relevant road and rail authorities (if required);</li> </ul>	<ul style="list-style-type: none"> <li>• An assessment of transport impacts is detailed in Section 7.3.</li> </ul>
<ul style="list-style-type: none"> <li>• Water – including: <ul style="list-style-type: none"> <li>○ an assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources (including watercourses, wetlands, riparian land, groundwater dependent ecosystems, sodic soils and acid sulfate soils), related infrastructure, adjacent licensed water users and basic landholder rights, and measures proposed to monitor, reduce and mitigate these impacts;</li> <li>○ details of water supply arrangements; and</li> <li>○ a description of the erosion and sediment control measures that would be implemented to mitigate any impacts (including tunnel erosion) in accordance with Managing Urban Stormwater: Soils &amp; Construction (Landcom 2004);</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• An assessment of water use and impacts on water resource impacts is detailed in Section 7.2.</li> </ul>
<ul style="list-style-type: none"> <li>• Electromagnetic Interference – an assessment of the proposed transmission line and substation against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for limiting exposure to</li> </ul>	<ul style="list-style-type: none"> <li>• An assessment of electromagnetic interference impacts is detailed in Section 7.6.</li> </ul>

Issue summary	Addressed in this EIS
Time-varying Electric, Magnetic and Electromagnetic Fields.	
<ul style="list-style-type: none"> <li>In preparing the EIS for the development, you should consult with relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups and affected landowners.</li> </ul>	<ul style="list-style-type: none"> <li>Consultation is summarised in Section 4.3.</li> </ul>
<ul style="list-style-type: none"> <li>In particular, you must undertake detailed consultation with affected landowners surrounding the development and Warren Shire Council.</li> </ul>	
<ul style="list-style-type: none"> <li>The EIS must describe the consultation that was carried out, identify the issues raised during this consultation, and explain how these issues have been addressed in the EIS.</li> </ul>	<ul style="list-style-type: none"> <li>A table of issues raised is provided in Section 4.3.</li> </ul>

#### 4.1.2 Relevant guidelines

The following guidelines have been consulted in the preparation of this EIS:

Table 4-2 Guidelines relevant to this EIS

	Guideline	How guideline has been addressed?
<b>Biodiversity</b>	Framework for Biodiversity Assessment (OEH)	Biodiversity Assessment format, Section 6.2.
	NSW Biodiversity Offsets Policy for Major Proposals (OEH)	
	Threatened Species Assessment Guidelines – Assessment of Significance (OEH)	Biodiversity survey methods, Section 6.2.
	Why do fish need to cross the road? Fish Passage Requirements for Waterway Crossings (2003)	NA
	Policy and Guidelines for Fish Habitat Conservation and Management (update 2013)	NA
<b>Heritage</b>	Aboriginal Cultural Heritage Consultation Requirements for Proponents (OEH)	Consultation approach Section 6.3
	Code of Practice for Archaeological Investigations of Objects in NSW (OEH)	Heritage survey methods Section 6.3
	Guide to investigating, assessing and reporting on aboriginal cultural heritage in NSW (OEH).	Heritage assessment format Section 6.3
	NSW Heritage Manual (OEH)	NA
<b>Land</b>	Primefact 1063: Infrastructure proposals on rural land (DPI)	NA

	<b>Guideline</b>	<b>How guideline has been addressed?</b>
	Establishing the social licence to operate large scale solar facilities in Australia: insights from social research for industry (ARENA)	Community consultation, Section 4.3  Visual assessment method, Section 6.5.
	Local Land Services Act 2013	NA
	Australian Soil and Land Survey Handbook (CSIRO)	Section 7.1
	Guidelines for Surveying Soil and Land Resources (CSIRO)	
	The land and soil capability assessment scheme: second approximation (OEH)	NA
<b>Noise</b>	NSW Industrial Noise Policy (EPA)	Section 6.4
	Interim Construction Noise Guideline (EPA)	
	NSW Road Noise Policy (EPA)	
<b>Transport</b>	Guide to Traffic Generating Development (RTA)	Section 7.3
	Road Design Guide (RMS) & relevant Austroads Standards	
	Austroads Guide to Traffic Management Part 12: Traffic Impacts of Development	NA
<b>Water</b>	Managing Urban Stormwater: Soils & Construction (Landcom)	Section 7.2
	Floodplain Development Manual (OEH)	NA
	Guidelines for Controlled Activities on Waterfront Land (DPI Water)	NA
	Water Sharing Plans (DPI Water)	Section 7.2
	Floodplain Management Plan (DPI Water)	Section 7.2
<b>Waste</b>	Waste Classification Guidelines (EPA)	Section 7.5
<b>Electromagnetic Interference</b>	ICNIRP Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields	Section 7.6
	State Environmental Planning Policy (State and Regional Development) 2011	Section 5.3



	Guideline	How guideline has been addressed?
<b>Environmental Planning Instruments</b>	State Environmental Planning Policy (Infrastructure) 2007	
	State Environmental Planning Policy (Rural Lands) 2008	
	State Environmental Planning Policy No.44 – Koala Habitat Protection	
	State Environmental Planning Policy No.55 – Remediation of Land	
	Warren Local Environmental Plan 2012	

### 4.1.3 Agencies additional comments

The SEARs require that, in preparing the EIS for the development, relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups and affected landowners be consulted.

Relevant local, State or Commonwealth Government authorities, infrastructure and service providers and consultation and assessment to address matters raised by these entities are provided below.:

Table 4-3 Agency consultation summary

Agency	Issue raised	How issue has been addressed
Essential energy	Essential Energy is the owner of the sub-transmission network at Nevertire.  The proponent discussed the proposal with Essential Energy connections case manager on 20 December 2016. Key matters discussed included the ownership of the new transmission line	Essential Energy stated that the proponent has the option to gift the transmission line asset back to Essential Energy or could own and operate it themselves. Both options are currently being considered.
Transgrid and Essential Energy	Grid connection	Epuron lodged a connection enquiry for the proposal in October 2015 and subsequently Nevertire Solar Pty Ltd entered into a Connection Investigation Services Agreement (CISA) with Essential Energy for the proposal in August 2016. Epuron are currently progressing the connection studies required for a Connection Agreement.  Essential Energy has consulted with other potentially affected network service providers (NSPs); Essential Energy met with TransGrid in November 2016 to discuss its current solar

Agency	Issue raised	How issue has been addressed
		connection investigations Nevertire Solar Farm was discussed with TransGrid at that meeting.
John Holland Rail	Transmission line crossing Nevertire Warren Railway Line	John Holland Rail informed Epuron they would require a permit to cross the railway line prior to construction.
Roads and Maritime Services	Matters raised in RMS's addendum to the SEARs included the requirement for a Traffic Management Study.	<p>The traffic assessment was completed from desktop assessment and site inspection and is included at Section 7.3. Required information including hours of construction, traffic volumes and overmass vehicles etc. are included in this section. Consideration has been given to the effect of local climate in the development of mitigation measures.</p> <p>It is noted the final internal road network and parking areas have not been developed. The appointed construction contractor would prepare a Traffic Management Plan (TMP), including this information, in consultation with the RMS and Warren Council.</p>
	Additionally, the proponent discussed the proposal with RMS on 25 November 2016. Construction traffic - the additional traffic load of construction workers accessing the site during peak construction, rather than the impact of haulage of components was raised.	The appointed construction contractor would prepare a Traffic Management Plan (TMP), including a means to reduce overall trips, such as provision of shuttle buses. Section 7.3.
	That the intersection treatment should be appropriate to the site's sight lines was raised.	The site access has good sightlines. The minimum intersection treatment of widening the access road and intersection is part of this proposal and would be finalised in consultation with RMS. Section 7.3.
Warren Shire Council	The proponent discussed the proposal with Council staff on 17 November 2016. Council were generally supportive. They asked questions about the construction process and identified a potential Native Title claim (it has been confirmed this is outside the development envelope).	
	Other matters raised in Council's addendum to the SEARs included:	
	<ul style="list-style-type: none"> <li>• Signage</li> </ul>	Signage including a contact number in case of emergency would be provided at the access to the

Agency	Issue raised	How issue has been addressed
		site during construction and operation of the proposal.
	<ul style="list-style-type: none"> <li>Waste management – limited disposal options in Warren.</li> </ul>	The appointed construction contractor would prepare a Waste Management Plan (WMP), including means to reduce, reuse and recycle construction waste. The plan would include consultation with local waste facility operators to ensure that loads do not exceed capacity. Haulage of waste to the facilities outside Warren may be undertaken. Section 7.5.
	<ul style="list-style-type: none"> <li>Lighting impacts on Mitchell Highway</li> </ul>	Minimal night lighting is proposed during construction and operation of the solar farm.
	<ul style="list-style-type: none"> <li>Access</li> </ul>	The access arrangements/treatment would be finalised in consultation with RMS, as above.
Office of Environment and Heritage (OEH)	Matters raised in Department’s addendum to the SEARs included impacts on waterways and land capability.	
	<ul style="list-style-type: none"> <li>Biodiversity and offsetting</li> </ul>	<p>The biodiversity assessment and offsetting has used the FBA for major proposals, as required, summarised in Section 6.2.</p> <p>Clarification was sought from OEH regarding patch sizes appropriate to the calculations (19, December 2016; D. Geering OEH) and the requirement for further threatened species surveys (21, December 2016; D. Geering OEH).</p>
	<ul style="list-style-type: none"> <li>Aboriginal cultural heritage</li> </ul>	The Aboriginal heritage assessment has used the <i>Guide to Investigating, assessment and reporting on Aboriginal Cultural Heritage in NSW</i> and consultation guidelines <i>Aboriginal cultural heritage consultation requirements for proponents 2010</i> as required, summarised in Section 6.3.
	<ul style="list-style-type: none"> <li>Historic heritage</li> </ul>	The heritage assessment was desktop, informed by a site inspection. No heritage items would be affected by the proposal. Refer to Section 7.8.
	<ul style="list-style-type: none"> <li>Water and soils, flooding</li> </ul>	The soil and water assessments were desktop, informed by a site inspection. Surface and ground water resources are detailed in Section 7.2. Acid sulphate soils are not relevant to the site. Water quantities are detailed. Water would be purchased; no intake or discharge locations are required for the

Agency	Issue raised	How issue has been addressed
		<p>proposal. No direct impacts are proposed on waterways.</p> <p>Operational impacts, such as creation of additional impervious surfaces, would be adequately mitigated through a commitment to a Ground Cover Management Plan, to retain ground cover beneath the panels, arresting soil erosion impacts.</p> <p>No flood mapping is available for the site; flooding risks are addressed in Section 7.2. No landform reshaping or other effects that would alter onsite hydrology are proposed, with the exception of filling one small farm dam. Flood risk contingency planning would be built into construction and operational plans for the proposal.</p>
Crown Lands (DPI)	<p>The proponent discussed the proposal with DPI on 24 May 2016.</p> <p>Works on crown land was the key issue raised.</p>	Landowner consent is being progressed with DPI, concurrent with the EIS submission. The consent will be conditional upon agreement on land tenure (such as establishment of a specific easement). The Minister will provide comment on the EIS, during the exhibition period.
Department of Primary Industries (DPI)	<p>Matters raised in Department’s addendum to the SEARs included impacts on waterways and land capability. The requirement for soil testing was discussed with the Department on 20 December 2016, (M Kovac, DPI Agriculture).</p> <ul style="list-style-type: none"> <li data-bbox="475 1245 794 1722">• Boggy Cowal and wetland impact assessment</li> <li data-bbox="475 1722 794 2018">• Land capability and rehabilitation – soil testing to inform rehabilitation.</li> </ul>	<p>The Biodiversity Assessment summarised in Section 6.2 addresses impacts to this wetland, onsite dam and drainage lines occurring east of the site where the transmission line would be constructed. Mapping uses aerial imagery from 22 October 2012. Boggy Cowal is being buffered by 40m. The onsite dam would be decommissioned. It is of limited biodiversity value. The wetlands east of the site would be avoided, spanned by overhead transmission lines, refer to Section 6.2. All construction works would be managed under a Biodiversity Management Plan.</p> <p>Soil properties and key risks of construction are well understood and documented in Section 7.1. Excepting the perimeter track and small footings onsite for inverters and the substation, the majority of the soil surface would not be impacted by the development; no large areas of landform reshaping or excavation are proposed.</p>

Agency	Issue raised	How issue has been addressed
		<p>A Ground Cover Management Plan is a commitment of the proposal. The objective is to ensure a stable ground cover during operation of the solar farm, minimising erosion and adverse water quality impacts. Agronomist input is a requirement of the plan, to ensure persistence of ground cover and any impacts of sodicity are addressed. Highly managed grazing may be used to maintain the height of ground cover.</p> <p>A Rehabilitation Plan is a commitment of the proposal, relevant to decommissioning. The objective is to ensure land uses post-operation are not adversely affected. Below ground infrastructure that impedes cropping (less than 500mm depth) may be removed, in consultation with the land owner.</p> <p>The Ground Cover Management Plan and Rehabilitation Plan would both be informed by soil testing to ensure treatments for sodicity and any other limitations are addressed specific to the soils onsite.</p>
Environmental Protection Agency (EPA)	Matters raised in Department's addendum to the SEARs included:	
	<ul style="list-style-type: none"> <li>Water quality – protection of surface and ground water, permanent sediment and erosion controls where required.</li> </ul>	The soil and water assessments were desktop based, and further informed by a site inspection. Surface and ground water resources are detailed in Section 7.2. Soil and water mitigation forms a commitment of the proposal.
	<ul style="list-style-type: none"> <li>Noise – assess and mitigate in accordance with the Interim Construction Noise Guideline</li> </ul>	A noise assessment in accordance with this guideline is included and summarised in Section 6.4.
	<ul style="list-style-type: none"> <li>Dust - manage dust to highway and Nevertire</li> </ul>	Dust control strategies are included in Section 7.7 as a commitment of the proposal.
	<ul style="list-style-type: none"> <li>Storage of chemicals and fuels</li> </ul>	Controls to reduce risks of spills are included in Section 7.2.
	<ul style="list-style-type: none"> <li>Waste management</li> </ul>	The appointed construction contractor would prepare a Waste Management Plan (WMP), including a means to reduce, reuse and recycle construction waste. Section 7.5.

Agency	Issue raised	How issue has been addressed
NSW Rural Fire Service	<ul style="list-style-type: none"> <li>The proponent discussed the proposal with NSW RFS on 22 December 2016. Key matters discussed included specific requirements for solar farms.</li> </ul>	There are no specific fire requirements for solar farms. A 10m fire break will be established internally between the perimeter fence and array or onsite infrastructure. Controls to prevent bushfire risk during construction, operation and decommissioning is discussed in Section 7.9.
Commonwealth Department of Environment	No adverse impacts are expected to any Commonwealth listed entity. No Matters of National Environmental Significance are relevant to the proposal. Refer to Section 5.4.1.	

## 4.2 ABORIGINAL COMMUNITY CONSULTATION

The consultation with Aboriginal stakeholders was undertaken in accordance with clause 80C of the *National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010* following the consultation steps outlined in the ACHCRP guide provided by OEH. The guide outlines a four stage process of consultation as follows:

- Stage 1 – Notification of project proposal and registration of interest.
- Stage 2 – Presentation of information about the proposed project.
- Stage 3 – Gathering information about cultural significance.
- Stage 4 – Review of draft cultural heritage assessment report.

The full list of consultation steps, including those groups and individuals that were contacted and a consultation log is provided in Appendix E. A summary of actions carried out in following these stages are as follows.

**Stage 1.** Letters outlining the development proposal and the need to carry out an ACHA were sent to the Warren Macquarie LALC (Warren LALC), and various statutory authorities including OEH, as identified under the ACHCRP. An advertisement was placed in the local newspapers, the Daily Liberal on 28 October 2016 seeking registrations of interest from Aboriginal people and organisations. A further series of letters was sent to other organisations identified by OEH in correspondence to NGH Environmental. In each instance, the closing date for submission was 14 days from receipt of the letter.

As a result of this process, a single group contacted the consultant to register their interest in the proposal. The group who registered interest was the Warren LALC who registered via email.

No other party registered their interest, including the entities and individuals recommended by OEH.

**Stage 2.** On the 30 November 2016 an Assessment Methodology document for the Nevertire Solar Farm was sent to the registered party. This document provided details of the background to the proposal, a summary of previous archaeological surveys and the proposed heritage assessment methodology for the proposal. The document invited comments regarding the proposed methodology and also sought any information regarding known Aboriginal cultural significance values associated with the subject area and/or any Aboriginal objects contained therein. A minimum of 28 days was allowed for a response to the document. Keith Redman, the CEO the Warren LALC provided written response via email that he was

satisfied with the methodology and found the document to be of high quality. He also noted that the Warren LALC were happy to proceed and assist with the fieldwork.

**Stage 3.** The *Assessment Methodology* outlined in Stage 2 included a written request to provide any information that may be relevant to the cultural heritage assessment of the study area. It was noted that sensitive information would be treated as confidential. No response regarding cultural information was received.

At this stage, the fieldwork was organised and the Warren LALC were asked to participate in the fieldwork, which was carried out in early January 2017.

**Stage 4** In January 2017 a draft version of this *Aboriginal Cultural Heritage Assessment Report* for the proposal was forwarded to the Warren LALC inviting comment on the results, the significance assessment and the recommendations. A response was received, and as a result, the language group noted in the report was amended in the final report, addressing this concern.

## 4.3 COMMUNITY CONSULTATION

Nevertire Solar Pty Ltd has undertaken consultation with the local community in developing the proposal, in line with the Australian Renewable Energy Agency's (ARENA's) *Establishing the social licence to operate large scale solar facilities in Australia: insights from social research for industry* (ARENA n.d.). The following section describes the consultation undertaken. Consultation activities were informed by *Beyond Public Meetings: Connecting community engagement with decision making* (Twyford Consulting 2007).

### 4.3.1 Community consultation plan

Effective engagement requires an understanding of community stakeholders and prioritisation of potential impacts. It also relies on the community understanding the proposal and specific issues of interest to them, in order to contribute effectively. The focus of the consultation process for the Nevertire Solar Farm has been toward providing this understanding and engagement.

A Community Consultation Plan (CCP) was developed for the proposal. It is provided in Appendix C.

The aim of the CCP is to identify methods to inform the community about the Nevertire Solar Farm and facilitate engagement with the community.

The CCP identifies:

- Community stakeholders for the proposal.
- Issues / risks related to the engagement of each stakeholder group.
- A consultation strategy for each stakeholder group.
- A set of activities against the proposal development timeline to facilitate consultation.

### 4.3.2 Visual impact assessment requirements

Community consultation specific to the assessment of visual impacts for the proposal was required in order to:

- Understand how the community values existing visual amenity in the study area.
- Document the perceptions of the community toward the proposed development.

As part of the community engagement for the proposal, respondents were surveyed on their views regarding the solar farm development and local visual amenity. Specific questions relating to visual impacts were included in a feedback form distributed, via:

- The proposal website.
- At public open house session to introduce the proposal, conducted on 18 November 2016.
- Direct meetings and mail-outs to nearby neighbours.

These questions related to:

- Local values, including views.
- Identification of views or landscape characteristics in the region and local area important to respondents.
- Perceptions and concerns about solar farm development.

The feedback form questions are included in the CCP (refer Appendix C). The results were used in the identification of viewpoints for the visual impact assessment (refer Appendix G and Section 6.3).

### **4.3.3 Community consultation activities to date**

In line with the CCP, a range of community engagement tools have been used with regard to the proposal. These included:

- Development of a proposal website to provide information and updates (<http://nevertiresolarfarm.com.au/> website went live in early December 2016 and is updated regularly).
- Establishment of a dedicated contact person with email address and phone number for feedback.
- A media release was issued on 9 November 2016 to advise of the proposal and the date, time and venue of the open house session for the Nevertire Solar Farm on Friday 18 November 2016 at the Nevertire Hotel (refer Appendix C).
- Direct engagement with neighbours through phone calls, letters and face to face meetings.
- The proposal was presented at a meeting with Warren Shire Council on 18 October. Council members of staff were generally supportive at this meeting.
- Open house session held by Epuron and attended by NGH Environmental in Nevertire on 18 November 2016. The session aimed to provide proposal information and to answer questions.

### **4.3.4 Results of community consultation**

Jessica Picton (Epuron) and Jenny Walsh (NGH Environmental) met with the nearest neighbours to the site on 18 October 2016. Information about the proposed solar farm was provided at the meetings and the neighbours were invited to raise concerns about the proposal. The following concerns were raised:

- The nearest neighbour to the south of the site was concerned about the view of the solar panels as they would be visible living and outdoor recreational area of his home. Possible vegetation screening buffers were discussed to obscure the view of the panels.

Thirteen people attended the Nevertire Solar Farm open house held in Nevertire on 18 November 2016. Twelve attendees were local, with one from Nyngan. Attendees were invited to complete feedback forms however none were completed on the day. Attendees viewed maps of the proposal layout and



photographs of other solar farms and discussed the proposal with staff from Epuron and NGH Environmental.

Attendees were generally supportive of the proposal and the following issues were discussed:

- Visual impact of the proposal and screening preferences - attendees were not generally concerned about the view of the proposal from Nevertire or the Mitchell Highway. Several attendees thought that screening of the public views would be a good idea, while others thought screening was unnecessary or suggested that a more visible project could be beneficial in terms of tourist/ visitor interest.
- Driver distraction.
- Stopping areas for travellers and visitors to view the solar farm once constructed.
- Local economy benefits – most attendees were interested to know how the Nevertire economy could benefit from the proposal i.e. keep the spending local.
- Business opportunities during construction, particularly accommodation.
- Several attendees mentioned that the open house coincided with harvest and some local people may not have been able to attend due to harvest work commitments.

Three feedback forms were returned, by respondents. One was less than 1km, one less than 2km and the third was more than 5km from the proposed solar farm site. Their combined comments included:

- Primary production was the most valued characteristic of the Nevertire local area. One respondent also noted the view, community/family ties, historic values, small town and natural values. Another respondent mentions the work opportunities.
- The open landscape was identified as the most important view or landscape characteristic for the region and local area. One respondent specifically outlines the open plains, grasslands, cropping, livestock and native fauna including Kangaroos and Emus.
- All three respondents cited renewable energy generation as what they liked most about solar farms generally. Two respondents cited local economic opportunities and diversification of land use.
- Two respondents cited potential visual impacts and land use or land value impacts as a concern regarding solar farms generally.
- One respondent cited concerns about potential community, noise, traffic impacts, as well as effects on natural areas and habitats.
- One respondent had specific concerns about the location of the proposed Nevertire Solar Farm. The concerns were in relation to impacts on views and rural lifestyle and devaluing of land.

While uptake levels of community engagement activities for the proposal have been relatively low, it is considered that this reflects a low level of concern about the proposal. The issues identified through the consultation process have been addressed in the EIA and proposal design.

#### **4.3.5 Continued engagement**

Engagement activities will continue throughout the determination period, as set out in the CCP.

The CCP will be reviewed regularly, as well as at key transition phases between different stages of the proposal development (e.g. prior to construction or operation). The Plan will continue to guide engagement activities at all stages of the proposal, ensuring that engagement is appropriate and in line with good practice.

## 5 PLANNING CONTEXT

### 5.1 ASSESSMENT CONTEXT

#### 5.1.1 Permissibility

The *State Environmental Planning Policy (Infrastructure) 2007* (SEPP Infrastructure) applies to the whole of the State. Clauses 34(7) and 34(8) of SEPP (Infrastructure) provide that development for the purpose of a solar energy system may be carried out by any person with consent on any land (other than on land in a prescribed residential zone if the system has the capacity to generate more than 100kW).

A 'solar energy system' includes a photovoltaic electricity generating system. The Nevertire Solar Farm development envelope is not located within a prescribed residential zone. Accordingly, the construction, operation, upgrade and decommissioning of the solar farm may be carried out with development consent.

#### 5.1.2 State Significant Development (SSD)

Section 89C of the EP&A Act provides that development will be SSD if it is declared to be SSD by a State Environmental Planning Policy (SEPP).

The *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP) declares the Nevertire Solar Farm to be SSD as it is development for the purpose of electricity generating works with a capital investment value of greater than \$30 million (clause 20, Schedule 1). This is considered further below.

Section 78A (8A) of the EP&A Act requires a development application for SSD to be accompanied by an EIS prepared in accordance with the EP&A Regulation.

The proponent made a written application to the Secretary requesting SEARS on 11 November 2016 for the proposed Nevertire Solar Farm as required by clause 3 of Schedule 2 of the EP&A Regulations. The proponent's application was accompanied by a Scoping Report which provided detailed information about the proposed Nevertire Solar Farm including key environmental issues to be investigated further. The request for SEARs was registered as SSD 8072.

On 5 December 2016, the Secretary issued the SEARs for the Nevertire Solar Farm (Appendix A). In formulating the environmental assessment requirements, the Secretary consulted with relevant public authorities and agencies and considered key issues raised by those authorities. Section 4.1 outlines the SEARs and provides a cross reference to where each item is addressed within this EIS. This EIS complies with the SEARs and the environment assessment requirements contained in Schedule 2 of the EP&A Regulation.

### 5.2 EVALUATION OF THE DEVELOPMENT

Section 89H of the EP&A Act provides that Section 79C applies to the determination of development applications for SSD. Under Section 79C of the EP&A Act, the consent authority is required to consider a number of matters when determining a development application under Part 4. These matters are listed in Table 5-1 and assessed in terms of their relevance to the proposal.

Table 5-1 Matters of consideration

Provision	Relevance to the proposal
Any environmental planning instrument;	Relevant environmental planning instruments (EPIs) are discussed in Section 5.3.
Any proposed instrument that is or has been the subject of public consultation under the EP&A Act and that has been notified to the consent authority;	There are no draft instruments relevant to the proposal.
Any development control plan;	Clause 11 of the SRD SEPP provides that development control plans do not apply to SSD.
Any planning agreement that has been entered into under section 93F, or any draft planning agreement that a developer has offered to enter into under section 93F;	There are no planning agreements that have been entered into, nor are any planning agreements proposed, that relate to the proposal.
The regulations (to the extent that they prescribe matters for consideration);	<p>Clause 92 of the EP&amp;A Regulation requires consideration of:</p> <ul style="list-style-type: none"> <li>• the Government Coastal Policy, for development applications in certain local government areas; and</li> <li>• the provisions of AS 2601 for development applications involving the demolition of structures.</li> <li>• the provisions of a subdivision order and any development plan for development of land that is subject to a subdivision order.</li> <li>• the provision of development under the <i>Dark Sky Planning Guideline</i>.</li> </ul> <p>The Nevertire Solar Farm does not involve any of these types of development and the LGA is not listed in the table under this clause. The additional provisions provided by the EP&amp;A Regulation are not relevant to the proposal.</p>
Any coastal zone management plan (within the meaning of the <i>Coastal Protection Act 1979</i> ), that apply to the land to which the development application relates;	Coastal zone management is not applicable to the proposal.
The likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality;	The likely impacts of the proposal, including environmental impacts on both the natural and built environments, and the social and economic impacts in the locality, are detailed in Sections 6 and 7 of this EIS. This EIS demonstrates that the environmental impacts of the proposal have to the extent, reasonably and feasibly possible, been avoided or minimised through careful proposal design.
The suitability of the site for the development;	As discussed in Section 2.2, various options were considered when selecting an appropriate site for the proposal. The proposal site has a number of characteristics that make it suitable for the development of a solar farm. Most notably, is its location within close vicinity to an existing electricity substation with good connection capacity.

Provision	Relevance to the proposal
	Further, the Nevertire Solar Farm is largely reversible; at the end of the life of the solar farm, all above ground infrastructure would be removed and agricultural land use activities could resume.
Any submissions made in accordance with this Act or the regulations; and	Epuron would consider and, as necessary, respond constructively to any submission made in relation to the Nevertire Solar Farm. Consultation with stakeholders that has been undertaken during the planning stages including the preparation of this EIS is summarised in Section 4.
The public interest.	<p>The Nevertire Solar Farm is in the public interest for a number of reasons. The plant would produce approximately 105MW, this would provide energy for approximately 44,000 average Australian homes<sup>8</sup>. The solar farm would also assist to:</p> <ul style="list-style-type: none"> <li>• Generate 263,000 MWh per annum of renewable electricity which is enough to supply electricity for 44,000 average NSW households<sup>9</sup>.</li> <li>• Displace approximately 221,000 tonnes of CO<sub>2</sub> equivalent greenhouse gas emissions per year<sup>10</sup>.</li> <li>• Diversify of fuel sources for electricity generation on the NEM therefore increasing energy security.</li> <li>• Create of local job opportunities.</li> <li>• Inject expenditure in the local area.</li> </ul> <p>A Community Engagement Plan has been prepared and implemented to inform the community and stakeholders about the proposal and their opportunities to provide input into the assessment and development process. Further details on the consultation process is provided in Section 4.</p>

## 5.3 NSW LEGISLATION

### 5.3.1 *Environmental Planning and Assessment Act 1979*

Development in NSW is subject to the requirements of the EP&A Act and its associated regulations. Environmental planning instruments prepared under the EP&A Act set the framework for development approval in NSW.

The relevant objects under Section 5 of the EP&A Act are:

- a) to encourage:
- i. The proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages

<sup>88</sup> "Guidance on electricity consumption benchmarks on residential consumers", AER, December 2014.

<sup>9</sup> "Guidance on electricity consumption benchmarks on residential consumers", AER, December 2014.

<sup>10</sup> "National Greenhouse Accounts Factors", Department of Environment and Energy, August 2016.

- for the purpose of promoting the social and economic welfare of the community and a better environment.
- ii. The promotion and coordination of the orderly and economic use and development of land.
  - iii. The protection, provision and coordination of communication and utility services.
  - vi. The protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats.
  - vii. Ecologically sustainable development.
- c) To provide increased opportunity for public involvement and participation in environmental planning and assessment.

The objects of the EP&A Act have been considered throughout this environmental assessment. The Nevertire Solar Farm aims to promote the orderly and economic use of the land through the provision of utility services (power generation). The proposed solar farm has been located and designed such that it would avoid protected areas and generally minimise the use of natural and artificial resources while still promoting the social and economic welfare of the local community.

Given the Nevertire Solar Farm would support a number of the objects of the EP&A Act, and is not inconsistent with the remaining objects of the EP&A Act, the proposal is considered appropriate in the context of the EP&A Act.

The assessment of the Nevertire Solar Farm would be in accordance with the provisions of Part 4 of the EP&A Act.

### ***Environmental Planning and Assessment Regulation 2000***

Clauses 82 to 85B of the EP&A Regulation addresses public participation in SSD.

The Nevertire Solar Farm Development Application and accompanying information (including this EIS) will be placed on public exhibition by DPE for a period not less than 30 days.

### ***5.3.2 State Environmental Planning Policy (Rural Lands) 2008***

One of the primary aims of this SEPP is 'to identify State significant agricultural land for the purpose of ensuring the ongoing viability of agriculture on the land, having regards to social, economic and environmental considerations'.

The objects of Part 4 (State Significant agricultural land) are:

- a) *to identify State significant agricultural land and to provide for the carrying out of development on that land,*
- b) *to provide for the protection of agricultural land:*
  - (i) that is of State or regional agricultural significance, and*
  - (ii) that may be subject to demand for uses that are not compatible with agriculture,*  
*and*
  - (iii) if the protection will result in a public benefit.*

Clause 13 of this SEPP identifies land as being State significant agricultural land if it is listed in Schedule 2. Schedule 2 does not identify any land. The Nevertire Solar Farm is also not located on land that is identified as Strategic Agricultural Land.

### 5.3.3 State Environmental Planning Policy No. 55 - Remediation of Land

SEPP No. 55 aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. SEPP No.55 applies to the whole of the State.

Clause 7 of SEPP No. 55 requires that the remediation of land be considered by a consent authority in determining a development application.

A search of the NSW EPA contaminated land public record (NSW Government 2016a) was undertaken for contaminated sites within the Warren LGA on 30 November 2016. The search returned one result within the suburb of Warren relating to a petroleum station. The site is not located near the proposal area. The online *List of NSW contaminated sites notified to EPA* (NSW Government 2016b) was also searched on 30 November 2016. There are no contaminated sites listed for Nevertire.

There is a risk that contamination associated with agricultural activities (e.g., pesticides) could be present on the site, however, given no contaminated sites are recorded on or adjacent to the proposal site and no evidence of contamination was observed during the site assessment, this risk is considered very low.

### 5.3.4 State Environmental Planning Policy No. 44 – Koala Habitat Protection

*State Environmental Planning Policy No. 44 – Koala Habitat Protection* (SEPP 44) encourages the conservation and management of natural vegetation that provides habitat for Koalas. Koalas are listed under the TSC Act as a vulnerable species. The Warren LGA is subject to this SEPP and therefore cannot approve development in an area affected by the policy without an investigation of *Core Koala Habitat*. SEPP 44 aims to identify areas of *Potential* and *Core Koala Habitat*. These are described as follows:

- Potential Koala Habitat: areas of native vegetation where the trees listed in Schedule 2 of SEPP 44 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component; and
- Core Koala Habitat: an area of land with a resident population of Koalas, evidenced by attributes such as breeding females, and recent and historical records of a population.

The biodiversity assessment undertaken for the proposal (summarised in Section 6.2 and provided in full in Appendix D addresses SEPP 44 requirements. The biodiversity assessment considered that the proposal area does not currently support a Koala population and it would not comprise *Core Koala Habitat* under SEPP 44.

