ACCENT ENVIRONMENTAL

ESCO Pacific

Wyalong Solar Farm: Environmental Impact Statement

November 2018

Wyalong Solar Farm

Environmental Impact Statement

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Abbreviations

ABS	Australian Bureau of Statistics
ABRI	Australian Battery Recycling Initiative
AC	alternating current
ACHAR	Aboriginal Cultural Heritage Assessment Report
ADG	Australian Dangerous Goods
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AEP	annual exceedance probability
AER	Australian Energy Regulator
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ASL	above sea level
AWS	automatic weather station
BAL	Basic left turn treatment
BAR	Basic right turn treatment
BCA	Building Code of Australia
BDAR	Biodiversity Development Assessment Report
BC Act	*Biodiversity Conservation Act 2016*
BoM	Bureau of Meteorology
BSAL	Biophysical Strategic Agricultural Land
BSC	Bland Shire Council
CCTV	closed-circuit television
CEMP	construction environmental management plan
COP21	21st Conference of the Parties
CFCs	chlorofluorocarbons
CML	concessional mass limits
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Cwlth	Commonwealth
DA	Development Application
dB	decibel
DC	direct current
DECCW	Department of Environment, Climate change and water

DoE	Department of Environment (Cwlth)
DoEE	Department of Environment and Energy
DoP	Department of Planning (NSW) (now DPE)
DPE	Department of Planning and Environment (NSW)
DPI	Department of Primary Industries
EIA	environmental impact assessment
EEC	Endangered Ecological Community
EIS	environmental impact statement
ELF	extremely low frequency
EMF	electromagnetic fields
EPA	Environment Protection Authority
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
EP&A	*Environmental Planning and Assessment*
EP&A Act	*Environmental Planning and Assessment Act 1979*
ERP	emergency response plan
ESD	ecologically sustainable development
ESDSC	Ecologically Sustainable Development Steering Committee
FM Act	*Fisheries Management Act 1994* (NSW)
GHGs	greenhouse gases
GML	general mass limits
GWh	gigawatt hours
ha	hectares
Heritage Act	*Heritage Act 1977* (NSW)
HML	Higher Mass Limits
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ICNG	Interim Construction Noise Guideline
ISEPP	State Environmental Planning Policy (Infrastructure) 2007 (NSW)
kL	kilolitre
km	kilometre
km²	square kilometre
kV	kilovolt
LALC	Local Aboriginal Land Council
LAeq	equivalent continuous level
LEP	Local Environmental Plan
LEMC	local emergency management committee
LGA	Local Government Area

LIIEMA	Landscape Institute and Institute of Environmental Management & Assessment
LLS Act	L*ocal Land Services Amendment Act 2016*
LRET	Large-scale Renewable Energy Target
LSC	land and soil capability
m	metres
MF	modifying factor
mG	milligauss
MIA BFRMP	Murrumbidgee Irrigation Area Bush Fire Risk Management Plan
MLV BFMC	Mid Lachlan Bush Fire Management Committee
MLV BFRMP	Mid Lachlan Valley Bush Fire Risk Management Plan
MPR	Major Projects Register
MNES	Matters of National Environmental Significance (under the EPBC Act)
MW	megawatts
NHVAS	National Heavy Vehicle Accreditation Scheme
NHVR	National Heavy Vehicle Accreditation Scheme
NPI	Noise Policy for Industry
NSR	noise sensitive receptors
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NSW	New South Wales
OEH	Office of Environment and Heritage (NSW)
OEMP	operation environmental management plan
PCT	Plant Community Type
PEA	preliminary environmental assessment
PCU	power conversion unit
PHA	preliminary hazard analysis
POEO	Protection of the Environment Operations
PSNL	project specific noise levels
PV	photovoltaic
RAP	Registered Aboriginal Party
RBL	rating background noise level
RDS	Rehabilitation and decommissioning strategy
RET	Renewable Energy Target
RFS	Rural Fire Service
RMRP	Riverina Murray Regional Plan
RMS	Roads and Maritime Service
RNP	Road Noise Policy

RU1	Rural Use Zone 1
SC	synchronous condenser
SCADA	supervisory control and data acquisition
SDS	safety data sheet (for chemical use)
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SISD	Safe Intersection Sight Distance
SSD	State Significant Development
SRES	small-scale renewable energy scheme
TEC	Threatened Ecological Community (listed under the EPBC Act)
TIA	traffic impact assessment
TMP	traffic management plan
TNSP	Transmission Network Service Provider
UNFCCC	United Nations Framework Convention on Climate Change
VP	viewpoint
WARR	Waste Avoidance and Resource Recovery
WMP	waste management plan
WPMP	weed and pest management plan

Glossary

Applicant	Entity applying for development consent under the EP&A Act, in this case, ESCO Pacific (may also be termed proponent).
alternating current	Alternating current (AC) is an electric current which periodically reverses direction, in contrast to direct current (DC) which flows only in one direction.
direct current	An electric current flowing in one direction only.
development footprint	Area occupied by the development. The site occupied by the development footprint is referred to as the development site.
development site	The development site (i.e. the footprint of development) is the area within which the solar panels, substation, office and supporting facilities will be located.
electromagnetic interference	Electromagnetic interference (EMI), also called radio-frequency interference (RFI) when in the radio frequency spectrum, is a disturbance generated by an external source that affects an electrical circuit by electromagnetic induction, electrostatic coupling, or conduction.
inverters	An apparatus which converts direct current into alternating current.
lot area	The entire area (259 ha) of Lot 160, within which the development site is located.
movement (vehicle)	A vehicle movement is a single trip to or from the development site.
power conversion unit	Device used to convert power from one form to another e.g. from DC to AC or changing the voltage or frequency.
photovoltaic cell	An electronic device consisting of layers of semiconductor materials fabricated to form a junction (adjacent layers of materials with different electronic characteristics) and electrical contacts and being capable of converting incident light directly into electricity (direct current).
photovoltaic modules	An integrated assembly of interconnected photovoltaic cells designed to deliver a selected level of working voltage and current at its output terminals, packaged for protection against environmental degradation, and suited for incorporation in photovoltaic power systems.
project boundary	The boundary around Lot 160 within which the development site is located.
risk assessment	Risk assessment is the process of identifying, evaluating and controlling risks associated with hazards for the project, including identifying a clear pathway to one or more receptors, and assessing the potential impacts on the receptors as a result of the hazard.
responsible authority	The relevant consent authority or determining authority. In the case of State significant infrastructure, the Minister.
RMS	(NSW) Roads and Maritime Services, formerly Roads and Traffic Authority (RTA).
SCADA system	SCADA is an acronym for Supervisory Control and Data Acquisition. SCADA generally refers to an industrial computer system that monitors and controls a process. In the case of the transmission and distribution elements of electrical utilities, SCADA will monitor substations, transformers and other electrical assets.
substation	A set of equipment reducing the high voltage of electrical power transmission to that suitable for supply to consumers.

synchronous condenser	A technological unit containing a motor which provides reactive power and corrective power factor, by adjusting the DC field current.
transformer	Transformers are used to increase or decrease the alternating voltages in electric power applications.

Executive summary

Project overview

This Environmental Impact Statement (EIS) is submitted by ESCO Pacific (the applicant) to support a Development Application (DA) for the construction and operation of a utility-scale solar farm and storage compound at Wyalong, New South Wales (NSW), located approximately 7.5 km northeast of the West Wyalong township and 136 km north of Wagga Wagga.

The proposed Wyalong Solar Farm (the project) will generate up to 100 MW of alternating current (AC) clean and renewable electricity through the conversion of solar radiation to electricity via photovoltaic modules (solar panels). The electricity output from the project will then be supplied to the Essential Energy electricity network via high voltage cables connecting to the 132 kV transmission line which transects the development site.

The total capital investment value of the solar farm (estimated at approximately $130 million) classifies it as a State Significant Development (SSD) to be assessed by the NSW Department of Planning and Environment (DPE). As an SSD, the project requires the preparation of an EIS under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The project is a large (256 ha) infrastructure project that is expected to create up to 150 jobs during construction and up to four full-time and eight part-time positions when operational. Construction is expected to take approximately nine months and the project is expected to operate for 40 years.

The purpose of the EIS is to identify and assess potential environmental and social impacts associated with the construction, operation and decommissioning of the proposed Wyalong Solar Farm and develop effective mitigation measures.

The EIS has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) and agency comments, issued by DPE on 18 September 2018, and outcomes of community and stakeholder consultation.

Project applicant

The project applicant, ESCO Pacific, is an Australian developer of utility-scale solar farms, founded in 2015 to develop renewable energy assets under the Renewable Energy Target (RET) scheme. ESCO Pacific has a 1.2 Gigawatt pipeline of projects in NSW, Queensland and Victoria.

Environmental setting

The project is located within the Bland Local Government Area (LGA) located in the Riverina region of southwestern NSW. This rural region consists predominantly of irrigated land, with the agricultural, forestry and fishing industries being the main employers.

Land within the development site is zoned RU1 - Primary Production under the Bland Local Environmental Plan (LEP) 2011. The site extends over three lots used for agricultural purposes that are currently owned by the one landholder.

The development site is highly modified due to its history of agriculture and grazing, and is comprised largely of canola, barley, pasture grasses and some environmental weeds. Apart from scattered paddock trees, native vegetation is largely absent except along fencelines and adjacent to the southwestern corner of the development site. The wider landscape consists largely of land historically cleared for agriculture.

Biodiversity values within the site include 13 paddock trees containing hollows which are potential habitat, and two threatened species, the Grey-crowned Babbler and White-fronted Chat, that may use the remnant vegetation to facilitate movement within the landscape for feeding or juvenile dispersal.

The development site is generally flat and crossed by two ephemeral drainage lines. Three dams are located on the site but none of them support aquatic vegetation. The site is located between the Murrumbidgee River to the southwest and the Lachlan River to the northeast. The closest river is the Lachlan River, approximately 70 km from the site.

Project description

The Wyalong Solar Farm will comprise up to 350,000 solar photovoltaic (PV) modules, known more commonly as PV modules or solar panels. The panels will be mounted in rows on horizontal tracking or fixed tilt systems.

Key infrastructure items to be established for the project include:

- installation of solar panels in regular arrays
- metal mounting structures (up to 4 m in height)
- aboveground and underground DC cabling (low voltage)
- central inverters, step-up transformers, and switchgear (PCUs) located in 40 foot containers or container skid pads (up to 26 PCUs, 3 m in height)
- battery storage area
- underground AC cabling that will run from the PCUs to the solar farm substation (high voltage)
- a main step-up transformer and associated equipment
- a synchronous condenser to adjust conditions on the electrical power transmission grid
- perimeter safety fencing and a fixed, closed-circuit television (CCTV) system
- supervisory control and data acquisition (SCADA) control systems
- site office and staff amenities
- maintenance shed
- permanent staff and contractor car parking area
- permanent all-weather access and access road leading to the office and substation (shared access with Essential Energy)
- internal vehicle access tracks (4 m) leading to solar arrays and PCUs
- temporary site compound, lay-down area, and equipment storage areas during construction.

Each solar panel will be fixed to a metal mounting structure that will be piled or screwed into the ground without the need for any excavation work or use of concrete. This technique is used to minimise ground disturbance.

The project will also include the potential for battery storage to be installed on site. The batteries would be made of lithium-ion and housed in containerised packs, and would provide a total capacity of 25 MW and 50 MWh.

Alternatives considered

ESCO Pacific has undertaken a constraints and opportunities analysis to identify potential project sites in NSW and other states. Wyalong was chosen as the location of the solar farm due to the high solar irradiance in the region and the capacity of the Essential Energy electricity network to transmit the power generated by the farm.

In selecting the development site from a range of options within the Wyalong area, ESCO Pacific has followed a process of avoiding, minimising and offsetting impacts to environmental and social values. Once the current site was chosen, this same process was followed to optimise project design, configuration and footprint. The result has been the selection of a site that can be developed with minimal adverse effects on the environment or local landholders.

Project benefits

The Wyalong Solar Farm will contribute to Australia's greenhouse gas (GHG) commitments by reducing emissions associated with energy use and contributing to the achievement of the Renewable Energy Target (RET). The project will also be part of the transition away from fossil fuel reliance to cleaner electricity generation, and the transition to increased energy security through a more diverse energy mix.

At a regional level, the project represents investment in an important rural area of the State and will contribute to a more diversified and sustainable income base. At a local level, project benefits will include employment and training opportunities and local economic stimulation.

Project permissibility

The proposed project has been assessed as a permissible development for which consent can be granted as an SSD under the Section 89E of the EP&A Act. The project, as proposed in this EIS, is also compatible with surrounding land use, and is also consistent with the requirements of the Bland LEP and relevant SEPPs.

A reconfiguration of the existing three lots will be required that conflicts with the requirements of the LEP. However, the Bland Shire Council has expressed general support for the project and has provided in-principle support for the reconfiguration to proceed.

Community and stakeholder engagement

ESCO Pacific has prepared a Stakeholder and Community Consultation Plan to guide communication activities relating to the project and assist in the preparation of the EIS. Consultation has been undertaken with numerous government agencies and council to clarify requirements, discuss methodologies, and seek feedback. Agencies, council and the community appear to be supportive of the project.

ESCO Pacific has also been actively engaging with the local Aboriginal community in the region and the Local Aboriginal Land Councils (LALCs).

Risk assessment and screening

A qualitative environmental risk assessment of the project has been undertaken as part of this EIS. The assessment concluded that the level of risk associated with the construction, operation and decommissioning of the project, taking into account the implementation of the proposed risk controls, mitigation strategies and management plans, is acceptably low.

Impact assessment

Biodiversity

A biodiversity assessment was undertaken by Ecolink and EnviroKey to identify ecological constraints for the project and prepare a Biodiversity Development Assessment Report (BDAR).

The vegetation within the site is identified as Plant Community Type (PCT) 76, belonging to the endangered Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt Bioregions community. However, the vegetation does not qualify as the nationally-significant Grey Box Grassy Woodlands and Derived Native Grasslands of South-eastern Australia community.

Up to 0.16 ha of PCT 76 will require removal from within the development site due to the construction of site access. The vegetation to be cleared comprises up to 45 paddock trees, including up to 13 hollow-bearing trees. Thirty-eight ecosystem credit class offsets and nine species class offsets are required for this vegetation.

Two threatened species, the Grey-crowned Babbler and White-fronted Chat, were identified during the site assessments. Other species assumed to occur on site under the Biodiversity Assessment Methodology (BAM) include the Glossy Black Cockatoo, Swift Parrot (also EPBC-listed), Masked Owl and Sloane's Toadlet.

The site assessments identified that the proposed development is unlikely to significantly impact on any Matters of National Environmental Significance (MNES).

The avoidance of habitat during project siting, in combination with appropriate environmental safeguards during construction of the project is expected to ensure the development meets the requirements to avoid and minimise impacts on biodiversity values.

Aboriginal cultural heritage

An Aboriginal Cultural Heritage Assessment Report (ACHAR) by OzArk has been prepared to identify Aboriginal cultural heritage values within the development site and surrounding area.

Three Registered Aboriginal Parties (RAPs) (one individual and two LALCs) were identified from the Wiradjuri people as part of the consultation process required under Part 6 of the *National Parks and Wildlife Act 1974*. Representatives of the RAPs accompanied the survey team during the archaeological survey of the development site.

The archaeological survey identified a total of 12 Aboriginal cultural heritage sites within the development site, comprising two artefact scatters and ten isolated finds. All recorded sites were assessed as having low historical value. Of the 12 identified sites, one artefact scatter and one isolated find will be avoided by the project. The remaining sites will either be avoided (where practical) or will be salvaged and reburied in consultation with the RAPs.

As the heritage impact value of the loss of Aboriginal cultural heritage is considered to be low, the loss would have a negligible cumulative impact on the region's Aboriginal cultural heritage resource.

Historic heritage

An historical heritage assessment was undertaken by OzArk to identify historical heritage values of the land within the development site. No known places of historical heritage value or significance were identified within or intersecting the development site.

Hydrology and water resources

An assessment was undertaken of potential project impacts on hydrology and water resources. The assessment included an investigation of flood risk, undertaken by Alluvium Consulting Australia, which involved the development of a 2D flood model and the use of the Direct Rainfall Approach for flood simulation.

The flood risk assessment concluded that the risk of the development resulting in adverse social and economic consequences during flooding events is negligible. Based on a literature review, the assessment also concluded that additional runoff as a result of the project is unlikely to occur provided site vegetation conditions are maintained and impervious areas are not increased substantially.

An investigation of flooding hazard showed the majority of the development site is of low risk with the exception of the drainage line in the northwest corner and the three dams. However, the dams are to be infilled which will reduce the risk of flooding.

The project is not expected to result in any significant impacts on surface water or groundwater hydrology or quality, during construction or operation, provided the management and mitigation measures proposed in the EIS are implemented. In addition, the project is not expected to impact on the availability of existing surface water or groundwater resources.

Soils and land use

Potential impacts on soils and land use were assessed, including impacts on agricultural land and compatibility with existing land uses.

Database searches were undertaken that showed: no record of existing contamination on the development site; a low probability of acid-sulphate soils being present; and no areas of Biophysical Strategic Agricultural

Land being present. The site is not located within a flood planning area as designated under the Bland LEP 2011.

Soils on the site are vertisols, which may be prone to erosion. However, adverse impacts on soil and land capability during construction and operation are expected to be readily manageable, provided that the management and mitigation measures proposed in the EIS are implemented.

A minerals exploration licence held by Argent Minerals Ltd covers approximately 64% of the development site, although the current targets of active exploration within the licence are located approximately 10 km to the south, and the overlap with the development site is only 1.5% of the total licence area. Should a potentially viable mineral resource be identified beneath the development site in the future, the consequent planning and regulatory implications would need to be considered at that time.

A number of quarries and the Cowal Gold Mine (25 km to the north) are located within the region. However, traffic to and from the development site is unlikely to impact upon their operation.

The project will alter the current land use from agriculture to electricity generation, reducing the availability of land for agriculture. However, once the project is decommissioned, the site is expected to be returned to its pre-existing agricultural state.

Traffic and transport

A traffic impact assessment was undertaken by IMPACT Traffic Engineering. The assessment identified the existing road network conditions and assessed the impacts of the project by considering the proposed vehicle access routes, site access, vehicular movements and sighting requirements.

Access to site will be from a single entry point located on the Newell Highway. Basic right-turn (BAR) and basic left-turn (BAL) treatments will be applied at the access point to ensure that inbound movements do not compromise performance and safety along the highway.

Roads along the proposed site access route were identified as being approved for General Mass Limits and Concessional Mass Limits for heavy vehicles and suitable for accommodating construction and other project-related traffic.

Peak project-related traffic volumes during construction are expected to increase Newell Highway traffic by approximately five per cent, which is expected to be absorbed with no significant detrimental impacts to operation or safety.

ESCO Pacific will undertake pre-construction condition audits of local roads along the site access route and return them to their pre-construction condition once construction is complete.

Noise

A noise assessment was undertaken by Accent Environmental (Accent) that included conservative calculations of noise levels during project construction and operation.

The nearest sensitive receivers to the development site for statutory assessment purposes are three residences located between 0.6 km and 1.0 km of the site. The noise assessment predicted that, in general, compliance with applicable guidelines will be achieved at each residence during construction and operation. However, two potential exceptions relate to the proposed use of a mulcher during construction and the potential installation of a synchronous condenser. Both are likely to require the application of additional noise management measures.

Visual amenity

A visual impact assessment for the project was prepared by Accent. The surrounding rural landscape is generally characterised by extensive agricultural land and vast flat open spaces.

The receiver with the highest visual impact rating (a moderate rating) is a residence located 1 km to the north of the solar farm. Three other receivers, including users of the Newell Highway adjacent to the

development site and two residences located on the opposite side of the Newell Highway to the site, had visual impact ratings of moderate-low.

Due to factors such as the presence of existing vegetative screening, the fleeting view of the site (in the case of highway users) and the distance between the site and the receivers, it is not considered necessary to take landscaping or visual screening measures within the development site. However, ESCO Pacific is in discussion with the resident to the north of the site concerning possible other means to mitigate the project's visual impact.

Other potential visual aspects of the project, such as glare and reflectivity, are not expected to pose significant issues.

Air quality

The project has the potential to create air quality impacts through dust from soil disturbance and emissions from vehicles and machinery. However, these impacts will be temporary and primarily restricted to the construction phase. Impacts are expected to be readily manageable through the application of standard management practices during construction.

Bushfire and electrical fire

Bushfires and electrical fires can present a significant risk to life, human health, biodiversity, and infrastructure. The site is not located on land mapped as Bushfire Prone Land, and the surrounding area has been largely cleared of vegetation. ESCO Pacific has committed to preparing a Bush Fire Management Plan and an Emergency Response Plan to manage fire risk in accordance with the requirements of the Rural Fire Services and Fire and Rescue NSW.

Electromagnetic interference

The risk posed by project-generated electromagnetic fields (EMFs) has been considered with reference to International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines. Exposure of both staff, nearby residents and the general public to EMFs as a result of the project is expected to be well below ICNIRP reference levels and therefore unlikely to present a health risk.

Socio-economic

Socio-economic impacts on local communities, both positive and negative, have the potential to occur as a result of large-scale developments such as the proposed project. As described above, the project is expected to have minimal adverse impacts on the local community, whilst resulting in significant benefits locally and regionally in terms of jobs and skills, economic stimulus and attainment of GHG and energy diversity/security targets.

Waste management and resource use

Resource consumption and waste generation will be minimised where practicable. Wastes generated during project construction and operation will be managed appropriately through the adoption of standard waste management measures. Materials will be recycled or re-used where possible.

Cumulative impacts

The main potential for cumulative impacts is the development of the proposed West Wyalong Solar Farm, approximately 6.2 km north of the development site. If construction of the Wyalong and West Wyalong solar farms was to coincide, then cumulative impacts may include community impacts such as demand for local resources (e.g. business and accommodation) straining capacity. However, construction of the two projects may also be sequential, depending on timing, which could provide an extended and sustainable period of income and business for the local region. If both projects shared existing transmission infrastructure, this will reduce or remove existing excess capacity in the local network.

Cumulative impacts with existing developments such as the Cowal Gold Mine and Pace Farm, Wattle Ridge Layer Complex are expected to be minimal due to the significant distances to these projects. Any cumulative impacts associated with future activities by Argent Minerals would need to be addressed at that time.

Management and mitigation

Based on the findings of this environmental impact assessment, ESCO Pacific has committed to a suite of project-specific mitigation measures to manage the environmental risks associated with the project. It is intended that ESCO Pacific manages all commitments and environmental mitigation measures by preparing and implementing a Project Environmental Management Plan.

Conclusion

Based on the findings of this risk assessment and environmental impact assessment (including technical investigations conducted by specialists in key areas of potential concern) and the outcomes of community and stakeholder consultation, the project is considered likely to provide significant local and regional benefit while resulting in generally minor, short-term and largely reversible environmental impacts. However, this conclusion relies on the effective implementation of the environmental management and mitigation measures outlined in this EIS.

1 Introduction

1.1 Purpose and scope of this document

This Environmental Impact Statement (EIS) has been prepared by Accent Environmental (Accent) on behalf of ESCO Pacific (the applicant) to support a Development Application (DA) to construct and operate a utility-scale solar farm and storage compound at Wyalong, New South Wales (NSW), located approximately 7.5 km northeast of the West Wyalong township and 136 km north of Wagga Wagga (Figure 1.1). The proposed Wyalong Solar Farm (the project) will[1] have a capacity of up to 130 megawatts (MW) direct current (DC) or 100 MW alternating current (AC).

The total capital value (exceeding $30 million) of the solar farm classifies it as a State Significant Development (SSD) to be assessed by the NSW Department of Planning and Environment (DPE). As an SSD, the project requires the preparation of an Environmental Impact Statement (EIS) under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of the EIS is to identify and assess potential environmental and social impacts associated with the construction, operation and decommissioning of the project and to develop effective mitigation measures where necessary.

This EIS has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) and agency comments, issued by DPE on 18 September 2018 (see Section 1.6), and outcomes of community and stakeholder consultation.

1.2 Project overview

The project is a utility-scale renewable energy development that will generate clean and renewable electricity from the power of the sun. Up to 100 MW of AC will be generated through the conversion of solar radiation to electricity via photovoltaic modules (solar panels). The solar panels will generate up to 130 MW of DC electricity that will be inverted to AC electricity via the use of power conversion units (PCUs). The electricity output from the project will then be supplied to the Essential Energy electricity network via high voltage cables connecting to the 132 kV transmission line which transects the development site.

Wyalong was chosen as the location of the solar farm due to the high solar irradiance in the region and the capacity of the Essential Energy electricity network to transmit the power generated by the farm.

The project is a large infrastructure project that is expected to create up to 150 jobs during construction and up to four full-time and eight part-time positions when operational.

General information about the project is provided in Table 1.1.

[1] The use of 'will' rather than 'would' in this EIS is for stylistic purposes and is not intended to imply that the outcomes of either the project approvals process or the detailed design process is known.

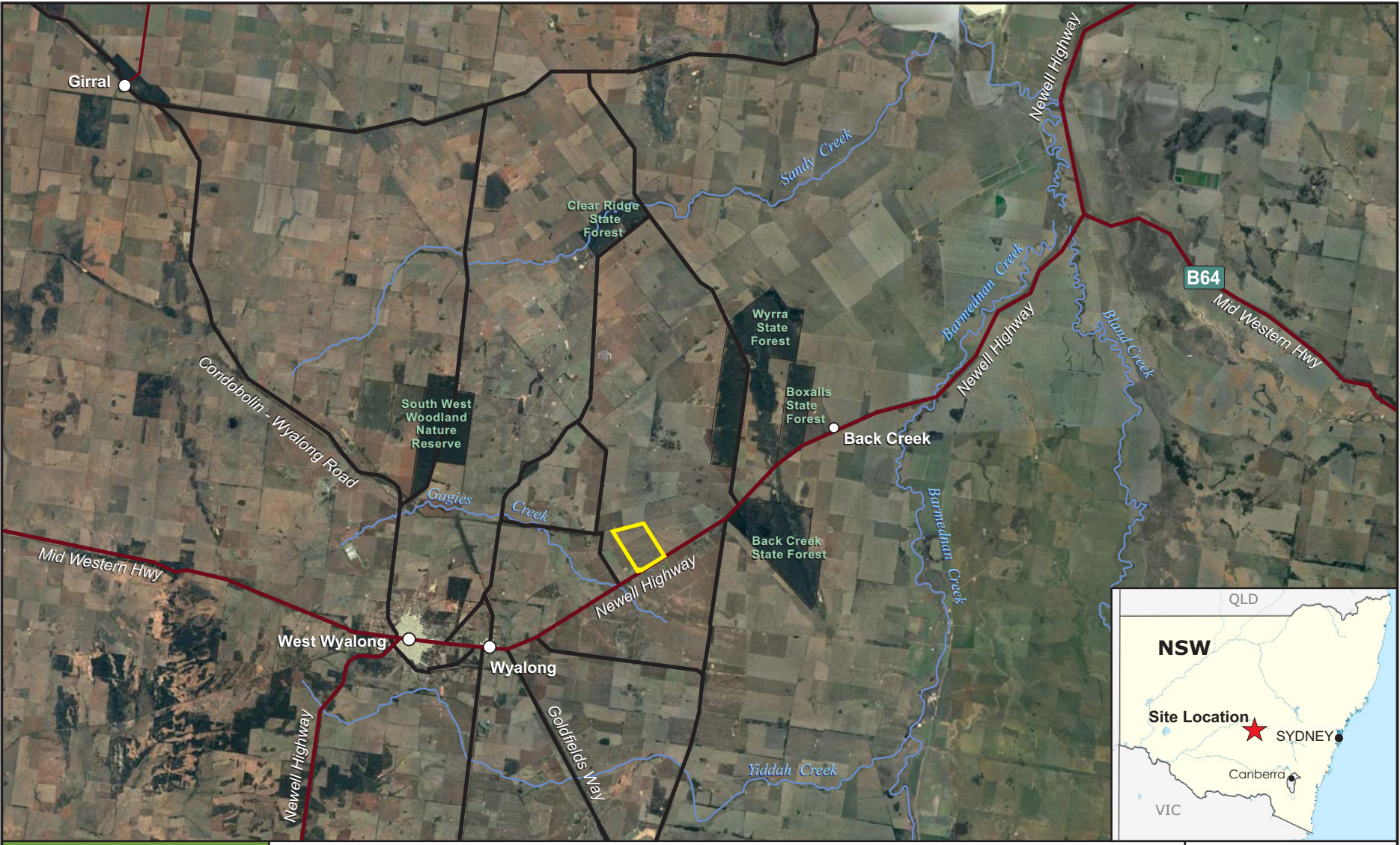

Figure 1.1

Regional Context
Wyalong Solar Farm

Client: Esco Pacific
Project No: AE1091.0

Legend
- Development Site
- Highway
- Main Road
- Watercourse

N
0 3,000 6,000
metres
1:250,000 when printed @ A4

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Table 1.1. Wyalong Solar Farm project overview

Address	1409 Newell Highway, Wyalong, New South Wales, 2671
Applicant	ESCO Pacific Pty Ltd
Council	Bland Shire Council
Titles	Lot 160 on Plan DP750615
Total indicative area	256 ha (development site) 259 ha (Lot 160, including land within the development site)
Landuse	Cropping, grazing – high level of ground disturbance
Capacity	Up to 130 MW (DC) or 100 MW (AC)
Connection	Essential Energy 132 / 66 kV Transmission line (Temora – Lake Cowal)

1.3 Development site

The project is located within the Bland Local Government Area (LGA). The LGA is located in the Riverina region of southwestern NSW and is crossed by the Newell and Midwestern Highways and Goldfields Way. The main landuse of the region is rural and consists predominantly of irrigated land, with agricultural, forestry and fishing industries being the main employers.

The proposed development site in relation to the wider landscape is shown in Figure 1.2. The site is located within the boundaries of a single lot used for agricultural purposes that is currently owned by one landholder residing 1.4 km east of the development site. The Applicant has secured land tenure with the existing landholder property.

The 256 ha development site is highly modified due to its history of agriculture and grazing, and is comprised largely of canola, barley, pasture grasses and some environmental weeds. The wider landscape consists largely of land historically cleared for agriculture.

The site is generally flat to gently undulating and is crossed by a number of ephemeral watercourses.

An existing 132 kV transmission line (Temora to Lake Cowal) transects the south eastern end of the development site, running northeast to southwest, and will be utilised by the project.

1.4 Project applicant

The project applicant, ESCO Pacific, is an Australian developer of utility-scale solar farms, founded in 2015 to develop renewable energy assets under the Renewable Energy Target (RET) scheme.

ESCO Pacific has a 1.2 Gigawatt pipeline of projects in NSW, Queensland and Victoria that in November 2018 included:

- the 148 MW Ross River Solar Farm, near Townsville, Queensland, under operation
- Susan River (98 MW) and Childers (75 MW) near Hervey Bay in Queensland
- four additional approved projects in Queensland, totalling approximately 300 MW
- the 175 MW Finley Solar farm in NSW, currently under construction
- the 80 MW Mulwala Solar Farm in NSW, for which determination is expected in November 2018
- the 125 MW Sandigo Solar Farm in NSW, approved by the NSW government in July 2018
- three projects in Victoria totalling 300 MW (approvals due early 2019).

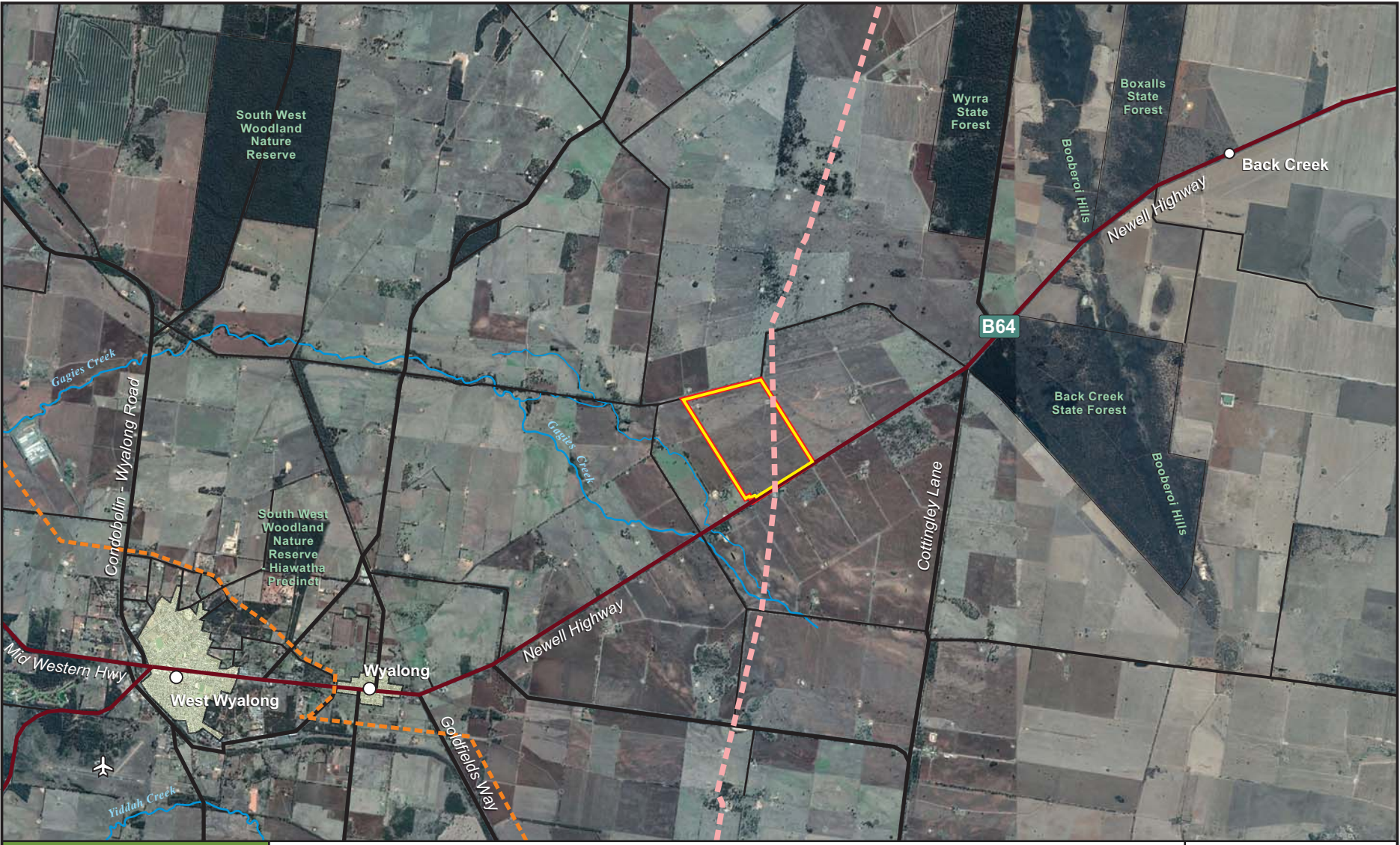

Figure 1.2

Local Context

Wyalong Solar Farm

Client: Esco Pacific
Project No: AE1091.0

Legend

- Development Site
- Lot Boundary
- 66kV Line
- 132kV Line
- Watercourse
- Highway
- Main Road
- Local Road
- Airport

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ESCO Pacific is headquartered in Melbourne and has a team of professionals with specific experience in developing and delivering to market, utility-scale renewable energy projects in Australia and internationally.

1.5 Capital investment value

The project will have a capital investment value of approximately $130 million.

1.6 Secretary's Environmental Assessment Requirements

To initiate the environmental approvals process for the project, a Preliminary Environmental Assessment (PEA) Scoping Report (ESCO Pacific 2018) was prepared to support a request to DPE for issue of the SEARs for the project.

The SEARs are intended to provide guidance on the process for environmental assessment and the structure and general content of the EIS.

In accordance with Clause 3, Schedule 2 of the EP&A Regulations, a written application accompanied with the PEA Scoping Report was made to the Secretary on 23 August 2018 requesting SEARs for the project (Application number: SSD 9564). The SEARs were issued by DPE on 18 September 2018 and were accompanied with statutory agency comments. ESCO Pacific undertook additional consultation with Bland Shire Council and the Department of Industry to seek clarification and advice regarding the SEARs.

A copy of the SEARs and agency comments, as well as relevant correspondence with statutory agencies, are provided in Appendix A and summarised in Table 1.2. S and Table 1.3. Key issues raised by statutory agencies. Each requirement listed in Table 1.2. S and each issue listed in Table 1.3. Key issues raised by statutory agencies is cross-referenced with the section of the EIS in which it is addressed.

Table 1.2. Secretary's Environmental Assessment Requirements

Secretary's Environmental Assessment Requirements	Section in EIS
General requirements	
The Environmental Impact Statement (EIS) for the development must comply with the requirements in Schedule 2 of the Environmental Planning and Assessment Regulation 2000.	1.5
In particular, the EIS must include: • a stand-alone executive summary; • A full description of the development, including: – details of construction, operation and decommissioning; – a site plan showing all infrastructure and facilities (including any infrastructure that would be required for the development, but the subject of a separate approvals process); – a detailed constraints map identifying the key environmental and other landuse constraints that have informed the final design of the development. • a strategic justification of the development focusing on site selection and the suitability of the proposed site with respect to potential land use conflicts with existing and future surrounding land uses (including other proposed or approved solar farms, rural residential development and subdivision potential; • an assessment of the likely impacts of the development on the environment, focusing on the specific issues identified below, including:	 3.4 and 3.5 3.2 3.2 4.0 8.0

Secretary's Environmental Assessment Requirements	Section in EIS
– a description of the existing environment likely to be affected by the development – an assessment of the likely impacts of all stages of the development, (which is commensurate with the level of impact), including any cumulative impacts of the two sites and existing or proposed developments, taking into consideration any relevant legislation, environmental planning instruments, guidelines, policies, plans and industry codes of practice; – 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 – a description of the measures that would be implemented to monitor and report on the environmental performance of the development; • a consolidated summary of all the proposed environmental management and monitoring measures, identifying all the commitments in the EIS; and • the reasons why the development should be approved having regard to: – relevant matters for consideration under the *Environmental Planning and Assessment Act 1979*, including objects of the Act and how the principles of ecologically sustainable development have been incorporated in the design, construction and ongoing operations of the development; – the suitability of the site with respect to potential land use conflicts with existing and future surrounding land uses; and – feasible alternatives to the development (and its key components), including the consequences of not carrying out the development. – a detailed consideration of the capability of the project to contribute to the security and reliability of the electricity system in the National Electricity Market, having regard to local system conditions and the Department's guidance on the matter. The EIS must also be accompanied by a report from a suitably qualified person, providing: • a detailed calculation of the capital investment value (CIV) (as defined in clause 3 of the Regulation) of the proposal, including details of all assumptions and components from which the CIV calculation is derived • certification that the information provided is accurate at the date of preparation. The development application must be accompanied by the consent in writing of the owner/s of the land (as required in clause 49(1)(b) of the Regulation).	9.0 4.0 and 5.2.1 8.5 4.5 4.3.1 To be provided separately To be provided separately
Specific issues	
The EIS must address the following specific issues:	
Biodiversity – including: • an assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the Biodiversity Conservation Act 2016 (NSW), the Biodiversity Assessment method (BAM) and documented in a Biodiversity Development Assessment Report (BDAR), unless OEH and DPE determine that the proposed development is not likely to have any significant impacts on biodiversity values • the BDAR must document the application of the avoid minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM	8.1 and Appendix B

Secretary's Environmental Assessment Requirements	Section in EIS
• an assessment of the likely impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the Fisheries Management Act 1994, and a description of the measures to minimise and rehabilitate impacts.	
Heritage - including an assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the development, including consultation with the local Aboriginal community in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents.*	8.2, 8.3 and Appendix D
Land – including: • An assessment of the potential impacts of the development on existing land uses on the site and adjacent land, including: – a consideration of agricultural land, flood prone land, Crown lands, mining, mineral or petroleum rights (including Exploration Licence 8430) – a soil survey to determine the soil characteristics and consider the potential for erosion to occur – a cumulative impact assessment of nearby developments • An assessment of the compatibility of the development with existing land uses, during construction, operation and after decommissioning including – consideration of the zoning provisions applying to the land including subdivision – Completion of a Land Use Conflict Risk Assessment in accordance with the Department of Industry's Land U/se Conflict Risk Assessment Guide – a description of measures that would be implemented to remediate the land following decommissioning in accordance with State Environmental Planning Policy No 55 – Remediation of Land.	8.4, 8.5 and 8.14
Visual - including an assessment of the likely visual impacts of the development (including any glare, reflectivity and night lighting) on surrounding residences, scenic or significant vistas, air traffic and road corridors in the public domain (particularly the Newell Highway), including a draft landscaping plan for on-site perimeter planting, with evidence it has been developed in consultation with affected landholders.	8.8 and Appendix H
Noise - including an assessment of the construction noise impacts of the development in accordance with the *Interim Construction Noise Guideline* (ICNG) and cumulative noise impacts (considering developments in the area), and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria.	8.7 and Appendix G
Transport – including: • an assessment of the peak and average traffic generation, including over-dimensional vehicles and construction worker transportation • an assessment of the likely transport impacts to the site access route (including Newell Highway and Mid-Western Highway), site access point, rail safety issues, any Crown land, particularly in relation to the capacity and condition of the roads • a cumulative impact assessment of traffic from nearby developments (including cumulative impacts from West Wyalong Solar Farm) • a description of any proposed road upgrades developed in consultation with the relevant road and rail authorities (if required) • a description of the measures that would be implemented to mitigate any transport impacts during construction.	8.6 and Appendix F

Secretary's Environmental Assessment Requirements	Section in EIS
Water - including: • an assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources (including drainage channels, wetlands, riparian land, farm dams, groundwater dependent ecosystems and acid sulfate soils), related infrastructure, adjacent licenced water users and basic landholder rights, and measures proposed to monitor, reduce and mitigate these impacts; • details of water requirements and supply arrangements for construction and operation; and • a description of the erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with *Managing Urban Stormwater: Soils & Construction* (Landcom 2004);	8.4 and Appendix E
Hazards and Risks - including: • a preliminary risk screening in accordance with *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development* and *Applying SEPP 33* (DoP 2011), and if the preliminary risk screening indicates the development is "potentially hazardous", a Preliminary Hazard Analysis (PHA) must be prepared in accordance with *Hazard Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis (*DoP 2011) and *Multi-Level Risk Assessment* (DoP 2011) • an assessment of all potential hazards and risks including but not limited to bushfires, spontaneous ignition, electromagnetic fields or the proposed grid connection infrastructure.	7.0 8.10 and 8.11
Socio-Economic – including an assessment of the likely impacts on the local community and a consideration of the construction workforce accommodation.	8.12
Waste – identify, quantify and classify the likely waste stream to be generated during construction and operation and describe the measures to be implemented to manage, reuse, recycle and safely dispose of this waste.	8.13
Consultation	
• During the preparation of the EIS, you should consult with relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups, affected landholders, exploration licence holders, quarry operators and mineral title holders (including Argent Minerals) • In particular, you must undertake detailed consultation with affected landholders surrounding the development and Bland Shire Council. • 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.	6.0 and Appendix C
Further consultation after 2 years	
If you do not lodge a development application and EIS for the development within 2 years of the issue date of these EARs, you must consult further with the Secretary in relation to the preparation of the EIS.	-
References	
The Assessment of the key issues listed above must take into account relevant guidelines, policies, and plans as identified. While not exhaustive, the following attachment contains a list of some of the guidelines, policies, and plans that may be relevant to the environmental assessment of this proposal.	-

Table 1.3. Key issues raised by statutory agencies

Agency	Key issue raised	Section in EIS
Office of Environment and Heritage	The EIS to appropriately address the following: • Biodiversity and offsetting • Aboriginal cultural heritage • Flooding	8.0
	Biodiversity • Biodiversity impacts are to be assessed in accordance with Section 7.9 of the *Biodiversity Conservation Act 2016* sing the Biodiversity Assessment Method (BAM) and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must include information in the form detailed in the *Biodiversity Conservation Act 2016* (s6.12), Biodiversity Conservation Regulation 2017 (s6.8) and the BAM unless OEH and DPE determine that the proposed development is not likely to have any significant impact on biodiversity values. • The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM. • The BDAR must include details of the measures proposed to address the offset obligations as follows: – total number and classes of biodiversity credits required to be retired for the development/project – number and classes of like-for-like biodiversity credits proposed to be retired – number and classes of biodiversity credits proposed to be retired in accordance with the variation rules – any proposal to fund a biodiversity conservation action – any proposal to make a payment to the Biodiversity Conservation Fund. • If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits. • The BDAR must be submitted with all digital spatial data associated with the survey and assessments as per Appendix 11 of the BAM. • The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the *Biodiversity Conservation Act 2016.*	8.1 and Appendix B
Office of Environment and Heritage	**Aboriginal cultural heritage** • An Aboriginal Cultural Heritage Assessment Report (ACHAR) must be prepared. • The EIS must identify and describe the Aboriginal cultural heritage values existing across the whole area that will be affected by the development, with identification conducted in accordance with the Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW (OEH 2010), and be guided by the Guide to investigating, assessing and	8.2 and Appendix D

Agency	Key issue raised	Section in EIS
	reporting on Aboriginal Cultural Heritage in NSW (DECCW 2011) and consultation with OEH regional branch officers. • Consultation with Aboriginal people must be undertaken and documented in accordance with the Aboriginal cultural heritage consultation requirements for proponents 2010 (DECCW). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the ACHAR. • Impacts on Aboriginal cultural heritage values are to be assessed and documented in the ACHAR. The ACHAR must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the EIS must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be document and notified to OEH. • The assessment of Aboriginal cultural heritage values must include a surface survey undertaken by a qualified archaeologist in areas with potential for subsurface Aboriginal deposits. The result of the surface survey is to inform the need for targeted test excavation to better assess the integrity, extent, distribution, nature and overall significance of the archaeological record. The results of surface surveys and test excavations are to be documented in the ACHAR. • The ACHAR must outline procedures to be followed if Aboriginal objects are found at any stage of the life of the project to formulate appropriate measures to manage unforeseen impacts. • All Aboriginal objects identified must be reported to the OEH through registration on AHIMS in accordance with the mandatory notification requirements of section 89A of the *National Parks and Wildlife Act 1974.* • The ACHAR must outline procedures to be followed in the event Aboriginal burials or skeletal material is uncovered during construction to formulate appropriate measures to manage the impacts to this material.	
	Historic heritage • The EIS must provide a heritage assessment including but not limited to an assessment of impacts to State and local heritage including conservation areas, natural heritage areas, places of Aboriginal heritage value, buildings, works, relics, gardens, landscapes, views, and trees. Where impacts to State or locally significant heritage items are identified the assessment shall address the requirements outlined for historic heritage in Attachment A.	8.3 and Appendix D
	Flooding • The EIS must map features relevant to flooding as described in the Floodplain Development Manual 2005. • The EIS must describe the flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 5% Annual Exceedance Probability	8.4 and Appendix E

Agency	Key issue raised	Section in EIS
	(AEP), 1% AEP flood levels and the probable maximum flood, or an equivalent extreme event. • The EIS must model the effect of the proposed development (including fill) on the flood behaviour under the following scenario: - Current flood behaviour for a range of design events as identified above. This includes the 0.5% and 0.2% AEP year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change. • Modelling in the EIS must assess and document impacts on existing flood behaviour in accordance with requirements outlined in Attachment A and relevant provisions of the NSW Floodplain Development Manual 2005.	
Bland Shire Council	Waste management should be addressed in the EIS.	8.13
Department of Industry	Water – including: • identification of an adequate and secure water supply for the life of the project, including an assessment of the current market depth where water entitlement is required to be purchased • a detailed and consolidated site water balance • assessment of impacts on surface water and ground water sources, related infrastructure, adjacent licenced water users, basic landholder rights, watercourse, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts • proposed surface and groundwater monitoring activities and methodologies • consideration of relevant legislation, policies and guidelines, including the NSW Aquifer Interference Policy (2012), the DPI Water Guidelines for Controlled Activities on Waterfront Land (2012) and the relevant Water Sharing Plans (available at https://www.industry.nsw.gov.au/water).	8.4 and Appendix E
	Details of construction, operation and decommissioning, including rehabilitation objectives for agricultural land.	
	A soil survey undertaken in accordance with any Guidelines listed in Attachment A.	8.5
	An assessment of impacts to surrounding agricultural land uses and industries.	8.5
	A Land Use Conflict Risk Assessment that includes identification of potential land use conflict, and consultation and negotiation with owners / managers of affected adjoining agricultural operations.	8.5
	A biosecurity (pests, weeds and livestock disease) risk assessment outlining the likely plant, animal and community risks (as per DPIs *Infrastructure Proposals on Rural Land 2013*).	7.0
	A rehabilitation and decommissioning strategy that will ensure land is return to its predevelopment state.	3.13 and 8.5

Agency	Key issue raised	Section in EIS
Department of Planning and Environment – Resources and Geoscience	Address the project's potential impacts on existing land use, including mining, mineral and petroleum rights on the site and adjacent land, including an assessment of cumulative impacts of nearby developments and compatibility of the development with existing land uses during construction, operation and following decommissioning.	8.5
	Consultation with operators or title holders to establish if the proposal is likely to have a significant impact on current or future extraction of minerals, petroleum or extractive materials (including by limiting access to, or impeding assessment of resources).	8.5
	The EIS should document any way the proposed development may be incompatible with existing or approved uses, or current or future extraction or recovery of resources under the land use compatibility requirements of Part 3 (13) of the MSEPP.	8.5
	Undertake a dated and referenced search of current mining and exploration titles and applications. Evidence of the search should be provided in the form of a date referenced map.	8.5
	The proponent is to contact the Division if no response is received from Argent Minerals Limited.	8.5
	Consultation with the Division in relation to the proposed location of any offsite biodiversity offset areas or any supplementary biodiversity measures to ensure there is no consequent reduction in access to prospective land for mineral exploration, or potential for sterilization of mineral or extractive resources.	8.1
Fire and Rescue NSW	A comprehensive Emergency Response Plan (ERP) be developed for the site, detailing: • foreseeable on-site and off-site fire events and other emergency incidents (e.g. fires involving solar panel arrays, bushfires in the immediate vicinity or potential hazmat incidents) • risk control measures that would need to be implemented to safely mitigate potential risks to health and safety of firefighters and other first responders (including electrical hazards) • other risk control measures that may need to be implemented in a fire emergency due to any unique hazard specific to the site. Store two copies of the ERP in a prominent 'Emergency Information Cabinet' directly adjacent to the site's main entry point/s.	8.10
	The operator of the facility to contact the relevant local emergency management committee (LEMC) post construction and prior to operation. LEMC contact details can be obtained from the relevant local council.	7.0 and 8.10
NSW Rural Fire Service	A bushfire hazard assessment report prepared by a suitably qualified person. The assessment should include site-specific recommendations for the proper design of: • asset protection zones (APZs)	8.10

Agency	Key issue raised	Section in EIS
	• measures to prevent a fire occurring with the site from developing into a bush / grass fire risk to the surrounding area • water supply for fire-fighting purposes • land and vegetation management • emergency management procedures, including the development of a Fire Management Plan in consultation with the local NSW RFS District fire Control Centre • vehicular access and defendable space around the solar array.	
Roads and Maritime Services	Consideration of: • Construction and decommissioning phase – the transport of materials and equipment / components for the establishment of the facility and ancillary infrastructure, the movement and parking of construction related vehicles, including personal vehicles, during the construction of the facility. • Operational phase – the ongoing traffic generation due to the operation, maintenance and servicing of the various elements of the project.	8.6 and Appendix F
	Development of a Traffic Impact Assessment (TIA), addressing impacts of traffic generated by the development upon the nearby road network, to be submitted with the Development Application. The TIA should contain information such as the characteristics of potential traffic generation, traffic volumes, types of vehicles, travel routes for vehicle accessing the development site, and other traffic generating influences on the surrounding public road network.	8.6 and Appendix F
	A Traffic Management Plan to manage traffic generated during the construction period.	8.6 and Appendix F
	Address potential distraction of passing motorists as a result of the project, including potential glint/glare impacts.	8.8 and Appendix H
	Consideration of the establishment and maintenance of a visual buffer, such as a vegetated buffer, within the subject site along its frontage to any public road.	8.8 and Appendix H
Essential Energy	The proponent should clearly state in their EIS whether any connections to Essential Energy's grid (including the construction of any substations, or additional feeder lines that may be required to connect to EE's grid) are assessed through the EIS under Part 4 of the Environmental Planning and Assessment Act 1974 (EP&A Act) or under Part 5 of the EP&A Act.	5.2.1
TransGrid	The project scope description should include all ancillary electricity transmission works (all works associated with connection to the National Electricity Market, such as ancillary substation works, transmission line works (direct and upstream), and telecommunication works) that would be necessary for the construction and operation of the project.	3.0 and 4.3.1
	The EIS should identify all land parcels affected by these works and include them with the project boundary.	2.0

1.7 Project team

A number of specialist consultants were engaged by ESCO Pacific and Accent to undertake the technical assessments required to support the preparation of this EIS. Table 1.4 lists the project team members and their relevant areas of assessment.

