ESCO Pacific

Mulwala Solar Farm

Preliminary Environmental Assessment – Scoping Report

January 2018

Document Information	
Prepared by	Cédric Bergé, Environmental consultant – Development Manager
File Ref:	MUL_PEA_Scoping Report
Version:	Version 2 - Final
Distribution:	Public - Uncontrolled when printed

Revision History

Revision	Description	Author	Review	Approval	Date
1	Draft	C. Bergé	T. Robertson	A. Hawke	17/11/17
2	Final	C. Bergé	T. Robertson	A. Hawke	16/01/18

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1 Abbreviations

AC	alternating current
AHIMS	Aboriginal Heritage Information Management System
CEMP	Construction Environmental Management Plan
Cwlth	Commonwealth
DC	direct current
DoE	Department of Environment (Cwlth)
DPE	Department of Planning and Environment (NSW)
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
EP&A Act	Environmental Planning and Assessment Act 1979
FM Act	Fisheries Management Act 1994 (NSW)
GWh	gigawatt hours
Ha	hectares
Heritage Act	Heritage Act 1977 (NSW)
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ICNG	Interim Construction Noise Guideline
ISEPP	State Environmental Planning Policy (Infrastructure) 2007 (NSW)
km	kilometre
km^2	square kilometre
kV	kilovolt
LEP	Local Environmental Plan
LGA	Local Government Area
m	metres
MNES	Matters of National Environmental Significance (under the EPBC Act)
MW	megawatts
NW Act	Noxious Weeds Act 1993 (NSW)
NPW Act	National Parks and Wildlife Act 1974 (NSW)
NV Act	Native Vegetation Act 2003 (NSW)
OEH	Office of Environment and Heritage (NSW)
PEA	Preliminary Environmental Assessment
PCU	power conversion unit
RET	Renewable Energy Target
RMRP	Riverina Murray Regional Plan 2036
RMS	Roads and Maritime Service
SEARs	Secretary's environmental assessment requirements
SEPP	State Environmental Planning Policy

SSD	State significant development
TEC	Threatened Ecological Community (listed under the EPBC Act)
TSC Act	Threatened Species Conservation Act 1995

2 Introduction

2.1 Project overview

The proposed Mulwala Solar Farm is a utility-scale renewable energy project of up to 140 megawatt (MW) that would be located north of the township of Mulwala in New South Wales (NSW) and would generate renewable energy from the power of the sun. Mulwala has been chosen as the location of the solar farm because of the relatively high solar irradiance in the region and the capacity of the Essential Energy electricity network to transmit the power generated by the project.

General information about the project is provided in Table 1.1. The proposed project area is shown in relation to Mulwala in Figure 1.1.

Table 1. Table 1.1 Project details

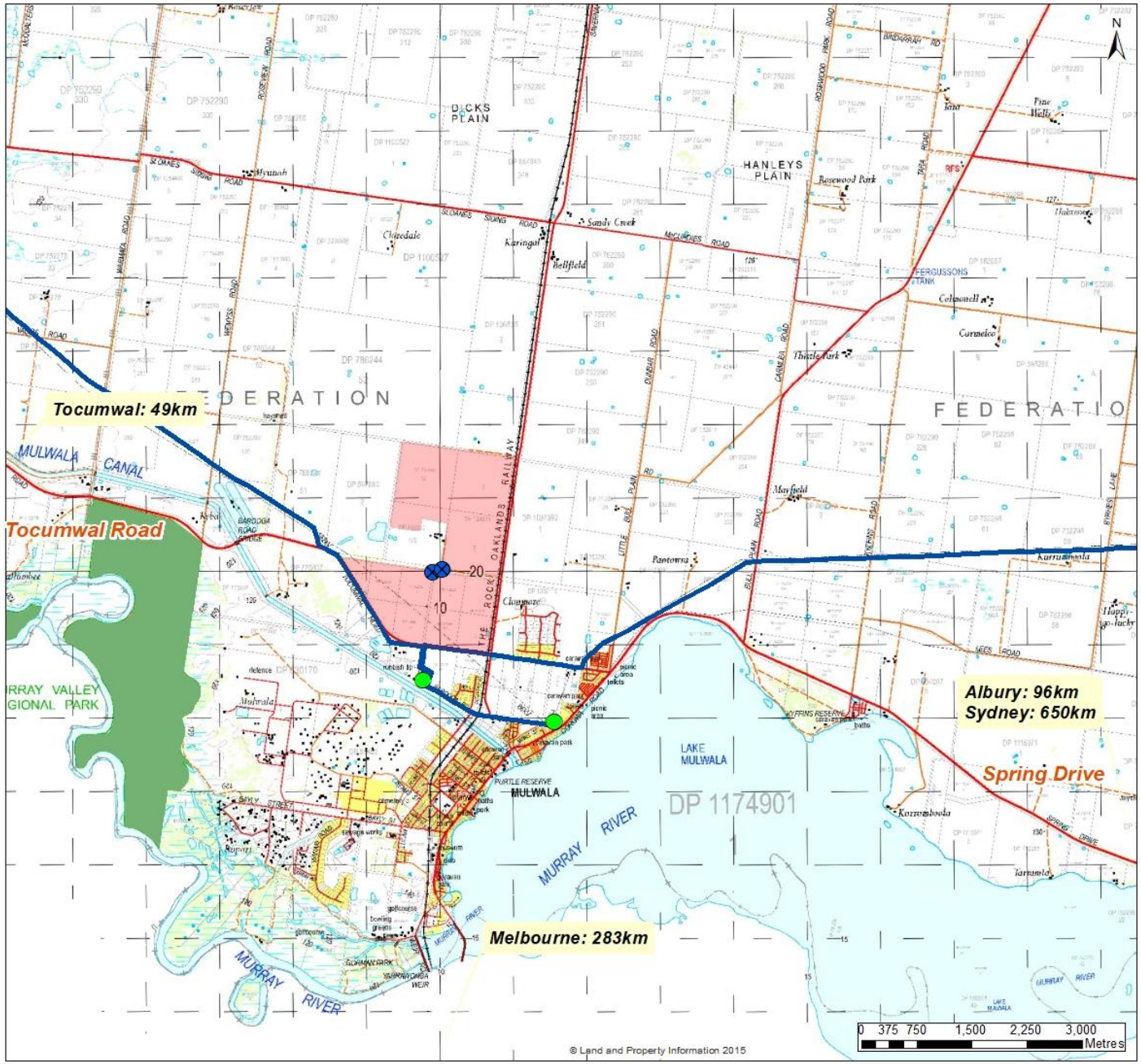
Name	Mulwala Solar Farm
Address	Savernake Rd, Mulwala, New South Wales 2647
Proponent	ESCO Pacific
Council	Federation Council
Titles	• Lot 1 in DP100773 • Lots 1-7 in DP134511 • Lot 103 in DP752290 • Lots 114-116 in DP752290 • Lot 125 in DP752290 • Lot 132 in DP752290
Total indicative area	Secured land tenure: **378 hectares** Area required for solar farm: **up to 270 hectares**
Land Use	Grazing, cropping
Capacity	Up to **140** MW
Connection	Mulwala 132 kV substation (Essential Energy) – 500m to the south