### 5.3.5 Warren Local Environmental Plan 2012

The site is located within the Warren LGA and is therefore subject to the provisions of the *Warren Local Environmental Plan 2012* (Warren LEP). The Warren LEP aims:

- (a) to realise the economic potential of rural land in Warren by following the principles of sustainable natural resource management,*
- (b) to encourage the proper management, development and conservation of natural and man-made resources in Warren by protecting, enhancing and conserving:*
  - (i) agricultural land, and*
  - (ii) timber, minerals, soil, water and other natural resources, and*
  - (iii) the Macquarie Marshes Nature Reserve, and*
  - (iv) areas of significance for nature conservation, and*

- (v) areas of high scenic or recreational value, and*
- (vi) places and buildings of archaeological or heritage significance, including relics and Aboriginal places of heritage significance,*
- (c) to ensure that development is permitted on land with due regard to environmental constraints, accessibility and existing land use patterns,*
- (d) to allow for the equitable provision of social services and facilities for the community,*
- (e) to minimise land use conflicts and adverse environmental impacts,*
- (f) to promote ecologically sustainable development.*

The solar farm site and transmission line route are located on land zoned RU1 - Primary Production.

### **RU1 Primary Production**

The LEP states that the consent authority must have regard to the objectives for development in a zone when determining a development application. The objectives of this zone 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 protect, enhance and conserve agricultural land in a manner that ensures that the primary role of land is for efficient and effective agricultural pursuits, managed in accordance with sustainable natural resource management principles.*
- *To protect water resources in the public interest.*
- *To protect areas of local, state, national and international significance for nature conservation, including areas with rare plants, wetlands and significant habitat.*
- *To permit rural industries that do not have a significant adverse impact on existing or potential agricultural production on adjoining land.*
- *To conserve and protect the Macquarie Marshes by encouraging and managing appropriate land uses and agricultural activities.*

Electrical generation is prohibited in the RU1 Zone. However, the ISEPP allows the development for the purpose of a solar energy system on any land with consent (refer to Section 5.1.1).

For the life of the proposal, the proposal would harness a natural resource (solar energy). While the activity would impact on land available for primary production, the land would allow for diversity in land use and being reversible and involving limited ground disturbance, it would not remove the potential to use the land for cropping (or some alternative permissible rural land use) at the end of the solar farm's life (expected to be 30 years). The solar farm would be decommissioned at the end of its operational life, removing all above ground infrastructure. Underground infrastructure less than 500mm deep may be removed in consultation with the landowner; landowner preference may be to leave groundcover undisturbed. Internal access tracks would be rehabilitated or sections retained, in consultation with the landowner.

Mitigation measures contained within this EIS that would form a commitment of the proposal, address construction and operational soil and water impacts and would act to maintain the onsite land capability as well as protect off site resources such as Boggy Cowal waterway, which drains into the Macquarie River approximately 19km north of the proposal site.

Once constructed, the operational requirements of the solar farm would be relatively limited, in terms of traffic movements and use of machinery onsite. They would not impact on the current/ongoing agricultural activities of adjoining land.

### **5.3.6 Roads Act 1993**

The Roads Act provides for the classification of roads and for the declaration of the Roads and Maritime Services and other public authorities as roads authorities for both classified and unclassified roads. It also regulates the carrying out of various activities in, on and over public roads. This includes the erection or removal of structures, the excavation or disturbance to a public road surface, the pumping of water into a public road from any land adjoining the road or the connection of a road to a classified road.

The proposal would use one existing access point from Mitchell Highway for operation and construction. The entry point would be upgraded in consultation with Roads and Maritime Services including minor widening and safety works prior to start of construction of the solar farm. These upgrades would involve work within the road reserves and would therefore require approval from Roads and Maritime Services.

The proposed transmission line would be constructed over the Oxley Highway and within the Crown road reserves of Belerenga Street, Clyde Street and Gobabla Street. This would require approval from Roads and Maritime Services and the Minister. RMS was consulted regarding the Oxley Highway crossing on 5 September 2016. A permit will be sought from RMS pre-construction. DPI (Lands) has confirmed that Belerenga Street, Clyde Street and Gobabla Street are Crown road reserves. Landowner consent has been granted by DPI, conditional upon agreement on land tenure (such as establishment of a specific easement). The Minister will provide comment on the EIS, during the exhibition period.

### **5.3.7 Crown Lands Act 1989**

The objective of the *Crown Lands Act* is to ensure that Crown land is managed for the benefit of the people of New South Wales. The Catchments and Lands Division, DPI is responsible for the sustainable and commercial management of Crown land. This involves the management of state-owned land, linking with other agencies, local government, the private sector and communities to provide social and economic outcomes for NSW.

DPI (Lands) has confirmed that the proposed transmission line would be within Crown road reserves (refer to Section 5.3.6). Landowner consent has been granted by DPI, conditional upon agreement on land tenure (such as establishment of a specific easement). The Minister will provide comment on the EIS, during the exhibition period.

Travelling Stock Reserves (TSR) are adjacent to the proposed transmission line. The proposal does not involve work or the placement of infrastructure within any TSR.

### **5.3.8 Threatened Species Conservation Act 1995**

The *Threatened Species Conservation Act 1995* (TSC Act) provides for the conservation of threatened species, populations and ecological communities of animals and plants. The TSC Act sets out a number of specific objects relating to the conservation of biological diversity and the promotion of ecologically sustainable development.

The potential to impact threatened species, populations and ecological communities listed under this act has been considered in a specialist biodiversity assessment, summarised in Section 6.2 and appended in full in Appendix D of this EIS. The format of the assessment is consistent with the newly developed



Framework for Biodiversity Assessment, developed for major proposals. Under Section 79B(2A) of the EP&A Act, concurrence under the TSC Act is not required for SSD.

### 5.3.9 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) provides an integrated system of licensing for certain polluting activities within the objective of protecting the environment.

- Section 148 of this Act requires notification of pollution incidents.
- Section 120 of this Act provides that it an offence to pollute waters.
- Schedule 1 of the POEO Act describes activities for which an Environment Protection Licence is required.

Epuron must ensure that all phases of the solar farm proposal are managed to prevent pollution, including pollution of waters. Epuron is obliged to notify the relevant authorities (e.g. Environment Protection Authority) when a 'pollution incident' occurs that causes or threatens 'material harm' to the environment. Spill controls, emergency response and notifications and contingency planning for the proposal is included in Section 7.1.3 and 7.2.3 of the EIS.

Under section 48 of the POEO Act, premises-based scheduled activities (as defined in Schedule 1 of the POEO Act) require an Environment Protection Licence (EPL). Clause 17 of Schedule 1 of the POEO Act concerns electricity generation works, however does not include solar power. Therefore, the Nevertire Solar Farm would not be a scheduled activity under this Act. Accordingly, an EPL is not required under the POEO Act.

Legal requirements for the management of waste are also established under the POEO Act and the *Protection of the Environment Operations (Waste) Regulation 2005*. Unlawful transportation and deposition of waste is an offence under Section 143 of the POEO Act. Waste management should be undertaken in accordance with the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act). The objectives of this Act are:

- a) to encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development,*
- b) to ensure that resource management options are considered against a hierarchy of the following order:*
  - i. avoidance of unnecessary resource consumption,*
  - ii. resource recovery (including reuse, reprocessing, recycling and energy recovery),*
  - iii. disposal,*
- c) to provide for the continual reduction in waste generation,*
- d) to minimise the consumption of natural resources and the final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste,*
- e) to ensure that industry shares with the community the responsibility for reducing and dealing with waste,*
- f) to ensure the efficient funding of waste and resource management planning, programs and service delivery,*
- g) to achieve integrated waste and resource management planning, programs and service delivery on a State-wide basis,*
- h) to assist in the achievement of the objectives of the [Protection of the Environment Operations Act 1997](#).*

Waste minimisation and management is assessed in Section 7.5 of the EIS.

### 5.3.10 Water Management Act 2000

The *Water Management Act 2000* (WM Act), currently administered by Department of Primary Industries (Office of Water) NOW and Water NSW, is progressively being implemented throughout NSW to manage water resources, superseding the *Water Act 1912*. The aim of the WM Act is to ensure that water resources are conserved and properly managed for sustainable use benefiting both present and future generations. It is also intended to provide formal means for the protection and enhancement of the environmental qualities of waterways and their in-stream uses, as well as to provide for the protection of catchment conditions.

Freshwater sources throughout NSW are managed via Water Sharing Plans (WSPs) under the WM Act. Key rules within the WSPs specify when licence holders can access water and how water can be traded. There are three WSPs for the Central West water management area that cover the proposal area.

Regarding the proposal, there would be no requirement to modify existing entitlements or seek new entitlements under these plans. The proposal has minimal water requirements that would be satisfied by purchasing water during construction and rain water collection during operation.

A 40m buffer has been applied to the Boggy Cowal waterway on the site's western boundary, to ensure no within waterfront land as defined under WM Act. Additionally, a controlled activity approval is not required for SSD under Section 89J of the EP&A Act.

### 5.3.11 Fisheries Management Act 1994 (FM Act)

The FM Act sets out to conserve fish stocks and key fish habitats, threatened species, populations and ecological communities of fish and marine vegetation and biological diversity. Further, it aims to promote viable commercial fishing, aquaculture industries and recreational fishing opportunities. Threatened species, populations and ecological communities and key threatening process are listed in the FM Act's Schedules.

The Nevertire Solar Farm development envelope is within the Central West catchment. The proposal site doesn't contain key fish habitat. The closest mapped key fish habitat is 8km north of the proposal site. As stated above, a 40m buffer has been applied to Boggy Cowal and specific soil and water mitigation measures within this EIS (section 7.1 and 7.2) would manage the potential impacts on the watercourse.

A permit under Section 201, 205 or 219 of the Act is not required by virtue of Section 89J of the EP&A Act.

### 5.3.12 National Parks and Wildlife Act 1974

Under the *National Parks and Wildlife Act 1974* (NPW Act), the Director General of OEHL is responsible for the care, control and management of all national parks, historic sites, nature reserves, reserves, Aboriginal areas and state game reserves. The Director General of OEHL is also responsible under this legislation for the protection and care of native fauna and flora, and Aboriginal places and objects throughout NSW.

The provisions of the NPW Act have been considered for the Nevertire Solar Farm. The proposed development envelope is not located in or within the vicinity of any protected areas as defined in the Act.

An assessment of impacts to Aboriginal Heritage is summarised in Section 6.3 of the EIS (and provided in full, Appendix E). An Aboriginal Heritage Impact Permit (AHIP) under Section 90 of the NPW Act is not required for SSD under section 89J of the EP&A Act.

### 5.3.13 Native Vegetation Act 2003

The *Native Vegetation Act 2003* regulates the clearing of native vegetation. Clearing is defined as cutting down, felling, thinning, logging, removing, killing, destroying, poisoning, ringbarking, uprooting or burning native vegetation including native grasses and herbage.

An authorisation to clear native vegetation is not required for SSD under section 89J of the EP&A Act. Native vegetation clearing is summarised in Section 6.2. The biodiversity assessment is appended in full in Appendix D.

### 5.3.14 Heritage Act 1977

The *Heritage Act 1977* aims to conserve heritage values. This Act defines 'environmental heritage' as those places, buildings, works, relics, moveable objects and precincts of State or local heritage significance. A property is a heritage item if it is listed in the heritage schedule of the local Council's LEP or listed on the State Heritage Register, being a register of places and items of particular importance to the people of NSW.

Section 7.8 of this EIS addresses potential impacts on heritage items or places. No heritage items or places have been identified on or in the vicinity of the proposal site.

## 5.4 COMMONWEALTH LEGISLATION

### 5.4.1 Environmental Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is administered by the Commonwealth Department of Environment (DoE). Under the EPBC Act, if the Minister determines that an action is a 'controlled action' which would have or is likely to have a significant impact on a Matter of National Environmental Significance (MNES) or Commonwealth land, then the action may not be undertaken without prior approval of the Minister.

The EPBC Act identifies nine MNES:

- World Heritage properties.
- National heritage places.
- Ramsar wetlands of international significance.
- Threatened species and ecological communities.
- Migratory species.
- Commonwealth marine areas.
- The Great Barrier Reef Marine Park.
- Nuclear actions (including uranium mining).
- A water resource, in relation to coal seam gas development and large coal mining development

When a person proposes to undertake an action that they believe may be a 'controlled action' under the EPBC Act, they must refer the action to the DoE for a decision about whether the proposed action is a 'controlled action'.

A search for MNES and other matters protected by the EPBC Act was carried out using the Commonwealth online Environmental Reporting Tool (report created 12 October 2016), and applying a 10km search buffer around the proposal site. A summary of the findings is provided in the tables below.

Table 5-2 Summary of Matters of National Environmental Significance (10km search radius).

Matters of National Environmental Significance	No.
World Heritage Properties	0
National Heritage Places	0
Wetlands of International Significance	4
Great Barrier Reef Marine Park	0
Commonwealth Marine Areas	0
Threatened Ecological Communities	5
Threatened Species	10
Migratory Species	4

Table 5-3 Summary of other matters protected by the EPBC Act (10km search radius).

Other Matters Protected by the EPBC Act	No.
Commonwealth Lands	1
Commonwealth Heritage Places	0
Listed Marine Species	9
Whales and Other Cetaceans	0
Critical Habitats	0
Commonwealth Reserves	0

Table 5-4 Summary extra information (10km search radius).

Extra information	No.
State and Territory Reserves	0
Regional Forest Agreements	0
Invasive Species	20
Nationally Important Wetlands	1
Key Ecological Features (Marine)	0

The EPBC protected matters report identified the following MNES to have potential to occur within the proposal site:

- Wetlands of international importance
- Threatened ecological communities
- Threatened species
- Migratory species
- Commonwealth land

The potential for these MNES to occur at the site are discussed below. Refer to the BAR for a more detailed assessment of the proposal in relation to the identified MNES.

## Wetlands of International Importance

Four wetlands of international importance were returned from the protected matters report. The nearest of these (within 100km of the development site) is the Macquarie Marshes. All other wetlands returned from the search are over 500km away. The Macquarie Marshes occurs approximately 95km north of the development site. It is fed by the Macquarie River of which Boggy Cowal may be a first order tributary.

## Threatened Ecological Communities

Five threatened ecological communities were returned from the protected matters report. One of these, the Weeping Myall Woodlands EEC occurs in close proximity to the proposal site but, not within it.

## Threatened species

Ten threatened species were returned from the protected matters report. Of these, three are considered to have the potential to utilise the habitats at the proposal site:

- Superb Parrot (*Polytelis swainsonii*) – Vulnerable EPBC Act
- Corben's Long-eared Bat (*Nyctophilus corbeni*) – Vulnerable EPBC Act
- Koala (*Phascolarctos cinereus*) – Vulnerable EPBC Act

## Migratory species

Four listed migratory species were returned from the protected matters report. None of these species are considered likely to occur at the site on a regular basis or rely on the habitats present.

## Commonwealth land

The proposal would not impact on Commonwealth Land.

### 5.4.2 Native Title Act 1993

The *Native Title Act 1993* provides a legislative framework for the recognition and protection of common law native title rights. Native title is the recognition by Australian law that Indigenous people had a system of law and ownership of their lands before European settlement. Where that traditional connection to land and waters has been maintained and where government acts have not removed it, the law recognises the persistence of native title.

People who hold native title have a right to continue to practise their law and customs over traditional lands and waters while respecting other Australian laws. This could include visiting to protect important places, making decisions about the future use of the land or waters, and hunting, gathering and collecting bush medicines. Further, when a native title claimant application is registered by the National Native Title Tribunal, the people seeking native title recognition gain a right to consult or negotiate with anyone who wants to undertake a proposal on the area claimed.

Native title may exist in areas such as:

- Vacant Crown land.
- Some national parks, forests and public reserves.
- Some types of pastoral lease.
- Some land held for Aboriginal communities.
- Beaches, oceans, seas, reefs, lakes, rivers, creeks, swamps and other waters that are not privately owned.

A search of the Native Title Register on 19 December 2016 for the Warren LGA found no registered native titles relevant to the proposal site.

### 5.4.3 Renewable Energy (Electricity) Act 2000

The *Renewable Energy (Electricity) Act 2000* (RE Act) aims:

- To encourage the additional generation of electricity from renewable sources.
- To reduce emissions of GHGs in the electricity sector.
- To ensure that renewable energy sources are ecologically sustainable.

Section 17 of the RE Act defines renewable energy sources eligible under the Commonwealth government's renewable energy target scheme. This includes solar energy.

Certificates for the generation of electricity are issued using eligible renewable energy sources. This requires purchasers (referred to as liable entities) to surrender a specified number of certificates for the electricity that they acquire. In January 2011, renewable energy certificates were reclassified as either large-scale generation certificates or a small-scale technology certificates following changes to the scheme.

The proposal is the subject of an application to the Clean Energy Regulator under the RE Act and would receive large-scale generation certificates. The power generated at the site would be fed into the national electricity grid and contribute to the renewable energy generation mix.

## 5.5 OTHER RELEVANT POLICIES AND MATTERS

### 5.5.1 Ecological Sustainable Development (ESD)

Ecologically Sustainable Development (ESD) involves the effective integration of social, economic and environmental considerations in decision-making processes. In 1992, the Commonwealth and all state and territory governments endorsed the *National Strategy for Ecologically Sustainable Development*.

In NSW, the concept has been incorporated in legislation such as the EP&A Act and EP&A Regulation. For the purposes of the EP&A Act and other NSW legislation, the Intergovernmental Agreement on the Environment (1992) and the *Protection of the Environment Administration Act 1991*, outline principles which can be used to achieve ESD. These principles are presented below along with a description of how the Nevertire Solar Farm and this EIS have considered each principle.

Table 5-5 ESD Principles

- a) *The precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:*
- careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*
  - an assessment of the risk-weighted consequences of various options.*

The precautionary principle has been adopted in the assessment of impact. All potential impacts have been considered and mitigated where a risk has been identified. Mitigation is commensurate with risk. Where uncertainty exists, measures have been included to address the uncertainty.

*b) Inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.*

The majority of the potential impacts of the proposal are likely to be localised and would not diminish the options regarding land and resource uses and nature conservation available to future generations. Importantly, the Nevertire Solar Farm provides additional renewable energy that contributes to minimising the risk of climate change to current and future generations by reducing carbon emissions intensity of electricity generation.

The solar farm would be decommissioned at the end of its operational life, removing all above ground infrastructure and underground infrastructure less than 500mm deep (unless the landowner wishes to retain the infrastructure in situ). Decommissioning would therefore result in returning the site to its existing land capability for future generations.

*c) Conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.*

The impacts of the proposal on biodiversity, including EPBC listed species, have been assessed in detail in Appendix D and Section 6.2. This has included avoidance of higher conservation value areas where possible and management prescriptions to minimise, manage and offset residual impacts. The impacts have been deemed acceptable and justifiable by this assessment.

*d) Improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:*

- i. polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*
- ii. the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*
- iii. environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.*

Attributes of the proposal site such as the existing native vegetation, land capability, soil and hydrology have been valued in terms of their broader contribution to the catchment and catchment processes. The requirement for biodiversity offsets has been considered in accordance with the FBA for Major Proposals.

The aims, structure and content of this EIS have incorporated these ESD principles. The mitigation measures in Section 8.2 set out an auditable environmental management commitment by the proponent. Based on the social and environmental benefits accruing from the proposal at a local and broader level, and the

assessed impacts on the environment and their ability to be managed, it is considered that the development would be ecologically sustainable within the context of ESD and is justifiable.

## 5.6 SUMMARY OF LICENSES

Table 5-6 lists licenses that have been identified as relevant to the proposal.

Table 5-6 Summary of licenses required

Instrument	Licence or approval requirement
<b>EP&amp;A Act, Part 4</b>	SSD consent - State Significant Developments require approval from the Minister for Planning and Environment. This EIS has been prepared in accordance with the requirements of the Secretary of the DPE.
<b>Roads Act, section 138</b>	Any works to public or classified roads require a permit under this act by the roads authority, which is Roads and Maritime Services for upgrades to the Mitchell Highway and the transmission line over the Oxley Highway, as well as the Minister in regards to the transmission line route for Belerenga Street, Clyde Street and Gobabla Street.
<b>Crown Lands Act</b>	Landowner permission and establishment of an electricity easement across Crown Land (Belerenga Street, Clyde Street and Gobabla Street).

Other permits required would include:

- Permit for the proposed transmission to cross the Nevertire Warren Railway Line prior to construction from John Holland Rail.

Note, if it is determined that additional licenses or approvals are required, Epuron would obtain these prior to commencement of relevant activities.



## 6 ENVIRONMENTAL IMPACT ASSESSMENT

### 6.1 IMPACT ASSESSMENT APPROACH

The environmental impact assessment below addresses all impacts likely to be attributed to the proposal (including the solar farm, access roads and transmission line). This includes consideration of:

- Direct impacts – these include impacts directly attributable to the construction, operational and decommissioning phases such as:
  - Disturbance to native vegetation, soil, water and air quality
  - Potential to impact on cultural features and values
  - Noise generated by equipment and traffic movements
  - Public safety and hazards.
  - Pollution risks
- Indirect impacts – these include follow-on or cascading impacts such as:
  - Impacts on the local economy
  - Potential to impact existing and future land uses.
- Cumulative impacts – these include the combined potential effects of different impact types as well as the potential interaction with other proposals. For example:
  - The combined impact of construction noise, traffic and visual impacts for nearby receivers
  - The combined effects of the construction phase coinciding with other large infrastructure works that may be planned in the area.

To guide the level of investigation within the EIS, a risk assessment was undertaken to characterise the likely environmental risks associated with the construction, operation and decommissioning of the proposal. This was based on the Constraints Analysis (NGH Environmental 2016) and Scoping Study (NGH Environmental 2016); provided in the application for the SEARs as well as a site inspection. This exercise has guided the preparation of this EIS.

The risk rating is a factor of the **consequence** and **likelihood** of an impact occurring. Depending on the combination of consequence and likelihood, the overall risk rating could be low to extreme. High to extreme risks (termed ‘key risks’) have warranted a higher level of investigation. Risks identified as low or highly manageable are discussed in less detail.

Table 6-1 summarises the results of the ‘unmitigated’ risk assessment. The following four key risks were investigated in detail by way of specialist assessments (refer Section 6):

- Biodiversity.
- Aboriginal heritage.
- Visual amenity.
- Noise.

Lower risk issues were investigated, primarily using desktop assessment. These are included in Section 6 of this EIS.

It is noted that on the basis of the investigations now documented in this EIS for key and lower risk issues, all risks are considered manageable and would have a revised ‘mitigated’ risk rating of ‘low’.

Table 6-1 Risk analysis of environmental issues

Relevant EIS section	Environmental risk	Consequence	Likelihood	Unmitigated risk rating
6.2	Biodiversity	Moderate	Possible	High
6.3	Aboriginal heritage	Moderate	Possible	High
6.4	Noise and vibration	Moderate	Possible	High
6.4	Visual amenity	Moderate	Possible	High
7.1	Soils	Minor	Possible	Medium
7.2	Hydrology, water use and water quality (surface and ground water)	Minor	Possible	Medium
7.3	Traffic, transport and road safety	Minor	Possible	Medium
7.4	Land use	Minor	Possible	Medium
7.5	Resource use and waste generation	Minor	Possible	Medium
7.6	Magnetic fields	Minor	Possible	Medium
7.7	Climate and air quality	Minor	Possible	Medium
7.8	Historic heritage	Minor	Possible	Medium
7.9	Bush fire risk	Minor	Possible	Medium
7.10	Socioeconomic and community	Minor	Possible	Medium

## 6.2 BIODIVERSITY

### 6.2.1 NSW Framework for Biodiversity Assessment

#### Methodology

A Biodiversity Assessment Report (BAR) has been prepared by NGH Environmental on behalf of Epuron. The report is appended in full (Appendix D) and summarised in this section.

The aim of the BAR is to address the biodiversity matters raised in the SEARs and to address the requirements of the Framework for Biodiversity Assessment (FBA), developed for Major Proposals as part of the *Biodiversity Offsets Policy for Major Proposals*. It contains the assessment methodology that is adopted by the policy to assess impacts and provide offset guidance for Major Proposals. This report follows the BAR format required by the FBA.

Comprehensive mapping and field surveys were completed in accordance with the requirements in the FBA and BioBanking Credit Calculator (BCC). BCC plot data were collected in October 2016 for three homogenous vegetation zones that were mapped for the site.

Targeted flora and fauna field surveys were undertaken in October (Spring) 2016 to ensure that the majority of species likely to be occurring within the development site could be detected, and in accordance with the threatened species survey timing matrix produced by the BCC. The survey timing was appropriate to all flora and fauna returned by the BCC, with the exception is Sloane's Froglet which can only be adequately surveyed for during winter (June – August).

Survey effort included:

- Fauna habitat
  - Approximately 12 person hours were spent assessing fauna habitat within the development site. This included:
    - An assessment of habitat types available and their quality and suitability as threatened species habitat was conducted across the development site. Factors such as arboreal resources, ground-layer resources, vegetation structure, connectivity and disturbance were noted.
    - An assessment was undertaken of all accessible trees within the development site to record the species, presence of hollows, tree height, diameter and number, and size and location of hollows. Photographs were taken of each tree surveyed.
    - Waterbodies and ephemeral waterways were assessed for their fauna habitat potential and their likely utilisation by species within the locality.
    - Incidental sightings of fauna and their traces (e.g. scats, tracks, scratches) made while present on the site were also recorded.
    - An opportunistic record of fauna species observed during the fauna assessments was taken.
- Koala
  - Approximately two person hours was spent on surveys for the Koala.
  - Surveys were undertaken for the Koala by actively searching each of the five trees that occur within the small area of woodland.
  - Nocturnal spotlighting surveys were also undertaken within the woodland area adjacent to the north-eastern boundary of the proposed solar array area
- Red-backed Button-quail
  - Approximately two-and-a-half person hours was spent on nocturnal transect surveys for the Red-backed Button-quail.
  - Active searching was also undertaken during diurnal targeted flora surveys as habitat was potentially suitable.
- Threatened flora (Slender Darling Pea)
  - Approximately six person hours were spent surveying the development site to search for threatened flora species.
  - Targeted surveys were conducted within suitable habitat for the Slender Darling Pea. Surveys were undertaken within the optimal detection period for this species.
  - Surveys were conducted in accordance with the NSW Guide to Surveying Threatened Plants, and included formal linear transects within the development site, in addition to random meanders (after Cropper 1993) in areas of adjacent less disturbed habitat.

The results were entered into the BCC to determine the landscape values, ecosystem and species credits generated by the proposed development, in accordance with the FBA.

### Previous surveys conducted in the local area

It is unclear whether dedicated biodiversity surveys have been previously undertaken within the locality. However, evidence from the Atlas of Living Australia indicates that occasional opportunistic surveys have been undertaken, with records from the Eremeae eBird website and Birdlife Australia being present within the locality, in addition to flora records from the Australian Virtual Herbarium.

### Landscape attributes

The dominant Interim Biogeographic Regionalisation for Australia (IBRA) subregion affected by the proposal is the Bogan - Macquarie Subregion.

Three Mitchell Landscapes occur within the proposal site; Boggy Cowal Channels and Floodplains, Boggy Cowal Alluvial Plains and Trangie Terrace. The dominant Mitchell Landscape affected by the proposal is Boggy Cowal Alluvial Plains.

A site based assessment was completed in the BCC, in accordance with Appendix 4 of the FBA (Appendix D), as the proposal site is non-linear. The total area of native vegetation mapped within the outer assessment circle of 1000ha is 223.10ha. This reflects the high amount of land cultivation and development surrounding the site.

One stream occurs within the western portion of the development site. Boggy Cowal may be a first order tributary of the Macquarie River. The stream is understood to be ephemeral in nature, filling only during periods of high rainfall. When it contains water, the waterway would provide suitable foraging habitat for fauna groups such as wading birds and ducks, in addition to suitable breeding habitat for frogs. This may in turn provide prey for native and feral predators.

Naturally occurring areas of inundation were observed within the western portion of the development site after Spring rains in 2016, forming ephemeral wetlands. While still cropped, these areas appear to become inundated following heavy rainfall events, and similar to Boggy Cowal, are also considered likely to provide suitable foraging habitat for groups such as wading birds and ducks, in addition to suitable breeding habitat for frogs.

There is one artificially constructed dam within the development site which provides potentially suitable habitat for wetland birds and amphibians, although they are generally considered low quality due to a sparse covering of aquatic vegetation.

The closest Nationally Important Wetland to the development site is the Macquarie Marshes, located approximately 100km to the north of the development site.

No state or regionally significant biodiversity links occur within the development site or within the inner and outer assessment circles.

The BCC returned a landscape value score of 1.00, based on the above data.

### Field survey results

#### FLORA

One Plant Community Type (PCT) was identified in the development site, *Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW* (PCT 56). This vegetation is not listed as an Endangered Ecological Community.

Within the development site, PCT 56 occurred as:

- A small patch (0.84 ha) of moderate to good woodland vegetation around an existing dam within the proposed solar array area
- Derived grassland vegetation along the proposed transmission line with 0.04 ha in moderate to good condition and 0.53 hectares in low condition

Refer to Figure 6-1 to Figure 6-4.

No Endangered Ecological Communities (EECs) would be impacted by the proposed development.

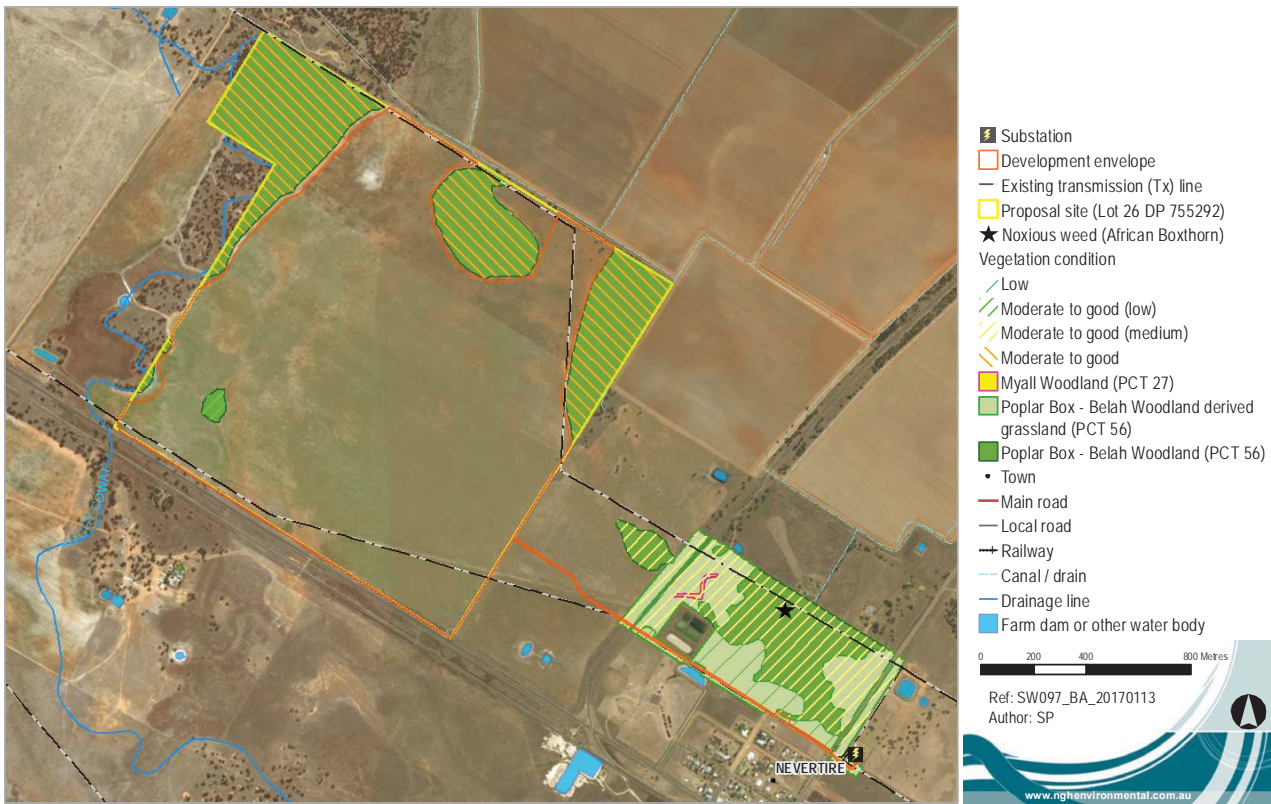


Figure 6-1 PCTs at the development site



Figure 6-2 Example of moderate to good (poor) condition Poplar Box - Belah woodland in the development site.



Figure 6-3 Example of moderate to good (medium) condition Poplar Box - Belah woodland derived grassland in the development site.



Figure 6-4 Example of low condition Poplar Box - Belah woodland derived grassland in the development site (foreground).

## FAUNA

The field surveys resulted in the identification of three threatened species, and one migratory species within the development site and adjacent habitats. Threatened species identified within the development site included:

- Grey-crowned Babbler (Eastern subspecies) *Pomatostomus temporalis temporalis* – Vulnerable (TSC Act)
- Spotted Harrier *Circus assimilis* – Vulnerable (TSC Act)
- Koala *Phascolarctos cinereus* (Vulnerable TSC Act, EPBC Act)

The Grey-crowned Babbler and Spotted Harrier were observed onsite. A single male Koala was heard vocalising in woodland vegetation adjacent to the development site.

One threatened species, Sloane’s Froglet (*Crinia sloanei*), is assumed to occur within the development site as survey timing was not suitable for this species and potentially suitable habitat for the species is present within the site.

### Biobanking Credit Calculator results

Applying the above information to the BCC assessment, the following data were entered into the BCC and returned the final site value scores and areas of impact on threatened species habitat.