Table 1.4. Project team

Name	Organisation	Area of assessment
Michael Cramer	Accent Environmental	Project Director and technical review
Fatma Ipek	Accent Environmental	Project Manager and EIS preparation
Samara Gomez	Accent Environmental	Deputy Project Manager and EIS preparation
Ian Finlay, Neil Wines, Marisa De Stefano	Accent Environmental	EIS preparation
Terry Clarke	Accent Environmental	GIS and graphics
Stuart Cooney and Simon Scott	Ecolink	Biodiversity
Steven Sass	EnviroKey	Biodiversity
Philippa Sokol	OzArk	Aboriginal and non-Aboriginal Cultural Heritage
Will Drew and John-Paul Maina	Impact Traffic Engineering	Traffic and transport
Christopher Power and Steve Skull	Alluvium Consulting	Flood risk
Paul Ollett	Hydralinc	Flood risk
Cédric Bergé and Martina Gassner	ESCO Pacific	Community and stakeholder engagement Aboriginal consultation

2 Site description

This section provides a brief description of the site setting. More detailed information is provided in subsequent chapters.

2.1 Land ownership

The 256 ha development site is located within the following lot:

- Lot 160 on Plan DP750615 (259 ha), herein referred to as the 'lot area'

The landholder's consent has been obtained for the lodgement of the DA and the supporting EIS.

2.2 Approvals

There have been no DAs for the development site or immediate vicinity, other than those provided for the establishment of residential residences and associated farm infrastructure.

2.3 Zoning

Under the Bland Local Environmental Plan (LEP), the proposed development site is located on land that is zoned RU1 - Primary Production (BSC 2011). The land zoning for the site is shown in Figure 2.1.

The RU1 zoning classification provides planning objectives and activities which are permitted and prohibited, which are discussed in relation to permissibility of the project in Chapter 5.

2.4 Landuse

2.4.1 Site landuse

The allotment on which the development site is located is divided into three cropped paddocks of roughly equal size. Crops including canola and barley are grown in rotation, interspersed with years in which the paddocks are sowed with nitrogen fixing crops and grazed to keep the biomass low (ESCO Pacific 2018).

Due to the long history of grazing and cropping activities in the area, there has been significant disturbance of the natural environment, and native vegetation is largely absent. Photo 2.1 and Photo 2.2 show the development site in mid-September 2018, when it was being cropped.

Three farm dams are present on the development site. However, no building structures or distinct tracks are present.

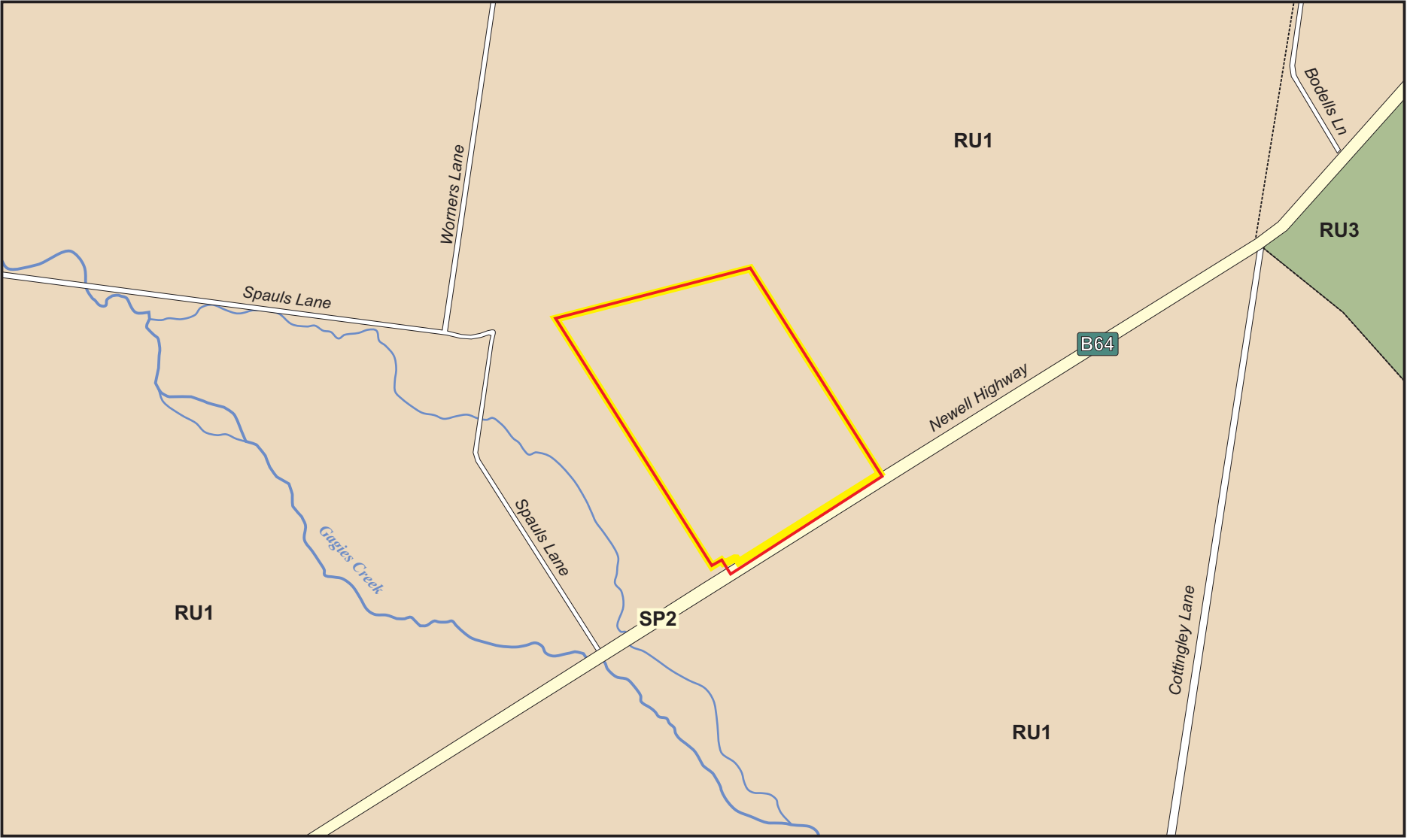

Figure 2.1

Local Zoning
Wyalong Solar Farm

Client: Esco Pacific
Project No: AE1091.0

Legend

- Development Site
- Lot Boundary
- Local Road
- Watercourse

Land Zoning

- RU1 Primary Production
- RU3 Forestry
- SP2 Special Activities - Road

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Photo 2.1. Development site – looking east

Photo 2.2. Example of a scattered tree on the development site – looking southwest

2.4.2 Surrounding landuse

The development site is located in the Riverina region of southwestern NSW, which consists predominantly of irrigated land, with agriculture, forestry and fishing being the main industries. The landuse immediately surrounding the development site is similar to that of the site (i.e. mainly cropping paddocks).

There are no current extractive industry operations in the vicinity of the site. However, the Cowal Gold Mine is located approximately 30 km north of the site.

Areas used for recreation in the surrounding region include:

- Back Creek State Forest, located 3.2 km east of the development site
- Wyrra State Forest, located 4 km to the northeast of the development site
- Boxalls State Forest, located 6.4 km to northeast of the development site
- Southwest Woodland Nature Reserve – Hiawatha Precinct, located 7.3 km southwest of the development site.

More detailed information on the surrounding landuse is provided in Section 8.5.

2.5 Sensitive receivers

As a result of the historical agricultural use of the area, the sensitive receivers potentially impacted by the project comprise rural residential residences. These sensitive receivers are shown on Figure 2.2.

Five residences are located within 2 km of the development site, as listed below. Those within 2 km of the development site are considered to be sensitive receivers for statutory assessment purposes, excluding the two owned by the landholder (R1 and R2) which are considered part of the commercial development of the project.

R1: Site landholder residence, 1.4 km east

R2: Residence 0.3 km west (owned by the landholder and leased)

R3: Residence 0.6 km southwest

R4: Residence 0.8 km southeast (unoccupied at the time of assessment)

R5: Residence 1.0 km north

Figure 2.2

Sensitive Receivers
Wyalong Solar Farm

Client: Esco Pacific
Project No: AE1091.0

Legend

- Development Site
- Lot Boundary
- 1 km Offset Buffer
- 2 km Offset Buffer
- Watercourse
- Highway
- Main Road
- Local Road
- Host Landholder
- Sensitive Receivers

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2.6 Climate

The nearest Bureau of Meteorology Automatic Weather Station (AWS) is located at West Wyalong Airport (BoM Site: 050017), at an elevation of 257 m, approximately 12 km southwest of the development site. Climate data for the West Wyalong Airport AWS is as follows (BoM 2018):

- The average annual minimum temperature is 9.9°C (with a range between 2.9°C in July and 18.2°C in January), with the coolest months generally between April and October.
- The average annual maximum temperature is 24.1°C (with a range between 14.4°C in July and 34.1°C in January), with the warmest months generally between November and March.
- Annual mean rainfall is 453.8 mm.
- Highest rainfall is experienced from May to December (i.e. generally over winter-spring). However, with the exceptions of January (27.7 mm) and April (18.8 mm), the average monthly rainfall totals are all greater than 30 mm, with the greatest monthly average occurring in December (53.6 mm), indicating that rainfall is relatively consistent across all months and seasons.
- Wind speeds average between 10.8 and 18.9 km per hour at 9 am, with strongest winds during the spring and summer months.
- During January through to April, winds from the north, east, and southwest are most prevalent at 9 am and most prevalent from the southwest at 3 pm. During May to August, winds are generally from the north, west or southwest at 9 am and 3 pm. From September to December, the prevailing wind direction is from the north, northeast or southwest at 9 am, and west or southwest at 3 pm.
- Daily solar exposure is not recorded by the West Wyalong Airport Weather Station. Therefore, no annual data is available for the site.

2.7 Geology and soils

The geology at the site consists of both the undifferentiated Cainozoic sediments and Quaternary alluvial deposits.

The main soil type in the area (OEH 2018), is defined as vertosols under the Australian Soil Classification (CSIRO 2018).

Further detail on geology and soils is provided in Section 8.5.

2.8 Topography and hydrology

2.8.1 Topography

The development site is relatively flat with elevations ranging from approximately 232 m above the Australian Height Datum (AHD) in the southeast to approximately 236 m AHD in the northwest.

A low, north to south trending ridgeline (the Booberoi Hills) is approximately 5.6 km to the east of the site. The southern part of the Booberoi Hills traverses Back Creek State Forest (a parcel of land of approximately 1000 ha).

2.8.2 Hydrology

The development site is located within the Murray-Darling Basin between the Murrumbidgee River to the southwest and the Lachlan River to the northeast. The closer of these rivers is the Lachlan River, which is approximately 70 km from the site.

Waterways in the immediate vicinity of the site include Gagies Creek, approximately 1.2 km to the west, an ephemeral tributary of Gagies Creek, approximately 550 m to the west, and two ephemeral drainage lines that cross the site.

Site hydrology and flood risk is discussed further in Section 8.4.

2.9 Biodiversity

The development site is located within the Lower Slopes Subregion of the South Western Slopes Bioregion, which lies in the foothills and isolated ranges comprising the lower inland slopes of the Great Dividing Range, extending into western Victoria.

A biodiversity site assessment, undertaken by Ecolink in late 2018 (Appendix B), identified that native vegetation is largely absent from the development site, with a small number of isolated paddock trees being the most obvious remnants of the historic vegetation communities that once dominated the landscape, including Western Grey Box (*Eucalyptus microcarpa*), White Cypress Pine (*Callitris glaucophylla*), and Buloke (*Allocasuarina luehmannii*). Most of these trees are old and are senescing or dead. However, some contain hollows that may provide nesting resources for birds and mammals. Exotic trees, Radiata Pine (*Pinus radiata*) and Pepper Tree (*Schinus molle*), are also present on the development site.

Some areas of native vegetation remain along fencelines and in the southwestern corner of Lot 160 (outside the development site), however this vegetation is of a very low quality. These areas remain dominated by pasture grasses and weeds from surrounding areas, including Flaxleaf Fleabane (*Conyza bonariensis*), Spear Thistle (*Cirsium vulgare*) and Paddy Melon (*Cucumis myriocarpus*).

Ten native bird species were recorded during the site assessment. A further three birds were recorded in higher quality habitat within the road reserve to the north of the study area. All of the recorded species recorded within the study area are common, large, gregarious species that have adapted well to a disturbed agricultural landscape.

Three dams are located within the study area: one in each of the three paddocks. Although each of these dams held water at the time of the site assessment, none of them support aquatic vegetation and lack vegetation surrounding them, limiting their utility for many native fauna species. They are, however, likely to provide water to a range of fauna species. Australian Wood Ducks (*Chenonetta jubata*), a common indigenous species, was recorded during the current assessment on the southern-most dam.

There are no creeks within the development site, only a number of ephemeral waterways as discussed in Section 8.4, and no natural wetlands or swamps were observed during the biodiversity assessment.

Further information on the biodiversity of the development site and vicinity can be found in Section 8.1.

3 Project description

3.1 Overview

The Wyalong Solar Farm will comprise up to 350,000 solar photovoltaic (PV) modules, known more commonly as PV modules or solar panels. The solar panels use the same type of technology as commonly used in residential scale solar installations throughout Australia but are larger in size. The panels will be mounted in rows on horizontal tracking or fixed tilt systems.

The solar panels will generate DC electricity that will be inverted to AC electricity via the use of PCUs. AC power is the standard form of electricity used throughout Australia.

Electricity from the solar farm will then be connected to the Essential Energy supply network by an on-site high voltage power reticulation system. The reticulation system will include an underground or above ground high voltage cable to the Essential Energy 132 kV transmission line. Details of the site layout, environmental constraints, access roads, easements, and closest receivers are shown in Figure 3.1.

3.2 Infrastructure design and development site layout

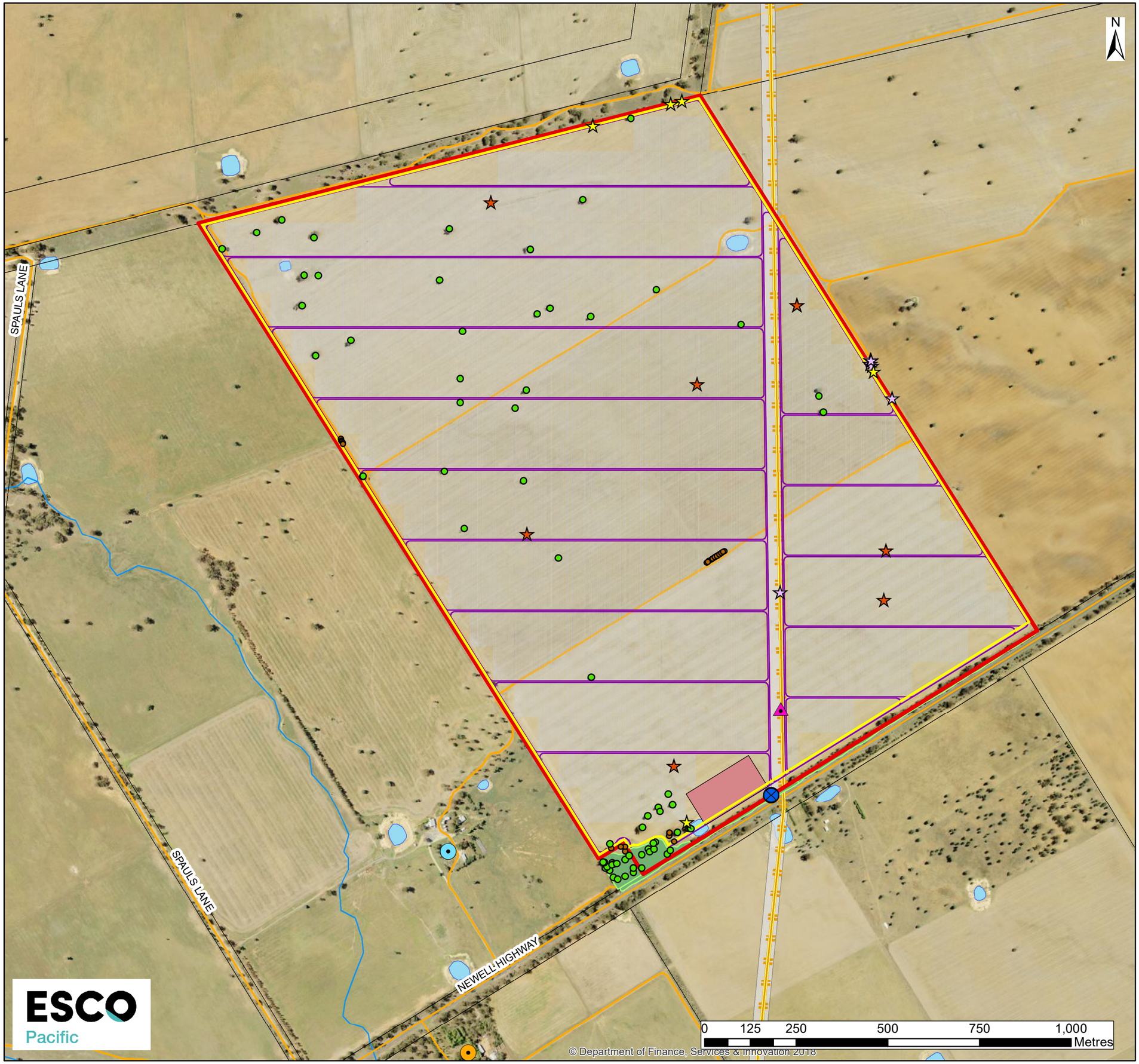
The infrastructure design and site layout aspects of the Wyalong Solar Project are discussed below.

3.2.1 Key project components

Key infrastructure items to be established for the project include:

- installation of solar panels in regular arrays
- metal mounting structures (up to 4 m in height)
- aboveground and underground DC cabling (low voltage)
- central inverters, step up transformers, and switchgear (PCUs) located in 40 foot containers or container skid pads (up to 26 PCUs, 3 m in height)
- battery storage area
- underground AC cabling that will run from the PCUs to the solar farm substation (high voltage)
- a main step-up transformer and associated equipment
- a synchronous condenser to adjust conditions on the electrical power transmission grid
- perimeter safety fencing and a fixed, closed-circuit television (CCTV) system
- supervisory control and data acquisition (SCADA) control systems
- site office and staff amenities
- maintenance shed
- permanent staff and contractor car parking area
- permanent all-weather site access and access road leading to office and substation (shared access with Essential Energy)
- internal vehicle access tracks (4 m) leading to solar arrays and PCUs
- temporary site compound, lay-down area, and equipment storage areas during construction.

The above components are discussed in further detail in the following sections. The design within the development site is currently conceptual. The switchyard/transformer could move to a different location



ESCO Pacific

PROJECT
Wyalong Solar Farm

MAP TITLE
Figure 3.1 Project Layout

Title Info
Lot 160 on Plan 750615

LEGEND

Wyalong Solar Farm

- Lot Boundary (259 hectares)
- Development Site (256 hectares)
- Site Office, Maintenance Shed, Switchyard and Battery Storage
- Proposed Access Point
- Indicative Connection Point (along Transmission line)
- Internal Access Tracks
- PV Solar Array
- Sensitive Receivers associated with the project
- Sensitive Receivers

Ecological Value

- Native Vegetation
- Scattered Trees
- Non Indigenous Trees

Aboriginal Heritage

- Aboriginal Artefacts to be avoided
- Aboriginal Artefacts to be avoided or salvaged
- Aboriginal Artefacts to be salvaged

Hydrology

- Watercourses
- Dams

Others

- Cadastral Boundary
- Transmission Lines
- Essential Energy Easement
- Roads / Tracks

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along the transmission line (within the site); however, any relocation would consider the need to avoid areas of flood hazard (see Section 8.4.3) and other environmental constraints.

3.2.2 Solar arrays and ground mounts

The solar arrays will comprise up to 350,000 individual solar panels which will either be multicrystalline, monocrystalline, or thin film technology. Each solar panel will be fixed to a metal mounting structure that will be piled or screwed into the ground without the need for any excavation work or use of concrete. This technique is used to minimise ground disturbance. The PV mounting structures will slowly track (in a single axis) the horizontal movement of the sun through the use of an automated tracker unit. Alternatively, fixed tilt mounting structures may also be used. Under both scenarios the height of the fixing systems and modules will not exceed 4 m. Photo 3.1 shows typical PV panels at a solar farm grouped in solar arrays.

Source: Array Technologies

Photo 3.1. Typical PV modules and solar array

3.2.3 DC cabling

DC cabling will be used to connect each PV module in a string to field DC boxes mounted near the solar panels. The DC boxes will be located approximately 1 m off the ground between the PV arrays. DC cabling will be installed underground at a minimum depth of 1 m between the DC boxes and the PCUs. DC cabling will be installed in accordance with Australian Standards and also with the requirements of Primefact 1063: Infrastructure Proposals on Rural Land (DPI 2013a).

3.2.4 Power conversion unit

A PCU will be located within each array block. The PCU contains the central inverters, step-up transformers and switchgear that convert the DC electricity collected from the PV panels into 33 kV AC electricity. The PCU (and associated equipment) is typically designed to be housed within a shipping container for easy transport and installation onsite. A PCU is typically 13 m long, 2.5 m wide, and 3 m high. Photo 3.2 shows a

typical PCU with the relevant power conversion equipment installed. There will be about 26 PCUs installed on site.

Source: SMA Solar Technology

Photo 3.2. Typical power conversion unit

3.2.5 AC cabling

From the PCUs within each array block, underground or above ground AC cabling will be installed (to a minimum depth of 1 m if underground) and connected with the step-up transformer in the solar substation. AC cabling will be installed in accordance with Australian Standards and also with the requirements of Primefact 1063: Infrastructure Proposals on Rural Land (DPI 2013).

3.2.6 Step-up transformer, substation and synchronous condenser

A main step-up transformer and associated equipment located in a solar substation will convert the on-site AC reticulated 33 kV electricity to 132 kV electricity. The 132 kV supply will then be connected via a high voltage cable to the Essential Energy electricity network. High voltage cabling will be installed in accordance with Australian Standards.

In the event Essential Energy transmission network system strength remediation is be required, a synchronous condenser may be installed on the development site to supply reactive power. The condenser would operate along with a specific transformer and a fin fan cooler.

A synchronous condenser operates in a similar way to a large electric generator. It contains a synchronous motor that spins freely to adjust technical conditions on the power system (Figure 3.2). Synchronous condensers are an important source of grid network system strength.

If required at the Wyalong Solar Farm, the synchronous condenser will be up to approximately 5 m high, 6 m long and 5 m wide (to be confirmed when grid studies are completed) and would be located within the proposed solar farm switchyard.

3.2.7 Battery storage

The project will also include the potential for battery storage to be installed on site.

Solar farms are an intermittent source of energy. Battery storage systems can be used either to smooth the fluctuating energy produced by the solar farm or to store the excess energy during low demand periods for subsequent use during higher demand periods or when solar energy is unavailable (e.g. at night).

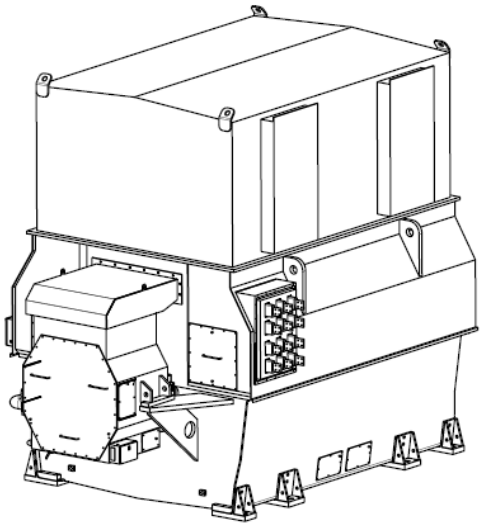


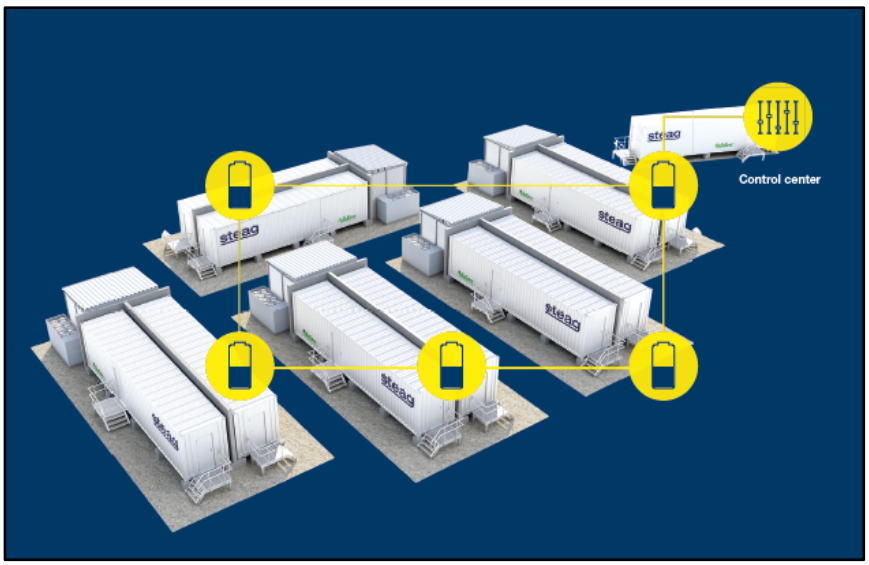
Figure 3.2. Indicative drawing of a synchronous condenser

The batteries can also compensate for frequency variations in the electricity grid that can be caused by intermittent renewable generators, power plant outages or fluctuations in consumption. Batteries can store electricity from the grid or feed electricity into the grid in a matter of seconds to compensate for such variations.

In addition to the shifting of electricity output, energy storage on the site can contribute to:

- improved reliability of the electricity network and reduced electricity costs associated with grid upgrades to deal with peak energy demand
- sustainable outcomes by combining clean energy generation with clean energy storage.

Lithium-ion batteries in containerised packs would be installed, as illustrated in Figure 3.3 and Figure 3.4. The chosen battery will be identified in the procurement phase along with modules and inverters. Any battery will have undergone the required hazard assessment to ensure the product meets Australian Standards and legislated safety requirements.



Source: steag

Figure 3.3. Example of containerised packs

Source: Tesla

Figure 3.4. PowerPack system

3.2.8 System monitoring

The entire solar farm will be monitored through a SCADA system that will monitor the performance of all the solar equipment onsite. The SCADA system will also be capable of notifying staff onsite and remotely of system issues and failures.

3.2.9 Internal roads

Internal vehicle access tracks will be constructed to each PCU and to the solar substation to allow for site maintenance. Onsite tracks will be constructed of compacted gravel and, where required, geotextile fabric will be laid between the soil and the gravel. Internal access tracks will be up to 4 m wide to allow for the safe delivery, unloading and installation of key components such as the PCUs, PV panels, and switch equipment. The access road leading to the substation will also be designed in accordance with Essential Energy requirements to enable access by their inspection and maintenance vehicles.

The exact position of access tracks will be determined during the detailed design phase when the layout of the solar arrays is finalised. Internal access tracks are private roads designed and constructed only for

construction, operation and maintenance purposes. The conceptual locations of internal roads are shown in Figure 3.1.

3.2.10 Site office and staff amenities

A site office and staff amenities building will be constructed or installed at the site. The dimensions of the building are expected to be approximately 16 m long, 10 m wide, and up to 3 m high. All visitors and contractors will be required to report to the site office upon entry to the site. The office building will include staff offices and a control room. Staff amenities will include toilets, showers, a lunch room and a first aid room. The conceptual location of the site office during operation is shown in Figure 3.1.
Maintenance building

A maintenance building will be established adjacent to the site office and will provide storage for spare parts and maintenance equipment, and include a workshop. The maintenance building will be approximately 25 m long, 15 m wide, and 5 m high. The workshop building will be approximately 15 m long and 10 m wide.

3.2.11 Site access and parking

Access to the site during construction and operation will be from Newell Highway, located immediately south of the site (see Figure 3.1 and Section 8.6).

A vehicle parking area will be located adjacent to the site office, with 10 parking spaces provided for operational and maintenance staff. Parking for construction vehicles will be either at designated laydown areas, storage locations, or where construction activities are concentrated at any given time.

3.3 Site services and utilities

3.3.1 Site power

Diesel generators will be available for power supply through the construction period. Should low voltage power be available in the vicinity, the project may use power from the existing network during construction.

Once operational, it is anticipated that the project will use power generated from the solar farm rather than a grid connected service.

3.3.2 Water and sewerage supply

Water consumption during construction is estimated to be 30 ML. ESCO Pacific's preferred option is for water to be trucked to site to meet requirements during construction and decommissioning.

Temporary toilets will be available throughout the construction period for use by contractors. The toilets will be pumped out by a local, licenced waste contractor.

Once operational, it is anticipated that the development will collect water from building roofs and use onsite water storage tanks (e.g. 2 x 35 kilolitre [kL] tanks). It is anticipated that 500 kL of water will be used during operation each year for cleaning, maintenance, and staff amenities. Water will be trucked in during periods when the onsite water tanks contain insufficient water.

Sewage generated during operation will be treated by an onsite bio-cycle system, installed to comply with Building Code of Australia (BCA) requirements.

3.3.3 Communications

The development is expected to use both mobile and fixed line networks for communication purposes. Where a connection is made to the fixed line network, cabling will follow existing access tracks and road reserves to minimise ground disturbance.

3.4 Construction

3.4.1 Construction materials

The majority of the construction materials and components are likely to be sourced from overseas due to the specialised nature of the equipment. Materials will be transported by road from port facilities in either Sydney or Melbourne in 12 m shipping containers. Civil materials such as aggregates and concrete will be sourced where available from local suppliers. The main construction materials will include:

- aggregates, road base, and concrete
- steel fencing materials
- steel piles and ground screws
- steel mounts and bolts
- cabling, conduit, and weather proof junction boxes
- PV modules and mounting structures
- shipping containers to house central inverters
- weatherproof DC boxes and steel posts
- steel framing and Colorbond sheeting for maintenance shed and site office
- timber and fixtures for building fit-out.

3.4.2 Site preparation

Site preparation will commence immediately across the development area to allow for the timely installation of roads, drainage, solar equipment, cabling, and infrastructure. Site preparation activities will generally involve the following:

- slashing and/or removal of paddock trees or vegetation approved for removal
- removal of existing fencing and establishment of boundary fencing
- establishing the site access point and internal roads for delivery of machinery and equipment
- undertaking land survey, geotechnical and other preliminary investigations
- establishing ancillary facilities including the site compound, laydown areas and temporary contractor facilities.

3.4.3 Infrastructure installation

The installation of infrastructure will commence directly after site preparation works are finalised. The key infrastructure activities will include:

- backfilling and levelling of dams (where required)
- installing internal roads and access tracks
- installing drainage works and regrading of surface features (where required)
- construction of the permanent site office, maintenance shed, and switchyard
- installing mounting structure foundations by driving steel piles pneumatically into the ground using specialist equipment (dependant on ground conditions ground screws may be used)

- attaching steel mounting structures to the ground piles
- installing solar panels onto the mounting structures, including tracker units
- installing and connecting the solar panels to the DC boxes with aboveground cabling
- installing the PCUs
- provision for installing battery energy storage system behind the meter
- connecting the DC boxes to the PCUs by trenching and underground cabling, and connecting the PCUs to the onsite power reticulation system and step-up transformer
- grid connection through the installation of underground mains from the step-up transformer to the TransGrid transmission line
- commissioning and testing of PV strings, central inverters, switch equipment, step-up transformer, monitoring systems, and electrical protection systems.

3.4.4 Construction equipment

Construction equipment required for the establishment of the solar farm will be limited to the heavy machinery and plant generally used across the wider construction industry. It is envisaged that all of this machinery and plant will be able to be sourced locally. Construction equipment to be used onsite will include:

- 1 x truck and dog for civil works
- 1 x D6 dozer or equivalent for levelling and road development
- 1 x 24 tonne excavator for earthworks
- 1 x grader for road development and levelling activities
- 1 x mulcher for the mulching and re-use of vegetation material onsite
- 1 x 7 tonne vibrating roller for road construction
- 1 x front end loader for the movement and loading of soil and aggregate materials
- 1 x water cart for road construction and dust suppression
- 1 x piling rig for installing PV piles
- 1 x Franna crane for the lifting of loads, erection of steel and movement of heavy plant
- 2 x trenchers for the installation of underground conduits and cabling
- 1 x portable generator for temporary site power
- hand power tools and equipment.

3.4.5 Construction schedule

The construction of the project is expected to take up to nine months to allow for the gradual development and commissioning of the facility (Table 3.1).

3.4.6 Commissioning activities

Commissioning of the solar farm will be undertaken once equipment is installed to ensure that the PV panels and associated infrastructure are structurally and electrically safe. Commissioning will also ensure that the solar plant is operating within its design and performance parameters.

Commissioning of the solar farm will involve the testing of the following components:

- PV module strings
- central inverters
- transformers
- switching equipment

- lightning protection systems
- earthing protection systems
- electrical protection systems
- grid connection compliance protection and disconnection systems
- battery storage
- SCADA system (including meteorological stations)
- support structures
- security systems.

The components of the solar farm will be subject to a maintenance and inspection regime for the life of the development.

Table 3.1. Construction schedule

Activity	Month								
	1	2	3	4	5	6	7	8	9
Site preparation and establishment									
Civil works (roads and drainage)									
Installation of PV piles, support structures and trackers									
Installation of PV panels									
Cabling of PV Strings									
Installation of central inverters									
Installation of underground cabling from central inverters									
Installation of switch equipment, step-up transformer and site office									
Connection to transmission line									
Commissioning									

3.5 Commissioning and operation

3.5.1 Operational activities

The project is anticipated to have an operational life of up to 40 years.

Operational activities involve monitoring of equipment on a daily basis, full servicing of inverters and substation equipment on an annual basis, and cleaning of the solar panels at regular intervals depending on system performance benchmarked to weather conditions.

There will be no storage of hazardous or dangerous goods or materials on site during the operation of the project.

The solar panels are expected to need cleaning up to two times per year. Any water required for cleaning of the panels will be brought to site in water trucks.

Land between the panels and along the boundary of the solar farm will require maintenance to control vegetation growth. Such maintenance will be undertaken either through the use of livestock (sheep) or by mowing with a slasher.

3.6 Workforce

3.6.1 Construction

The anticipated construction workforce will be approximately 150 staff. It is expected that the majority of the workforce will be sourced from the local area. Non-local workforce or contractors are likely to come from other areas of NSW and are likely to seek accommodation in West Wyalong and other regional centres in Southern NSW (see Section 8.12). It is expected the majority of the construction staff movements will be made to/from site using mini buses from West Wyalong.

3.6.2 Operation

During operation, it is expected that there will be up to four full-time and eight part-time staff based at the solar facility to manage site activities and to support routine plant operation and maintenance. The operational staff are likely to originate from West Wyalong or the surrounding region.

3.7 Hours of operation

3.7.1 Construction

Construction activities at the site will occur from 7 am to 6 pm Monday to Friday and from 8 am to 1 pm on Saturdays. No construction activities will occur on Sundays or public holidays.

3.7.2 Operation

As the solar farm only generates power during daylight hours, site staff will only be present during the daytime, except in response to any emergencies. Regular hours will be from 8 am to 6 pm, Monday to Friday, with work on weekends if required.

3.8 Traffic generation

3.8.1 Construction

It is anticipated that the average traffic generation during the construction phase will peak at 46 movements (single trips to or from the development site) per day in month four, comprising 24 heavy vehicle and 22 light vehicle movements. At least 10 oversized vehicles will be required during construction stage.

Further detail on construction traffic movements and impacts is provided in Section 8.6.

3.8.2 Operation

It is anticipated that the average traffic generation during operation will peak at 14 movements (single trips to or from the development site) per week in year one and 11 in year two, before averaging 9 movements per week in subsequent years.

Further detail on operational traffic movements and impacts is provided in Section 8.6.

3.9 Fire management

The development site is located within an existing highly modified and cleared environment, therefore there is no dense bushland and only limited vegetation in or surrounding the site. The site comprises a mixture of grazed and cropped paddocks.

Once the solar farm is constructed and operational, the lands in and around the PV panels, PCUs, and site office will require maintenance to ensure that the potential for fire is minimised (e.g. ground cover will be kept low).

A water tank, solely for fire protection purposes, will be located adjacent to the site office. The tank will be located such that there is suitable all-weather access for the Rural Fire Service (RFS) fire tankers and appliances.

An ERP will also be prepared for the site which will detail an evacuation plan, fire response, location of fire services and contacts, and a site muster point.

An assessment of bushfire risk and relevant management and mitigation measures is presented in Section 8.10.

3.10 External lighting

External lighting at the solar farm will be restricted to the area where the maintenance shed, permanent site office and switch yard will be located. Lighting will be provided for security reasons and for staff and contractors using the site facilities during operation. All external lighting around buildings will be directed downwards and towards the facility to ensure there is no impact to neighbouring properties from lighting.

3.11 Site security

To ensure public safety, the solar farm will be fenced around the perimeter of the developable area. The security fence will be a height of 2.4 m and will feature CCTV security cameras mounted at regular intervals for monitoring purposes. The fence is expected to be constructed of cyclone fencing material with a strand of barbed wire at the top to deter intruders.

3.12 Environmental management

The development will be constructed under a construction environmental management plan (CEMP) and operated under an operation environmental management plan (OEMP). The CEMP and OEMP will include the following key sections:

- Introduction
- Environmental policy
- Organisational structure
- Description of activities

- Identification of environmental issues and impacts
- Environmental management and monitoring
- Contingency plans and emergency response
- Complaints management
- Auditing and reporting
- Continuous improvement.

The CEMP and OEMP will be formally developed during the post-approvals process in consultation with relevant government agencies. The OEMP will be a living document that is updated as necessary to incorporate any key operational changes. A rehabilitation and decommissioning strategy (RDS) will be prepared three years before the planned decommissioning of the project (see Section 3.13.1, below).

3.13 Site decommissioning

3.13.1 Rehabilitation and decommissioning strategy

Prior to the commencement of decommissioning activities, a rehabilitation and decommissioning strategy (RDS) would be prepared in consultation with the landholder and submitted for approval by the NSW Department of Primary Industries (DPI). The objectives of the RDS will be to:

- rehabilitate the site to a safe, stable and non-polluting landform
- minimise the visual impact of any above ground ancillary infrastructure agreed to be retained for an alternative use
- restore land capability to pre-existing agricultural use
- ensure public safety

The RDS would include the following key elements:

- rehabilitation strategies and objectives
- rehabilitation design criteria
- productivity targets to ensure the re-establishment of agricultural production (if agreed as the final landuse)
- expected timeline for rehabilitation works
- mitigation measures and monitoring.

3.13.2 Infrastructure removal

At the end of the project's operational life, the development area will be decommissioned. During decommissioning, all above ground infrastructure will be removed. Key elements of project decommissioning are expected to include:

- disconnection of the solar farm from the TransGrid connection point at the substation
- disconnection and removal of PV modules, and removal of mounting posts, mounting frames and trackers. Materials would be sorted and packaged for removal from the site and for recycling or reuse wherever possible. Many of the solar array panels are expected to be recyclable
- removal of all buildings and equipment, with materials recycled wherever possible
- removal of steel columns and cabling for recycling
- removal of all underground infrastructure to ensure that previously cropped lands can be returned to their predevelopment state
- removal of fencing (unless requested otherwise by the landholder)

- site rehabilitation, remediation (if required), and return to pre-existing landuse (unless otherwise agreed with the landholder).

3.13.3 Site rehabilitation

Following infrastructure removal, the following is expected to be undertaken to re-instate the site for agricultural activities:

- removal of gravel from internal tracks and roads (unless requested otherwise by the landholder)
- removal of any concrete and foundations
- deep ripping of any compacted areas to allow for the infiltration of water and to allow for cropping activities
- re-establishment of groundcover in any areas where cropping is not to occur to ensure the stabilisation of soil resources, using groundcover species that are compatible with the existing native species composition
- establishment of suitable erosion and sediment control measures.

3.13.4 Final landuse

It is expected that the final landuse after rehabilitation will be the resumption of current agricultural practices at the site.

4 Project justification and alternatives considered

The Wyalong Solar Farm can be justified against a range of criteria, including greenhouse gas mitigation, energy security, economic benefits, and commercial factors. Justification for the project taking these aspects into consideration is presented below, along with a discussion of alternatives considered by ESCO Pacific when developing the project.

4.1 Climate change and renewable energy

The greenhouse effect is a natural process whereby some of the sun's energy is absorbed by greenhouse gases (GHGs), increasing the temperature of the Earth's surface. Human activities, particularly burning of fossil fuels (coal, oil and natural gas), agriculture and land clearance, are dramatically increasing the concentration of GHGs and resulting in an enhanced greenhouse effect. GHGs include water vapour, carbon dioxide, ozone, methane, nitrous oxide, and chlorofluorocarbons (CFCs) (DoEE 2018a).

The enhanced greenhouse effect is resulting in (DoEE 2018a):

- a significant increase in the frequency and intensity of global extreme weather events such as bushfires, extreme rainfall, droughts, and tropical cyclones
- an increase in ocean and sea levels (and their acidity)
- changes in rainfall patterns (with wet regions becoming wetter and dry regions becoming drier).

Climate change poses a threat to Australia due to its environmental, social and economic impacts, particularly to water security, agriculture, coastal communities and infrastructure. This threat was acknowledged by scientists and politicians around the world at the 21st Conference of the Parties (COP21) in Paris in November/December 2015, where a historic global climate agreement was agreed to under the United Nations Framework Convention on Climate Change (UNFCCC), referred to as the Paris Agreement.

The Paris Agreement sets in place a framework for all countries to take climate action from 2020, and build on existing efforts in the period up to 2020. Key objectives of the agreement include:

- A global goal to hold average temperature increase to well below 2°C and pursue efforts to keep warming below 1.5°C above pre-industrial levels.
- All countries to set mitigation targets from 2020 and review targets every 5 years to build ambition over time, informed by a global stocktake.
- Robust transparency and accountability rules to provide confidence in countries' actions and track progress towards targets.
- Promoting action to adapt and build resilience to climate impacts.
- Financial, technological and capacity building support to help developing countries implement the Agreement.

At the COP21 conference, Australia committed to reducing its GHG emissions to 26-28% below 2005 levels, by 2030.

The replacement of energy from fossil fuel sources with energy from renewable sources, such as solar power, is a key mechanism for reducing GHGs. The Australian and NSW governments are making efforts to reduce GHG emissions through development of strategies and targets in relation to renewable energy generation, which are discussed further in Section 4.2 below.

4.2 Energy context in Australia

In addition to GHG reduction, efforts are being made by governments at both Commonwealth and State level, to improve energy security, reduce prices for consumers, diversify the energy mix and facilitate the adoption of renewable technologies.

4.2.1 Electricity generation in Australia

Renewable Energy Target

Since 2001, the Commonwealth Government has mandated the use of energy from renewable resources in electricity generation. In 2009, the Renewable Energy Target (RET) scheme mandated that 20% of Australia's electricity supply was to come from renewable sources by 2020.

In 2011, the RET was split into two parts comprising a large-scale RET (LRET) and a small-scale renewable energy scheme (SRES). The LRET created a financial incentive to establish and expand renewable power stations such as solar farms, wind farms and hydro-electric power stations and deliver the majority of the 2020 target. Reforms were made to the RET in 2015 with a target for large-scale energy generation of 33,000 GWh by 2020 i.e. 23.5% of Australia's electricity supply will come from renewable sources by 2020. Further reforms were announced by the Australian government in September 2018, with a target of 25% of renewable energy by 2020 and 40% by 2025.

The LRET scheme sits within the broader context of Australia's need to reduce greenhouse gas emissions to meet its commitments under the 1997 Kyoto Protocol and Paris Agreement.

The SRES provides an incentive for communities, including households and small businesses, to install eligible small-scale renewable energy systems including solar water heaters, PV systems, and small-scale wind systems (DoEE 2018b).

4.2.2 Electricity generation in NSW

NSW 2021: A Plan to Make NSW Number One

The NSW 2021 Plan is a 10-year strategic plan (developed in 2011) for NSW to strengthen the local environment and communities through economy-rebuilding and restoring government accountability, by setting priority actions to meet targets It replaces the State Plan as the NSW Government's strategic business plan (NSW Government 2011).

A target of the plan is to increase renewable energy generation, with a 20% renewable energy supply by 2020, to meet Goal 22 – Protect Our Natural Environment, in support of the RET scheme.

The priority action to meet this target is as follows:

…contribute to the national renewable energy target by promoting energy security through a more diverse energy mix, reducing coal dependence, increasing energy efficiency and moving to lower emission energy sources. Specific initiatives include:

- Building the Moree solar power plant in partnership with the Commonwealth Government under the Solar Flagship Program
- Establishing a Joint Industry Government Taskforce to develop a Renewable Energy Action Plan for NSW to identify opportunities for investment in renewable energy sources.

NSW Renewable Energy Action Plan

The NSW Renewable Energy Action Plan (the Plan) was released in 2013 by the NSW Government to support the achievement of the national target of 20% renewable energy by 2020 (NSW Government 2013).

The strategy of the Plan is to work with NSW communities and the renewable energy sector to increase renewable energy generation in NSW, with the least cost to the energy customer and the maximum benefits to NSW.

The goals of the Plan are to:

- attract renewable energy and investments, using practical steps to remove barriers to investment in renewable energy
- build community support for renewable energy by allowing the community to have a say on decisions that affect it and build community support for renewable energy
- attract and grow expertise in renewable energy technology, as well as focusing on moving renewable energy technologies from the research and development phase to demonstration and deployment.

The Plan recognises that energy storage can reduce the pressure on distribution and transmission line infrastructure and electricity prices by allowing energy to be sold at times of peak market prices, and encouraging more supply at times of peak demand. Energy storage increases the value of renewable energy to individuals, communities, network operators and investors.

Some key achievements of the Plan have been (DPE 2018):

- The NSW government entered into a contract with the Beryl Solar Farm in the State's central west to use enough renewable energy to cover all of Sydney Metro Northwest's operational electricity needs.
- Research was commissioned by the NSW government into community awareness, knowledge and attitudes to renewable energy technologies across NSW, which showed strong public support.
- An agreement was signed by the government to buy renewable energy from the 24 MW Dubbo Solar Hub which underpinned the project reaching finance close and beginning construction.

Climate Change Fund Draft Strategic Plan 2017 - 2022

The Climate Change Fund was established in 2007 to encourage energy and water saving activities, as part of a wider strategy to address the impacts of climate change. The fund assists the NSW Government to improve energy management by contributing funding to activities that reduce the impacts of climate change, including the implementation of the Energy Efficiency Action Plan 2013 which works alongside the NSW Renewable Energy Action Plan 2013 to attract investment and growing expertise, build community support and reduce pressure on electricity costs for customers (OEH 2016; NSW Government 2013).

Over the next five years, the Climate Change Fund will support $1.4 billion of activity in New South Wales. This will include $900 million allocated to ongoing priorities including conserving private land and delivering sustainability programs.

The Climate Change Fund Draft Strategic Plan sets out priority investment areas and potential actions to be undertaken over the next five years (2017 to 2022) using the remaining $500 million of funding from the $1.4 billion Climate Change Fund. An aspirational objective of the Strategic Plan is to achieve net-zero emissions by 2050, and for NSW to be more resilient to a changing climate.

The potential actions for investigation under the three priority areas of policy, operation and advocacy are:

- Accelerating advanced energy: attract investment in advanced energy and save emissions (up to $200 million to be invested).
- National leadership in energy efficiency: grow the economy and reduce energy bills (up to $200 million to be invested).
- Preparing for a changing climate: minimise impacts of climate change in NSW (up to $100 million to be invested).

4.3 Project benefits

4.3.1 Government level benefits

The Wyalong Solar Farm would contribute Australia's GHG commitments by reducing emissions associated with energy use and contributing to the achievement of the RET. The solar farm would also be part of the transition away from fossil fuel reliance to cleaner electricity generation, and the transition to increased energy security through a more diverse energy mix. It is therefore consistent with, and strongly supports, current policy direction at both a Commonwealth and State government level.

Key project benefits include:

- increased energy security through a more diverse energy mix (DoI 2016)
- increased security and reliability of the National Electricity Market (NEM) by reducing pressure on electricity prices during sunlight hours through low cost generation and increased competition in the NEM
- generation of approximately 130 MW (DC) at full capacity, which is enough to power approximately 32,000 NSW homes (DoI 2016)
- reduction in State GHG emissions – based on an emission factor of 0.87 kg of carbon dioxide equivalent (CO_2-e)/kWh (DIICCSRTE 2013) the proposed solar farm would displace approximately 190,000 tonnes of CO_2-e or GHG emissions per year.

For context, a solar energy facility that displaces 100,000 tonnes of CO_2 per annum is the equivalent of taking approximately 30,000 petrol-fuelled cars off the road each year, based on an average car in NSW travelling 14,100 km per year (DIT 2011).

The project is classified as a State Significant Development and has an estimated capital investment value of approximately $130 million. It therefore represents a significant new investment in the State of NSW, with significant direct and indirect economic flow-on effects. These effects will be particularly apparent at a regional level, where the project represents welcome investment in an important rural area of the State and will contribute to a more diversified and sustainable income base.

4.3.2 Local project benefits

At a local level, project benefits are expected to include:

- An increase in direct local employment. The project is expected to require up to 150 staff and contractors during the nine-month construction period, with many of these drawn from the local area. During operation the project is expected to provide long-term local employment opportunities for the four full-time and eight part-time staff, as well as requiring support from local contractors in site management and maintenance activities. The expected 40-year duration of the project means that it will be a long-term employer in the region.
- Stimulation of the local economy, particularly during the construction period, through workforce demand for accommodation, hospitality, retail and other services, as well as through the local hire and supply of equipment and materials.
- The provision of education and training opportunities for contractors and local residents, as well as practical on-the-job experience, resulting in an increase and diversification of the local skills base – with many of these skills directly transferable to other projects.
- The project has the potential to act as a seed for further investment in the region, particularly in the area of renewables and new technologies. This will help diversify the local income base and provide alternate sources of income during periods when tough climatic or market conditions are depressing agricultural returns.
- The project assists with the local energy system by supplying the load at the Lake Cowal mine. By supplying the mine with nearby generation, rather than from the Hunter Valley, Snowy Scheme or

Newcastle regions, the losses in the system are reduced. Reducing these losses will likely reduce the loss factor costs incurred by Lake Cowal mine.

4.3.3 Commercial benefits

ESCO Pacific is investing in and developing the project because the company has confidence in the project's financial viability and the commercial returns it will generate. ESCO Pacific and management have a track record of developing utility-scale solar farms in Australia and overseas.

4.4 Ecologically sustainable development

Ecologically Sustainable Development (ESD) is the integration of environmental, social and economic considerations in policy development and decision-making processes. In 1991, the Commonwealth Government defined ESD as '*using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased'.*

In 1992, the Australian Government endorsed *The National Strategy for Ecologically Sustainable Development (1992)*, noting that implementation would be subject to budgetary priorities and constraints in individual jurisdictions. The strategy aims to provide governments with a framework for policy development and decision-making in Australia using ESD principles, particularly in relation to industry sectors that rely on utilisation of natural resources (ESDSC 1992).

Governments encourage industry and businesses to use the strategy to contribute to Australia's national goal of ESD which is:

'*Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.'*

Section 7 (subclause 1f) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 requires the EIS to include justifications for the development, with regard to biophysical, economic and social considerations, including the principles of ESD set out in subclause 4. Subclause 4 lists the principles of ESD as follows:

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:
   i. careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
   ii. an assessment of the risk-weighted consequences of various options,
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,
c) conservation ***of biological diversity and ecological integrity***, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,
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.