2.2 Site details

The Mulwala Solar Farm is located approximately 2km north of Mulwala township, within the Federation Local Government Area (LGA). Federation Council is located to the north of the Murray River, on the banks of Lake Mulwala, halfway between Albury and Echuca, and is situated in the Southern Riverina region of NSW. Farming has traditionally been the primary source of employment in the area, although this has evolved with the diversification of the economic base to include tourism and various other rural industries. (Federation Council 2017).

A map of the proposed project area is shown in Figure 1.2, and crosses the properties of one landholder who is engaged in agricultural and grazing activities. The land comprises flat-lying open paddocks. The southeast paddock is irrigated with water pumped from a bore. Due to a long history of agriculture and grazing, the project area is highly modified.

The project area is bounded to the East by Savernake Road and to the South and West by Tocumwal Road. The nearest major roads are the Murray Valley Highway located approximately 6 km to the south in Victoria and the Riverina Highway approximately 25 km to the north (see Figure 1.1).



PROJECT

Mulwala Solar Farm

MAP TITLE

Project location and Access
Figure 1

Title Info

LEGEND

- Project Area
- Indicative Access Points
- Substation
- Essential Energy Transmission lines

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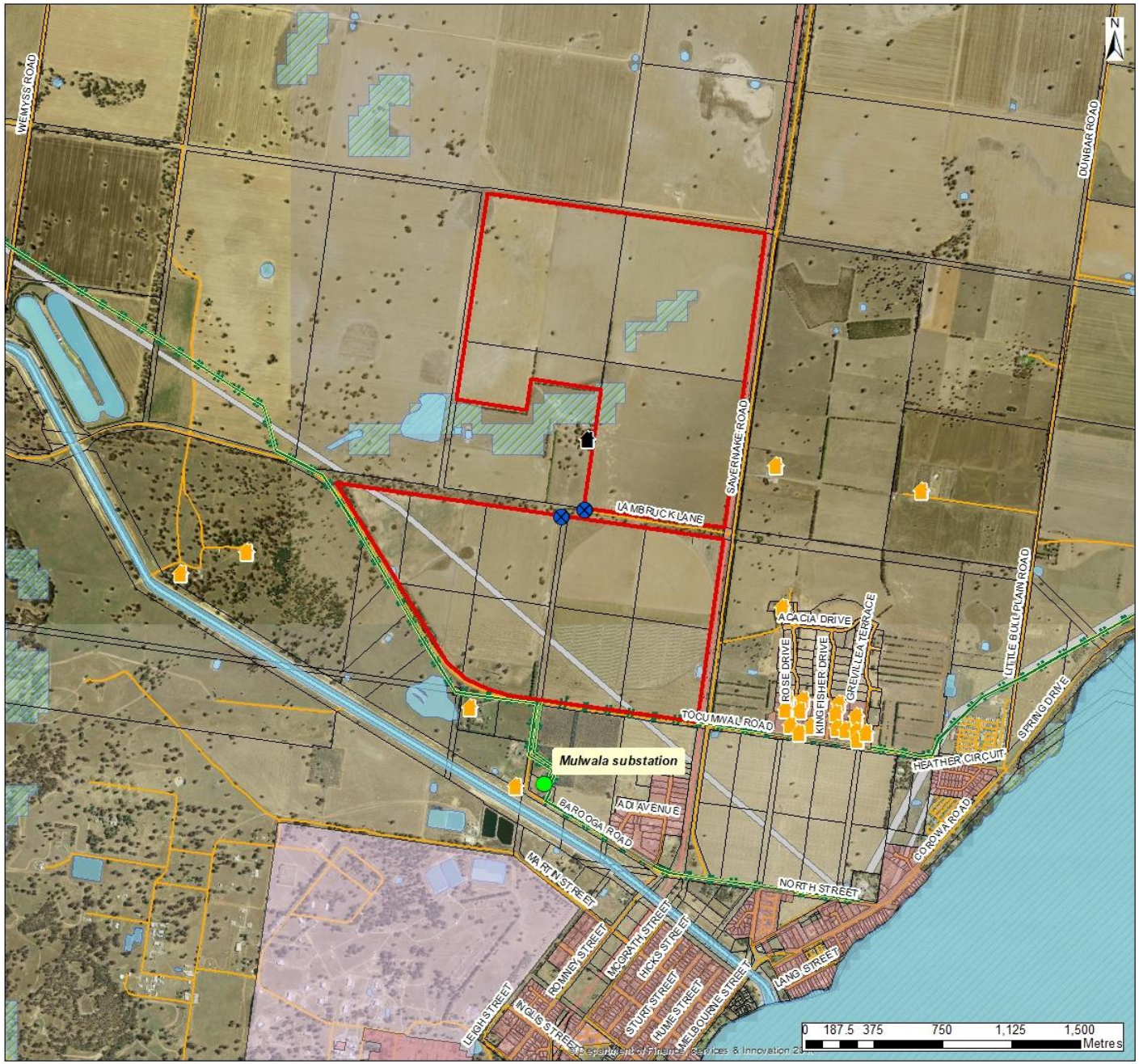