Table 6-2 Vegetation zones for the development site

Zone ID	Vegetation zones	Condition class	Area (ha) within development site	Survey effort (number of plots)	Site value score (current)
1	PCT #56 BVT CW167 Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Moderate – good (poor)	0.84	1	29.17
2	PCT #56 BVT CW167 Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW <sup>11</sup>	Low	0.53	2	14.58
3	PCT #56 BVT CW167 Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW <sup>1</sup>	Moderate – good (medium)	0.04	1	13.02
<b>Total</b>			<b>1.41</b>	<b>4</b>	

<sup>11</sup> Occurring as a derived grassland with no overstorey or midstorey present



Table 6-3 Species impacted at the development site

Common name	Scientific name	Impacted by development?	ID method	Loss (ha)	Survey date
Koala	<i>Phascolarctos cinereus</i>	No	Survey	0.00	25/10/2016
Red-backed Button-quail	<i>Tumix maculosus</i>	No	Survey	0.00	25/10/2016
Slender Darling Pea	<i>Swainsona murrayana</i>	No	Survey	0.00	25/10/2016
Sloane's Froglet	<i>Crinia sloanei</i>	Yes	Assumed	22.72	NA

The outcome of the FBA BCC assessment is that a total of 14 ecosystem credits and 295 species credits have been generated for the development site (BCC Major Proposal 0035/2016/4008MP Version 1). The BCC full credit report is included within the BAR.

#### ECOSYSTEM CREDITS

- PCT 56 - Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW – 14 Credits

#### SPECIES CREDITS

- Sloane's Froglet (*Crinia sloanei*) – 295 credits

To offset the impacts of the development, these credits must be retired, either through the establishment of an offset onsite, retirement at another offset site, or purchase of credits on the Public Biobanking Register.

It is noted that targeted surveys were not undertaken for Sloane's Froglet *Crinia sloanei* within the correct survey period; in accordance with the BCC, the species requires survey during winter in order to conclude the species does not occur. A literature review and background records search were both undertaken in order to determine whether the site constitutes suitable habitat for the species. The nearest record of the species is approximately 25 km to the north-west of the site, within riparian vegetation along Crooked Creek. There is some connectivity between the site and this record, with a complex of drainage channels and floodplains occurring throughout the locality. Vegetation connectivity is limited, restricted to disjunct riparian corridors and vegetation patches along paddock boundaries. Many of the cropped paddocks in the local area have constructed drainage channels to assist cotton irrigation.

The species is endemic to the Murray-Darling Basin from where it has been recorded from widely scattered locations in north central Victoria and central western NSW from the Victorian to Queensland border. Nearly, three quarters of the records are from the Riverina Bioregion which straddles southern NSW and Central Victoria, with a further 18% of records within the NSW South Western Slopes. Other records are from the Darling Riverine Plains, Cobar Peneplain and from the edges of the Victorian Midlands, Brigalow Belt - South and Murray Darling Depression bioregions (EPBC Act Threatened Species Nomination Form 2014).

The species lives and breeds in temporary and permanent waterbodies including oxbows off creeks and rivers, farm dams, large and small natural wetlands, constructed frog ponds and temporary puddles. It prefers wetlands that contain riparian and aquatic vegetation. Most often it has been found in waterbodies

that contain grasses and reeds that are of medium height and have small stem diameters such as couch, watercouch or the Common spikerush, *Eleocharis acuta*. Waterbodies containing this type of vegetation are essential for Sloane's Froglet as it lays its eggs attached to vegetation rather than as a frothy mass on the surface of the water like some other frogs. Gilgai and other depressions on clay plains are favoured habitat, while elsewhere they are generally restricted to temporary ponds in the river valley where they occur within 8 km of large rivers. As well as requiring particular breeding habitat, Sloane's Froglet needs connections between breeding and refuge sites. Inland Australia's extremely variable climate means that for Sloane's Froglet to survive, it has to move across the landscape when it is wet. Sloane's Froglet uses roadside drains, table drains, irrigation channels and inundated grasslands to move from one spot to another (EPBC Act Threatened Species Nomination Form 2014).

The site contains some areas of suitable breeding habitat in the form of temporary and permanent waterbodies, with areas of suitable shelter habitat occurring in the form of woodland containing woody ground debris to the immediate north and west of the site. However, though suitable habitat is present, the quality of the habitat is considered low as a result the ongoing cropping which occurs within the temporary waterbodies, modification of surrounding drainage (constructed drainage channels for cotton irrigation) and the historic clearing which has taken place within the paddocks and adjacent woodlands, leading to a low level of vegetation connectivity and limited built up of woody ground debris. The species appears to be sparsely distributed within its known distribution, so is considered unlikely to occur in such a disturbed and isolated area of habitat or be impacted by the development.

In advance of OEH consultation regarding this species or further winter surveys, the species has been entered as being impacted by the development. The area entered is equivalent to the area of inundation present in the October 2016 survey.

## 6.2.2 Commonwealth Matters of National Environmental Significance (MNES)

An EPBC protected matters report was undertaken on the 12 October 2016 (10km buffer of the development site) to identify Matters of National Environmental Significance (MNES) that have the potential to occur within the development site. The MNES relevant to the biodiversity assessment are summarised below.

### WETLANDS OF INTERNATIONAL IMPORTANCE

Four wetlands of international importance were returned from the protected matters report. The nearest of these (within 100km of the development site) is the Macquarie Marshes. All other wetlands returned from the search are over 500km away. The Macquarie Marshes occurs approximately 95km north of the development site. It is fed by the Macquarie River of which Boggy Cowal may be a first order tributary.

### THREATENED ECOLOGICAL COMMUNITIES

Five threatened ecological communities were returned from the protected matters report. One of these, the Weeping Myall Woodlands EEC occurs in close proximity to the development site but, not within it.

### THREATENED SPECIES

Ten threatened species were returned from the MNES protected matters report. Of these, three are considered to have the potential to utilise the habitats at the development site:

- Superb Parrot (*Polytelis swainsonii*) – Vulnerable EPBC Act
- Corben's Long-eared Bat (*Nyctophilus corbeni*) – Vulnerable EPBC Act

- Koala (*Phascolarctos cinereus*) – Vulnerable EPBC Act

#### MIGRATORY SPECIES

Four listed migratory species were returned from the protected matters report. None of these species are considered likely to occur at the site on a regular basis or rely on the habitats present.

### 6.2.3 Potential impacts

#### Avoidance measures

A preliminary constraints analysis was conducted by NGH Environmental (2016) which informed the site layout design. Vegetation constituting the highest ecological constraints, such as forming components of EECs and providing potential threatened flora and fauna habitat, were avoided as far as practical. The net outcome is an impact of only 1.41ha of native vegetation removal (largely in a degraded state), out of a total development envelope of approximately 200ha (approximately <0.01%).

Key changes to the proposal design included:

- Application of a 40m buffer to Boggy Cowal to avoid impacts to associated riparian habitats
- Selection of the southern transmission line route, avoiding impacts to woodland vegetation and threatened species habitat

#### Construction and decommissioning

In addition to the offset requirement, direct impacts that must be managed during construction and decommissioning include:

- Habitat clearance for permanent and temporary construction facilities (e.g. solar infrastructure, transmission lines, compound sites, stockpile sites, access tracks). The consequences of this impact may include:
  - Direct loss of native flora and fauna habitat
  - Injury and mortality to fauna during clearing of fauna habitat
  - Introduction and spread of noxious weeds and pathogens
  - Disturbance to fallen timber, dead wood and bush rock

A commitment to a Flora and Fauna Management Plan to address the risks during construction and decommissioning forms part of the proposal.

Indirect impacts identified in the BAR included risks for soil and water contamination, creation of barriers to fauna movement, or the generation of excessive dust, light or noise. Where not already included as soil and water mitigation commitments of the proposal, these issues are addressed in the mitigation measures below.

#### Operation

- Shading by solar array infrastructure. The consequences of this impact may include:
  - Ongoing prevention of flora regeneration
  - Unstable ground surfaces and sedimentation of downstream habitats
  - Collision risk to birds and microbats (fencing, array infrastructure)

Indirect impacts identified in the BAR included risks for light spill, weed encroachment, increased vehicle traffic, solar array microclimate, fences, pest animals, and mobilisation of sediments. Where not already

included as soil and water mitigation commitments of the proposal, these issues are addressed in the mitigation measures below.

### 6.2.4 Safeguards and mitigation measures

The safeguards provided in the BA are restated below and would be implemented to minimise and manage risks to biodiversity values. Since the finalisation of the Biodiversity assessment, the proponent has confirmed all hollow bearing trees will be avoided by the proposal. This is now included as a commitment of the project.

Table 6-4 Safeguards and mitigation measures for biodiversity impacts

*C: Construction, O: Operation, D: Decommissioning*

Safeguards and Mitigation Measures	C	O	D
<ul style="list-style-type: none"> <li>All hollow bearing trees identified would be avoided by the works.</li> </ul>	C		
<ul style="list-style-type: none"> <li>If the loss of 0.84 ha of Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW cannot be avoided, the ecosystem credit requirements (calculated to generate 14 credits) would be offset according to the FBA.</li> </ul>	C		
<ul style="list-style-type: none"> <li>Appropriately timed surveys (June – August) would be implemented to determine if Sloane’s Froglet occurs within the development site.</li> <li>If identified within the development site either:               <ul style="list-style-type: none"> <li>The proposal would be modified to avoid habitat for this species, or</li> <li>The species credit requirements (calculated using the constructed impact area on mapped habitat) would be offset for the species according to the FBA</li> </ul> </li> <li>If not identified within the development site, the species credit requirement would be zero and no further action would be undertaken.</li> </ul>	C		
<ul style="list-style-type: none"> <li>Preparation of a Flora and Fauna Management Plan (FFMP) that would incorporate protocols for:               <ul style="list-style-type: none"> <li>Protection of native vegetation to be retained</li> <li>Best practice removal and disposal of vegetation</li> <li>Weed management</li> <li>Unexpected threatened species finds</li> <li>Rehabilitation of disturbed areas</li> </ul> </li> </ul> <p>The FFMP would form part of the Nevertire Solar Farm Construction Environmental Management Plan (CEMP).</p>	C		
<ul style="list-style-type: none"> <li>Stockpiling materials and equipment and parking vehicles will be avoided within the dripline (extent of foliage cover) of any native tree.</li> <li>Prior to the commencement of work, a physical vegetation clearing boundary at the approved clearing limit is to be clearly demarcated and implemented. The delineation of such a boundary may include the use of temporary fencing, flagging tape, parawebbing or similar.</li> </ul>	C		D

Safeguards and Mitigation Measures	C	O	D
<ul style="list-style-type: none"> <li>Where possible, use non barbed-wire on exterior fencing to minimise bird collision risks.</li> </ul>		O	
<ul style="list-style-type: none"> <li>Where possible, landscape plantings will be comprised of local indigenous species with the objective of increasing the diversity of the existing vegetation. Planting locations would be designed to improve the connectivity between patches in the landscape where consistent with landscaping outcomes.</li> </ul>		O	
<ul style="list-style-type: none"> <li>If night work is unavoidable, ensure any floodlights are directed away from vegetation.</li> </ul>	C		D
<ul style="list-style-type: none"> <li>Weed and hygiene protocols will be prepared and implemented.</li> </ul>	C		D
<ul style="list-style-type: none"> <li>During operation direct lights away from vegetation.</li> </ul>		O	
<ul style="list-style-type: none"> <li>Weed and planting protocols will be prepared and implemented</li> </ul>		O	
<ul style="list-style-type: none"> <li>Feral species to be monitored and a management plan to be prepared and implemented to reduce feral species abundance</li> <li>Implement offset management plan which ensures that fauna movement still possible around perimeter of development site</li> </ul>		O	

## 6.3 ABORIGINAL HERITAGE

### 6.3.1 Approach

A specialist Aboriginal Cultural Heritage Assessment Report (ACHAR) was undertaken to provide an assessment of the Aboriginal cultural values associated with the proposal site and to assess the cultural and scientific significance of any Aboriginal heritage sites recorded.

The full report is provided in Appendix E and is summarised below.

This ACHA Report was prepared in line with the following:

- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011);
- *Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales* (OEH 2010a), and
- *Aboriginal cultural heritage consultation requirements for proponents 2010* (ACHCRP) (OEH 2010b) produced by the NSW Office of Environment and Heritage (OEH)

Consultation with Aboriginal stakeholders was undertaken in accordance with clause 80C of the *National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010*, following the consultation steps outlined in the (ACHCRP) guide provided by OEH.

As a result of the consultation process, one group contacted the consultant to register their interest in the proposal. The group who registered interest was the Warren Macquarie Local Aboriginal Land Council. No other party registered their interest, including the entities and individuals recommended by OEH.

The fieldwork was organised and the Warren Macquarie Local Aboriginal Land Council was asked to participate in the fieldwork.

A copy of the draft report was provided to the registered party for comment. A response was received, and as a result, the language group noted in the report was amended in the final report, addressing this concern.

### **6.3.2 Archaeological context**

The assessment included a review of relevant information relating to the existing landscape of the proposal area. Included in this was a search of the OEH Aboriginal Heritage Information Management System (AHIMS) database. No Aboriginal sites had previously been recorded within and adjacent to the proposal area. The closest AHIMS site to the project area, a scarred tree, is located approximately 1.6km west of the proposal area.

Assessment of Aboriginal site models for the region suggest that the most archaeologically sensitive areas within the proposal area are areas of remnant vegetation and areas in close proximity to the Boggy Cowal ephemeral watercourse. Nonetheless, given that Aboriginal people have lived in the region for tens of thousands of years, there is some potential for archaeological evidence to occur across the proposal area. This would most likely be in the form of stone artefacts and scarred trees.

### **6.3.3 Survey results**

Survey transects were undertaken on foot and traversed the main part of the proposed solar farm site given that the project was going to disturb approximately 200ha, within the 255-hectare property on Lot 26/ DP 755292. The survey visibility was variable with the wheat paddock visibility on average 50% and the remnant vegetation about 5%.

Between the survey participants, over the course of the field survey, approximately, 55 km of transects were walked across the main solar farm proposal area. Allowing for an effective view width of 5 m each person, this equates to a surface area of 27.5 ha. However, allowing for the visibility restrictions, the effective survey coverage is reduced to 13.75 ha, or 6.9% of the project area.

The effective survey coverage for the proposed powerline was higher at 14.7% of the alignment corridor.

Despite the variable visibility encountered during the survey, there were three stone artefacts (Nevertire IF 1, Nevertire IF 2, Nevertire IF 3) and a scarred tree (Nevertire ST 1) found across the proposal site.

It is possible that additional stone artefacts could occur within the proposed development footprint. However, based on the land use history of the proposal area, and an appraisal of the results from the field survey, there is negligible potential for the presence of intact subsurface deposits with high densities of objects or cultural material within the solar farm and powerline easement areas.

The models of site location for the area have been shown to be accurate, with the current survey confirming the predicted distribution and nature of archaeological material with three of the sites located in close proximity to the Boggy Cowal watercourse.

While the results of this investigation have increased the number of sites recorded in the local area, the research potential of the sites located during this assessment are considered to be generally low, as their scientific value for further research is limited. It is argued that there are likely to be many hundreds of such sites in the local area, and that the lack of artefact sites in AHIMS is merely an indication that few surveys have been undertaken in the area and therefore they are yet to be found.

The cultural significance of the sites is only determined by the local Aboriginal community.

### 6.3.4 Potential impacts

The proposal involves the construction of a solar farm and includes connection to the nearby substation with an above ground and underground powerline. The development will result in disturbance of almost 200ha of the 255ha property within Lot 26/ DP 755292. The impact is likely to be most extensive where earthworks occur and would involve the removal, breakage or displacement of artefacts. This is considered a direct impact on the Aboriginal objects by the development in its present form.

The impact to the scientific values if the sites Nevertire IF 1, Nevertire IF 2 and Nevertire IF 3 were to be impacted by the current proposal is considered low. The isolated artefacts have little research value apart from what has already been gained from the information obtained during the present assessment. This information relates more to the presence of the artefacts and in the development of Aboriginal site modelling, which has largely now been realised by the recording.

The scarred tree site, Nevertire ST 1, will not be impacted by the solar farm proposal.

The Nevertire Solar Farm proposal is classified as State Significant Development under the EP&A Act which have a different assessment regime. As part of this process, Section 90 harm provisions under the NPW Act are not required, that is, an AHIP is not required to impact Aboriginal objects.

Table 6-5 Identified risk to known sites

Site name	Site integrity	Type of harm	Degree of harm	Consequence of harm	Recommendation
<b>Nevertire Isolated Find 1</b>	Poor – 100+ year history of agricultural use	Direct	Complete	Minimal loss of value	Salvage object prior to development of project.
<b>Nevertire Isolated Find 2</b>	Poor – 100+ year history of agricultural use	Direct	Complete	Minimal loss of value	Salvage object prior to development of project.
<b>Nevertire Isolated Find 3</b>	Poor – 100+ year history of agricultural use	Direct	Complete	Minimal loss of value	Salvage object prior to development of project.
<b>Nevertire Scarred Tree 1</b>	Good- <i>in situ</i> living tree	Nil- outside of development area or access tracks	Nil- outside of development area or access tracks	Nil- outside of development area or access tracks	Avoid

### 6.3.5 Safeguards and mitigation measures

The ACHAR identifies that the development proposal can proceed with no additional archaeological investigations. The report identifies a number of safeguards, these are identified below, tabulated by find in Table 6-5 and stipulated as project commitments in the Safeguards and mitigation measures table below.

Table 6-6 Safeguards and mitigation measures for Aboriginal heritage

C: Construction, O: Operation: D: Decommissioning

Safeguards and Mitigation Measures	C	O	D
<ul style="list-style-type: none"> <li>The sites Nevertire Isolated Find 1, Nevertire Isolated Find 2 and Nevertire Isolated Find 3 are salvaged by an archaeologist and/or</li> </ul>	C		

Safeguards and Mitigation Measures	C	O	D
the Warren LALC prior to the proposed work commencing. The final storage place for the artefacts should be negotiated with the registered Aboriginal party.			
<ul style="list-style-type: none"> <li>The development must avoid the site Nevertire Scarred Tree 1, as per the current design plans detailed in this report. A minimum 10m buffer around the tree should be in place to protect the root zone.</li> </ul>	C		
<ul style="list-style-type: none"> <li>Epuron prepares a Cultural Heritage Management Plan (CHMP) to address the potential for finding additional Aboriginal artefacts during the construction of the Solar Farm. The CHMP will outline an unexpected finds protocol to deal with construction activity. Preparation of the CHMP should be undertaken in consultation with the registered Aboriginal party.</li> </ul>	C		
<ul style="list-style-type: none"> <li>In the unlikely event that human remains are discovered during the construction, all work must cease in the immediate vicinity. OEH, the local police and the registered Aboriginal parties should be notified. Further assessment would be undertaken to determine if the remains were Aboriginal or non-Aboriginal.</li> </ul>	C		
<ul style="list-style-type: none"> <li>Further archaeological assessment would be required if the proposal activity extends beyond the area of the current investigation. This would include consultation with the registered Aboriginal party and may include further field survey.</li> </ul>	C	O	D

## 6.4 NOISE IMPACTS

### 6.4.1 Approach

A Construction and Operational Noise and Vibration Assessment for the proposed Nevertire Solar Farm was undertaken by Renzo Tonin and Associates. The full report is provided in Appendix F and is summarised below. It includes consideration of noise and vibration impacts from the construction and operation phases of the proposal in accordance with relevant Council and EPA requirements and guidelines.

### 6.4.2 Existing environment

The proposal is located in a regional setting, approximately 1km west of Nevertire. The surrounding land uses to the proposed solar farm are generally agriculture, including cropping and cattle and sheep grazing. Noise sources include traffic along Mitchell Highway and agricultural activities such as the operation of large harvesters, tractors, haulage trucks, irrigation pumps, quad bikes and 4WD vehicles.

Figure 6-5 illustrates the locations of the nearest receivers to the proposal site, with the nearest non-involved residential dwelling being approximately 340m south of the proposal site (R2) and approximately 80m (R5, R6, R7) south of the proposed transmission line.

### 6.4.3 Noise monitoring

Criteria for the assessment of construction and operation noise are usually derived from the existing noise environment of an area. The NSW EPA Industrial Noise Policy (INP) outlines methods for determining the



background noise level of an area. This assessment of the proposed works has used long-term noise monitoring.

Noise monitoring was undertaken at the second closest residence (R1, monitored at M1 on Figure 6-5). Monitoring was unable to be taken at the closest receiver due to access. Long term (unattended) noise monitoring was carried out at M1 between Thursday 10 and Friday 18 November 2016. The existing background and ambient noise levels are presented in (Table 6-7).

Table 6-7 Results of background noise monitoring and noise management levels

Monitoring location	L <sub>A90</sub> Background Noise Levels			L <sub>A90</sub> Ambient noise level		
	Day	Evening	Night	Day	Evening	Night
L1 9650 Oxley Highway, Snake Plain	34	32	27	67	43	39

Based on the relevant section of the INP Guidelines, where background noise levels are less than 30dB(A), the minimum applicable background noise level is recommended to be set at **30dB(A)**. Therefore, this minimum background noise level has been adopted for all receiver locations nominated during the night time assessment period.



Figure 6-5 Residential receivers and noise monitoring locations adjacent to the proposal site

#### 6.4.4 Construction noise impact assessment

##### Criteria

The NSW *Interim Construction Noise Guideline* (ICNG; DECC 2009) deals with managing construction noise impacts. According to the guideline, a quantitative assessment of noise impacts is warranted when works are likely to impact an individual or sensitive land use for more than three weeks in total.

The guideline specifies noise targets, or ‘noise management levels’, for residences and other noise sensitive receivers (Table 6-8). The Rating Background Level (RBL) is used when determining the management level. The RBL is the overall single-figure background noise level measured in each relevant assessment period. Residential receivers are considered ‘noise affected’ where construction noise levels are greater than the noise management levels identified below.

Table 6-8 Noise Management Levels at residential receivers

Time of day	Management Level
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL + 10dB(A)
	Highly noise affected 75dB(A)
Outside recommended standard hours	Noise affected RBL + 5dB(A)

##### Noise management levels

Table 6-9 identifies the adopted construction Noise Management Levels (NMLs) for the nearest noise sensitive receivers (refer to Figure 6-5). The NMLs for the receiver locations are derived from the RBLs represented by the background noise levels measured at the monitoring location (Table 6-7) and NSW ICNG (DECC 2009) criteria (Table 6-8). Furthermore, during standard construction hours, a highly affected noise objective of 75 dB(A) applies at all receivers.

Table 6-9 Construction Noise Management Levels at Residential Receivers

Location description	Day $L_{A90}$ Background Noise Level (RBL)	Day Noise Management $L_{A90}$ (15min)
All residential receivers	34 <sup>1</sup>	44

Notes: 1. Construction works occur during the daytime period only, hence only the day period is assessed.

### Construction noise sources

Noise impact predictions take into account the typical noise levels of construction equipment likely to be used for the construction phase. The equipment and their sound power levels are in Table 6-10.

Table 6-10 Construction equipment sound power levels

Equipment used	L <sub>Aeq</sub> Sound power levels (dBA)	No. Items required
Chainsaw	119	1
Mulcher	119	1
Piling Drilling Rig	111	6
Compactor	110	1
Mobile crane	110	1
Powered hand tools	110	6
Bulldozer	109	1
Loader	109	1
Vibratory roller	109	1
Trucks	108	15 per day
Excavator	107	1
Grader	107	1
Concrete truck	106	42
Trencher	104	2
Water Cart	104	1
Concrete pump	102	42
Generator	100	1

### Construction noise assessment

Noise emissions were determined by modelling the noise sources, receiver locations, topographical features of the intervening area, and possible noise control treatments surrounding the study area. The modelling calculates the contribution of each noise source at each specified receptor point and allows for the prediction of the total noise from a site.

The noise prediction models take into account:

- Location of noise sources and receiver locations.
- Height of sources and receivers.
- Separation distances between sources and receivers.
- Ground type between sources and receivers.
- Attenuation from barriers (natural and purpose built).

Table 6-11 presents the noise levels likely to be experienced at the nearby affected receiver locations during the construction works. The present levels are considered a worst-case scenario with up to three noisiest plants operating concurrently.

Table 6-11 Predicted L<sub>Aeq 15 min</sub> construction noise levels at receiver locations

Receiver location (refer to Figure 6-5)	Noise management level <sup>1</sup>	Predicted Construction Noise Level, L <sub>Aeq</sub> (15 min) <sup>2</sup>	Comply? (Yes/No)
R1	44	26-40	Yes
R2		26-46	No
R3		30-59	No
R4		30-62	No
R5		30-63	No
R6		30-63	No
R7		30-63	No
R8		30-63	No
R9		30-63	No

- Notes: 1 Noise management for standard day time construction works (i.e Monday to Friday 7am to 6pm and Saturday 8am to 1pm)  
2. Based on up to three noisiest construction plant and equipment operating concurrently.

Based on the construction noise levels presented in the table above, the construction management levels at receivers R2, R3, R4, R5, R6, R7, R8 and R9 will be exceeded when the construction works are conducted at closest proximity to the receivers. It is noted that construction noise levels at all receivers are predicted to be less than the highly noise affected level of 75dB(A). In addition, receivers R3, R4, R5, R6, R7, R8 and R9 are located far from the development envelope and predominantly affected by the transmission line construction works which are shorter in duration.

In light of the predicted noise levels above, it is recommended that a feasible and reasonable approach towards noise management measures be applied to reduce noise levels as much as possible to manage the impact from construction noise. Table 6-12 outlines possible noise reductions from using some recommended control methods (refer to Appendix F).

Table 6-12 Relative Effectiveness of Various Forms of Noise Control, dB(A)

Noise control method	Practical examples	Typical noise reduction possible in practice		Maximum noise reduction possible in practice	
		AS2436	Renzo Tonin and Associates	AS2436	Renzo Tonin and Associates
Distance	Doubling of distance between source and receiver	6	6	6	6
Screening	Acoustics barriers such as earth mounds, temporary or permanent noise barriers	5 to 10	5 to 10	15	15
Acoustic enclosures	Engine casing lagged with insulation and plywood	15 to 25	10 to 20	50	30
Engine Silencing	Residential class mufflers	5 to 10	5 to 10	20	20
Substitution by alternative process	Use electric motors in preference to diesel or petrol	-	15 to 25	-	40

## 6.4.5 Operational noise assessment

### Background noise monitoring

The background noise data collected to assess construction noise was also used to assess operational noise.

### Criteria

The *NSW Industrial Noise Policy (INP) (EPA 2000)* specifies noise criteria relating to intrusive noise impacts and noise level amenity. The assessment criteria under the INP for the Nevertire Solar Farm is outlined in Table 6-13.

Table 6-13 NSW Industrial Noise Policy Proposal Specific criteria

Assessment Criteria	Proposal Specific Criteria
<b>Intrusive</b>	Rating background level + 5dBA
<b>Amenity</b>	INP based on recommended LAeq noise levels for rural residential properties.

The operational proposal-specific noise criteria for the solar farm based on the INP criteria and guidelines (Table 6-13) is shown in (Table 6-14).

Table 6-14 Applicable operational noise criteria

Receiver	Intrusiveness criteria		Recommended LAeq Amenity Noise level		
	Period	LAeq (15 minute) (dBA)	Time of day	Acceptable	Maximum
All receivers	Day	34 + 5 = 39	Day <sup>1</sup>	50	55
	Evening	32 + 5 = 37	Evening <sup>2</sup>	45	50
	Night	30 + 5 = 35	Night <sup>3</sup>	40	45

- Notes:
1. Day is defined as 7.00am to 6.00pm, Monday to Saturday, 8.00am to 6.00pm Sundays and Public holidays
  2. Evening is defined as 6.00pm to 10.00pm, Monday to Sunday and Public Holidays.
  3. Night is defined as 10.00pm to 7.00am, Monday to Saturday, 10.00pm to 8.00am, Sundays and Public Holidays.

Comparing the amenity and the intrusiveness criteria shows that the intrusiveness criteria are more stringent for day, evening and night periods. As intrusiveness criteria is more stringent, this only is considered further in this assessment.

As the proposal will potentially operate for part of the night time period (prior to 7.00am) during summer months, EPA sleep disturbance criteria apply. Criteria specific to the proposal are outlined in Table 6-15.

Table 6-15 Sleep Disturbance Criteria dB(A)

Receiver	Sleep Disturbance Criteria	Sleep Disturbance Criteria specific to proposal, LAmax
All residential receivers	Night Rating background level + 15dBA	30 +15 = 45dBA

### Operational noise sources

The potential sources of noise during operation of the solar farm considered for the assessment included:

- Mechanical noise from the tracking system of the solar panels, from up to 5000 tracking motors to drive up to 363,636 solar panels.
- Operation of 44 inverters with integrated transformers.
- Two staff member onsite daily with the use of a light vehicle.

The predicted power levels of these operation activities are outlined in Table 6-16.

Table 6-16 Typical operational plant and equipment and sound power levels for the proposal

Plant description	L <sub>Aeq</sub> Sound power levels (dBA)
NexTracker Motor (5,000 in total)	78 (each)
Sunny Central 2200 inverter with integrated transformer (44 in total)	94 (each)
Light vehicle (2 in total)	88 (each)

### Operational noise assessment

In order to determine the noise impacts of the operating solar farm, a computer model incorporating all significant noise sources, receiver locations, topographical features of the intervening area, and possible noise control treatments surrounding the study area. The modelling calculates the contribution of each noise source at each specified receptor point and allows for the prediction of the total noise from a site.

Additionally, in accordance with INP noise predictions, three meteorological conditions are considered, including:

- Calm and isothermal conditions (acoustically neutral) – no wind and no temperature inversion.
- Slight to gentle breeze –3m/s wind velocity at 10m from ground level between each noise source and each noise receiver (as per INP default wind conditions). Wind direction was based on wind travelling from the source to the receiver.
- Moderate temperature inversion – applicable for noise predictions during night time periods only.

Table 6-17 presents the predicted noise levels for the ‘worst case scenario’ based on concurrent operation all plant and equipment shown in Table 6-16.

Table 6-17 Predicted  $L_{Aeq, 15min}$  Operational Noise Levels at Receiver Locations, dB(A)

Receiver location (refer to Figure 6-5)	Intrusiveness criteria	Predicted Operational Noise Levels, $L_{Aeq}$ (15 min)			Comply? (Yes/No)
		Calm and isothermal conditions	Slight gentle breeze	Moderate temperature inversion <sup>1</sup>	
R1	Day 39 Evening 37 Night 35	25	31	31	Yes
R2		29	35	35	Yes
R3		25	30	30	Yes
R4		22	28	28	Yes
R5		21	27	27	Yes
R6		20	26	26	Yes
R7		20	26	26	Yes
R8		<20	25	25	Yes
R9		<20	25	25	Yes

Notes: 1. Applicable for the night time period only.

Based on the predicted operational noise levels presented in Table 6-17, predicted noise levels at all nearby receivers comply with the nominated criteria under all scenarios and meteorological conditions. The predicted operational noise levels will additionally be below the sleep disturbance criteria of 45 dB(A). No specific mitigation measures are required.

#### 6.4.6 Vibration assessment

Vibration generating activities would occur only during the construction phase. There are no vibration generating activities expected during the operational phase. The nearest identified non-involved receiver is in excess of 80m from the transmission line and further for the proposal site. Also, there are no high vibration producing plant items to be used, therefore structural damage due to vibration is not expected. Assessment for vibration impact on human comfort is assessed during the construction phase.

Assessment of potential disturbance from vibration on human occupants of buildings is made in accordance with EPA's *Assessing Vibration: A Technical Guideline* (DECC 2006). Based on the proposed plant items to be used during construction (Table 6-10), vibration generated by construction plant was estimated and potential vibration impacts are summarised in Table 6-18.

Table 6-18 Potential vibration Impacts for Identified receivers.

Receiver location (refer to Figure 6-5)	Approx. distance to nearest buildings from works	Type of nearest sensitive buildings	Assessment on potential vibration impacts	Vibration monitoring
R1	530	Residential	Very low risk of adverse comment	Not required
R2	340	Residential	Very low risk of adverse comment	Not required



Receiver location (refer to Figure 6-5)	Approx. distance to nearest buildings from works	Type of nearest sensitive buildings	Assessment on potential vibration impacts	Vibration monitoring
R3	140	Residential	Very low risk of adverse comment	Not required
R4	100	Residential	Very low risk of adverse comment	Not required
R5	80	Residential	Very low risk of adverse comment	Not required
R6	80	Residential	Very low risk of adverse comment	Not required
R7	80	Residential	Very low risk of adverse comment	Not required
R8	80	Residential	Very low risk of adverse comment	Not required
R9	80	Residential	Very low risk of adverse comment	Not required

The potential for adverse comment to vibration impacts was determined to be very low. No vibration mitigation measures are required.

#### **6.4.7 Road traffic noise assessment**

As the proposed vehicle access to the subject site is much greater during the construction stage than the operational stage, road traffic noise assessment is only considered for the construction stage to provide a ‘worst case’ assessment. Vehicle movements during operation of the solar farm would be minimal.

Noise impact from the potential increase in traffic on the surrounding road network due to construction is assessed against the NSW ‘Road Noise Policy’ (RNP). The RNP sets out criteria to be applied to particular types of road and land uses. The Mitchell Highway is categorised as an arterial road. Criteria for these roads are outlined in Table 6-19.

Vehicle access to the subject site will be via Mitchell Highway on the southern side of the site. The proponent has advised that peak vehicle movements during the construction stage are presented in the following table.

Table 6-19 Summary of estimated construction traffic volumes during peak.

Vehicle type	Trips per day
Cars (proposal management, construction staff etc.)	600
Utility vehicles	38
Buses	Up to 12
Delivery trucks (including overmass vehicles)	6

During the operational stage, vehicle access to the site will be primarily limited to maintenance vans and delivery trucks (for large faulty items) which would occur on an irregular basis.

Table 6-20 Predicted road traffic noise contribution levels along public roads, dB(A).

Receiver	Road	Criteria	Truck movements	Speed (km/h)	Distance to Road	Predicted Noise Level	Comply? (Yes/No)
<b>Residences on Mitchell Highway</b>	Arterial	L <sub>Aeq</sub> (15 hour) 60 dB(A)	refer to Table 6-19	110	20m	55 dB(A)	Yes

From Table 6-20 it can be seen that road traffic noise level contributions from the truck movements associated with the construction works are at least 5dB(A) below the applicable noise criteria. Therefore, traffic noise levels as a result of the construction works for the solar farm would not adversely contribute to the existing traffic noise levels at the most affected residences along the surrounding roads and require no specific mitigation.