This EIS incorporates these ESD principles as outlined below and as demonstrated in Chapter 8.

Precautionary principle

The precautionary principle has been adopted by undertaking technical assessments of various project options so as to ensure serious or irreversible damage to the environment is avoided. The resultant project design has resulted in a project that is expected to have minimal impact on the environment. The management and mitigation measures proposed in this EIS are conservative where uncertainty exists over the extent of potential impact. The project is therefore consistent with the precautionary principle.

Inter-generational equity

The project is consistent with the principle of inter-generational equity. The project will assist in meeting the RET and helping to reduce climate change impacts, which will contribute to positive environmental and social outcomes for future generations. As a renewable energy project, it avoids the depletion of finite resources and does not reduce the capacity of future generations to generate energy. Once the site is decommissioned, it can be returned to primary production.

Conservation of biological diversity and ecological integrity

The development site is located on agricultural land that has been largely cleared of native vegetation. A biodiversity assessment was undertaken to identify existing ecological values of the site and potential project-related impacts. Areas of high ecological significance have been avoided during project design. Where impacts are unavoidable, these will be managed and offset appropriately. Further detail on the biodiversity assessment and relevant management and mitigation measures, including offset requirements, is provided in Section 8.1.

Improved valuation, pricing and incentive mechanisms

This principle places a monetary value on the environment to reduce future exploitation. This project uses a natural environmental resource, the sun's energy, to produce electricity which is a valued commodity. Additionally, solar power is increasingly able to compete economically with less environmentally friendly energy sources such as fossil fuels, providing a market-driven incentive mechanism for the adoption of sustainable and non-polluting energy production.

The removal of native vegetation on the development site would be offset in accordance with the NSW Biodiversity Offsets Policy for Major Projects, which would fund biological conservation activities. Offsetting is a means of placing monetary value on the environment to provide incentive for improved biodiversity outcomes.

The project is not expected to have any significant impacts to soil or waterways and therefore environmental resources will not be significantly depleted. Any pollution generated as a result of the project would be managed and remediated by the applicant.

4.5 Alternatives considered

4.5.1 Site selection

ESCO Pacific has undergone a process of constraints and opportunities analysis to identify potential project sites in NSW and other States. This process has included consideration of factors such as:

- regulatory settings for renewable energy projects
- solar irradiation levels
- access to and capacity of existing energy grids
- potential for land acquisition
- land suitability (topography, existing landuse, flood risk, zoning etc.)
- need to minimise environmental and social impacts (e.g. avoiding sensitive environments or areas of cultural heritage value).

The Wyalong locality was chosen as the location for the project because of the high solar irradiance in the region and the capacity of the Essential Energy electricity network to transmit the power generated.

Subsequently, a decision was made to initiate pre-development investigations and activities.

Nine potential sites along the Essential Energy 132kV 901 electricity network were initially identified within Bland Shire Council and subjected to further desktop assessments. In addition to grid capacity considerations, ESCO Pacific followed a process to avoid, minimise and offset impacts to environmental and social values. This resulted in Lot 160 on DP 750615 (current development site) and one other site near Blands Lane being progressed through preliminary environmental and technical assessments. The result of this assessment confirmed that the current development site provided:

- optimal grid connection opportunities within the lot boundary: there is no need for an additional easement or land tenure agreement outside the lot boundary to connect the solar farm to the Essential Energy electricity network
- safer access for all construction and operation and maintenance traffic via the Newell Highway: access via the Newell Highway also reduces amenity issues for local residents as there is no need for heavy construction vehicles to use smaller unsealed roads
- minimal ecological constraints within the project vicinity: there are no significant waterways within the development site. Furthermore, the few threatened species recorded in the vicinity are more likely to utilise the native vegetation patches within the road reserve than the development site
- minimal sensitive receptors: there are three neighbouring properties to the proposed solar farm (within 2km). Only one of these is not associated with the landholder. ESCO Pacific has an ongoing constructive dialogue with each of these stakeholders, who are all generally supportive of the project.

Furthermore, land suitability and potential for land acquisition also made the current site the most suitable for development.

4.5.2 Project design and configuration

The size of the solar project was determined by the connection capacity of the local electricity network through the Essential Energy 132 kV transmission line. The design and configuration of the project take into account the findings of EIS studies and investigations. This includes consideration of environmental and social factors such as the need to:

- identify and operate within any environmental constraints (such as avoiding areas within the development site that may be of conservation significance)
- minimise disruption to local landholders
- minimise amenity issues through siting of infrastructure and screening
- take into account the expectations and any concerns of the local community and Bland Shire Council.

These considerations were balanced against the need to achieve design, construction and operational efficiencies to reduce projects costs and maximise solar yields.

4.5.3 Project footprint and micro-siting

As a result of the constraints and opportunities analysis discussed in Section 4.5.1 and studies undertaken as part of this EIS, ESCO Pacific has gained a detailed understanding of key environmental and social constraints of the current development site, enabling further refinement of the project to avoid any key issues, including the avoidance of scattered trees within the south western part of the property.

A 130 MW solar farm can comfortably be located within the proposed development site, without causing a significant impact to environmental or social values.

As set out in Chapter 8, the avoidance of key environmental areas, in combination with appropriate environmental safeguards during construction of the project (to be detailed in the project's CEMP), is expected to ensure that the development meets the requirements to avoid and minimise impacts on environmental values.

4.5.4 A 'do nothing' approach

A 'do nothing' approach would forgo the benefits of the project outlined in Section 4.3. These benefits are expected to significantly outweigh the potential adverse environmental impacts of the project, which are expected to be of low to negligible significance when appropriate management and mitigation measures are implemented.

5 Planning and statutory framework

The following sections provide an outline of the planning and statutory framework that applies to the project, including relevant Commonwealth and NSW legislation, regulations and policies. The permissibility of the development and requirements for lot reconfiguration are also presented.

5.1 Commonwealth legislation

5.1.1 Environmental Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), administered by the Commonwealth Department of the Environment and Energy (DoEE), requires approval from the Environment Minister for actions likely to have a significant impact on a Matter of National Environmental Significance (MNES).

The EPBC Act identifies the following nine MNES:

- World Heritage properties
- national heritage places
- wetlands of international significance (Ramsar wetlands)
- nationally threatened species and ecological communities
- migratory species
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- nuclear actions (including uranium mining)
- water resources (relating to coal seam gas development and large coal mining development).

Any proposed actions falling within the following categories must be referred to DoEE to determine whether the action is a 'controlled action':

- actions that have a significant impact on MNES
- actions that (indirectly or directly) have a significant environmental impact on Commonwealth land
- actions carried out by the Commonwealth Government.

The assessment of the significance of the impact is based on the criteria listed in the DoEE's *Significant Impact Guidelines 1.1* (DoE 2003). Should the Environment Minister decide the action is to be taken in a manner that is not likely to have an adverse impact on the MNES, approval will be granted.

This project will be unlikely to significantly impact MNES. This is further discussed in Section 8.1.

5.1.2 Native Title Act 1993

The *Native Title Act 1993* provides a national framework for the recognition and protection of native title (i.e. the rights and interests, recognised by common law, possessed under traditional laws and customs of Aboriginal and Torres Strait Islander people).

The Act recognises the ownership (or set of rights and interest) of land or waters by Aboriginal and Torres Strait Island groups prior to European Settlement; provides a mechanism for determining where native title exists and who holds it; and identifies compensation for actions affecting it. The Act establishes ways in which future dealings affecting native title may proceeds and sets standards for those dealings.

People who hold native title have a right to practice their traditional laws and customs, whilst respecting Australian laws, and have a right to a) be consulted with regarding any proposed action on their land b) receive compensation for that action.

No Native Title Determination Applications, Determinations of Native Title, or Indigenous Land Use Agreements exist over the development site and Native Title will not be further considered within this EIS.

5.1.3 Commonwealth Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* enables the Australian Government to respond to requests to protect areas and objects of particular significance to Aboriginal people if it appears that state or territory laws have not provided effective protection.

The Australian Government can make a declaration to protect an area, object or class of objects from a threat of injury or desecration. However, the government cannot make a declaration unless an Aboriginal person or group of persons has requested it. A declaration is only made if the relevant processes of the state or territory have been exhausted.

An ACHAR was prepared for this project, identifying some objects of Aboriginal cultural significance within the development site. The assessment is discussed further in Section 8.2.

5.2 New South Wales legislation

5.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act is the principle legislation regulating land use in NSW and is administered by DPE. The EP&A Act sets a framework for approval of developments in NSW and requires relevant planning authorities to assess potential environment and social impacts of proposed development or landuse change. The Act prescribes relevant planning bodies, environmental planning instruments, environmental assessment, and liability with regards to contaminated land.

The proposed project supports a number of objects of the EP&A Act by promoting and encouraging social, economic and environmental wellbeing through the use of land for power generation using renewable sources. Specifically, the project supports the following objects of the EP&A Act:

(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 for the purpose of promoting the social and economic welfare of the community and a better environment,

(ii) the promotion and co-ordination of the orderly and economic use and development of land,

(iii) the protection, provision and co-ordination 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, and

(vii) ecologically sustainable development

(b) to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and

> *(c) to provide increased opportunity for public involvement and participation in environmental planning and assessment.*

The project is also consistent with the remaining objects of the Act.

Consent for an SSD, including any connections to the Essential Energy grid (such as construction of a substation or additional feeder lines) within the solar farm development site, is granted under Part 4, Division 4.1, Section 89E of the EP&A Act*:*

> *(1) The Minister is to determine a development application in respect of State significant development by:*
>
> > *(a) granting consent to the application with such modifications of the proposed development or on such conditions as the Minister may determine, or*
> >
> > *(b) refusing consent to the application.*

As an SSD, the project requires the development of this EIS under Part 4 'Development Assessment' of the EP&A Act.

5.2.2 Environmental Planning and Assessment Regulation 2000

The Environmental Planning and assessment Regulation 2000 (EP&A Regulation) contains detail on various processes set out under the EP&A Act.

Schedule 2 of the EP&A Regulation provides:

- provisions for EIS development, including EIS content
- conditions for the preparation of environmental assessment requirements for a development, by the Secretary and approval bodies
- timing requirements for Development Applications (DAs)
- other provisions relating to state significant infrastructure
- clauses 84 and 85 provide provisions relating to advertising of the development, and state the DA be placed on public exhibition for a period of no less than 30 days
- Section 7 (subclause 1f) of Schedule 2 requires the EIS include justifications for the development, with regard to biophysical, economic and social considerations, including principles of ecologically sustainable development (ESD) set out in subclause 4
- Division 6 of the EP&A Regulation relates to public participation for SSDs and includes provisions for the public exhibition period, notices of application, responding to submissions and lists the documents that are to be made publicly available.

This EIS has been prepared in accordance with the EP&A Regulation. Justifications for the development, and its incorporation of ESD principles, are provided in Chapter 4. Notices of application are addressed further in Chapter 6.

5.2.3 State Environmental Planning Policy (State and Regional Development) 2011

The State Environmental Planning Policy (SEPP) (State and Regional Development) 2011 aims to identify development that is of State significance and confers functions on joint regional planning panels to determine development applications.

The following is considered an SSD under Clause 20 of Schedule 1 of the policy:

> *Development for the purpose of electricity generating works or heat or their co-generation (using any energy source, including gas, coal, biofuel, distillate, waste, hydro, wave, solar or wind power) that:*
>
> > *(a) has a capital investment value of more than $30 million, or*

(b) has a capital investment value of more than $10 million and is located in an environmentally sensitive area of State significance.

The Wyalong Solar Farm project is classified as an SSD under Part 4 of the EP&A Act, as it has a capital investment value of more than $30 million.

As an SSD, the project would be assessed by DPE and require approval from the Minister for Planning and Environment. SSDs require the preparation of an EIS detailing potential environmental impacts as a result of the project and appropriate management measures. The EIS is to be prepared in accordance with the requirements of the SEARs.

The Wyalong Solar Farm project is classified as an SSD under Part 4 of the EP&A Act, as it has a capital investment value of more than $30 million. The EIS has been prepared in accordance with the SEARs as shown in Section 1.5.

5.2.4 State Environmental Planning Policy (Infrastructure) 2007

The SEPP (Infrastructure) 2007 (ISEPP) aims to facilitate the effective delivery of infrastructure across the State by providing for the development of electricity generating works on any land in a prescribed rural, industrial or special use zone for which there is consent, including large-scale solar energy systems.

Part 3 (Development controls), Division 4 (Electricity generation works or solar energy systems), Clause 34 (Development permitted with consent) of ISEPP specifically refers to solar energy systems, stating that (except as provided by subclause (8) relating to prescribed residential zones), *development for the purpose of a solar energy system may be carried out by any person with consent on any land*.

ISEPP states that development of electricity generation works or solar energy systems is a permitted activity on any land with consent within a 'prescribed rural zone'. Under Part 3, Division 4 of the ISEPP, the following clauses are relevant:

Clause 34:

(1) Development for the purpose of electricity generating works may be carried out by any person with consent on any land in a prescribed rural, industrial or special use zone.

Clause 33:

In clause 33, a 'prescribed rural zone' is defined as:

...any of the following land use zones or a land use zone that is equivalent to any of those zones:
(a) Zone RU1 Primary Production… .

Division 17 (Roads and Traffic), Subdivision 2 (Development in or adjacent to road corridors and road reservations) of the ISEPP sets out requirements for the management of road and traffic issues related to proposed developments adjacent to road corridors and road reservations. Clause 101 (Development with frontage to classified road) states that:

(2) The consent authority must not grant consent to development on land that has a frontage to a classified road unless it is satisfied that:

(a) where practicable, vehicular access to the land is provided by a road other than the classified road, and

(b) the safety, efficiency and ongoing operation of the classified road will not be adversely affected by the development as a result of:

(i) the design of the vehicular access to the land, or

(ii) the emission of smoke or dust from the development, or

(iii) the nature, volume or frequency of vehicles using the classified road to gain access to the land, and

(c) the development is of a type that is not sensitive to traffic noise or vehicle emissions, or is appropriately located and designed, or includes measures, to ameliorate potential traffic noise or vehicle emissions within the site of the development arising from the adjacent classified road.

ISEPP allows for the development of large-scale solar energy systems with consent even on land prescribed for rural use. Traffic access and management for the Wyalong Solar Farm has been designed taking the requirements of the ISEPP into account, as outlined in Section 8.6.

As required under the SEARs, a traffic management plan (TMP) is required for the project. ESCO Pacific accepts this requirement and will prepare a TMP consistent with the objectives of the ISEPP as a condition of the Development Consent.

5.2.5 State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

SEPP No. 33 – Hazardous and Offensive Development (SEPP 33) defines and regulates the assessment and approval of potentially hazardous or offensive development.

A potentially hazardous industry is defined within SEPP 33 as "*a development for the purpose of any industry which, if the development were to operate without employing any measures to reduce or minimise its impact, would pose a significant risk to human health, life or property, or to the biophysical environment*".

A potentially offensive development is defined within SEPP 33 as a "*development for the purposes of an industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would emit a polluting discharge (including for example, noise) in a manner which would have a significant adverse impact in the locality or on the existing or likely future development on other land, and includes an offensive industry and an offensive storage establishment.*"

The project is not considered as potentially hazardous or offensive and therefore SEPP 33 does not apply. This is discussed further in Section 7.

5.2.6 State Environmental Planning Policy No. 55 – Remediation of Land

SEPP No. 55 – Remediation of Land (SEPP 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.

Under Clause 7 of SEPP 55, a consent authority must not consent to the carrying out of any development on land unless it has considered whether the land is contaminated.

There is no reason to suggest that contamination exists at the development site requiring consideration during the development of the Wyalong Solar Farm. This is discussed further in Section 8.5.

5.2.7 State Environmental Planning Policy (Rural Lands) 2008

The SEPP (Rural Lands) 2008 aims to:

- facilitate the orderly and economic use and development of rural lands for rural and related purposes
- identify Rural Planning Principles and the Rural Subdivision Principles so as to assist in the proper management, development and protection of rural lands for the purpose of promoting the social, economic and environmental welfare of the State
- implement measures designed to reduce landuse conflicts
- identify State significant agricultural land for the purpose of ensuring the ongoing viability of agriculture of that land, having regard to social, economic and environmental considerations

- amend provisions of other environmental planning instruments relating to concessional lots in rural subdivisions.

Land considered State significant agricultural land is listed in Schedule 2 of the SEPP.

The project is not considered State significant agricultural land, and is unlikely to impact on such, and is consistent with the aims of the SEPP. Lot subdivision will be required as part of the approval process for the project and this is discussed further in Section 5.3.2.

5.2.8 State Environment Planning Policy No. 44 – Koala Habitat Protection

State Environment Planning Policy No. 44 – Koala Habitat Protection (SEPP 44) requires that for Development Applications 'potential koala habitat' must be determined. Such habitats are defined as having 15 per cent of trees of the species listed in the SEPP 44.

This EIS considers the presence of Koala habitat within the development site, concluding that no habitat is present (see Section 8.1).

5.2.9 Bland Local Environmental Plan 2011

The development site is located within the Bland Shire Council boundaries and is therefore subject to the relevant provisions of the 2011 Bland Local Environmental Plan (Bland LEP).

Aims of Bland LEP

The Bland LEP provides local environmental planning provisions for land in Bland in accordance with the relevant standard environmental planning instrument under section 33A of the EP&A Act.

The aims of the plan are:

- to protect, enhance and conserve agricultural land through the proper management, development and conservation of natural and man-made resources
- to encourage a range of housing, employment, recreation and community facilities to meet the needs of existing and future residents of Bland
- to promote the efficient and equitable provision of public services, infrastructure and amenities
- to conserve, protect and enhance the environmental and cultural heritage of Bland
- to encourage the sustainable growth of the villages of Bland.

Land zoning

The proposed Wyalong Solar Farm and transmission line routes are located on land zoned RU1 – Primary Production. The objectives of the RU1 zone include the following:

- 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 landuses within this zone and landuses within adjoining zones
- to ensure that development on land within this zone does not unreasonably increase the demand for public services or public facilities.

Additional local provisions

The Bland LEP contains a number of additional local provisions relating to matters such as essential services, earthworks, terrestrial biodiversity, riparian land and watercourses, wetlands, groundwater vulnerability, flood planning, airspace operation and location of sex services premises.

Subdivision

The development site is located within zone AF for subdivision. Section 4.1 of the LEP states that the size of any lot resulting from a subdivision of land to which this clause applies is not to be less than 200 ha. No exemption exists at council level, so subdivision, if required, may not comply with the LEP. ESCO Pacific has been consulting with Bland Shire Council regarding the potential need for subdivision and the implications for project approvals.

The project will address all the relevant provisions of the Bland LEP. Proposed lot subdivision is discussed further in Section 5.3.1.

5.2.10 Riverina Murray Regional Plan 2036

The proposed Wyalong Solar Farm falls within the Riverina Murray region of NSW. DPE has prepared the *Riverina Murray Regional Plan 2036* (RMRP) which provides a 20-year blueprint for the region (DPE 2017).

The RMRP sets out the NSW Government's vision for the Riverina Murray, which is to create a diversified economy founded on Australia's food bowl, iconic waterways and a strong network of vibrant and connected communities.

The Government has set four goals for the region to achieve this vision:

- a growing and diverse economy
- a healthy environment with pristine waterways
- efficient transport and infrastructure networks
- strong, connected and healthy communities.

The development of the Wyalong Solar Farms is consistent with these objectives, in particular the development of a growing and diverse economy.

The project will assist in meeting the objectives of the RMRP. This is discussed further in Section 8.12.

5.2.11 Roads Act 1993

The *Roads Act 1993* (Roads Act) provides a framework for the management of roads in NSW. It provides for the classification of roads and the declaration of the Roads and Maritime Services (RMS) and other public authorities as roads authorities for both classified and unclassified roads. The Roads Act confers functions on RMS and other roads authorities, and allows the distribution of such functions between RMS and other roads authorities.

The Roads Act sets out procedures for the opening and closing of public roads and regulates the carrying out of various activities on public roads.

Under Section 138 of the Roads Act, consent is required for any works or activities in a public reserve, public road way or footpath (nature strip). Section 138 requires that all activities undertaken within council road reserves be approved by council prior to the activities being undertaken.

A traffic assessment report outlining any requirements for use of roads has been prepared as part of this EIS (see Section 8.6). If applicable, approval from the RMS or local council will be sought under section 138 of the Roads Act.

5.2.12 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) commenced on 25 August 2017 as part of the NSW Government's new framework for the conservation of biodiversity. It supersedes the *Native Vegetation Act 2003*, *Threatened Species Conservation Act 1995*, *Nature Conservation Trust Act 2001* and sections of the *National Parks & Wildlife Act 1974*. The BC Act governs the management and conservation of biodiversity in NSW, which includes all flora, fauna and ecological communities, consistent with the principles of ESD (as

described in section 6(2) of the Protection of the Environment Administration Act 1991). The BC Act establishes (amongst others):

- a framework to avoid, minimise and offset the impacts of proposed development and landuse change on biodiversity
- a scientific method for assessing the likely impacts on biodiversity values of proposed development and landuse change, for calculating measures to offset those impacts and for assessing improvements in biodiversity values
- a market-based conservation mechanism through which the biodiversity impacts of development and landuse change can be offset at landscape and site scales.

A BDAR has been prepared as part of this EIS to identify the potential impacts of the Wyalong Solar Farm project on biodiversity. The project has been designed to avoid impacts to native vegetation. No threatened flora, fauna and populations are expected to be significantly impacted. The biodiversity assessment is discussed further in Section 8.1.

5.2.13 Biodiversity Conservation Regulation 2017

The Biodiversity Conservation Regulation 2017 (BC Regulation) supports the BC Act in outlining the framework for addressing impacts on biodiversity from development and clearing. The BC Regulation also establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offsets Scheme.

Section 6.8 of the BC Regulation requires that a BDAR for a development application must include details of offsets for impacts, including the number and classes of biodiversity credits required to be retired in accordance with the like-for-like requirements of the offset rules. The credentials of the assessors that established these offsets and the date of the assessment is also required under the BC Regulation.

A BDAR has been prepared as part of this EIS, in accordance with the BC Regulation, and discusses the biodiversity offsets that will be required as a result of the Wyalong Solar Farm project. The biodiversity assessment is discussed further in Section 8.1.

5.2.14 Fisheries Management Act 1994

The Department of Primary Industries (DPI) administers the *Fisheries Management Act 1994* (FM Act) and associated regulations (FM Regulations). The broad objective of the FM Act is to conserve, develop and share the fishery resources of the State for the benefit of present and future generations.

Part 7 of the Act deals with the protection of aquatic habitats and Part 7A deals with threatened species conservation. When assessing and either approving or refusing proposals for developments (including SSD and infrastructure projects) or other activities affecting fish habitats, DPI take into account their Policy and Guidelines for Fish Habitat Conservation and Management (DPI 2013b).

Unless known to provide habitat for threatened species, for the purposes of these policies and guidelines, the following are not considered key fish habitat:

- farm dams constructed on unmapped gullies and first and second order streams
- purpose built irrigation and other water supply channels and off-stream storages
- irrigation, agricultural or urban drains.

A BDAR has been prepared as part of this EIS to identify the potential impacts of the Wyalong Solar Farm project on biodiversity. The site does not contain key fish habitat and is not known to provide habitat for threatened species. The biodiversity assessment is discussed further in Section 8.1.

5.2.15 Local Land Services Amendment Act 2016

The *Local Land Services Act 2013* (LLS Act) was amended on 25 August 2017 in relation to native vegetation land management and clearance in rural areas, replacing the *Native Vegetation Act 2003,* as part of the NSW Government's new framework for the conservation of biodiversity. The LLS Act provides a framework for the management of local land services which include programs and advisory services relating to agricultural production, biosecurity, natural resource management (including management of native vegetation, weeds and pests) and emergency management.

The LLS Act aims to ensure natural resources are managed in accordance with the principles of ESD (as described in section 6(2) of the Protection of the *Environment Administration Act 1991*) in the social, economic and environmental interests of the State.

The management of local land services, specifically relating to native vegetation clearance on rural land, and the management of weeds, has been considered in this EIS (see Section 8.1).

5.2.16 Water Management Act 2000

The objective of the *Water Management Act 2000* is to provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations and, in particular to:

- promote ESD
- protect, enhance and restore water courses
- recognise and foster social and economic benefits
- recognise the role of the community
- provide efficient and equitable sharing of water
- manage water sources together with other aspects of the environment including native vegetation and native fauna
- encourage the sharing of responsibility and efficient use of water encourage best practice management and use of water.

The management of surface water and groundwater, and potential impacts to hydrology, have been considered in this EIS and are addressed in Section 8.4.

5.2.17 Biosecurity Act 2015

The *Biosecurity Act 2015* (Biosecurity Act) provides a statutory framework for the management of biosecurity risks from diseases, pests (plant and animal) and contaminants that have the potential to cause harm to the environment, people and the economy. The Biosecurity Act aims to reduce risks by: preventing the entry of diseases, pests and contaminants into NSW; identifying, containing and eradicating new entries; and minimising potential impacts through appropriate management.

The Biosecurity Act has provisions in place for: conferring a power, function or right; or imposing an obligation, for the prevention of the introduction, or control or eradication of invasive pests (such as weeds and animal pests) which threaten ecosystems, habitats or species.

Under the Biosecurity Act, Local Control Authorities such as local councils may appoint authorised officers to enforce weed management and provide direction on complying with obligations under the Biosecurity Act.

The potential for project-related impacts from invasive weeds and pests has been considered in the EIS and is discussed in Section 8.1.

5.2.18 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) is the key legislation governing the State's care, control and management of all national parks, historic sites, nature reserves and Aboriginal areas. State conservation areas, karst conservation reserves and regional parks are also administered under the Act.

Places or objects of Aboriginal cultural heritage on or in the vicinity of the site will need to be managed in accordance with this Act. Clause 86 of this Act states: a person must not harm or desecrate an object that the person knows is an Aboriginal object.

Section 87 of the NPW Act establishes defences against prosecution under s.86 (1), (2) or (4) – harming or desecrating Aboriginal objects and Aboriginal places. The defences are as follows:

- An Aboriginal Heritage Impact Permit (AHIP) authorising the harm (s.87(1)).
- Exercising due diligence to establish Aboriginal Objects will not be harmed (s.87(2)). Due diligence may be achieved by compliance with requirements set out in the National Parks and Wildlife Regulation 2009 (the NPW Regulation) or a code of practice adopted or prescribed by the NPW Regulation (s.87(3)).

Under Section 89J of the EP&A Act, an Aboriginal heritage impact permit under section 90 of the *National Parks and Wildlife Act 1974* would not be required for an SSD, unless the requirement of an environmental planning instrument for consultation or concurrence specifies that it applies to an SSD.

An ACHAR has been prepared for this project, identifying some objects of Aboriginal cultural significance within the development site. The assessment, as well as a historic heritage assessment, are discussed further in Section 8.2 and Section 8.3.

5.2.19 National Parks and Wildlife Regulation 2009

The NPW Regulation 2009 (cl.80A) assigns the OEH (2010b) *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* as one of the codes of practice that can be complied with pursuant to s.87 of the NPW Act. Disturbed land is defined by cl.80B (4) as;

> *"…disturbed if it has been the subject of a human activity that has changed the land's surface, being changes that remain clear and observable". Examples given in the notes to cl.80B (4) include "construction or installation of utilities and other similar services (such as above or below ground electrical infrastructure, water or sewerage pipelines, stormwater drainage and other similar infrastructure)".*

The presence and extent of ground disturbance is a key determinant in establishing the cultural heritage potential of an area under the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW*.

An ACHAR has been prepared for this project, identifying some objects of Aboriginal cultural significance within the development site. The assessment is discussed further in Section 8.2.

5.2.20 Heritage Act 1977

The *Heritage Act 1977* provides a legal framework for the management of items and places of State heritage significance, providing for their protection. The Act encourages conservation of the State's heritage and provides for the identification and registration of items of State heritage significance.

Under Section 89J of the EP&A Act, an approval under Part 4, or an excavation permit under section 139, of the *Heritage Act 1977* would not be required for an SSD.

Any existing or unknown or other potential unknown State heritage items will be managed under the Act.

A search of the local and state heritage registers identified no recorded heritage items within the development site, and therefore the project is unlikely to impact on historic heritage, as discussed in Section 8.3.

5.2.21 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) provides the regulatory framework to protect the environment of NSW, including land, air and water. It is the key piece of environment protection legislation administered by the EPA. PA 2.49 and PA 2.50 of the Act set out obligations regarding the receiving of wastes to be stored, processed or disposed on site and the classification of those wastes.

The control and mitigation measures for greenhouse gas emissions associated with the project will also be managed under this Act.

Under section 48 of the POEO Act, premises-based scheduled activities, as defined in Schedule 1, require an Environmental Protection Licence (EPL). Under Clause 17 of Schedule 1, electricity generation is a scheduled activity requiring an EPL. However, solar power is not included in this definition and therefore the project is not a scheduled activity under the POEO Act and an EPL is not required (NSW Government 2017).

This EIS considers emissions to land, air and water, including greenhouse gas emissions, in Chapter 4 and Chapter 8.

5.2.22 Rural Fires Act 1997

The Rural Fires Act 1997 (Rural Fires Act) provides:

- (a) for the prevention, mitigation and suppression of bush and other fires in local government areas (or parts of areas) and other parts of the State constituted as rural fire districts, and
- (b) for the co-ordination of bush firefighting and bush fire prevention throughout the State, and
- (c) for the protection of persons from injury or death, and property from damage, arising from fires, and
- (c1) for the protection of infrastructure and environmental, economic, cultural, agricultural and community assets from damage arising from fires, and
- (d) for the protection of the environment by requiring certain activities referred to in paragraphs (a)-(c1) to be carried out having regard to the principles of ecologically sustainable development described in section 6 (2) of the Protection of the Environment Administration Act 1991.

As the project is an SSD, a bush fire safety authority under section 100B of the Rural Fires Act is not required. However, Section 63 of the Rural Fires Act imposes a duty of care on land managers and landholders to take appropriate steps to prevent bush fires and Section 64 requires that during the bush fire danger period land managers and landholders take steps to extinguish fire or call the local fire authority.

The site is not located on land mapped as Bush Fire Prone Land. The bush fire risk of this project is discussed in Section 8.10.

As required under the SEARs and requested by Fire and Rescue NSW (FRNSW), an emergency response plan (ERP) is required to be prepared for the site that specifically addresses foreseeable on-site and off-site fire events. ESCO Pacific accepts this requirement and will prepare an ERP as a condition of the Development Consent.

5.2.23 Mining Act 1992

The *Mining Act 1992* aims to encourage and facilitate the discovery and development of mineral resources in NSW, having regard to the need to encourage Ecologically Sustainable Development.

There is one existing mineral exploration licence which partially covers the development site, held by Argent Minerals Ltd, as discussed in Section 8.5. ESCO Pacific is undertaking consultation with Argent Mineral Ltd as part of this EIS.

5.2.24 Crown Lands Act 1989

The *Crown Lands Act 1989*, administered by the Minister for Crown Lands, regulates the management of Crown land for the benefit of the people of New South Wales and in particular to provide for:

a) *a proper assessment of Crown land,*
b) *the management of Crown land having regard to the principles of Crown land management contained in this Act,*
c) *the proper development and conservation of Crown land having regard to those principles,*
d) *the regulation of the conditions under which Crown land is permitted to be occupied, used, sold, leased, licenced or otherwise dealt with,*
e) *the reservation or dedication of Crown land for public purposes and the management and use of the reserved or dedicated land, and*
f) *the collection, recording and dissemination of information in relation to Crown land.*

Under Part 3 of the Act, a land assessment is required to be undertaken for any matters affecting Crown Land.

The project is not expected to have any impacts on Crown land, and the Crown Lands Act 1989 is not discussed further in this EIS.

5.2.25 Conveyancing Act 1919

The *Conveyancing Act 1919* provides a framework for the management of property and land and aims to improve the practice of conveyancing.

Under 7A, item 3A, of the Act, land that is, or is proposed to be, leased for more than a period of five years (including the period of any option to renew), will need to be reconfigured.

The project will lease land for a minimum of five years and therefore reconfiguration of the lots will be required. This is further addressed in Section 5.3.2.

5.3 Permissibility and lot reconfiguration

5.3.1 Project permissibility

Permissibility of solar farm development is determined by the relevant environmental planning instruments, including SEPPs and LEPs. The EP&A Act and the EP&A Regulation also establish the assessment and approval pathways and other development controls relevant to solar farm developments, which are not necessarily permitted in all zones. Key reference points include:

- Section 89E of the EP&A Act, under which consent for an SSD is granted (see Section 5.2.1)
- State Environmental Planning Policy (State and Regional Development) 2011 (see Section 5.2.3)
- the ISEPP (see Section 5.2.4)
- the zoning and land use provisions of the Bland LEP (see Section 5.2.9).

The project is sited on land zoned as RU1 Primary Production under the Bland LEP. Under zone RU1 Primary Production, the following applies:

Planning objectives (Item 1)

- 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.

The LEP lists activities permitted in zone RU1 without consent (Item 2) and with consent (Item 3). Anything not listed in items 1 or 2 are prohibited activities (Item 4). Electricity generating works (including solar energy systems) are not listed under items 2 or 3 of the LEP and are therefore generally prohibited within zone RU1. However, as outlined in Section 5.2.4, the ISEPP states that development of electricity generation works or solar energy systems is a permitted activity with consent on any land within a prescribed rural zone.

Notwithstanding the provisions of the ISEPP, it is the expectation of DPE and Council that large-scale solar developments are broadly compatible with local landuse objectives such as those outlined in the LEP (see Section 5.2.9). In considering this, the following points are relevant:

- The primary objective of the RU1 zone is to encourage primary production. In this regard, the project will be compatible with local landuse objectives as it will have minimal impact on the ground surface and, once the project is decommissioned, the site can return to primary production with no expected loss of land capability.
- Direct and indirect revenue from low impact renewable developments such as solar farms is also a means by which local landholders can diversify their income helping them to remain in primary production during years of low production or depressed market prices.
- The project will not result in the closure of, or restrict the use of, surrounding public roads and will therefore not fragment or alienate surrounding resource lands.
- The development will not conflict with or restrict activities in adjoining landuse zones.

In addition, the project will have minimal impact on the ground surface and once it is decommissioned the site will be able to be returned to its existing state.

The proposed Wyalong Solar Farm is therefore a permissible development for which consent can be granted as an SSD under the Section 89E of the EP&A Act. The project as proposed in this EIS is also consistent with the requirements of the Bland LEP and relevant SEPPs.

5.3.2 Lot reconfiguration

Existing configuration

ESCO Pacific has signed an option to Lease with the landholder that owns Lot 160 on Plan 750615 (Figure 5.1).

Proposed reconfiguration

As outlined in Section 5.2.9, the Wyalong Solar Farm site is located within zone AF for subdivision under the Bland LEP 2011 and any lot resulting from a subdivision is not to be less than 200 ha. As per Section 7A of the *Conveyancing Act 1919*, the project is expected to require reconfiguration of the lot since the proposed lease with the landholder will exceed 5 years.

The reconfiguration of the lot proposed by ESCO Pacific is shown in Figure 5.2. The new lot resulting from the reconfiguration would be less than 200 ha, created within the solar farm boundaries for the switchyard (owned by Essential Energy) with an area of approximately 2,500 m2 (0.25 ha) (pink on the map).

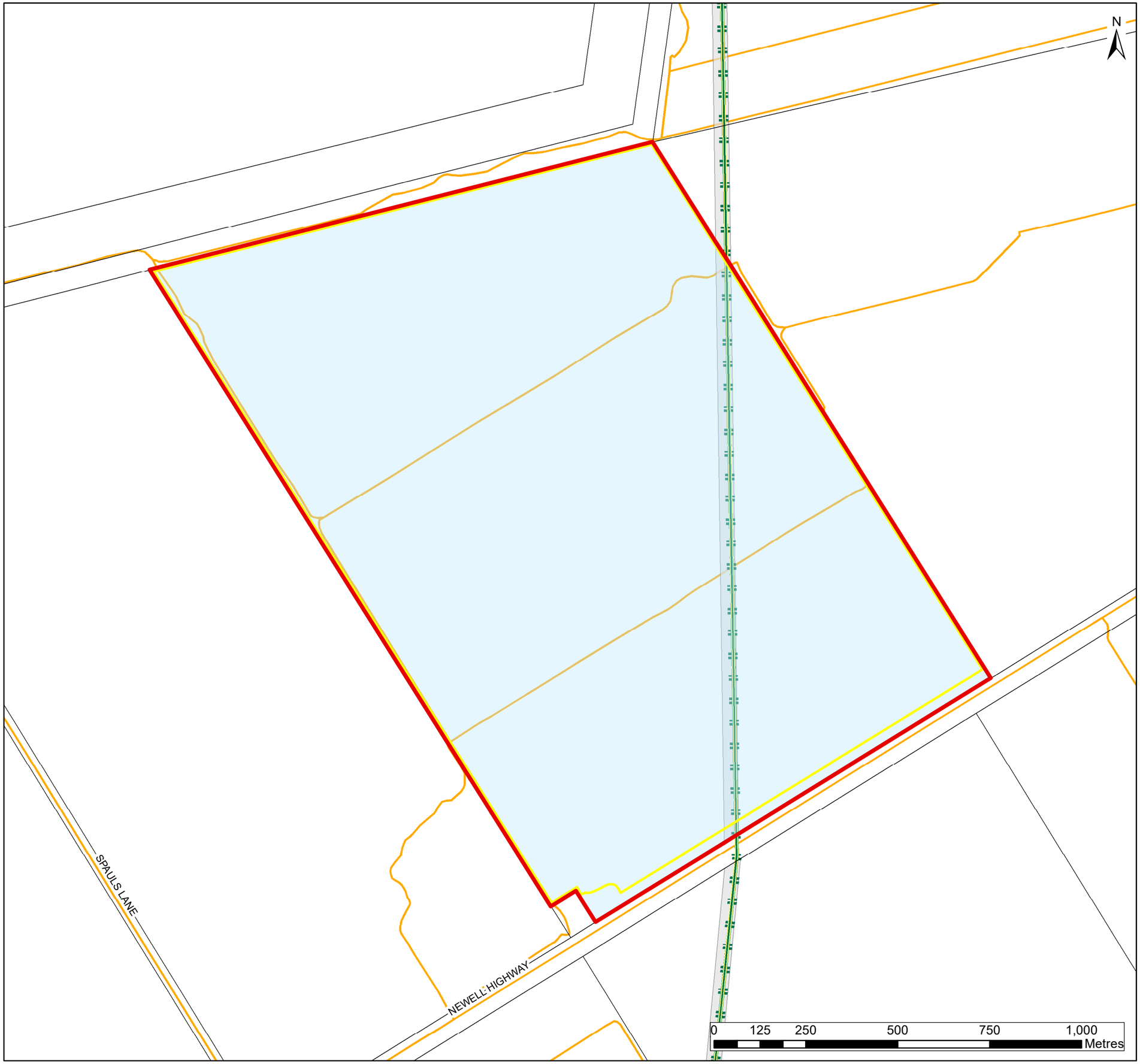
The proposed boundaries and areas shown on Figure 5.1 and Figure 5.2 are indicative at this stage and will need to be surveyed before execution of options to lease, and are subject to feedback from the Transmission Network Service Provider (TNSP).

No residence entitlement will be attached to any of the newly created lots and land ownership would remain unchanged for all lots. Both lots will be accessible from Newell Highway.

ESCO Pacific is in discussion with Bland Council to seek approval for the required subdivision of the existing lots. In a letter dated 2 November 2018, Bland Shire Council stated the proposed reconfiguration of the lots

did not comply with the Bland LEP 2011. However, council provided in principle support for the subdivision as it is consistent with the ISEPP.

The in-principle agreement letter from Bland Shire Council regarding the subdivision is attached in Appendix C.



PROJECT
Wyalong Solar Farm

MAP TITLE
Figure 5.1 Existing Lot Configuration

Title Info
Lot 160 On Plan 750615

LEGEND

Wyalong Solar Farm

- Lot Boundary (259 hectares)
- Development Site (256 hectares)

Existing Cadastral Boundaries

- Lot 160 On Plan 750615

Others

- Cadastral Boundaries
- Essential Energy Transmission lines
- Essential Energy Easement
- Roads / Tracks

ESCO Pacific

DATE	SCALE	Page Size
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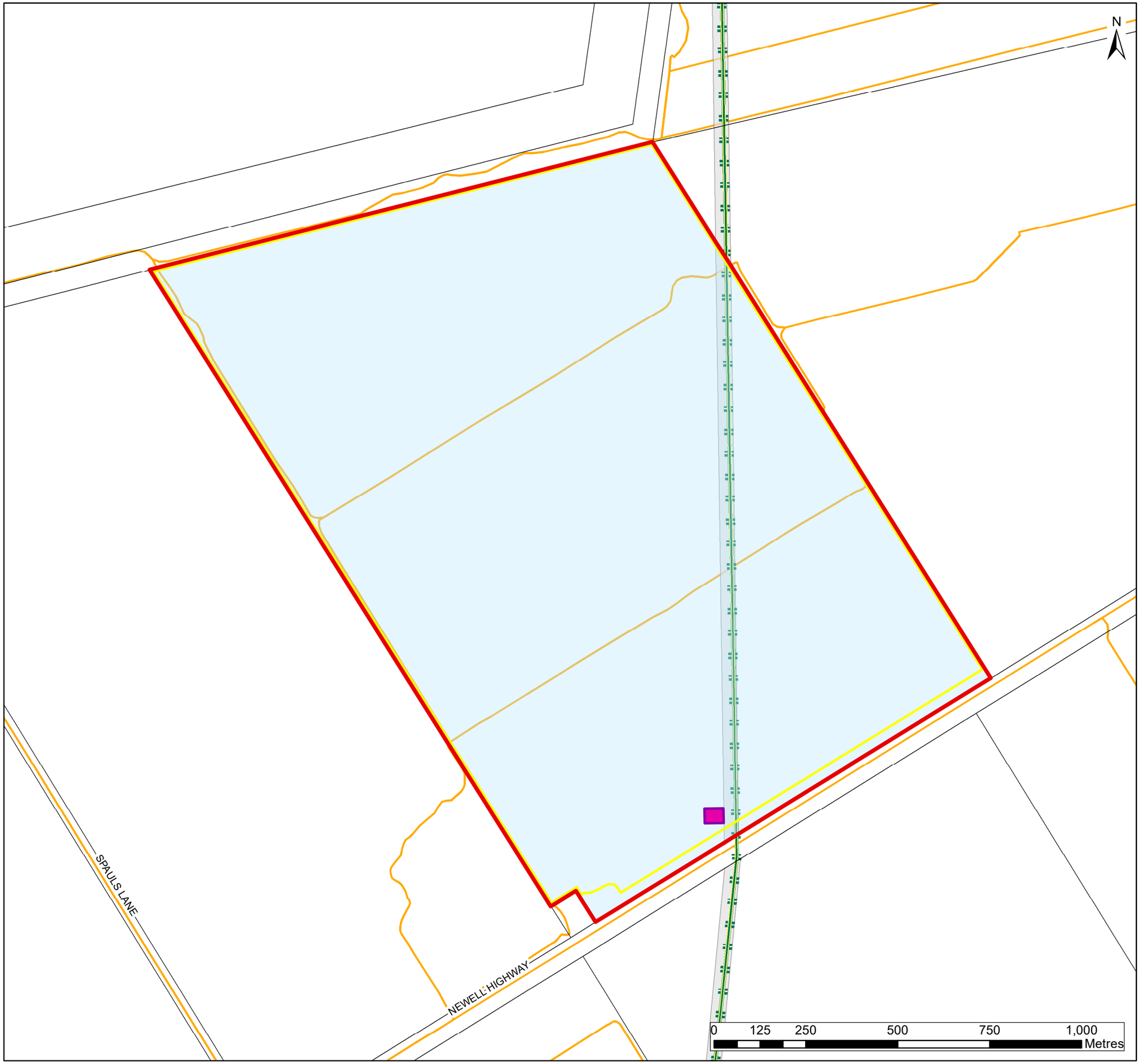

PROJECT
Wyalong Solar Farm

MAP TITLE
Figure 5.2 Proposed Lot Configuration

Title Info
Lot 160 On Plan 750615

LEGEND

Wyalong Solar Farm

- Lot Boundary (259 hectares)
- Development Site (256 hectares)

Unchanged Cadastral Boundaries

- Lot 160 On Plan 750615

Proposed Cadastral Boundaries

- Switchyard - Essential Energy (approx. 2,500 sq. m.)

Others

- Cadastral Boundaries
- Essential Energy Transmission lines
- Essential Energy Easement
- Roads / Tracks

ESCO Pacific

DATE	SCALE	Page Size
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6 Community and stakeholder engagement

6.1 Engagement overview

ESCO Pacific has prepared a Stakeholder and Community Consultation Plan to guide communication activities relating to the proposed project and assist in the preparation of the EIS. This plan provides an overview of stakeholder engagement, a description of the stakeholder engagement activities undertaken and a summary of the findings that have been incorporated into this EIS.

6.2 Formal consultation requirements

The SEARs for the Project state that:

> *"During the preparation of the EIS, you should consult with relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups, affected* landholders*, exploration licence holders, quarry operators and mineral title holders (including Argent Minerals). In particular, you must undertake detailed consultation with affected* landholders *surrounding the development and Bland Shire Council.*
>
> *The EIS must describe the consultation process and the issues raised, and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided."*

Furthermore, the SEARs state that the EIS must:

> "with the local Aboriginal community in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents*".

6.3 Government consultation

Consultation with government agencies was initiated by DPE during the preparation of the SEARs. Government Agencies that provided a response to DPE for inclusion in the SEARs included:

- Bland Shire Council
- NSW Department of Industries
- NSW Department of Planning and Environment, Resources & Energy - Division of Resources & Geoscience
- NSW Environment Protection Authority
- Fire & Rescue NSW
- NSW Rural Fire Service
- NSW Office of Environment and Heritage (OEH)
- NSW Roads & Maritime Services

Consultation was undertaken by ESCO Pacific with numerous government agencies during the preparation of the EIS to clarify agency requirements, discuss methodologies, and to seek feedback. A summary of the consultation undertaken with Government Agencies is provided in Appendix C (Consultation Register).

6.4 Aboriginal community consultation

ESCO Pacific has been actively engaging with the local Aboriginal community in the region and the Local Aboriginal Land Councils (LALCs) since June 2018. Aboriginal consultation for the project is required to be undertaken in accordance with the OEH Aboriginal Cultural Heritage Consultation Requirement's (ACHCRs). Aboriginal consultation is regulated under Clause 80C of the National Parks and Wildlife Regulation 2009. The process includes a four-stage Aboriginal consultation process that stipulates specific timeframes for components of each stage. All stages will be completed before obtaining Development Consent.

The four-stage consultation process is described below along with an outline of consultation activities undertaken to date for each stage. Section 8.2 and the ACHAR (Appendix D) provide further details regarding Aboriginal community consultation.

6.4.1 Stage 1 Identifying Aboriginal stakeholders to be listed as Registered Aboriginal Parties

Stage 1 requires that Aboriginal people who hold cultural information are identified, notified and invited to register an expression of interest in the assessment. This identification process should draw on reasonable sources of information including: the Registrar (Aboriginal Land Rights Act, 1983), the relevant OEH Environment Protection Regulation Group (EPRG) Regional Office, the Local Aboriginal Land Council(s), the National Native Title Tribunal, the Native Title Services Corporation Limited, the relevant Catchment Management Authority and the relevant local council(s). The identification process should also include an advertisement placed in a local newspaper circulated in the general location of the development site. Aboriginal organisations and/or individuals identified should be notified of the project and invited to register an expression of interest (EoI) for Aboriginal consultation. Once a list of Aboriginal community stakeholders has been compiled from the expression of interest process, they need to be consulted in accordance with stages 2, 3 and 4 of the ACHCRs.

In accordance with Stage 1 of the ACHCRs, letters were sent (15/06/2018) to the Albury OEH office, the Registrar of Aboriginal Owners NSW, the Native Title Tribunal, Native Title Services Corporation Limited, and the Local Land Service requesting the identification of interested Aboriginal groups. A letter was also sent to local and regional LALCs. An advertisement was placed in the West Wyalong Advocate (Friday 15 June 2018), Narrandera Argus (Wednesday 18–20 June 2018) and the Temora Independent (Friday 22 June 2018) for at least two weeks, inviting expressions of interest from Aboriginal stakeholders. Letters inviting expressions of interest were sent to three Aboriginal organisations as a result of feedback from the notification process.

The following organisations have been identified as Registered Aboriginal Parties (RAPs) (Table 6.1).

Table 6.1. Registered Aboriginal Parties

RAP	Contact	Date of Expression of Interest
Mark Saddler (individual)	Mark Saddler	18 June 2018
West Wyalong LALC	Leeanne Hampton	6 July 2018
Young LALC	Norma Freeman	13 July 2018

6.4.2 Stage 2 – Providing project information

Stage 2 requires that project information is provided to Aboriginal community stakeholders by the proponent. Relevant project information may include an outline of the project activities, proposed impact areas and environmental assessment process. The presentation of the project information should be documented and include any agreed outcomes with the Aboriginal community stakeholders. In some instances, depending on the nature, scale and complexity of the project, the applicant may create the opportunity for Aboriginal community stakeholders to visit the development site and/or may conduct additional project information sessions.

6.4.3 Stage 3 – Gathering cultural significance

The purpose of Stage 3 is to gather information regarding cultural significance. The aim is to facilitate a process by which Aboriginal community stakeholders can have input into the heritage assessment methodology and management options, and provide information on the cultural significance of Aboriginal objects or places. The applicant must provide a proposed methodology for the cultural heritage assessment and allow a minimum of 28 days to respond. If needed, protocols for the appropriate handling of culturally sensitive information may need to be developed with the Aboriginal community stakeholders. The applicant must also seek the views of the Aboriginal community stakeholders on potential management options for Aboriginal objects or places.

6.4.4 Stage 4 – Draft report

Stage 4 requires that the applicant prepare a draft cultural heritage assessment report and provide a copy to the registered Aboriginal stakeholders for comment. A minimum of 28 days must be provided for the registered Aboriginal stakeholders to comment on the draft report. To finalise the report the applicant must consider the submissions made by the registered Aboriginal stakeholders and include the applicant's response to each submission. The finalised report must be provided to the registered Aboriginal stakeholders and the relevant LALC. Refer to ACHAR (Appendix D) for detailed Aboriginal Community Consultation and outcomes of stage 2 to 4.

6.5 Community consultation

The purpose of the stakeholder and community consultation plan is to identify the key community stakeholders, present the stakeholders with details of the proposed project and give the stakeholders an opportunity to provide feedback and identify any issues or concerns they may have. The plan has focused on the following groups:

- those landholders in close proximity to the project
- individuals within the wider community that have an interest in the project.

A range of consultation activities were undertaken before and during the preparation of the EIS. An overview of these activities is outlined below.

6.5.1 Project factsheet

A project factsheet was prepared to introduce the project to key community stakeholders to provide an overview of the project. The project factsheet provided information on ESCO Pacific, a project summary and a website address for further information on the Project.

ESCO Pacific distributed the project factsheet to community stakeholders via mailout. The project factsheet and other information about the project were also available during the community information session (Appendix C).

6.5.2 Mail-out

Introductory letters and project factsheets were mailed by ESCO Pacific to all landholders within approximately 2 km of the proposed project. The letters introduced the proposed project, ESCO Pacific and encouraged landholders to contact ESCO Pacific to discuss the project further. Letters also included an invitation to the Community Consultation Meeting.

A copy of the introductory letter is provided in Appendix C.

6.5.3 Individual meetings

ESCO Pacific representatives contacted landholders closest to the project offering to meet with them to discuss the project in person prior to and after the Community Consultation Meeting. ESCO Pacific contacted by phone three other landholders located close by to introduce the project and discuss any concerns or feedback.

A copy of the consultation register is provided in Appendix C.

6.5.4 Community consultation meeting

A community information session was held at the West Wyalong Services and Citizens Club, 100 Monash Street, West Wyalong, between 6.30 pm and 7.30 pm on Wednesday 3 October 2018. Over 35 residents attended the session.