PROJECT

Mulwala Solar Farm

MAP TITLE

Site map - Figure 2

Title Info

LEGEND

- Project area maximum extent
- Indicative Access Points
- Land Parcels
- Dwelling owned by project area landowner
- Dwelling owned by surrounding landowners
- General Cultural Area
- Heritage Area
- TransGrid Substation
- Essential Energy Transmission lines
- Easement
- Murray Irrigation channel
- Water Area
- Wetlands (NSW dataset)
- Roads / Tracks
- Railway

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A 132 kV transmission powerline runs along the southwest boundary of the project area (along Tocumwal Road) and connects into the Mulwala 132 substation (Essential Energy) located south of the boundary of the area (see Figure 1.2).

2.3 Proponent

ESCO Pacific is an Australian developer of ground-mounted utility-scale solar farms. The company was founded in 2015 to develop renewable energy assets under the then recently revised Australian Renewable Energy Target (RET).

Headquartered in Melbourne, ESCO Pacific has a highly experienced team of energy, infrastructure, development and corporate finance professionals with specific experience in developing, and delivering to market, utility-scale renewable energy projects in Australia and internationally.

ESCO Pacific has a pipeline of projects in NSW, Queensland and Victoria in excess of 1.25GW that in December 2017 included:

- the 148 MW Ross River Solar Farm, near Townsville, with construction works commencing in late-2017
- six additional approved projects in Queensland, totalling 500 MW
- the 170 MW Finley Solar farm in NSW, determination of planning consent predicted early 2018.
- three projects in Victoria totalling 335 MW (approvals due early 2018).

2.4 Capital investment value

The proposed Mulwala Solar Farm is currently in the feasibility and design stage. The capital investment value of the project, while not yet finally determined, is estimated to be $130,000,000 for a 140 MW project. The capital cost of the project will exceed the $30 million threshold for it to be classified as a State Significant Development (SSD), as defined under the State Environmental Planning Policy (State and Regional Development) 2011 (see Section 5.2.2).

2.5 This report

This Preliminary Environmental Assessment – Scoping Report (PEA Scoping Report) has been prepared in accordance with the requirements of the Department of Planning and Environment (DPE) for projects identified as SSDs and therefore requires an Environmental Impact Statement (EIS) to be prepared under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The report will support a request to DPE from ESCO Pacific for the Secretary's Environmental Assessment Requirements (SEARs) for the EIS.

The report:

- describes the proposed development, including project justification and alternatives considered
- outlines permissibility and strategic planning requirements for the project under NSW and Commonwealth legislative frameworks
- describes the existing environmental and social context of the project
- provides a preliminary assessment of project impacts and management
- sets out previous, current and proposed stakeholder consultation
- proposes environmental assessment requirements for incorporation into the SEARs.

3 Development description

The proposed Mulwala Solar Farm project is a utility scale renewable energy project that would generate up to 140 MW of clean and renewable electricity. The solar farm would comprise up to 400,000 solar photovoltaic modules, known more commonly as 'PV Modules' or 'solar panels'. The solar panels use the same type of technology used in residential solar installations located commonly throughout Australia, however are larger in size.

The solar panels would be installed on ground-mounted frames that would slowly track the daily horizontal movement of the sun. They would generate direct current (DC) electricity that would be converted to alternating current (AC), which is the standard form of electricity used throughout Australia.

3.1 Design and configuration

The solar panels and horizontal tracking systems would be mounted in rows that would be electrically connected into arrays before being converted from DC to AC electricity via containerised power conversion units. The electricity would then be fed, via an underground, on-site, high voltage power reticulation system, into the local electricity network.

3.1.1 Grid and road access

The proposed project site offers proximity to the existing electricity network via the nearby Mulwala 132 kV Substation (see Figure 1.2).

Photo 1 – Mulwala substation (Essential Energy)

Photo 2 – Tocumwal Road and Essential Energy 132kV Transmission line

Access to the site during construction and operation is expected to be from Savernake Road.

3.1.2 Key elements

Key elements of the project would include:

- Installation of solar panels in regular arrays.
- Each solar panel would be fixed to a metal mounting structure. The mounting structure would be piled or screwed into the ground without the need for any concrete. The mounting structure would slowly and silently track (on a single axis) the horizontal movement of the sun. There is also an alternative option to install a fixed tilt mounting structure. Both mounting structure options would not exceed 4 m in height.
- Above ground DC cabling will connect each module in a string (up to 400,000 modules in total) to field combiner boxes mounted underneath the solar panels. The combiner boxes would sit approximately 1 m off the ground.
- Underground DC cabling would run from the combiner boxes to the central inverters.