### 6.4.8 Safeguards and mitigation measures

Table 6-21 Safeguards and mitigation measures for noise impacts

*C: Construction; O: Operation; D: Decommissioning*

Safeguards and mitigation measures	C	O	D
<ul style="list-style-type: none"> <li>• Implement noise control measures such as those suggested in Australian Standard 2436-2010 “Guide to Noise Control on Construction, Demolition and Maintenance Sites”, to reduce predicted construction noise levels.</li> </ul>	C		
<ul style="list-style-type: none"> <li>• Additionally, during construction:               <ul style="list-style-type: none"> <li>○ Use less noisy plant and equipment where feasible and reasonable</li> <li>○ Plant and equipment to be properly maintained.</li> <li>○ Provide special attention to the use and maintenance of ‘noise control’ or ‘silencing’ kits fitted to machines to ensure they perform as intended.</li> <li>○ Strategically position plant on site to reduce the emission of noise to the surrounding neighbourhood and to site personnel.</li> <li>○ Avoid any unnecessary noise when carrying out manual operations and when operating plant.</li> <li>○ Any equipment not in use for extended periods during construction work should be switched off.</li> <li>○ Establish good relations with people living in the vicinity of the site at the beginning of proposal and maintain. Keep people informed, take complaints seriously, deal with complaints expeditiously. The community liaison member of staff should be adequately experienced.</li> </ul> </li> </ul>	C		

## **6.5 VISUAL IMPACT**

NGH Environmental completed a Visual Impact Assessment (VIA) of the proposed Nevertire Solar Farm (provided in full, Appendix G and summarised below). It provides a full assessment of the visual impacts associated with the proposal, including:

- Landscape character and scenic vistas.
- Stakeholder values regarding visual amenity.
- Potential impacts on representative viewpoints (including glare and reflectivity).

It includes a strategy to address identified impacts, including onsite vegetation screening, general design measures and a process to verify the actual visual impacts of the proposal. This improves the reliability of the measures and provides a trigger to undertake additional mitigation if required.

### **6.5.1 Approach**

The VIA includes the following components:

- Background investigations, mapping and modelling.
- Field survey including reconnaissance, ground truthing and photography.
- Community consultation.
- Impact assessment.
- Development of a visual impact mitigation strategy.

The impact assessment methodology used in this VIA is based on the Bureau of Land Management (BLM) Visual Resource Management System, developed by the BLM, US Department of the Interior (n.d). The BLM developed a systematic process to analyse the visual impact of proposed developments. The basic philosophy states that the degree to which a development affects the visual landscape depends on the visual contrast imposed by the proposal. Mitigation measures are considered for impacts greater than medium visual impact; for a medium impact, the contrast is considered acceptable.

For the purpose of the assessment, a height of 3m was used to model onsite infrastructure to the proposal boundary extents. This is a realistic approximation of the height of panels and inverter containers, which may actually be 2.3m and 3.4m, respectively. It is conservative as panels may not be distributed to the site boundaries and the model does not take into account screening such as vegetation or infrastructure. On this basis is considered a 'worst case' model. The full methodology is provided in Appendix G.

### **6.5.2 Results**

#### **Existing environment**

Approximately 48 residences are located in close proximity (within 1km) of the proposal site. None are proposal-involved. All but four occur within the residential centre of Nevertire. The remainder occur on larger land holdings either:

- Immediately north of the northern transmission line options (Receivers 43 and 44)
- Immediately north-west of the array site, screened behind vegetation (Receiver 39)
- Immediately south of the array site, unscreened (Receiver 42)

Local land uses include cropping (including relatively intensive canal infrastructure) and grazing (sheep and cattle) on lot sizes of approximately 300ha.

No look outs or promoted scenic areas are located within 16km of the site however, features that contribute to the scenic character of the area include:

- Village of Nevertire
- Roadside native vegetation remnants
- Expansive pastoral views

#### VILLAGE OF NEVERTIRE

The visual character of the village is defined by wide tree lined streets, with new and historic buildings. Garden plantings that extend onto the nature strip, street trees and well maintained residences provide visual amenity. Surrounding cropped paddocks, silos and other agricultural infrastructure in the mid distance reinforce the local agricultural land use of surrounding lands.

#### ROADSIDE NATIVE VEGETATION REMNANTS

The Mitchell Highway and adjacent rail line are important regional transport corridors. The roads, rail and electricity transmission infrastructure create linear built elements in the landscape. Within the corridors however, native vegetation is quite mature and provides a relatively well connected series of remnants, breaking up or framing views of pastures for travellers.

#### EXPANSIVE PASTORAL VIEWS

The pastures and cropping lands range from relatively low input (cattle grazing) to high input (high rotation cropping and canal infrastructure). The views would change with the seasons, from brown fallow areas, to yellow canola, green wheat and green and white cotton crops.

### Values of the local community to the proposal

Epuron and NGH Environmental representatives met with the nearest neighbours to the site on 18 October 2016. Information about the proposed solar farm was provided at the meetings and the neighbours were invited to raise concerns about the proposal. The following concerns were raised:

- The nearest neighbour to the south of the site was concerned about the view of the solar panels as they would be visible living and outdoor recreational area of his home.
- Possible vegetation screening buffers were discussed to obscure the view of the panels.

Thirteen people attended the Nevertire Solar Farm open house held in Nevertire on 18 November 2016. Twelve attendees were local, with one from Nyngan. Attendees were invited to complete feedback forms however none were completed on the day. Attendees viewed maps of the proposal layout and photographs of other solar farms and discussed the proposal with staff from Epuron and NGH Environmental.

Attendees were generally supportive of the proposal and the following issues, relevant to visual impacts, were discussed:

- Visual impact of the proposal and screening preferences - attendees were not generally concerned about the view of the proposal from Nevertire or the Mitchell Highway. Several attendees thought that screening of the public views would be a good idea, while others thought screening was unnecessary or suggested that a more visible project could be beneficial in terms of tourist/ visitor interest.
- Driver distraction.
- Stopping areas for travellers and visitors to view the solar farm once constructed.

Three feedback forms were returned, by respondents. One was less than 1km, one less than 2km and the third was more than 5km from the proposed solar farm site. Their combined comments included:

- Primary production was the most valued characteristic of the Nevertire local area. One respondent also noted the views, community/family ties, historic values, small town and natural values. Another respondent mentions the work opportunities.
- The open landscape was identified as the most important view or landscape characteristic for the region and local area. One respondent specifically outlines the open plains, grasslands, cropping, livestock and native fauna including Kangaroos and Emus.
- All three respondents cited renewable energy generation as what they liked most about solar farms generally. Two respondents cited local economic opportunities and diversification of land use.
- Two respondents cited potential visual impacts and land use or land value impacts as a concern regarding solar farms generally.
- One respondent cited concerns about potential community, noise, traffic impacts, as well as effects on natural areas and habitats.
- One respondent had specific concerns about the location of the proposed Nevertire Solar Farm. The concerns were in relation to impacts on views and rural lifestyle and potential to devalue land.

While uptake levels of community engagement activities for the proposal have been relatively low, it is considered that this reflects a low level of concern about the proposal.

#### **Landscape character units (LCU) and representative viewpoints**

LCUs take into account topography, vegetation, land use, and other distinct landscape features. They are a way to summarise differences in the receiving environment that may affect the visual impact of the proposed solar farm at different locations. The three LCUs identified within 16km of the proposed solar farm site are characterised in Table 3-1 in terms of their scenic quality (illustrated in Table 6-22):

- Agricultural - Scenic quality is low to moderate. Built elements are production related and include linear fences, powerlines, roads, rail corridors and agricultural buildings and rural houses. Forms are generally uniform, of low elevation and linear. However, the colours would change with the seasons and where framed by road side vegetation remnants, expansive pastures and crops can have a higher scenic quality. This LCU is common in the study area. The proposed solar farm site is located within this LCU, but is on the edge of the rural village.
- Rural village - Scenic quality is considered moderate. These areas have variety in colour and form normal in this character type. Elements include recreational aspects; parks and gardens. This LCU is common in the study area.
- Industrial - Scenic quality is considered low. Elements are production related. The structures match the land use and have historic references. They have limited screening to break up views. This LCU is common in the study area.

Table 6-22 Landscape Characteristic Units within 16km of the proposed Nevertire Solar Farm

Landscape Character Unit - Agricultural



Landscape Character Unit – Rural village



Landscape Character Unit – Industrial



Representative viewpoints within each LCU were identified using ZVI modelling, assuming the proposal could be modelled as a 3m high rectangular block. This is realistic approximation of the height of panels and inverter containers, which may actually be 2.3m and 3.4m, respectively. The predicted sensitivity of each viewpoint was then be determined, considering its proximity to the proposed solar farm site and

factors such as use, scenic quality and regional significance. Figure 6-6 illustrates the locations of these representative viewpoints with reference to the proposal site and Table 6-23 provides details of representative viewpoints. Criteria for proximity and sensitivity are provided in the full visual assessment, Appendix G.

Considering the sensitivity of local viewpoints, the following assessments were made:

- **Residential / recreational viewpoints** were assessed as having high sensitivity. While the population is relatively low, in these locations, if there were a view to the solar farm infrastructure, the view duration could be expected to be high for a receiver. Maintenance of gardens and recreational areas demonstrate the areas are valued for their amenity.
- **Road viewpoints** were assessed as having generally moderate sensitivity. While the Mitchell and Oxley Highways are high use corridors, in the 110km speed zones, motorists would have limited view durations, if there were a view to the solar farm infrastructure. There are limited pull over areas. As motorists approach the village of Nevertire however, view durations increase as vehicle speed reduces. The entrance to the village is therefore assessed as having high sensitivity, within the 80 and 60km speed limit areas.
- **Commercial viewpoints** were assessed as having low sensitivity. In these locations, receivers would be more likely to be focused on work activities and view durations, if there were a view to the solar farm infrastructure, would be limited due to this work focus. While sites are tidy and well kept, there is limited effort expended on visual amenity, such as garden plantings. Built structure is more commonly functional than aesthetic.

The sensitivity of each viewpoint is tabulated below.

Table 6-23 Representative viewpoints (ID) with reference to the proposed Nevertire Solar Farm

ID	LCU	View location	Distance to site	Scenic quality	Sensitivity
1	Agricultural	Road	Middle ground	Moderate	Moderate
2	Agricultural	Residential	Background	Moderate	High
3	Agricultural	Residential	Middle ground	Moderate	High
8	Agricultural	Residential	Middle ground	Low	High
10	Agricultural	Road	Background	Moderate	Moderate
11	Industrial	Road	Middle ground	Low	Moderate
13	Residential	Recreational	Foreground	Moderate	High
14	Industrial	Residential	Foreground	Low	High
15	Residential	Residential	Foreground	Moderate	High
16	Residential	Residential	Foreground	Moderate	High
17	Industrial	Commercial	Foreground	Low	Low
18	Agricultural	Road	Middle ground	Low	Moderate
19	Agricultural	Road	Middle ground	Moderate	Moderate
21	Industrial	Commercial	Foreground	Low	Low
22	Residential	Residential	Foreground	Moderate	High
23	Agricultural	Road	Middle ground	Low	Moderate
25	Agricultural	Commercial	Background	Low	Low

<b>ID</b>	<b>LCU</b>	<b>View location</b>	<b>Distance to site</b>	<b>Scenic quality</b>	<b>Sensitivity</b>
<b>30</b>	Agricultural	Residential	Foreground	Moderate	Moderate
<b>36</b>	Agricultural	Road	Foreground	Low	High
<b>39</b>	Agricultural	Road	Foreground	Low	High



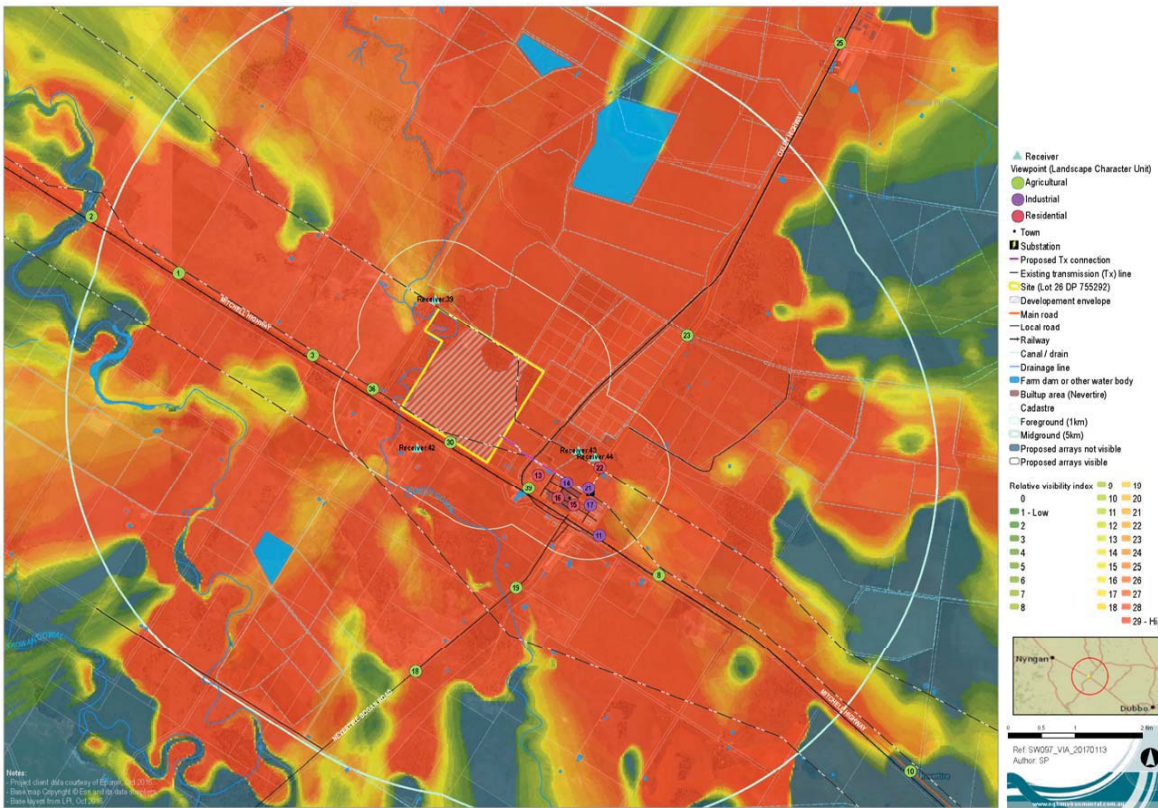


Figure 6-6 Location of representative viewpoints and array infrastructure ZVI

### 6.5.3 Potential impacts

The visual impact assessment was undertaken considering the:

- a) Infrastructure components proposed.
- b) Their potential impact on landscape character units and representative viewpoints.
- c) The degree of contrast the development would have within the identified Visual Landscape Management Zones and if these are considered acceptable.

#### Evaluation criteria

The ratings for the degree of contrast created by the proposed solar farm infrastructure in each viewpoint have the following definitions (BLM n.d.).

- High contrast: the proposal would be dominant within the landscape and generally not overlooked by the observer, the visual change would not be absorbed.
- Medium contrast: the proposal would be moderately dominant and noticed, the visual change would be partially absorbed.
- Low contrast: the proposal would be seen but would not attract attention, the visual change would be well absorbed.
- Indistinct: contrast would not be seen or would not attract attention, the visual change would be imperceptible.

To determine if the objectives for the VLM zone are met, the contrast rating for the viewpoint is compared with the relevant management objectives to give a visual impact level. The visual impact level is consequently defined as:

- High impact: contrast is greater than what is acceptable.
- Medium impact: contrast is acceptable.
- Low impact: visual contrast is little or not perceived and is acceptable.


For high impact viewpoints, mitigation must be considered.


Table 6-24 below evaluates the representative viewpoints. They are ordered in terms of highest visual impact rating. Viewpoints assessed to have a low impact (little or not perceived and acceptable) are excluded but provided in full, Appendix G.

#### Photomontages

To inform the evaluation, three photomontages were commissioned in areas identified in the preliminary stage of the assessment as likely to be most affected. The montages are presented in Appendix G (Appendix C of the full Visual Impact Assessment) and were considered when assessing the visual contrast that the array infrastructure would have with the existing landscape; specifically, how dominant the solar array infrastructure would be and how able to be 'absorbed' into the existing landscape.

Table 6-24 Visual impact at representative viewpoints with high and medium impact, with reference to the Nevertire Solar Farm

ID	LCU	Viewpoint	LMZ objective	Contrast	Visual Impact	Comment	Image
13	Residential	Recreational (foreground)	A Maximise existing visual quality	Medium	Medium	<p>This viewpoint is located on the edge of the Noel Waters Oval. It would be used by large groups. View extent to the solar farm site is relatively unimpeded. View durations would be long, several hours at a time.</p> <p>With reference to the photomontages, Appendix C Montage 1 shows the infrastructure at this distance can be seen to be well absorbed vertically, but occupying a wide horizontal view.</p> <p><b>Mitigation is suggested</b></p> <p>Views of the array site could be effectively screened along its eastern boundary to break up views of the array infrastructure.</p> <p>While not mandatory, it is recommended that any additional overhead electricity infrastructure should be minimised, where possible, to address cumulative impacts.</p> <p>The mitigated visual impact would be considered low.</p>	

ID	LCU	Viewpoint	LMZ objective	Contrast	Visual Impact	Comment	Image
30	Agricultural	Residential (foreground)	B Protect dominant visual features	Medium	Medium	<p>This viewpoint is representative of a residence immediately south of the array site (Receiver 42). The front entrance, north facing windows and recreational areas to the north of the residence would have extended view of the site, broken up only by plantings around the residence.</p> <p>With reference to the photomontages, Appendix C, Montage 2 shows the infrastructure at this distance<sup>12</sup> can be well absorbed vertically, but occupying a wide horizontal view. Montage 3 is a higher contrast, being closer to the infrastructure (taken from the roadside; the closest possible vantage point). This provides a worst case representation of the view seen from Receiver 42 from the site boundary and access road, not the residence.</p> <p><b>Mitigation is suggested</b></p> <p>The array site could be effectively screened along its southern boundary to break up views of the array infrastructure. It is noted that from this location, this treatment may reduce the expansiveness of existing pastoral views. Onsite vegetation screening in this location should be undertaken in consultation with the affected landowner.</p> <p>The mitigated visual impact would be considered low.</p>	

<sup>12</sup> The Montage 2 distance was selected to represent the view from this receiver but as site access could not be obtained, the montage is taken from the south east, not the south.



ID	LCU	Viewpoint	LMZ objective	Contrast	Visual Impact	Comment	Image
39	Agricultural	Road (foreground)	B Protect dominant visual features	Medium	Medium	<p>This viewpoint is located at the entrance to Nevertire (for east-bound traffic). Dominant visual features include the road corridor, rail signage, overhead electricity transmission infrastructure and fencing. View extent to the solar farm site is relatively unimpeded for west-bound traffic. View durations would be relatively short in this 60km/hr zone.</p> <p>With reference to the photomontages, Appendix C, Montage 1 provides the closest representation of this view and shows the infrastructure is well absorbed vertically, but occupying a wide horizontal view.</p> <p><b>Mitigation is suggested</b></p> <p>The array site could be effectively screened along its south-eastern corner to break up views of the array infrastructure. The aim in this area will be to minimise the cumulative impact of built elements.</p> <p>The mitigated visual impact would be considered low.</p>	
14	Industrial	Residential (foreground)	B Protect dominant visual features	Medium	Low-medium	<p>Dominant visual features at this viewpoint include the overhead electricity easement, water tank and unsealed roads. Only glimpse views of solar array infrastructure are likely.</p> <p><b>No mitigation required</b></p> <p>While not mandatory, it is recommended that any additional overhead electricity infrastructure should be minimised, where possible, to address cumulative impacts.</p>	

Figure 6-7 to Figure 6-11 illustrate, where possible, the indicative horizontal extent of the view of solar array infrastructure from high and medium impact viewpoints.

- Red is estimated extent of arrays visible (unshielded) within the view field.
- Green is estimated total extent of arrays but shielded by trees/buildings within the view field.
- Yellow is the estimated extent of the property boundary within the view field.



Figure 6-7 Panorama of ID 13, showing the horizontal extent of array infrastructure that would be visible from this location



Figure 6-8 Panorama of ID 30, showing the horizontal extent of array infrastructure that would be visible from this location



Figure 6-9 Panorama of ID 39, showing the horizontal extent of array infrastructure that would be visible from this location



Figure 6-10 Panorama of ID 14, showing the horizontal extent of array infrastructure that would be visible from this location



Figure 6-11 Panorama of ID 27, showing the horizontal extent of array infrastructure that would be visible from this location



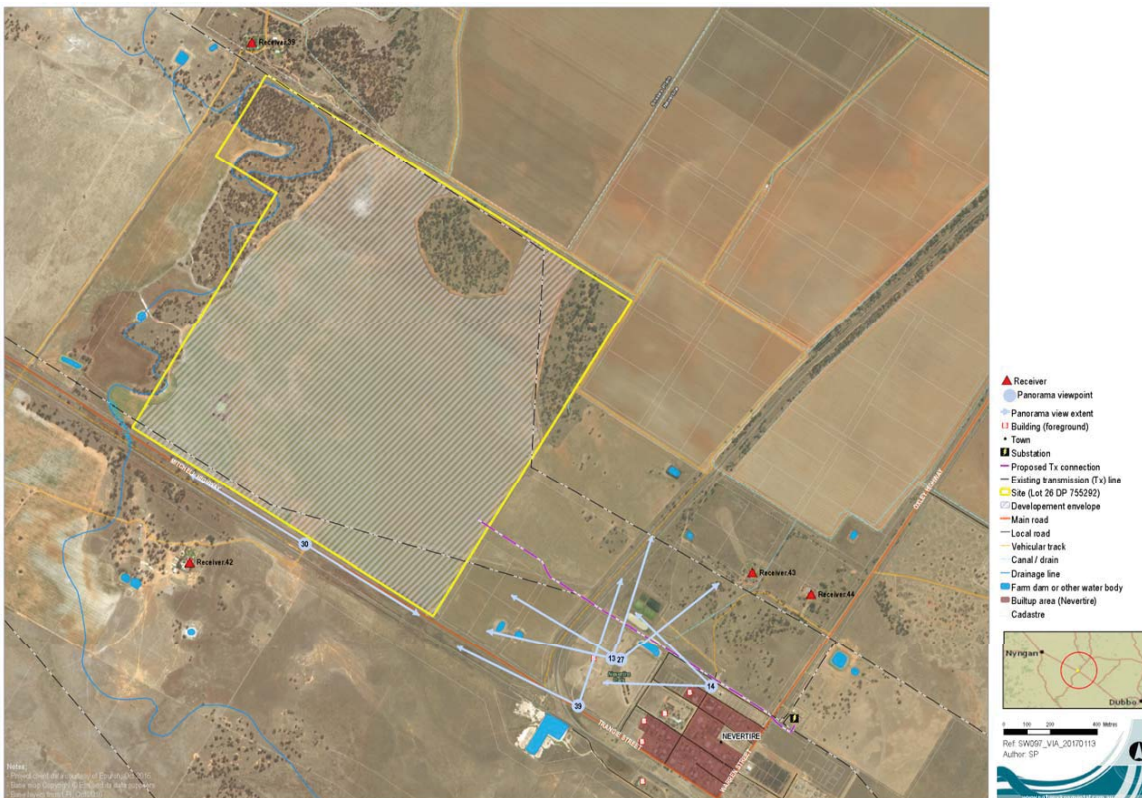


Figure 6-12 The location of the five panorama viewpoints: 13, 14, 27, 30 and 39

## Visual impact assessment at representative viewpoints

### FOREGROUND VIEWS

Considering foreground views, the low profile of the proposed solar array infrastructure, and the existing overhead transmission easements present on the northern edge of Nevertire village and existing residential and commercial buildings ensure that the proposed infrastructure would not be dominant or present an unacceptable contrast from most foreground locations.

The highest impacts (rated medium visual impact) are the uninterrupted foreground views in two discrete areas:

- To the immediate east of the site where limited vegetation screening is present and recreational areas occur in close proximity to the site (Viewpoint 13). Although the distance will mean the low height of infrastructure does not 'overshadow' the area, this recreational area will have groups present for extended durations, increasing the impact rating. Only glimpse views will be afforded from residential areas further from the site, at the western ends of Gunningbar and Narromine Streets.
- To the immediate south of the site where no road side vegetation is present, producing an expansive view of the site to the Mitchell Highway motorists and one residential receiver whose residence faces the site (Viewpoints 39 and 30, respectively). The existing view of expansive crops will be replaced by infrastructure visible from the residence and access way, producing a medium degree of contrast with existing views and impacting on the ability to 'Protect dominant visual features'.

**Mitigation is recommended to address views of the array site from these locations.**

The locality is extremely flat ensuring that any screening vegetation planted close to the solar array infrastructure will be very effective in screening the site from foreground and middle ground locations. It is recommended to plant screening vegetation within the southern and eastern site boundaries, supplementing existing onsite vegetation to the north-east. This will reduce the medium impact rating to a low and acceptable level. A suggested screening plan has been developed (Figure 6-13 and Appendix E of the VIA provided in full., Appendix G of this EIS) to specifically consider views in these areas.

It is noted that the cadastre mapping indicates that growth of the residential areas are likely to expand north of the existing village. This screening would also reduce the medium and low impact ratings within other area of the residential LCU and potential growth to the north. Onsite vegetation that would be retained, to the west, north and north-east would act to break up views of infrastructure in these directions, though receivers here are few.

It is noted that any additional overhead transmission lines will add a cumulative adverse visual impacts to the residential LCU. Although this does not present a high impact requiring mitigation from any viewpoint, impact minimisation should be considered, where practical, to minimise impacts.

### MIDDLE AND BACKGROUND VIEWS

Given the extremely flat landscape and the extensive road side corridor and rail corridor overstorey and midstorey native vegetation remnants, most middle and background viewpoints would have indiscernible visual contrast and low visual impact.

**No mitigation is required for middle and background viewpoints.**

It is noted that in these areas, the native vegetation community consists of low eucalypts (approximately 18m) and a lower height of dense shrub species that create a dense visual screen for some road side remnants. In most cases, visual mitigation screening aims to 'break up' rather than block entirely views of infrastructure. However, using species native to the area for onsite planting, it is anticipated that a high degree of screening could be achieved for this site, for the foreground views discussed above.

- Zone 1: dense planting, 2-3 rows mid and upper storey plantings
- Zone 2: light planting, 1-2 rows mid and upper storey plantings

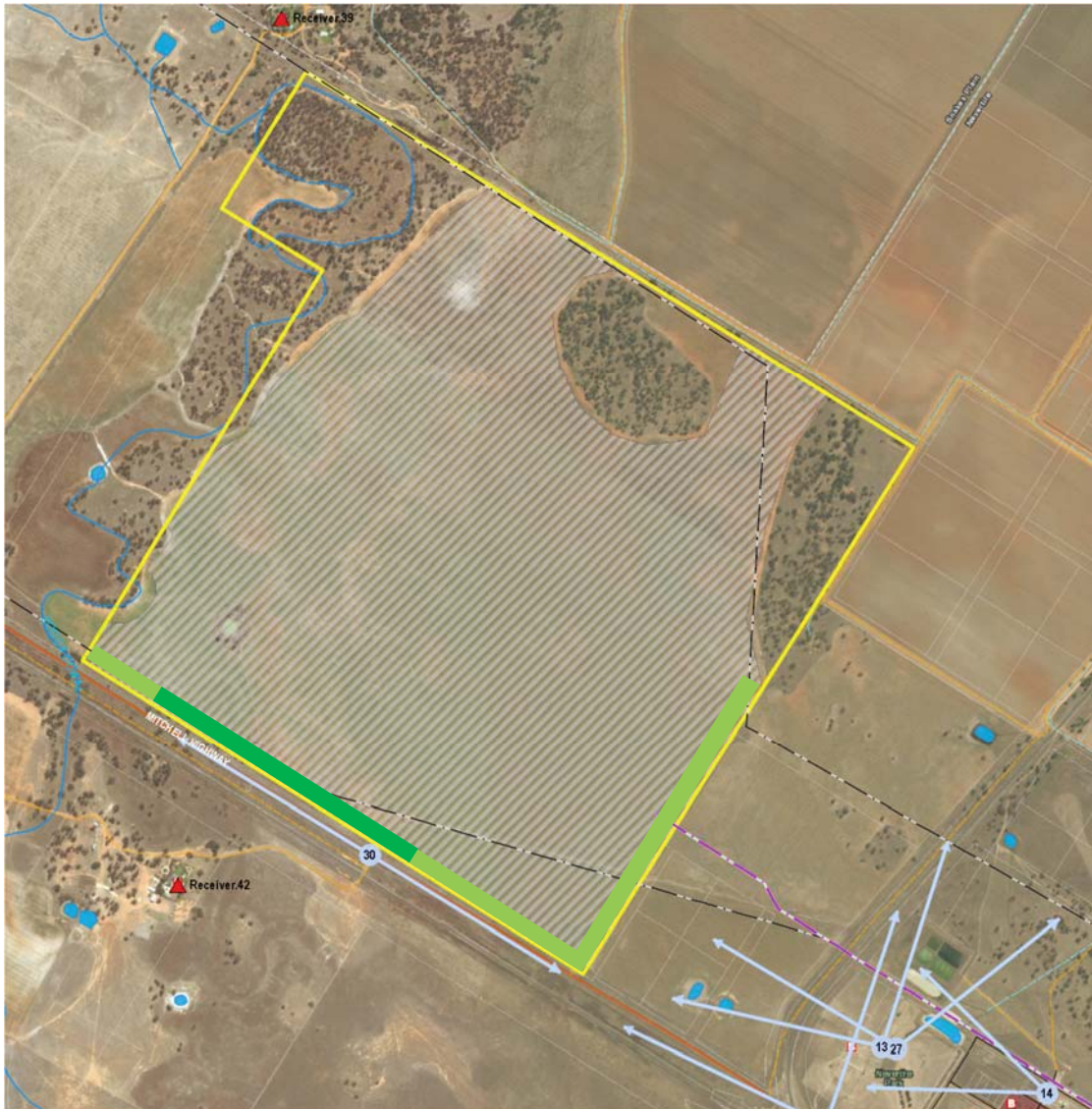


Figure 6-13 Proposed onsite screening

### **Glare and reflectivity of solar panels**

The potential for glare associated with non-concentrating photovoltaic systems which do not involve mirrors or lenses is relatively limited. PV solar panels are designed to reflect as little sunlight as possible (generally around 2% of the light received; Spaven Consulting 2011), resulting in negligible glare. The reason for this is that PV panels are designed to absorb as much solar energy as possible in order to generate the maximum amount of electricity. The panels will not generally create noticeable glare compared with an existing roof or building surfaces (NSW Department of Planning 2010). Seen from above (such as from aircraft) they appear dark grey and do not cause a glare or reflectivity hazard. Solar photovoltaic farms have been installed on a number of airports around the world.

Other onsite infrastructure that may cause glare or reflections depending on the sun angle, include:

- Steel array mounting - array mounting would be steel or aluminium.
- Temporary site offices, sheds, containerised inverter stations.
- The onsite substation
- Perimeter fencing
- Permanent staff amenities.

This infrastructure would be relatively dispersed and unlikely to present a glare or reflectivity hazard to motorists or aircraft.

### **Cumulative impacts**

Adverse cumulative impacts occur when the infrastructure or activities at the proposal site exacerbate the negative impacts of other infrastructure or activities occurring nearby.

During construction, the additional traffic impact is probably the greatest potential for cumulative visual impacts. The Mitchell Highway is a high use road corridor carrying a large proportion of heavy and oversized vehicles. The visual impact of increased traffic movements to the site would be predominantly limited to construction (approximately 12 months). It is understood a Traffic Management Plan would be developed to minimise vehicle movements as much as practical for construction.

The operational view of the solar farm may generate a cumulative impact with the existing substation and powerlines. The array site and substation require security fencing and steel dominated infrastructure.

Further, at the western entry to Nevertire, the solar array may add to existing transmission line, road, rail and fencing infrastructure, to detract from the visual amenity. The screening strategy suggested for the southern and eastern corner of the site would address this impact.

During operation, excepting unusual maintenance operations such as inverter or transformer replacement, a small maintenance team using standard vehicles are all that will be required. Cumulative visual traffic impacts are considered negligible.

It is possible another large scale development could be approved within view of the proposed solar farm, however none are known to be proposed at this time.

Generally, adverse cumulative visual impacts are anticipated to be manageable due to the ability to effectively screen infrastructure in this low relief landscape.

### 6.5.4 Safeguards and mitigation measures

The proposed Nevertire Solar Farm is located on the edge of a residential area, in an area of moderate scenic quality. It is located next to a high use transport corridor and in close proximity (<1km) of approximately 48 residences. A medium impact was determined for three representative viewpoints. Onsite vegetation screening is proposed to break up views of the proposed infrastructure from these locations. This would reduce the impact to a low and acceptable level.

General measures to reduce impacts for all receivers have also been recommended. These centre on use of design elements to reduce visual contrast, mitigation of construction impacts such as dust and traffic that may reduce visual amenity and mitigation of operation impacts, such as maintaining ground cover beneath the panels, to break up side on and back views of infrastructure and soften the appearance of the facility. Where not already included as soil, air quality and biodiversity mitigation commitments of the proposal, these issues are included in the mitigation measures below.