The event was advertised to government agencies, project neighbours and the broader community as detailed below:

- the mail-out by ESCO Pacific, including all houses within 2 km of the project
- the West Wyalong Advocate (28 September 2018)
- the Wyalong Solar Farm website (http://wyalongsolarfarm.com.au/)
- emails sent to key government stakeholders, including DPE and council
- local business networks via Bland Shire Council.

The community information session was attended by ESCO Pacific representatives. The session provided an opportunity for community stakeholders to view the proposed plans and to speak to members of the project team to find out more. Stakeholders were encouraged to read and take a copy of the project factsheet, visit the website and or download a copy of the application (PEA Scoping Report) and complete a feedback form.

6.5.5 Project website

Project information has been provided on the Wyalong Solar Farm website www.wyalongsolarfarm.com.au. The website includes an up-to-date overview of the project and offers stakeholders the opportunity to provide feedback on the project.

6.5.6 Consultation database

A consultation database has been created and maintained to record stakeholder contact details and any issues, concerns or feedback received. A copy of the Consultation Register is provided in Appendix C.

6.5.7 Issues raised

Community consultation is ongoing. Issues raised to date have been addressed within the EIS. An up to date consolidated summary of the responses received from the community consultation activities, correspondence can be provided upon request. The consultation Register is presented in Appendix C.

6.6 Continuing consultation activities

ESCO Pacific will continue to undertake consultation with stakeholders as necessary, at various times through the project including:

- EIS public exhibition
- any other time as interest levels dictate
- as otherwise recommended by DPE.

Lines of communication between the applicant and stakeholders will remain open through various communication mediums as detailed in Section 6.5.

Consultation with Argent Minerals

ESCO Pacific initiated consultation with Argent Minerals and the company's agent on the 26 September 2018, providing project information, key timelines and contact details (see Appendix C). Several follow up phone calls and emails have been exchanged. ESCO Pacific is committed to ongoing consultation with Argent Minerals to ensure any conflicting landuse issues are resolved as a matter of priority.

6.6.1 EIS public exhibition and post exhibition

This EIS will be placed on public exhibition for a minimum period of 30 days.

ESCO Pacific will continue to commit resources to satisfy consultation requirements during the public exhibition phase and throughout the life of the Project.

ESCO Pacific will actively engage with key stakeholders to ensure they are aware the EIS is on exhibition.

Information about the EIS will be made available on:

- the project website www.wyalongsolarfarm.com.au
- the website of Department of Planning & Environment – Major Project Assessment – http://majorprojects.planning.nsw.gov.au/.

Contact details for ESCO Pacific will continue to be made available on the project website and on any distributed material.

ESCO Pacific will continue to undertake consultation with stakeholders as necessary post determination of the EIS for the project.

7 Risk assessment

Environmental risk assessment is the process of identifying, evaluating and controlling risks that may lead to impacts on the environmental aspects of a project. It includes identifying a clear pathway to one or more sensitive receivers, and assessing the risk of potential impacts on the sensitive receivers as a result of the project.

Key risk assessment terms and definitions are provided in Table 7.1

Table 7.1. Key risk assessment terms and definitions

Term	Definition
Risk	The potential for an event to occur that impacts on a sensitive receiver, assessed by considering likelihood and consequence. An **inherent risk** is a risk before the application of risk controls and a **controlled risk** is a risk after the application of risk controls.
Likelihood	The likelihood of the event occurring, determined based on the history of similar incidents occurring and/or professional judgment.
Consequence	The consequence of the event occurring determined based on the history of similar incidents occurring and/or professional judgment.
Standard controls	Risk management controls considered accepted practice in industry for reducing the likelihood and/or consequence of a potential impact on a sensitive receiver. Standard controls are recognised procedures, guidelines, methods, and codes of practice that can be sourced from regulations, policies, guidelines and leading practice references.
Non-standard controls	Risk management controls that are specific to the site or the project, or are required in response to a specific project commitment or regulator/community requirement.

The risk assessment process adopted for the Wyalong Solar Farm can be summarised as follows:

- **Step 1**. Sensitive receivers were identified, corresponding to potentially 'at risk' aspects or components of the environment.
- **Step 2**. The hazards and risk sources that are applicable to the project and the development site were identified.
- **Step 3**. Project-related events that may result in an impact on a sensitive receiver were identified.
- **Step 4**. Likelihood and consequence categories were defined, including different definitions of consequence for different environmental aspects.
- **Step 5**. The inherent risk of each potential event occurring was assessed by assigning a likelihood and consequence category, and using a risk matrix (Figure 7.1) to assign a risk rating.
- **Step 6.** Standard and non-standard risk controls were applied, based on the management and mitigation measures identified during the EIS investigations, to reduce the likelihood and/or consequence of each event occurring and thereby reduce its overall risk rating.
- **Step 7**. The controlled risk of each potential impact event occurring was assessed and a new risk rating assigned.

Table 7.2 shows the likelihood levels and definitions used for the risk assessment. Table 7.3 shows the consequence levels and definitions. Consequences have been considered for the following aspects:

- environment
- heritage
- community
- project design and management.

For each event, the aspect resulting in the highest consequence category was used to assign an overall rating to the risk.

Consequence	Rare (1)	Unlikely (2)	Possible (3)	Likely (4)	Almost Certain (5)
Critical (5)	Medium	High	Very high	Very high	Very high
Major (4)	Medium	Medium	High	Very high	Very high
Moderate (3)	Low	Medium	Medium	High	Very high
Minor (2)	Low	Low	Medium	Medium	High
Insignificant (1)	Low	Low	Low	Medium	Medium

Likelihood

Figure 7.1. Risk matrix showing classification of risk ratings

Table 7.2. Likelihood categories and definitions

Category	Definition
Rare	May occur only in exceptional circumstances. This risk event is known to not have occurred elsewhere (likelihood < 5%).
Unlikely	Could occur at some time. This risk event is not expected to occur but could occur at some time (likelihood 5% to 30%).
Possible	Might occur at some time. This risk event could occur at any time during planned works (likelihood > 30% to 70%).
Likely	Will probably occur in most circumstances. This risk event will likely occur several times during the planned works (likelihood > 70% to 90%).
Almost certain	Expected to occur in most circumstances. This risk event will likely occur frequently during the planned works (likelihood > 90%).

Table 7.3. Consequence categories and descriptions

Category	Environment	Heritage	Community	Project design and management
Critical	Major, irreversible impacts on viability of threatened ecological communities or species.	Irreversible damage to places or objects of very high cultural heritage significance.	Widespread, unplanned loss of major individual or community assets or infrastructure. Widespread, irreversible loss of land capability. Major debilitating injury or loss of life.	Requires extensive changes in design, construction and operation that threaten the viability of the wider organisation, and additional resources are required that may exceed the organisation's resource capability to resolve.
Major	Localised impacts on threatened ecological communities or species.	Irreversible damage to places or objects of high cultural heritage significance. Excavation and salvage of objects of high or very high cultural heritage significance.	Significant deterioration in community assets or infrastructure. Long-term loss of land capability or incompatibility of project with surrounding landuse. Non-life-threatening and non-permanent injury. Substantial loss of local amenity.	Requires changes in design, construction and operation adversely impact the project's success, and additional resources are required that may exceed the project's resource capability to resolve.
Moderate	Localised, irreversible impacts on non-threatened ecological communities or species.	Irreversible damage to places or objects of moderate cultural heritage significance. Excavation and salvage of objects of moderate cultural heritage significance.	Moderate, reversible loss of land capability or landuse. Occasional moderate level or frequent low-level impacts on amenity.	Changes in design, construction and operation may be required and additional resources are required, and may result in disruption to the project's timelines and activities.
Minor	Localised, reversible impacts on non-threatened ecological communities or species.	Excavation and salvage of objects of low cultural heritage significance.	Minor, reversible loss of land capability or current landuse. Low level or occasional nuisance impacts on amenity.	Can be managed with no change in design, construction and operation, but may need to be prioritised and requires additional resources.
Insignificant	Localised, temporary disruption to non-threatened species.	No impact on places or objects of cultural heritage significance.	Negligible impacts on amenity, land capability or current landuse.	Can be managed with no change in design, construction and operation or additional resources.

7.1 Sensitive receivers

This EIS and its supporting technical assessments have identified the following main categories of sensitive receivers that are at risk of impacts from the project:

- community – including local landholders, local businesses, registered Aboriginal parties, the broader community, council and other regulatory agencies
- environment – including terrestrial and aquatic flora and fauna, ecosystems and waterways
- heritage – including places and objects of Aboriginal or historic heritage significance.

7.2 Risk identification

Based on an understanding of the sensitive receivers potentially affected by the project, and a review of project location, design, configuration and activities, the following risks have been identified:

- loss of threatened ecological communities or species adversely impacting on biodiversity values
- injury and death of non-threatened fauna impacting on local biodiversity
- weed and pest introduction and spread impacting on local biodiversity and agriculture
- harm of Aboriginal or historic cultural heritage
- dust or other emissions affecting nearby residences
- increased electromagnetic interference potentially affecting public health
- increase in bushfires or electrical fires as a result of the development
- increase in downstream flood risk as a result of the development
- loss of containment of hazardous materials affecting surface waters, groundwater, soils or ecology
- loss of land capability affecting agricultural and other uses
- erosion and sedimentation affecting agricultural and other uses
- conflict with landuse in surrounding areas
- noise from site activities or traffic affecting local landholders
- altered property values and reduced agricultural viability affecting the local community
- traffic accidents involving the public
- reduced visual amenity affecting nearby landholders or adjacent road users
- nuisance glint and glare affecting nearby residences
- excessive resource use or waste generation degrading natural capital
- cumulative impacts.

The applicability of these risks to different phases of the project phases (construction, operation and decommissioning) is summarised in Table 7.4

Table 7.4. Potential impacts and applicability to project phases

Risk categories	Construction	Operation	Decommissioning
Biodiversity impacts	Yes	Yes	Yes
Heritage impacts	Yes	-	Yes
Dust/air emissions	Yes	-	Yes
Electromagnetic field impacts	-	Yes	-
Fire and bushfire issues	Yes	Yes	Yes
Flood and hydrology impacts	Yes	Yes	Yes
Hazardous substances issues	Yes	Yes	-
Landuse impacts	Yes	Yes	Yes
Light emissions	-	Yes	-
Noise pollution	Yes	Yes	Yes
Socioeconomic and community impacts	Yes	Yes	Yes
Soils, erosion and sedimentation	Yes	-	Yes
Traffic and transport impacts	Yes	Yes	Yes
Visual amenity impacts	Yes	Yes	-
Resource use and waste generation	Yes	Yes	Yes

7.3 Preliminary risk assessment

A preliminary risk assessment is shown in Table 7.5. The preliminary risk assessment does not take into consideration the application of risk controls.

Table 7.5. Preliminary risk assessment

Aspects	Sensitive receivers	Potential risk	Likelihood	Consequence	Risk
Biodiversity	Environment	Loss of threatened ecological communities or species	Possible	Major	High
	Environment	Injury and death of non-threatened fauna	Likely	Moderate	High
	Environment	Weeds introduction and spread	Possible	Minor	Medium
	Environment	Pest introduction and spread	Possible	Minor	Medium
Cultural heritage (Aboriginal and historic)	Heritage	Harm of Aboriginal cultural heritage	Likely	Moderate	High
	Heritage	Harm of historic heritage	Rare	Major	Medium
Dust/air emissions	Community	Nuisance emissions	Unlikely	Minor	Low
Electromagnetic fields	Community	Increased electromagnetic interference	Unlikely	Insignificant	Low
Bushfire and electrical fire issues	Community/ Environment	Development causing increase in fires	Rare	Major	Medium
Flood and hydrology	Community/ Environment	Development causing flooding impacts downstream	Rare	Minor	Low
Hazardous substances	Environment	Loss of containment following spills	Unlikely	Major	Medium
Landuse	Community/ Environment	Loss of land capability	Unlikely	Minor	Low
	Community	Conflict with adjacent landuse	Unlikely	Minor	Low
Light emissions	Community	Operation causing nuisance light	Unlikely	Minor	Low
Noise pollution	Community	Nuisance noise	Unlikely	Minor	Low
	Community	Cumulative project noise impacts	Unlikely	Minor	Low
Soils, erosion and sedimentation	Community/ Environment	Erodible soils and sedimentation from construction and rehabilitation	Unlikely	Minor	Low
Socioeconomic and community	Community	Altered property values and reduced agricultural viability	Rare	Minor	Low

Aspects	Sensitive receivers	Potential risk	Likelihood	Consequence	Risk
Traffic and transport	Community	Traffic accidents involving public	Unlikely	Critical	High
	Community	Reduced amenity	Unlikely	Minor	Low
	Community	Increased traffic from cumulative projects	Unlikely	Minor	Low
Visual amenity	Community	Local amenity reduced	Possible	Moderate	Medium
	Community	Nuisance glint and glare	Unlikely	Minor	Low
	Community	Amenity reduced for extent of visibility	Unlikely	Minor	Low
Resource use and waste generation	Environment	Excessive resource use	Unlikely	Minor	Low
	Environment	Excessive waste generation	Unlikely	Minor	Low

7.4 Risk management and controls

Five key risks associated with the development were identified as potentially having high consequences in the absence of risk controls:

- loss of threatened native vegetation communities or species
- injury and death of non-threatened fauna
- loss of Aboriginal cultural heritage
- traffic accidents involving public
- local amenity reduced.

These risks required detailed investigation and assessment by specialists (see specialist reports appended to this EIS) to assess potential risks in greater detail, and develop management and mitigation measures to reduce risks and avoid or mitigate impacts.

The proposed management and mitigation of the potential impacts associated with these keys risks is outlined in detail in Chapter 8 and the supporting technical appendices. Key risk controls include:

- locating the development site to avoid and minimise impacts on threatened ecological communities or species
- committing to having a licenced wildlife salvage team on site during vegetation removal when active hollows are identified
- locating the development site to avoid scarred trees, avoiding or salvaging areas of Aboriginal cultural significance, and preparing the ACHAR in cooperation with the RAP
- managing project-related traffic in accordance with RMS requirements to minimise the risk of accidents
- locating the development site away from nearby residences.

7.5 Residual risk assessment

A residual risk assessment was undertaken taking risk controls into account and is shown in Table 7.6 The revised risk rating considers the proposed management and mitigation measures for the project as described in Chapter 8 and summarised in Chapter 9.

Table 7.6. Residual risk assessment

Aspect	Sensitive receivers	Potential Impact	Mitigated Likelihood	Mitigated Consequence	Residual Risk
Biodiversity	Environment	Loss of threatened ecological communities or species	Unlikely	Moderate	Medium
	Environment	Injury and death of non-threatened fauna	Possible	Minor	Medium
	Environment	Weeds introduction and spread	Unlikely	Minor	Low
	Environment	Pest introduction and spread	Unlikely	Minor	Low
Cultural heritage (Aboriginal and historic)	Heritage	Harm of Aboriginal cultural heritage	Unlikely	Moderate	Medium
	Heritage	Harm of historic heritage	Unlikely	Minor	Low
Dust/air emissions	Community	Nuisance emissions	Unlikely	Insignificant	Low
Electromagnetic fields	Community	Increased electromagnetic interference	Unlikely	Insignificant	Low
Bushfire and electrical fire issues	Community/ Environment	Development causing increase in fires	Rare	Moderate	Low
Flood and hydrology	Community/ Environment	Development causing flooding impacts downstream	Rare	Insignificant	Low
Hazardous substances	Environment	Loss of containment following spills	Unlikely	Minor	Low
Landuse loss	Environment	Loss of land capability	Rare	Insignificant	Low
	Environment	Conflict with adjacent landuse	Unlikely	Minor	Low
Light emissions	Community	Operation causing nuisance light	Rare	Insignificant	Low
Noise pollution	Community	Nuisance noise	Rare	Insignificant	Low
	Community	Cumulative project noise impacts	Rare	Minor	Low

Aspect	Sensitive receivers	Potential Impact	Mitigated Likelihood	Mitigated Consequence	Residual Risk
Soils, erosion and sedimentation	Environment	Erodible soils and sedimentation from construction and rehabilitation	Rare	Insignificant	Low
Socioeconomic and community	Community	Altered property values and reduced agricultural viability	Rare	Minor	Low
Traffic and transport	Community	Traffic accidents involving public	Rare	Critical	Medium
	Community	Reduced amenity	Rare	Insignificant	Low
	Community	Increased traffic from cumulative projects	Rare	Minor	Low
Visual amenity	Community	Local amenity reduced	Unlikely	Minor	Low
	Community	Nuisance glint and glare	Rare	Insignificant	Low
	Community	Amenity reduced for extent of visibility	Rare	Insignificant	Low
Resource use and waste generation	Environment	Excessive resource use	Rare	Insignificant	Low
	Environment	Excessive waste generation	Rare	Insignificant	Low

The application of standard and non-standard risk controls results in the residual risk ratings being considered low for all environmental issues, apart from the following four exceptions for which the risk is moderate:

- loss of threatened ecological communities or species
- injury and death of non-threatened fauna
- harm of Aboriginal cultural heritage
- traffic accidents involving public.

The level of risk associated with the construction, operation and rehabilitation of the project, taking into account the implementation of the proposed risk controls, mitigation strategies and management plans, is considered acceptably low.

7.6 SEPP 33 preliminary risk screening

In addition to the risk assessment above, the SEARs require:

> *a preliminary risk screening in accordance with State Environmental Planning Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33 (DoP 2011), and if the preliminary risk screening indicates the development is "potentially hazardous", a Preliminary Hazard Analysis (PHA) must be prepared in accordance with Hazard Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis (DoP 2011) and Multi-Level Risk Assessment (DoP 2011).*

The preliminary risk screening is detailed below.

7.6.1 Potentially hazardous industry

A potentially hazardous industry is defined within SEPP 33 as "*a development for the purpose of any industry which, if the development were to operate without employing any measures to reduce or minimise its impact, would pose a significant risk to human health, life or property, or to the biophysical environment*".

DPE have checklists and a risk screening procedure to assist in determining whether a development proposal falls within the definition of potentially hazardous industry.

Lists of potentially hazardous industry

Industries that may fall within SEPP 33 are listed in:

- SEPP 33: Appendix 3 Table: Industries that may be potentially hazardous
- Multi-Level Risk Assessment Guidelines: IAEA Table II Checklist (DPI 2011).

Solar farms are not listed in either checklist.

Screening potentially hazardous industry

The screening procedure is based on the quantity of dangerous goods involved in the development and, in some cases, the distance of these materials from the site boundary.

The following list of hazardous materials and quantities of goods for the development and operation of the Wyalong Solar Farm was estimated based on previous solar farm construction by ESCO Pacific at Ross River, Queensland:

- fire suppression gas (minor numbers of 2.5 kg hand held fire extinguishers)
- diesel – up to 2500 L (operation: up to 2000 L)
- machine oils – 100 L
- lubricants – 100 L
- hydraulic fluid – 100 L
- herbicides – 100 L
- lithium-ion batteries – 240 *Tesla Powerpack 2* units and 40 inverters (in the event a battery storage facility is developed on-site).

If any of the above materials result in a screening threshold being exceeded, the proposed project will be considered potentially hazardous and SEPP 33 will apply.

Materials need to be classified according to the National Transport Commission (2017) *Australian Code for the Transport of Dangerous Goods by Road and Rail* (ADG Code) (NTC 2017).

The ADG Code lists the following classes of dangerous goods:

- Class 1 Explosives
- Class 2 Gases
- Class 3 Flammable liquids
- Class 4 Flammable solids
- Class 5 Oxidising substances and organic peroxides
- Class 6 Toxic and infectious substances
- Class 7 Radioactive material
- Class 8 Corrosive substances
- Class 9 Miscellaneous dangerous substances and articles, including environmentally hazardous substances.

The ADG Code classes were assigned to the materials identified as dangerous goods that are likely to be used on site. Materials identified as dangerous goods for the Wyalong Solar Farm project include:

- fire suppression gas
- fuels and oils
- herbicides
- lithium-ion batteries.

Tables 7.7 and 7.8 present the screening threshold levels from SEPP 33 above which the dangerous goods are considered potentially hazardous and requiring further assessment. Table 7.7 covers dangerous goods storage and Table 7.8 covers dangerous goods transportation. The tables include dangerous goods class, storage and transport thresholds, proposed storage and transportation, and an assessment of whether the SEPP is exceeded.

Transport, Storage and Handling

The ADG Code requires dangerous goods to be carried in a secure, safe and environmentally controlled manner. All hazardous materials will be stored and transported in bunded containment. The ADG code also specifies 'special provisions' and 'packing instructions' applying to the transportation of lithium-ion batteries.

All Dangerous goods (excluding Lithium–ion batteries) will be appropriately segregated and stored within bunded areas of the maintenance yard located near the southern boundary of the solar farm.

Lithium‑ion battery units will be stored in separate enclosure next to the maintenance yard. The distance from maintenance yard and battery enclosure to the nearest development site boundary (located to the south) would be 15 m. The maintenance yard would be located approximately 660 m east of the nearest residence (owned by the landholder).

Lithium-ion batteries

It is noted that although DG Class 9 materials are excluded from the screening test, the hazards related to these materials should be considered as detailed in *Applying SEPP 33 Guidelines.* Further information follows in the next section Battery Storage.

Table 7.7. Dangerous goods and SEPP 33 storage threshold

Hazardous material	Dangerous goods class	SEPP 33 storage threshold	Project storage	Exceed SEPP
Fire suppression gas	2.2	Not applicable		No
Fuels and oils	3 PGII	5 tonne	<2.8 tonne[1] <2.0 tonne[2]	No
Herbicides	6.1 PGII	2.5 tonne	0.1 tonne[2]	No
Lithium-ion battery units	9	Not applicable	300	No

[1] during construction
[2] during operation

Table 7.8. SEPP 33 transport threshold

Hazardous material	Dangerous goods class	SEPP 33 transport threshold		Project transport requirements		Exceed SEPP
		Movements	Quantities	Movements	Quantities	
Fire suppression gas	2.2	Not applicable				No
Fuels and oils	3 PGII	>750/year cumulative >45/week	3-10 tonne	52/year cumulative, 1/week[1] 12/year cumulative, 1/month[2]	<2.5 tonne[1] <2.0 tonne[2]	No
Herbicides	6.1 PGII	Yes	1-3 tonne	twice a year[2]	<0.1 tonne[2]	No
Lithium-ion battery units	9	>1000/year cumulative >60/week	No limit	25/year in total[1]	12[1]	No

[1] during construction
[2] during operation

Battery storage

The installation of the battery storage will be undertaken in accordance with the current regulations and guidelines for battery installation. However, this is a new and evolving area of regulation and if further regulations, standards or guidelines (e.g. release of final AS/NZ 5139 *Safety of battery systems for use in inverter energy systems*) become available, the proposed battery installation shall be checked and modified for consistency with these new reference documents and modified as required to conform with best practice.

The level of risk arising from battery storage depends on the quantity and type of batteries, the storage arrangements and proposed control measures (including fire prevention, protection and mitigation measures). The following information provides details on the batteries and storage arrangements to qualify the extent and the magnitude of the risks associated with the proposed battery storage[2]:

- total capacity of the battery storage
- distance from the battery storage location to the nearest residence and to the office building
- details on storage arrangements, including minimum separation distances between the containers
- hazards arising from the storage of lithium-ion batteries should be identified and appropriate safeguards should be listed
- details on the proposed control measures to minimise the risks.

Total capacity of the battery storage

The proposed battery storage system for the Wyalong Solar Farm is a Tesla *Powerpack 2* system developed for use in commercial, industrial, or utility energy storage applications for various on-grid applications, as well as microgrid applications to support backup and islanded systems (Tesla 2017).

The Tesla *Powerpack 2* system is a pre-assembled integrated battery energy storage systems (BESS) which includes the battery system, cabling, switchgear, power conversion equipment and auxiliary equipment.

ESCO Pacific proposes to install up to 300 Tesla *Powerpack 2* lithium-ion batteries units and 50 inverters. This will provide a total capacity of 25 MW and 50 MWh.

Distance from the battery storage location to the nearest residence and to the office building

Lithium‑ion battery units will be stored in separate battery enclosure (50 m x 100 m) next to the maintenance yard located centrally in the solar farm. The distance from the battery storage enclosure to the nearest development site boundary would be 15 m. As outlined above, the battery storage enclosure would be located approximately 660 m east of the nearest residence (landholder residence).

The office and workshop are located within the maintenance yard and would be at least 20 m from the battery enclosure.

Details on storage arrangements, including minimum separation distances between the containers

The following, listed in *Battery Energy Storage Systems - A guide for Electrical Contractors* (DoC 2017), will be considered for appropriate location of battery storage:

- building codes applicable to batteries (national and local), changes to floor loadings and National Construction Code requirements for battery installations
- location complies with the manufacturer's recommendations to protect the system from weather and extreme heat, light and temperature
- room or enclosure must be suitably ventilated for the location and the type of BESS

[2] Email correspondence from Lilia Donkova, NSW Department of Planning and Environment, to ESCO Pacific on 28 March 2018.

- the enclosure must be capable of containing any electrolyte spills
- adequately fire-rated walls are used to avoid or delay the spread of fire
- suitable means of access/egress to the area is provided during installation and for maintenance work
- the enclosure provides adequate mechanical protection to the BESS.

Separation of units and inverters

The Tesla *Powerpack 2 System* consists of self-contained lithium-ion battery units installed in a modular system in accordance with the Tesla (2017a) manufacturer's instructions, as shown Photo 7.1 and in Table 7.9

Photo 7.1. Standard arrangement of a storage bank of Tesla Powerpack units and inverter (Tesla 2017a)

Table 7.9. Minimum clearances between Powerpack units and inverters (Tesla 2017a)

Equipment	Front	Sides	Back	Top
Powerpack Unit	1830 mm	105 mm	30 mm [1]	1524 mm for combustible materials or 610 mm for minimum 1-hr fire rated materials
Powerpack Inverter	1830 mm [2]	100 mm	100 mm	915 mm [3]

Exceptions are approved for the clearances, as follows:

[1] *The back to back spacing of the Powerpack Units should be measured from the body of the enclosure. If the Powerpack Unit anchor template is not used, use a spacer to ensure that 16 mm of clearance is provided at the top of the units for seismic deflection.*

[2] *The clearance stated above is a minimum and should be increased to meet electrical building codes as necessary.*

[3] *If clearance to the rear of the inverter is at least 915 mm, top clearance can be reduced to 610 mm.*

NOTE: The required tolerance for the spacing between Powerpack Unit sides is +/- 6.4 mm (Tesla 2017a).

Access and egress clearances

The Australian Battery Guide details the egress and access requirements for a battery enclosure to provide access to the batteries with sufficient space for safe installation, testing and maintenance and suggests at least 1,200 mm of space for battery cells / mono-blocks that weigh more than 150 kg (ESC 2016).

The Powerpack System will be installed in an outdoor enclosed area that must provide a minimum 1.22 m wide access around the sides of the equipment and 1.83 m access to the front and of each Powerpack Unit

(Figure 7.2). This access is required for service cart access and is required to be level (maximum 5% cross slope) as detailed in the *Tesla Powerpack System O&M Manual* (Tesla 2017a).

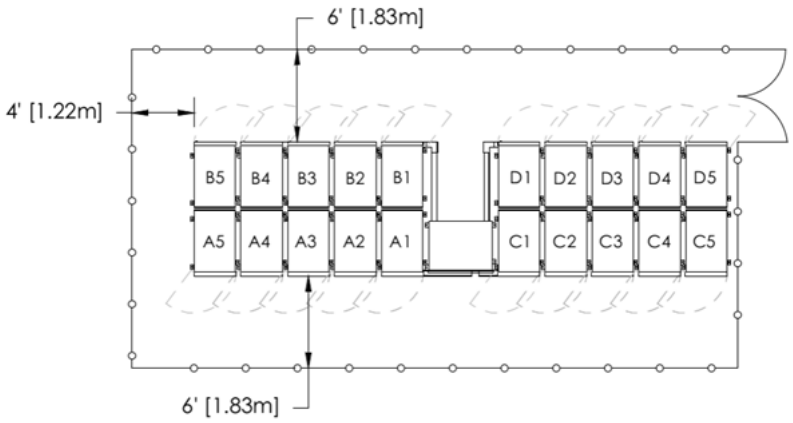

Figure 7.2. Battery unit system

Within the maintenance yard, security fencing for the battery enclosure will ensure that no walls or other structures are built that could interfere with any component's door opening fully (Tesla 2017a).

Hazards arising from the storage of lithium-ion batteries should be identified and appropriate safeguards listed

Batteries can be a serious safety risk for occupants and installers if incorrectly installed and operated, potentially leading to electric shock, fire, flash burns, explosion or exposure to hazardous chemicals and released gases (DoC 2017).

The Clean Energy Council (2017) prepared the *Battery install guidelines for accredited installers*. These guidelines represent latest industry best practice for the installation of battery systems and pre-assembled BESS.

The guidelines note there are numerous hazards associated with battery systems/pre-assembled BESS, such as:

- electrical
- energy
- fire
- chemical
- explosive gas
- mechanical.

Where a hazard is identified, as per the chemistry and overall battery system/BESS design, the guidelines state that risk reduction methods shall be applied to eliminate or reduce these risks to protect persons, property and livestock from:

- electric shock
- fire
- physical injury (CEC 2017).

Electrical hazard

The electrical risks associated with battery systems are dependent on the voltage of the battery system and other connected equipment – such as earthing, protection devices, etc. The degree of separation of the relevant battery port from the grid or other energy source and the prospective short circuit/ fault current may be significant in a battery system. This condition occurs where the impedance between conductors is almost zero and overcurrent protection does not operate (CEC 2017).

Shutting off power to the Tesla Powerpack System does not de-energize the battery, and thus a shock hazard may still be present. Electric shock could occur when touching live components. Servicing instructions are for use by qualified personnel only (Tesla 2017a).

The mishandling of BESS components could result in an electrical shock or personal injury.

Energy hazard

An energy, or arc flash, hazard occurs where there is a release of energy caused by electrified conductors when there is insufficient isolation or insulation to withstand the applied voltage. Under such conditions, electrical energy is transferred into other forms of energy including heat, light and sound. Such a hazard may occur under the following scenarios:

- accidental contact between battery terminals with a conductive tool – such as an uninsulated socket wrench, spanner, etc.
- a dead short within connected PCEs
- a build-up of conductive material across conductors – such as fluid, metal shavings, etc.
- damage to cable insulation, resulting in electrical conductivity between copper conductors (CEC 2017).

Lithium-ion batteries are a source of energy and therefore short circuiting, puncturing, incinerating, crushing, immersing, forcing discharge or exposing to temperatures above the declared operating temperature range of the product could result in a release of energy causing an electrical shock, fire or personal injury (Tesla 2017b).

Fire hazard

A fire hazard may be present where the battery system chemistry is lithium. Factors that may result in fire include:

- low ambient pressure
- overheating
- vibration
- shock
- external short circuit
- impact
- overcharge
- forced discharge (CEC 2017).

Powerpack systems can withstand temperatures of -40°C to 60°C for up to 24 hours. However, exposure of elevated temperatures can drive battery cells into thermal runaway and result in a fire. An internal or external short circuit can cause significant overheating and provide an ignition source resulting in fire, including surrounding materials or materials within the cell or battery. Severe mechanical damaged (e.g. severe crushing) can cause a small quantity of electrolyte (up to approximately 1 g) to leak out of a cell. Evaporated electrolyte is flammable (Tesla 2017b).

The mishandling of BESS components could result in a fire or personal injury.

Chemical hazard

There are many types of chemical hazards that a battery system may represent. Typically, stored chemical energy in the form of a fluid or gel electrolyte is the source of a chemical hazard. A chemical hazard may occur:

- under normal operating conditions (e.g. venting of hydrogen gas when charging)
- under fault or abuse conditions, including:
  - mechanical (e.g. impact, puncture, etc.)
  - thermal (e.g. in excess of specified operating conditions)
  - electrical (e.g. forced discharge) (CEC 2017).

Tesla lithium-ion batteries do not contain free liquid electrolyte and do not pose a liquid release hazard (Tesla 2017a).

Under normal conditions of use, the electrode materials and electrolyte they contain are not exposed, provided the battery integrity is maintained and seals remain intact. Risk of exposure may occur only in cases of abuse (mechanical, thermal, electrical). Severe mechanical damaged (e.g. severe crushing) can cause a small quantity of electrolyte (up to approximately 1 g) to leak out of a cell and evaporated electrolyte is flammable (Tesla 2017b).

The release of the chemical electrolyte could result in a fire or personal injury.

Explosive gas hazard

Under certain conditions, some battery systems and pre-assembled BESS emit explosive gas which represents a hazard where an ignition source is present.

Ignition sources may include:

- battery system isolation and overcurrent devices
- switches internal to electrical components
- fans
- motors
- general electrical switches (e.g. light & power) (CEC 2017).

Lithium‑ion batteries do not produce any exhaust gases during normal operation, but they can produce flammable and toxic gases if there is a fault (DoC 2017).

Severe mechanical damaged (e.g. severe crushing) can cause a small quantity of electrolyte (up to approximately 1 g) to leak out of a cell and evaporated electrolyte is flammable (Tesla 2017b).

The release of the explosive gas electrolyte could result in a fire or personal injury.

Details on the proposed control measures to minimise the risks

The installation of the Tesla *Powerwall 2 system* will be in accordance with the current regulations and guidelines for battery installation to help avoid and mitigate battery hazard impacts:

- The Clean Energy Council (2017) provides guidelines for battery installation – *Battery install guidelines for accredited installers* (CEC 2017).
- WA Department of Commerce has released a guide for electrical contractors in relation to battery storage systems – *Battery Energy Storage Systems - A guide for Electrical Contractors* (DoC 2017).

Note: Standards Australia has developed a draft standard (AS/NZS 5139) for battery installations which has been released for public submissions but a final release date has not been indicated.

Electrical and energy hazard risk reduction

A *Powerpack 2* unit (as shown in Photo 7.2), even in a normally discharged condition, is likely to contain substantial electrical charge and can cause injury or death if mishandled (Tesla 2017a).

To reduce the risk of Electrical and Energy Hazards:

- Access to the battery enclosure will be restricted to authorised personnel only.
- Battery installation will only be undertaken by an accredited installer (CEC 2017).
- The *Powerpack 2* System will be installed in accordance with the manufactures instructions Tesla (2017a).
- All access and servicing will be performed by qualified personnel only (Tesla 2017a).
- The *Powerpack 2* unit door includes two latches that require a special tool to unlock (Photo 7.2), limiting access to authorised personnel only (Tesla 2017a).
- Operating alarm and shutdown response systems will be installed.
- An ERP, including instructions for responding to incidents related to the battery storage and details of the local emergency management committee (LEMC), will be developed.

- Personal protective equipment will be used, spill kits provided and safe work procedures followed when handling, repairing, maintaining, installing and inspecting battery systems (CEC 2017).
- First aid materials and training will be provided to staff.

Photo 7.2. Powerpack unit security latches (Tesla 2017a)

Fire hazard risk reduction

Elevated temperatures can result in reduced battery service life and exposure of elevated temperatures can drive battery cells into thermal runaway and result in a fire. An internal or external short circuit can cause significant overheating and provide an ignition source resulting in fire, including surrounding materials or materials within the cell or battery (Tesla 2017b).

Gaseous agents such as CO_2 or Halon, or dry chemical suppressants may temporarily suppress flaming of lithium-ion battery packs, but they will not cool lithium-ion batteries and will not limit the propagation of cell thermal runaway reactions (Tesla 2017b).

Tesla recommends that copious volumes of water be used to fight a fire involving Tesla Energy Products. Virtually all fires involving lithium-ion batteries can be controlled with water. To date, water has been found to be the most effective agent for controlling lithium-ion battery fires. Water will suppress flames and can cool cells, limiting propagation of thermal runaway reactions. If water is used, electrolysis of water (splitting of water into hydrogen and oxygen) may contribute to the flammable gas mixture formed by venting cells, burning plastic, and burning of other combustibles (Tesla 2017b).

To reduce the risk of fire hazard:

- The battery enclosure will be located to maximise distances to sensitive receivers (residences, public) and from external hazards (bushfire, vehicles).
- The battery enclosure would including gravel surfacing to minimise the risk of fire escaping from the facility and the risk of external fire affecting the facility (Tesla 2017a).
- All access and servicing will be performed by qualified personnel only (Tesla 2017a).
- Battery installation will only be undertaken by an accredited installer (CEC 2017).
- The *Powerpack 2* system will be installed in accordance with the manufactures instructions Tesla (2017a).

- The *Powerpack 2* system include sealed thermal management systems containing coolants and refrigerants (Tesla 2017b).
- An operating alarm and shutdown response system will be installed.
- An ERP, including instructions for responding to incidents related to the battery storage and contact details of the local emergency management committee (LEMC), will be developed.
- An external fire detection system will be installed.
- A fire water sprinkler system will be installed and maintained.
- Communication with local fire services will be established and maintained.
- Personal protective equipment will be used, spill kits provided and safe work procedures when handling, repairing, maintaining, installing and inspecting battery systems (CEC 2017).
- Fire response tools and training will be provided to staff.

Chemical risk reduction

In case of an electrolyte leak, the following protective equipment is recommended: an air purifying respirator with organic vapor/acid gas cartridges, safety goggles or a full-face respirator, and safety gloves (Butyl rubber or laminated film). Protective clothing should be worn. Use a dry absorbent material to clean up a spill (Tesla 2017b).

To reduce the risk of chemical hazard:

- A battery storage enclosure will be developed, restricting access to vehicles and personnel.
- Units will be bunded to retain harmful substances in the event of spillage and/ or discharge.
- An ERP, including instructions for responding to incidents related to the battery storage and contact details of the local emergency management committee (LEMC), will be developed.
- Personal protective equipment will be used, spill kits provided and safe work procedures when handling, repairing, maintaining, installing and inspecting battery systems (CEC 2017).
- First aid, spill response and fire response materials and training will be provided to staff.

Explosive gas risk reduction

Leaked electrolyte is colourless and characterised by a sweet odour. If an odour is obvious, evacuate or clear the surrounding area and allow area to ventilate. If a liquid is observed that is suspected electrolyte, ventilate the area and avoid contact with the liquid (Tesla 2017b).

Gases or smoke exiting a lithium-ion battery pack are likely flammable and could ignite unexpectedly as the condition that led to cell venting may also cause ignition of the vent gases. A venting Tesla Energy Product should only be approached with extreme caution by trained first responders equipped with appropriate personal protective equipment (PPE) (Tesla 2017b).

To reduce the risk of explosive gas hazard:

- An outdoor battery enclosure will be constructed, providing clearance from and/or elimination of ignition sources, allowing for full ventilation, and restricting access to vehicles and personnel. (CEC 2017)
- An ERP, including instructions for responding to incidents related to the battery storage and contact details of the local emergency management committee (LEMC), will be developed.
- Personal protective equipment will be used, spill kits provided and safe work procedures when handling, repairing, maintaining, installing and inspecting battery systems (CEC 2017).
- First aid, spill response and fire response materials and training will be provided to staff.

Assessment

Based on the quantities of dangerous goods required for solar farms, none of the screening threshold levels were exceeded and the project is therefore considered not potentially hazardous. Accordingly, SEPP 33 does not apply in this regard and a PHA is not required.

The major hazard associated with lithium-ion battery technologies is fire, as a result of the flammability of the substances used in the battery (Recharge 2013). Fire risks associated with lithium-ion batteries are also discussed in Section 8.10.

7.6.2 Potentially offensive industry

A potentially offensive industry is defined under SEPP 33 as:

> "*development for the purposes of an industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would emit a polluting discharge (including for example, noise) in a manner which would have a significant adverse impact in the locality or on the existing or likely future development on other land, and includes an offensive industry and an offensive storage establishment."*

Identifying potentially offensive industry

The process for identifying a potentially offensive industry is based on whether a pollution control licence or approval is required for the development and/or if the development causes offence having regard to the sensitivity of the receiving environment.

In the case of the Wyalong Solar Farm:

- A pollution control licence or approval is not required.
- This EIS (specifically Chapter 8) assesses the impact on the environment.

Assessment

Based on the identification process and the outcomes of this EIS, the project is not considered to be potentially offensive and therefore SEPP 33 does not apply in this regard.

8 Impact assessment and management

8.1 Biodiversity

A biodiversity assessment was undertaken by Ecolink and EnviroKey to identify ecological constraints for the project and is detailed in the BDAR provided in Appendix B. This section provides a summary of the BDAR and discusses the potential impacts of the project on biodiversity.

8.1.1 Methodology

The SEARs state that an assessment of the likely biodiversity impacts of the development be conducted, having regard to the BC Act, BC Regulation, Biodiversity Assessment Method (OEH 2017a) and the Threatened Species Assessment Guidelines – Assessment of Significance (DoECC 2007).

The SEARs provide a list of some of the environmental planning instruments, guidelines, policies, and plans that may be relevant to the biodiversity assessment for this development. Other policies and plans relevant to this biodiversity assessment include:

- SEPP No. 44 – Koala Habitat Protection
- Bland LEP 2011

The Biodiversity Assessment Method (BAM) comprises three stages that set out the biodiversity assessment requirements and offset practices for major projects (OEH 2017a), which are as follows:

- **Stage 1** – Biodiversity assessment requirements and survey methods that must be undertaken by an applicant to identify, map and describe the native plant community types (PCTs), threatened species and threatened species' habitat on the development site and an offset site.
- **Stage 2** – Impact assessment requirements for demonstrating how any impacts on biodiversity values have been avoided and minimised at the planning, construction and operational phases of the development.

  Stage 2 measures the loss to biodiversity caused by the remaining direct and indirect impacts of the development. The assessments quantify the loss and gain in biodiversity values through the determination of biodiversity credits. The loss of biodiversity values caused by the project is expressed as a biodiversity credit requirement (i.e. the number and type of biodiversity credits that would be required to offset the impact of development).

  Both Stage 1 and Stage 2 are documented in the BDAR provided in Appendix B.
- **Stage 3** – An assessment of the management requirements at a biodiversity stewardship site, where offsets for impacts to biodiversity values can be managed to achieve an improvement of biodiversity values within the state. Stage 3 is typically undertaken after submission of the BDAR.

Assessment area

Preliminary assessments undertaken for scoping works for the project were undertaken in June 2018 (Ecolink Consulting Pty Ltd 2018). These assessments provided the applicant with a broad overview of ecological constraints of the 259 ha lot area, including the development site. As a result of these assessments, ESCO Pacific has refined its proposed development site to avoid key ecological values within this property, to derive the 256 ha development site. This approach is consistent with ESCO Pacific's commitment to avoid and minimise impacts to biodiversity and in line with the purpose of the Biodiversity Offsets Scheme provided in the BC Regulation.

The surveys undertaken as part of the BDAR assessed the development site, as well as other areas within the lot. The Newell Highway road reserve, that will provide access to the proposed solar farm, was also assessed, to the east and west of the proposed solar farm entrance.

Desktop assessment

The potential ecological constraints within the development site were identified based on a desktop assessment of the following information sources:

- Department of Environment Protected Matters Search Tool, to identify Matters of National Environmental Significance (MNES) under the EPBC Act
- existing threatened species listings under the BC Act, FM Act and EPBC Act
- existing records of threatened species observations in the development site, as recorded in the Threatened Species Database in the Atlas of NSW Wildlife (OEH 2018a) and BioNet Atlas (OEH 2018b).

Site assessment

A site assessment was undertaken between 16 and 19 September 2018, by two ecologists from Ecolink under the guidance and supervision of Steven Sass from EnviroKey (Biodiversity Accreditor Assessor BAAS17047). The entire development site was walked and/or driven to assess the location and quality of habitats that were present. Areas adjacent to the development site that contained higher ecological values than the development site were also assessed as reference areas to the pre-settlement conditions of the site.

Key parameters of the habitats present within each location (such as the presence/absence of shelter, foraging, and/or nesting resources) were recorded to determine the quality of the habitats present. Areas with the highest likelihood of containing native fauna, including threatened species, were inspected more closely in an attempt to inform the presence of these species based on the habitat quality. Active searches were undertaken underneath debris and leaf litter, and signs, tracks and scats were recorded to confirm the presence of particular species or fauna groups. Incidental observations of all fauna species were recorded throughout the assessment.

Plot surveys

A total of four plots were assessed during the site assessment to confirm PCTs in the development site and areas immediately adjacent. Data collected from one of these plots (as detailed in the BDAR in Appendix B) was used in accordance with the data requirements of the BAM Credit Calculator (used to calculate offsets required) to assess site values within the development site. The remainder of the plots have been used to determine PCT classification and as reference data to determine vegetation quality.

Identifying patches of native vegetation

Although most of the vegetation within the development site is non-native, scattered trees within the paddocks were classified as extant examples of historic PCTs within the landscape. However, these trees meet the definition of a Paddock Tree, as described below, and therefore plot assessments were not required to identify the quality and character of the vegetation.

Paddock tree assessment

An assessment of all paddock trees within the development site was undertaken. Under the BAM, these trees meet the definition of a paddock tree because foliage cover for the tree growth form is not within 25% of the benchmark for the PCT most likely to occur (i.e. PCT 76) across the entire development site.

Threatened species surveys

All threatened species surveys were undertaken from 16 to 19 September 2018. Weather conditions were generally conducive to the detection of fauna species targeted by the surveys. The location of targeted threatened species is shown in Section 10.3 of the BDAR.

8.1.2 Existing conditions

Site condition

The development site is divided into three paddocks. Each of these paddocks, at the time of the assessment, was growing either Barley *Hordeum* spp. (southern paddock) or Canola *Brassica napus* (northern two paddocks). The current land manager has rotated these crops, with other nitrogen fixing species, for the last eight years, and the paddocks have been managed in a similar way under previous land managers. In years when cropping does not occur the paddocks are grazed by cattle (Ecolink 2018b).

Native vegetation is largely absent from the development site, with scattered paddock trees the most obvious remnants of the historic vegetation communities that once covered the area. Despite this, some areas of native vegetation remain in the south of the development site and in the road reserves that adjoin the development site. Within the southern part of the lot area, vegetation consists of an overstorey of Western Grey Box *Eucalyptus microcarpa*, White Cypress Pine *Callitris glaucophylla*, and Bulloak *Allocasuarina luehmannii* (in descending order of dominance), over a grazed, but predominantly native understorey. Dominant species within the understorey included the native Rough Spear-grass *Austrostipa scabra* subsp. *falcata*, Common Wheat Grass *Elymus scaber* and Smallflower Wallaby Grass *Rytidosperma setaceum* as well as exotic species including crop species from the nearby paddocks as well as Perennial Rye-grass *Lolium perenne* and Onion Grass *Romulea rosea.* The mid-storey is largely absent, and recruitment is limited or excluded by regular grazing, and ongoing soil disturbances from cultivation and cropping. Interspersed among these native trees are planted Pepper Trees *Schoenus mollis.* Elsewhere, within the development site, there is a line of planted Red Ironbark *Eucalyptus sideroxylon* trees on the fenceline between the southern, and middle paddocks, and planted Pine *Pinus radiata* trees planted along the western fenceline on the northern paddock.

There are three dams within the development site, which appeared to have been lined with clay and were devoid of fringing or aquatic vegetation. There are no creeks or constructed drains within the development site, only ephemeral waterways as discussed in Section 8.4, and no natural wetlands or swamps were observed during the biodiversity assessment.

The landuse within the development site is similar to that surrounding it: cropping and grazing. These surrounding properties generally support very little native vegetation, apart from scattered paddock trees and vegetation within road reserves, or fringing the boundaries of the property. Properties to the east and west of the development site are owned by the same landholder, and form part of the crop rotation system employed within the development site.

Landscape features

For all analyses of landscape features within the BDAR, a 1.5 km (1,952 ha) assessment circle around the development site was used in accordance with the BAM (OEH 2017b), using GIS layers and aerial imagery.

Bioregions, sub-regions and Mitchell landscape regions

The development site and assessment circle occur wholly within the South Western Slopes Bioregion, which lies in the foothills and isolated ranges comprising the lower inland slopes of the Great Dividing Range, extending into western Victoria. The bioregion extends from Albury in the south to Dunedoo in the northeast. Within its boundaries lie the towns of Wagga Wagga, Mudgee, Cootamundra, Narrandera, Parkes, Gundagai and Young. The bioregion also includes parts of the Murray, Murrumbidgee, Lachlan and Macquarie river catchments.

The development site and assessment circle also occur wholly within the Lower Slopes Subregion (NSS02), which comprises of undulating and hilly ranges and isolated peaks set in wide valleys at the apices of the Riverina alluvial fans. Vegetation in this subregion consists of: Dwyer's Gum *Eucalyptus dwyeri* on granite, Red Ironbark *Eucalyptus sideroxylon* on sedimentary rocks; Hill Red Gum *Eucalyptus dealbata*, White Cypress Pine and Red Stringybark *Eucalyptus macrorhyncha* in the ranges; Grey Box woodlands with Yellow Box *Eucalyptus melliodora*, White Cypress Pine and Belah *Casuarina cristata* on lower areas.

Two Mitchell Landscapes occur within the 1.5 km assessment circle: the Mimbi Plains; and the Manitoba Hills and Footslopes. The development site straddles each of these landscapes, with 89.9% of the site located in Manitoba Hills and Footslopes which consists of low ridges with outcrops and tors of granite, with narrow incised drainage contributing to major creeks.

Native vegetation and cleared areas in the landscape

Regional mapping identified 198.67 ha of native vegetation within the assessment circle. Site surveys within the development site, and more broadly from publicly accessible areas within the assessment circle, confirmed the location and character of this vegetation. Seven PCTs were identified within the assessment circle with the remainder being cleared land or non-native vegetation that is predominantly used for cropping and grazing (Figure 8.1). Detailed descriptions of these PCTs are provided in the BDAR (Appendix B). Scattered paddock trees also occur within the assessment circle and are isolated by more than 50 m from the nearest patch of vegetation

Native vegetation within the development site is discussed in detail below.

Rivers, streams and wetlands

There are no rivers or streams within the development site and no perennial waterways within the 1.5 km assessment circle.

Gagies Creek is an ephemeral creek that is located approximately 1.2 km west of the development site and was dry at the time of the site assessment. An ephemeral tributary to Gagies Creek is located approximately 550 m west of the development site. An unnamed ephemeral tributary to Gagies Creek is also located along the northern area of the development site, and an unnamed ephemeral tributary transects the southern area (see Section 8.4). These unnamed tributaries transecting the site are no longer readily discernible due to the changes to the land form as a result of agricultural development of the landscape.

No important local wetlands, national wetlands (i.e. as listed in The Directory of Important Wetlands of Australia (Environment Australia 2001)) or international wetlands (e.g. Ramsar listed) are located in the vicinity of the development site.

Connectivity

Vegetation within the road reserve of the Newell Highway provides significant connectivity to higher quality native vegetation at Back Creek, Boxalls and Wyrra State Forests (extending east and north from approximately 4 km east of the development site). Similarly, vegetation within the road reserve of Spauls Lane provides corridor habitat to higher quality vegetation to the northwest of the study area (South West Woodland Nature Reserve, approximately 7 km northwest of the development site).

Native vegetation in the remaining landscape is limited, with a highly fragmented and intensively altered landscape between the development site and these State Forests. Scattered paddock trees provide stepping stones between these locations, that will be exploited by some, highly mobile species (such as medium to large birds). However, with the exception of road reserve vegetation, corridors to facilitate the movement of other species are limited in number, patchy and have gaps between them.

Figure 8.1: Native vegetation within the assessment circle

Legend

- Development site
- Wider development site (Lot 160/750615)
- 1.5km assessment circle
- Habitat corridors and stepping stones

PCT name

- Derived tussock grassland of the central western plains and lower slopes of NSW
- Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion
- Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion
- River Red Gum - wallaby grass tall woodland wetland on the outer River Red Gum zone mainly in the Riverina Bioregion
- River Red Gum swampy woodland wetland on cowals (lakes) and associated flood channels in central NSW
- Western Grey Box - White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion
- Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions

0 310 620 930 1,240 Meters

1:19,916

Datum/Projection: GDA 1994 MGA Zone 55

October 2018

Two threatened fauna species have been identified within the development site, the Grey-crowned Babbler *Pomatostomus temporalis temporalis* and White-fronted Chat *Epthianura albifrons*. Both of these species may use the remnant vegetation to facilitate movement within the landscape for feeding or juvenile dispersal. A 15 m wide access point is proposed to be installed in this vegetation, in an area that has already faced significant disturbance (during the installation and maintenance of the powerline), therefore the proposed development is unlikely to impose a new and significant impact on species' ability to navigate the already highly modified landscape.