- Central inverters, step up transformers and switchgear would be located in 40 foot containers or container skid pads. A power conversion unit (PCU) within each array block would convert the DC electricity generated by the solar panels into AC electricity for connection to the national electricity grid.
- Underground AC cabling would run from the PCUs to the solar substation.
- A main step up transformer and associated equipment in the solar substation would convert the on-site AC reticulated 33 kV electricity to 132 kV electricity for connection via high voltage cable to the nearby Mulwala substation where it would enter the local electricity network.
- Internal vehicle access tracks would be constructed from the entrance point to each PCU and to the solar substation to allow for maintenance of the site.
- Perimeter safety fencing would be installed around the site and a fixed, closed-circuit television (CCTV) system established within the fence perimeter.
- Supervisory control and data acquisition (SCADA) control systems would monitor the performance of the equipment.
- A site office and maintenance building would be installed.
- Temporary infrastructure would be put in place during site construction including the site compound and storage areas.

3.1.3 Potential for battery storage

The proposal 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 which can be subsequently used during higher demand periods or when solar energy is unavailable (e.g. at night).

The batteries can also compensate for frequency variations in the electricity network which are caused by intermittent renewable generators as well as fluctuations in consumption. Batteries can store electricity from the network or feed electricity into the grid in a matter of seconds and compensate for the fluctuations caused by renewables or resulting from power plant outage or irregularities in consumption.

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 network upgrades to deal with peak energy demand
- improved sustainable outcomes by combining clean energy generation with clean energy storage.

3.2 Construction

The construction process for the project would involve the following activities:

- Site access and establishment.
- Civil works: limited grading, compaction, stormwater drainage and sediment controls and dust suppression.
- Installation of the mounting structures: rows of driven piles would be pneumatically driven into the ground using specialist equipment, and steel mounting structures would then be attached to the piles. If required, ground screws may replace the need for driven piles.
- Installation of the solar panels onto the mounting structures.
- Installation and connection of the solar panels to the combiner boxes.
- Installation of the power conversion stations.
- Connection of the combiner boxes to the power conversion stations and underground cabling.
- Connection of the power conversion stations to form the onsite power reticulation system to evacuate power from the site.
- Grid connection works taking power from the onsite reticulation system to the local electricity grid.

- Commissioning and testing.

The proposed Mulwala Solar Farm would be expected to create up to 130 jobs during construction, which is anticipated to take up to 9 months.

Construction activities would be undertaken during standard hours for construction works. Any construction or commissioning activities outside of these standard working hours would require approval from relevant authorities. Any affected local residences would be informed of the timing and duration of the proposed activities, prior to the commencement of any works.

3.3 Operation

The project is anticipated to operate for up to 40 years. A minimal number of personnel, up to four full-time and eight part-time positions, would be required for the operation and maintenance of the project.

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

It is expected the solar panels would need cleaning, on average, four times during any calendar year. Any water required for module cleaning, would be either sourced locally (the landowner has readily available water on site that he no longer has a use for, and informed that he can supply water or, if required brought, in from offsite. There would be no storage of hazardous or dangerous goods or materials on site during the operation of the project.

3.4 Decommissioning

At the end of it operational life the solar farm would be decommissioned and the site rehabilitated, with the aim of returning it to its pre-existing condition. All above-ground and underground infrastructure will be removed, allowing the pre-existing agricultural land use activities to resume, or new land uses in the area to be established.

4 Justification and alternatives considered

4.1 Project justification

Since 2001, the Commonwealth Government has mandated the use of energy from renewable resources in electricity generation. In 2009, the RET scheme mandated that 20% of Australia's electricity supply was to come from renewable sources by 2020 (NSW Trade and Investment 2013).

In 2011, the RET was split into two parts comprising a large-scale RET scheme and a small-scale renewable energy scheme. The large scale RET scheme 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. The target has since been adjusted and the current RET is 33,000 GWh by 2020 (Clean Energy Regulator 2017).

The RET 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 revised emissions target under the 2015 Paris Agreement (Commonwealth of Australia 2015).

The Mulwala Solar Farm would contribute Australia's greenhouse gas 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.

At a State level, the Mulwala Solar Farm proposal is consistent with current goals and targets for renewable energy generation in NSW. These include (NSW Trade and Investment 2013):

- supporting the achievement of the RET
- attracting renewable energy investment and projects
- building community support for renewable energy
- attracting and growing expertise in renewable energy.
- employment opportunities during construction, including engagement of local contractors and materials and service providers
- long-term local employment opportunities over the life of the project
- contributions to local infrastructure improvements
- education and training of contractors and local residents
- rent received from workers accommodated in the area.

4.2 Alternatives

4.2.1 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 the existing energy network
- potential for land acquisition
- land suitability (topography, existing land use, flood risk, zoning etc.)
- need to minimise environmental and social impacts (e.g. avoiding sensitive environments or areas of cultural heritage value).

The proposed location for the Mulwala Solar Farm emerged as a highly prospective site for the development of a solar project and a decision was made to initiate pre-development investigations and activities.

4.2.2 Project design and configuration

The design and configuration of the project would take into account the findings of EIS studies and investigations. This would include consideration of environmental and social factors such as the need to:

- identify and operate within any environmental constraints (such as avoiding areas within the project area that may be of conservation significance)
- minimise disruption to local landholders
- minimise amenity issues
- take into account the expectations and any concerns of the local community and Federation Council.