Table 6-25 Safeguards and mitigation measures for visual impacts

C: Construction; O: Operation; D: Decommissioning

Safeguards and mitigation measures	C	O	D
<ul style="list-style-type: none"> <li>• The materials and colour of onsite infrastructure will, where practical, be non-reflective and in keeping with the materials and colouring of existing infrastructure or of a colour that will blend with the landscape. Where practical:               <ul style="list-style-type: none"> <li>○ Buildings will non-reflective and in eucalypt green, beige or muted brown.</li> <li>○ Pole mounts will be non-reflective.</li> <li>○ Security fencing posts and wire would be non-reflective; green or black rather than grey would reduce the industrial character of the fence.</li> </ul> </li> </ul>		Design stage	
<ul style="list-style-type: none"> <li>• A Visual Impact Management Plan would be prepared to address the ‘as built’ visual impacts of the proposed solar farm. The plan would include:               <ul style="list-style-type: none"> <li>○ Onsite vegetation screening for viewpoints 13, 30 and 39. This would be aimed at ‘breaking up’ not blocking views of onsite infrastructure, although sections of denser plantings may be considered for the residence to the immediate south of the site (Receiver 42), in consultation with this landowner (draft plan provided as Figure 6-13 to show location of screening. Additional guidance on screening is provided in the VIA, Appendix G).</li> <li>○ Verification of predicted and actual impacts. A post construction audit would be undertaken to assess the effectiveness of the screening layout with reference to the final constructed infrastructure and augment the former if required.</li> <li>○ The final screening plan would be developed in consultation with the affected landowners (the residence 340m south-west of the site and managers of the Noel Waters Oval (where they wish to be consulted).</li> </ul> </li> </ul>	C	O	

Safeguards and mitigation measures	C	O	D
<ul style="list-style-type: none"> <li>Parking areas, material stock piles and other construction activities would be located as far as practical from nearby residences or screened (by existing vegetation or constructed screens) for the period of construction.</li> </ul>	C		
<ul style="list-style-type: none"> <li>Night lighting would be minimised to the maximum extent possible (i.e. manually operated safety lighting at main component locations). It would be directed away from the Mitchell Highway, so as not to cause light spill that may be hazardous to drivers.</li> </ul>	C	O	D

## 7 ASSESSMENT OF ADDITIONAL ISSUES

### 7.1 SOILS

#### 7.1.1 Existing environment

##### Soils, landform and Geology

The topography of the site is flat, and low lying. There is a slight gradient towards Boggy Cowal located along the western boundary of the site. The Nyngan 1:250,000 Geological Map series (Watkins 1996) indicates that the site is meandering fluvial deposits of the Carrabear formation.

eSPADE (OEH 2016) identifies three soil profiles, approximately 10km east of the proposal site. Three soil types were present within these soil profiles, these are described in Table 7-1.

Table 7-1 Soil types and descriptions (OEH 2016).

Soil type	Soil description
Grey Vertosol	<ul style="list-style-type: none"> <li>• Self-mulching clay, that was weakly self-mulching.</li> <li>• Land cleared and used for cropping.</li> <li>• Soft surface condition</li> <li>• Poorly drained</li> <li>• Very dark to dark greyish brown and weak red</li> <li>• Light clay, medium loam and medium clay.</li> <li>• pH 8.0</li> <li>• Cracking clays (swell and shrink behaviour) (ASC 2016)</li> <li>• High salt contents (ASC 2016)</li> </ul>
Red Chromosol	<ul style="list-style-type: none"> <li>• Well drained</li> <li>• Land cleared and used for cropping.</li> <li>• Soft surface condition</li> <li>• Fragile coarse texture</li> <li>• Low organic matter</li> <li>• pH 6.5-8.0</li> <li>• Reddish brown, dark reddish brown to yellowish red</li> <li>• Light sandy clay loam to medium loam</li> </ul>
Brown Dermosol	<ul style="list-style-type: none"> <li>• Imperfectly drained</li> <li>• Land cleared and used for cropping.</li> <li>• Soft surface condition</li> <li>• Low organic matter</li> <li>• pH 6.0-8.0</li> <li>• Dark brown, reddish brown to strong brown</li> <li>• Clay loam, medium loam to medium clay</li> </ul>

During the site inspection, the proposal site had evidence of salt scalding and water inundation (Figure 7-1 and Figure 7-2). Sodic soils are likely to occur on at least part of the site. Salts can rise up in the soil profile

during periods of inundation or in response to vegetation clearing. The salt deposits onsite can retard plant growth and render the soils more dispersive and susceptible to poor structure and erosion. Some minor cracking clays were observed onsite and were also evident along the transmission line route and adjacent land (Figure 7-3).



Figure 7-1 Salt scalding on proposal site



Figure 7-2 Water inundation on proposal site



Figure 7-3 Cracking clays adjacent to proposal site.

During the site inspection the land was cropped and is now being grazed. Cropping and ploughing can impact soil structure. The current crop of wheat shows variable growth rates across the site suggesting the influence of sodicity is not confined to the observed salt scald. Land capability is discussed further in Section 7.4.

### **Potential contamination**

A search of the NSW EPA contaminated land public record (NSW Government 2016a) was undertaken for contaminated sites within the Warren LGA on 30 November 2016. The search returned one result within the suburb of Warren relating to a petroleum station. The site is not located near the proposal area. The online *List of NSW contaminated sites notified to EPA* (NSW Government 2016b) was also searched on 30 November 2016. There are no sites listed for Nevertire.



There is a risk that contamination associated with agricultural activities (e.g., use and storage of pesticides, buried rubbish) could be present on the site however, no evidence of contamination was observed during the site assessment, such as odours or colouring and this risk is considered very low.

There is no potential for acid sulphate soils due to the distance of the proposal site from the coast.

### **7.1.2 Potential impacts**

#### **Construction and decommissioning**

##### **SOIL IMPACTS**

Construction activities at the proposal site, such as excavation and earthworks, have the potential to disturb soils, cause erosion and subsequent sedimentation. Excavations would be required for the construction of internal roads, site compound, laydown and parking areas, and footings for the onsite substation and inverters. Given the relatively flat landforms, large scale bulk earthworks would not be required.

Trenches excavated for underground cabling and the transmission line would remove vegetation cover and disturb soils, potentially decreasing their stability and increasing susceptibility to erosion.

Erosion and sedimentation impacts associated with soil disturbance from the construction and decommissioning activities can be minimised by undertaking works in accordance with the provisions of the *Managing Urban Stormwater: Soils and Construction* series, in particular:

- *Managing Urban Stormwater: Soils and Construction, Volume 1, 4<sup>th</sup> edition (Landcom 2004), known as 'the Blue Book.'*
- *Volume 2A Installation of Services (DECC 2008a)*
- *Volume 2C Unsealed Roads (DECC 2008b).*

Pile driving/screwing of steel posts supporting the PV modules as well as installation of power poles and fencing is unlikely to result in substantive disturbance of soils due to their small and discrete footprint. The areas of disturbance would be sparsely distributed and groundcover would be retained as far as possible prior to and during construction, and would be rehabilitated post-construction.

Soil compaction can also result from sodic soil disturbance. Trenches, once refilled, may slump, limiting vegetation growth and causing a channel for erosion to take hold. Minimal vegetation clearing and alterations to site hydrology are required to construct the proposal. The disturbance areas would be minimal due to the small and overall dispersed disturbance footprint. Hence, the proposal is unlikely to increase the occurrence of sodicity on site. Soil treatment is likely to be required as part of rehabilitating disturbed soils. It is noted that the site will be more susceptible to compaction after high rainfalls.

Soil compaction would also occur as hardstands and internal access roads are created, which would reduce soil permeability thereby increasing runoff and the potential for concentrated flows across the site. During excavations, mixing of different soil horizons can retard plant growth due to inadequate top soil layer. Top soil management will be required as part of the construction process.

Dust may be generated as a result of the construction and traffic activities such as vehicles travelling on unsealed roads as well as excavations. Impacts of dust generation are discussed in Section 7.7.

Machinery and vehicles have potential to track sediments onto public roads. This has potential to create a risk to other road users through reduced road stability. Cleaning vehicles and machinery as part of the soil and water management plan would reduce this risk.

The use of fuels and other chemicals onsite pose a risk of soil contamination in the event of a spill. Chemicals used onsite would include fuels, lubricants and (minimally) herbicides. Spills of these contaminants can alter soil health, affecting its ability to support plant growth. When mobilised, such as in a rain event or flooding, these substances may spread via local drainage lines, affecting much larger areas of aquatic habitat. This risk is highly manageable.

It is possible that contamination associated with past agricultural activities (e.g. pesticides) could be present on the site, however, given no contaminated sites are recorded on or adjacent to the proposal site, it is unlikely that significant contamination exists at the proposal site. Furthermore, construction activities would not significantly disturb soil or groundwater at the site. Pollution response protocols would be included in the Construction Environmental Management Plan (CEMP).

Except the perimeter track and small footings onsite for the inverters and substation, the majority the site’s soil layer would not be impacted by the development; no large areas of reshaping or excavation are proposed. It is estimated that 3.2ha of soil will be disturbed.

## Operation

### SOIL IMPACTS

Minimal operational impacts to soils would occur. Maintenance activities and vehicles would be largely confined to the formalised access tracks. There would remain a risk of soil contamination in the event of a chemical spill (fuels, lubricants, herbicides) requiring the development of strict emergency protocols (refer to Section 7.1.3).

The potential for wind erosion (dust generation) during regular plant operation would be low given the ability to stabilise soils soon exposed after construction. Areas that were temporarily used during construction (e.g. laydown and construction parking areas) would be rehabilitated. This will be covered in a Rehabilitation Plan.

Concentrated runoff from the impervious surfaces created by the solar panels could lead to increased soil erosion below the leading edge of the solar array modules during significant rain events and could be influenced by seasonal droughts. Increased concentration of runoff also has potential to increase salt scalding on the site, with the addition of concentrated water flow to the water table bringing salt to the ground surface. The maintenance of ground cover (including monitoring through a formal groundcover management plan) will ensure a stable groundcover during the operation of the solar farm, minimising erosion and adverse water quality impacts. It would be prepared in consultation with an agronomist to address any sodicity issues. The soil structure, its potential for erosion and dust generation, would all be less than the existing impacts of a cropping regime at the site. This would be a benefit to soil condition during the operational life of the proposal.

### 7.1.3 Safeguards and mitigation measures

Activities with potential for adverse soil impacts would be managed through the development and implementation of site specific sediment control plans and spill controls, as detailed below.

Table 7-2 Safeguards and mitigation measures for soil impacts

*C: Construction, O: Operation: D: Decommissioning*

Safeguards and Mitigation Measures	C	O	D
<ul style="list-style-type: none"> <li>The array would be designed to allow sufficient space between panels to establish and maintain ground cover.</li> </ul>			Design measure

Safeguards and Mitigation Measures	C	O	D
<ul style="list-style-type: none"> <li>• A soil and water management plan, and erosion and sediment control plans, would be prepared, implemented and monitored during the proposal, in accordance with Landcom (2004), to minimise soil (and water) impacts. These plans would include provisions to:               <ul style="list-style-type: none"> <li>○ Carry out soil testing prior to any impacts, to inform any soil treatments (such as application of gypsum in compacted areas and top soil management) and provide baseline information for the decommissioning rehabilitation.</li> <li>○ Install, monitor and maintain erosion controls.</li> <li>○ Ensure that machinery leaves the site in a clean condition to avoid tracking of sediment onto public roads which may cause risks to other road users through reduced road stability.</li> <li>○ Manage topsoil: In all excavation activities, separate subsoils and topsoils and ensure that they are replaced in their natural configuration to assist revegetation. Stockpile topsoil appropriately so as to minimise weed infestation, maintain soil organic matter, maintain soil structure and microbial activity.</li> <li>○ Minimise the area of disturbance from excavation and compaction; rationalise vehicle movements and restrict the location of activities that compact and erode the soils as much as practical. Any compaction caused during construction would be treated such that revegetation would not be impaired.</li> <li>○ Ensure any discharge of water from the site is managed to ensure ANZECC (2000) water quality criteria are met.</li> <li>○ Manage works in consideration of heavy rainfall events; if a heavy rainfall event is predicted, the site should be stabilised and work ceased until the wet period had passed.</li> </ul> </li> </ul>	C		D
<ul style="list-style-type: none"> <li>• A ground cover management plan would be developed to ensure a stable ground cover during operation of the solar farm, minimising erosion and adverse water quality impacts. The plan would be developed with reference to soil testing and with input from an Agronomist to ensure species selection and sodicity impacts are addressed. Highly managed grazing may be used to maintain the height of ground cover.</li> </ul>	C		
<ul style="list-style-type: none"> <li>• A spill response plan would be developed as part of the overall risk management plan to prevent contaminants affecting adjacent surrounding environments. The plan would:               <ul style="list-style-type: none"> <li>○ Manage the storage of any potential contaminants onsite.</li> <li>○ Mitigate the effects of soil contamination by fuels or other chemicals (including emergency response and EPA notification procedures and remediation.</li> <li>○ Ensure that machinery arrives on site in a clean, washed condition, free of fluid leaks.</li> </ul> </li> </ul>	C	O	D
<ul style="list-style-type: none"> <li>• A protocol would be developed in relation to discovering buried contaminants within the proposal site (e.g. pesticide containers).</li> </ul>	C		D

Safeguards and Mitigation Measures	C	O	D
It would include stop work, remediation and disposal requirements.			

## 7.2 HYDROLOGY, WATER USE AND WATER QUALITY (SURFACE AND GROUNDWATER)

### 7.2.1 Existing environment

#### Surface Water

The proposal is located in the Central West Local Land Services area. The site is located within the Macquarie Catchment. Two waterways are located within 10km of the proposal site, Beleringar Creek 10km to the north, and Trowan Cowal 6km to the south (Figure 7-4). The closest Nationally Important Wetland and Ramsar Wetland to the proposal site is the Macquarie Marshes and Nature Reserve, which is approximately 100km north east of the site.

One watercourse occurs within the proposal site. Boggy Cowal is located along the western boundary of the site (Figure 7-4 and Figure 7-5). Boggy Cowal is a tributary of the Macquarie River and drains into the river approximately 19km north of the proposal site.

A Cowal is defined as a shallow lake or swampy depression supporting vegetation. Therefore, Boggy Cowal is not an incised creek but rather a shallow swampy area that extends into the south-west corner of the site. It is likely that Boggy Cowal would be inundated with water most of the time. Boggy Cowal is well vegetated and had no signs of erosion at the time of the site surveys. One man-made dam occurs on the proposal site (Figure 7-6). When Boggy Cowal and/or the dam contain water, they would provide suitable foraging habitat for fauna groups such as wading birds and ducks, in addition to suitable breeding habitat for frogs.

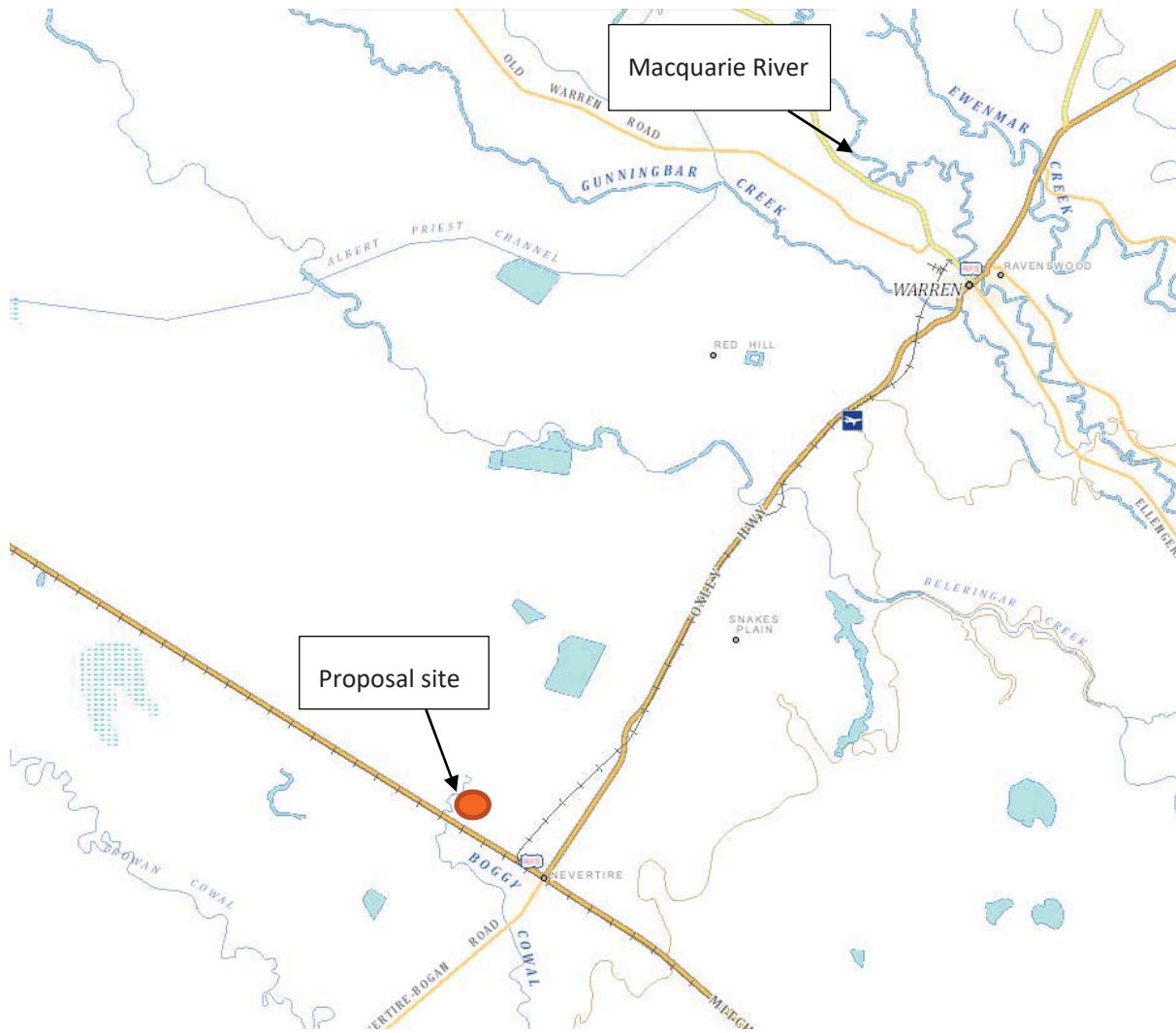


Figure 7-4 Waterways surrounding the proposal site.



Figure 7-5 Boggan Cowl on proposal site



Figure 7-6 Manmade dam onsite

The proposed transmission line would intersect informal drainage channels within Nevertire (Figure 7-7) and a dam located within the Noel Waters Oval. It would also be south of the Nevertire sewerage treatment plant ponds.



Figure 7-7 informal drainage channels to be intersected by the proposed transmission line.

### **Groundwater**

There is one bore located within the north west corner of the proposal site (Figure 7-8). Bore GW002260 is a private bore drilled in 1928 with an unknown purpose. The standing water level is approximately 48m deep (NSW Office of Water, 2016). Two other groundwater bores GW016859 and GW018939 are located within 500m of the proposal site. GW016859 was drilled in 1957 and is used for domestic and stock water purposes. GW018939 was drilled in 1961 and has a standing water level of 36 metres.



Figure 7-8 Groundwater bores in relation to the proposal site (orange boundary).

### Groundwater Dependent Ecosystems

Boggy Cowal and areas of native vegetation within the proposal site have been identified as having moderate potential for groundwater interaction (Figure 7-9). The mapped locations for potential groundwater interaction coincide with native vegetation remnants on site that would not be impacted by the development. The closest high priority GDE is over 100km north west of the proposal site.

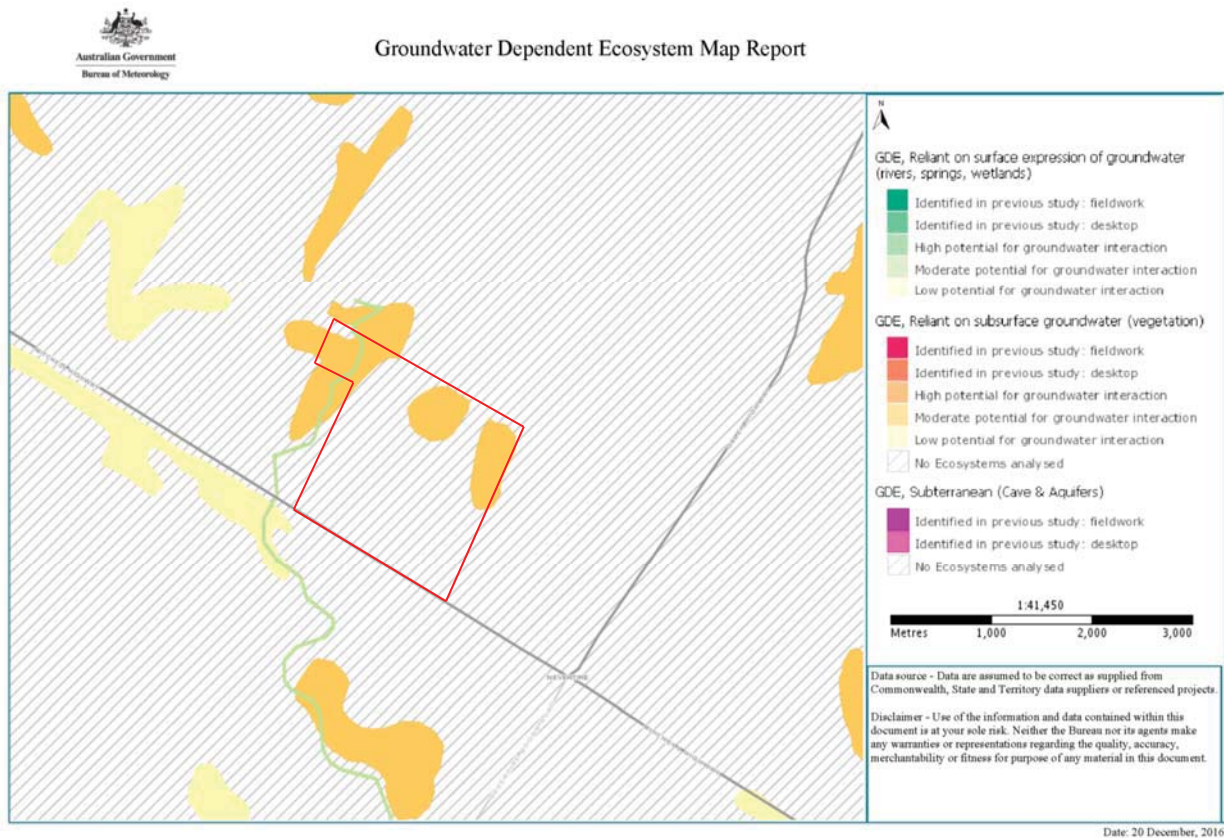


Figure 7-9 GDEs in regards to proposal site, red (BOM 2016).

### Surface hydrology and flooding

The proposal site is flat and low lying. Elevation at the site ranges from approximately 196m AHD at the south boundary of the site to approximately 199m AHD at the north western corner of the site.

There is no Flood Prone Land mapping for the site, however the Australian flood risk portal shows water was detected in the south west corner of the site during 5% of the observations (Figure 7-10). Local anecdotal information suggests that surfaces at 196m AHD were not impacted by the February 1955 or April 1990 floods<sup>13</sup> (one in 43 and 130 year events respectively - BOM Nevertire Clyde station historical rainfall data).

The proposal site would be prone to temporary flooding due to the close proximity of Boggy Cowal. The proposal site is likely to be periodically inundated with water periods of extended rain fall. Salt scalds on the soil surface indicate that inundation has brought salt up through the soil profile in such events. Due to the low relief landscape and the nature of Boggy Cowal, a swampy area rather than a flowing incised creek, water can sit onsite for long periods of time onsite rather than rapidly draining away.

<sup>13</sup> Personal communication, Brian Russ, 21 December 2016.



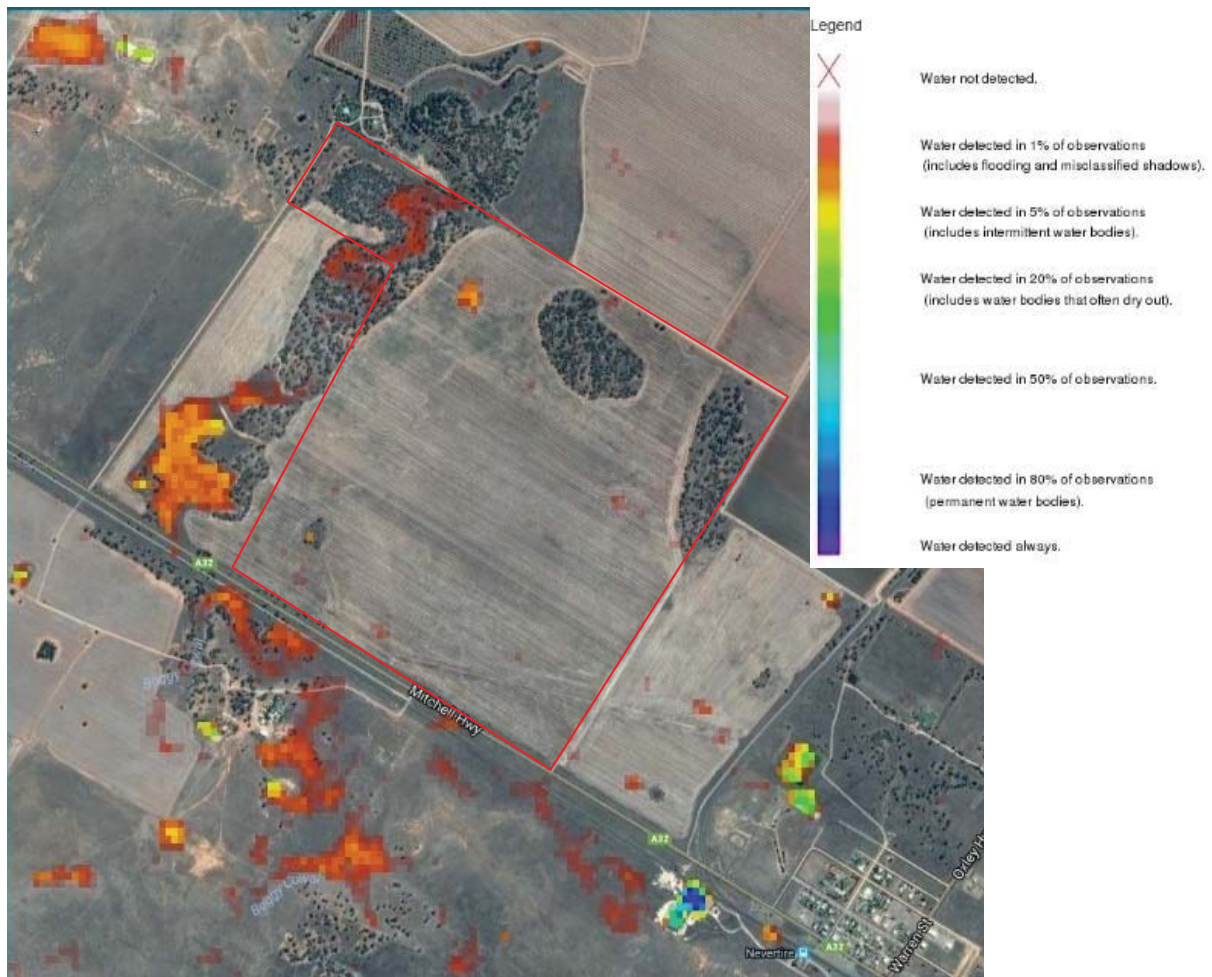


Figure 7-10 Flood Risk Information Map (Geoscience Australia 2016).

### Water entitlement

The proposal site is located within the area of three Water Sharing Plans (WSPs) within the Central West water management area. However, the proposal would not involve the extraction of water and therefore would not require any extraction licenses.

### 7.2.2 Potential impacts

#### Construction and decommissioning

##### SURFACE WATER

The proposed works would involve a range of activities that would disturb soils and potentially lead to sediment laden runoff, affecting local water ways. These activities include:

- Excavations for the construction of internal roads, compound, laydown and parking areas and footings for the onsite substation and inverters.
- Trenching for underground cable installation and transmission line.
- Pile driving/screwing of module frames, transmission line poles and fencing poles.

Soil compaction would occur when hardstands and access tracks are created, which would reduce soil permeability thereby increasing run off and the potential for concentrated flows. The use of fuels and other

chemicals (lubricants and herbicides), as well as concrete used onsite during construction and decommissioning, pose a risk of surface water contamination in the event of a spill.

Activities with the potential for adverse water quality impacts would be managed through the development of site specific sediment control plans and spill control plans, as detailed in Section 7.1 - Soil. Additionally, impacts to local water quality can be minimised by ensuring erosion and sediment control plans include measures to ensure ANZECC water quality criteria are met prior to discharge of water offsite.

Detention ponds, if required to manage surface water during construction and operation, will be detailed in the design phase, specific to the array layout.

#### GROUNDWATER DEPENDENT ECOSYSTEMS

The proposed development envelope would not directly affect any GDEs identified within the proposal site. The GDEs are located within areas of native vegetation and Boggy Cowal onsite, these would be avoided by the proposal. Additionally, as the proposal would not alter existing groundwater supplies within the proposal site, it is considered that impacts to GDEs are not likely to result from the proposal. Very limited deep rooted vegetation would be removed. Furthermore, the proposal is not predicted to have any impact on any High Priority GDEs listed in the relevant WSPs given their distance from the proposal site.

#### FLOODING AND HYDROLOGY

The low relief site and heavy soils are slow to drain water, particularly in close proximity of Boggy Cowal, along the western boundary of the site. Temporary flooding has the potential to interfere with construction and poses a safety risk for workers onsite. Additionally, flooding has potential to impact the water quality of the site and downstream waterways through the washing away of construction equipment, fuels and chemicals stored onsite. A flood contingency plan would be developed to reduce the safety and potential water quality impacts. Additionally, mitigation measures would be implemented for the storing of fuels and chemicals onsite within bunded areas.

The proposal would not involve any extensive earthworks or landform reshaping therefore the onsite hydrology would not be altered during construction or decommissioning.

#### WATER USE

Water use during the construction phase would be minimal and mainly for dust suppression on unsealed roads. This water requirement is likely to vary depending on weather conditions such as rainfall and wind and is estimated to be up to 21,600 kL per annum. Potable water requirements for staff would be approximately 243 kL per annum (refer Table 7-3).

Table 7-3 Water requirements during construction

Water quality	Annual construction water requirement (kL)	Potential sources	Availability
<b>Potable (drinking)</b>	243	Truck delivery	Available as required – commercial or council supply. Potential source is chlorinated bore water from Nevertire.
<b>Non-potable</b>	21,600	Truck delivery	Available as required at most convenient delivery point (to be defined by EPC contractor or subcontractors). Potential source is river water from Warren through Warren Shire Council.

Water is likely to be delivered on site by truck through commercial arrangements during construction. Water is unlikely to be sourced or extracted from site.

Impacts on water use during the decommissioning would be similar to those during construction. The amount would be low and managed using standard measures.

## **Operation**

### **SURFACE WATER QUALITY**

During operation, there is minimal potential for any impacts to surface water quality to occur. Appropriate drainage features would be constructed along internal access roads to minimise the risks of dirty water leaving the site or entering waterways. With the exception of internal roads, parking areas and areas around site offices, the site would be revegetated with grass cover. Water quality impacts at the site would therefore be low and are not considered substantially different to the current potential water quality impacts occurring from existing activities onsite including cropping and use of machinery.

There would be a low risk of contamination in the event of a chemical spill (fuels, lubricants, herbicides etc.) as strict storage and emergency handling protocols would be implemented (refer to Section 7.1 soil).

### **GROUNDWATER**

No operational activities would affect groundwater at the proposal site. No groundwater is proposed to be sourced during operation of the solar farm.

There would be no impacts to GDEs during the operation phase. There would be a 40m buffer established around Boggy Cowal and no direct impact would occur to the native vegetation onsite.

### **FLOODING and HYDROLOGY**

While the proposal would not increase flooding at the site or change the local hydrology, extensive flooding may pose:

- A safety risk for workers and assets, where electrical infrastructure becomes inundated
- A pollution risk, where stored pollutants may be leaked to the environment
- A local flooding risk, should any components become mobile in flood waters

None of the infrastructure is considered habitable, although an office would provide facilities for 2-5 staff required to maintain the site. The final design would take into account the best available flood information and may include footings up to a height of 500mm above ground level. Electrical components would be designed to withstand inundation, should it occur. The substation and office building would be located on the higher north-east portion of the site.

All potential pollutants stored on site would be stored in accordance with HAZMAT requirements and banded to contain 110% of the volumes stored.

The concrete footings and panel mounts would be designed to withstand periods of local flooding. No components are considered susceptible to becoming mobile and entering waterways.

A flood contingency plan would be developed to manage the safety of workers and equipment in the event of extended flooding in the region.

The proposal would not involve any extensive earthworks or landform reshaping, however one man-made dam onsite may be decommissioned and infilled. It is unlikely the proposed works would change the hydrology of the site due to the site's natural topography (flat) and that the dam was man-made.

**WATER USE**

Water use volumes during operation would be minimal. Some solar plants are never cleaned; others require more than two cleanings per year. Water would be required for staff amenities and may be required for panel cleaning. Panel cleaning may be required in dry conditions when cropping operations in the locality are generating dust. Generally, requirements would be minor and would be reduced in wetter conditions.

Water is likely to be delivered on site by truck through commercial operations during operation. Water is unlikely to be sourced from onsite.