Native vegetation within the development site

All areas within the development site are regionally mapped as non-native. The majority of the development site is currently used for cropping, interspersed with seasons of grazing, with native vegetation substantially modified through past disturbances. The proposed development has deliberately avoided impacts to areas that retain patches of higher quality native vegetation. Within the lot area, native vegetation occurs as a small isolated patch of woodland where a school was once located. Additional patches of native trees and remnant vegetation occur within the road reserves adjacent to the development site. Most of these areas have been avoided and road crossovers have been located in areas where the native vegetation quality is at its lowest – where trees have been removed for the installation and maintenance of the powerline that crosses the development site.

Native vegetation within the wider development site is limited to a small patch of remnant vegetation in the southwest of the wider development site, and the Newell Highway road reserve. This vegetation is modelled as PCT 76 – Western Grey Box tall grassy woodland (the current assessment confirmed that this vegetation possesses the floristic composition, soil profile and landform to be classified as PCT 76).

PCT 76 is the endangered Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt Bioregions community. The PCT is listed under the BC Act, but does not qualify as the nationally significant Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia community. Species identified on the development site as belonging to PCT 76 include Western Grey Box *Eucalyptus macrocarpa* and White Cypress Pine *Callitris glaucophylla* in the upper stratum and Sprawling Bluebell *Wahlenbergia gracilis*, Corrugated Sida *Sida corrugata,* Rough Spear-grass *Austrostipa scabra* subsp. *falcata*, Plains Grass *Austrostipa aristiglumis, and* Windmill Grass *Chloris truncate* in the ground stratum.

The benchmark data for PCT 76 was therefore used to assess the paddock tree data for the development site.

Vegetation zones

Vegetation zones identified within the development site are summarised in Table 8.1 and shown in Figure 8.2. The landuse was accurate at the time the assessment. However, all paddocks within the development site are on a cycle of cropping and grazing.

Table 8.1. Vegetation zones within the development site

Zone	Name and description	Total area (ha)
1	Cleared Land – dominated by crops of barley and canola and exotic pasture grasses such as Perennial Rye-grass; weeds such as Lucerne *Medicago sativa,* Prickly Lettuce *Lactuca serriola* and the high-threat weed African Lovegrass *Eragrostis curvula.* See Photo 8.1. Scattered paddock trees – 45 paddock trees (with hollows in 13 of these trees and stick nests in eight) previously belonging to PCT 76 – Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverine Bioregions.	256

Zone	Name and description	Total area (ha)
2	Road Reserves - area of the Newell Highway road reserve, where the vegetation has been previously cleared to enable the installation and maintenance of the powerline. Only native understorey vegetation, dominated by grass species, remains. The vegetation at the proposed access site was dominated by Rough Spear-grass *Austrostipa scabra* subsp. *falcata*, Ringed Wallaby Grass *Rytidosperma caespitosum,* Smallflower Wallaby Grass *Rytidosperma setaceum* and Common Wheat Grass *Elymus scaber*. Other dominant species included Ruby Saltbush *Enchylaena tomentosa* and Black Rolypoly *Sclerolaena muricata* var. *villosa.* The dominant weed species in this vegetation zone were the crop species from the surrounding landscape (Barley, Canola and Perennial Rye-grass), as well as Onion Grass *Romulea rosea*. See Photo 8.2.	0.16
	Total	**256.16**


Photo 8.1. Cleared land (left) and scattered paddock trees (right) within Zone 1


Photo 8.2. Newell Highway road reserve looking east (left) and west (right) in Zone 2

Figure 8.2: Vegetation Zones within the development site, scattered paddock trees and locations of Plot surveys

Legend

- Development site
- Wider development site (Lot 160/750615)
- Native vegetation

Paddock Trees

- Class 2
- Class 3

Vegetation Zone

- Zone 1 - Paddock Tree Area
- Zone 2 - Road Reserve
- Plot Surveys

0 130 260 390 520 Meters

1:8,571

Datum/Projection: GDA 1994 MGA Zone 55
October 2018

Threatened species potentially present

A total of 26 threatened fauna species under the BC Act were reliably predicted by the BAM Calculator to utilise the site, and therefore no surveys were required as they are assumed present. Ecosystem credits apply to these species as components of PCT 76.

A total of 22 threatened species under the BC Act (13 fauna and nine flora) were identified by the BAM as potentially occurring at the development site and requiring targeted surveys. None of the 22 threatened species were identified during field survey. However, four of these species, the Masked Owl *Tyto novaehollandiae*, Swift Parrot *Lathamus discolor,* Glossy Black Cockatoo *Calyptorhynchus lathami* (and endangered Riverina sub-population), and Sloane's Froglet *Crinia sloanei*, have prescribed survey periods outside the timing of the September field surveys. In accordance with BAM requirements, it has therefore been assumed, conservatively, that these four species are present on site.

Two threatened species identified during the site assessments were the Grey-crowned Babbler *Pomatostomus temporalis temporalis*, whose roosting nests were observed close to the development site and the White-fronted Chat *Epthianura albifrons*, for which individuals were observed feeding in the canola crops within the development site.

Targeted searches within the development site were undertaken within, and underneath, trees to look for evidence of occupation by Koalas *Phascolarctos cinereus.* No evidence was found and it is concluded that Koalas do not occur within the development site.

The EPBC Act Protected Matters Search Tool identified 22 threatened species, 11 listed migratory species (some of which are also threatened species), three threatened ecological communities and four Wetlands of International Importance (Ramsar wetlands) that are either known, or have the potential to occur, within a 10 km radius of the development site. Of these 33 species, only six have at least a moderate likelihood of occurrence within the development site, with none having been previously recorded within the site. Two migratory bird species, Fork-tailed Swift *Apus pacificus* and White-throated Needletail *Hirundapus caudacutus,* are also likely to occur within the boundary of the development site on occasion. However, the development site does not provide important or limiting habitat for any of these species and therefore the project is unlikely to have a significant impact to either species.

8.1.3 Impact assessment

The proposed development of the project may result in both direct and indirect impacts on biodiversity. The direct impacts of the project are expected to comprise:

- Loss of up to 0.16 ha of PCT 76 native vegetation (moderate - good condition)
- removal of up to 45 paddock trees (PCT 76) within the development site
- removal of up to 13 hollow-bearing trees (included within the 45 trees mentioned above).

The potential indirect impacts of the project on biodiversity may include:

- introduction and spread of weeds due to import of construction vehicles and materials
- potential impact of inappropriate species being used in site rehabilitation and landscaping
- erosion of disturbed areas leading to sedimentation affecting any downgradient habitat
- water quality impacts (e.g. increased turbidity and suspended solids) affecting any downgradient habitat
- short-term disturbance of fauna during construction due to noise generated by vehicles, equipment and construction activities
- possible installation of barbed wire fencing, which could harm birds and bats.

All areas within the final development site are regionally mapped as non-native vegetation, with the exception of the access point through the Newell Highway road reserve. The proposed footprint is almost entirely located on cropped and grazed land that goes through a regular process of disturbance. Native vegetation identified in the development site is limited to 45 paddock trees, 13 of which contain hollows.

This vegetation is identified as PCT 76 and is identified as the endangered Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt Bioregions community under the BC Act, but does not qualify as the nationally significant Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia community. An additional 0.16 hectares of vegetation will be impacted in the road reserve to provide access to the proposed solar farm. Thirty-eight ecosystem credit class offsets and nine species class offsets are required for this vegetation.

ESCO Pacific is committed to meeting their obligations in relation to ecosystem credits. The offsets required for potential impacts to paddock trees, classified as historically being a part of the threatened PCT 76 community and the threatened fauna species were calculated in accordance with Section 10 of the BAM and are outlined in Section 8.1.4.

The assessments identified that the proposed development is unlikely to significantly impact on any MNES.

8.1.4 Management and mitigation

ESCO Pacific has sought to reduce impacts on biodiversity values within the development site by avoiding and minimising the removal of native vegetation and disturbance of fauna habitat. The development site has been selected in part due to its high level of disturbance from a long history of primary production and its distance from areas of high environmental sensitivity. However, to mitigate residual impacts after initial avoidance and minimisation has been implemented, a number of management measures are proposed.

Site Selection and Planning

Site access for construction and operation will be from the Newell Highway, at a gap in the quality of native vegetation, where the road reserve vegetation is of relatively low ecological value, to minimise vegetation removal and impacts to threatened fauna species.

Offsetting strategy

Approximately 38 ecosystem credit class offsets and nine species class offsets are required for removal of 45 paddock trees, including 13 hollow bearing trees, and 0.16 ha of native vegetation (i.e. 36 ecosystem credit class offsets for removal of 45 paddock trees and two credit class offsets and nine species class offsets for removal of 0.16 ha of native vegetation which would potentially impacting the Glossy Black Cockatoo, Swift Parrot, Masked Owl and Sloane's Froglet). ESCO Pacific is committed to meeting their obligations in relation to ecosystem credits. This offset will be provided in Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions and be sourced from PCT's 76, 80, 81, 82, 101, 110, 237, and/or 248. The offset site must be in the Lower Slopes, Bogan-Macquarie, Inland Slopes, Lachlan Plains, Murray Fans, Murrumbidgee or Nymagee bioregions, or any IBRA subregion that is within 100 km of the outer edge of the impacted site.

Offsets will be in place prior to the commencement of construction.

Construction

No direct impacts are expected to occur as a result of the construction phase other than the removal of the 45 scattered paddock trees and 0.16 ha of PCT 76 native vegetation described in Section 8.1.3 above.

Mitigation measures to avoid and minimise impacts will be outlined in the Biodiversity Management Plan to be developed prior to construction and provided as part of the CEMP and will include:

- Unless otherwise agreed by the Responsible Authority, the removal of hollow-bearing trees will not be undertaken during the late winter to spring period to avoid the main breeding period for hollow-dependent fauna, such as owls and possums.
- Pre-clearance surveys will be undertaken to ensure that nests and hollows identified in paddock trees are inactive.

- Where an active hollow is identified, a licenced wildlife salvage team will be on-site during vegetation removal to catch and relocate (if appropriate) any wildlife encountered in vegetation or hollow-bearing trees.
- Demarcation and exclusion fencing will be installed around trees and vegetation to be retained in, or directly adjacent to (within the radius of an applicable tree protection zone (TPZ)), the development site, as follows:
  - TPZs will be clearly defined
  - the radius of the TPZ will be calculated for each tree by multiplying its diameter at breast height (DBH) by 12 (i.e. TPZ = DBH x 12) in accordance with the Australian Standard – Protection of trees on development sites AS 4970-2009 (Standards Australia 2009)
  - the TPZ will not be less than 2 m or greater than 15 m, except where crown protection is required (Standards Australia Committee 2009)
  - appropriate signage such as 'No Go Zone' or 'Environmental Protection Area' will be installed around retained trees and vegetation
  - the location of any 'No Go Zones' will be identified in site inductions
  - fencing will comprise star pickets with high visibility bunting.
- All material stockpiles, vehicle parking and machinery storage will be located within cleared areas or areas proposed for clearing, and not in areas of retained native vegetation.
- Where practical, all paddock and hollow-bearing trees to be removed will be placed in areas of retained vegetation to provide additional fauna habitat.
- Where appropriate, native vegetation cleared from the development site will be mulched for re-use on the site, to stabilise bare ground.
- Sediment and erosion control measures will be implemented prior to construction works commencing, to protect drainage channels and any downgradient habitat as outlined in Section 8.5.3.
- Standard noise controls will be implemented during construction as outlined in Section 8.7 to minimise disturbance to fauna.
- Barbed wire for site fencing will be avoided, where possible.
- Boundary fences and laydown areas will be located in cleared areas.
- The site rehabilitation plan will be prepared and implemented to progressively rehabilitate disturbed areas.
- Following construction, revegetation of areas of the development site with groundcover plant species compatible with the existing native species composition will be undertaken.
- A Weed and Pest Management Plan (WPMP) will be prepared prior to construction, as outlined in Section 8.5.3.

Operation

The impacts arising from the operation of the project are expected to be negligible due to the inherently low impact nature of solar farm operation.

Decommissioning

Where relevant, the mitigation measures listed as part of the construction phase of the project will be implemented during the decommissioning phase. In addition to this, in areas where cropping is not to occur, revegetation with groundcover plant species compatible with the existing native species composition will occur.

8.2 Aboriginal cultural heritage

The project may impact on the aboriginal cultural heritage of the development site, particularly during construction, by activities such as vegetation clearance and topsoil stripping. This section provides an assessment of these potential impacts and the proposed mitigation measures.

In accordance with the requirements outlined in the SEARs, ESCO Pacific commissioned an ACHAR by OzArk to identify aboriginal cultural heritage values within the development site and surrounding area. A draft of the ACHAR (as issued to the RAP for review and comments) is attached as Appendix D. This section is based on the draft ACHAR and provides an assessment of the potential impacts of the project on Aboriginal cultural heritage.

8.2.1 Methodology

The following were undertaken to identify the Aboriginal cultural heritage values on the development site and surrounding area:

- a detailed Aboriginal Heritage Information Management System (AHIMS) search, undertaken on 20 September 2018
- a review of Aboriginal cultural heritage studies of the wider Wyalong district
- predictive modelling to identify potential density of archaeological sites and/or objects
- registration of interest for the project includes three groups/individuals to be consulted as a RAP for the project (including one individual, West Wyalong Local Aboriginal Land Council (LALC) and Young LALC)
- consultation and engagement with the RAPs
- a pedestrian archaeological survey of the development site to determine the extent of the disturbance and identify whether Aboriginal cultural heritage or any areas sensitivity were present with the development site (undertaken 25 to 27 September 2018 by two qualified archaeologists, accompanied by three representatives from the West Wyalong LALC).

SEARs

Specific to the assessment of cultural heritage impacts, the SEARs outline that the EIS must include:

- an assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the development, including consultation with the local Aboriginal community in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents*.

The assessment relating to historic (non-Aboriginal) heritage is addressed in Section 8.3.

Consultation

Consultation with Aboriginal people about cultural heritage places and the manner in which they should be managed is required under Part 6 of the NP&W Act. The processes of consultation are specifically outlined in the Department of Environment, Climate Change and Water publication 'Aboriginal cultural heritage consultation requirements for proponents 2010' (DECCW 2010).

The consultation steps employed in the cultural heritage assessment for the project included:

- notifying relevant agencies (including the NTSCORP, Local Land Services, National Native Title Tribunal, OEH, West Wyalong LALC, Griffith LALC, Wagga Wagga LALC, Narrandera LALC and the Office of the Registrar Aboriginal Land Rights Act 1983) of the project, requesting information on any Aboriginal people or organisations who may hold relevant cultural heritage knowledge for the area to be contacted as part of consultation

- advertising for RAPs in local and regional media
- providing written notification to invite those people identified by relevant agencies to participate in the cultural heritage assessment process
- jointly participating with the RAP in the archaeological assessment of the development site
- facilitating consultation with the RAP on the cultural values of the development site, and recording Aboriginal cultural heritage values
- archival investigation
- consulting with OEH as required
- assessing the key cultural heritage issues for the project, considering relevant guidelines, policies and plans and input from the RAP.

Three representatives of the West Wyalong LALC accompanied the project archaeologists on the pedestrian archaeological survey and were requested to comment on site specific and cultural, social, historic and aesthetic values, including the significance of archaeological and cultural sites, and values associated with flora and fauna and landscape features to inform the assessment and management measures. The Young LALC and one individual RAP did not undertake archaeological surveys but did register interest with the project and were provided with project information and the archaeological survey methodology. No RAPs had comments on the survey methodology.

Archaeological and cultural values assessment

The archaeological and cultural values assessments presented in the ACHAR have been prepared in accordance with the requirements of the following:

- the SEARs
- Code of Practice for the Investigation of Aboriginal Objects in New South Wales (Code of Practice, DECCW 2010a)
- the community consultation guidelines of the current Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (DECCW 2010b)
- Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011).

The ACHAR has also been prepared in accordance with, and complies with the intent of, the requirements and assessment methodologies outlined in the Burra Charter (1999).

The Aboriginal archaeological assessment was conducted to meet the following objectives:

- to undertake Aboriginal archaeological survey of the development site as per the Code of Practice
- to assess the significance of any recorded Aboriginal sites, objects or places likely to be impacted by the project, in consultation with the RAPs, consistent with the Code of Practice on Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (ACHCRs; DECCW 2010b)
- to assess the likely impacts of the project to any recorded Aboriginal sites, objects, places or cultural values, and to develop management recommendations, in consultation with RAPs, consistent with the Code of Practice and the ACHCRs.

A determination of cultural significance, consistent with the guidance provided in the Burra Charter and Indigenous Cultural Heritage Management Practice Note (Australia ICOMOS 2013), was made and further detail is provided in Section 8.2.2.

8.2.2 Existing conditions

Landuse history and existing levels of disturbance

Crucial for the preservation of archaeological deposits is the history of past landuse in a given area, particularly the European settlement and associated agricultural practices of the area. Satellite imagery of

the development site shows that the immediate landscape, including surrounding areas, have been subject to extensive historical clearing and agriculture, with many of the surrounding areas representing cultivated paddocks.

The flat landforms which dominate the development site would not have been an impediment to use of the area by Aboriginal people in the past. However, the occupation of the area by Aboriginal people would most likely have been limited to transient inhabitation resulting from movement across the landscape to other areas which provide more stable resources. Such resources would have included the ephemeral tributary of Gagies Creek on the western boundary of the development site at a distance of approximately 550 m and Barmedman Creek approximately 12 km to the east.

Desktop search

Prior to European occupation, the development site and wider region was inhabited by the Wiradjuri People.

A desktop search was undertaken for the area within the lot boundary, and found:

- no places listed on either the National or Commonwealth heritage lists
- no Native Title Claims
- no recorded Aboriginal sites
- no places listed on the Bland LEP (including areas adjacent to the area within the lot boundary).

The AHIMS search identified:

- no Aboriginal sites or places within 5 km of the development site
- no Aboriginal cultural heritage studies undertaken within 5 km of the development site
- 12 records for Aboriginal heritage sites within a 30 km x 30 km search area:
  - one artefact (generally located near watercourses but can occur anywhere in the landscape – potential to occur on the development site)
  - one burial-artefact (generally uncommon and recorded in areas with less ground disturbance and generally found in elevated sandy contexts or in association with rivers and major creeks - unlikely to occur within the development site)
  - 10 scarred trees (generally located in areas where native vegetation has not been cleared – potential to occur in the development site).

There have been a small number of archaeological investigations in the local and regional area. The closest recorded study was an assessment located approximately 8 km southwest of the development site and as a result seven scarred trees were recorded.

In the region, two surveys had been undertaken near Lake Cowal located approximately 26 km northeast of the development site. These surveys found:

- nine artefact scatters and one scarred tree
- 65 sites which were dominated by stone artefact concentrations and heat retainer features – a few intact ground ovens were identified and a single scarred tree was recorded.

Predictive modelling was undertaken based on the landscape type and distance to watercourses. This modelling identified the potential for higher numbers of sites within the slopes landscapes rather than the plains, particularly within drainage line buffers. Artefact sites (including isolated finds and artefact scatters) are the most likely site types to be encountered within the development site, and are predicted to be more likely within the slopes landscapes, occupying the northern portion of the development site, although they are also predicted to occur in lower numbers within the plains landscapes. The likelihood of recording scarred trees is significantly lower within the slopes/plains landscapes.

Archaeological survey

A total of 12 Aboriginal cultural heritage sites were recorded within the development site. The results of the current assessment confirm closely to the predictive model with two artefact scatters and ten isolated finds being identified. All recorded sites are assessed as having low historic value. There were no identified constraints which prevented the successful completion of the archaeological assessment, which was conducted by up to four surveyors per day, including two qualified archaeologists. All values of the Burra Charter were considered when assessing the significance of the sites.

The two artefact scatters are of a low-density and located on the fenceline boundary of the development site (Figure 8.3):

- Glenroy-OS1 is a low-density artefact scatter comprising flakes (including broken flakes) and one core manufactured from silcrete.
- Glenroy-OS2 is a very low-density artefact scatter comprising flakes manufactured from quartz and silcrete.

The 10 isolated finds (Glenroy-IF1-10) were identified at the locations shown in Figure 8.3 and consisted of single pieces of quartz flake or silcrete flake/blade/core (see Photos 8.3, 8.4 and 8.5). The high number of identified isolated find sites is not unexpected given the high levels of ground exposure across the development site.

The recorded low-density artefact scatters and isolated artefacts highlight the limited availability of resources within the development site that would generally have only supported sporadic visits in the past.

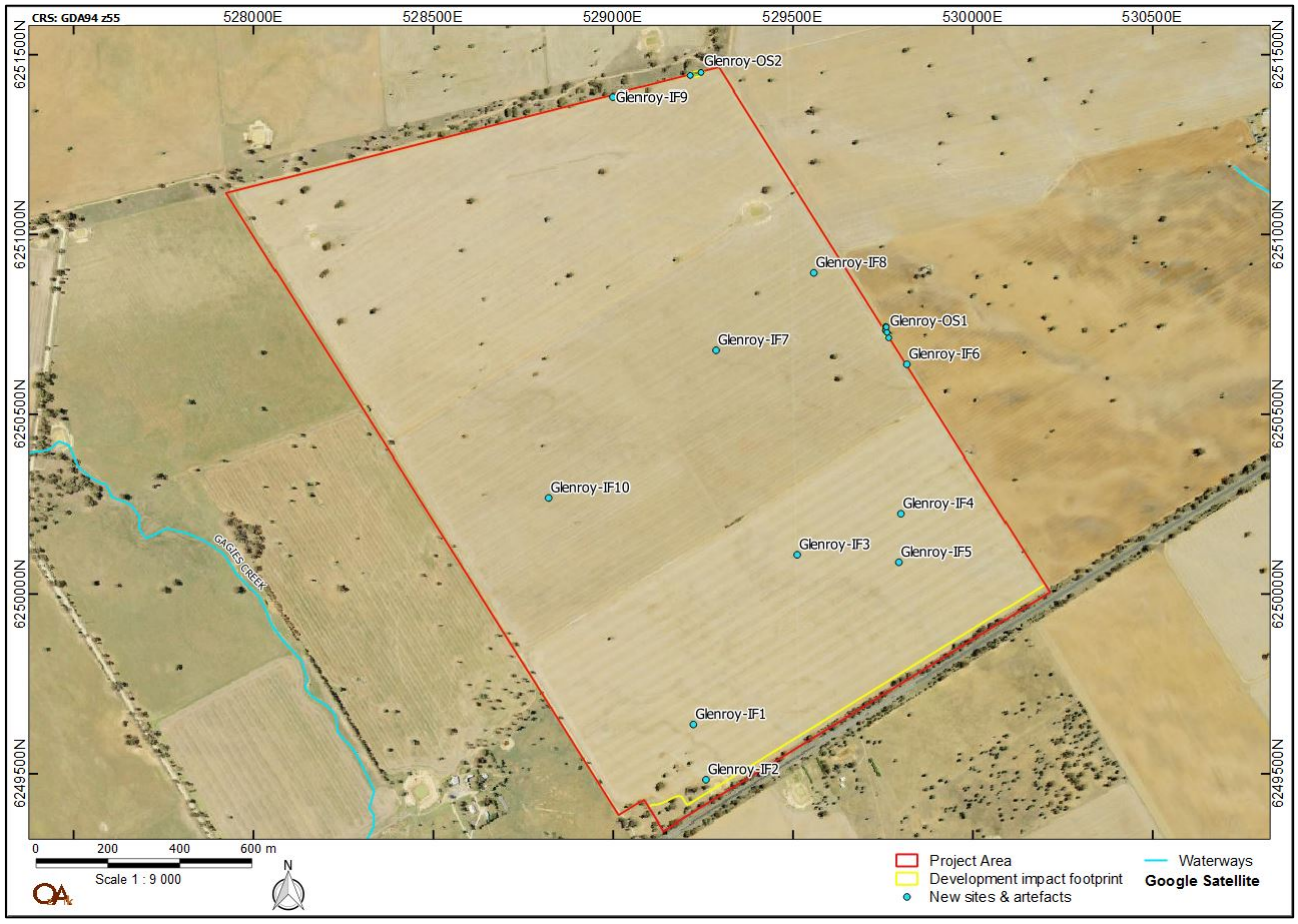

Figure 8.3. Location of newly recorded Aboriginal heritage sites within the development site

The potential for the presence of further subsurface archaeological deposits at each of the sites was assessed as negligible.

The identified sites are currently waiting registration approval by AHIMS.

Photo 8.3. A silcrete flake (Glenroy-IF1)

Photo 8.4. A silcrete blade (Glenroy-IF5)

Photo 8.5. A silcrete core (Glenroy-IF8)

The cultural material found within the development site is not considered rare for the following reasons:

- The isolated finds and low-density artefact scatters are representative of sites in the region.
- On a state-wide scale, low-density artefact scatters and isolated finds are the most common site type recorded.
- The general site integrity is low as the development site has been subject to consistent ploughing in the past.
- The potential for the presence of further subsurface archaeological deposits at the sites was assessed as negligible.

Assessment of significance

Archaeological / scientific value

Assessing a site in this context involves placing it into a broader regional framework, as well as assessing the site's individual merits in view of current archaeological discourse. Archaeological / scientific value relates to the ability of a site to answer current research questions and is also based on a site's condition (integrity), content and representativeness.

Aesthetic value

Aesthetic value refers to the sensory, scenic, architectural and creative aspects of the place. It is often closely linked with the social values. It may consider form, scale, colour, texture and material of the fabric or landscape, and the smell and sounds associated with the place and its use (Australia ICOMOS 2013).

Historic value

Historic value refers to the associations of a place with an historically important person, event, phase or activity in an Aboriginal community. Historic places do not always have physical evidence of their historical importance (such as structures, planted vegetation or landscape modifications). They may have 'shared' historic values with other (non-Aboriginal) communities.

Social or cultural value

The assessment of cultural or social value concerns the importance of a site or features to the relevant cultural group – in this case the Aboriginal community. Aspects of social value include assessment of sites, items, and landscapes that are traditionally significant or that have contemporary importance to the Aboriginal community. This importance involves both traditional links with specific areas, as well as an overall concern by Aboriginal people for their sites generally and the continued protection of these. This

type of value may not be in accord with interpretations made by the archaeologist: a site may have low archaeological value but high social value, or vice versa.

Significance of the sites

All values of the Burra Charter were considered when evaluating the significance of sites in the development site. OzArk assessed that the cultural material identified within the development site was of:

- low scientific/archaeological significance
- no aesthetic value
- low historic value.

Cultural heritage significance is assessed by the Aboriginal community and is typically based on traditional and contemporary lore, spiritual values, and oral history, and may also take into account scientific and educational value.

Correspondence on the social or cultural significance of the development site is yet to be provided by the RAP.

8.2.3 Impact assessment

ESCO Pacific has committed to avoiding one scatter site (Glenroy-OS1) and an isolated artefact (Glenroy-IF6). Three sites, including a scatter site and two isolated artefact sites, will be either avoided or salvaged (Glenroy-OS2, Glenroy-IF2 and Glenroy IF-9). The remaining seven isolated artefacts sites identified during the archaeological assessment would therefore be directly impacted as a result of the project.

A series of guidelines have been developed by DPE to quantify and standardise impact assessments (DPE 2016). All impacts have been graded based on the matrix outlined in DPE 2016 (see Figure 8.4).

Degree of potential impact on heritage item	Significance of heritage object or place: Very high	High	Medium	Low
Total impact	Very high value	High value	Medium value	Low value
High partial impact	High value	High value	Medium value	Low value
Medium partial impact	Medium value	Medium value	Low value	Minimal value
Minimal partial impact	Low value	Low value	Minimal value	Minimal value

Figure 8.4. Potential impact to heritage items reference matrix

Table 8.2 assesses the seven heritage items determined for direct impact and total harm, to arrive at a standardised 'value of impact'. In Table 8.2 all objects have been given the highest cultural value (2), and low scientific, aesthetic and historic values (0). It is recognised that even isolated, displaced artefacts can have value to the Aboriginal community.

Table 8.2. Overall value of potential impact on heritage items

Factor	Heritage items (isolated finds)
Name or location of the heritage item or place	Glenroy-IF1; Glenroy-IF3 to IF5; Glenroy-IF7 to IF8; Glenroy-IF10
Social or cultural value	2
Historical value	0
Scientific value	0
Aesthetic value	0
Significance of heritage item	Low
Degree of impact (partial or full)	Full
Overall value of potential impact on heritage item	**Low**
Reasoning behind scores	General disturbance at sites; isolated finds.

The management will depend on many factors including the assessed significance of the sites. In certain instances, a site may have low archaeological, aesthetic, and historic values but moderate or high cultural values. In these cases, management is aimed to mitigate the loss of the cultural heritage values, rather than the loss of the scientific values.

Sites of low scientific significance, such as an isolated finds could, from an archaeological perspective, be removed/destroyed with no further archaeological management being required. However, given the site's cultural value, the local Aboriginal community may wish to collect or relocate artefacts and such management will form part of the ACHMP.

As the heritage impact value of the loss of Aboriginal cultural heritage is considered to be low, the loss would have a negligible cumulative impact on the region's Aboriginal cultural heritage resource.

8.2.4 Management and mitigation

The following management measures are proposed for the project:

- ESCO Pacific and its Contractors will adhere to the following Statement of Commitments:
  - The Aboriginal Cultural Heritage Management Plan (ACHMP) will be developed in consultation with the RAPs and the recommendations of the ACHAR (Appendix D). Impacts to aboriginal heritage will be managed in accordance with the ACHMP.
  - As project design is finalised all efforts will be made to conserve Aboriginal sites in the development site.
  - The location of Glenroy-OS1 and OS2; Glenroy-IF2; Glenroy-IF6; and Glenroy-IF9, will be noted and efforts made to avoid these sites as they are located near the perimeter of the development site in a landform that will be subject to less disturbance than adjacent landforms.
  - The impacted isolated finds (Glenroy-IF1; Glenroy-IF3 to IF5; Glenroy-IF7 to IF8; and Glenroy-IF10), that have been recorded within the development site will be salvaged, along with any located near the perimeter of the development site that are unable to be avoided.

  - The salvaged artefacts will be reburied at a location outside of the development site, but within the lot boundary where no future developments are planned. The manner of reburial will be detailed in the ACHMP following RAP consultation. A site card will be submitted to AHIMS to register the location of any reburied artefacts.
  - An Aboriginal Site Impact Recording Form will be submitted to AHIMS recording the results of the salvage of any sites associated with the Project.
  - Should any sites within the development site (Glenroy-OS1 and OS2; Glenroy-IF2; Glenroy- IF6; and Glenroy-IF9) be able to be avoided, those sites will be clearly and permanently demarcated to avoid inadvertent impacts. The demarcation will include permanent signage. ESCO Pacific and its Contractors will consider permanently fencing these sites to avoid inadvertent impacts.
- All land-disturbing activities will be confined to the assessed area within the lot boundary. Should the parameters of the proposed work extend beyond the assessed area, then further archaeological assessment may be required.
- Inductions for staff undertaking the proposed activity shall include the legislative protection requirements for Aboriginal sites and items in NSW and the relevant fines for non-compliance.
- Should any items of Aboriginal cultural heritage significance (including human remains) be uncovered then the Unanticipated Finds Protocol should be followed.

Unanticipated Finds Protocol

The protocol to be followed in the event that previously unrecorded or unanticipated historic objects are encountered is as follows:

- If any Aboriginal object is discovered and/or harmed (in or under the land) while undertaking the proposed development activities, the applicant will:
  - not further harm the object
  - immediately cease all work at the particular location
  - secure the area so as to avoid further harm to the Aboriginal object
  - notify OEH as soon as practical on 131 555, providing any details of the Aboriginal object and its location
  - not recommence any work at the particular location unless authorised in writing by OEH.
- In the event that Aboriginal burials are unexpectedly encountered during the activity, work must stop immediately, the area secured to prevent unauthorised access, and NSW Police and OEH contacted.
- ESCO Pacific will cooperate with the appropriate authorities and relevant Aboriginal community representatives to facilitate:
  - the recording and assessment of the find(s)
  - the fulfilment of any legal constraints arising from the find(s), including complying with OEH directions
  - the development and implementation of appropriate management strategies, including consultation with stakeholders and the assessment of the significance of the find(s).
- Where the find(s) are determined to be Aboriginal object(s), recommencement of work in the area of the find(s) can only occur in accordance with any consequential legal requirements and after gaining written approval from OEH (normally an Aboriginal Heritage Impact Permit).

Proposed management measures from the RAP

Correspondence on the proposed management measures for the development site is yet to be provided by the RAP, however the management measures above will be revised to take into consideration any further recommendations suggested by the RAP.

8.3 Historic heritage

An historic heritage assessment was undertaken by OzArk in accordance with the Heritage Council's Historical Archaeology Code of Practice (Heritage Council 2006) to identify historic heritage values of the land within the development site and assess the potential impacts to them as a result of the project (Appendix D).

This section provides an assessment of the potential impacts to historic heritage values.

8.3.1 Methodology

The following register searches were undertaken to identify historic heritage at the development site and surrounding area:

- National and Commonwealth Heritage Listings
- NSW State Heritage Register
- Australian Heritage Database
- Bland LEP 2011.

The fieldwork component of this assessment was undertaken simultaneously with the Aboriginal heritage assessment from Tuesday 25 to Thursday 27 September 2018 (see Section 8.2).

8.3.2 Existing conditions

The initial settlement began in the district in 1833, recognising the area's agricultural potential. Vast sheep and cattle runs were introduced and the area became known as "The Blands" after a Sydney doctor, leading to the name Bland Shire Council. It was not until John Neeld discovered gold in 1893 that a centralised settlement was developed. Concurrent with the goldrush, the large pastoral holdings in the district were divided up and mixed farming developed. This resulted in West Wyalong becoming the largest cereal growing centre in NSW.

National and Commonwealth Heritage Listings

There are no places listed on either the National or Commonwealth heritage lists located within the development site.

NSW State Heritage Register

There are no places of state historic heritage significance registered within the development site.

Australian Heritage Database

There are no places listed in the Australian Heritage Database within the development site.

Bland LEP

There are no places listed as being of state historic heritage significance within the development site.

Archaeological survey

No historic heritage items or sites were recorded during the archaeological survey of the development site; therefore, there are likely to be no impacts on historic heritage from the activities of the project.

8.3.3 Impact assessment

There are no known places of historic heritage value or significance within or intersecting the development site. Also, it is unlikely there are any unidentified items of historic heritage located within the development

site. Therefore, the project will not have any direct impacts on known historic heritage and is highly unlikely to have impacts upon unknown historic heritage.

8.3.4 Management and mitigation

The following management measures are proposed:

- If it is identified that ground disturbance activities will occur beyond the assessed area, then further archaeological assessment may be required.
- Should any items suspected of having historic heritage significance be uncovered, all work will stop and the Historic Heritage Unanticipated Finds Protocol (below) will be followed.
- Inductions for staff undertaking the proposed activity will include the legislative protection requirements for historic sites and items in NSW and the relevant fines for non-compliance.

Historic Heritage Unexpected Finds Protocol

The protocol to be followed in the event that previously unrecorded or unanticipated historic objects are encountered is as follows:

- All ground surface disturbance in the area of the finds should cease immediately the finds are uncovered.
- The discoverer of the find(s) will notify machinery operators in the immediate vicinity of the find(s) so that work can be halted.
- The site supervisor will be informed of the find(s).
- If finds are suspected to be human skeletal remains, then NSW Police must be contacted as a matter of priority.
- If there is substantial doubt regarding the historic significance for the finds, then a qualified opinion from an archaeologist will be obtained as soon as possible. This can circumvent proceeding further along the protocol for items which turn out not to be significant. If a quick opinion cannot be obtained, or the item is considered likely to be significant, then proceed to the next step.
- Immediately notify OEH (Heritage Division) at 131 555 of the find(s)
- Facilitate, in co-operation with the appropriate authorities:
  - the recording and assessment of the finds;
  - fulfilling any legal constraints arising from the find(s). This will include complying with OEH directions
  - the development and conduct of appropriate management strategies. Strategies will depend on consultation with stakeholders and the assessment of the significance of the find(s).
- Where the find(s) are determined to be significant historic items, any re-commencement of construction related ground surface disturbance may only resume in the area of the find(s) following compliance with any consequential legal requirements and after gaining written approval from OEH.

8.4 Hydrology and water resources

The hydrology of a site and downgradient waterways can be modified due to earthworks or the construction of facilities or infrastructure, potentially increasing flood risk. Groundwater hydrology can also be affected by dewatering of excavations or water extraction to meet project supply needs.

Surface water and groundwater quality can be affected by issues such as erosion from soil disturbance, or the release of chemicals and hydrocarbons.

Changes to hydrology or water quality can cause impacts on surface water and groundwater resources affecting beneficial uses of these resources. This section provides an assessment of the potential hydrology and water resource impacts resulting from the project, including an assessment of flood risk. It aims to address the SEARs and Agencies' comments regarding surface water and groundwater resources, water requirements and supply arrangements, and erosion and sediment control.

8.4.1 Methodology

A literature review was undertaken to assess the existing hydrology and water resources for the development site, including sourcing information from the NSW (DPI) and from the Bland LEP 2011 maps and website tools.

Flood risk assessment

A flood risk assessment of the development site was undertaken by Alluvium in response to the SEARs and is provided as Appendix E.

To determine the flood extents of the Wyalong Solar Farm, a 2D flood model was developed to determine the channel and overland flows.

A Light Detection and Ranging (LiDAR) survey was obtained for the catchment at 1 km^2 tiles and joined to form an overall Digital Elevation Model (DEM) of 5 m resolution. The tiles were obtained from the Geoscience Australia website. A 2D flood model was built using TUFLOW software and used to determine the channel and overland flows.

The Direct Rainfall Approach was used for the flood simulation. Rainstorms were applied to the model created above for the 0.1% [1:1000] annual exceedance probability (AEP), 1% [1:100] AEP and 5% [1:20] AEP events for a 6-hour storm duration event.

To assist with validating the model, two hydrological methods were utilised to determine the upper limit discharges for the project catchment at the same measurement locations used in the TUFLOW model and to ensure the most conservative approach was taken. The first was the new Regional Flood Frequency Estimation Method (RFFEM 2016) in the Australian Rainfall and Runoff 2016 (ARR16) literature. A second method was a full hydrological model which was constructed using the Watershed Bounded Network Model (WBNM) software.

The WBNM model was broken down into 27 sub-catchments, each having an average area of 10 km^2 and total area of 270 km^2. The discharge results of the WBNM and RFFEM, measured at the downstream extent of the regional model, are in close agreement.

An estimation of the flooding hazard was achieved by multiplying the maximum flood depths and velocities of the 100-year ARI event (1% AEP).

Erosion and sediment control

Accent undertook an erosion assessment that included an analysis of soils and an assessment of erosion and drainage risk by:

- a literature review

- field observations from 19 to 20 September 2018.

8.4.2 Existing conditions

Surface water hydrology

Regional and local setting

On the broadest scale, the development site is located within the Murray-Darling Basin, a catchment that drains approximately one-seventh of Australia's landmass (Pigram 2007).

The development site is located between the Murrumbidgee River to the southwest and the Lachlan River to the northeast. The closest river is the Lachlan River, approximately 70 km from the site. Other waterways in the vicinity of the site include:

- Gagies Creek, approximately 1.2 km to the west
- an ephemeral tributary of Gagies Creek, approximately 550 m to the west
- Barmedman Creek, approximately 11.6 km to the east
- Warralonga Creek, approximately 15.3 km to the east
- Bland Creek, approximately 20.6 km to the east.

The ephemeral tributary of Gagies Creek flows from northwest to southeast into Gagies Creek and then Barmedman Creek which, in turn, joins Bland Creek 23 km northeast of the site. Bland Creek flows north into the largely ephemeral Lake Cowal, which in district-wide flooding events, is connected to the Lachlan River.

Development site

The development site is drained by an unnamed and ephemeral tributary to Gagies Creek and an unnamed and ephemeral tributary to Barmedman Creek. The northern part of the site drains to the east to Barmedman Creek and the southern part drains into Gagies Creek. Figure 8.5 shows the streams draining the development site and the direction of drainage. Note that the streamlines have been generated by the flood model and all drainage lines within the development site are ephemeral.

Two constructed farm dams are located along the ephemeral drainage lines within the northern part of the development site and one constructed dam is in the southern part of the site.

The development site is not located within a flood planning area as designated under the Bland LEP 2011.

Based on the categories of flood risk shown in Figure 8.6, below, the majority of the development site flood risk is low with the exception of the dams and a western portion of the development site at a medium to extreme level. If the dams were to be filled in to match surrounding ground level this hazard category may be reduced. Detailed maps of flood inundation and flood hazard are provided in *Wyalong Solar Farm Flood Modelling* (Alluvium (2018)).

The flood risk assessment undertaken by Alluvium is discussed in Section 8.4.3.

Groundwater

Groundwater is a vital source of water for a number of communities throughout the Lachlan catchment. However, at the site, groundwater is not a source of irrigation water.

NSW records for groundwater bores show nine bores are within a 10 km radius of the site. However, eight of the nine bores were drilled for mineral exploration purposes and only one (Bore ID No. GW056453) was drilled for water supply purposes. This bore is located approximately 4.4 km south of the site. The total depth of the bore is 45.7 m, suggesting that the depth to groundwater in this area may be approximately 40 m below the ground surface.

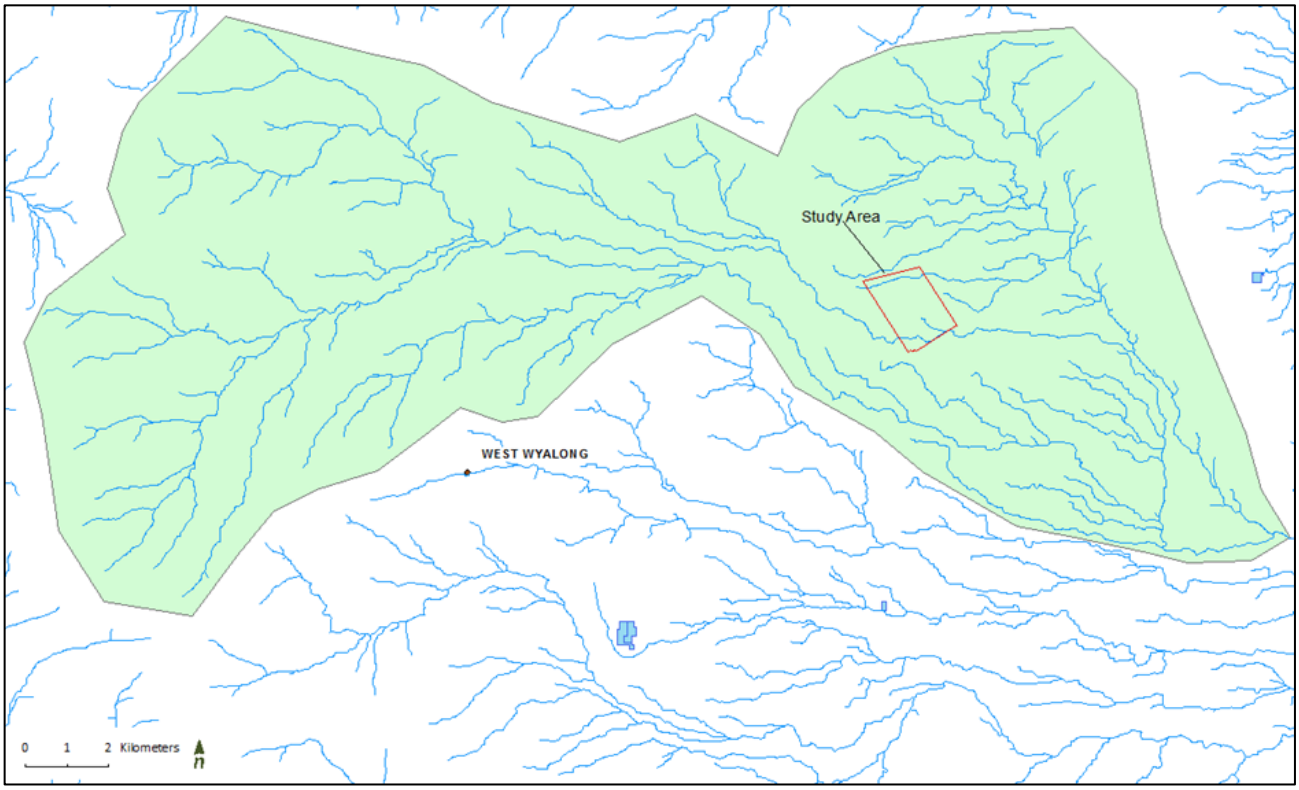

Figure 8.5 Development site sub-catchments (Alluvium 2018)

Erosion and sediment

During the field inspection, evidence of soil erodibility was noted – the soils and subsoils used to create the farm dam embankments at the site displayed eroded surfaces as can be seen in Photo 8.6. There is no significant evidence of vegetation recolonisation, indicating that the dam embankment may be comprised of subsoil of limited fertility and that erosion is occurring at a faster rate than revegetation.

Photo 8.6. Farm dam earthen embankment showing erosion channels

8.4.3 Impact assessment

Flood risks

Two categories of flood risk have been considered:

- flood risks posed by the project
- flood risks posed to the project.

Flood risks posed by the project

There are two main potential impacts the Wyalong project could have on flooding and runoff external to the site.

- impacts on riverine flood levels due to the project being an obstruction to flow
- impacts on flood levels due the development producing extra runoff.

The results of the flood modelling showed that runoff through and adjacent to the proposed solar farm development site was shallow and of an overland nature. Significant creek or riverine flooding did not develop due to the flat nature of the terrain and relatively low runoff volumes. Therefore, the potential for the solar farm to obstruct the very shallow overland flow observed in the catchment would be negligible.

The development site is not expected to have any impact on existing community emergency management arrangements and is not expected to place any burden on Council or State Emergency Service (SES) staff. Consultation with Council and SES has been initiated and will be considered in detail during the development of internal workplace health and safety (WH&S) procedures at a later date. Normal emergency management procedures are to be employed with respect to flooding. Flood warning times are reasonable, and staff are not required to be on-site during flood conditions.

The development site experiences shallow overland sheet flow, low hazard ratings, and is not expected to sustain flood damages during major flooding. Social and economic consequences due to the impact of flooding on the development site are expected to be negligible.

Literature was reviewed by Alluvium regarding the potential for the solar panels to generate additional local stormwater runoff. It was concluded that so long as the developed site vegetation conditions are maintained to pre-development conditions, and that impervious areas are not increased substantially, additional runoff as a result of the project is unlikely to occur.

Risks posed to the project

The investigation of flooding hazard showed the majority of the development site is of low risk with the exception of the drainage line in the northwest corner (including the dam in that drainage line), the dam in the southwestern corner and the dam near the northern part of the eastern boundary (Figure 8.6). However, ESCO Pacific has advised they will fill these dams to match the surrounding ground level, which will reduce the risk of flooding.

The conceptual design shows that the substation and office buildings are located away from drainage lines and outside the flooding zone. If these facilities were moved to a different location along the transmission line as part of detailed design, the applicant would ensure that the new location was also located away from drainage lines and flooding zones.

Construction and decommissioning

Water quality

In addition to the hydrological impacts discussed in the flood risk assessment above, potential impacts to surface water and groundwater quality during construction could occur due to contamination from unintended spillages of fuel, lubricants, herbicides, sewage and other chemicals.

During the construction of the project, fuels, chemicals or other potential contaminants will be used or stored onsite. However, the quantities of chemicals used during construction will be relatively minor. With the management and mitigation measures proposed in Section 8.4.4, there are not expected to be any significant impacts to surface water or groundwater quality.

Figure 8.6. Flood hazard mapping of the development site for a 100-year ARI (1% AEP)

Any residual water within the farm dams will be pumped out prior to infilling. The water will be offered to the landholder for use or storage in another dam, used preferentially as a source of water during construction, or tested and, if of suitable quality, disposed of to surface drainage lines in accordance with EPA requirements.

As noted in Chapter 2, the soils of the development site are vertosols and are often called 'cracking clay' soils. These soils may be prone to erosion. However, impacts from soil erosion are expected to be minor and readily manageable. Erosion risk is discussed in further detail in Section 8.5.2.

Groundwater impacts are expected to be unlikely as excavation will not be required to erect the solar panels, and trenches for underground cables will be shallow. Earthworks will mostly occur within one metre of the ground surface and are therefore highly unlikely to intercept the groundwater table.

Water use

Water use during project construction (approximately 30,000 kL) and decommissioning will be mainly for dust suppression. ESCO Pacific's preferred option is for water requirements during construction and decommissioning to be met by trucking water to site. Truck movements as a result of water delivery have been considered as part of the traffic impact assessment (see Section 8.6).

Should the groundwater bore option be implemented, ESCO Pacific will seek to obtain all relevant permits and comply with all relevant requirements.

The water supply would not be sourced from surface water; therefore there is no anticipated impact to adjacent surface water users.

Potable water supply for staff amenities would be imported to the site in containers, as required, under a commercial supply arrangement, and onsite water tanks would be filled. Temporary toilets will be available throughout the construction period for use by contractors. These toilets will be pumped out by a local licenced waste contractor.

Accordingly, the project is not expected to impact on the availability of current surface water or groundwater resources to local landholders.

Operation

Water quality

In addition to the hydrological impacts discussed in the flood risk assessment above, potential impacts to surface water and groundwater quality during operation could occur due to contamination from unintended spillages of fuel, lubricants, herbicides, sewage and other chemicals.

Only minor quantities of chemicals will be used and stored on site during operation and there will be no fuel storage. With the management and mitigation measures proposed in Section 8.5.3, there are not expected to be any significant impacts to surface water or groundwater quality.

The management of water flows on and offsite have been designed to minimise erosion and sedimentation from the site (see Section 8.5). The revegetation of the site following construction will minimise the risk of impacts.

Water supply

The project will collect water from building roofs and utilise onsite water storage tanks. It is anticipated that 500 kL of water will be used during operation each year for cleaning, maintenance and staff amenities. Water will be trucked in during periods when there is insufficient rainfall to fill onsite water tanks.

No impact on the availability of current groundwater resources used by local landholders is anticipated.

8.4.4 Management and mitigation

Design

The design of the project layout will ensure any high-risk site facilities (such as the substation) are located away from areas of potential flood risk. The indicative location of site facilities on the project layout (see Figure 3.1) avoids the ephemeral waterways within the development site as well as the flood hazard areas.

Project design will be in accordance with Managing Urban Stormwater: Soils & Construction (Landcom 2004).

Construction and decommissioning

The following management and mitigation measures will be implemented during construction to limit the impacts of the project on hydrology and water resources:

- implementing erosion and sediment control measures during construction as outlined in Section 8.5.3, including minimising areas of disturbance and rehabilitating disturbed areas as soon as possible
- installing effective stormwater management and control measures during construction, in accordance with the erosion and sediment control plans for the site
- developing and implementing procedures for the testing and management of construction wastewater if disposal is required

- refuelling plant and machinery in an impervious bunded area at least 50 m away from water bodies and drainage lines
- storing fuel and chemicals in an impervious bunded area at least 50 m away from water bodies and drainage lines as outlined in Section 8.5.3
- implementing a spill response plan (to be prepared as part of the CEMP) which will include containment and remediation procedures, placement of spill kits and safety data sheets (SDSs), and training requirements for staff as outlined in Section 8.5.3
- disposing of all hazardous chemicals and waste offsite in accordance with relevant NSW government regulations and guidelines
- daily inspection of all machinery and plant to ensure no leakage of fuels, lubricants or other liquids.

Operation

The following management and mitigation measures will be implemented during operation to limit the impacts of the project on hydrology and water resources:

- maintaining vegetation cover under all solar panel arrays to maximise water infiltration
- undertaking regular inspection of equipment and facilities to identify any spills or leaks
- implementing a spill response plan (also used for the CEMP)
- treating sewage by an onsite bio-cycle system installed to comply with Building Code of Australia (BCA) requirements
- ensuring the ERP for the project includes procedures to be followed in the event of flooding within the development site or surrounding area, including information on safe evacuation routes.