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

5 Permissibility and strategic planning

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 (DoE), 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 action likely to have a significant impact on the following must be referred to the DoE to determine whether the action is a 'controlled action' and include:
  - 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 DoE's *Significant Impact Guidelines 1.1* (DoE 2003). Should the Environment Minister decide the action will be taken in a manner that will ensure it will be likely to not have an adverse impact on the MNES, approval will be granted.

The EIS will consider the requirement for an 'EPBC Referral' to the Minister and this will be further assessed during the EIS process.

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, and provides a mechanism for determining where native title exists, 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. In areas where native title existence has not been determined, a compensation application can be made by a registered native title body corporate or group of people asserting native title rights.

The potential existence of native title within the proposed project area will be considered during the EIS process.

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.

This Scoping Report considers the potential presence of Aboriginal heritage within the project area and this will be further assessed during the EIS process.

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 land-use 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 by promoting and encouraging social, economic and environmental wellbeing through use of land for power generation using renewable sources.

Specifically, the project supports the following objects of the EP&A Act (and is also consistent with the remaining objects of the 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.

Development of the Mulwala Solar farm would be assessed under Part 4 'Development Assessment' of the EP&A Act (see Section 5.2.2, below).

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

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

Under Clause 20 of Schedule 1 of the policy, the following is considered a State significant development (SSD):

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 Mulwala Solar farm project would be 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 a SSD, the project would be assessed by DPE and require approval from the Minister for Planning and Environment. SSDs require the preparation of an Environmental Impact Statement (EIS) detailing potential environmental impacts as a result of the project and appropriate management measures. The EIS would be prepared in accordance with the requirements of the DPE SEARs.

The Mulwala Solar Farm is considered a SSD and will therefore require the preparation of an EIS and approval from the Minister for Planning and Environment.

5.2.3 State Environmental Planning Policy (Infrastructure) 2007

The State Environmental Planning Policy (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.

Division 4, Clause 34 of ISEPP specifically refers to solar energy systems, stating that (except as provided by subclause (8)), *development for the purpose of a solar energy system may be carried out by any person with consent on any land.*

However, large-scale solar developments are still required to be broadly compatible with local land use objectives such as those outlined in an LEP (see Section 5.2.5).

In addition, the Clause states that *development for the purpose of a photovoltaic electricity generating system may be carried out by a person with consent on land in a prescribed residential zone only if the system has the capacity to generate no more than 100kW.*

ISEPP allows for the development of large-scale solar energy systems with consent even on land prescribed for rural use, although compatibility with local land use objectives needs to be considered.

ISEPP does not allow the development of large-scale solar energy systems on residential zoned land.

5.2.4 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. The applicant must then ascertain whether the potential habitat is 'core koala habitat' (i.e. has a population of breeding koalas). If the site has core habitat then a koala plan of management must be prepared by the applicant. Should Koalas, or potential Koala habitat be identified within the study area, a Plan of Management may be required in consultation with the Director-General of the Office of Environment and Heritage (OEH).

The EIS will consider the presence of Koala habitat within the project area, and will conclude whether habitat is present and whether a Plan of Management is required (see Section 6.2).

5.2.5 Corowa Local Environmental Plan 2012

The project site is located within the Federation Council boundaries. Council is still operating with the former Corowa Shire Council and would therefore be subject to the relevant provisions of the 2012 Corowa Local Environmental Plan (Corowa LEP) (Federation 2017).

Federation Council has endorsed a Planning Proposal to amend Corowa Local Environmental Plan 2012.

Aims of Corowa LEP

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

The aims of the plan are:

- to promote sustainable urban development by consolidating infrastructure and urban growth around the existing centres of Corowa, Howlong and Mulwala
- to facilitate the equitable provision of social services and facilities for the community
- to maintain a strong economy by:
  - retaining sufficient rural land in a form suitable for primary production, and
  - encouraging tourist-related development in Corowa, Howlong and Mulwala townships and other suitable locations, and
  - promoting opportunities for business development,
  - to identify, protect, conserve and enhance Corowa's natural assets, particularly the bed and banks of the Murray River, its streams and tributaries
  - to identify and protect Corowa's built and cultural heritage assets for future generations.

Land zoning

The proposed Mulwala Solar Farm and transmission line route are located on land zoned R2 – Low density Residential (southeast parcels) and RU1 – Primary Production (all other parcels).

The objectives of the R2 zone include the following:

- To provide for the housing needs of the community within a low density residential environment
- To enable other land uses that provide facilities or services to meet the day to day needs of residents.

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 land uses within this zone and land uses within adjoining zones

The primary objective of the R2 zone is to encourage housing and related facilities, and the primary objective of the RU1 zone is to encourage primary production. Electricity generating works are prohibited in R2 and RU1 zones, however, under the ISEPP, development of electricity generation works is potentially allowed on any land with consent (except as provided by *subclause (8): development for the purpose of a photovoltaic electricity generating system may be carried out by a person with consent on land in a prescribed residential zone only if the system has the capacity to generate no more than 100kW*), particularly if there is compatibility with local land use objectives. In addition, the solar farm will have minimal impact on the ground surface and once the farm is decommissioned the site would be returned to its existing state.

The project site is bounded on the east side by lots zoned SP2 (Infrastructure – train line) which are not included as part of the project area. Any infrastructure other than roads and railways are prohibited within the zone. During construction and operation, vehicles will be crossing the railway at the existing level crossing; no infrastructure is to be constructed within zone SP2.

Urban Release areas

The Corowa LEP contains a clause relative to developments within Urban Release areas. The southeast parcels are included in this type of areas.