**7.2.3 Safeguards and mitigation measures**

Table 7-4 Safeguards and mitigation measures for water quality impacts

*C: Construction, O: Operation, D: Decommissioning*

Safeguards and mitigation measures	C	O	D
<ul style="list-style-type: none"> <li>A 40 m buffer would be established around Boggy Cowal Creek to reduce potential impacts to the waterway and GDEs.</li> </ul>		Design	
<ul style="list-style-type: none"> <li>The final design would take into account the best available flood information and may include foundations up to 500mm above ground level. Electrical components would be designed to withstand inundation. The substation and office building would be located on the higher north-east portion of the site.</li> </ul>		Design	
<ul style="list-style-type: none"> <li>Design would take into account:                             <ul style="list-style-type: none"> <li>Anchoring to resist short term flooding</li> <li>Mounts used for infrastructure to resist short term flooding</li> </ul> </li> </ul> <p>Stage construction where necessary to avoid working in areas that are inundated with water.</p>		Design	
<ul style="list-style-type: none"> <li>All staff would be appropriately trained through toolbox talks for the minimisation and management of accidental spills.</li> </ul>	C	O	D
<ul style="list-style-type: none"> <li>All fuels, chemicals, and liquids would be stored at least 50 m away from any waterways or drainage lines and would be stored in an impervious bunded area.</li> </ul>	C	O	D
<ul style="list-style-type: none"> <li>Adequate incident management procedures will be incorporated into the Construction Environmental Management Plan, including requirement to notify EPA for incidents that cause material harm to the environment (refer s147-153 Protection of the Environment Operations Act).</li> </ul>	C	O	D
<ul style="list-style-type: none"> <li>The refuelling of plant and maintenance would be undertaken in impervious bunded areas on hardstand areas only.</li> </ul>	C	O	D
<ul style="list-style-type: none"> <li>Machinery would be checked regularly to ensure there is no oil, fuel or other liquids leaking from the machinery.</li> </ul>	C		D
<ul style="list-style-type: none"> <li>A flood risk contingency plan would be prepared prior to construction and is to be implemented during construction, operation and decommission. The plan would:                             <ul style="list-style-type: none"> <li>Detail who would be responsible for monitoring the flood threat and how this is to be done.</li> </ul> </li> </ul>	C	O	D

Safeguards and mitigation measures	C	O	D
<ul style="list-style-type: none"> <li>○ A process for removing any necessary equipment and materials offsite and out of flood risk areas.</li> <li>○ Consideration of site access in the event that some tracks become flooded.</li> <li>○ Establishment of an evacuation point.</li> </ul>			
<ul style="list-style-type: none"> <li>● To mitigate temporary flooding impacts on infrastructure:           <ul style="list-style-type: none"> <li>○ Design would take into account:               <ul style="list-style-type: none"> <li>▪ Anchoring to resist short term flooding</li> <li>▪ Mounts used for infrastructure to resist to short term flooding</li> </ul> </li> <li>○ Stage construction to avoid the short term periods where parts of the site are inundated with water.</li> </ul> </li> </ul>	C		

## 7.3 TRAFFIC, TRANSPORT AND ROAD SAFETY

### 7.3.1 Existing environment

Nevertire is located on the junction of the Mitchell Highway and Oxley Highway. The Mitchell Highway stretches 1,105km connecting central and south western regions of QLD with central western regions of NSW. It is a key freight route in NSW and designated as a route suitable for heavy vehicles, including road trains and 4.6m high vehicles (RMS 2016). The Oxley Highway is a rural highway that begins at Nevertire. It connects central west NSW with the NSW north coast by joining the Pacific Highway at Port Macquarie. Both highways are managed by the Roads and Maritime Services.

The proposal site is adjacent to the Mitchell Highway and would be accessed from the highway. At the site, the highway has two lanes and a speed limit of 110 km/hour. There is currently no formal turning lanes into the site. The line of sight at the proposed site entry is considered to be good; over 500m either way due to the flat terrain and it being straight road. The speed limit reduces to 50km/hour approximately 1km from the site, as the highway enters Nevertire.

The closest station for counting average daily traffic along the Mitchell Highway is located in Nyngan, approximately 58km west of the proposal site. In 2016 the average daily traffic was 609 vehicles travelling west which included 77% cars and 23% heavy vehicles. The closest station for the Oxley Highway is located in Gilgandra, approximately 107km north east of the proposal site. The average daily traffic for 2016 was 1,783 vehicles travelling north including 62% cars and 38% heavy vehicles (RMS 2016).

The proposed transmission line would cross the Oxley Highway (also known as Warren Street in Nevertire) and two residential roads within Nevertire including Belerenga Street and Clyde Street. The Oxley Highway at this location is a sealed two lane road with a 50km/hour speed limit. The speed limit increases to 110km/hour approximately 45m north of the Belerenga Street and Oxley Highway junction. Belerenga Street and Clyde Street are both unsealed with 50km/hour speed limits.

The Nevertire Warren Railway line is located approximately 700m east of the proposal site and would be intersected by the proposed transmission line approximately 400m north of the Mitchell Highway crossing. The railway line is a 20km line connecting Warren with the Main Western Railway line located in Nevertire. It is mostly used for grain haulage. The Main Western Railway line is parallel with the Mitchell Highway, on

the opposite side of the road to the proposal site. The Main Western Railway line provides an important link for east/west rail operations in Australia. It is used for the movement of freight through to Nyngan and as a weekly passenger train, as well as by the Indian Pacific tourist train to Dubbo.

### **7.3.2 Potential impacts**

#### **Construction and decommissioning**

The potential traffic, transport and road safety impacts associated with construction of the proposal relate primarily to the increased numbers of large vehicles on the road network which may lead to:

- Increased collision risks (other vehicles, pedestrians, stock and wildlife).
- Damage to road infrastructure
- Associated noise and dust (particularly where traffic is on unsealed roads) which may adversely affect nearby receivers.
- Disruption to existing services (public transport and school buses).
- Reduction of the level of service on the road caused by platooning of construction traffic.

#### **Onsite and local traffic**

##### **INCREASED VEHICLE NUMBERS**

Approximately 20 employees would be required during the first month of construction, rising to approximately 300 employees during the peak construction period (approximately 6-9 months' duration). Preliminary plans for the site include proposed parking for approximately 300 vehicles. If the proposed carpark was utilised to full capacity, this would result in approximately 600 vehicle movements per day to and from the site.

Approximately 38 utility vehicles would be used on a daily basis at the site during peak construction. Less would be required during non-peak construction periods. The utility vehicles will be remaining onsite during construction, and therefore not included in the estimated daily traffic volume to site (Table 7-5).

Buses may be used to transport workers to and from the site. Approximately 300 construction personnel would be required onsite during the peak construction period. Assuming an uptake rate of 80% and a 20-person capacity, up to 12 bus trips would be required per day during peak construction. During non-peak periods, approximately half as many buses are expected to be required.

Approximately 194 truck deliveries will transport equipment to site during the construction period. On average this equates to less than one truck delivery per day over the peak construction period (between 6 and 9 months). Up to 15 trucks in a single day may deliver equipment to site if a large equipment delivery is needed. The number of oversize/over mass vehicles required is expected to be low. Oversize/overmass vehicles would be required for the delivery of the transformer and transmission line poles. A mobile crane may be required for the offloading of the inverters and substation. Two to six piling or drilling machines would also be present onsite during the first months of the works. Approximately 22 standard concrete trucks would also be required during the construction of the substation slab. This would occur over 14 days. Construction plant and equipment would primarily be restricted to onsite travel until the end of the construction program. Construction plant and equipment required to be delivered to site would include:

- Excavator
- Compactor
- Bulldozer
- Grader

- Mobile crane
- Trencher
- Loader
- Vibratory roller

Traffic volumes associated with the construction of the proposal are summarised in Table 7-5.

Table 7-5 Summary of the estimated construction traffic volumes during peak

Vehicle type	Trips per day
Cars (proposal management, construction staff etc.)	600
Buses	Up to 12
Delivery trucks (including overmass vehicles)	6
Total trips per day:	618

Traffic impacts would largely be confined to standard hours of construction. Exceptions would occur as staff arrive and leave the site, before and after shifts; some of this traffic may occur outside the standard construction hours. Additionally, the delivery of large components may take place outside normal working hours.

Decommissioning impacts are likely to follow a similar pattern as components are dismantled and removed, however this would occur over a reduced time period.

#### INCREASED COLLISION RISK

The increased collision risk relates primarily to traffic entering and exiting the site from the Mitchell Highway. This is related to both oncoming traffic and traffic following behind turning vehicles. Slow moving vehicles may also present a risk to through traffic, requiring signage to warn motorists of the construction timeframes. Due to a good line of sight only minimal upgrades including widening will occur at the intersection.

As set out above, the majority of the traffic will be standard vehicles used by onsite workers, not overmass or oversize haulage vehicles. As such there are opportunities to rationalise traffic movements, such as through the provision of shuttle buses for workers. This objective would be a requirement of the Traffic Management Plan to be developed for the proposal.

#### DAMAGE TO ROAD INFRASTRUCTURE

The increase in traffic and heavy vehicle movement could impact the condition of roads on the haulage network. Along the Mitchell Highway the impact is expected to negligible due to the existing capacity of the road network.

Considering traffic turning movements into the site, the existing intersection is proposed to be widened. Monitoring would be undertaken to ensure that the road is maintained in adequate condition throughout the proposal, or repaired promptly by the proponent.

Internal access roads would be constructed or upgraded as required to accommodate the proposal volumes and loads of traffic. The tracks would be compacted but unsealed with the expectation of the 'throat' entrance to the site which will be sealed to a length of 40m.

## ASSOCIATED NOISE AND DUST

The proposed works may result in increased noise and dust, particularly from the use of unsealed internal access roads. Impacts from dust generated from the proposed activity, including that associated with increased traffic is considered in Section 7.7. During construction, water would be used to minimise dust generation along the tracks.

The DECCW (2011) NSW Road Noise Policy (NSW RNP) has been used to evaluate impacts from road traffic noise. This policy outlines a range of measures required to minimise road traffic noise and its impacts, including noise generated by developments that generate additional traffic on existing roads. A noise assessment is included in Appendix F and summarised in Section 6.4 of this EIS.

## DISRUPTION TO EXISTING SERVICES

Local traffic in Nevertire would be minimally affected by increased vehicles from construction staff seeking accommodation and services, and conducting commercial activities relating to the solar farm. This would extend outside construction hours. Due to the size of Nevertire, construction workers would be required to stay in other towns in the locality including Warren, Narromine, Dubbo or Nyngan along the Mitchell Highway and Warren on the Oxley Highway. The potential impacts on the Mitchell Highway and Oxley Highway at these towns would be insignificant in the context of existing traffic movements along these roads and due to the dispersion of the construction workers (300 at peak) across the area.

Increased traffic along Mitchell Highway and Oxley Highway during construction may cause disruptions to general traffic flows and to public transport services including school bus routes that operate along the road. The use of buses to transport workers to and from site will reduce the amount of disruption to traffic along the Mitchell Highway.

The proposed construction works would not impact on the operation of the Main Western Railway Line. There may however be some minor impacts to the Nevertire Warren Rail line with the construction of the transmission line over the railway line. The construction would be undertaken in consultation with John Holland Rail. It is unlikely that during construction or decommissioning, the amount of traffic turning into the proposal site would result in traffic being backed-up over the Nevertire Warren railway line crossing that intersects the Mitchell Highway. This is due to the proposed minor intersection upgrades, as well as the distance between the proposal site entry and crossing; approximately 700m.

## Haulage

While a detailed haulage program has not yet been developed, it is expected that the proposal's components are most likely to be delivered by road from either Sydney, Brisbane or Adelaide. The proposed roads of these routes would have sufficient capacity to accommodate the haulage of components required for the construction of the solar farm and transmission line.

## SUMMARY OF CONSTRUCTION AND DECOMMISSIONING IMPACTS

Overall, the additional traffic associated with the solar farm would be a small component of the existing traffic volumes on the Mitchell Highway and Oxley Highway. No substantive increased collision risks, damage to road infrastructure, noise or dust impacts, disruption to existing services or reduced level of service is expected to occur as a consequence of the construction activities. This would be ensured by the preparation of a detailed haulage plan to manage the haulage process and a detailed traffic management plan to manage the traffic impacts. The road can withstand large loads and heavy vehicles, being part of an important transport route.



## Operation

Vehicles would use the designated road network to access the site and travel within the site during the operational phase (30 year period), with 2-5 cars expected during the operation phase, including travelling to the site office or maintenance building, and carrying out maintenance activities on the solar farm infrastructure. During major maintenance operations, this number could increase to 20-30 vehicles at any one time for a limited period. Operational staff would be confined to designated parking areas and access roads/tracks within the proposal site.

It is considered unlikely that the low levels of operational traffic would obstruct public or private local access. Additional risks to road safety from operational traffic would be minimal.

### 7.3.3 Safeguards and mitigation measures

Traffic and haulage impacts would be managed in consultation with the roads authorities covering issues such as, but not limited to, reinstatement of pre-existing road conditions, shuttle bus transport, intersection upgrade, scheduling of deliveries and traffic controls (speed limits, signage etc.), as detailed in Table 7-6.

Table 7-6 Safeguards and mitigation measures for traffic, transport and road safety impacts

C: Construction, O: Operation, D: Decommissioning

Safeguards and mitigation measures	C	O	D
<ul style="list-style-type: none"> <li>The proponent would consult with the Roads and Maritime Services regarding the proposed upgrading of the site access. The upgrade would be subject to detailed design, and must be designed and constructed to the standards specified by Roads and Maritime Services.</li> </ul>	Design		
<ul style="list-style-type: none"> <li>A Haulage Plan would be developed with input from the roads authority, including but not limited to:                             <ul style="list-style-type: none"> <li>Assessment of road routes to minimise impacts on transport infrastructure.</li> <li>Scheduling of deliveries of major components to minimise safety risks (on other local traffic).</li> <li>Traffic controls (signage and speed restrictions etc.).</li> </ul> </li> </ul>	C		D
<ul style="list-style-type: none"> <li>A Traffic Management Plan would be developed as part of the CEMP, in consultation with Warren Council and Roads and Maritime. The plan would include, but not be limited to:                             <ul style="list-style-type: none"> <li>Assessment of road condition prior to construction on all local roads that would be utilised.</li> <li>A program for monitoring road condition, to repair damage exacerbated by the construction and decommissioning traffic.</li> <li>The designated routes of construction traffic to the site.</li> <li>Carpooling/shuttle bus arrangements to minimise vehicle numbers during construction.</li> <li>Scheduling of deliveries.</li> <li>Community consultation regarding traffic impacts for nearby residents.</li> <li>Consideration of cumulative impacts.</li> <li>Consideration of impacts to the railway.</li> <li>Traffic controls (speed limits, signage, etc.).</li> </ul> </li> </ul>	C		D

Safeguards and mitigation measures	C	O	D
<ul style="list-style-type: none"> <li>○ Procedure to monitor traffic impacts and adapt controls (where required) to reduce the impacts.</li> <li>○ Providing a contact phone number to enable any issues or concerns to be rapidly identified and addressed through appropriate procedures.</li> </ul>			
<ul style="list-style-type: none"> <li>● The proponent would repair any damage resulting from proposal traffic (except that resulting from normal wear and tear) as required at the proponent's cost.</li> </ul>	C	O	D

## 7.4 LAND USE IMPACTS (INCLUDING MINERAL RESOURCES)

### 7.4.1 Existing environment

The proposal site is located on land zoned RU1 Primary Production under the Warren LEP. The proposal site is not located on land proposed for residential subdivision development, or land managed for forestry or conservation purposes.

#### Agriculture

The Nevertire locality currently supports agriculture, particularly sheep and cattle grazing, as well as wheat, oat and cotton cropping. Agriculture is a significant land use in the local area with an output value of \$112.818m (REMPPLAN 2016). For the Nevertire locality 42% of the population work in the Sheep, Beef Cattle and Grain Farming industry and another 6.9% work in other cropping industries (ABS 2011).

The proposal site land use is currently grazed by sheep and has a history of cropping. The landowner leases out the land for cropping and owns other land within the area. The surrounding properties include cotton growing and cereals.

#### Electricity

The proposed 132kV overhead and underground transmission line route would be from the proposal site to the existing Nevertire Essential Energy substation, approximately 1.5km east. Existing overhead 66kV and 22kV transmissions lines occur adjacent to the proposed transmission route.

The proposal site has two existing powerlines intersecting the site, one 132kV running north west from the eastern boundary and one 66kV running south west from the eastern boundary. These existing lines may be relocated within the site boundary in consultation with Essential Energy. No solar farm infrastructure will be located within the Essential Energy easements for these powerlines without the agreement of Essential Energy.

#### Mining

A search of the Department of Industry's Minview database (Department of Industry 2016) found there are no mineral exploration licences held for the proposal site. There also no existing mineral exploration licences in the surrounding area of the proposal site.

#### Aviation

There are three airstrips located in close proximity to the proposal site including:

- Red Hill airport approximately 12km north east
- Elengerah airport approximately 26km east, at Gin Gin NSW.

- Trangie airport approximately 33km south east.

These airstrips are small airports primarily used by light aircraft, private charter flights and medical services. Due to the nature of agricultural industry in the area, there are potentially other smaller (private) airstrips in the locality used for aerial spraying of crops.

### **Other land uses**

The Nevertire Warren Railway line is located approximately 700m east of the proposal site and would be intersected by the proposed transmission line, approximately 400m north of the Mitchell Highway crossing. Additionally, the Main Western Railway line is parallel with the Mitchell Highway, on the opposite side of the road than the proposal site. Rail is discussed further in section 7.3.

The village of Nevertire is located 1km west of the proposal it contain retail, residential and recreational areas. Closer to the site, recreational areas including the Noel Waters Oval provide a playing field, tennis courts, and amenities block. A pony club is located to the east of the site.

## **7.4.2 Potential impacts**

### **Construction**

From the commencement of construction, agricultural activities would cease in areas required for access and construction of the solar farm. Soil properties and key risks of construction are well understood and documented in Section 7.1. Excepting the perimeter track and small footings onsite, for inverters and the substation, the majority of the site would not be impacted by the development; no large areas of reshaping or excavation are proposed. Therefore, post decommissioning, the land could return to existing agricultural use or an alternative use.

Consultation would be required with John Holland Rail and Essential Energy to ensure the construction of the transmission line has minimal impact on the operation of the Nevertire Warren Railway line and Nevertire Substation. There is unlikely to be any impacts on aviation during construction of the proposal. Installation of electricity poles would be the tallest infrastructure to be constructed and would not impact on any flight paths of, or present a hazard to, aircraft.

There would be no extraction of minerals during the construction period. Due to the proposal being highly reversible, mineral exploration would not be sterilised in the long term, post decommissioning.

No land use conflicts are likely during construction.

### **Operation**

During operation, the proposal site would change from agricultural land use to power generation. Grazing may occur as maintenance, and a groundcover management plan would be developed primarily to prevent erosion, and therefore are not conducted for agricultural profit.

The development will result in the development of a large proportion of the 255 ha property, including along the proposed transmission line easement. The transmission easement is mostly sited along an existing road corridor with other services, so this would not result in a significant land use change. The duration of the proposal would be 30 years. The loss of the array site (200 ha) for agricultural production during this period is not considered a significant (agricultural production or economic) loss in the locality.

The identified risk to aviation from the operation of the Nevertire Solar Farm is reflective glint and glare. Glint is a quick reflection that occurs when the sun is reflected on a smooth surface. Glare is a longer reflection.

Onsite infrastructure that may cause glint or glare depending on the sun angle, include:

- Solar panels.
- Steel array mounting - array mounting would be steel or aluminium.
- Temporary construction site buildings.

The potential for glint or glare associated with non-concentrating PV systems which do not involve mirrors or lenses is relatively limited. PV solar panels are designed to absorb as much solar energy as possible in order to generate the maximum amount of electricity or heat. As such, they reflect only around 2% of the light received (Spaven Consulting 2011).

A comparative reflection analysis against other surfaces is shown in Figure 7-11. The figure shows that in relation to water and snow, a solar panel (with a reflectivity coating) reflects a much lower percentage of light. In addition, the Department of Planning (2010) in their discussion paper on planning for renewable energy generation, stated that solar panels will not generally create noticeable glare compared with an existing roof or building surfaces.

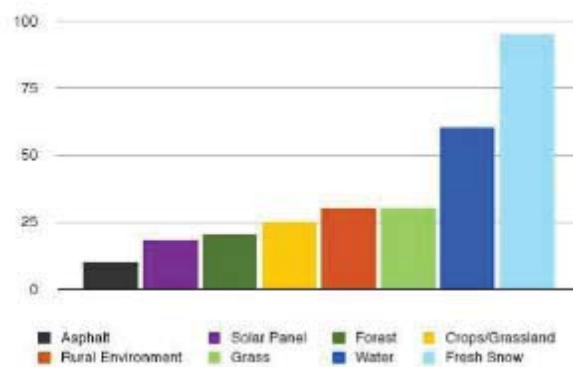


Figure 7-11 Comparative reflection analysis (Spaven 2011)

For other infrastructure on site such as the buildings and steel support frame posts, impacts from glint and glare is considered minor due to their small size and low surface area. Careful design and colour schemes can further reduce any potential reflection problems.

Impacts of glint and glare on aviation as a result of the proposed solar farm's infrastructure are considered to be minor and can be effectively managed with the implementation of the mitigation measures outlined below.

### Decommissioning

Due to the proposal site requiring relatively low levels of impacts on the soil surface, the proposal is viewed as highly reversible. Some compaction on access roads, for cabling and footings would occur. Following decommissioning, the rehabilitated site would have similar opportunities for land use as the site currently possesses. At the end of the proposal, all above ground infrastructure would be removed and infrastructure less than 500mm deep would be removed, subject to consultation with the landowner. Once removed, current agricultural activities or alternative activities including rural residential development or forestry could be resumed or undertaken. A Rehabilitation Plan is a commitment of the proposal, relevant to

decommissioning. The objective is to ensure the array site is returned to its pre-solar farm land capability. Cropping, other forms of agriculture, or alternative land uses could occur. The plan would be developed with reference to soil testing (conducted pre-construction as a requirement of the staged Groundcover Management Plan) and with input from an Agronomist. The site would be left stabilised, under a cover crop or other suitable ground cover. The plan would reference:

- The Australian Soil and Land Survey Handbook (CSIRO 2009)
- The Guidelines for Surveying Soil and Land Resources (CSIRO 2008)
- The land and soil capability assessment scheme: second approximation (OEH 2012)

### 7.4.3 Safeguards and mitigation measures

Potential for land use impacts is proposed to be addressed via the mitigation measures in Table 7-7.

Table 7-7 Safeguards and mitigation measures for land use impacts

*C: Construction; O: Operation; D: Decommissioning*

Safeguards and mitigation measures	C	O	D
<ul style="list-style-type: none"> <li>• Consultation with local community, to minimise impact of construction of adjacent agricultural activities and access.</li> </ul>	C		
<ul style="list-style-type: none"> <li>• Consultation would be undertaken with Essential Energy regarding connection to the substation and design of electricity transmission infrastructure.</li> </ul>	C		
<ul style="list-style-type: none"> <li>• Consultation would be undertaken with John Holland Rail regarding design of transmission line over the Nevertire Warren Railway line.</li> </ul>	C		
<ul style="list-style-type: none"> <li>• A Rehabilitation Plan would be prepared to ensure the array site is returned to its pre solar farm land capability. The plan would be developed with reference to base line soil testing and with input from an Agronomist to ensure the site is left stabilised, under a cover crop or other suitable ground cover. The plan would reference:               <ul style="list-style-type: none"> <li>○ Australian Soil and Land Survey Handbook (CSIRO 2009)</li> <li>○ Guidelines for Surveying Soil and Land Resources (CSIRO 2008)</li> <li>○ The land and soil capability assessment scheme: second approximation (OEH 2012)</li> <li>○ Below ground infrastructure that impedes cropping (less than 500mm depth) may be removed, subject to consultation with the land owner.</li> </ul> </li> </ul>			D
<ul style="list-style-type: none"> <li>• The materials and colour of onsite infrastructure will, where practical, be non-reflective and in keeping with the materials and colouring of the landscape.</li> </ul>	C		

## 7.5 RESOURCE USE AND WASTE GENERATION

### 7.5.1 Existing environment

#### Resource use

Key resources and estimated quantities (pending the completion of the detailed proposal design) required to construct the proposed solar farm include those listed in Table 7-8.

Table 7-8 Resource requirements for the proposed Nevertire Solar Farm.

Resource	Quantity
Gravel	2,200 m <sup>3</sup>
Sand (back filling trenches, inverters, substation)	3,860 m <sup>3</sup>
Metal (components for mounting system, inverters and delivery system containers,)	827 tonnes
Glass for panels	8728 tonnes
Water during construction	21,600 kL total

The majority of the required resources will be used during the construction of the proposal. During operation and decommissioning, resource requirements would be associated with maintenance activities, including primarily the use of machinery, vehicles and water resources. Water resources would be required throughout construction, operation and decommissioning. Water use is considered in Section 7.2 of this REF.

#### Waste generation

##### POLICY POSITION

Guidelines for the legal requirements for waste management are stipulated under the POEO Act and the *Protection of the Environment Operations (Waste) Regulation 2005*. Unlawful transportation and deposition of waste is an offence under Section 134 of the POEO Act. Littering is an offence under Section 145 of the POEO Act.

The proposal resource management options would be developed using the *Waste Avoidance and Resource Recovery Act 2001* objectives. Specifically, these would be designed to:

- encourage the most efficient use of resources and to reduce environmental harm in accordance with the [principles of ecologically sustainable development](#);
- ensure that resource management options are considered against a hierarchy of the following order:
  - I. avoidance of unnecessary resource consumption,
  - II. resource recovery (including reuse, reprocessing, recycling and energy recovery),
  - III. disposal

Adopting the above principles would encourage the most efficient use of resources, and reduce costs and environmental harm in accordance with the principles of ecologically sustainable development.

## CONSTRUCTION

Solid waste is one of the major pollutants caused by construction. A number of different construction activities associated with the proposal would produce solid wastes, including:

- Packaging materials.
- Excess building materials.
- Scrap metal and cabling materials.
- Plastic and masonry products, including concrete wash.
- Excavation of topsoils and vegetation clearing (expected to be minimal).
- Bio wastes, from onsite septic systems.

In accordance with the definitions in the POEO Act and associated waste classification guidelines, most waste generated during the construction and decommissioning phases would be classified as building and demolition waste within the class *general solid waste* (non putrescibles). Ancillary facilities in the site compound would also produce sanitary wastes classified as *general solid waste* (putrescibles) in accordance with the POEO Act.

## OPERATION

During operation the solid waste streams would be associated with maintenance activities and presence of employees. Some materials, such as fuels and lubricants, and metals may require replacement over the operational life of the proposal.

## DECOMMISSIONING

Decommissioning of the site would involve the recycling or reuse of materials including:

- Solar panels and mounting system.
- Metals from posts, cabling, fencing.
- Buildings and equipment such as the inverters, transformers and similar components would be removed for resale or reuse, or for recycling as scrap.

Items that cannot be recycled or reused, such as excess of above, would be disposed of in accordance with applicable regulations and to appropriate facilities. All above ground infrastructure would be removed from the site during decommissioning.

### **7.5.2 Potential impacts**

#### **Construction and decommissioning**

While increasing scarcity of resources and environmental impacts are emerging from the use of non-renewable resources, the supply of the materials required for the proposal are not currently limited or restricted. In considering the volumes required, the proposal is unlikely to place significant pressure on the availability of local or regional resources. The use of the required resources is considered reasonable in light of the benefits of offsetting fossil fuel electricity generation.

Water would be required during construction for activities including watering of roads and in the site office and amenities. Water use is considered in Section 7.2.

During decommissioning, all above ground infrastructure and materials would be removed, and buried infrastructure less than 500mm deep would be removed subject to consultation with the landowner. Materials removed from the site would be recycled or otherwise disposed of at approved facilities. The

proposal is considered highly reversible in its ability to return to the site to the pre-existing land use capability or alternative land uses. The majority of the proposal components are recyclable and mitigation measures are in place to maximise reuse and recycling in accordance with resource management hierarchy principles.

Due to the size of the waste facilities within the Warren LGA, the disposal of waste at these facilities may place pressure on their resources and capacity. Consultation would be undertaken with local waste facility operators to ensure that loads do not exceed capacity. Haulage of waste to facilities outside Warren LGA may also be undertaken. A Waste Management Plan would be developed and would include ways to reduce, reuse and recycle construction and decommissioning waste.

**Operation**

Electricity production using photovoltaics emits no pollution, produces no GHGs, and uses no finite fossil-fuel resources (US Department of Energy 2004). Only limited amounts of fuels would be required for maintenance vehicles during operation of the solar farm. Operational waste streams would be very low as a result of low maintenance requirements of the solar farm.

Some balance of system electrical components (e.g., inverters, transformers, electrical cabling) would likely need replacement over the proposed life of the solar farm, requiring further use of metal and plastic based products. Repair or replacement of infrastructure components would result in some waste during plant operations, however, such activities would occur very infrequently and there would be a high potential for recycling or reuse of such waste.

**7.5.3 Safeguards and mitigation measures**

A Waste Management Plan would be developed to minimise waste and maximise the opportunity for reuse and recycling. Potential impacts are to be addressed with regards to the mitigation measures in Table 7-9.

Table 7-9 Safeguards and mitigation measures for resource use and waste generation

*C: Construction; O: Operation; D: Decommissioning*

Safeguards and mitigation measures	C	O	D
<ul style="list-style-type: none"> <li>• A Waste Management Plan (WMP) would be developed in consultation with Warren Shire Council (with regard to disposal options). It would include but not be limited to:               <ul style="list-style-type: none"> <li>○ Identification of opportunities to avoid, reuse and recycle, in accordance with the waste hierarchy.</li> <li>○ Quantification and classification of all waste streams.</li> <li>○ Provision for recycling management onsite.</li> <li>○ Provision of toilet facilities for onsite workers and how sullage would be disposed of (i.e., pump out to local sewage treatment plant).</li> <li>○ Tracking of all waste leaving the site.</li> <li>○ Disposal of waste at facilities permitted to accept the waste. Consultation would be undertaken with local waste facility operators to ensure that loads do not exceed capacity.</li> <li>○ Requirements for hauling waste (such as covered loads).</li> </ul> </li> </ul>	C	O	D



Safeguards and mitigation measures	C	O	D
<ul style="list-style-type: none"> <li>○ Disposal options for excess waste (Warren Shire has limited options available for the disposal of waste and other viable options will need to be implemented).</li> <li>○ Wooden crates used on site will need to be thoughtfully disposed of offsite. The crates often cannot be chipped to be used as mulch due to chemical sprays used.</li> <li>○ Septic system is installed and operated according to the local Warren Shire Regional Council regulations.</li> </ul>			

## 7.6 MAGNETIC FIELDS

### 7.6.1 Existing Environment

Electromagnetic fields (EMFs) consist of electric and magnetic fields and are produced whenever electricity is used. EMFs also occur naturally in the environment, e.g., from a build-up of electric charge in thunder storms and Earth’s magnetic field (WHO 2012).

Electric fields are produced by voltage and magnetic fields by current. When electricity flows, EMFs exist close to the lines and wires that carry electricity and close to electrical devices and appliances (WHO 2007). Electric and magnetic field strengths reduce rapidly with distance from the source, and while electric fields are shielded to some extent by building materials, magnetic fields are not.

Fields of different frequencies interact with the body in different ways. In Australia, transmission lines and other electrical devices and infrastructure, including substations, operate at a frequency of 50 Hertz (Hz). This frequency falls within the Extremely Low Frequency (ELF) range of 0-300 Hz.

As electricity use has become an everyday part of life, concerns have been raised about the potential for exposure to EMFs to adversely affect human health. Over decades of EMF research, no major public health risks have emerged, but uncertainties remain (WHO undated). While it is accepted that short-term exposure to very high levels of electromagnetic fields can be harmful to health, the International EMF Proposal has thus far concluded that there are no substantive health consequences from exposure to ELF electric fields at the low levels generally encountered by the public (WHO 2007), such as those that would be produced by electricity generation at the Nevertire Solar Farm and along the transmission line.

Whether exposure to ELF magnetic fields is also harmless is unclear. The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA 2015) advises that ‘the scientific evidence does not firmly establish that exposure to 50 Hz electric and magnetic fields found near transmission lines is a hazard to human health’, and that ‘current science would suggest that if any risk exists, it is small’.

Australia does not currently have a standard that regulates exposure to extremely low frequency electric or magnetic fields. ARPANSA refers to the limits in the National Health and Medical Research Council’s (NHMRC) *Interim guidelines on limits of exposure to 50/60 Hz electric and magnetic fields* (1989), summarised in Table 7-10.

Table 7-10 Summary of the Interim guidelines on limits of exposure to 50/60 Hz electric and magnetic fields.

Exposure characteristics	Electric field strength (volts per metre - V/m)	Magnetic flux density (microteslas - $\mu$ T)
<b>Occupational</b>		

Whole working day	10,000	500
Short term	30,000	5,000
General public		
Up to 24 hours/day	5,000	100
Few hours/day	10,000	1,000

The proposal includes four main types of infrastructure that could create EMFs:

- an overhead 132kV transmission line;
- underground 22-33kV cables;
- a 22-33kV/132kV substation and;
- the solar array (up to 1.5kV DC).

Typical and maximum EMF levels for these types of infrastructure are discussed below. Strength attenuates with distance from the infrastructure, as seen below.

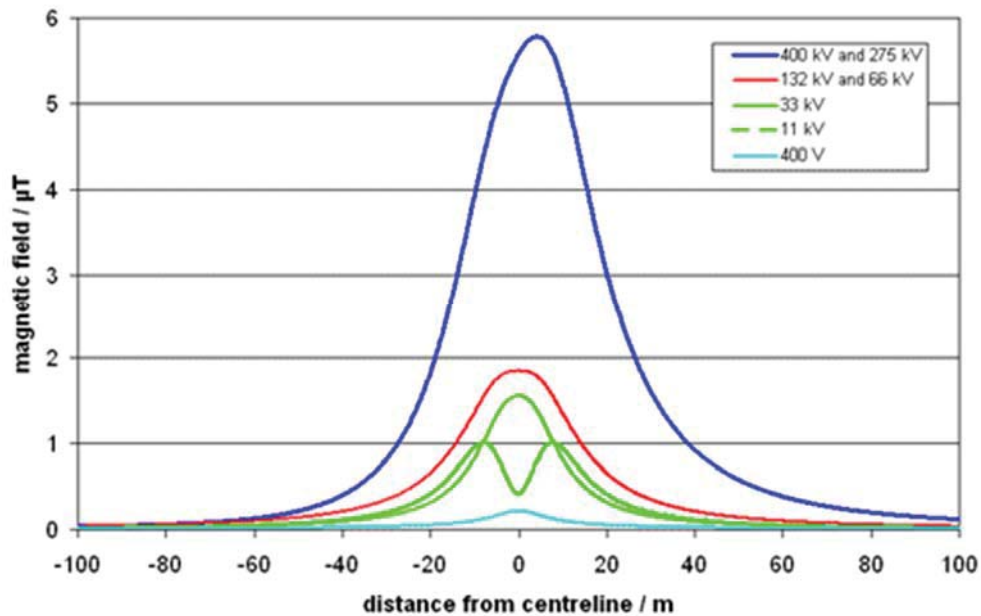


Figure 7-12 Typical magnetic fields from overhead powerlines (Source: EMFs.info 2016).