8.5 Soils and landuse

Potential impacts of the project on agricultural land and flood-prone land, and compatibility with existing land uses on the development site and adjacent land, including nearby mineral and exploration activities, are assessed in this section. They address the Agencies' comments on the SEARs such as provided by NSW Department of Industry and NSW Planning & Environment – Resources & Geoscience.

8.5.1 Existing conditions

Landuse within development site

The development site, covering approximately 256 ha of rural land, is highly modified due to its history of agriculture and grazing, and is currently comprised largely of crops. The site is generally flat and is crossed by two ephemeral drainage lines.

The single allotment on which the development site is located consists of three cropped paddocks. Crops include canola (*Brassica napus)* in the northern paddock and barley (*Hordeum spp*.) in the middle and southern paddocks. Both of these crops are grown in rotation, interspersed with years in which the paddocks are sowed with crops that are nitrogen fixing, returning nutrients to the soil, but are also suitable for grazing. In those years, cattle graze the paddocks keeping the biomass low (ESCO Pacific 2018). Due to the long history of grazing and cropping activities in the area, there has been significant disturbance in natural environment, and native vegetation is largely absent.

Three dams are present on the development site. However, these dams will be infilled during construction. No building structures or distinct tracks are present on the site.

The development site is zoned RU1 primary production under the provisions of the Bland Shire LEP 2011 (see Figure 2.1).

Surrounding landuse

The landuse immediately surrounding the site is similar to that of the site (i.e. mainly cropping paddocks). The wider landscape also consists largely of land historically cleared for agriculture, with vegetation cover occurring along road reserves and waterways such as the ephemeral tributary to Gagies Creek, located approximately 550 m west of the development site. Surrounding landuse is shown in Figure 8.7.

The development site is located in the Riverina region of southwestern NSW which consists predominantly of irrigated land, with agriculture, forestry and fishing being the main industries.

North: The land immediately to the north is divided into three paddocks – one which is cropped land and the other two are grazed paddocks. A fenced strip of sparsely treed land approximately 50 m wide separates these three paddocks from the development site.

East: The land immediately to the east appears to be used for cropping. This cropped paddock is bounded by farmland to the north and to the east and by the Newell Highway to the south.

West: The land immediately to the west appears to be used for cropping. This cropped paddock is bounded by farmland to the north and to the west and by the Newell Highway to the south.

South: immediately south of the development site is Newell Highway. South of the highway, the land appears to be used for cropping.

Geology, soil and land capability

The Forbes 1:250 000 Geological Sheet (Raymond *et al.* 2000) indicates the geology of the area consists of three main units:

- Silurian-Devonian sedimentary rocks, including sandstone, siltstone, mudstone and basal conglomerate units
- undifferentiated Cainozoic sediments/sedimentary rocks consisting of unconsolidated mud, silt, sand and gravel of an uncertain age and origin
- minor Quaternary alluvial deposits of mud, silt, sand and gravel deposited by river (alluvial) systems.

The local geology is shown on Figure 8.8. As can be seen on this figure, both the undifferentiated Cainozoic sediments (covering the majority of the site) and the Quaternary alluvial deposits (in the south-western corner) are shown to be present at the site.

A review of the eSPADE website (OEH 2018) shows the soil at the site is classified as belonging to the Vertosol group of soils.

Vertosols are described by CSIRO (2018) as soils with:

I. a clay field texture or 35% or more clay throughout the solum except for thin, surface crusty horizons 0.03 m or less thick and.
II. when dry, open cracks occur at some time in most years. These are at least 5 mm wide and extend upward to the surface or to the base of any plough layer, self-mulching horizon, or thin, surface crusty horizon; and
III. slickensides and/or lenticular peds occur at some depth in the solum.

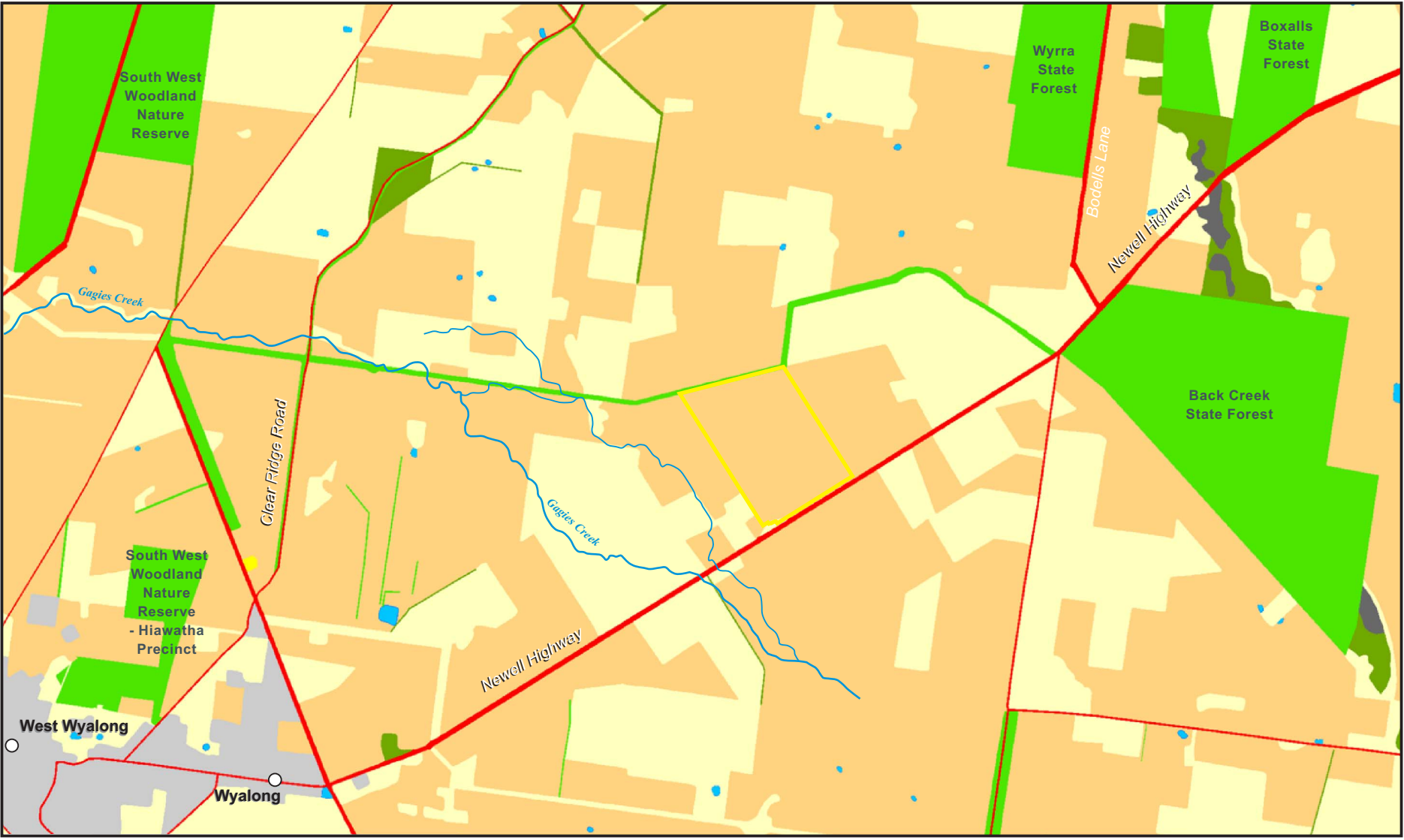

Figure 8.7

Local Landuse
Wyalong Solar Farm

Client: Esco Pacific
Project No: AE1091.0

Legend

Development Site

Landuse

- Conservation Area
- Cropping
- Grazing
- Mining and Quarrying
- River and Drainage System
- Transport and Other Corridors
- Tree and Shrub Cover
- Urban

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Land and soil capability

To assess the land and soil capability (LSC) (i.e. the inherent physical capacity of the land to sustain a range of landuses and management practices over the long term, without degradation to soil, land, air and water resources), data presented on the Land and Soil Capability Mapping on the eSPADE website (OEH 2018) has been reviewed. This data indicates the proposed development is mapped as LSC Class 3 land which, according to the classification, has 'moderate limitations'. This class of land is capable of sustaining high impact landuses using more intensive, readily available and accepted management practices. LSC Class 3 land is suited to grazing, including the use of improved pastures. Cultivation is limited to cash or forage crops in rotation with pastures.

Figure 8.9 shows the land and soil capability for the site and surrounding area.

Potential erosion of the soil as a result of the project is discussed in Section 8.5.2.

Agriculture

The main landuse in the Bland LGA is rural and the area consists predominantly of irrigated land. As described in Section 8.12, agriculture and mining are the main employers, with the main agricultural activities being grain-sheep or grain-beef cattle farming and other grain growing.

The NSW government, through the Department of Planning and Environment, has assessed the state to map areas of land that are considered to be Biophysical Strategic Agricultural Land (BSAL). BSAL is land with high quality soil and water resources capable of sustaining high levels of productivity (DPE 2018b). The 'Safeguarding our Agricultural Land' portal was accessed to check whether the proposed solar farm would impact any such designated land. This check found no BSAL area in the vicinity of the development site (DPE 2018b). The nearest BSAL is located approximately 70 km southeast of the site.

Potential contamination

To assess potential contamination in the area, searches of two publicly available databases were conducted on 19 September 2018. A search of the OEH contaminated land public record (NSW Government 2018a) was undertaken for contaminated sites within the Bland LGA and the search returned no results. A search of the online list of *NSW contaminated sites notified to the EPA* (NSW Government 2018b) was also conducted and returned three listings, each of which were in the West Wyalong township. Each of the three sites is at a distance of greater than 6 km from the proposed development site and is not expected to impact on the site.

Past and present agricultural activities at the site (e.g. use and disposal of herbicides and pesticides) have the potential to pose a contamination risk. However, no indications of soil contamination were observed during site inspections.

Acid sulfate soils

The Australian Soil Resource Information System indicates there is a low probability / low confidence that acid sulfate soils occur on the site (CSIRO 2013). No indications of acid sulfate soils were observed during site inspections.

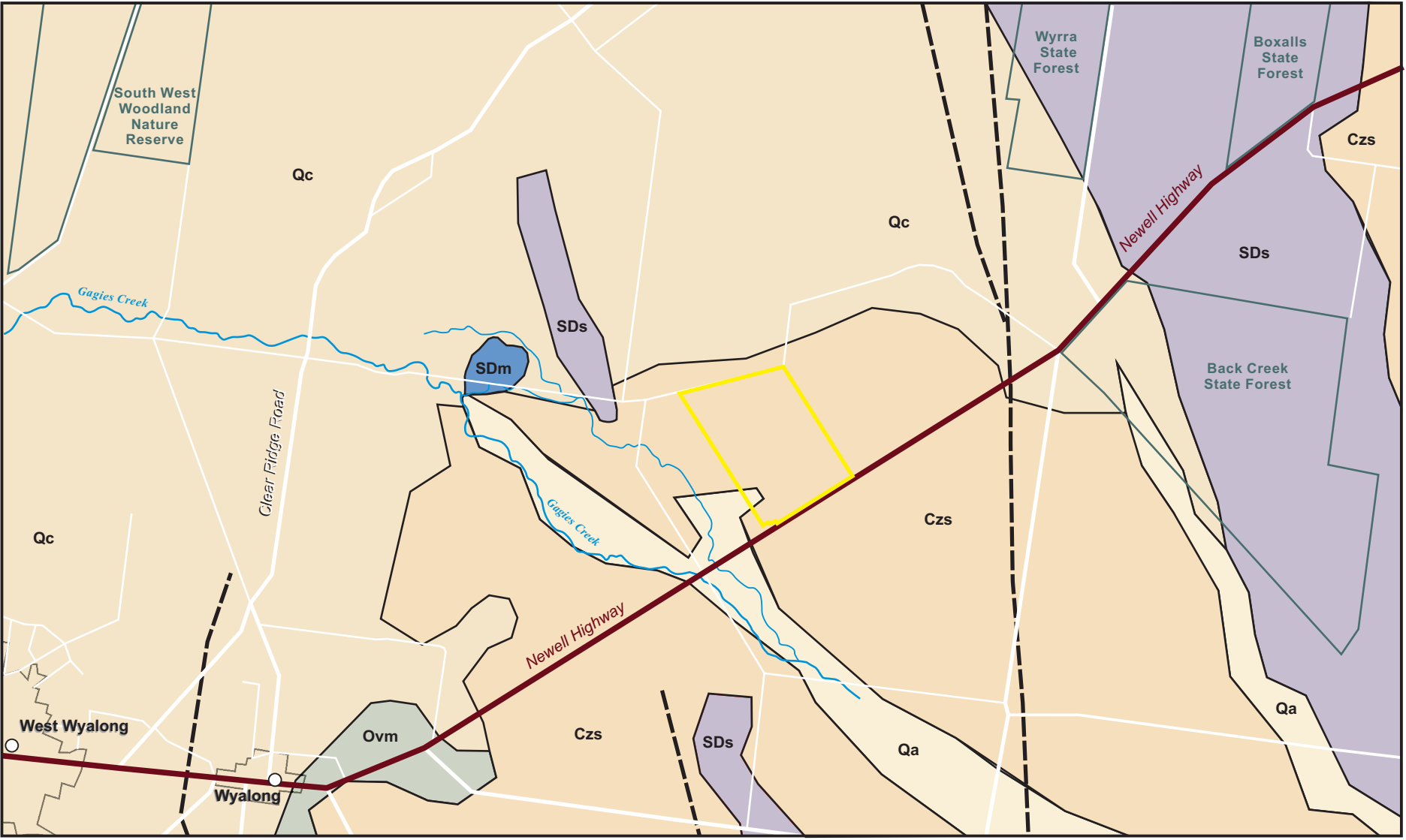

Figure 8.8

Local Geology

Wyalong Solar Farm

Client: Esco Pacific
Project No: AE1091.0

Legend

- Development Site
- State Forest / Reserve
- Township
- Watercourse
- Highway
- Fault, concealed

Qa	Quaternary - Alluvial Deposits
Qc	Quaternary colluvial deposits
Czs	Cainozoic undifferentiated - sedimentary
Ovm	Ordovician - Igneous mafic volcanics
SDs	Silurian - Devonian - sedimentary rocks
SDm	Silurian - Devonian - Magnesium and Mafic intrusivs

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Figure 8.9

Land and Soil Capability
Wyalong Solar Farm

Client: Esco Pacific
Project No: AE1091.0

Legend

- Development Site

- 1 Very slight to negligible limitation
- 2 Slight but significant limitations
- 3 Moderate limitations
- 4 Moderate to severe limitations
- 5 Severe limitations
- 6 Very severe limitations
- 7 Extremely severe limitations

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Mineral resources

A search of DPE's MinView tool on 19 September 2018 identified that a minerals exploration licence (EL8430) covers 64% of the development site. EL8430 is held by Argent Minerals Ltd and was granted on 20 April 2016, expiring on 20 April 2020. The minerals exploration licence is one of many in the broader region. DPE's Division of Resources & Geoscience has noted that the development site is located in highly prospective Macquarie Arc rock within the Gilmore Fault Zone. The Macquarie Arc is considered to host the most economic porphyry deposits in NSW, with an approximate density of 39 deposits per 100,000 km^2, including Cadia, Northparkes and Lake Cowal Gold Mines.

MinView does not identify any mineral occurrences on the development site but three mineral occurrences (including a quarry) are located between approximately 1 km and 2 km to the northwest (Figure 8.10). In addition, licence EL8430 includes two current copper-gold targets (Theia and Narragudgil) being drilled by Argent Minerals (see Figure 8.10). The targets are located approximately 10 km south of the development site (Argent Minerals 2018). The geological formations targeted by Argent are aligned generally north-south, meaning that the potential for mineralisation to be present beneath the development site cannot be discounted.

The total areas of EL8430 and the development site are approximately 112 km^2 and 1.62 km^2, respectively (identified using the SEED Maps measurement tool). Therefore, the area of overlap between the development site and the exploration licence area is only 1.5% of the total licence area.

The nearby Cowal Gold Mine is covered by mining lease ML1535 and is held by Evolution Mining (Cowal) Pty Ltd. The title is located approximately 25 km to the north (see Figure 8.10) and is highly unlikely to be affected by the project.

There are no other minerals, petroleum or coal exploration titles or applications over the development site (DPE 2018a).

The Division of Resources & Geoscience (DPE) search did not identify any operating quarries within 1 km of the development site. However, a number of quarries have been identified within 20 km of the site. These are listed in Table 8.3 and the main quarries are shown on Figure 8.10.

Flooding and water resources

As described in Section 8.4, waterways in the vicinity of the development site include Gagies Creek, an ephemeral tributary of Gagies Creek, and two ephemeral drainage lines that cross the site. The development site is not located within a flood planning area as designated under the Bland LEP 2011.

8.5.2 Impact assessment

Landuse

ESCO Pacific has secured land with a landholder who owns several parcels in the Wyalong area totalling approximately 750 ha, and also leases land from neighbouring properties. Of this area, 259 ha will be used for the project, which is approximately 34% of the total area of his landholding. The landholder would be able to continue farming activities on the remaining land without disruption. A corridor along the southern or northern boundary of the lot area will be created for passage of machinery for farming purposes.

The project will alter the current landuse from agriculture to electricity generation, reducing the availability of land for agriculture during project operation. During construction, agricultural landuse on the 259 ha project lot (i.e. the secured land), would cease. However, during operation there may be an opportunity for grazing to occur on the site. Once the project is decommissioned, the site would be able to be returned to its existing state, including the re-excavation of the three currently existing farm.

As outlined in Section 5.3.1, the project is considered compatible with surrounding land uses.

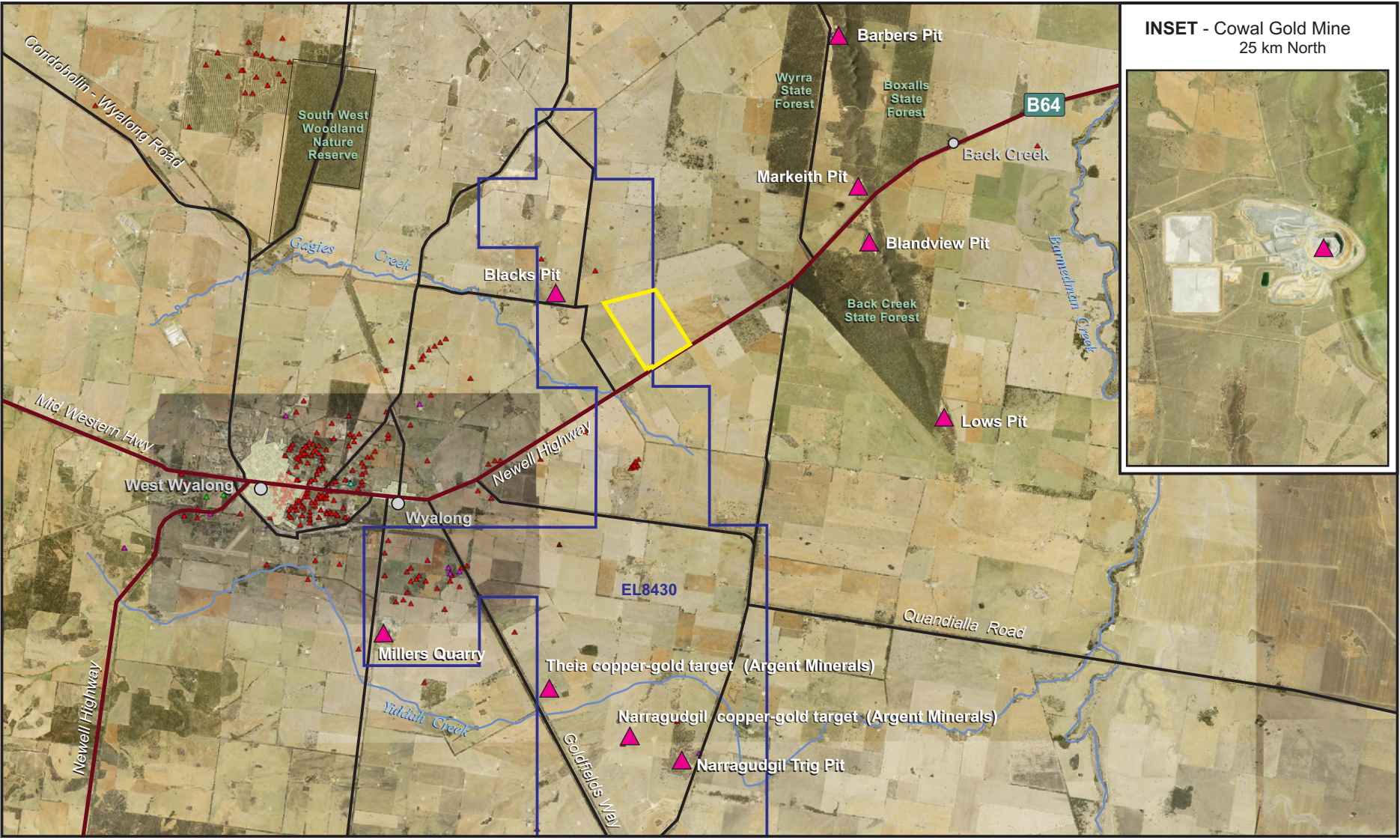

Figure 8.10

Recorded Mineral Occurrences
Wyalong Solar Farm

Client: Esco Pacific
Project No: AE1091.0

Legend

- Development Site
- Highway
- Main Road
- Watercourse
- Recorded Mineral Occurrences
- Existing or Prospective Extractive Sites
- Exploration Licence

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Table 8.3. Quarries identified within 20 km of the site

Quarry name	Identification number	Status	Distance and direction from site	Material quarried
Blacks Pit	217210	Operating - intermittent	1.3 km northwest	Siltstone
Unnamed	103930	Not operating	5.7 km southwest	Unprocessed construction materials
Blandview Pit	217198	Operating - intermittent	5.8 km northeast	Manna Conglomerate
Markeith Pit	217196	Operating - intermittent	6.1 km northeast	Manna Conglomerate
Lows Pit	217195	Operating - intermittent	7.1 km southeast	Manna Conglomerate
Unnamed	109065	Not operating	7.3 km southwest	Construction material
Unnamed	109066	Not operating	7.3 km southwest	Construction material
Unnamed	109067	Not operating	7.3 km southwest	Construction material
Millers Pit	216102	Not known	8.5 km west	Narragudgi Volcanics
Barbers Pit	217197	Operating - intermittent	8.6 km northeast	Manna Conglomerate
Unnamed	103931	Not operating	8.6 km northeast	Not known
Millers Quarry	104013	Operating - continuous	9.6 km southwest	Coarse aggregate quarry in Bland Diorite
Yiddah South Road Pit	216064	Not operating	10.4 km south	Yiddah Formation
Narragudgil Trig Pit	216062	Operating - intermittent	10.5 km south	Manna Conglomerate
Unnamed	104028	Not operating	10.6 km northwest	Not known
Unnamed	104027	Not operating	10.7 km northwest	Unprocessed construction materials
Unnamed	104026	Not operating	11.9 km northwest	Unprocessed construction materials
Unnamed	103929	Not operating	12.4 km southwest	Not known
Unnamed	108988	Not operating	14.0 km southwest	Not known
Unnamed	103928	Not operating	14.7 km southwest	Not known
Unnamed	216074	Not known	16.7 km west	Ungarie Granite
Rodmere Pit	217208	Operating - intermittent	17.4 km west	Humbug Sandstone
Wyalong South Pit	217181	Operating - intermittent	18.7 km west	Not known

Geology, soil and land capability

Soils have the potential to be impacted as a result of construction activities such as excavation and earthworks, resulting in the risk of soil erosion and sedimentation. Due to the relatively flat topography of the site, large-scale excavation will not be required. However, the soils of the development site are vertosols and may be prone to erosion.

Key construction works with the potential to increase erosion and sedimentation impacts are:

- slashing/removal of areas of vegetation
- excavation for installation of underground cabling in trenches
- installation of internal roads, access tracks, and laydown areas
- construction of the permanent site office, maintenance shed, switchyard and battery storage facility, and temporary contractor facilities
- installation of drainage works
- levelling/backfilling of existing dams
- construction vehicle movements on the site.

The above activities will potentially reduce the stability of soil, particularly through removal and disturbance of vegetation. This will increase the risk of soil erosion, particularly on windy days or during heavy rainfall. By disturbing the soil profile, particularly topsoil, vegetation may also take longer to re-establish in these areas. However, soil disturbance will only occur in a small portion of the development site. Activities such as the pile driving of the steel posts supporting the solar panels and installation of fencing will result in impacts that are highly localised and unlikely to result in significant disturbance of soils.

Vehicle movement, as well as other construction and decommissioning activities, have the potential to generate dust. However, dust issues are expected to be readily manageable, as discussed further in Section 8.9.

Soil compaction in areas such as internal roads and access tracks can result in soil erosion through an increase in runoff during rainfall events due to the reduced soil permeability. This can result in concentrated flows that may erode adjoining areas. Effective road design and management is required to control such risks.

Impacts to soil during operation are expected to be minimal, however there is potential for some dust generation from vehicle movement. Disturbed areas used during construction, but not required during operation (e.g. laydown and construction parking areas), will require rehabilitation to stabilise soils.

Concentrated runoff from solar panels during rainfall events has potential to increase the effect of erosion. However, retaining vegetation cover underneath and surrounding these panels will mitigate this.

There is some risk of soil contamination during construction as a result of the use of fuels, lubricants and other chemicals such as herbicides. Soil contamination from these chemicals could potentially inhibit plant growth on the site, reducing stabilisation of soil and increasing runoff into waterways after rainfall events. Contamination could also adversely affect land capability and cause wider ecological effects. However, due to the relatively small volumes of fuels, lubricants and other chemicals to be used on site, the risk of such impacts is considered very low. If soil contamination from existing or past agricultural activities such as pesticide and herbicide use is identified during construction, it will be addressed in accordance with the CEMP.

Agriculture

Due to the nature of solar farms, impacts to the long-term agricultural productivity of the site will be minimal. It is not anticipated that conversion to a solar farm landuse would alter the existing surface water or groundwater processes. During construction, trenching works will separate topsoils from subsoils. At the end of operation, the site will be decommissioned and the land rehabilitated to its existing conditions as far as practical to enable the existing agricultural use of the site to be re-established.

The development site does not contain areas of BSAL and the temporary loss of 256 ha of agricultural land is not considered a significant loss for the region.

ESCO Pacific has considered whether alternative sites for the solar farm exist along the transmission powerline that would occupy land less suitable for agriculture. As can be seen on Figure 8.7, with the

exception of the parcels of land to the south and north of the development site, all the land in the region is classified as Class 3 land. These parcels of less suitable agricultural land were considered as locations but were determined to be less appropriate for the proposed solar farm, due to factors including accessibility by vehicles for construction, and other constraints (see Section 4.5).

Due to the increased movement in people and vehicles to and from the site, particularly during construction and decommissioning, there is the potential for an increase in the spread of weeds and pathogens. Perishable waste such as food waste can attract pest animals to the site, including rats, foxes and rabbits. Weeds and pest animals should be able to be readily managed through the adoption of standard management and mitigation measures, as outlined in Section 8.5.3.

Mineral resources

The development site is not located on an area currently identified as a mineral resource. However, the potential may exist for mineralisation to be present beneath the site.

ESCO Pacific initiated consultation with Argent Minerals and the company's agent on the 26 September 2018, providing project information, key timelines and contact details (see Appendix C). Several follow up phone calls and emails have been exchanged. ESCO Pacific is committed to ongoing consultation with Argent Minerals to ensure any conflicting landuse issues are resolved as a matter of priority.

Should a potentially viable resource be identified beneath the site in the future, the consequent planning and regulatory implications would need to be considered at that time. The use of the site as a solar farm would not sterilise an underlying resource nor preclude its development following the eventual decommissioning of the project.

The project is unlikely to impact upon the operation of surrounding mines or quarries, including Cowal Gold Mine or the quarries listed in Table 8.3 (see Section 8.6).

Flooding and water resources

The potential for flooding within the development site is addressed in detail in Section 8.4. The investigation of flooding hazard showed the majority of the development site is of low risk with the exception of the drainage line in the northwest corner, the dam in southwestern corner and the dam near the northern part of the eastern boundary (see Figure 8.4). The proposed infilling of these dams will reduce the risk of flooding. In addition, the potential of the development to be an obstruction to riverine flood flow is considered to be negligible.

The project is not expected to impact on the availability of current surface water or groundwater resources to local landholders

8.5.3 Management and mitigation

Construction

Potential erosion and sedimentation impacts as a result of construction will be managed in accordance with the CEMP for the project. The CEMP would be developed in consideration of the following guidelines to address potential erosion and sedimentation impacts:

- Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition (Landcom 2004) (also known as the Blue Book)
- Volume 2A Installation of Services (DECC 2008a)
- Volume 2C Unsealed Roads (DECC 2008b).

The CEMP will include the following measures to reduce potential impacts to soils, landuse and agricultural land:

- designing internal access roads, tracks and the site car park with adequate run-off controls to prevent erosion from concentrated flows (e.g. as outlined in Landcom (2004))

- constructing and/or installing erosion and sediment control structures, and regular inspection of them, particularly following rainfall events (e.g. as outlined in Landcom (2004))
- lining drains with geotextile or plastic, where required to reduce erosion
- maintaining a register of erosion and sediment control activities, including records of inspection and maintenance
- minimising areas of disturbance and rehabilitating disturbed areas as soon as possible with appropriate plant species
- separating topsoil and subsoil and ensuring that soils are reinstated in the correct order
- filling trenches progressively after placement of underground cabling
- implementing a weed and pest management plan (WPMP) to be developed prior to construction, to reduce the spread of weeds and pathogens and control pest animals. This should include:
  - identification of areas on the development site which have environmental weeds
  - methods for controlling weeds e.g. herbicides, physical removal, grazing, etc.
  - ongoing monitoring of weeds
- implementing a vehicle hygiene protocol when entering and leaving the site to ensure vehicles and earthmoving machinery are free of debris, sediment and weeds
- ensuring any fill brought to site is weed and pathogen free
- implementing a TMP to ensure vehicles adhere to speed limits and keep to designated roads to reduce generation of dust. This is further outlined in Section 8.6 (traffic and transport) and Section 8.9 (air quality)
- ensuring appropriate stockpile management to reduce dust, erosive run-off and potential contamination (where relevant)
- implementing a contamination procedure (to be developed as part of the CEMP) outlining appropriate steps and authorities to be notified in the event buried contamination is uncovered
- refuelling plant and machinery in an impervious bunded area at least 50 m away from water bodies and drainage lines
- storing fuel and chemicals in an impervious bunded area at least 50 m away from water bodies and drainage lines
- implementing a Spill Response Plan (to be prepared as part of the CEMP) which will include containment and remediation procedures, placement of spill kits and SDSs, and training requirements for staff
- disposing of all hazardous chemicals and waste offsite in accordance with relevant NSW government regulations and guidelines.

Operation

Assuming areas disturbed by construction are effectively rehabilitated, soil erosion during operation will be limited predominantly to dust generation from internal roads and access tracks and the site car park. There is a low potential for contamination to occur associated with vehicle use and some maintenance activities.

The OEMP will include the following measures to reduce potential impacts to soils, landuse and agricultural land:

- undertaking regular inspection of drains and erosion and sediment control structures
- revegetating any residual areas still disturbed following construction (where no longer active) with appropriate plant species
- maintaining vegetation cover across the development site to reduce potential erosion impacts
- implementing a WPMP, to manage weed occurrence on site
- implementing a vehicle hygiene protocol for any earth moving machinery entering and leaving the site to ensure it is free of debris, sediment and weeds

- implementing a spill response plan.

Decommissioning

Management and mitigation measures to be implemented as part of decommissioning would be similar to those implemented during construction, as will be outlined in the RDS. Decommissioning will largely focus on reinstatement of the development site to its original (pre-construction) condition.

8.6 Traffic and transport

Traffic and transport can present a significant risk to human health, biodiversity and infrastructure by increasing traffic movements, removal of vegetation for improved sighting and disruption to existing businesses in the local area. This section provides an assessment of the potential impacts associated with traffic and transport.

In accordance with the requirements outlined in the SEARs, ESCO Pacific commissioned a Traffic Impact Assessment (report attached as Appendix F) undertaken by IMPACT Traffic Engineering Pty Ltd (IMPACT). This assessment identified the existing conditions including the existing road network, and assessed the impacts of the project by considering the proposed vehicle access routes, site access, vehicular movements and sighting requirements.

8.6.1 Existing conditions

The existing road network

The existing road network in the vicinity of the development site is shown on Figure 3.1. Access to the site during construction and operation will be from the Newell Highway, which bounds the site to the southeast.

Newell Highway

Newell Highway is a State Arterial Road which is generally aligned in a north-south direction and extends between Goondiwindi in Queensland to Tocumwal in southern New South Wales.

In the vicinity of the site, Newell Highway has been constructed with a central seal in the order of 7 m (2 x 3.5 m lanes) plus sealed shoulders measuring approximately 2.5 m on each side. Additional local widening has been provided at various points along Newell Highway (near the development site) to provide for pull out areas for broken down vehicles.

Road network limits

RMS is the state government agency that regulates vehicular load limits in NSW. RMS provides both General Mass Limits (GML) and Concessional Mass Limits (CML) for vehicles using roads in NSW. The RMS network plans confirm that the Newell Highway in the vicinity of the site is approved for GML, CML and HML vehicles.

Routes approved for GML, CML and HML vehicles are also available further afield to both the northeast and southwest.

Intersection sight distances

An assessment of the sight distance available from the development site access point has been undertaken by IMPACT.

AustRoads Guide to Road Design - Part 4A: Unsignalised Intersections sets out the sight distance requirements for unsignalised intersections, including:

- Approach Sight Distance

- Safe Intersection Sight Distances (SISD)
- Minimum Gap Sight Distance.

The guide recommends that Safe Intersection Sight Distance (SISD) is the minimum distance that should be provided on the Major Road at any intersection.

The Austroads Guide provides SISD values for commuter vehicles at varying design speeds. Based on this and adoption of an operating 85th percentile speed of 110km/h, a minimum SISD of 366 meters is required.

Newell Highway

Newell Highway in the vicinity of the site is generally very straight and flat, with trees along the verge of the highway set back at least 5 - 5.5 m from the carriageway to the northeast and 6-7 m to the southwest.

The SISD measurement is taken from a location 5.0 m from the edge of the through lane to the middle of the through lanes for approaching vehicles. Thus, with trees setback approximately 5-7 m from the through lanes, sight distances at this intersection to the northeast and southwest are expected to comfortably exceed the minimum requirement.

Sight distances available along Newell Highway are therefore assessed as more than sufficient to meet the minimum SISD requirements (assessed sight distances exceed 450 m in both directions).

8.6.2 Methodology

To assess the impacts of traffic on the site, the following aspects were considered:

- site location and local and regional context
- the existing road network
- vehicle access routes, including:
  - the anticipated access routes from Melbourne and Sydney to the site for the delivery of solar module/substation components
  - the anticipated access routes for delivery of construction materials such as aggregate and gravel, and water deliveries
  - the anticipated access routes for project workers
- site access point
- vehicle turning lane requirements
- sight distance requirements and assessed intersection sight distances
- traffic generation during construction, operation and decommissioning
- the impacts of the traffic on the local roads and nearby businesses (including the local mineral extraction pits).

To assist with the transport management assessment, the following documents were considered:

- AustRoads Guide to Road Design (and RMS supplements) (AustRoads 2009)
- National Heavy Vehicle Accreditation Scheme (NHVAS) Fact Sheet (NHVR 2016).

8.6.3 Impact assessment

Construction

Traffic generation

Total and peak vehicle movements have been estimated based on the nine-month construction phase, and are shown in Table 8.4. Each vehicle movement includes both the trip to and from the development site.

Table 8.4 Estimated traffic – construction

Type of vehicle	Approximate total vehicle movements	Peak daily vehicle movements
Heavy vehicles	2,320	24
Light vehicles	2,970	22
Total vehicles	**5,290**	**46**

In non-peak months (months 1 to 3 and 5 to 9), total vehicle movements will range from 18 to 40 movements (36 to 80 trips) per day, comprising 9 to 20 heavy vehicle movements and a consistent average of 14 light vehicle movements.

It is anticipated that the following vehicle movements will be required during the site construction:

- transportation of construction workers
- delivery of high voltage equipment, PV components, and related construction materials
- delivery of construction materials for the permanent site office, switchyard, and maintenance buildings
- delivery of temporary construction worker toilets, lunchrooms, and site office
- mobilisation and de-mobilisation of heavy plant and equipment
- delivery of aggregates and concrete for civil works
- delivery of water to meet construction requirements (mainly for use in dust suppression).

Potential impacts

The following aspects have been identified as being potentially impacted by the proposed development:

- traffic efficiency for non-project traffic using public roads, including:
  - minor delays to trip times caused by movements of project-related vehicles along the major transport routes
  - delays as a result of road closures (it should be noted that no road closures are currently planned during construction or decommissioning of project)
- safety, particularly increased collision risks with other vehicles, cyclists, pedestrians, stock and wildlife
- amenity impacts associated with dust (where traffic is on unsealed roads) and noise adversely affecting nearby residents.

Traffic impact on road network

Data provided by the RMS indicates that the Newell Highway generally carries in the order of 2,200 vehicles per day in the locality of the subject site.

Traffic during the peak construction periods equates to an approximate increase of 5% when compared against the existing traffic along Newell Highway. It is expected that these volumes will be comfortably absorbed on Newell Highway with no detrimental impacts to performance.

Basic right turn (BAR) and basic left turn (BAL) treatments will be applied at the site access point to ensure that inbound movements do not compromise performance and safety along Newell Highway.

Although sight distances available along Newell Highway are assessed as exceeding minimum SISD requirements, an on-site assessment will be undertaken prior to construction to confirm that there is no vegetation impeding on the integrity of the available SISD's (minor trimming will be undertaken if required). Furthermore, supplementary 'trucks crossing' signs will be used if required to provide advanced warning for vehicles travelling along Newell Highway in the vicinity of the site.

Traffic impact on nearby mineral extraction sites

The potential impact of construction traffic on various operational quarries within 20 km of the development site, and Cowal Gold Mine located 30 km north, was assessed. These quarries are listed in Table 8.3, Section 8.5. Given the proposed construction vehicle routes, it is possible that a portion of construction traffic will drive past some of these quarries and the turn-off to the Cowal Gold Mine on their way to and from the development site. However, it is not expected that construction traffic will have any significant impact on the operation of these quarries or the mine, given the relatively low number of total vehicle movements (i.e. 92 trips across an entire day, conservatively assuming all construction traffic passes a particular quarry or the mine site). As discussed in Section 8.6, any cumulative impacts on the use of these extractive operations are expected to be minimal.

Operation

Traffic generation

During the operational phase of the solar farm, minimal traffic movements will be generated and there are anticipated to be negligible impacts upon traffic on the local road network.

Traffic generation during operation is not expected to exceed 14 movements (28 trips) per week.

Operational traffic will be generated from the following sources:

- electricians and operators
- water trucks and sewage disposal
- general delivery of replacement equipment and parts
- labour for PV module cleaning
- labour for general maintenance.

Traffic impact on road network

Compared with traffic during project construction and background traffic levels along Newell Highway, traffic during project operation will be minimal.

Traffic impact on nearby mineral extraction sites

As minimal traffic movements will be generated during operation, impacts on the nearby mineral extraction sites is anticipated to be negligible.

Decommissioning

It is envisaged that decommissioning would involve the removal of all infrastructure associated with the project and rehabilitation of the site. It is anticipated that traffic generated during decommissioning and associated impacts would be similar to that during the construction phase.

8.6.4 Management and mitigation

Construction phase

Newell Highway, Showground Road, Compton Road and Central Road are all approved for use by GML and HML vehicles, thus no approvals will be required for any of these roads to be used as part of the heavy vehicle delivery route.

It is expected that intersections on these roads will be able to physically cater for any proposed over-dimensional vehicles used by the site. Over-dimensional vehicles will require adequate traffic management (including escort vehicles and pilot cars) to the satisfaction of the relevant authority; the extent of the escort will be determined when securing the relevant RMS / VicRoads OD permits.

Traffic management measures will be put in place to mitigate any potential impacts. This includes the development of a TMP prior to construction, in consultation with the council, RMS and any other relevant stakeholders. The TMP will include the following:

- confirmation of the project construction timeframe and work stages
- confirmation of expected traffic volumes generated by the project for all work stages
- identification of all heavy vehicle and over-dimensional vehicle haulage routes for all work stages
- a mechanism to review identified haulage route road conditions prior to the commencement of works
- any additional relevant mechanisms for over-dimensional vehicle permits and traffic management requirements
- mechanisms/agreements (if deemed necessary) to maintain haulage route roads and road infrastructure, including local public roads used by site traffic, during construction works and to reinstate roads to at least pre-construction conditions
- any requirements for specific work stage construction traffic management plans
- confirmation of the adequacy of available sight distances along the Newell Highway from the site access (trimming will be undertaken if required)
- assessment of the need for 'trucks crossing' signs to be placed along Newell Highway in the vicinity of the site.

Traffic related impacts to amenity during construction (such as noise and dust) will be addressed in the CEMP with management measures proposed to mitigate these (see Section 8.7 and Section 8.9).

Operation

Risks to road safety from operational traffic are expected to be minimal. However, an OEMP will be prepared which will include traffic management measures to mitigate any potential traffic impacts.

Decommissioning

Traffic management measures will be implemented during decommissioning to mitigate any potential impacts.

8.7 Noise

The project has the potential to create noise impacts as result of the use of noise-generating activities such as operation of vehicles, equipment and machinery, and the presence of staff. The majority of these impacts will be temporary and primarily experienced during construction and decommissioning. This section provides an assessment of the potential noise impacts as a result of this project. Further detail regarding the noise assessment is contained in the noise impact assessment report, attached as Appendix G.

8.7.1 Existing conditions

The development site, covering approximately 256 ha of rural land, is located approximately 50 m north of Newell Highway. The highway is the nearest major road, is used by light and heavy vehicles, and is expected to be the main external noise source.

Landuse in the vicinity of the development site is predominantly cropping and grazing, therefore the operation of noise generating machinery and equipment such as harvesters, boom sprayers and tractors, are a further source of external noise.

Residences in the landscape are sparse. These residences would be expected to generate low levels of noise as a result of equipment such as generators or on-site water pumps. Three of the five residences that

are located within 2 km of the development site (R3, R4 and R5) have been identified as nearest sensitive receivers (NSRs) for the purpose of statutory noise assessment (see Section 2.5 and Figure 2.2).

Noise from insects and wind through trees and vegetation would also contribute to background noise levels within and in the vicinity of the development site.

8.7.2 Methodology

Construction noise

Impacts from construction noise have been assessed in accordance with the 'Interim Construction Noise Guideline' (ICNG) (DECC 2009) which provides guidance on managing works to minimise noise (including airborne noise, ground-borne noise and blasting), with an emphasis on communication and cooperation with all involved in, or affected by, construction and noise.

Noise criteria

A rating background noise level (RBL) has been derived for noise assessment purposes. The RBL is the overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period (EPA 2017). As background noise monitoring was not undertaken as part of this assessment, it has been assumed conservatively that background levels are less than 30 dB(A) during all time periods. In accordance with the Noise Policy for Industry (NPI) (EPA 2017), 30 dB(A) for evening and night periods, and 35 dB(A) for daytime periods have therefore been adopted as RBLs.

The construction hours for the project (see Section 3.7) are in accordance with the ICNG recommended standard hours for construction work. There will be no evening or night time work. The ICNG specifies noise thresholds at NSRs for construction activities where standard hours are worked as:

- noise affected: RBL + 10 dB(A)
- highly noise affected: 75 dB(A).

The 'noise affected' level represents the point above which there may be some community reaction to noise. The 'highly noise affected level' represents the point above which there may be strong community reaction to noise.

The derived noise affected level for construction impacts during standard hours is therefore 45 dB(A) and the highly noise affected level is 75 dB(A).

Noise sources

The construction activities include approximately four months of piling and installation of the mounting structures, and approximately eight months of installation of the PV modules and inverter assemblies. Equipment to be used during construction is shown in Table 8.5, along with sound power levels (Lw) sourced from typical values for the listed equipment types. Lw is the intrinsic noise output of a piece of plant or equipment, and does not depend on distance or orientation of the machine. The Lw values in Table 8.5 are conservative in nature, representing the higher end of typical ranges.

Noise calculation

In accordance with the ICNG, a calculation was used to estimate the magnitude of expected noise levels at the NSRs (residences R3, R4 and R5, see Figure 2.2) using the relationship between the sound power level and sound pressure level to predict attenuation over distance.

Operational noise

Impacts from noise during operation have been assessed in accordance with the NPI. Assessment under the NPI has two components:

- controlling intrusive noise impacts in the short term for residences
- maintaining noise level amenity for particular land uses for residences and other land uses.

Table 8.5. Sound power levels for construction noise sources

Plant	Sound power level (Lw) (dB(A))
Truck and dog	103
D6 dozer	86
24 tonne excavator	101
Grader	106
Vibrating roller	109
Front end loader	110
Piling rig	107
Franna crane	107
Trenchers	97
Generator	73

Noise criteria

The intrusiveness criterion for residential noise receptors as set out in the NPI is:

$L_{Aeq,\ 15\ min} \leq$ RBL (dB(A) L_{A90}) + 5 dB(A)

The NSRs are residences located in a rural area. Accordingly, the amenity criteria (L_{Aeq}) for rural residential properties have been applied.

Under the NPI, the lower of the two (intrusiveness or amenity) is adopted as the project specific noise level (PSNL). Table 8.6 shows that the intrusiveness criteria are lower for day, evening and night periods and these criteria have therefore been adopted as the PSNLs.

Table 8.6. Project specific noise levels (PSNLs) based on NSW NPI

Period	RBL dB(A)	Intrusiveness criteria L_{Aeq} dB(A)	Acceptable amenity criteria L_{Aeq} dB(A)	Adopted PSNL L_{Aeq} dB(A)
Day	35	40	50	40
Evening	30	35	45	35
Night	30	35	40	35

The NPI provides guidance on applying adjustments where the noise may be considered annoying (e.g. due to tonality, intermittency, irregularity or dominant low-frequency content). For each aspect an adjustment of 5 dB(A) can be added to the predicted value, up to a total of 10 dB(A), to penalise the noise for its potential annoyance.

Noise sources

The main operational noise generating activities on site will include:

- approximately 4,000 NexTrack motors that allow the solar panels on the horizontal mounting structure to track the sun across the sky, evenly spread across the arrays of PV modules

- approximately 30 central inverters that are located in containers at the end of each block of PV modules
- the main step-up transformer and (optional) synchronous condenser in the switchyard.

The equipment will operate continuously during daylight hours only.

Sound power totals used in the noise calculations are shown in Table 8.7.

Table 8.7. Sound power levels for operational noise sources

Plant	Sound power (Lw) (dB(A))	Usage period
Proposed		
NexTracker (each)	58	Day Evening (sunlight hours only)
SC2200 Inverter (each)	95	Day Evening (sunlight hours only)
Transformer	75	Day Evening Night
Optional		
Synchronous condenser (SC)	93*	Day Evening (sunlight hours only)
SC Transformer	90	Day Evening (sunlight hours only)

* Synchronous condenser Sound Power Level at 1m, 82 dB(A) + Tolerance +3 dB(A)

Noise calculation

Noise impacts from project operation have been quantified by:

- predicting the realistic worst case or conservative noise levels from the identified sources
- assuming no inverter will be located within 851 m of an NSR
- assuming a maximum attenuation of 3 dB from acoustical shielding for an inverter
- applying these assumptions to assessment locations representing the most noise exposed NSRs.

Expected noise levels at the NSRs were calculated using the same method as for construction noise.

Noise from road traffic

Noise from road traffic was assessed taking into consideration the NSW Road Noise Policy (DECCW 2011), that sets out noise assessment criteria for existing residences affected by landuse development.

The policy sets different noise limits dependent upon the road category and type of project and landuse. Based on the road categories in the traffic impact assessment (Appendix F), Newell Highway is classified as a State Arterial Road.

8.7.3 Impact assessment

Construction noise

Table 8.8 shows the resultant maximum noise levels predicted at the NSRs during project construction compared with the relevant noise management levels for activities undertaken during standard hours.

Table 8.8. Predicted maximum construction noise levels at NSRs, $L_{Aeq,15min}$ dB(A)

Receiver (residence)	Noise affected management level dB(A)	Predicted construction noise levels* $L_{Aeq,15min}$ dB(A)	Exceed noise management level
R3	45	52	Yes +7 d(B(A)
R4	45	49	Yes +4 d(B(A)
R5	45	47	Yes +2 d(B(A)

* Note: Predicted noise levels have been rounded up to the nearest integer

As shown in Table 8.8, the predicted maximum construction noise levels at the development site would attenuate to a level that remains above 45 dB(A) at the three NSRs. However, the predicted construction noise levels are based on a worst case scenario:

- All plant and equipment are assumed to be operating together and at the closest point of the development site to each sensitive receptor. This situation would not occur on site due to the spatial and temporal separation of civil work and construction activities.
- Construction noise levels would also vary over the construction period due to the location, type and duration of construction being undertaken. Equipment utilisation would vary throughout the day and these factors would also see a reduction in the above predicted noise levels.
- The noise level predictions do not take into account the implementation of noise attenuation measures, such as barriers, use of topographical features for shielding, or possible noise control treatments on plant and equipment.
- As construction noise levels at all NSRs are predicted to be substantially lower than the 'highly noise affected' level of 75 dB(A) (as defined by the ICNG), a strong community reaction to noise levels is therefore unlikely.

Note however, that ESCO Pacific is also proposing the use of a mulcher on site to assist with removing scattered paddock trees. Depending upon model, design and noise mitigation measures, mulchers can potentially emit sound power levels of up to 120 dB(A). At a Lw of 120 dB(A), the noise calculation predicts that a distance of approximately 2.5 km is required between a sensitive receiver and the mulcher to achieve compliance with noise management levels.

The short-term use of a mulcher on site is therefore likely to require management to avoid exceeding noise management levels, although the conservatism inherent in the noise level predictions, as outlined above, should be taken into consideration.

Operational noise

Table 8.9 shows the resultant noise levels predicted at the NSRs during project operation compared with the relevant PSNLs.

Table 8.9. Predicted $L_{Aeq,15min}$ noise levels at NSRs during operation dB(A)

Receiver	PSNL (intrusiveness criteria) L_{Aeq} dB(A)	Predicted operational noise levels $L_{Aeq,15min}$ dB(A)		Exceed intrusive criterial
	Day	Neutral conditions	Modifying Factor*	
R3	40	<30	35	No
R4	40	<30	34	No
R5	40	<30	31	No
	Evening	Neutral conditions	Modifying Factor*	
R3	35	<30	35	No
R4	35	<30	34	No
R5	35	<30	31	No
	Night	Neutral conditions	Modifying Factor*	
R3	35	<20	<20	No
R4	35	<20	<20	No
R5	35	<20	<20	No

* Modifying factor conservatively set at maximum +10 dB(A)

The predicted noise levels at all NSRs during operation comply with all the nominated criteria under neutral conditions and modifying factors.

It should be noted that the noise emissions during operation were predicted to comply without the implementation of noise attenuation measures under normal conditions. However, the design and layout for the project will consider measures such as setbacks, orientation, shielding or other treatments on plant and equipment in relation to the sensitive receptors.

Note however, that ESCO Pacific is proposing the option of installing a synchronous condenser with its own transformer. Depending upon the installed model, design and noise mitigation measures, the additional Sound Power Levels of these two pieces of equipment combined with an SC2200 Inverter, NexTracker and transformer at the 851 m minimum distance from the NSRs raises the noise level to 30 dB(A) at the NSRs under neutral conditions.

Hence without any reductions for orientation, shielding or increased distance from an NSR the noise calculation predicts that noise levels will potentially exceed evening intrusive criteria when a maximum modifying factor is applied (conservatively set at maximum +10 dB(A)). Further assessment of potential noise impacts and requirements for noise mitigation will be required if a synchronous condenser is to be installed on site.

Decommissioning noise

It is expected that noise levels and associated impacts during decommissioning would be comparable to those during construction, assuming that sensitive receivers are still in the same locations.

Noise from road traffic

Construction traffic will comprise a combination of light vehicle and heavy movements as equipment, materials and personnel are transported to site. Peak traffic movements are expected to be 46 movements (round trips) per day comprising 24 heavy vehicle movements and 22 light vehicle movements (see Section 8.6).