The objective of Urban Release areas is to ensure that development on land in an urban release area occurs in a logical and cost-effective manner, in accordance with a Staging Plan and only after a Development Control Plan that includes specific controls has been prepared for the land.

The Development Control Plan must include:

- A Staging Plan for the timely and efficient release of urban land, making provision for necessary infrastructure and sequencing,

- An overall transport movement hierarchy showing the major circulation routes and connections to achieve a simple and safe movement system for private vehicles, public transport, pedestrians and cyclists,
- An overall landscaping strategy for the protection and enhancement of riparian areas and remnant vegetation, including visually prominent locations, and detailed landscaping requirements for both the public and private domain,
- A network of active and passive recreation areas,
- Stormwater and water quality management controls,
- Amelioration of natural and environmental hazards, including bush fire, flooding and site contamination and, in relation to natural hazards, the safe occupation of, and the evacuation from, any land so affected,
- Detailed urban design controls for significant development sites,
- Measures to encourage higher density living around transport, open space and service nodes,
- Measures to accommodate and control appropriate neighbourhood commercial and retail uses,
- Suitably located public facilities and services, including provision for appropriate traffic management facilities and parking.

Additional local provisions

The Corowa LEP contains a number of additional local provisions relating to matters such as earthworks, flood planning, stormwater management, terrestrial biodiversity, wetlands, and airspace operations. The terrestrial biodiversity and wetlands provisions are applicable to the project area.

Subdivision

The project area is located within zones Y (southeast paddock) and AE (all other parcels) 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 1 hectare in zone Y and 250 hectares in zone AE. No exemption exists at Council level, so subdivision, if required in zone AE, may not comply with the LEP. ESCO Pacific will be consulting with Federation Council regarding the potential need for subdivision and the implications for project approvals. This will be considered further during the EIS process.

The Mulwala Solar Project will be subject to the relevant provisions of the Corowa LEP. This Scoping Report considers the implications of the terrestrial biodiversity provisions (see Section 6.2).

5.2.6 Riverina Murray Regional Plan 2036

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

The plan 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 Mulwala Solar Farm is consistent with these objectives, in particular the development of a growing and diverse economy.

The compatibility of the Mulwala Solar Farm with the objectives of the RMRP will be considered during the EIS process.

5.2.7 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 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.

As part of the Mulwala Solar Farm proposal, a traffic assessment report outlining any requirements for use of roads in the area will be included. If required, approval from the RMS or local council will be sought under section 138 of the Roads Act.

5.2.8 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 principles of ecologically sustainable development (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, minimize and offset the impacts of proposed development and land use change on biodiversity
- a scientific method for assessing the likely impacts on biodiversity values of proposed development and land use change, for calculating measures to offset those impacts and for assessing improvements in biodiversity values
- a market-based conservation mechanisms through which the biodiversity impacts of development and land use change can be offset at landscape and site scales.

The potential for impacts on biodiversity as a result of the Mulwala Solar Farm has been considered in this Scoping Report (see Section 6.2) and will be addressed further during the EIS process.

5.2.9 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 ecologically sustainable development (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 Scoping Report (see Section 6.2) and will be addressed further during the EIS process.

5.2.10 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 which 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 animals pests) which threaten ecosystems, habitats or species.

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

The potential for the Mulwala Solar Farms to result in noxious weed impacts will be considered during the EIS process.

5.2.11 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) is the key legislation governing the management of the State's parks, conservation areas, reserves, historic sites, and places and objects of aboriginal cultural heritage significance. It also provides for the protection and care of native fauna and flora.

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.

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 State significant development

The potential for the Mulwala Solar Farm to have an impact upon Aboriginal cultural heritage has been considered in this Scoping Report (see Section 6.3) and will be addressed further during the EIS process.

5.2.12 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.

The potential for the Mulwala Solar Farm to have an impact upon historic cultural heritage has been considered in this Scoping Report (see Section 6.5) and will be addressed further during the EIS process.

5.2.13 Protection of the Environment Act 1997

The *Protection of the Environment Operations Act* (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.

The EIS process for the Mulwala Solar Farm will consider emissions to land, air and water, including greenhouse gas emissions.

5.2.14 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, licensed 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 potential impacts of the Mulwala Solar Farm on Crown Land (if any) will be addressed during the EIS process.

6 Preliminary impact identification and assessment

6.1 Project issues and risks

The proposed development of the Mulwala Solar Farm may result in a number of potential environmental and social impacts, both positive and negative. The nature and extent of these potential impacts will need to be assessed during the EIS process so that effective avoidance, management and mitigation measures can be incorporated into project design, construction, operation and eventual decommissioning.

The project as a whole is expected to be a relatively low risk development compared with many SSDs due to the inherently low impact nature of solar farm construction and operation, and the location of the project in an area that has a long history of disturbance from agricultural and grazing activities and is distant from areas of high environmental sensitivity.

An initial assessment of environmental and social risks by ESCO Pacific has identified three higher priority areas of potential impact that will require particular focus during the EIS process:

- potential impacts on ecological values such as local habitat for threatened and endangered species
- potential impacts on Aboriginal cultural heritage, which, although considered a low likelihood, require specific assessment and consultation
- potential impacts on hydrology and water resource management, particularly given the presence of irrigation and drainage channels within the project area.

These higher priority impacts are assessed in Sections 6.2 to 6.4.

The initial assessment of environmental and social risks also identified a number of lower priority potential environmental or social impacts:

- Land use impacts
- Traffic and transport
- Socio-economic impacts
- Noise impacts
- Air quality and dust
- Visual amenity
- Airfield impacts
- Historic heritage
- Electric and magnetic fields
- Bushfire hazard
- Contamination
- Waste management.