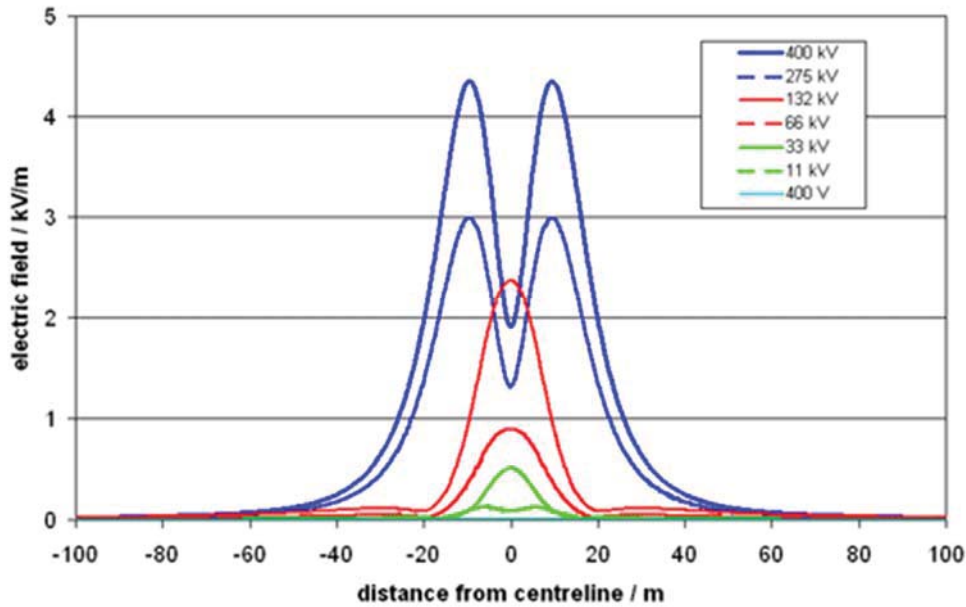


Figure 7-13 Typical electric fields from overhead powerlines (Source: EMFs.info 2016).

ARPANSA (2015) provides the following typical levels of magnetic fields near transmission lines and substations.

Table 7-11 Typical magnetic fields from overhead powerlines.

Source	Location of measurement	Range of measurement	
		(mG)	( $\mu\text{T}$ ) <sup>14</sup>
Transmission line	Directly underneath	10 - 200	1 - 20
Transmission line	At edge of easement	2 - 50	0.2 - 5
Substation	At substation fence	1 - 8	0.1 - 0.8

EMFs.info (2012) provide maximum and typical ground-level field levels for both electric and magnetic fields from 132 kV overhead transmission lines in the UK, which, like Australia, operate at a 50Hz frequency.

Table 7-12 Typical electric and magnetic fields from overhead powerlines.

	Electric Field (v/m)	Magnetic Field ( $\mu\text{T}$ )
Maximum field (under line)	4,000	40
Typical field (under line)	1,000 - 2,000	0.5 - 2
Typical field (25m to side)	100 - 200	0.05 - 0.2

<sup>14</sup> Converted from mG where 1 mG = 0.1  $\mu\text{T}$ .

Underground 33kV cabling does not produce external electric fields due to shielding from effects of the soil, however magnetic fields still occur. EMFs.info (2016) provides some typical magnetic field data for a single 33kV underground cable at 0.5m depth.

Table 7-13 Magnetic field levels from underground 33kV cabling.

Magnetic Field ( $\mu\text{T}$ ) at distance from centreline			
0 m	5 m	10 m	20 m
1.00	0.29	0.15	0.07

Research into electric and magnetic fields undertaken at utility scale photovoltaic installations in California<sup>15</sup> by Chang and Jennings (1994), indicated that magnetic fields (the EMF type of greatest public concern) was significantly less for solar arrays than for household applications. Chang and Jennings (1994) found magnetic fields from solar arrays were not distinguishable from background levels at the site boundary, suggesting the health risk of EMFs from solar arrays is minimal.

## 7.6.2 Potential impacts

### Construction and decommissioning

There is low potential for EMF impacts during the construction and decommissioning phases of the proposal. Site staff would be exposed over intermittent periods during works at and around the existing 132kV and 66kV transmission lines that occur along the proposed 132kV transmission alignment. The maximum magnetic field of the existing transmission lines are well under the 100  $\mu\text{T}$  and 500  $\mu\text{T}$  limits respectively, as recommended for public and occupational exposure. Similarly, the maximum electric field of a 132kV transmission line is less than the recommended 5000 V/m, and at the 66kV line can be expected to be even lower than the 132kV. Given the voltage that workers would be exposed to, and the intermittent nature of exposure, the effects are likely to be negligible.

### Operation

During operation, EMF sources would include the 132kV transmission line, substation, and the solar arrays incorporating 22-33kV underground cables.

Electric fields can be reduced with distance from operating electrical equipment and by shielding, while magnetic fields are reduced more effectively with distance. Using the Principle of Prudent Avoidance to design and site this infrastructure, the exposure to EMFs can be minimised and potential for adverse health impacts avoided.

The site is surrounded by agricultural land and public access would be further restricted by site fencing around the solar array and substation. EMFs from the solar farm are likely to be indistinguishable from background levels at the boundary fence. The underground 22-33kV cabling would not produce external electric fields due to shielding from soil, and its magnetic fields would be limited in the order of 1  $\mu\text{T}$  directly above the cabling and falling away to 0.7  $\mu\text{T}$  at a distance of 20 metres (EMFs.info 2016). These levels are well within the public and occupational exposure levels recommended by ARPANSA.

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<sup>15</sup> Note the U.S.A electricity supply operates at 60 Hz frequency

The onsite substation would also be located within fenced proposal site. While there are number of EMF sources within a substation, design procedures relating to equipment selection, layout, electrical connection techniques and compound size, would ensure the EMFs produced by the equipment within the station would also be typically indistinguishable from background levels beyond the substation fence. The substation design would be similar to other designs used throughout Australia that have had EMF measurements taken to ensure levels within the compound are within recommended occupational exposure limits for staff.

The largest potential for public exposure would be associated with the 132kV transmission line alignment. Public exposure would be fleeting and intermittent when accessing those areas, and typical EMF levels produced by a 132kV transmission line are well below ARPANSA’s recommended exposure limits outlined in Table 7-10.

Staff exposure to EMFs from the proposed and existing transmission lines would be intermittent during site access and maintenance activities, and again EMF levels produced would be well within the recommended occupational exposure limits outlined in Table 7-12.

Using the Principle of Prudent Avoidance to design and site this infrastructure, exposure to EMFs and potential for adverse health impacts can be further reduced. Adverse health impacts from EMFs are therefore unlikely as a result of the proposal.

### 7.6.3 Safeguards and mitigation measures

Table 7-14 Safeguards and mitigation measures for magnetic fields.

*C: Construction; O: Operation; D: Decommissioning*

Safeguards and mitigation measures	C	O	D
<ul style="list-style-type: none"> <li>All design and engineering would be undertaken by qualified and competent person/s with the support of specialists as required.</li> </ul>	C		
<ul style="list-style-type: none"> <li>Transmission lines would be located as far as practical from residences, farm sheds, and yards to reduce the potential for exposure to EMFs.</li> </ul>	C		
<ul style="list-style-type: none"> <li>Design of electrical infrastructure would minimise EMFs.</li> </ul>	C		

## 7.7 CLIMATE AND AIR QUALITY

Air quality can be affected by dust caused by soil disturbance and emissions from vehicles and machinery. These impacts can be a nuisance to nearby receivers i.e. residences, farm workers and road users. At worst they can interfere with plant growth, degrade ecosystems, represent human health risks and contribute to GHG emissions and anthropogenic climate change. In Australia’s rural agricultural landscape dust and dirt are a major influence on air quality.

### 7.7.1 Existing environment

#### Air quality

The proposal site is located in the Warren LGA, Central West NSW. The closest climate data for the region is from the Trangie research station (BOM 2016). The area experiences hot summers and mild winters. The

hottest months of the year are November through to March. The coldest months of the year are June, July and August (BOM 2016). The average rainfall is 496.9 mm; with the majority of rainfall occurring in January and February. Annual wind speed averages for the area are 31 km/h, with October to January averaging the highest wind speeds (BOM 2016).

Air quality for the Warren LGA is generally expected to be good and typical of that found in a rural setting of NSW. Existing sources of air pollution include vehicle emissions, dust during dry periods and agricultural activities, particularly stubble burning and harvest. During colder months, there may be a minimal increase in air contaminants due to smoke emissions from the operation of solid fuel heating. A search of the National Pollutant Inventory (Australian Government 2015) identified no facilities within the Warren LGA that are required to record emissions.

The closest receiver is approximately 340m south of the proposal site. A second residence is located 530m north west of the proposal site. Nevertire is approximately 1km east of the proposal site, and parts of the transmission line would occur within Nevertire. Topography of the proposal site is flat. Surrounding the proposal site is minimal native vegetation or screenings.

**CRITERIA**

The POEO Act requires that no vehicle shall have continuous smoky emissions for more than ten seconds. Limits on dust emission of less than 4mg/m/m2 are also specified.

**Climate change**

Climate change refers to the warming temperatures and altered climatic conditions associated with the increased concentration of greenhouse gases in the atmosphere. Climate change proposals for Australia include more frequent and hotter hot days and fewer frost days, rainfall declines in southern Australia and more extreme weather events including intense rainfall, severe drought and harsher fires (CSIRO 2015).

It is now generally accepted that the release of certain gases, including most notably carbon dioxide, contribute to global climate change. These gases are collectively referred to as ‘greenhouse gases’ (GHGs). Construction and maintenance activities where plant and equipment uses diesel, gasoline and other hydrocarbons, result in GHG emissions and are likely to contribute to climate change. The construction, operation and decommission of the proposed solar farm assessed in this EIS would produce minimal CO<sub>2</sub> emissions when compared to conventional coal and gas fired powered stations; refer to Table 7-15.

Table 7-15 Comparison of CO<sub>2</sub> equivalent emissions produced per kilowatt hour

Generation method	Emissions produced (grams CO <sub>2</sub> equivalent per kWh)	Source
PV solar farm	19-59	Wright and Hearps (2010)
Coal-fired power station	800-1000	Wright and Hearps (2010)
Combined cycle gas turbine	400	Alsema <i>et al.</i> (2006)

The operation of the proposal would help reduce GHG emissions and move towards cleaner electricity generation. Based on 105MW, the proposal would offset the equivalent of 220 kilotonnes per annum of CO<sub>2</sub> emissions and power the equivalent of 44,000 NSW homes.

## **7.7.2 Potential impacts**

### **Construction and decommissioning**

Dust generation would accompany excavation and other earthworks as well as the movement of trucks and work vehicles along unsealed access roads during construction and decommissioning of the proposal. Air emissions would also be produced from equipment and vehicle exhaust fumes. Dust and emissions can be a nuisance, interfere with visibility when driving, or lead to adverse health impacts where severe or prolonged.

Earthworks associated with construction would be relatively minor and mostly involve trenching for cables and the construction of access track. Poles for the module frames would be pile driven. The impact area for the piles would be less than 0.01% of the site area.

The majority of emissions would be generated from earth-moving equipment, diesel generators, trucks, cranes and pile driving equipment. Vehicles accessing the site would include the construction labour force, and haulage traffic delivering construction components.

The closest residential dwelling is approximately 340m from the proposal site and the Mitchell Highway is adjacent to the site. In dry and windy conditions, it is likely these would be affected by dust. However, the proposed works involve minimal earth-moving, and mostly piling equipment would be used, thus reducing the amount of dust produced. Additionally, the south western area of the proposal site, closest to the dwelling, is periodically inundated with water, further reducing the production of dust. With the minor earthworks and implementation of mitigation measures, air quality issues for this dwelling would be considered manageable. Due to the distance of other residential dwellings, dust and emissions would be expected to attenuate with very limited distance from the site. Substantive air quality impacts are not anticipated for these dwellings.

Mitigation strategies include a formal community consultation and engagement system, and complaints mechanisms, whereby the sources of complaints are promptly identified and addressed, and appropriate application of a suite of dust and emission reduction measures. The construction of the proposal is not anticipated to have a significant impact on air quality. Identified impacts are highly manageable.

No air quality impacts in addition to those mentioned for construction are anticipated during the decommissioning phase. Traffic requirements would be similar in type but of shorter duration than that required for the construction phase.

Due to the existing activities surrounding the proposal site and the minimal impacts on air quality during construction and decommissions, the cumulative impact is expected to be not significant. Cumulative impacts are discussed further in Section 7.11.

No climatic impacts are anticipated as a consequence of the construction and decommissioning activities for the solar farm. Haulage traffic and plant and equipment would generate emissions, however, the short duration of the work and the scale of the solar farm proposed suggests this contribution would be negligible in a local or regional context.

### **Operation**

The generation of solar energy during the operation of the proposal would generate negligible air quality impacts and emissions.

Maintenance activities during operation would result in some minor, localised vehicle emissions and potentially some generation of dust from vehicles travelling on the unsealed access roads. A groundcover

management plant would be implemented to reduce dust production from disturbed areas (Section 7.1) and planting of the site would provide screening to the Mitchell Highway and residences (Section 6.5). The impacts on local and regional air quality are expected to be negligible during normal operation; during normal operation, it is likely that no vehicles would be present at the site on a permanent basis, with only occasional visits by standard vehicles. During major maintenance operations, this number could increase to 20-30 vehicles at any one time for a limited period.

Limited amounts of fuels would be required for maintenance vehicles during operation of the solar farm and for temporary power generation in the event of an unplanned outage. During operation, the proposal would have a positive impact on global climate change by assisting to reduce Australia’s reliance on fossil fuels for electricity generation (discussed in Section 7.5).

Due to the existing activities surrounding the site and the minimal impacts on air quality during operation, the cumulative impact is expected to be not significant. Cumulative impacts are discussed further in Section 7.5.

### 7.7.3 Safeguards and mitigation measure

Air quality impacts would be addressed via the mitigation strategies in Table 7-16.

Table 7-16 Safeguards and mitigation measures for climate and air quality impacts

*C: Construction; O: Operation; D: Decommissioning*

Safeguards and mitigation measures	C	O	D
<ul style="list-style-type: none"> <li>Development of a complaints procedure to promptly identify and respond to issues generating complaints.</li> </ul>	C	O	D
<ul style="list-style-type: none"> <li>Protocols to guide vehicle and construction equipment use, to minimise emissions would be included in construction and operational environmental management plans. This would include but not limited to Australian standards and the POEO Act.</li> </ul>	C	O	D
<ul style="list-style-type: none"> <li>Protocols would be included in construction and decommissioning to minimise and treat dust (water carts or similar in response to visual cues). This may involve installation of barriers such as shade cloth, to protect receivers.</li> </ul>	C		D

## 7.8 HISTORIC HERITAGE

### 7.8.1 Approach

A desktop study was undertaken to identify any historic heritage (Non-indigenous) items or places in proximity to the study area, with a focus on the proposal site and surrounding landscape. Heritage databases searched as part of this assessment are:

- The NSW State Heritage Inventory (SHI), this includes items on the State Heritage Register and items listed by state agencies and local Government, to identify any items currently listed within or adjacent to the proposal site.



- The Australian Heritage Database, this includes items on the National and Commonwealth Heritage Lists, to identify any items that are currently listed within or adjacent to the proposal site.
- Heritage schedule of Warren LEP 2012, for locally listed heritage items, that are within or adjacent to the proposal site.

### 7.8.2 Results

The results of the heritage searches listed above indicate that no known historic items or places occur on the site. A summary of the results of the heritage searches are illustrated in Table 7-17. Details of listed items are provided below.

Table 7-17 Summary of heritage listed items in the Warren LGA

Name of register	Number of listings
World Heritage List	0
National Heritage List	0
NSW State Heritage Register	0
NSW State Agency Heritage Register (section 170)	15
Warren Local Environmental Plan (LEP) 2012	0

#### Australian Heritage Database

The Australian Heritage Database search was undertaken on the 12 October 2016. Three historic sites within the Warren LGA listed under Register of the National Estate were found. These items are not statutory and therefore not listed within the table above. None of these items would be impacted by the proposal.

#### NSW State Heritage Inventory

The SHI database search was undertaken on the 12 October 2016. No known items listed under the World Heritage List and NSW State Heritage Register were identified for the Warren LGA. There were 15 items listed under the NSW State Agency Heritage Register (Section 170) for the Warren LGA. None of these items were identified onsite, with the closest item being over 16km north of the proposal site (Belaringar Creek Regulator).

#### Warren Local Environmental Plan 2012

The Warren LEP database search was conducted on the 1 November 2016. No local heritage items have been recorded within the LGA.

#### Unlisted heritage items

Although no listed items were identified within the site, it is acknowledged that there may be unlisted items of historic significance on the subject site. No additional potential heritage items were identified within the proposal site during the site inspection.

### 7.8.3 Potential impacts

Several heritage items were identified during the desktop study as outlined above. None of these items are in proximity to the proposal site.

The proposal is not considered likely to have a significant impact in accordance with the NSW *Heritage Act 1977*, the EP&A Act, or the EPBC Act, in terms of heritage.

There are no anticipated impacts on any of the above identified heritage items during construction, operation or decommissioning, due to the location of the proposed solar farm.

### 7.8.4 Safeguards and mitigation measures

A protocol for unexpected finds would be developed for the proposal, as detailed below.

Table 7-18 Safeguards and mitigation measures for Non-Aboriginal Heritage

*C: Construction; O: Operation; D: Decommissioning*

Safeguards and mitigation measures	C	O	D
<ul style="list-style-type: none"> <li>Should an item of historic heritage be identified, the Heritage Division (OEH) would be contacted prior to further work being carried out in the vicinity.</li> </ul>	C	O	D

## 7.9 BUSH FIRE RISK

Bush fire presents a threat to human life and assets and can deliver adverse ecological impacts. Bush fire risk can be considered in terms of environmental factors that increase the risk of fire (fuel quantity and type, topography and weather patterns), as well as specific activities (such as hot works) or infrastructure components that exacerbate combustion or ignition risks (such as transmission lines and other electrical components).

### 7.9.1 Existing environment

The study area is flat and a majority of the area has been cleared of overstorey vegetation. Localised native vegetation remnants occur in the locality, specifically linear roadside vegetation and along waterways. Patches of open woodland also occur within paddocks. The study area is dominated by cropping land.

The proposal site is currently used for cropping and therefore understorey fuel loads vary from season to season. In terms of existing bush fire hazards onsite, there are vegetation corridors along the western and north eastern boundaries of the property. There are two existing powerlines (66 and 132kV) intersecting the site, one running north west from the eastern boundary and the other running south west from the eastern boundary. The existing Nevertire substation is located approximately 1.5km east of the site and is surrounded by some vegetation screening.

The Warren Shire Council's Bush Fire Prone Land mapping, (Figure 7-14) identifies that the vegetation with the proposal site bushfire prone land.

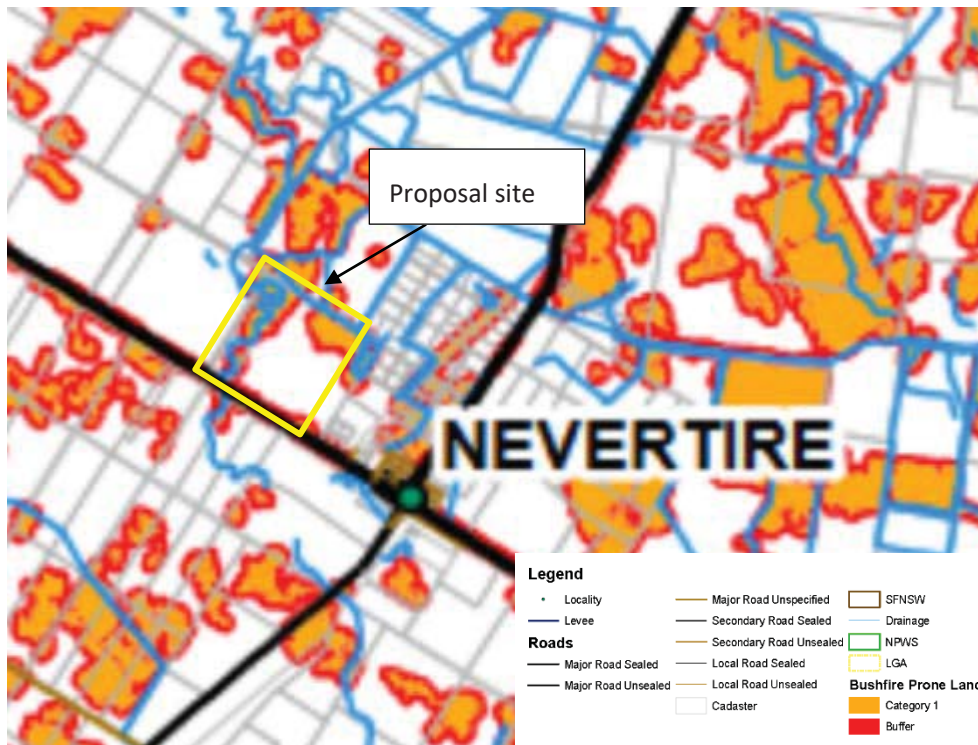


Figure 7-14 Warren Bush Fire Prone Land, (Warren Shire Council 2006).

The local bush fire danger period occurs from October to March. The North West Bush Fire Management Plan states that typical climatic conditions for the Warren Shire is hot summers and cold winters with predominantly summer rainfall (NWBFMC 2010). The catalyst for weather conditions favourable for bush fires in the area are north-westerly winds accompanied by high daytime temperatures and low relative humidity (NWBFMC 2010). The harvest period of November to mid-December is considered a prime risk period due to machinery in crops and generally high activity in the rural sector.

One dam occurs onsite but would potentially be removed during construction. Boggy Cowal is located along the western boundary and inundates the south western area of the site with water. The proposal site has existing access tracks underneath powerlines and along the site perimeter. The site has good access from the Mitchell Highway.

In terms of receivers and assets at risk from bush fire, 48 residences are located within 1km of the site. Additionally, farm sheds, watering points, silos, council infrastructure and equipment are common in the local area. As stated above, November to mid-December represents a period of high activity when many people may be active in harvest and other farm activities onsite and in the local area.

## 7.9.2 Potential impacts

### Construction and decommissioning

Activities associated with proposal construction that may cause or increase the risk of bush fire include:

- Smoking and careless disposal of cigarettes on site.
- Site maintenance activities such as mowing, slashing and using other petrol powered tools.
- Hot works including welding and soldering activities.
- Operating a petrol, LPG or diesel powered motor vehicle over land containing combustible material.

- Operating plant fitted with power hydraulics on land containing combustible material.

Considering the sparse vegetation cover and wet nature of the western boundary due to Boggy Cowal, it is considered unlikely that proposal would pose a significant bush fire risk. Site access would be formalised at the beginning of the construction stage during civil works, which would increase the ability to access and suppress any fire onsite or on adjoining sites.

The bush fire hazard associated with the activities listed above is considered highly manageable. Risks would be minimised through the implementation of fire and bush fire mitigation measures outlined below.

Potential impacts from decommissioning activities would be similar to those for construction. As for construction and operation activities (below), any bush fire risk associated with decommissioning of the proposal would be highly manageable.

### Operation

Repairs and maintenance activities during proposal operation could increase bush fire risk. All electrical components would be designed to minimise potential for ignition. A minimum 10m setback from native vegetation remnants to the array would be incorporated into the final design. Ground cover beneath panels would be maintained and not allowed to build up to high fuel levels (access and solar input requirements are in line with this activity).

A significant portion of the transmission line is underground. The overhead transmission line portions would be managed by maintaining vegetation clearances reducing the potential ignition risks.

Bush fire risks during operation of the solar farm and connection infrastructure is considered highly manageable.

### 7.9.3 Safeguards and mitigation measures

Fire risks would be addressed as part of the proposal through the development and implementation of a Bush Fire Management Plan, covering construction and operational phases, as detailed in Table 7-19.

*C: Construction; O: Operation; D: Decommissioning*

Table 7-19 Safeguards and mitigation measures for bush fire risk.

Safeguards and mitigation measures	C	O	D
<ul style="list-style-type: none"> <li>• A minimum 10m setback from native vegetation remnants would be incorporated into the final design.</li> </ul>	Design		
<ul style="list-style-type: none"> <li>• Develop a Bush Fire Management Plan to include but not be limited to:                             <ul style="list-style-type: none"> <li>○ Management of activities with a risk of fire ignition.</li> <li>○ Management of fuel loads onsite.</li> <li>○ Storage and maintenance of firefighting equipment, including siting and provision of adequate water supplies for bush fire suppression. This includes access to the onsite dam if required for fire emergency situations.</li> <li>○ The below requirements of <i>Planning for Bush Fire Protection 2006</i> -                                     <ul style="list-style-type: none"> <li>▪ Identifying asset protection zones</li> <li>▪ Providing adequate egress/access to the site</li> </ul> </li> </ul> </li> </ul>	C	O	D

Safeguards and mitigation measures	C	O	D
<ul style="list-style-type: none"> <li>▪ Emergency evacuation measures</li> <li>○ Operational procedures relating to mitigation and suppression of bush fire relevant to the solar farm.</li> </ul>			

## 7.10 COMMUNITY AND SOCIO-ECONOMIC

Large and new types of developments can produce social and economic impacts on local communities. These can be positive, such as the provision of employment and increased retail trade. They can also produce unintended or adverse impacts, such as creating strains on existing infrastructure (such as public transport or accommodation facilities during construction), including social infrastructure (volunteer services, social ties and networks). This section investigates the socio-economic profile of the region to understand the impact of the proposal on socio-economics and the community.

### 7.10.1 Background

#### Socio-economic profile

The Warren LGA has a population of approximately 2,901 people in 2015 (REMPPLAN 2016a). The population in the area has increased from 2,758 in 2011 (143 people only in 4 years); the median age is 42 (REMPPLAN 2016a). The 2011 census records indicate that 13.3% of the population is of Aboriginal and Torres Strait Islander origin and 9.4% of the population was born overseas. The median working age for full time employment is 46 compared with the Australian average of 40 (ABS 2011b). The median weekly personal income for people aged 15 years and over in the Warren LGA was \$498 in 2011 which is comparative to the Australian average in 2011 of \$577 (ABS 2011b). The estimated working population (15-64) is 47.6% of the LGA (ABS 2011b).

The main local industries for employment within the Warren LGA is agriculture, forestry and fishing, providing approximately 43.73% of employment (REMPPLAN 2016b). The economy is reliant predominantly on sheep and cattle grazing, as well as wheat, oat and cotton growing (Warren Council 2016). This reliance on the agricultural industry creates a significant economic benefit and flow on effects to other industries (Warren Council 2016). Public Administration and Safety was the second largest industry (8%) after agriculture, forestry and fishing. This was followed by retail trade (7.82%), health care and social assistance (7.43%), and education and training (7.14%) (REMPPLAN 2016b). The unemployment rate for Warren LGA in 2011 was 5.6%; which was the same as the Australian unemployment rate (ABS 2011b).

The ABS socio-economic indexes for Areas (SEIFA) is a summary of social and economic data that provides a measure of relative disadvantage in relation to social conditions of people and households within an area. The SEIFA score ranges from 121 (most disadvantaged) to 1193 (least disadvantaged). The SEIFA score for the Warren LGA in 2011 was 941, which ranks it 137 out of 564 SEIFA scores in Australia (REMPPLAN 2016a). These indices of wellbeing indicate that the Warren LGA has a relatively high standard of living without many social or economic disadvantages.

Some of the main socio-economic features of the Warren shire include:

- Education facilities including one high school, two primary schools, seven pre-schools and playgroups and TAFE Western Warren College (Warren Shire Council n.d.).

- Health facilities – Warren Multi-Purpose Health Service and Hospital, family health centre, dentist, baby health nurse, palliative care support group, aged care facility, home care service and meals on wheels service (Warren Shire Council n.d).
- Services – two banks, Australia Post, Roads and Maritime Services, Local Warren Newspaper, tradespeople, accountants, secretarial services, employment services and solicitor (Warren Shire Council n.d).
- Tourism attractions include environmental attractions, gold, wine tasting, fishing, country pubs, heritage walking tours and walking and cycleway (Warren Shire Council 2016).
- Events - Golden Ibis Shoot, Warren Community Triathlon, Sheep Breeders Race Meeting, Warren Show, Polocrosse Carnival, Campdraft Weekend, Nevertire Family Muster, Cotton Cup Race meeting, Macquarie River Fishing Classic and Twilight Race Meeting (Warren Shire Council n.d).
- Environmental attractions such as the Macquarie Marshes (Ramsar listed wetlands), Macquarie River and Tiger Bay Wetlands (Warren Shire Council 2016).
- Transport – rail and coach services between Dubbo.
- Recreational and sporting facilities including an indoor sporting and cultural centre complex, 18-hole golf course, bowling club, tennis courts, Olympic swimming pool, pony club, gun club, polocrosse club and racecourse complex (Warren shire council 2016).
- Community facilities including library, showground and racecourse complex, parks and halls (Warren Shire Council n.d).
- Clubs – 24 sport and recreational clubs, 4 art and cultural clubs and 14 community clubs (Warren Shire Council n.d).
- Churches – Anglican, Catholic, Community and Presbyterian (Warren Shire Council n.d).

## NEVERTIRE

Nevertire is a small village located 26.2km south-west of Warren on the junction of the Mitchell Highway and Oxley Highway. Surrounding towns along the Mitchell Highway include Trangie (33km), Narromine (68km), Dubbo (90km) and Nyngan (56km). The visual character of the village is dominated by tree-lined streets and residences with surrounding cropped paddocks and silos in the mid-distance.

The population recorded in the 2011 Australian census was approximately 225 people; this is approximately 7.75% of the population of the Warren LGA (ABS 2011a). Nevertire SEIFA score was 1,049 in 2011, indicating that it has a relatively high standard of living without many social or economic disadvantages (REPLAN 2016a).

The Nevertire population has declined by 104 people (-31%) since the 2006 Census (ABS 2006). The Nevertire labour force in 2011 consisted of 63.5% full time employment, 21.9% part-time employment and unemployment was currently 2.9%. The leading employment for the village was agriculture, forestry and fishing industries (50.38%) (REMPPLAN 2016b). The median weekly income for people aged 15 and over was \$622, this was \$45 above the Australian average. Regarding the education of Nevertire, 9.5% of the population had a bachelor degree or higher (ABS 2011a).

Services in the village include a café, pub that provides accommodation, mechanic, and a rural supplies store. The village also includes a GrainCorp station, a Rural Fire Service station, substation and a railway. The Nevertire Public School closed in 2002 due to the number of student enrolments; students now generally travel to Warren for education purposes.

The village features a recreational community park. The Nevertire Family Muster is an annual event held the first Saturday of the September school holidays. Community activities include a highly competitive lawnmower race (NSW Government 2016).

Table 7-20 Community profile snapshot (REMPPLAN 2016a)

	Population	Youth (0-15)	Seniors (65+)	Labour force	Home ownership (owned)	Dwellings (separate house)
NSW		<b>20.5%</b>	<b>14.7%</b>		<b>63.4%</b>	<b>68.6%</b>
<b>Warren LGA</b>	2,758	21.8%	17.1%	47.2%	60.1%	90%
<b>Warren</b>	1,600	22.3%	17.8%	46.7%	61.7%	88.6%
<b>Nevertire</b>	225	23.6%	16.9%	59.3%	67.4%	100

### Attitudes to renewable energy proposals

A high percentage (77%) of Australians believe that large scale solar farms could supply a significant source of Australia’s energy requirements (IPSOS 2015). Attitudes in Australia are greatly divided about the visual impacts of large scale solar farms; 30% agree and 26% disagree that large-scale wind farms have a negative visual impact (IPSOS 2015). Approaches to improving community understanding of the visual impacts of large scale installations include:

- Provision of images (from many angles) of large scale solar facilities, particularly in the early stages of a proposal (IPSOS 2015).
- Understanding the similarities between highly supported domestic scale installations and large scale facilities (IPSOS 2015).
- Understanding the current function of the land proposed to hold the facility and the additional value the installation allows for (IPSOS 2015).
- Understanding of what steps are needed to prepare the proposed land for the installation and how the condition of the land after decommissioning (IPSOS 2015).

This EIS and the CCP addresses these issues.

Employment in the sector is considered a positive driver; the Australian Bureau of statistics estimated that 14,020 people were employed in the renewable sector in the 2014-15 financial year (Clean Energy Council 2015).

Attitudes towards renewable energy proposals can vary significantly from community to community. Often this is due to lack of information on the ability and efficacy on the renewable energy sector (IPSOS 2015). Key lessons learned from other solar farm proposals in regards to community and stakeholder engagement was that transparency is essential. Listening to the issues that are important to the community is essential over what issues outsiders (developer) may think are important and fit-for-purpose consultation needs to be a priority (FRV n.d.). Fit-for-purpose consultation can become a problem in the community consultation phase due to inconsistencies and confusion within the community (FRV n.d.). Various proposal stages would cause much activity, whilst other stages no consultation activity; this leads to confusion and misconceptions about the proposal, and interest and attitudes were adversely affected (FRV n.d.).