Traffic during the peak construction periods equates to an approximate increase of 5% when compared against the existing traffic along Newell Highway (see Section 8.6). Accordingly, the associated increase in traffic noise from the Newell Highway during this period is also expected to be minor.

There will be no construction traffic on local roads, and so apart from highway traffic, no road noise-related impacts are anticipated.

During the operational phase, only up to four full-time and eight part-time staff will be typically based at the solar facility. Accordingly, operational activities are anticipated to have a negligible impact upon traffic volumes on the Newell Highway and the local road network, and a minor impact on associated noise levels.

8.7.4 Management and mitigation

The noise assessment undertaken for the Wyalong Solar Farm was conservative. However, it is proposed that noise monitoring be undertaken during construction to confirm predictions and determine any need for noise management measures. In particular, the use of a mulcher on site will be subject to noise monitoring and, if noise management levels are exceeded at any of the three NSRs, management measures such as the following will be implemented to achieve compliance:

- locating the mulcher within the site so as to maintain a specified minimum distance to the NSRs
- operating the mulcher within designated time periods rather than in an ad hoc manner to minimise the frequency of intrusion
- positioning the mulcher to make use of any shielding
- application of noise shielding or noise suppression measures at the mulcher
- consultation with the landholders at R3, R4 and R5 to agree on measures.

The noise impact assessment has shown that construction noise may exceed applicable criteria at three of the NSRs and therefore, as per DPE's requirement, a noise management plan must be prepared prior to construction to manage construction noise. The noise management plan will be prepared as part of the CEMP.

The noise impact assessment has shown that operational noise levels do not exceed the intrusive criteria under normal conditions. However, the final design and layout of equipment will consider noise attenuation measures such as setbacks, orientation, shielding or other treatments on plant and equipment in relation to the sensitive receptors.

Should a synchronous condenser installation be confirmed, measures to reduce its potential operational noise impacts on NSRs, which may include positioning, orientation, enclosure or sound barrier screening, will be provided in the noise management plan to be developed and provided as part of the OEMP.

8.8 Visual amenity

The project has potential to create impacts to visual amenity, as a result of the construction works and development of infrastructure associated with solar farms. This section provides an assessment of the potential visual impacts as a result of the project. Further detail regarding visual assessment is contained in the visual impact assessment in Appendix H.

8.8.1 Existing conditions

The dominant character of the surrounding area is a rural landscape characterised by a patchwork of extensive agricultural land and vast open spaces, predominantly focused on cropping and livestock grazing.

The surrounding properties are generally partitioned and have varying types of rural infrastructure, such as generally unsealed roads, tree plantings and fencing. At various locations in the vicinity of the development

site, farm sheds and other structures are present. Most vegetation within the area is located along road reserves, including the Newell Highway which is located adjacent to the site.

Topography

There is a minimal degree of topographic relief across the local and regional area, resulting in a largely flat landscape aesthetic. Across the 1.9 km x 1.3 km site, elevations vary by just 4 m from 232 m AHD to 236 m AHD.

However, some gentle relief is present, as follows:

- two ephemeral drainage lines that cross the site
- Gagies Creek, approximately 1.2 km to the west
- an ephemeral tributary of Gagies Creek, approximately 550 m to the west
- a low, forested ridgeline (the Booberoi Hills) located approximately 5.6 km east of site and associated gently undulating country, such as found within the Wyrra State Forest.

This generally vast and open regional landscape character results in a locale with a broad visual catchment. The predominantly flat nature of the terrain also contributes to high visual exposure.

Adjacent roads

Two roads located within 500 m of the development site are considered to be sensitive receivers. Selected viewpoints (VPs) along them have been chosen to assess the visual impacts to those receivers.

The two roads are:

- Newell Highway (VP1) located adjacent to the site along its southern boundary
- Spauls Lane (VP4) located to the west of the site (480 m from the northwest corner of the site at its closest point).

A farm access road also runs along the northern boundary of the site. The view of the site from this road will be similar to that from the Newell Highway in terms of the visual aspects of the project. However, as this road is used only to access properties in the area and is not used by the public in general transit, it has not been considered further as a sensitive receiver.

Surrounding residences

Residences in the vicinity of the development site are also sensitive receivers and those within 2 km of the development site have been selected as viewpoints to assess the visual impacts to those receivers.

Five scattered residences (R1-R5) are located on rural properties within 2 km of the site (see Section 2.5). These residences are located between 300 m and 1.4 km from the site, as shown in Figure 8.11.

Three residences (R3, R4 and R5) form part of the visual receptors and were chosen as viewpoints for statutory assessment purposes (VP5, VP3 and VP6 respectively). The remaining two residences (R1 and R2) are not considered sensitive receivers for the purposes of statutory assessment since they are owned by the landholder who is part of the commercial venture of the solar farm. The visual impacts on R1 and R2 are nonetheless presented in Appendix H for completeness and to assist with ESCO Pacific's consultation process.

Recreational features

The main recreational features of the region are the Back Creek, Wyrra and Boxalls state forests and the Southwest Woodland Nature Reserve – Hiawatha Precinct, located between 3.2 and 7.3 km from the development site (see Section 2.4, and Figure 8.11).

Figure 8.11

Viewpoint Locations
Wyalong Solar Farm

Client: Esco Pacific
Project No: AE1091.0

Legend

- Development Site
- Lot Boundary
- 1 km Offset Buffer
- 2 km Offset Buffer
- Watercourse
- Highway
- Main Road
- Local Road
- Host Landholder
- Sensitive Receivers
- Viewpoint Locations

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ACCENT ENVIRONMENTAL

Boxalls State Forest is on the northeastern side of a ridgeline and beyond the viewshed of the project. The Southwest Woodland Nature Reserve – Hiawatha Precinct is gently undulating, but due to its forested nature, relatively low elevation above the site (approximately 25 m) and distance to the project (7.3 km) it is not considered further.

Existing vegetation

The local and regional area is highly modified and has been largely cleared of vegetation. However, remaining vegetation includes:

- scattered native trees within the development site, particularly the northern and southwestern area
- scattered native trees lining Newell Highway (in the road reserve) and the northern boundary of the site, which offer some breakup of the view of the site
- native vegetation in the southern area of the development site and the adjoining road reserves.

The screening potential of the vegetation described is reduced by a lack of understory.

8.8.2 Methodology

The visual impact assessment was based on a combination of professional qualitative judgment and commonly accepted industry criteria and guidelines, as outlined below:

- Landscape Institute and Institute of Environmental Management & Assessment (LIIEMA) *Guidelines for Landscape and Visual Impact Assessment*. Third edition. 2013
- Roads and Maritime Services (RMS) Beyond the Pavement: Urban Design Policy Procedures and Design Principles. 2014
- RMS Environmental Impact Assessment Guidance Note. Guidelines for landscape character and visual impact assessment. 2009.

The assessment was undertaken to:

- assess the existing visual character within the development site as well as the surrounding landscape
- determine the extent and nature of the potential visual impact of the project on the surrounding areas
- identify measures to mitigate and minimise any potential visual impacts.

The assessment was based on the following visual elements and assumptions in the proposed project design and layout:

- Solar panels will be installed in regular arrays.
- Each solar panel will be fixed to a metal mounting structure, piled or screwed into the ground without the need for any concrete.
- The mounting structure will slowly and silently track (in a single axis) the horizontal movement of the sun.
- The solar panels will not exceed 4 m in height (attained early and late in the day when tilted at maximum angle towards the sun).
- Above-ground DC cabling will connect field combiner boxes approximately 1 m off the ground.
- Central inverters, step up transformers and switchgear will be located in 40 foot containers or container skid pads.
- A substation will be installed, located adjacent to the existing 132 kV transmission line.
- A Synchronous Condenser up to approximately 5 m high, 6 m long and 5 m wide may be installed within the proposed solar farm switchyard.
- Internal vehicle access tracks will be constructed from the entrance point of the site to each PCU and to the solar substation to allow for maintenance of the site.
- Perimeter safety fencing will be installed around the site.

- A site office and maintenance building will be installed.
- Temporary infrastructure will be put in place during site construction including site compounds and storage areas.
- Battery storage to be installed on site (in shipping container-like buildings).
- The approximately nine-month construction process will involve the following civil works: limited grading, compaction, stormwater drainage and sediment controls and dust suppression.
- Construction activities will be undertaken during standard hours for construction works. Any construction or commissioning activities outside of standard working hours will require approval from relevant authorities.

The assessment involved the following methodology:

- A desktop review of aerial photography was undertaken to identify landscape character and potential visual receptors.
- The desktop research was ground-truthed on 10 January 2018. Viewpoints of the development site were selected and photographed and surrounding visual receptor views were considered and documented.
- The existing landscape character and visual environment was described and evaluated based on the ground truthing and desktop research.
- Photomontages were prepared showing the completed development site from key viewpoints.
- A visual impact assessment was undertaken using a grading matrix, taking into consideration the sensitivity of the landscape and receptors and magnitude of likely development site impacts.
- The visual impact of project night lighting on surrounding residences, scenic/significant vistas, air traffic and road corridors was assessed.
- The degree of occurrence of potential reflective visual nuisance (glare and glint) based on the design and the mechanical behaviour of the solar panels and the existing environment was assessed.
- Appropriate design, construction and operational management and mitigation measures were developed, including consideration of the necessity for a site landscaping and visual screening plan.
- The outcomes of community consultation (undertaken as part of the wider EIS process) were considered throughout the assessment.

8.8.3 Potential impacts

Potential impacts assessed included:

- impacts during construction
- impacts during decommissioning
- operational impacts:
  - on residences
  - on landscape character
  - on roads
  - on other sensitive locations
- potential impact for glare or glint, from proposed infrastructure on nearby receivers
- cumulative impacts.

Construction

A number of activities that are likely to occur in the construction (or pre-construction) phase of the proposed development may be visible from areas surrounding the development envelop, including:

- ongoing detailed site assessment including technical investigations

- various minor civil works at the site access point
- construction facilities, including portable structures and laydown areas
- various construction and directional signage
- vegetation clearing, excavations and earthworks
- construction related vehicles and equipment gaining access to site from widened shoulders and left- and right-hand turning treatments on the Newell Highway
- various construction activities including erection of solar panels with associated electrical infrastructure works, including power conversion blocks
- the use of lighting at night to assist with construction activities and/or site security.

Operation

As the number and type activities undertaken during the operational phase of the project are much less, the impacts likely to be less and limited to the impacts of:

- the constructed solar arrays and their daily tracking of the sun
- site buildings
- fencing
- minor site signage
- vehicles and equipment gaining access to site for operation and maintenance activities from widened shoulders and left- and right-hand turning treatments on the Newell Highway
- the use of lighting at night to assist with operation activities and/or site security.

As the operation phase of the proposed project is expected to be 40 years, visual impacts during operation need to be carefully assessed.

Decommissioning

Decommissioning activities are anticipated to be similar to those during construction.

8.8.4 Impact assessment

For the Wyalong Solar Farm, visual receivers fall into three main categories:

- people living at residences near the development site
- people passing through by road (such as road users on the Newell Highway and Spauls Lane)
- recreational users of the Back Creek State Forest and the Wyrra State Forest.

Based on the LIIEMA guidance, people living at residences are considered more susceptible to change than road users. The use of roads in the vicinity of the development site is assumed to be largely for functional purposes (e.g. movement between towns via a major highway, or access to farmland via local roads). The roads in question are not thought to be used typically by people, 'engaged in outdoor recreation' or 'visitors to heritage assets, or to other attractions' – at least, not attractions in the immediate vicinity of the development site which may cause their awareness of views to be particularly high.

People using the two recreational features (Back Creek State Forest and Wyrra State Forest) are considered to be sensitive receivers as:

- Back Creek State Forest straddles the low, forested ridgeline located to the east of the site, which provides a potential vantage point (up to approximately 80 m higher elevation than the site).
- Wyrra State Forest is located in gently undulating terrain to the southwest of the ridgeline, also providing a potential vantage point (up to approximately 30 m higher elevation than the site).

The three residences (R3, R4 and R5) that are considered as part of the statutory assessment are identified as sensitive receivers as the project will be, at least to some extent, visible from the households or immediate surrounds.

Construction phase

Pre-construction and construction activities would be unlikely to result in an unacceptable level of visual impact due to their relatively short duration (nine months) and temporary nature.

Operation phase

In assessing the visual impacts proposed development, the following were considered:

- the potential sensitive receivers in the vicinity of the site
- the type of sensitive receiver
- distance of sensitive receiver from site
- visibility of site from sensitive receiver
- profile of proposed infrastructure
- the type of materials proposed to be used in construction
- the nature, location and frequency of project-related traffic accessing the site
- lighting required during construction and operation.

In summary, nine viewpoints in the vicinity of the project have been considered as part of the statutory assessment (see Table 8.10 and Table 8.11, and Figure 8.11).

Table 8.10. Viewpoint visual impact assessment summary

Viewpoint	Location viewed from	Sensitivity	Magnitude	Resultant impact
VP1	Newell Highway, directly adjacent to site, northeast of site access point	Low	Moderate	Moderate-low
VP3	Newell Highway, at entrance to driveway of residence **R4**	Moderate	Low	Moderate-low
VP4	Spauls Lane at closest point to site	Low	Low	Low
VP5	Newell Highway, between site and residence **R3**	Moderate	Low	Moderate-low
VP6	In front of residence **R5**	High	Low	Moderate
VP8	View from ridgeline in Back Creek State Forest	Moderate	Negligible	Negligible
VP9	View from hill in Wyrra State Forest	Moderate	Negligible	Negligible

Table 8.11. Receiver visual impact assessment summary

Receiver	Location	Sensitivity	Magnitude	Resultant impact	Comment
Residences					
R3 (60 m south of **VP5**)	Residence close to Newell Highway on opposite side of highway from site	Moderate	Low	Moderate-low	Conservative assessment – impact at R3 expected to be substantially lower than at VP5 due to presence of additional trees between residence and site
R4 (500 m southeast of **VP3**)	Residence approximately 470 m from Newell Highway on opposite side of highway from site	Moderate	Low	Moderate-low	Conservative assessment – impact at R4 expected to be substantially lower than at VP3 due to additional distance between residence and site and presence of some additional trees
R5 (same as **VP6**)	Residence off Spauls Lane	High	Low	Moderate	R5 is same location as VP6
Roads					
Newell Highway (**VP1**)	Newell Highway, directly adjacent to site, northeast of site access point	Low	Moderate	Moderate-low	VP1 considered to represent maximum visual intrusion for road users passing site
Spauls Lane (**VP4**)	Spauls Lane at closest point to site	Low	Low	Low	VP4 considered to represent maximum visual intrusion for road users along Spauls Lane
Recreational features					
Back Creek State Forest (**VP8**)	View from ridgeline in forest	Moderate	Negligible	Negligible	VP8 and VP9 assessments are conservative as they assume open view of site with no screening by forest vegetation
Wyrra State Forest (**VP9**)	View from hill in forest	Moderate	Negligible	Negligible	

Receiver with the highest visual impact rating

The receiver with the highest visual impact rating (moderate) is VP6, which corresponds to residence R5 located to the north of the solar farm off Spauls Lane. The moderate rating is due primarily to the sensitivity of the location, with the front of the property facing directly towards the solar farm (although the distance to the solar farm is 1 km and the eastern half of the solar farm is largely screened by trees). A photomontage simulating the view of the solar farm from VP6 is presented in Figure 8.12.

Figure 8.12. Photomontage simulating view of solar farm from viewpoint 6, in front of R5

Other receivers with visual impact ratings of greater than negligible

Three receivers (VP1, VP3 and VP5) are considered to have impact ratings of moderate to low.

VP1 is the Newell Highway immediately adjacent to the site. Moderate existing shielding is provided by roadside vegetation. In the stretch of highway immediately adjacent to site, this vegetation comprises a combination of mature trees of greater than 4 m height interspersed with shrubs and smaller, immature trees that provide more complete car-level screening. The main gap in the vegetation is an approximately 50 m wide gap located where the proposed site access point is to be constructed.

As a result of the vegetation, the site would be clearly, but intermittently visible to vehicles passing by. However, viewing opportunities would be brief (43 seconds to drive past the site boundary at 110 kmh) and the general lack of scenic attractions in the vicinity of the site means that the attention of road users (in the absence of the solar farm) would not likely be specifically focussed on the scenery at that point. In addition, road users are receivers but in the case of this project are not considered to be sensitive receivers.

VP3 and VP5 correspond to residences R3 and R4, located across the Newell Highway from the solar farm. However, in both cases, the viewpoint where the rating was undertaken was closer to site than the corresponding residence. At the two residences, impacts are expected to be substantially lower due to factors such as the additional distance between residence and site and presence of additional trees.

Receivers with a visual impact rating of negligible

None of the remaining viewpoints (VP4, VP8 and VP9) have a visual impact rating greater than low.

Glare and reflectivity

There are a number of factors which contribute to the occurrence of reflective visual nuisance, such as the frequency of the reflection, the type of reflection (specular versus diffuse), localised environmental impacts

and the location of visual receivers. The following two qualities were used to ascertain the proposal's degree of reflective nuisance caused by the project:

- the design and the mechanical behaviour of the solar panels
- the existing environment.

Glare-based visual nuisance associated with the project will be largely influenced by the location and position of the solar panels relative to sensitive visual receivers. Receivers within a closer proximity to the development site will be exposed to more direct specular reflection.

Reducing the visual impact

Although VP6 had a moderate rating, it is not considered necessary to take measures within the development site to mitigate the project's impact from the project due to the relatively large (1 km) distance to the solar farm and the blending in of the solar farm with distant treelines. However, it is understood that ESCO Pacific is in discussion with the resident concerning possible other means of impact mitigation. Additionally, ongoing engagement with the local community may ameliorate visual impacts on other sensitive receivers.

Community and stakeholder consultation

The process of community consultation implemented by ESCO Pacific will provide a forum for project issues, including visual impacts, to be discussed.

ESCO Pacific has prepared a Community and Stakeholder Consultation Plan that sets out the objectives and requirements for consultation with identified project stakeholders, including the residences located nearest to the development site. ESCO Pacific is in active discussion with the nearest residences concerning visual impacts and their management.

Decommissioning phase

It is envisaged that decommissioning would involve the removal of all infrastructure associated with the project and rehabilitation of the site. It is anticipated that activities occurring during decommissioning and associated impacts would be similar to that during the construction phase. As the decommissioning phase of the project is likely to be of limited duration, it is not considered likely to result in an unacceptable level of visual impact. At the completion of rehabilitation, the development site would have been returned to its existing rural landscape character.

8.8.5 Management and mitigation

Design phase

Landscaping and visual screening treatments within the site are not considered to be required. However, the following detailed design measures should be adopted to reduce the visual impact of the project:

- apply urban design principles and objectives during detailed design phase
- investigate colour combinations for infrastructure items to aid visual obscurity
- minimise reflective surfaces with a preferred use of muted colours for ancillary structures.

Construction phase

The following measures will be implemented to minimise visual impacts during construction:

- demarcation and exclusion fencing will be installed around trees and vegetation to be retained, as outlined in Section 8.1.3
- limiting disturbance and rehabilitating disturbed areas, as outlined in Section 8.5.3

- minimising light spill from the development into adjacent visually sensitive properties by directing construction lighting into the construction areas and ensuring the site is not over-lit. This includes the sensitive placement and specification of lighting to minimise any potential increase in light pollution
- temporary hoardings, barriers, traffic management and signage should be removed when no longer required
- the site to be kept tidy and well maintained, including removal of all rubbish at regular intervals. There should be no storage of materials beyond the construction boundaries.

Operation

Visual impacts during the operational phase of the project are expected to be minimal. However, an OEMP will be prepared, including measures to mitigate any potential visual impacts, including:

- restricting external lighting to the area where the maintenance shed, permanent site office, and switch yard are located
- all external lighting around buildings to be faced downwards and inwards to minimise impacts to neighbouring properties.

Decommissioning

An RDS will be implemented to return the site to its pre-existing condition.

8.9 Air quality

The project has the potential to create air quality impacts through dust from soil disturbance and emissions from vehicles and machinery. However, these impacts will be temporary and primarily occur during the construction phase. This section provides an assessment of the potential air quality impacts as a result of the project.

8.9.1 Existing conditions

The air quality within the Bland LGA is generally expected to be good and typical of a rural setting in NSW. Potential sources of air pollution near the development site include:

- agricultural practices, including cropping and earth moving
- spray-drift from pesticide and herbicide application
- vehicle and agricultural machinery emissions
- dust from unsealed roads
- burning-off of green waste and wood-fuelled fires.

Wind speeds average between 10.8 and 18.9 km per hour at 9 am, with the strongest winds during the spring and summer months (see Section 2.6). During January through to April, winds from the north, east, and southwest are most prevalent at 9 am and most prevalent from the southwest at 3 pm. During May to August, winds are generally from the north, west or southwest at both 9 am and 3 pm. From September to December, the prevailing wind direction is from the north, northeast or southwest at 9 am, and west or southwest at 3 pm.

In 2016/2017 there were five facilities in the Bland LGA (West Wyalong) required to report their emissions to the Department of the Environment and Energy (DoEE), as part of the National Pollution Inventory. The closest facility, Oilplus Holdings Australia Pty Ltd, is located approximately 9.7 km southwest of the development site. The facility is a petroleum storage depot.

The three residences (R3, R4 and R5) that have been identified as sensitive receivers for statutory assessment purposes (see Section 2.5) and the two landholder residences (R1 and R2), could all be impacted as a result of dust or exhaust emissions resulting from the project.

The development site is relatively flat and has been largely cleared of native vegetation. However, the northern and southern perimeters of the development site are lined with trees (which are to be retained), creating a potential barrier between project related air emissions and residences R3, R4 and R5.

8.9.2 Methodology

Due to the temporary nature of construction works and the low risk of significant air quality impacts, a qualitative assessment of air quality (i.e. without air quality modelling) has been undertaken.

8.9.3 Impact assessment

Construction and decommissioning

Dust generation as a result of surface disturbance works, including earthworks and vehicle movements on unsealed roads will be expected to occur as a result of the project. Surface disturbance works are relatively minor for solar farm projects. However, works will include:

- installation of piles to support the mounting framework
- installation of underground cabling between PV solar panels and inverters
- preparation foundations for the inverter blocks
- development of hardstands, access tracks and boundary fencing
- construction of transmission infrastructure
- installation of permanent fencing and security
- construction of support buildings including a site office, maintenance shed and switchyard.

Air emissions will be generated from vehicle, plant and equipment, including:

- earthmoving machinery and equipment, including excavators, scrapers and loaders
- material handling equipment, including forklifts and cranes
- vehicles travelling to and from the site, including light vehicles transporting construction personnel and heavy vehicles delivering construction materials
- water trucks for dust suppression.

The residence at R1 is located 1.4 km east of the development site. Due to the distance between R1 and the development site and the presence of shielding vegetation, dust impacts associated with construction activities are expected to be minimal, even during May to August when winds from north and west may be prevalent.

The residence at R2 is located 0.25 km west of the development site. It may be impacted by dust and exhaust emissions generated by vehicles turning onto the unsealed roads. However due to the presence of shielding vegetation dust impacts are expected to be minor.

The residence at R3 is located 0.6 km southwest of the development site and approximately 120 m south of the site access route (Newell Highway). Due to the distance between R3 and the development site, dust impacts associated with construction activities are expected to be minimal, even during January to April when winds from the southwest may be prevalent (see Section 2.6). In addition, the northern and eastern boundary of the residential property is lined with trees, helping reduce the potential of air quality impacts.

The residence at R4 is located at 0.8 km southeast of the development site. Due to the distance between R4 and the development site and the presence of shielding vegetation, dust impacts associated with construction activities are expected to be minimal.

The residence at R5 is located 1.0 km north of the development site. Winds blowing from the southwest, particularly during September to December (see Section 2.6) could carry project-related dust from the development site. Due to the presence of shielding vegetation and the distance between R5 and the development site, dust impacts are expected to be minimal.

The risk of dust impacts will be greatest under dry conditions. At other times of the year, including over summer, prevailing winds would carry any dust away from the residences (see Section 2.6). Air quality impacts as a result of construction will be temporary in nature (expected to last up to nine months).

Decommissioning impacts are expected to be the same as for construction, assuming there are no residences located closer to the development site at that time.

Notwithstanding the low inherent risk of dust and air quality impacts, management and mitigation measures are outlined in Section 8.9.4 to further reduce the risk.

Operation

Daily traffic to and from the site during operation will be minimal as only up to four full-time and eight part-time staff members will be located on-site. Traffic generation during operation is not expected to exceed 14 movements (28 trips) per week (see Section 8.6). This is expected to result in minor, infrequent dust generation from vehicles travelling on unsealed roads. Air quality impacts on sensitive receivers during operation are therefore expected to be negligible.

In addition, the operation of the project will produce minimal greenhouse gas emissions compared to conventional coal and gas-fired power stations, and will make a positive contribution to the reduction of greenhouse gas emissions from NSW (see Chapter 4).

8.9.4 Management and mitigation

The following standard management and mitigation measures are proposed for the construction, operation and decommissioning of the project:

- Preparing a CEMP, OEMP and RDS which includes procedures to prevent and control dust, including:
  - grading and ongoing maintenance of internal access roads to increase stabilisation of soil, where possible
  - wetting down the internal access roads and other exposed surfaces, particularly during dry and windy conditions
  - minimising vehicle movements on unsealed roads
  - limiting the extent of vegetation clearance and excavation
  - minimising the number of stockpiles on site
  - enforcing on-site speed limits
  - clearly defining access and travel routes.
- The CEMP, OEMP and RDS will also include procedures to prevent and control vehicle, plant and equipment emissions, including:
  - regularly inspecting and maintaining vehicles, plant and equipment to ensure they are operating efficiently, and in accordance with the manufacturer's requirements
  - ensuring that vehicles, plant and equipment meet relevant standards for emissions
  - switching off vehicles, plant and equipment when not in use.
- A TMP will be developed which will outline requirements for the management of vehicle generated dust and emissions (see Section 8.6).
- A complaints register and procedure will be developed to respond to any issues raised by the local community regarding air quality impacts.

8.10 Bushfire and electrical fire

Bushfires and electrical fires can present a significant risk to human health, life, biodiversity, and infrastructure. Environmental hazards such as hot, dry climatic conditions and the presence of dense vegetation can increase the risk or severity of a fire occurring. Activities such as the operation of construction machinery or the use of tools such as angle grinders can increase combustion or ignition risks. This section provides an assessment of the potential hazards associated with bushfires and electrical fires.

8.10.1 Existing conditions

The development site, covering approximately 256 ha of rural land, is highly modified due to its history of agriculture and grazing, and is comprised largely of crops (Barley and Canola), pasture grasses and environmental weeds. Native vegetation is largely absent, with scattered paddock trees occurring throughout the site (to be cleared during project construction) and more intact native vegetation located along fencelines and outside of the development site: along the Newell Highway road verge; in the south western corner and along the northern boundary of the development site.

The existing 132 kV transmission line (Temora to Lake Cowal) transects the southern end of the development site, running north to south. The transmission line was constructed to supply power to the Cowal Gold Mine. Essential Energy is responsible for managing the potential fire impacts of this transmission line.

The development site is within the Bland Temora Fire District, and just 20 km south of the Mid Lachlan Bush Fire Management Committee (MLV BFMC) area.

Based on the 2008 Mid Lachlan Valley Bush Fire Risk Management Plan (MLV BFRMP) developed by the MLV BFRMC, the site is likely to be subject to hot dry summers, with generally very low humidity and hot northwesterly winds. The site has an annual rainfall of only 453.8 mm and winters are normally cool to cold with moist with south to southwest winds (Section 2.6). The MLV BFRMP also indicates that dry lightning storms are likely to occur frequently in the area during the bushfire season, with the bush fire danger period typically occurring from October to March. The MLV BFRMC area typically has 150 bush fires per year, of which one on average could be considered a major fire (MLV BFRMC 2008).

As the development site is within the Bland Temora Fire District, which has not produced a bush fire risk management plan, no management zones have been mapped for the site. The Bland Temora Fire District has produced a readiness plan, named the Bland Temora Zone Pre-incident Plan (2013), to assist the rural fire service with their planning.

The site is not located on land mapped as Bushfire Prone Land, according to the NSW Rural Fire Service Bush Fire Prone Land Tool (NSW RFS 2018a).

The nearest NSW Rural Fire Service (NSW RFS) fire station is located at West Wyalong, approximately 11 km southwest of the development site.

8.10.2 Methodology

As the project is an SSD, a bush fire safety authority under section 100B of the *Rural Fires Act 1997* (Rural Fires Act) is not required. However, Section 63 of the Rural Fires Act imposes a duty of care on land managers and landholders to:

> *…. take the notified steps (if any) and any other practicable steps to prevent the occurrence of bush fires on, and to minimise the danger of the spread of bush fires on or from, that land.*

Section 64 requires that during the bush fire danger period, land managers and landholders must:

> *(a) immediately on becoming aware of the fire and whether the occupier has lit or caused the fire to be lit or not, take all possible steps to extinguish the fire, and*

(b) if the occupier is unable without assistance to extinguish the fire and any practicable means of communication are available, inform or cause to be informed an appropriate officer of the existence and locality of the fire if it is practicable to do so without leaving the fire unattended.

The MLV BFRMP and the Bland Temora Zone Pre-incident Plan (2013) have been prepared in accordance with the Rural Fires Act. These plans set out methods for assessing and managing bush fire risk within the MLV BFRMC area and the Bland Temora Zone respectively, which are applicable to the project.

The SEARs for the project required the preparation of a Bushfire Hazard Assessment Report. However, in subsequent discussions between ESCO Pacific and RFS, it was determined that a Bushfire Hazard Assessment Report would not be required.

The SEARs for the project also include the Fire and Rescue NSW (FRNSW) requirement for the preparation of a comprehensive ERP detailing requirements for bush fire preparation and response.

This section has been prepared taking the above requirements into account.

8.10.3 Impact assessment

The existing vegetation on the development site, including pasture grasses, environmental weeds and scattered paddock trees remaining after construction, could be susceptible to fires in hot, dry or windy conditions. Fire could cause damage to project infrastructure and adversely impact the health and safety of site personnel.

Sources of ignition at the site could include:

- operation of machinery, including construction machinery, hot tools (angle grinders, welders etc.) and motor vehicles
- solar panels subject to faulty wiring or incorrect installation
- battery storage facility (containing lithium-ion batteries), if installed at the site
- electrical faults in inverters and/or the substation
- overhead transmission lines
- nearby bushfires
- lightning strikes
- smoking and careless disposal of cigarette butts.

The risk of a bushfire may also be increased by the presence of combustible materials including chemicals and hazardous materials, petrol powered tools and machinery, or stockpiled vegetation.

Given the low cover of vegetation within the development site, it is unlikely the project will present a significant bushfire risk. The fire hazards within the site are readily manageable and will be minimised through the implementation of mitigation measures outlined in Section 8.10.4. The risk assessment in Section 7 identified a medium risk of bush fire and electrical fire associated with the project in the absence of appropriate management and mitigation measures. However, with appropriate controls in place, the risk was assessed as low.

8.10.4 Management and mitigation

The following management and mitigation measures will be implemented to reduce bush fire and electrical fire risk:

- Preparing a Bush Fire Management Plan (BFMP) as part of an ERP prior to construction or operation, in accordance with the NSW RFS Planning for *Bush Fire Protection – a guide for councils, planners, fire authorities and developers 2017* (NSW RFS 2017b), and in consultation with the NSW RFS District Office. The BFMP will include the following:
  - on-site firefighting equipment required

  - management of asset protection zones
  - measures for reducing fuel loads on the site (e.g. grazing regime, slashing, ploughing and weed control etc.)
  - location of hazards and procedures to manage the hazards prior to and during firefighting operation
  - site access and internal road plan
  - management arrangements for the development of the ERP (see below)
  - procedures to update and review the BFMP
  - contact details during and outside office hours.
- Preparing the ERP in accordance with FRNSW requirements as outlined in the SEARs, which ESCO Pacific accepts as a condition of Development Consent. The ERP will detail:
  - foreseeable onsite and offsite fire events and other emergency incidents (e.g. fires involving solar panel arrays, bushfires in the immediate vicinity or potential hazmat incidents)
  - risk control measures that will need to be implemented to safely mitigate potential risks to health and safety of firefighters and other first responders (including electrical hazards)
  - other risk control measures that may need to be implemented in a fire emergency due to any unique hazard specific to the site.
- The ERP will also be prepared in accordance with the NSW RFS Planning for *Bush Fire Protection – a guide for councils, planners, fire authorities and developers 2017*, and in consultation with the NSW RFS District Office, addressing onsite and offsite fire events. The ERP will detail appropriate risk control measures to mitigate potential risks to the health and safety of firefighters and other first responders, including:
  - appropriate personal protective clothing required to be worn
  - minimum level of respiratory protection required
  - decontamination procedures
  - minimum evacuation zone distances and site muster point
  - a safe method of shutting down and isolating the photovoltaic system.
  - emergency evacuation procedures.
- Two copies of the ERP will be stored in a prominent 'Emergency Information Cabinet', to be located directly adjacent to the main entry point of the development site.
- The fire station at West Wyalong, the RFS, Fire and Rescue NSW will be provided with the BFMP and ERP, including plans of the development site.
- Electrical components, including solar panels, will be designed and maintained to minimise the risk of ignition, in accordance with relevant Australian Standards.
- Buildings will be designed in accordance with relevant NSW RFS standards (NSW RFS 2017b).
- Access site and internal roads will be designed and constructed in compliance with RFS standards (NSW RFS 2017b). Emergency access to vehicles will be provided across the entire development site.
- Chemicals will be stored in accordance with Safety Data Sheet (SDS) requirements.
- The battery storage facility, if constructed, would be monitored and maintained regularly to avoid leaks from the lithium-ion batteries or overheating.
- The interior of any buildings will contain the necessary fire safety provisions, in accordance with the relevant Australian Standards and legislation (e.g. fire extinguishers, smoke alarms, sprinklers).
- If required, a non-combustible dedicated 20,000 L water tank with a 65 mm Storz outlet will be located adjacent to the site office. Water from this tank will only be used for fire-fighting. A petrol, diesel or solar powered fire-fighting pump and 30 m hose reel with a steel nozzle will be available onsite, suitable

for mounting on a 4WD with water tank, and used for grass fire / ember attacks by the applicant in the event of a fire.

- If required, to allow emergency service personnel to undertake property protection activities, a 10 metre Asset Protection Zone (APZ), allowing for unobstructed access by a four-metre-wide vehicle will be provided around the perimeter of the development site and associated infrastructure. The development site is to also be serviced by a graded road, offering direct access to the centre of the site.
- The CEMP and OEMP will provide safety protocols including:
  - storage of hazardous and flammable chemicals
  - daily monitoring of the Fire Danger Rating for the area, during the Fire Danger Period
  - smoking on-site
  - basic fire-fighting by onsite staff and use of fire-fighting equipment.
- Project staff and contractors will be informed or fire risks and evacuation procedures. Staff will be trained in emergency response procedures.

8.11 Electromagnetic interference

Electromagnetic fields (EMFs) are a combination of electric and magnetic fields generated from electrically charged objects such as transmission lines. They are produced whenever electricity is used and are present wherever energy flows, and therefore humans are exposed to some level of EMF in their daily lives.

Voltage produces the electric fields and currents that produce the magnetic fields, therefore the stronger the voltage and current, the stronger the EMF will be. Electric fields exist in any live wire, whether electricity is being consumed or not, however magnetic fields only exist when an appliance is operating (ARPANSA 2016).

With distance from the source, the strength of EMFs reduces rapidly. However, although electric fields can be insulated from surrounding materials such as air, buildings and the earth, magnetic fields are not. The strength of magnetic fields, at a given location, is dependent on the number and kinds of sources and the distance from the sources (ARPANSA 2016).

Naturally occurring EMFs are associated with thunderstorms, lightning and ionospheric currents (ARPANSA 2018a).

This section considers the potential impacts of EMFs associated with the project.

8.11.1 Existing conditions

Existing potential sources of EMFs in the vicinity of the development site include one power transmission line transecting the development site (Essential Energy: 132kV). The site would connect to this transmission line by construction of a substation immediately west of it, located towards the southern boundary of the development site.

As part of the project, DC cabling would run from the combiner boxes to the central inverters and AC cabling would carry 33 kV from the switchgear to the solar substation. The cabling, inverters and substation would produce some electromagnetic emissions.

The following project infrastructure have the potential to generate EMFs:

- PV units
- DC cabling (above-ground and underground)
- AC cabling (underground)
- Li-ion batteries (if installed)
- central inverters

- set up transformers
- PCUs
- synchronous condenser (if installed)
- main step-up transformer and associated equipment.

8.11.2 Methodology

Transmission lines and other electrical devices and infrastructure in Australia operate at a frequency of 50 Hz and fall within the Extremely Low Frequency (ELF) range of 0-300 Hz (ARPANZA 2016). Fields of different frequencies can interact with the human body in various ways. However, ELF EMFs have not been shown to have significant impacts on health (ARPANSA 2014).

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) advises that exposure to ELF EMF at high levels can affect nervous system functioning. Some population studies have reported a possible association between prolonged exposure to ELF magnetic fields (below exposure limits but above what is typically encountered) and childhood leukaemia, although scientific evidence of this is not strong (ARPANSA 2014). However, based largely on these population studies, the International Agency for Research on Cancer has classified EFL magnetic fields as possibly carcinogenic to humans (ARPANSA 2015).

ARPANSA states that:

> *The scientific evidence does not establish that exposure to the electric and magnetic fields found around the home, the office or near powerlines causes health effects (ARPANSA 2016).*
>
> *There is no established evidence that the exposure to magnetic fields from powerlines, substations, transformers or other electrical sources, regardless of the proximity, causes any health effects* (ARPANSA 2015).

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) establishes guidelines for limiting EMF exposure to humans, with the aim of preventing adverse impacts to health and wellbeing. The exposure limits outside the body, referred to as reference levels, were developed using worst-case assumptions so that basic restrictions (i.e. exposure limits related to adverse effects within the body) can be met (ICNIRP 2010). ICNIRP reference levels for the general public and occupational exposure of electric fields in kilovolt (kv) and magnetic fields in milligauss (mG) are shown in Table 8.12.

Table 8.12. ICNIRP reference levels (ICNIRP 2010)

Receiver	Electric field strength (kv/m)	Magnetic field strength (mG)
General public	5	2000
Occupational	10	10,000

Electric fields

The World Health Organization (WHO) states that strength of electric fields directly underneath powerlines can reach up to 10 kV/m, but reduces significantly with distance – at 50 m to 100 m they are reduced to levels that are negligible (WHO 2018). The electric field values at different distances from transmission lines is shown in Figure 8.13 (note that the units on the vertical axis are V/m whereas the ICNIRP reference levels are kV/m).

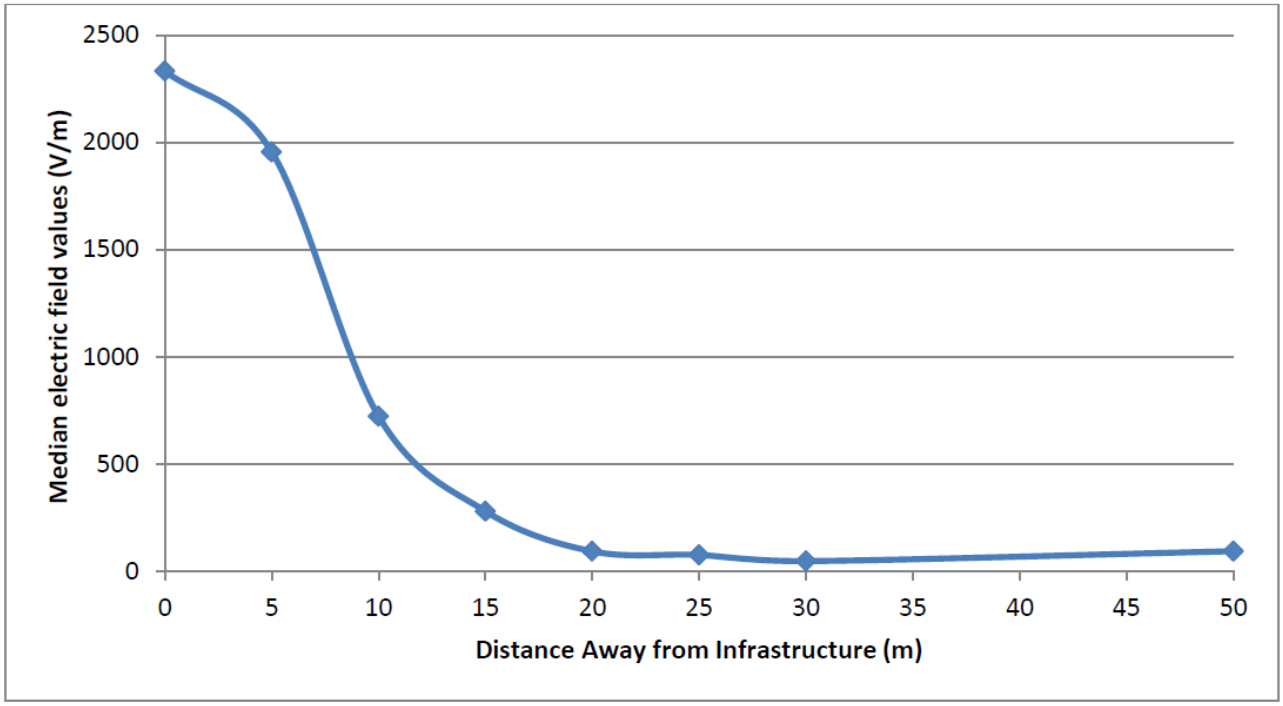

Figure 8.13. Median electric field values at different distances from transmission lines (sourced from APRANSA 2014)

The typical electrical field strengths of household equipment, for comparison, is shown in Table 8.13 (sourced from WHO 2018).

Table 8.13. Typical electric field strengths of household appliances, measured at a distance of 30 cm

Appliance	Electric field strength (kV/m)	Electric field strength (V/m)
Stereo	0.18	180
Iron	0.12	120
Refrigerator	0.12	120
Mixer	0.1	100
Toaster	0.08	80
Hair dryer	0.08	80

Magnetic fields

The values of magnetic fields that are typical for powerlines and substations are listed in

Table 8.14, and are well below ICNIRP reference levels of 2,000 mG for the general public and 10,000 mG for occupational exposure (ARPANSA 2016; ICNIRP 2010).

Typical values of magnetic fields measured at normal user distance are shown in Table 8.14 as a comparison to Table 8.15.

Table 8.14. Typical values of magnetic fields measured near powerlines and substations (ARPANSA 2016)

Source	Location of measurement	Range of measurements (mG)
Distribution line	Directly underneath	2-30
Distribution line	10 m away	0.5-10
Substation	At substation fence	1-8
Transmission line	Directly underneath	10-200
Transmission line	At edge of easement	2-50

Table 8.15. Typical values of magnetic fields measured at normal user distance (ARPANSA 2016)

Appliance	Range of measurement (mG)	Range of measurement (µT)
Electric stove	2-30	0.2-3
Personal computer	2-20	0.2-2
Electric blanket	5-30	0.5-3
Hair dryer	10-70	1-7
Toaster	2-10	0.2-1
Electric kettle	2-10	0.2-1

Homes located more than 50 m from high voltage powerlines, including transmission lines, are not expected to have higher than typical levels of magnetic fields. Levels of magnetic fields measured five to ten metres from substations and transformers are generally indistinguishable from typical background levels that occur in a home (APRANSA 2015). The magnetic field values (in Microtesla µT) (where 100uT = 1 Gauss) at different distances from transmission lines is shown in Figure 8.14.

8.11.3 Impact assessment

Exposure to ELFs depends on factors including proximity to electricity equipment and infrastructure and the number of electrical components comprising the infrastructure (ARPANSA 2014).

Construction and decommissioning

Exposure to EMFs during construction and decommissioning would be limited to staff working in and around the 132 kV transmission line traversing the site. However, this will be for a short duration and therefore the potential impacts of EMFs on the health of staff is likely to be insignificant. Magnetic fields produced from the PV units would be less than those of household appliances, and risk of EMFs from the PV units would be insignificant (Chang and Jennings 1994).

Exposure of the public to EMFs during construction and decommissioning would be no greater than is currently the case, as the main sources of EMFs in the area are the existing transmission lines.

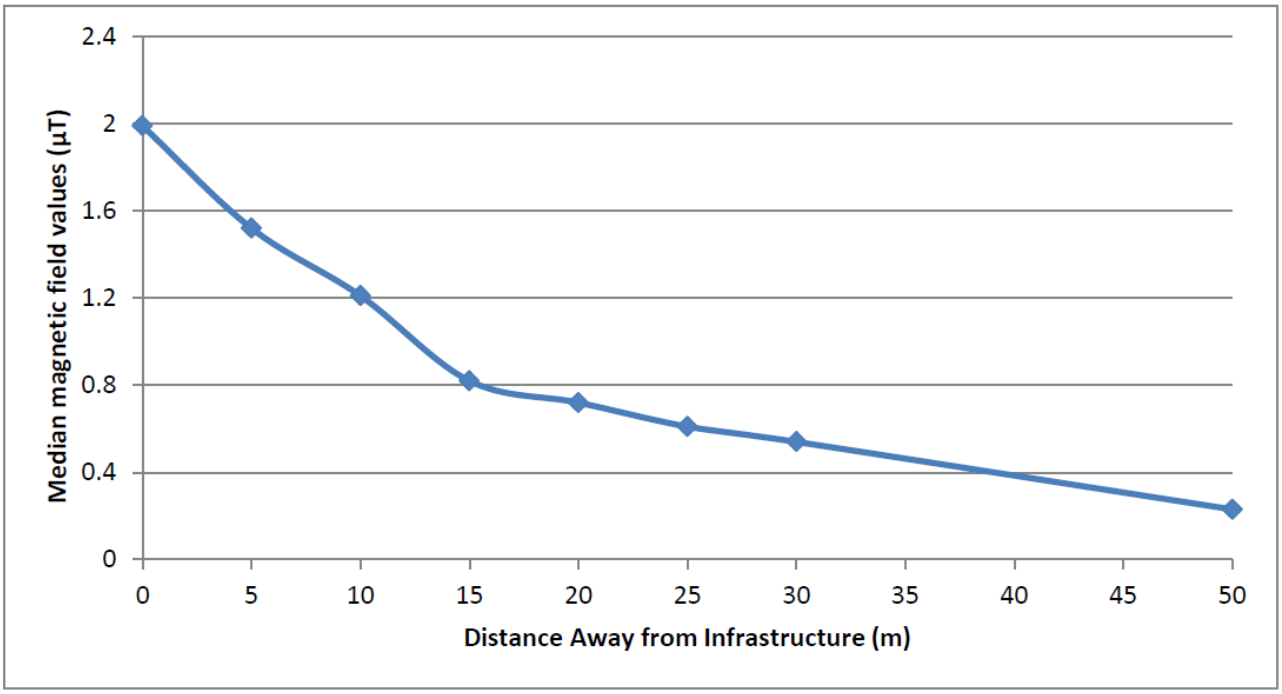

Figure 8.14. Median magnetic field values at different distances from transmission lines (sourced from APRANSA 2014)

Operation

Project-related sources of exposure during operation would be limited to the existing 132 kV transmission line, and the cabling, inverters, Li-ion batteries and PV units of the solar farm. There may be minor increases in EMF due to the increased current from the solar farm, however these are unlikely to be significant.

Exposure to EMFs during operation would be limited to maintenance staff and on-site staff. Public access would be restricted by site fencing around the site. EMFs from underground AC cabling would be shielded by the soil. EMFs from Li-ion batteries (in the event a battery storage facility is constructed) will be partially shielded by the units they will be contained in.

Four residences, including one owned by the site landholder, are located within one km of the development site (see R2, R3, R4, and R5 in Figure 2.2). Another landholder residence, R1, is located within 2 km. Distances of these residences to the development site and proposed substation location are shown in Table 8.16.

Table 8.16. Distance of residences from development site and substation

Residence	Distance to development site (km)	Distance to proposed substation (km)
R1	1.4	2.2
R2	0.3	0.7
R3	0.6	0.9
R4	0.8	1.6
R5	1.0	2.8

Given the distance of these residences to the development site and substation, EMF levels at these residences are not expected to increase significantly as a result of the project.

Exposure to both staff and the general public is expected to be well below ICNIRP reference levels and therefore EMF exposure as a result of the project is unlikely to present a health risk.

8.11.4 Mitigation and management

The following management and mitigation measures will be implemented to minimise the risk of EMFs from the project:

- Electrical equipment and infrastructure will be designed and maintained in accordance with relevant Australian standards and codes of practice.
- Design of electrical equipment and infrastructure will be undertaken by qualified personnel, with support from specialists where required.
- Electrical equipment will be accessed only by qualified staff.
- The general public would not be allowed to enter the development site, unless supervised by onsite staff and with prior permission.
- The landholder and general public will not, under any circumstances, have access to the substation or inverters.

8.12 Socio-economic

Socio-economic impacts on local communities, both positive and negative, have the potential to occur as a result of large-scale developments. As required by the SEARs, this section provides an assessment of the social and economic impacts of the project, including a summary of the existing socio-economic profile of the surrounding area and the wider Bland LGA.

8.12.1 Existing conditions

The proposed Wyalong Solar Farm is located approximately 7.5 km northeast of the West Wyalong Township, and 136 km north of Wagga Wagga, within the Bland LGA. The LGA is located in the Riverina region of southwestern NSW, covering an area of 8,482 $km^{2,}$ and is crossed by the Newell and Midwestern Highways and Goldfields Way.

The Bland LGA has a population of 5,955 people, a 1.5% increase since 2011, with a median age of 43 years (significantly higher than the national average of 38 years) (ABS 2017; ABS 2013). Of this, 50.1% are female and 49.9% are male. Aboriginal and Torres Strait Islander people make up 4.4% of the population, which is high compared to the national average of 2.8%. Approximately 80.2% of people were born in Australia.

The LGAs main landuse is rural and consists predominantly of irrigated land. Agriculture and mining are the main employers in the LGA, with 9.1% of people working in grain-sheep or grain-beef cattle farming, 7.4% in gold ore mining, 7.3% in other grain growing, and 4.0% in sheep farming (specialised). Other important sectors include public administration and healthcare. The unemployment rate for the Bland LGA based on the 2016 census was 3.6%, which was lower than the national rate of 6.9% (ABS 2017).

The Bland LGA forms part of the Riverina region where manufacturing, agriculture, forestry and fishing are the key drivers of the Riverina's economy. Between 2015 and 2016, the number of registered businesses in Riverina increased by 0.8% to 18,413 (RDA 2018).

A number of educational facilities are located within the LGA, including the TAFE NSW West Wyalong, which is known for its delivery of training in sport and recreation, administration, community services and forestry. The TAFE could potentially be used for training of construction and operation staff (TAFE NSW 2018).

The LGA also provides health and wellbeing support to the community, including providing services in aged and disability care, and offering key medical and business facilities, and sporting and recreation facilities (BSC 2017).

An airport is also located in West Wyalong, however it has not been serviced by any scheduled flights since 2007, and is currently operated by Bland Shire Council (SMH 2007). Airports in Wagga Wagga, Griffith and Parkes (located 1.5 hours away from West Wyalong) are regularly serviced by flights to Sydney and Melbourne. There is also a bus and train service available from West Wyalong to Canberra, Sydney and Melbourne (BSC 2018b).

Your Vision, Our Future, Community Strategic Plan 2017 – 2027

The Bland Shire Community Strategic Plan 2017 – 2027 was developed in 2017 by the council, with objectives and strategies to improve social, environmental, economic and civil leadership performance within the Bland community. The plan is based on extensive engagement with the community, Councillors, council staff and relevant government authorities (BSC 2017). The compatibility of the project with the strategic plan is outlined in Section 8.12.2.

Riverina Murray Regional Plan 2036

The RMRP provides a 20-year blueprint for the region, setting out the NSW Government's vision for the Riverina Murray which is to create a diversified economy founded on Australia's food bowl, iconic waterways and a strong network of vibrant and connected communities (DPE 2017). The compatibility of the project with the regional plan is outlined in Section 8.12.2.

A 20-Year Economic Vision for Regional NSW

The 20-Year Economic Vision for Regional NSW report was developed by the NSW Government in 2018 and sets out a clear pathway for ensuring that Regional NSW will continue to be a vibrant and growing part of the NSW economy, and that people are supported in their decision to live in the regions (NSW Government 2018). The report brings together long-term and existing strategies including the Future Transport Strategy 2056, NSW State Infrastructure Strategy, and regional plans.