These lower priority impacts are considered lower risk than the three higher priority impacts and/or to be readily manageable by implementing standard environmental management and mitigation procedures. The lower priority impacts are assessed in Section 6.5.

6.2 Biodiversity

6.2.1 Existing conditions

Preliminary site assessment

A site assessment was undertaken of the study area on 27 November 2017 by Dr Stuart Cooney and Simon Scott, Principal Ecologists at Ecolink. The ecologists drove throughout the property with the landowners, who pointed out historic land use and potential ecological features of interest. The landowner has owned the property for 50 years, which is now run by his son.

During the site inspection dominant species were recorded and general land use at the time of the assessment was recorded and mapped onto an iPad mini with GIS Pro software (accurate to +/- 5m). This data was used to create Figure 1. Areas of potential ecological value were assessed more closely than areas that were unlikely to support such values.

Six paddocks were identified during the site assessment. These paddocks were separated from each other by wire fences, some of which were in poor repair, or had gates that were open allowing stock to move freely between some paddocks. The entire site is generally on a five year rotation of cropping and grazing by sheep (Pers. comm. 27 November 2017).

Paddock 1 (Figure 1) has been sown with Italian Rye-grass *Lolium multiflorum* and Strawberry Clover *Trifolium fragiferum* for hay. It has a pivot irrigation sprinkler installed (Plate 3). This paddock is currently separated from the rest of the paddocks by an electric fence, however, once harvested the entire paddock is grazed by sheep. Scattered paddock trees within the paddock include White Cypress Pine *Callitris glaucophylla* and Grey Box *Eucalyptus microcarpa*.

Photo 3 – Paddock 1

Paddock 2 is grazed by sheep. Dominant species in this paddock include a range of exotic pasture grasses including Rye Grass *Lolium sp.*, *Oats Avena spp.*, and Great Brome *Bromus diandrus*, Prairie Grass *Bromus catharticus*, as well as environmental weeds including Paterson's Curse *Echium plantagineum*, Common Sow-thistle *Sonchus oleraceus* and Spear Thistle *Cirsium vulgare* which have been sown into this paddock (Plate 4). Scattered paddock trees within the paddock include White Cypress Pine and Grey Box. A small patch of native vegetation is located on the north-western boundary of the paddock. This is an area of native Rushes *Juncus spp.*in a wet depression (Plate 5).

Photo 4 – Paddock 2 - Photo 5 –Remnant patch in Paddock 2

Paddock 2a is south of Paddock 2. This paddock supports a planted wind row of non-native Radiata Pines *Pinus radiata* that was planted 50 years ago and is now senescing (Plate 6). To the west of this wind row is a plantation of approximately 400 Grey Box trees, which were planted as an offset for the loss of eight large trees when installing the pivot irrigation system. These Grey Box trees are generally very densely planted in a single cohort stand (Plate 7).

Photo 6 – Wind row in Paddock 2a - Photo 7 –Offset trees

Paddock 3 is almost identical to Paddock 2, with similar land use and a fence that is in disrepair and therefore is ineffective in stopping sheep moving between the paddocks (Plate 8). Scattered paddock trees within the paddock include White Cypress Pine and Grey Box.

Photo 8 – Paddock 3

Paddock 4 is grazed by sheep in higher densities that Paddocks 2 and 3 (Plate 9). It supports a remnant patch of native vegetation, is located in a low-lying area, and has been fenced to exclude stock and allowed to regenerate (Plate 10). The remainder of the paddock is dominated by a range of exotic pasture species and weedy species (see Paddock 2 above). Scattered paddock trees within the paddock include White Cypress Pine and Grey Box.

Photo 9 – Paddock 4 - Photo 10 –Remnant patch in Paddock 4

Paddock 5 is similar to the other paddocks that grazed by sheep, with a range of exotic pasture species, some weedy species and a low abundance of native species (Plate 11) (see Paddock 2 above). Scattered paddock trees within the paddock include White Cypress Pine and Grey Box.

Photo 11 – Paddock 5

Paddock 6 is also dominated by exotic species (Plate 12) (see Paddock 2 above). In the northwestern corner of this paddock is another wet depression that supports native vegetation (Plate 13). Scattered paddock trees within the paddock include White Cypress Pine and Grey Box.

Photo 12 – Paddock 6 – Photo 13 –Remnant patch in Paddock 6

Results of the current assessment.

Mulwala Solar Farm, NSW

Legend

Study Area

Land use

Grazed

Grey box plantation

Pivot irrigation

Remnant Patches of Native Vegetation

Creeks and drains

Dams and wetlands

ecolink consulting

P/N 1474 November 2017.

Figure 3. Biodiversity assessment map

Threatened species and ecological communities

Threatened flora species are unlikely to persist within most of the study area, where sheep grazing, disturbance through ploughing and their small size are ongoing threats to their survival. In the patches of native vegetation it is unlikely, but possible, that some threatened wetland species may persist.

Threatened fauna species are similarly unlikely to persist within the study area due to the lack of high quality habitat, although mobile species such as birds and bats may use the study area infrequently or temporarily when foraging or roosting, or as stepping stones when moving between higher quality habitats within the landscape. On this basis it is unlikely to provide important or significant habitat (e.g. breeding habitats, bat maternity caves) for any threatened fauna species and none are likely to occur.

6.2.2 Preliminary impact assessment and management

To remove or minimise impacts to the ecological values within the project area, remnant native vegetation and the scattered paddock trees will be avoided as far as practicable. A tree survey may be undertaken to accurately locate all scattered trees and inform the design of the solar farm if this cannot be undertaken through aerial photography.