The International Energy Agency (IEA) reported that the renewable energy sector is now the largest source of installed power capacity in the world, surpassing coal (OECD/IEA 2016). Large scale solar energy

proposals within Australia have been steadily increasing over the last decade (IPSOS 2015). In 2012-13 it was estimated that only 13% of all electricity generated within Australia came from renewable energy sources (IPSOS 2015); in 2015 this had increased to 14.6% (Clean Energy Council 2015). In 2015, eight solar farms were completed in Australia (Clean Energy Council 2015). This included Nyngan (102 MW) and Broken Hill (53 MW) solar farms; two of the three largest in Australia, with the Moree 56 MW solar farm completed in 2016 (Clean Energy Council 2015). In September 2016, another 12 large-scale solar farms were announced in Australia with a proposed cost of \$1,056.4 million (ARENA 2016). This is set to increase in the future as Australia averages the highest average solar radiation potential per square metre in the world (IPSOS 2015). It is expected that strong policy support; climate change mitigation, and quality of information may help change attitudes towards renewables in the future (OECD/IEA 2016).

### **Community feedback on this proposal**

Jessica Picton (Epuron) and Jenny Walsh (NGH Environmental) met with the nearest neighbours to the site on 18 October 2016. Information about the proposed solar farm was provided at the meetings and the neighbours were invited to raise concerns about the proposal. The following concerns were raised:

- The nearest neighbour to the south of the site was concerned about the view of the solar panels as they would be visible living and outdoor recreational area of his home. Possible vegetation screening buffers were discussed to obscure the view of the panels.

Thirteen people attended the Nevertire Solar Farm open house held in Nevertire on 18 November 2016. Twelve attendees were local, with one from Nyngan. Attendees were invited to complete feedback forms however none were completed on the day. Attendees viewed maps of the proposal layout and photographs of other solar farms and discussed the proposal with staff from Epuron and NGH Environmental.

Attendees were generally supportive of the proposal and the following issues were discussed:

- Visual impact of the proposal and screening preferences - attendees were not generally concerned about the view of the proposal from Nevertire or the Mitchell Highway. Several attendees thought that screening of the public views would be a good idea, while others thought screening was unnecessary or suggested that a more visible project could be beneficial in terms of tourist/ visitor interest.
- Driver distraction.
- Stopping areas for travellers and visitors to view the solar farm once constructed.
- Local economy benefits – most attendees were interested to know how the Nevertire economy could benefit from the proposal i.e. keep the spending local.
- Business opportunities during construction, particularly accommodation.
- Several attendees mentioned that the open house coincided with harvest and some local people may not have been able to attend due to harvest work commitments.

Three feedback forms were returned, by respondents. One was less than 1km, one less than 2km and the third was more than 5km from the proposed solar farm site. Their combined comments included:

- Primary production was the most valued characteristic of the Nevertire local area. One respondent also noted the view, community/family ties, historic values, small town and natural values. Another respondent mentions the work opportunities.
- The open landscape was identified as the most important view or landscape characteristic for the region and local area. One respondent specifically outlines the open plains, grasslands, cropping, livestock and native fauna including Kangaroos and Emus.



- All three respondents cited renewable energy generation as what they liked most about solar farms generally. Two respondents cited local economic opportunities and diversification of land use.
- Two respondents cited potential visual impacts and land use or land value impacts as a concern regarding solar farms generally.
- One respondent cited concerns about potential community, noise, traffic impacts, as well as effects on natural areas and habitats.
- One respondent had specific concerns about the location of the proposed Nevertire Solar Farm. The concerns were in relation to impacts on views and rural lifestyle and devaluing of land.

### **7.10.2 Potential impacts**

#### **Construction**

Large scale solar farms can create polarised reactions in communities; some may see it as a large change to existing land use, lifestyles and land character. This feature alone can generate concern in the community. Others may see it as a positive contribution and sign of progress and may derive some direct benefit (such as involved landowners).

The local area has several large scale industrial facilities, these are located on the eastern side of Nevertire. The solar array would be a new type of infrastructure in the area and would change the character of the site from extensive agriculture to electricity generation. The site would be visible to the public during construction, for traffic travelling along the Mitchell Highway, and users of Noel Waters Oval, east of the site. Several houses are within 1km of the site but only one would have a direct view of the site. Visual, noise and traffic impacts and mitigation have been discussed in previous sections.

The proposal would represent a direct economic benefit to some. The construction of the proposal would utilise up to 300 staff at peak construction. Many of these could be drawn from the local area. Additional workers moving to the area temporarily may stimulate local economic activity. Accommodation and retail services would be stimulated. Conversely, the temporary influx may place pressures on local services such as schools and health services. Additional demands for accommodation and additional traffic may present an adverse effect on local tourism, if coinciding with local festivals for example. Additional traffic may be noticeable. Additional hazards accompany construction traffic (refer to Section 7.3). Mitigation strategies to address these impacts centre on consultation with the community, so that benefits can be maximised and conflicts resolved where possible.

#### **Operation and decommissioning**

The development of rural land uses compatible with agricultural activities, such as solar power generation, have potential to provide increased economic security to rural economies through diversification of employment opportunities and income streams. Additionally, they provide a substitute for carbon emission producing electricity production that is stable and renewable, and consistent with State and National greenhouse emission reduction objectives.

Considering the local economy is dominated by agriculture, it is relevant to note that the soil capabilities at the site limit intensive agriculture (refer to Section 7.4 ). The installation of solar array modules, that involve little soil disturbance and provide an alternative income stream for large agricultural properties, can be seen as an important local economic benefit. Further, it is noted that proposal global warming will increase potential evaporation and water demand, potentially reducing the capacity of the arable land.

Pittock (AGO 2003) observed that a significant proportion of Australian exports are agricultural products sensitive to global warming impacts. Federal Government publications note that failure to adequately mitigate increases in emissions will lead to greater costs for adaptation to consequences of climate change.

Minimal adverse social-impacts impacts are anticipated during operation and decommissioning. During operation, maintenance staffing and activities would be at low levels. The additional accommodation and traffic impacts of a number of operational staff are not likely to be noticeable.

Decommissioning is likely to require less staff onsite than for construction. It would offer a similar economic benefit to construction in terms of opportunities for local staff and industries. It may also include local recycling of infrastructure components.

### 7.10.3 Safeguards and mitigation measures

Table 7-21 Safeguards and mitigation measures for Community and Socioeconomic impacts.

*C: Construction; O: Operation; D: Decommissioning*

Safeguards and mitigation measures	C	O	D
<ul style="list-style-type: none"> <li>• The Community Consultation Plan would be implemented to manage impacts to community stakeholders, including but not limited to:                             <ul style="list-style-type: none"> <li>○ Protocols to keep the community updated about the progress of the proposal and proposal benefits.</li> <li>○ Protocols to inform relevant stakeholders of potential impacts (haulage, noise etc.).</li> <li>○ Protocols to respond to any complaints received.</li> </ul> </li> </ul>	C		
<ul style="list-style-type: none"> <li>• Liaison with local industry representatives to maximise the use of local contractors, manufacturing facilities, materials.</li> </ul>	C		
<ul style="list-style-type: none"> <li>• Liaison with local representatives regarding accommodation options for staff, to minimise adverse impacts on local services.</li> </ul>	C		D
<ul style="list-style-type: none"> <li>• Liaison with local tourism industry representatives to manage potential timing conflicts with local events.</li> </ul>	C		D

## 7.11 CUMULATIVE IMPACTS

Adverse cumulative impacts occur when the infrastructure or activities at the proposal site exacerbate the negative impacts of other infrastructure or activities occurring nearby.

During construction, the additional traffic impact is probably the greatest potential for cumulative visual impacts. The Mitchell Highway is a high use road corridor carrying a large proportion of heavy vehicles, particularly in harvest periods. The visual impact of increased traffic movements to the site would be predominantly limited to construction (approximately 12 months). During operation, excepting unusual maintenance operations such as inverter or transformer replacement, a small maintenance team using standard vehicles are all that will be required.

The operational view of the solar farm may generate a cumulative impact with the existing substation and powerlines. While the substation is relatively well screened by tree plantings, both facilities would have security fencing and steel dominated infrastructure, and would be visible from the Oxley Highway and Nevertire. The additional placement of the transmissions lines underground along Belerenga Street would

reduce the potential cumulative impact of transmission lines within the locality. However, the additional transmission lines where above ground would exacerbate an already dominant view of powerlines in some locations. Mitigation strategies have been recommended to reduce impacts where possible.

It is possible another large scale development could be approved within view of the proposed solar farm, however none are known to be proposed at this time.

Generally, adverse cumulative visual impacts are anticipated to be manageable due to the ability to effectively screen infrastructure in this low relief landscape.

## 8 ENVIRONMENTAL MANAGEMENT

### 8.1 ENVIRONMENTAL FRAMEWORK

The environmental risks associated with the proposed Nevertire Solar Farm would be managed by implementing a proposal-specific suite of mitigation measures detailed in Sections 6 and 7 and summarised below.

All commitments and mitigation measures would be managed through the implementation of a Proposal Environmental Management Plan, consisting of a CEMP, an Operation Environmental Management Plan and a Decommissioning Environmental Management Plan. These plans would be prepared sequentially, prior to each stage of works.

These plans would detail the environmental management responsibilities of specific staff roles, reporting requirements, monitoring requirements, environmental targets and objectives, auditing and review timetables, emergency responses, induction and training, complaint response procedures and adaptive management mechanisms to encourage continuous improvement.

### 8.2 MITIGATION MEASURES

Where measures are relevant to more than one environmental aspect, they are cited only once under the most relevant aspect, to avoid duplication.

*Construction (C), Operation, (O), Decommissioning (D)*

Safeguards and Mitigation Measures	C	O	D
<ul style="list-style-type: none"> <li>All hollow bearing trees identified would be avoided by the works.</li> </ul>	C		
<ul style="list-style-type: none"> <li>If the loss of 0.84 ha of Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW cannot be avoided, the ecosystem credit requirements (calculated to generate 14 credits) would be offset according to the FBA.</li> </ul>	C		
<ul style="list-style-type: none"> <li>Appropriately timed surveys (June – August) would be implemented to determine if Sloane’s Froglet occurs within the development site.</li> <li>If identified within the development site either:               <ul style="list-style-type: none"> <li>The proposal would be modified to avoid habitat for this species</li> <li>The species credit requirements (calculated using the constructed impact area on mapped habitat) would be offset for the species according to the FBA</li> </ul> </li> <li>If not identified within the development site, the species credit requirement would be zero and no further action would be undertaken.</li> </ul>	C		
<ul style="list-style-type: none"> <li>Preparation of a Flora and Fauna Management Plan (FFMP) that would incorporate protocols for:               <ul style="list-style-type: none"> <li>Protection of native vegetation to be retained</li> <li>Best practice removal and disposal of vegetation</li> <li>Weed management</li> <li>Unexpected threatened species finds</li> </ul> </li> </ul>	C		

Safeguards and Mitigation Measures	C	O	D
<ul style="list-style-type: none"> <li>○ Rehabilitation of disturbed areas</li> </ul> <p>The FFMP would form part of the Nevertire Solar Farm Construction Environmental Management Plan (CEMP).</p>			
<ul style="list-style-type: none"> <li>● Stockpiling materials and equipment and parking vehicles will be avoided within the dripline (extent of foliage cover) of any native tree.</li> <li>● Prior to the commencement of work, a physical vegetation clearing boundary at the approved clearing limit is to be clearly demarcated and implemented. The delineation of such a boundary may include the use of temporary fencing, flagging tape, parawebbing or similar.</li> </ul>	C		D
<ul style="list-style-type: none"> <li>● Where possible, use non barbed-wire on exterior fencing to minimise bird collision risks.</li> </ul>		O	
<ul style="list-style-type: none"> <li>● Where possible, landscape plantings will be comprised of local indigenous species with the objective of increasing the diversity of the existing vegetation. Planting locations would be designed to improve the connectivity between patches in the landscape where consistent with landscaping outcomes.</li> </ul>		O	
<ul style="list-style-type: none"> <li>● If night work is unavoidable, ensure any floodlights are directed away from vegetation.</li> </ul>	C		D
<ul style="list-style-type: none"> <li>● Weed and hygiene protocols will be prepared and implemented.</li> </ul>	C		D
<ul style="list-style-type: none"> <li>● During operation direct lights away from vegetation.</li> </ul>		O	
<ul style="list-style-type: none"> <li>● Weed and planting protocols will be prepared and implemented</li> </ul>		O	
<ul style="list-style-type: none"> <li>● Feral species to be monitored and a management plan to be prepared and implemented to reduce feral species abundance</li> <li>● Implement offset management plan which ensures that fauna movement still possible around perimeter of development site</li> </ul>		O	
<ul style="list-style-type: none"> <li>● The sites Nevertire Isolated Find 1, Nevertire Isolated Find 2 and Nevertire Isolated Find 3 are salvaged by an archaeologist and/or the Warren LALC prior to the proposed work commencing. The final storage place for the artefacts should be negotiated with the registered Aboriginal party.</li> </ul>	C		
<ul style="list-style-type: none"> <li>● The development must avoid the site Nevertire Scarred Tree 1, as per the current design plans detailed in this report. A minimum 10m buffer around the tree should be in place to protect the root zone.</li> </ul>	C		
<ul style="list-style-type: none"> <li>● Epuron prepares a Cultural Heritage Management Plan (CHMP) to address the potential for finding additional Aboriginal artefacts during the construction of the Solar Farm. The CHMP will outline an unexpected finds protocol to deal with construction activity. Preparation of the CHMP should be undertaken in consultation with the registered Aboriginal party.</li> </ul>	C		
<ul style="list-style-type: none"> <li>● In the unlikely event that human remains are discovered during the construction, all work must cease in the immediate vicinity. OEH, the local police and the registered Aboriginal parties should be notified. Further assessment would be undertaken to determine if the remains were Aboriginal or non-Aboriginal.</li> </ul>	C		

Safeguards and Mitigation Measures	C	O	D
<ul style="list-style-type: none"> <li>Further archaeological assessment would be required if the proposal activity extends beyond the area of the current investigation. This would include consultation with the registered Aboriginal party and may include further field survey.</li> </ul>	C	O	D
<ul style="list-style-type: none"> <li>Implement noise control measures such as those suggested in Australian Standard 2436-2010 “Guide to Noise Control on Construction, Demolition and Maintenance Sites”, to reduce predicted construction noise levels.</li> </ul>	C		
<ul style="list-style-type: none"> <li>Additionally, during construction:               <ul style="list-style-type: none"> <li>Use less noisy plant and equipment where feasible and reasonable</li> <li>Plant and equipment to be properly maintained.</li> <li>Provide special attention to the use and maintenance of ‘noise control’ or ‘silencing’ kits fitted to machines to ensure they perform as intended.</li> <li>Strategically position plant on site to reduce the emission of noise to the surrounding neighbourhood and to site personnel.</li> <li>Avoid any unnecessary noise when carrying out manual operations and when operating plant.</li> <li>Any equipment not in use for extended periods during construction work should be switched off.</li> <li>Establish good relations with people living in the vicinity of the site at the beginning of proposal and maintain. Keep people informed, take complaints seriously, deal with complaints expeditiously. The community liaison member of staff should be adequately experienced.</li> </ul> </li> </ul>	C		
<ul style="list-style-type: none"> <li>The materials and colour of onsite infrastructure will, where practical, be non-reflective and in keeping with the materials and colouring of existing infrastructure or of a colour that will blend with the landscape. Where practical:               <ul style="list-style-type: none"> <li>Buildings will non-reflective and in eucalypt green, beige or muted brown.</li> <li>Pole mounts will be non-reflective.</li> </ul> </li> <li>Security fencing posts and wire would be non-reflective; green or black rather than grey would reduce the industrial character of the fence.</li> </ul>		Design stage	
<ul style="list-style-type: none"> <li>A Visual Impact Management Plan would be prepared to address the ‘as built’ visual impacts of the proposed solar farm. The plan would include:               <ul style="list-style-type: none"> <li>Onsite vegetation screening for viewpoints 13, 30 and 39. This would be aimed at ‘breaking up’ not blocking views of onsite infrastructure, although sections of denser plantings may be considered for the residence to the immediate south of the site (Receiver 42), in consultation with this landowner (draft plan provided as Figure 6-13 to show location of screening. Additional guidance on screening is provided in the VIA, Appendix G).</li> </ul> </li> </ul>	C	O	

Safeguards and Mitigation Measures	C	O	D
<ul style="list-style-type: none"> <li>○ Verification of predicted and actual impacts. A post construction audit would be undertaken to assess the effectiveness of the screening layout with reference to the final constructed infrastructure and augment the former if required.</li> <li>● The final screening plan would be developed in consultation with the affected landowners (the residence 340m south-west of the site and managers of the Noel Waters Oval (where they wish to be consulted).</li> </ul>			
<ul style="list-style-type: none"> <li>● Parking areas, material stock piles and other construction activities would be located as far as practical from nearby residences or screened (by existing vegetation or constructed screens) for the period of construction.</li> </ul>	C		
<ul style="list-style-type: none"> <li>● Night lighting would be minimised to the maximum extent possible (i.e. manually operated safety lighting at main component locations). It would be directed away from the Mitchell Highway, so as not to cause light spill that may be hazardous to drivers.</li> </ul>	C	O	D
<ul style="list-style-type: none"> <li>● The array would be designed to allow sufficient space between panels to establish and maintain ground cover.</li> </ul>	Design measure		
<ul style="list-style-type: none"> <li>● A soil and water management plan, and erosion and sediment control plans, would be prepared, implemented and monitored during the proposal, in accordance with Landcom (2004), to minimise soil (and water) impacts. These plans would include provisions to:               <ul style="list-style-type: none"> <li>○ Carry out soil testing prior to any impacts, to inform any soil treatments (such as application of gypsum in compacted areas and top soil management) and provide baseline information for the decommissioning rehabilitation.</li> <li>○ Install, monitor and maintain erosion controls.</li> <li>○ Ensure that machinery leaves the site in a clean condition to avoid tracking of sediment onto public roads which may cause risks to other road users through reduced road stability.</li> <li>○ Manage topsoil: In all excavation activities, separate subsoils and topsoils and ensure that they are replaced in their natural configuration to assist revegetation. Stockpile topsoil appropriately so as to minimise weed infestation, maintain soil organic matter, maintain soil structure and microbial activity.</li> <li>○ Minimise the area of disturbance from excavation and compaction; rationalise vehicle movements and restrict the location of activities that compact and erode the soils as much as practical. Any compaction caused during construction would be treated such that revegetation would not be impaired.</li> <li>○ Ensure any discharge of water from the site is managed to ensure ANZECC (2000) water quality criteria are met.</li> </ul> </li> </ul>	C		D

Safeguards and Mitigation Measures	C	O	D
<ul style="list-style-type: none"> <li>○ Manage works in consideration of heavy rainfall events; if a heavy rainfall event is predicted, the site should be stabilised and work ceased until the wet period had passed.</li> </ul>			
<ul style="list-style-type: none"> <li>● A ground cover management plan would be developed to ensure a stable ground cover during operation of the solar farm, minimising erosion and adverse water quality impacts. The plan would be developed with reference to soil testing and with input from an Agronomist to ensure species selection and sodicity impacts are addressed. Highly managed grazing may be used to maintain the height of ground cover.</li> </ul>	C		
<ul style="list-style-type: none"> <li>● A spill response plan would be developed as part of the overall risk management plan to prevent contaminants affecting adjacent surrounding environments. The plan would:               <ul style="list-style-type: none"> <li>○ Manage the storage of any potential contaminants onsite.</li> <li>○ Mitigate the effects of soil contamination by fuels or other chemicals (including emergency response and EPA notification procedures and remediation.</li> <li>○ Ensure that machinery arrives on site in a clean, washed condition, free of fluid leaks.</li> </ul> </li> </ul>	C	O	D
<ul style="list-style-type: none"> <li>● A protocol would be developed in relation to discovering buried contaminants within the proposal site (e.g. pesticide containers). It would include stop work, remediation and disposal requirements.</li> </ul>	C		D
<ul style="list-style-type: none"> <li>● A 40 m buffer would be established around Boggy Cowal Creek to reduce potential impacts to the waterway and GDEs.</li> </ul>		Design	
<ul style="list-style-type: none"> <li>● The final design would take into account the best available flood information and may include foundations up to 500mm above ground level. Electrical components would be designed to withstand inundation. The substation and office building would be located on the higher north-east portion of the site.</li> </ul>		Design	
<ul style="list-style-type: none"> <li>● Design would take into account:               <ul style="list-style-type: none"> <li>○ Anchoring to resist short term flooding</li> <li>○ Mounts used for infrastructure to resist short term flooding</li> </ul>               Stage construction where necessary to avoid working in areas that are inundated with water.             </li> </ul>		Design	
<ul style="list-style-type: none"> <li>● All staff would be appropriately trained through toolbox talks for the minimisation and management of accidental spills.</li> </ul>	C	O	D
<ul style="list-style-type: none"> <li>● All fuels, chemicals, and liquids would be stored at least 50 m away from any waterways or drainage lines and would be stored in an impervious bunded area.</li> </ul>	C	O	D
<ul style="list-style-type: none"> <li>● Adequate incident management procedures will be incorporated into the Construction Environmental Management Plan, including requirement to notify EPA for incidents that cause material harm to the environment (refer s147-153 <i>Protection of the Environment Operations Act</i>).</li> </ul>	C	O	D
<ul style="list-style-type: none"> <li>● The refuelling of plant and maintenance would be undertaken in impervious bunded areas on hardstand areas only.</li> </ul>	C	O	D



Safeguards and Mitigation Measures	C	O	D
<ul style="list-style-type: none"> <li>• Machinery would be checked regularly to ensure there is no oil, fuel or other liquids leaking from the machinery.</li> </ul>	C		D
<ul style="list-style-type: none"> <li>• A flood risk contingency plan would be prepared prior to construction and is to be implemented during construction, operation and decommission. The plan would:               <ul style="list-style-type: none"> <li>○ Detail who would be responsible for monitoring the flood threat and how this is to be done.</li> <li>○ A process for removing any necessary equipment and materials offsite and out of flood risk areas.</li> <li>○ Consideration of site access in the event that some tracks become flooded.</li> <li>○ Establishment of an evacuation point.</li> </ul> </li> </ul>	C	O	D
<ul style="list-style-type: none"> <li>• To mitigate temporary flooding impacts on infrastructure:               <ul style="list-style-type: none"> <li>○ Design would take into account:                   <ul style="list-style-type: none"> <li>▪ Anchoring to resist short term flooding</li> <li>▪ Mounts used for infrastructure to resist to short term flooding</li> </ul> </li> <li>○ Stage construction to avoid the short term periods where parts of the site are inundated with water.</li> </ul> </li> </ul>	C		
<ul style="list-style-type: none"> <li>• The proponent would consult with the Roads and Maritime Services regarding the proposed upgrading of the site access. The upgrade would be subject to detailed design, and must be designed and constructed to the standards specified by Roads and Maritime Services.</li> </ul>		Design	
<ul style="list-style-type: none"> <li>• A Haulage Plan would be developed with input from the roads authority, including but not limited to:               <ul style="list-style-type: none"> <li>○ Assessment of road routes to minimise impacts on transport infrastructure.</li> <li>○ Scheduling of deliveries of major components to minimise safety risks (on other local traffic).</li> <li>○ Traffic controls (signage and speed restrictions etc.).</li> </ul> </li> </ul>	C		D
<ul style="list-style-type: none"> <li>• A Traffic Management Plan would be developed as part of the CEMP, in consultation with Warren Council and Roads and Maritime. The plan would include, but not be limited to:               <ul style="list-style-type: none"> <li>○ Assessment of road condition prior to construction on all local roads that would be utilised.</li> <li>○ A program for monitoring road condition, to repair damage exacerbated by the construction and decommissioning traffic.</li> <li>○ The designated routes of construction traffic to the site.</li> <li>○ Carpooling/shuttle bus arrangements to minimise vehicle numbers during construction.</li> <li>○ Scheduling of deliveries.</li> <li>○ Community consultation regarding traffic impacts for nearby residents.</li> <li>○ Consideration of cumulative impacts.</li> <li>○ Consideration of impacts to the railway.</li> </ul> </li> </ul>	C		D

Safeguards and Mitigation Measures	C	O	D
<ul style="list-style-type: none"> <li>○ Traffic controls (speed limits, signage, etc.).</li> <li>○ Procedure to monitor traffic impacts and adapt controls (where required) to reduce the impacts.</li> <li>○ Providing a contact phone number to enable any issues or concerns to be rapidly identified and addressed through appropriate procedures.</li> </ul>			
<ul style="list-style-type: none"> <li>● The proponent would repair any damage resulting from proposal traffic (except that resulting from normal wear and tear) as required at the proponent's cost.</li> </ul>	C	O	D
<ul style="list-style-type: none"> <li>● Consultation with local community, to minimise impact of construction of adjacent agricultural activities and access.</li> </ul>	C		
<ul style="list-style-type: none"> <li>● Consultation would be undertaken with Essential Energy regarding connection to the substation and design of electricity transmission infrastructure.</li> </ul>	C		
<ul style="list-style-type: none"> <li>● Consultation would be undertaken with John Holland Rail regarding design of transmission line over the Nevertire Warren Railway line.</li> </ul>	C		
<ul style="list-style-type: none"> <li>● A Rehabilitation Plan would be prepared to ensure the array site is returned to its pre solar farm land capability. The plan would be developed with reference to base line soil testing and with input from an Agronomist to ensure the site is left stabilised, under a cover crop or other suitable ground cover. The plan would reference: <ul style="list-style-type: none"> <li>○ Australian Soil and Land Survey Handbook (CSIRO, 2009)</li> <li>○ Guidelines for Surveying Soil and Land Resources (CSIRO, 2008)</li> <li>○ The land and soil capability assessment scheme: second approximation (OEH, 2012)</li> <li>○ Below ground infrastructure that impedes cropping (less than 500mm depth) may be removed, subject to consultation with the land owner.</li> </ul> </li> </ul>			D
<ul style="list-style-type: none"> <li>● The materials and colour of onsite infrastructure will, where practical, be non-reflective and in keeping with the materials and colouring of the landscape.</li> </ul>	C		
<ul style="list-style-type: none"> <li>● A Waste Management Plan (WMP) would be developed in consultation with Warren Shire Council (with regard to disposal options). It would include but not be limited to: <ul style="list-style-type: none"> <li>○ Identification of opportunities to avoid, reuse and recycle, in accordance with the waste hierarchy.</li> <li>○ Quantification and classification of all waste streams.</li> <li>○ Provision for recycling management onsite.</li> <li>○ Provision of toilet facilities for onsite workers and how sullage would be disposed of (i.e., pump out to local sewage treatment plant).</li> <li>○ Tracking of all waste leaving the site.</li> <li>○ Disposal of waste at facilities permitted to accept the waste. Consultation would be undertaken with local waste facility operators to ensure that loads do not exceed capacity.</li> </ul> </li> </ul>	C	O	D

Safeguards and Mitigation Measures	C	O	D
<ul style="list-style-type: none"> <li>○ Requirements for hauling waste (such as covered loads).</li> <li>○ Disposal options for excess waste (Warren Shire has limited options available for the disposal of waste and other viable options will need to be implemented).</li> <li>○ Wooden crates used on site will need to be thoughtfully disposed of offsite. The crates often cannot be chipped to be used as mulch due to chemical sprays used.</li> <li>○ Septic system is installed and operated according to the local Warren Shire Regional Council regulations.</li> </ul>			
<ul style="list-style-type: none"> <li>● All design and engineering would be undertaken by qualified and competent person/s with the support of specialists as required.</li> </ul>	C		
<ul style="list-style-type: none"> <li>● Transmission lines would be located as far as practical from residences, farm sheds, and yards to reduce the potential exposure to EMFs.</li> </ul>	C		
<ul style="list-style-type: none"> <li>● Design of electrical infrastructure would minimise EMFs.</li> </ul>	C		
<ul style="list-style-type: none"> <li>● Development of a complaints procedure to promptly identify and respond to issues generating complaints.</li> </ul>	C	O	D
<ul style="list-style-type: none"> <li>● Protocols to guide vehicle and construction equipment use, to minimise emissions would be included in construction and operational environmental management plans. This would include but not limited to Australian standards and the POEO Act.</li> </ul>	C	O	D
<ul style="list-style-type: none"> <li>● Protocols would be included in construction and decommissioning to minimise and treat dust (water carts or similar in response to visual cues). This may involve installation of barriers such as shade cloth, to protect receivers.</li> </ul>	C		D
<ul style="list-style-type: none"> <li>● Should an item of historic heritage be identified, the Heritage Division (OEH) would be contacted prior to further work being carried out in the vicinity.</li> </ul>	C	O	D
<ul style="list-style-type: none"> <li>● A minimum 10m setback from native vegetation remnants would be incorporated into the final design.</li> </ul>	Design		
<ul style="list-style-type: none"> <li>● Develop a Bush Fire Management Plan to include but not be limited to:               <ul style="list-style-type: none"> <li>○ Management of activities with a risk of fire ignition.</li> <li>○ Management of fuel loads onsite.</li> <li>○ Storage and maintenance of firefighting equipment, including siting and provision of adequate water supplies for bush fire suppression. This includes access to the onsite dam if required for fire emergency situations.</li> <li>○ The below requirements of <i>Planning for Bush Fire Protection 2006</i> -                   <ul style="list-style-type: none"> <li>▪ Identifying asset protection zones</li> <li>▪ Providing adequate egress/access to the site</li> <li>▪ Emergency evacuation measures</li> </ul> </li> <li>○ Operational procedures relating to mitigation and suppression of bush fire relevant to the solar farm.</li> </ul> </li> </ul>	C	O	D

Safeguards and Mitigation Measures	C	O	D
<ul style="list-style-type: none"> <li>• The Community Consultation Plan would be implemented to manage impacts to community stakeholders, including but not limited to:               <ul style="list-style-type: none"> <li>○ Protocols to keep the community updated about the progress of the proposal and proposal benefits.</li> <li>○ Protocols to inform relevant stakeholders of potential impacts (haulage, noise etc.).</li> <li>○ Protocols to respond to any complaints received.</li> </ul> </li> </ul>	C		
<ul style="list-style-type: none"> <li>• Liaison with local industry representatives to maximise the use of local contractors, manufacturing facilities, materials.</li> </ul>	C		
<ul style="list-style-type: none"> <li>• Liaison with local representatives regarding accommodation options for staff, to minimise adverse impacts on local services.</li> </ul>	C		D
<ul style="list-style-type: none"> <li>• Liaison with local tourism industry representatives to manage potential timing conflicts with local events.</li> </ul>	C		D

## 9 CONCLUSION

The proposed Nevertire Solar Farm would be located approximately 1km west of Nevertire. The site is accessed directly off the Mitchell Highway. The proposal would connect to the existing Nevertire substation located approximately 1.5km east of the site.

The proposed solar farm would produce up to 105MW of electricity that will be fed into the National Electricity Market. Development of the solar farm would make use of existing electricity infrastructure and contribute to Australia's transition to a low emission energy generation economy. The proposal is considered compatible with existing land uses and highly reversible upon decommissioning, returning the site to its previous land capability in consultation with the landowner.

The proposed Nevertire Solar Farm will result in a number of benefits such as:

- Generation of approximately 263,000 MWh per annum of renewable electricity which is enough to supply electricity for 44,000 average NSW households<sup>16</sup>.
- Displacement of approximately 221,000 tonnes of CO<sub>2</sub> equivalent greenhouse gas emissions per year<sup>17</sup>.
- Diversification of fuel sources for electricity generation on the NEM therefore increasing energy security.
- Creation of local job opportunities.
- Injection of expenditure in the local area.
- Exploitation of a new land use thereby diversifying the regional economy.

In summary, there is a clear need for the project to meet Australia's greenhouse gas reduction, renewable energy and electricity needs. It will additionally bring local benefits such as job opportunities and local expenditure.

The key environmental risks have been investigated through specialist investigations, and include:

- Aboriginal heritage impacts - The survey recorded three stone artefacts and one scarred tree across the proposal site. No additional archaeological investigations are considered to be required. The three isolated finds would be salvaged prior to development of the project by an archaeologist and/or the Warren LALC. The scarred tree would not be impacted by the solar farm proposal as its outside the development envelope.
- Biodiversity impacts – impacts from the removal of *Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW* and any confirmed Sloane's Froglet habitat would require offsetting in accordance with the NSW Biodiversity Banking and Offsets Scheme unless the final design avoid these areas.
- Visual impact – A medium impact was determined for three representative viewpoints. Onsite vegetation screening is proposed to break up views of the proposed infrastructure from these locations. This would reduce the impact to a low and acceptable level. Generally, the low height infrastructure and onsite screening will minimise the view shed, and therefore visual impact will be low.
- Noise impacts – Noise emissions are predicted to exceed criteria during construction for the nearest affected receivers. Mitigation measures would limit the potential noise generated

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<sup>16</sup> "Guidance on electricity consumption benchmarks on residential consumers", AER, December 2014.

<sup>17</sup> "National Greenhouse Accounts Factors", Department of Environment and Energy, August 2016.

to within acceptable levels. No exceedances of noise limits are predicted during operation or from traffic.

Issues raised via community engagement have been addressed in the EIA and proposal design. These include:

- Minimal vegetation clearing.
- Visual impact mitigation: planting of native vegetation within specific sections of the site boundaries to break up views of infrastructure.
- Implementation of Australian Standard noise controls to minimise construction noise.

While uptake levels of community engagement activities for the proposal have been low, this is an indication of a low level of concern about and community support for the proposal.

A suite of management measures has been developed to address environmental impacts and risks to these and other physical, social and environmental impact areas. Key management strategies centre on management plans and protocols to minimise impacts and manage identified risks.

The impacts and risks identified are considered manageable with the effective implementation of the measures stipulated in this EIS. Impacts are considered justifiable and acceptable.

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