A key vision of the document is to *accelerate economic growth in key sectors such as agribusiness, tertiary education and health care, taking full advantage of trade and tourism opportunities with Asia to ensure regional NSW continues to play a critical role in the Australian economy.*

The compatibility of the project with the 20-Year Economic Vision document is outlined in Section 8.12.2.

Local community attitudes

The community information sessions facilitated by the applicant (see Chapter 6) did not identify any issues that are likely to prove difficult to address. Members of the local community asked questions in regard to the number of jobs created, noise from inverters, access routes and potential ecological impacts, and appeared to be supportive of solar projects in the area.

8.12.2 Impact assessment

Construction and decommissioning

The project is expected to have a generally positive impact on the local and wider economy during construction, with any adverse impacts being minimal given the temporary nature of the construction phase and implementation of management measures listed in Section 8.12.3. The key potential social and economic impacts that may result from construction of the project include:

- Increase in local employment, as the project will create direct employment for up to 130 staff and contractors during construction, with many of these drawn from the local area.
- Increase in local workforce skills from the training and experience gained working on the project.
- Additional workers from outside the area will stimulate the local economy through demand for accommodation, hospitality and retail services.

- Short-term pressure on accommodation and local services such as health facilities, especially if construction of the West Wyalong Solar Farm project, proposed to be located 6.3 km northeast of the development site, overlaps with construction of the Wyalong Solar Farm project (see Section 8.14). However:
  - In addition to West Wyalong, accommodation options and additional services are available in other regional centres within acceptable commuting times of the development site. These centres include Temora (70 km by road from the site, population approximately 4,100), Forbes (95 km by road from the site, population approximately 8,400), Parkes (115 km by road from the site, population approximately 11,300) and Narrandera 120 km by road from the site (population approximately 3,700).
  - Occupancy rates of private residences are 82.8% (ABS 2017), and there are a number of short-term accommodation options within the Bland LGA including hotels, motels, motor inns and caravan parks, indicating that additional workers could be easily accommodated.
- Pressure on accommodation and retail services, as well as the increases in traffic, could adversely affect local tourism, especially if construction coincides with local events such as festivals.

Impacts during decommissioning are expected to be similar to those outlined above for construction. In addition, local reuse or recycling of infrastructure (such as used solar panels) may provide community and economic benefit.

Operation

The key potential social and economic impacts that may result from operation of the project include:

- Increase in local employment as the project will directly employ up to four full-time and eight part-time staff to manage the site during operation, including maintenance staff and site managers, and require additional operational and maintenance support by contractors, many of them likely to be sourced locally.
- Temporary loss of agricultural land, however this loss for the site landholder will be offset from income generated from lease arrangements. In addition, the size of the project (256 ha) will not significantly reduce the availability to agriculture of land in the Bland LGA. Following decommissioning, agricultural activities could recommence as the project is not expected to cause any long-term impacts on land capability.
- Change in visual character of the development site and the rural landscape until operation has ceased and decommissioning has been carried out.
- Potential creation of a local tourist attraction.

Compatibility with Your Vision, Our Future, Community Strategic Plan 2017 – 2027

The Wyalong Solar Farm project supports the following objectives and strategies outlined in the Bland Shire Council Community Strategic Plan 2017 – 2027:

- Promote the Shire as a place to do business.
  - Encourage and actively seek out businesses and industry to relocate within the Shire
  - The Wyalong project would be a new industry operating out of the Shire, and would potentially through its successful operation, encourage other businesses and industries to relocate within the Shire.
- Work with our communities and businesses to use our resources in a sustainable way for the future of the Bland Shire.
  - Ensure a sustainable environment for current and future generations through effective management and planning for the long-term future by ensuring appropriate land is zoned and available to support business and industry growth

- The Wyalong project would highlight the requirement for appropriate zoning to support business and industry growth, specifically for a sustainable environment through the generation of clean energy.
- Through partnerships with stakeholders foster our education, learning and training industry and increase employment opportunities within the Shire
- The majority of the construction and operation workforce is expected to be sourced from the local area, increasing local employment and training opportunities.
- Liaise with utility providers to ensure a quality sustainable service to the community
- The Wyalong project will provide clean energy which will ultimately contribute to lower energy bills for the community.
- The availability of commercial and industrial land, coupled with our geographic location, will be maximised and marketed to boost economic growth.
- The project will make use of existing commercial land to boost economic growth.

An additional objective to 'Manage waste and recycling to improve the utilisation of existing resources, including exploring new technologies', also highlights the importance of sustainability initiatives being implemented for a healthier environment. The Wyalong project would contribute to a healthier environment through the sustainable generation of energy.

Alternative energy resources have also been listed in the plan as a bottom line aspect for improvement of the environment.

Compatibility with Riverina Murray Regional Plan

The Wyalong Solar Farm project supports the following goals set out in the RMRP (NSC 2016):

- a growing and diverse economy – by developing and diversifying the rural economy through the development of renewable energy generation
- a healthy environment with pristine waterways – by undertaking a development that has minimal environmental impact on land and waterways and which reduces GHG emissions by producing renewable energy
- efficient transport and infrastructure networks – by maximising the use of existing transmission lines and infrastructure
- strong, connected and healthy communities – by providing a diversified income base, employment opportunities and flow-on economic impacts within the region.

Compatibility with A 20-Year Economic Vision for Regional NSW

The 20-Year Economic Vision document recognises renewable energy as an industry that is driving the economic future of NSW, and that development of regional energy zones would capitalise on the state's energy resources and further attract renewable energy project development to support a more secure and affordable clean energy system for people and businesses in regional NSW.

The Wyalong Solar Farm project would contribute to the key vision by assisting with the economic growth of Regional NSW and further encouraging renewable energy project development through its successful operation.

8.12.3 Management and mitigation

A Consultation and Stakeholder Engagement Plan outlining measures to reduce adverse impacts on the Bland community will be prepared and implemented by ESCO Pacific. The plan will provide procedures for:

- managing community expectations
- informing stakeholders of potential impacts
- providing project related updates

- registering and responding to complaints and feedback.

The applicant will liaise with the appropriate local community representatives to reduce the potential for adverse impacts on local services or events due to the accommodation of the construction workforce. Where possible, local contractors, manufacturing facilities, materials and services will be used.

Ongoing engagement with Bland Shire Council will be undertaken to discuss and resolve any concerns.

8.13 Waste management and resource use

The potential impacts of resource consumption and the production and disposal of waste is assessed in this section.

8.13.1 Existing conditions

Construction

The key resources to be used for the project during construction will include:

- glass and silicon for PV modules
- metal components for site buildings, DC boxes
- components of cabling and junction boxes
- electrical conduit materials
- timber for building fit-out
- lithium-ion batteries (if a battery storage facility is constructed)
- steel for posts, and for shipping containers to house inverters, aggregates, road base and concrete
- steel fencing materials
- steel piles and ground screws
- steel mounts and bolts
- plastic and masonry products, for slabs and footings
- sand for burying cables
- water for cleaning, dust suppression and sanitary facilities
- fuel and lubricants for machinery and motor vehicles.

Wastes as a result of construction will include:

- excess building materials, offcuts, scrap metals and cabling
- packaging materials such as cardboard, plastic, and timber pallets
- topsoil from excavations
- green waste from vegetation clearance
- bio-wastes from onsite septic systems.

Operation

Resource use associated with project operation is likely to be limited to maintenance activities (e.g. replacement of some materials), presence of onsite personnel (e.g. use of office related products including stationary), the use of machinery and motor vehicles.

Water use will be minimal and restricted to cleaning and sanitary facilities. Water use is discussed further in Section 8.4.

Waste may include replaced materials, green waste from vegetation clearance, bio-waste from onsite septic systems, minor waste chemicals, and packaging materials such as cardboard, plastic, and timber pallets.

Decommissioning

Above ground infrastructure would be removed during decommissioning. Resources are likely to include fuels and lubricants used for machinery and motor vehicles that are used to remove the infrastructure. Water use would be similar to that used in construction.

Recycle and reuse (including sale) of the following materials will be possible during decommissioning of the site:

- metals from piles, steel mounts fencing and cables
- PV modules
- lithium-ion battery (potentially recycled through Tesla's Closed Loop Battery Recycling Program[3] or other appropriate lithium-ion battery recycling program)
- electrical conduits
- timber from buildings
- equipment including DC boxes and junction boxes.

Where a material cannot be recycled or reused, it will be disposed of in accordance with the EPA Waste Classification Guidelines 2014 to appropriately licenced facilities.

8.13.2 Methodology

Guidelines and policies

The Protection of the Environment Operations (POEO) Act provides a framework for the management of waste in NSW. Under the Act, a licence is required to carry out certain scheduled waste activities, and it is an offence to:

- wilfully or negligently dispose of waste likely to cause harm to the environment
- litter.

The Protection of the Environment Operations (Waste) Regulation 2005 (POEO Regulation) prescribes management requirements for certain wastes and provides thresholds for environment protection licences. The regulations also outline the waste levy system, including EPAs requirements for records, surveys and reports.

The POEO Act and POEO Regulation assist in meeting the objectives of the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act). The WARR Act promotes waste avoidance and resource recovery for the reduction in waste generation, in accordance with principles of ecologically sustainable development, and sets out resource management hierarchy principles.

To ensure resources are used efficiently and adverse impacts to the environment as a result of waste are minimised, this chapter has been prepared in accordance with the following guidelines and strategies:

- EPAs Waste Avoidance and Resource Recovery (WARR) Strategy 2014-2012 (EPA 2014a)
- EPAs Waste Classification Guidelines 2014 (EPA 2014b)
- EPAs Better Practice Guidelines for Waste Management and Recycling in Commercial and Industrial Facilities 2012 (EPA 2012).

[3] https://www.tesla.com/en_AU/blog/teslas-closed-loop-battery-recycling-program

Waste classification

The EPA Waste Classification Guidelines 2014 provide detail on how wastes should be assessed and classified and provides management options for their disposal. The guidelines classify waste as follows:

- special waste (e.g. asbestos and tyres)
- liquid waste (e.g. fuels, oils and pesticides)
- hazardous waste (e.g. lead-acid or nickel-cadmium batteries and lead paint)
- restricted solid waste (currently no wastes have been pre-classified by the EPA as 'restricted solid waste')
- general solid waste (putrescible) (e.g. general litter, food waste, green waste, sanitary waste and animal waste)
- general solid waste (non-putrescible) (e.g. building and demolition waste, synthetic fibre waste, and wood waste).

The majority of the waste resulting from construction would be classified under the POEO Act as 'general solid waste (non-putrescibles)'. Other wastes such as bio-wastes would be classed as 'general solid waste (putrescibles)'.

Lithium-ion batteries have not been pre-classified by EPA NSW, however they are classified as a Dangerous Good under the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code) (EPA 2014b; ABRI 2015) (see Section 7.6). The EPA recommends the Australian Battery Recycling Initiative (ABRI) be contacted regarding recycling of lithium-ion batteries (EPA 2012).

Waste hierarchy

The project will be consistent with the waste management hierarchy set out in the WARR Act and shown in Figure 8.15.

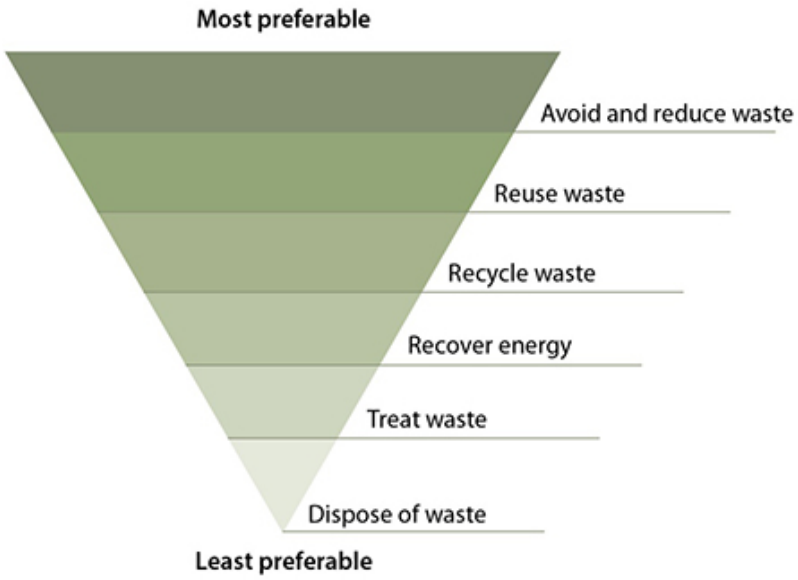

Figure 8.15. Waste management hierarchy (EPA 2017)

A description of the waste management hierarchy is as follows:

- Avoid and reduce waste: reduce the quantity of waste being generated.
- Reuse waste: reusing a product more than once in its original form for the same or similar use, avoiding the need for reprocessing.
- Recycle waste: processing waste into a similar non-waste product. This consumes less energy than the production of the non-waste product from raw materials.
- Recover energy: convert non-recyclable waste to energy such as heat, electricity or fuel.

- Treat waste: use chemical, biological or mechanical processes (e.g. composting) to stabilise wastes, reducing their health and environmental impacts.
- Disposal of waste: disposing of waste at appropriately licenced facilities.

8.13.3 Impact assessment

Construction and decommissioning

The majority of the waste resulting from construction will be building and demolition waste, classified under the POEO Act as 'general solid waste (non-putrescibles)'. Many of these wastes, including infrastructure components such as steel or electrical components, are highly recyclable or reusable and would not be expected to require disposal during either construction or decommissioning.

At decommissioning, the ABRI would be consulted in regard to recycling of lithium-ion batteries (EPA 2012).

Operation

During operation, replacement of some materials may occur as part of maintenance activities, however these wastes will be recycled or reused where possible.

Other wastes generated by the project such as general solid waste (putrescibles) (e.g. food, animal carcasses, and green waste from vegetation clearance) and liquid waste (fuel) will be minimal and will be managed in accordance with the EPA Waste Classification Guidelines 2014.

Where materials cannot be reused or recycled, they will be disposed of at an appropriately licenced facility.

Resource use impacts

Demand for materials as part of the project is unlikely to place significant pressure on local or regional resource availability or suppliers. The energy used by the project as a result of the key resources consumed during construction, operation and decommissioning activities will be outweighed by the overall benefits from the generation of renewable energy.

Relatively small quantities of water will be consumed by the project during construction, operation and decommissioning. It is anticipated that 500 kL of water will be used during operation each year for cleaning, maintenance, and staff amenities. During operation, water use will be offset by the collection of rainwater from building roofs and storage in onsite water storage tanks (e.g. 2 x 35 kL tanks).

8.13.4 Management and mitigation

A Waste Management Plan (WMP) will be prepared to meet the waste management classification and hierarchy outlined in Section 8.13.2, and will form part of the CEMP, OEMP and RDS. The plan will set out waste management responsibilities to be communicated to staff and contractors. The WMP will include:

- waste transportation protocols
- procedures for ordering materials
- classification of waste to be generated during construction
- procedures for identifying opportunities to avoid, reuse, recycle, recover, or treat waste
- method of tracking all waste entering and leaving the site
- procedures for managing waste generated during maintenance of plant and equipment
- procedures for waste monitoring, inspection and reporting
- location of dedicated waste management areas onsite (e.g. skips and recycling bins)
- commercial reuse opportunities.

A review of Bland Shire Councils seven landfills will be undertaken in preparation of the CEMP to understand capacity, the types of materials acceptable and accessibility of each site considering the location and requirements of the Wyalong Solar Farm.

8.14 Cumulative impacts

8.14.1 Existing conditions

For the purpose of this EIS, cumulative impacts are the combined effects of:

- various impact types (such as air quality and noise) which may occur as a result of a project
- the project with other activities (such as nearby developments) and other environmental trends in the area.

The DPE Major Projects Register (MPR), accessed on 22 October 2018, was used to undertake a search on any major projects within the Bland LGA. Three projects were identified:

- West Wyalong Solar Farm – Lightsource Development Services Australia Pty Ltd propose to develop a solar farm at West Wyalong, approximately 15 km northeast of the West Wyalong township and 6.2 km north of the development site. The proposed Lightsource development will generate up to a total of 135 MW of renewable energy and occupy around 560 ha of rural land currently used for agriculture (Urbis 2018).
- Cowal Gold Mine, located approximately 30 km north of the development site.
- Pace Farm, Wattle Ridge Layer Complex located approximately 12.2 km northwest of the development site.

A review of the RMS website identified that final stage works on the West Wyalong Heavy Vehicle Alternative Route, including reconstructing and widening the railway crossings and approach roads on the Mid Western and the Newell highways, were to be completed by mid-June 2018. Potential impacts were to include an increase in construction noise and extra vehicle and heavy machinery movements in the area. The West Wyalong heavy vehicle alternative route will be upgraded in sections over a number of years, depending on the availability of funding, to improve road safety and meet the demand of heavy vehicles using Newell Highway (RMS 2018).

As outlined in Section 8.5.1, a search of DPEs MinView tool and consultation with the DPE identified that a minerals exploration title partially covers the development site (EL8430). EL8430 is held by Argent Minerals Ltd which was granted on 20 April 2016 and expires on 20 April 2020. There are no other minerals, petroleum, or coal exploration titles or applications over the development site (see Figure 8.10) (DPE 2018). Cowal Gold Mine is covered by mining lease ML1535, held by Evolution Mining (Cowal) Pty Ltd, and is located approximately 30 km to the north of the development site.

8.14.2 Impact assessment

The view of the project infrastructure may compound the visual impact already associated with the existing transmission line, however this impact is considered to be negligible.

The Wyalong Solar Farm project is unlikely to generate a cumulative impact with the Pace Farm, Wattle Ridge Layer Complex construction and operations due to the significant distance between the projects.

The final stage works to upgrade the West Wyalong Heavy Vehicle Alternative Route were scheduled to be completed in mid-July 2018, with future works likely to be relatively minor and dependent on funding. Therefore, it is unlikely the project will generate a cumulative impact with future upgrade works.

Although a significant distance from the development site, major maintenance works at the Cowal Gold Mine during construction of the Wyalong Solar Farm has the potential to place additional pressure on accommodation and local services and place. However, ESCO Pacific will undertake ongoing consultation with the mine operators to ensure local resources are not strained, and will explore this issue further during the Engineering, Procurement and Construction phase.

The proposed West Wyalong Solar Farm is located approximately 6.2 km north of the project development site. The construction periods could partially coincide. Both projects will require similar support and create

similar types of impacts on the local region. The proposed West Wyalong Solar Farm site is larger than the proposed Wyalong Solar Farm, however the footprint of development is likely to be similar given both projects will have the potential to generate similar levels of energy. The potential cumulative impacts associated with the two solar developments are discussed below.

Construction

The timing of the proposed West Wyalong Solar Farm development may partially overlap with construction of the Wyalong Solar Farm. Key cumulative impacts may include community impacts such as combined demand that may strain local resources (e.g. accommodation and local services). However, construction of the two projects may also be sequential, depending on actual timing, and in this case will provide an extended period of sustainable income and business for the local region (Urbis 2018). In addition, there are a number of regional centres within acceptable commuting distance of the solar farms that provide options for accommodation and other services (see Section 8.12.2).

Land clearance during construction of the two projects is likely to result in cumulative impacts on native vegetation and species habitat (minor if managed appropriately and offset) and the loss of Aboriginal cultural values and archaeological sites within the local area. Other potential cumulative impacts of construction resulting from the two projects are traffic and amenity (including noise and visual) impacts.

The increase of traffic on Newell Highway and local roads could generate potential cumulative impacts with traffic generated from local events and activities. However, in such a case, appropriate measures to reduce the potential impacts will be addressed in the Wyalong TMP. In addition, potential traffic and associated noise impacts may occur if construction of the development site coincides with extraction of materials from the various operational quarries within 12 km of the development site as outlined in Section 8.5 including Blacks Pit (1.3 km northwest), Blandview Pit (5.8 km northeast), Markeith Pit (6.1 km northeast) and Lows Pit (7.1 km southwest), as well as existing quarries that are not currently operational. However, as discussed in Section 8.6, any cumulative impacts on the use of these pits are expected to be minimal.

In terms of visual amenity, the increase in construction traffic on Newell Highway, which is used regularly by heavy vehicles, local roads and the development site has the potential to contribute to cumulative visual amenity impacts to surrounding receivers, including road users and nearby residents. However, the increase in traffic as a result of the project will be temporary and for a short duration during the construction period.

Cumulative impacts from decommissioning will be similar to construction and will depend on the timing of decommissioning of the two projects. However, infrastructure removal (rather than construction) would result in a shorter duration of works, and therefore a reduced impact.

Operation

The two solar farm projects would potentially be sharing some of the same power transmission infrastructure, such as the Essential Energy 132 kV Temora – Lake Cowal transmission line. This will reduce or remove existing excess capacity in the local network.

The benefits of renewable energy generation in the region as outlined in Section 4.3 may be further enhanced by having two solar farms and the negative cumulative operational impacts resulting from the Wyalong Solar Farm and West Wyalong Solar Farm would be minimal.

8.14.3 Management and mitigation

Implementing the management and mitigation measures discussed for each environmental aspect in Chapter 8 is expected to acceptably minimise the risk of cumulative impacts occurring as a result of the project. No additional management and mitigation measures are proposed.

9 Environmental management

9.1 Environmental framework

ESCO Pacific proposes to manage the environmental risks associated with the proposed Wyalong Solar Farm by implementing a suite of project-specific mitigation measures detailed in Chapter 8 and summarised in the statement of commitments below.

It is intended to manage all commitments and environmental mitigation measures by implementing a Project Environmental Management Plan, consisting of a CEMP, OEMP and RDS. ESCO Pacific will prepare these plans prior to each stage of works. Each of these plans will describe project aspects, including:

- staff and contractor roles and responsibilities
- approval and licencing requirements
- monitoring and reporting requirements
- environmental targets and objectives
- auditing and review processes and timetables
- emergency response procedures
- induction and training
- stakeholder engagement and complaint response procedures
- adaptive management mechanisms to encourage continuous improvement.

9.2 Statement of commitments

The mitigation measures, monitoring activities and management strategies outlined in Chapter 8 will be implemented for all activities associated with each stage of the project. Table 9.1 details the key commitments proposed in this EIS that will enable ESCO Pacific and its contractors to effectively mitigate and manage the potential environmental impacts of the project.

Table 9.1. Summary of environmental management commitments

No.	Mitigation Measure	Development Stage*		
		Const.	Op.	Decomm.
9.1	**Biodiversity**			
B.1	Site access for construction and operation will be selected to minimise vegetation removal and impacts to threatened fauna species	x	x	x
B.2	Use of ecosystem credit offsets to minimise impacts to flora and fauna	x	x	
B.3	EMPs will be developed to mitigate potential impacts to biodiversity, including:	x	x	x
B.3.1	• unless otherwise agreed by the Responsible Authority, the removal of hollow-bearing trees will be undertaken outside of the spring to early summer period to avoid the main breeding period for hollow-dependent fauna	x	x	x

No.	Mitigation Measure	Development Stage*		
		Const.	Op.	Decomm.
B.3.2	• pre-clearance surveys will be undertaken to ensure that nests and hollows identified in paddock trees are inactive	x		
B.3.3	• where an active hollow is identified, a licenced wildlife salvage team will be on-site during vegetation removal to catch and relocate (if appropriate) any wildlife encountered in vegetation or hollow-bearing trees	x		
B.3.4	• demarcation and exclusion fencing will be installed around trees and vegetation to be retained in, or directly adjacent to (within the radius of an applicable tree protection zone (TPZ)), the development site, as follows:	x	x	x
B.3.4.1	– TPZs will be clearly defined	x	x	x
B.3.4.2	– the radius of the TPZ will be calculated for each tree by multiplying its diameter at breast height (DBH) by 12 (i.e. TPZ = DBH x 12) in accordance with the Australian Standard – Protection of trees on development sites	x	x	x
B.3.4.3	– a TPZ will not be less than 2 m or greater than 15 m, except where crown protection is required	x	x	x
B.3.4.4	– appropriate signage such as 'No Go Zone' or 'Environmental Protection Area' will be installed around retained trees and vegetation	x	x	x
B.3.4.5	– the location of any 'No Go Zones' will be identified in site inductions	x	x	x
B.3.4.6	– fencing will comprise star pickets with high visibility bunting	x	x	x
B.3.5	• all material stockpiles, vehicle parking and machinery storage will be located within cleared areas or areas proposed for clearing, and not in areas of retained native vegetation	x	x	x
B.3.6	• where practical, all paddock and hollow-bearing trees to be removed will be placed in areas of retained vegetation to provide additional fauna habitat	x		
B.3.7	• where appropriate, native vegetation cleared from the development site will be mulched for re-use on the site, to stabilise bare ground	x		
B.3.8	• sediment and erosion control measures will be implemented prior to construction works commencing, to protect drainage channels and any downgradient habitat. These will be in accordance with the measures outlined in the *Soil, landuse and agriculture* section	x	x	x
B.3.9	• standard noise controls should be implemented during construction as outlined in the *Noise* section to minimise disturbance to fauna	x		x
B.3.10	• barbed wire for site fencing will be avoided, where possible	x	x	

No.	Mitigation Measure	Development Stage*		
		Const.	Op.	Decomm.
B.3.11	• boundary fences and laydown areas will be located in cleared areas	x	x	
B.3.12	• the site rehabilitation plan will be implemented to progressively rehabilitate disturbed areas	x	x	x
B.3.13	• following construction, revegetation of areas of the development site with groundcover plant species compatible with the existing native species composition will be undertaken		x	x
B.3.14	• a Weed and Pest Management Plan will be prepared prior to construction as outlined in the *Soil, landuse and agriculture* section. This should include:	x	x	x
B.3.14.1	– identification of areas on the development site which have environmental weeds	x		
B.3.14.2	– methods for controlling weeds e.g. herbicides, physical removal, grazing, etc.	x	x	x
B.3.14.3	– ongoing monitoring of weeds	x	x	x
B.3.15	• in areas where cropping is not to occur, revegetation with groundcover plant species compatible with the existing native species composition will occur			x
9.2	**Aboriginal cultural heritage**			
AH.1	ESCO Pacific and its Contractors will adhere to the following Statement of Commitments:	x	x	x
AH.1.1	• The Aboriginal Cultural Heritage Management Plan (ACHMP) will be developed in consultation with the RAPs and the recommendations of the ACHAR (Appendix D). Impacts to aboriginal heritage will be managed in accordance with the ACHMP	x	x	x
AH.1.2	• As project design is finalised all efforts will be made to conserve Aboriginal sites in the development site	x	x	x
AH.1.3	• The location of Glenroy-OS1 and OS2; Glenroy-IF2; Glenroy-IF6; and Glenroy-IF9, will be noted and efforts made to avoid these sites as they are located near the perimeter of the development site in a landform that will be subject to less disturbance than adjacent landforms	x	x	x
AH.1.4	• The impacted isolated finds (Glenroy-IF1; Glenroy-IF3 to IF5; Glenroy-IF7 to IF8; and Glenroy-IF10), that have been recorded within the development site will be salvaged, along with any located near the perimeter of the development site that are unable to be avoided	x	x	x
AH.1.5	• The salvaged artefacts will be reburied at a location outside of the development site, but within the lot boundary where no future developments are planned. The manner of reburial will be detailed in the ACHMP following RAP	x	x	x

No.	Mitigation Measure	Development Stage*		
		Const.	Op.	Decomm.
	consultation. A site card will be submitted to AHIMS to register the location of any reburied artefacts			
AH.1.6	• An Aboriginal Site Impact Recording Form will be submitted to AHIMS recording the results of the salvage of any sites associated with the Project	x	x	x
AH.1.7	• Should any sites within the development site (Glenroy-OS1 and OS2; Glenroy-IF2; Glenroy- IF6; and Glenroy-IF9) be able to be avoided, those sites will be clearly and permanently demarcated to avoid inadvertent impacts. The demarcation will include permanent signage. ESCO Pacific and its Contractors will consider permanently fencing these sites to avoid inadvertent impacts	x	x	x
AH.2	All land-disturbing activities will be confined to the assessed area within the lot boundary. Should the parameters of the proposed work extend beyond the assessed area, then further archaeological assessment may be required	x	x	x
AH.3	Inductions for staff undertaking the proposed activity shall include the legislative protection requirements for Aboriginal sites and items in NSW and the relevant fines for non-compliance	x	x	x
AH.4	If any Aboriginal object is discovered and/or harmed (in, or under the land), while undertaking the proposed development activities, ESCO Pacific and its Contractors will:	x	x	x
AH.4.1	• not further harm the object	x	x	x
AH.4.2	• immediately cease all work at the particular location	x	x	x
AH.4.3	• secure the area so as to avoid further harm to the Aboriginal object	x	x	x
AH.4.4	• notify OEH as soon as practical on 131 555, providing any details of the Aboriginal object and its location	x	x	x
AH.4.5	• not recommence any work at the particular location unless authorised in writing by OEH	x	x	x
AH.5	In the event that Aboriginal burials are unexpectedly encountered during the activity, work must stop immediately, the area secured to prevent unauthorised access, and NSW Police and OEH contacted	x	x	x
AH.6	ESCO Pacific will cooperate with the appropriate authorities and relevant Aboriginal community representatives to facilitate:	x	x	x
AH.6.1	• the recording and assessment of the find(s)	x	x	x
AH.6.2	• the fulfilment of any legal constraints arising from the find(s) including complying with OEH directions	x	x	x
AH.6.3	• the development and implementation of appropriate management strategies, including consultation with	x	x	x

No.	Mitigation Measure	Development Stage*		
		Const.	Op.	Decomm.
	stakeholders and the assessment of the significance of the find(s)			
AH.7	Where the find(s) are determined to be Aboriginal object(s), recommencement of work in the area of the find(s) can only occur in accordance with any consequential legal requirements and after gaining written approval from OEH (normally an Aboriginal Heritage Impact Permit	x	x	x
9.3	**Historic heritage**			
HH.1	If it is identified that ground disturbance activities will occur beyond the assessed area, then further archaeological assessment may be required	x	x	x
HH.2	Should any items suspected of having historic heritage significance be uncovered, all work will stop and the Historic Heritage Unanticipated Finds Protocol (below) will be followed	x	x	x
HH.3	Inductions for staff undertaking the proposed activity will include the legislative protection requirements for historic sites and items in NSW and the relevant fines for non-compliance	x	x	x
HH.4	The protocol to be followed in the event that previously unrecorded or unanticipated historic objects are encountered is as follows:	x	x	x
HH.4.1	• All ground surface disturbance in the area of the finds should cease immediately the finds are uncovered	x	x	x
HH.4.2	• The discoverer of the find(s) will notify machinery operators in the immediate vicinity of the find(s) so that work can be halted	x	x	x
HH.4.3	• The site supervisor will be informed of the find(s)	x	x	x
HH.5	If finds are suspected to be human skeletal remains, then NSW Police must be contacted as a matter of priority	x	x	x
HH.6	If there is substantial doubt regarding the historic significance for the finds, then a qualified opinion from an archaeologist will be obtained as soon as possible. This can circumvent proceeding further along the protocol for items which turn out not to be significant. If a quick opinion cannot be obtained, or the item is considered likely to be significant, then proceed to the next step:	x	x	x
HH.6.1	• Immediately notify OEH (Heritage Division) at 131 555 of the find(s)	x	x	x
HH.6.2	• Facilitate, in co-operation with the appropriate authorities:	x	x	x
HH. 6.2.1	– the recording and assessment of the finds;	x	x	x
HH. 6.2.2	– fulfilling any legal constraints arising from the find(s). This will include complying with OEH directions	x	x	x
HH. 6.2.3	– the development and conduct of appropriate management strategies. Strategies will depend on	x	x	x

No.	Mitigation Measure	Development Stage*		
		Const.	Op.	Decomm.
	consultation with stakeholders and the assessment of the significance of the find(s)			
HH.6.3	• Where the find(s) are determined to be significant historic items, any re-commencement of construction related ground surface disturbance may only resume in the area of the find(s) following compliance with any consequential legal requirements and after gaining written approval from OEH	x	x	x
9.4	**Hydrology and water resources**			
H.1	The following management and mitigation measures will be implemented during construction to limit the impacts of the project on hydrology and water resources:	x	x	x
H.1.1	• ensuring any high-risk site facilities (such as the substation) are located away from areas of potential flood risk	x		
H.1.2	• implementing erosion and sediment control measures during construction as outlined in *soil, landuse and agriculture* section, including minimising areas of disturbance and rehabilitating disturbed areas as soon as possible	x	x	x
H.1.3	• installing effective stormwater management and control measures during construction, in accordance with the erosion and sediment control plans for the site	x		x
H.1.4	• developing and implementing procedures for the testing and management of construction wastewater if disposal is required	x		x
H.1.5	• refuelling plant and machinery in an impervious bunded area at least 50 m away from water bodies and drainage lines	x	x	x
H.1.6	• storing fuel and chemicals in an impervious bunded area at least 50 m away from water bodies and drainage lines as outlined in *soil, landuse and agriculture* section	x	x	x
H.1.7	• implementing a spill response plan (to be prepared as part of the CEMP) which will include containment and remediation procedures, placement of spill kits and material safety data sheets, and training requirements for staff as outlined in *soil, landuse and agriculture* section	x	x	x
H.1.8	• disposing of all hazardous chemicals and waste offsite in accordance with relevant NSW government regulations and guidelines as outlined in *soil, landuse and agriculture* section	x	x	x
H.1.9	• daily inspection of all machinery, plant, equipment and facilities to ensure no leakage of fuels, lubricants or other liquids	x	x	x
H.2	Maintaining vegetation cover under all solar panel arrays to maximise water infiltration		x	

No.	Mitigation Measure	Development Stage*		
		Const.	Op.	Decomm.
H.3	Undertaking regular inspection of equipment and facilities to identify any spills or leaks		x	
H.4	Implementing a spill response plan (also used for the CEMP)		x	
H.5	Treating sewage by an onsite bio-cycle system installed to comply with Building Code of Australia requirements		x	
H.6	Ensuring the Emergency Response Plan for the project includes procedures to be followed in the event of flooding within the development site or surrounding area, including information on safe evacuation routes	x	x	x
9.5	**Soil and landuse**			
S.1	Development of EMPs to mitigate potential impacts to soils, landuse and agricultural land. The plans will be developed with the following guidelines to address potential erosion and sedimentation impacts, including:	x	x	x
S.1.1	• Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition (also known as the Blue Book)	x	x	x
S.1.2	• Volume 2A Installation of Services	x	x	x
S.1.3	• Volume 2C Unsealed Roads	x	x	x
S.2	Environmental management plans will include measures such as:	x	x	x
S.2.1	• designing internal access roads, tracks and the site carpark with adequate runoff controls to prevent erosion from concentrated flows	x		x
S.2.2	• constructing and/or installing erosion and sediment control structures, and regular inspection of them, particularly following rainfall events	x	x	x
S.2.3	• lining drains with geotextile or plastic, to reduce erosion	x		x
S.2.4	• maintaining a register of erosion and sediment control activities, including records of inspection and maintenance	x	x	x
S.2.5	• minimising areas of disturbance and rehabilitating disturbed areas as soon as possible with appropriate plant species	x		x
S.2.6	• separating topsoil and subsoil and ensuring that soils are reinstated in the correct order	x		x
S.2.7	• filling trenches progressively after placement or removal of underground cabling	x		x
S.2.8	• implementing a WPMP to be developed prior to construction, to reduce the spread of weeds and pathogens and control pest animals. This should include:	x	x	x
S.2.8.1	– identification of areas on the development site which have environmental weeds	x		

No.	Mitigation Measure	Development Stage*		
		Const.	Op.	Decomm.
S.2.8.2	– methods for controlling weeds e.g. herbicides, physical removal, grazing, etc.	x	x	x
S.2.8.3	– ongoing monitoring of weeds	x	x	x
S.2.9	• implementing a vehicle hygiene protocol when entering and leaving the site to ensure vehicles and earthmoving machinery are free of debris, sediment and weeds	x	x	x
S.2.10	• ensuring any fill brought to site is weed and pathogen free	x		x
S.2.11	• implementing a TMP to ensure vehicles adhere to speed limits and keep to designated roads, to reduce generation of dust	x		x
S.2.12	• ensuring appropriate stockpile management to reduce dust, erosive runoff and potential contamination (where relevant)	x		x
S.2.13	• implementing a contamination procedure (to be developed as part of the CEMP) outlining appropriate steps and authorities to be notified in the event buried contamination is uncovered	x	x	x
S.2.14	• refuelling plant and machinery in an impervious bunded area at least 50 m away from water bodies and drainage lines	x	x	x
S.2.15	• storing fuel and chemicals in an impervious bunded area at least 50 m away from water bodies and drainage lines	x	x	x
S.2.16	• implementing a spill response plan (to be prepared as part of the CEMP) which will include containment and remediation procedures, placement of spill kits and SDSs, and training requirements for staff	x	x	x
S.2.17	• disposing of all hazardous chemicals and waste offsite in accordance with relevant NSW government regulations and guidelines	x	x	x
S.2.18	• revegetating any residual areas still disturbed following construction (where no longer active) with appropriate plant species		x	
S.2.19	• maintaining vegetation cover across the development site to reduce potential erosion impacts		x	
9.6	**Traffic and transport**			
T.1	Development of EMPs, including traffic management measures, will be put in place to mitigate any potential impacts	x	x	x
T.2	Development of a traffic management plan (in consultation with Bland Shire Council, RMS and any other relevant stakeholders), which will include:	x		x
T.2.1	• confirmation of the project construction timeframe and work stages	x		
T.2.2	• confirmation of expected traffic volumes generated by the project for all work stages	x		

No.	Mitigation Measure	Development Stage*		
		Const.	Op.	Decomm.
T.2.3	• identification of all heavy vehicle and over-dimensional vehicle haulage routes for all work stages	x		
T.2.4	• a mechanism to review identified haulage route road conditions prior to the commencement of works	x		
T.2.5	• any additional relevant mechanisms for over-dimensional vehicle permits and traffic management requirements	x		
T.2.6	• mechanisms/agreements (if deemed necessary) to maintain haulage route roads and road infrastructure, including local public roads used by site traffic, during construction works and to reinstate roads to at least pre-construction conditions	x		
T.2.7	• any additional requirements for specific work stage construction traffic management plans	x		
T.2.8	• confirmation of the adequacy of available sight distances along the Newell Highway from the site access (trimming will be undertaken if required)	x		
T.2.9	• assessment of the need for 'trucks crossing' signs to be placed along Newell Highway in the vicinity of the site	x		
T.3	Traffic-related impacts to amenity during construction (such as noise and dust) will be addressed in the EMP with management measures proposed to mitigate these	x		x
T.4	Traffic-related impacts to during operation (such as risks to road safety from operational traffic) are expected to be minimal but will be addressed in the EMP with management measures proposed to mitigate these		x	
9.7	**Noise**			
N.1	The noise assessment undertaken for the Wyalong Solar Farm was conservative. However, it is proposed that noise monitoring be undertaken during construction to confirm predictions and determine any need for noise management measures. In particular, the use of a mulcher on site will be subject to noise monitoring and, if noise management levels are exceeded at the two nearest sensitive receivers (NSRs), management measures such as the following will be implemented to achieve compliance:	x	x	
N.1.1	• locating the mulcher within the site so as to maintain a specified minimum distance to the nearest sensitive receivers	x	x	
N.1.2	• operating the mulcher within designated time periods rather than in an ad hoc manner to minimise the frequency of intrusion	x	x	
N.1.3	• positioning the mulcher to make use of any natural shielding	x	x	
N.1.4	• application of noise shielding or noise suppression measures at the mulcher	x	x	

No.	Mitigation Measure	Development Stage*		
		Const.	Op.	Decomm.
N.1.5	• consultation with the landholders at R3, R4 and R5 to agree on measures	x	x	
N.2	The noise impact assessment has shown that construction noise may exceed applicable criteria at three of the NSRs and therefore, as per DPE's requirement, a noise management plan must be prepared prior to construction to manage construction noise. The noise management plan will be prepared as part of the CEMP	x		
N.3	Final design and layout of equipment will consider noise attenuation measures such as setbacks, orientation, shielding or other treatments on plant and equipment in relation to the sensitive receptors	x	x	x
N.4	Should a synchronous condenser installation be confirmed, measures to reduce its potential operational noise impacts on NSRs, which may include positioning, orientation, enclosures or sound barrier screening, will be provided in the noise management plan to be developed and provided as part of the OEMP	x	x	
9.8	**Visual amenity**			
V.1	Apply urban design principles and objectives during detailed design phase	x		
V.2	Investigate colour combinations for infrastructure items to aid visual obscurity	x	x	
V.3	Minimise reflective surfaces with a preferred use of muted colours for ancillary structures	x	x	
V.4	Development of EMPs, including visual amenity management measures, will be put in place to mitigate any potential impacts. These measures will include:	x	x	x
V.4.1	• demarcation and exclusion fencing will be installed around trees and vegetation to be retained as described in the *Biodiversity* and *Soil and landuse* sections	x		x
V.4.2	• limiting disturbance and rehabilitating disturbed areas, as described in the *Biodiversity* and *Soil and landuse* sections	x	x	x
V.4.3	• minimise light spill from the development into adjacent visually sensitive properties by directing construction lighting into the construction areas and ensuring the site is not over-lit. This includes the sensitive placement and specification of lighting to minimise any potential increase in light pollution	x	x	x
V.4.4	• temporary hoardings, barriers, traffic management and signage should be removed when no longer required	x		x
V.4.5	• keeping the site tidy and well maintained, including removal of all rubbish at regular intervals. There should be no storage of materials beyond the construction boundaries	x	x	x

No.	Mitigation Measure	Development Stage*		
		Const.	Op.	Decomm.
V.5	Restricting external lighting to the area where the maintenance shed, permanent site office, and switch yard are located		x	
V.6	All external lighting around buildings to be faced downwards and inwards to minimise impacts to neighbouring properties		x	
9.9	**Air quality and dust**			
AQ.1	Development of EMPs which will contain procedures to prevent and control dust and will include:	x	x	x
AQ.1.1	• grading and ongoing maintenance of internal access roads to increase stabilisation of soil, where possible	x	x	x
AQ.1.2	• wetting down the internal access roads and other exposed surfaces, particularly during dry and windy conditions	x	x	x
AQ.1.3	• minimising vehicle movements on unsealed roads	x	x	x
AQ.1.4	• limiting the extent of vegetation clearance and excavation	x	x	x
AQ.1.5	• minimising the number of stockpiles on site	x	x	x
AQ.1.6	• enforcing on-site speed limits	x	x	x
AQ.1.7	• clearly defining access and travel routes	x	x	x
AQ.2	Implementation of an EMP with procedures to prevent and control vehicle, plant and equipment emissions and will include:	x	x	x
AQ.2.1	• regularly inspecting and maintaining vehicles, plant and equipment to ensure they are operating efficiently, and in accordance with the manufacturer's requirements	x	x	x
AQ.2.2	• ensuring that vehicles, plant and equipment meet relevant standards for emissions	x	x	x
AQ.2.3	• switching off vehicles, plant and equipment when not in use	x	x	x
AQ.3	Development of a TMP to assist with management of vehicle generated dust and emissions	x	x	x
AQ.4	Development of a complaints procedure to respond to issues raised by project staff and the local community regarding air quality impacts	x	x	x
9.10	**Bushfire and electrical fire**			
F.1	Development of a BFMP prior to construction, to include the following:	x	x	x
F.1.1	• on-site firefighting equipment required	x	x	x
F.1.2	• management of asset protection zones	x	x	x
F.1.4	• measures for reducing fuel loads on the site (e.g. grazing regime, slashing, ploughing and weed control, etc.)	x	x	x
F.1.5	• location of hazards and procedures to manage the hazards prior to and during firefighting operations	x	x	x

No.	Mitigation Measure	Development Stage*		
		Const.	Op.	Decomm.
F.1.6	• site access and internal road plan	x		x
F.1.7	• management arrangements for the development of an Emergency Response Plan	x		x
F.1.8	• procedures to update and review the BFMP	x		x
F.1.9	• 24 hour, 7 days per week contact details	x		x
F.2	Development of a comprehensive ERP, addressing on-site and off-site fire events and detailing appropriate risk control measures to mitigate potential risks to health and safety of firefighters and other first responders, including:	x	x	x
F.2.1	• appropriate personal protective clothing required to be worn	x	x	x
F.2.2	• minimum level of respiratory protection required	x	x	x
F.2.3	• decontamination procedures	x	x	x
F.2.4	• minimum evacuation zone distances	x	x	x
F.2.5	• a safe method of shutting down and isolation the photovoltaic system	x	x	x
F.2.6	• emergency evacuation procedures	x	x	x
F.3	Two copies of the ERP will be stored in a prominent 'Emergency Information Cabinet', to be located directly adjacent to the site's main entry point	x	x	x
F.4	Provide the fire station at West Wyalong, the RFS, Fire and Rescue NSW with the BFMP and ERP, including plans of the development site	x	x	x
F.5	Electrical components, including solar panels, will be designed to minimise the risk of ignition, in accordance with relevant Australian Standards	x	x	x
F.6	Buildings will be designed in accordance with relevant NSW RFS standards	x	x	x
F.7	Access site and internal roads will be designed and constructed in compliance with RFS standards. Emergency access to vehicles will be provided across the entire development site	x	x	x
F.8	Chemicals will be stored in accordance with SDS requirements	x	x	x
F.9	The battery storage facility, if constructed, would be monitored and maintained regularly to avoid leaks from the lithium-ion batteries or overheating	x	x	x
F.10	The interior of any buildings will contain the necessary fire safety provisions, in accordance with the relevant Australian Standards and legislation (e.g. Fire extinguishers, smoke alarms, sprinklers)	x	x	x
F.11	If required, a non-combustible dedicated 20,000 L water tank with a 65 mm Storz outlet will be located adjacent to the site office. Water from this tank will only be used for fire-fighting. A	x	x	x

No.	Mitigation Measure	Development Stage*		
		Const.	Op.	Decomm.
	petrol, diesel or solar powered fire-fighting pump and 30 m hose reel with a steel nozzle will be available onsite, suitable for mounting on a 4WD with water tank, and used for grass fire / ember attacks by the applicant in the event of a fire			
F.12	If required, to allow emergency service personnel to undertake property protection activities, a 10 m Asset Protection Zone (APZ), allowing for unobstructed access by a four-metre-wide vehicle will be provided around the perimeter of the development site and associated infrastructure. The development site is to also be serviced by a graded road, offering direct access to the centre of the site	x	x	x
F.13	Development of an Environmental Management Plan that will provide safety protocols including:	x	x	x
F.13.1	• storage of storage of hazardous and flammable chemicals	x	x	x
F.13.2	• daily monitoring of the Fire Danger Rating for the area, during the Fire Danger Period	x	x	x
F.13.3	• smoking on-site	x	x	x
F.13.4	• basic fire-fighting by on-site staff and use of fire-fighting equipment	x	x	x
F.14	Project staff and contractors will be informed or fire risks and evacuation procedures. Staff will be trained in emergency response procedures	x	x	x
9.11	**Electromagnetic interference**			
E.1	Electrical equipment and infrastructure will be designed and maintained in accordance with relevant Australian standards and codes of practice	x	x	
E.2	Design of electrical equipment and infrastructure will be undertaken by qualified personnel, with support from specialists where required	x	x	
E.3	Electrical equipment will be accessed only by qualified staff	x	x	x
E.4	The general public will not be allowed to enter the development site, unless with supervised by onsite staff and with prior permission	x	x	x
E.5	The landholder and general public will not, under any circumstances, have access to the substation or inverters	x	x	x
9.12	**Socio-economic**			
SSE.1	Development of a Consultation and Stakeholder Engagement Plan to reduce adverse impacts on the Bland Shire community. The plan will include procedures for:	x	x	x
SE.1.1	• managing community expectations	x	x	x
SE.1.2	• informing stakeholders of potential impacts	x	x	x
SE.1.3	• providing project-related updates	x	x	x

No.	Mitigation Measure	Development Stage*		
		Const.	Op.	Decomm.
SE.1.4	• registering and responding to managing complaints and feedback	x	x	x
SE.2	The applicant will liaise with the appropriate local community representatives to help ensure accommodation of construction workforce does not adversely impact on local services or events. Where possible, local contractors, manufacturing facilities, and materials and services will be used.	x		x
SE.3	Ongoing engagement with Bland Shire Council will be undertaken to discuss and resolve any concerns	x	x	x
9.13	**Waste management**			
WM.1	Preparation of a Waste Management Plan (WMP) that meet the waste management classification as set out in EPA Waste Classification Guidelines and EPA's waste management hierarchy. The WMP will be incorporated into the EMPs and will include:	x	x	x
WM.1.1	• waste transportation protocols	x	x	x
WM.1.2	• procedures for ordering materials	x	x	x
WM.1.3	• classification of waste to be generated during construction	x		x
WM.1.4	• procedures for identifying opportunities to avoid, reuse, recycle, recover, or treat waste	x	x	x
WM.1.5	• method of tracking all waste entering and leaving the site	x	x	x
WM.1.6	• procedures for managing waste generated during maintenance of plant and equipment		x	
WM.1.7	• procedures for waste monitoring, inspection and reporting	x	x	x
WM.1.8	• Use of dedicated waste management areas onsite (e.g. skips and recycling bins)	x	x	x
WM.1.9	• commercial reuse opportunities for generated waste	x	x	x
WM.2	A review of Bland Shire Councils seven landfills will be undertaken in preparation of the CEMP to understand capacity, the types of materials acceptable and accessibility of each site considering the location and requirements of the Wyalong Solar Farm	x	x	x
9.14	**Cumulative impacts**			
	Implementing management and mitigation measures for each environmental aspect above.	x	x	x

*Construction, operation, decommissioning

10 Conclusion

This EIS has been prepared to support a Development Application by ESCO Pacific for the construction and operation of the utility-scale Wyalong Solar Farm (the project). This EIS has been prepared in accordance with the SEARs issued by DPE on 18 September 2018, and outcomes of community and stakeholder consultation. The project will generate up to 100 MW (AC) and 130 MW (DC) of clean and renewable electricity through the conversion of solar radiation to electricity via photovoltaic modules.

The project represents a capital investment value of approximately $130 million and is expected to create up to 150 jobs during construction and up to four full-time and eight part-time positions when operational. Construction is expected to take approximately eight months and the project is expected to operate for 40 years.

ESCO Pacific has undertaken a constraints and opportunities analysis to identify potential project sites in NSW and other States. Wyalong was chosen as the location of the project due to the high solar irradiance in the region and the capacity of the Essential Energy electricity network to transmit the power generated by the farm. In selecting the development site from a range of options within the Wyalong area, ESCO Pacific has followed a process of avoiding, minimising and offsetting impacts to environmental and social values. Once the current site was chosen, this same process was followed to optimise project design, configuration and footprint. The result has been the selection of a site that can be developed with minimal adverse effects on the environment and local landholders.

The project will contribute to Australia's greenhouse gas commitments by reducing emissions associated with energy use and contributing to the achievement of the Renewable Energy Target. The project will also be part of the transition away from fossil fuel reliance to cleaner electricity generation, and the transition to increased energy security through a more diverse energy mix.

At a regional level, the project represents investment in an important rural area of the State and will contribute to a more diversified and sustainable income base. At a local level, project benefits will include employment and training opportunities and local economic stimulation.

The project has been assessed as a permissible development for which consent can be granted as an SSD under the Section 89E of the EP&A Act. The project as proposed in this EIS is also compatible with the surrounding landuse and is generally consistent with the requirements of the Bland LEP 2011 and relevant SEPPs.

ESCO Pacific has placed a strong emphasis on stakeholder and community consultation through the EIS process. Consultation has been undertaken with numerous government agencies and council to clarify requirements, discuss methodologies and seek feedback. The agencies, council and community appear supportive of the project. ESCO Pacific has also been actively engaging with the local Aboriginal community in the region and the LALCs.

Based on the findings of the risk assessment and environmental impact assessment processes undertaken for this EIS, including technical investigations conducted by specialists in key areas of potential concern, and the outcomes of community and stakeholder consultation, the project is considered likely to provide significant local and regional benefit whilst resulting in generally minor, short term and largely reversible environmental impacts. However, this conclusion relies on the effective implementation of the environmental management and mitigation measures outlined in this EIS.

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