The construction and operation of the solar farm is expected to have a relatively low impact, long term, to the remaining ecological values within the project area. Once the solar farm is built, there will be no greater disturbance to the landscape than is currently experienced by the extant flora and fauna as a result of the current farming practices. Therefore, if the highest quality ecological values can be protected, there is likely to be no significant impact to these values.

In addition to the protection of the ecological values, buffers will be created to ensure indirect impacts do not occur during construction or operation of the Solar Farms. Buffer zones for trees will be based on the size of the tree, specifically the Tree Protection Zone (TPZ) (Standards Australia 2009). TPZs will be avoided where possible so the integrity of the tree can be retained and there are unlikely to be any impacts to these trees. Where trees cannot be avoided, trees that possess hollows will be retained preferentially over those that do not.

Retained patches of native vegetation are unlikely to require a buffer zone, and will be fenced during construction works, and machinery and personnel will be excluded from these areas.

A Construction Environmental Management Plan (CEMP) will be prepared, as well as the development of management protocols, to ensure indirect or inadvertent impacts to areas of ecological value do not occur during the construction and operation of the Solar Farms. The CEMP will also provide induction to construction workers in relation to the protection of these values, including weed management, and provide contingency plans should an EPBC Act threatened species be encountered during works.

6.2.3 Need for further assessment

If the ecological values described above cannot be avoided, a range of threatened species surveys will be undertaken. Some of these surveys are required because there is a moderate, or greater, likelihood that a threatened species may be found within the project area (as discussed above), while others are required because it will be a condition of approval imposed by OEH due to impacts to native vegetation based on their Plant Community Types (PCTs). These surveys will feed into the preparation of a Biodiversity Development Assessment Report (BDAR). For each species identified as potentially requiring a survey, a presentation of the results of the survey, or a robust justification for not undertaking the survey, will be provided in the BDAR. If some PCTs can be avoided entirely, the number of species requiring survey is likely to decrease.

Prior to undertaking any threatened species surveys, OEH will be consulted on the proposed scope to ensure that surveys are not undertaken unnecessarily and that the proposed methods will satisfy their requirements. Survey methods will follow the Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Department of Environment and Conservation (NSW) 2004) with survey effort reflecting the eventual impact of the final proposed solar farm footprint (and therefore not provided below).

In summary, ESCO Pacific proposes managing the potential presence of threatened species habitat during the EIS process by placing a strong primary emphasis on impact avoidance and a strong secondary emphasis on impact minimisation. The company considers that even with the adoption of a conservative approach to avoidance it will have sufficient space within the Mulwala project area to locate the solar farm.

6.3 Aboriginal cultural heritage

6.3.1 Existing conditions

The OEH Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (2010b) (Due Diligence Code) specifies that if the initial assessment process identifies that aboriginal objects or places will or are likely to be harmed, then further investigation and impact assessment is required (Step 5). For SSDs the Due Diligence Code is not required to be followed, as this is superseded by the requirements for the project EIS to address the SEARs in relation to Aboriginal and historic cultural heritage

Sensitive landforms

Previous research indicates that archaeological evidence is likely to be locally found associated with certain landforms. The Due Diligence Code lists five such landscape features:

- within 200 m of water
- within a sand dune system,
- on a ridge top, ridge line or headland,
- within 200 m below or above a cliff face,
- within 20 m of or in a cave, rock shelter, or a cave mouth.

Within the activity area there are several water features, including ephemeral and/or ancestral creek lines and what appears to be several drained creeks / swamps. Closer inspection is required to determine the nature and extent of these features and any intersection with the project area.

The proximity to available water in prehistory renders parts of the activity area more sensitive to the presence of Aboriginal sites than the balance of the surrounding region.

Traditional Owners

Mulwala is located within the traditional lands of the Wiradjuri people. The contemporary Wiradjuri Region covers much of eastern NSW extending from the Murray River in the south to Hay in the west and Nyngan in the north.

The activity area is within the area of interest of the Cummeragunja Local Aboriginal Land Council (LALC). Other LALCs from the surrounding region may also have interests in the activity area.

Archaeological sites and objects

Mulwala is in the Riverina NSW Bioregion. This bioregion is dominated by the alluvial fans of several major rivers that contribute to the Murray-Darling Basin.

The Murray-Darling Basin contains some of the oldest archaeological sites recorded in Australia, most famously at Lake Mungo in southwestern NSW. The Riverina area is known to be home to scarred trees, earth mounds, shell middens, human burials and stone artefact scatters. Sites are often located near waterways and other water bodies; however, they can potentially occur anywhere in the landscape. Given the length of time Aboriginal people have lived in the Riverina they would have traversed the activity area regularly. Our ability to identify the remains of this behaviour depends on the visibility of the archaeological record, ground surface conditions, the extent and nature of disturbance that has occurred to the landscape through historical land use (e.g. land clearing) and the nature of past Aboriginal land use.

The following Aboriginal objects may potentially occur within the activity area:

- Aboriginal culturally modified trees (scarred trees)

- earth mounds
- archaeological deposits (sub-surface archaeological sites)
- stone artefacts (either isolated or in clusters).

The presence / absence of these items or places can only be determined through rigorous ground survey of the project area.

Native Title claims

There are no native title claims affecting the project area.

Database search

Relevant databases / registers were searched for heritage sites / values in proximity to the activity area at Mulwala. Of most relevance, an 'extensive' search of the Aboriginal Heritage Information Management System (AHIMS) was undertaken. From that search, it was determined that no Aboriginal sites were known to exist within the activity area. However, searches of heritage databases cannot be assumed to be definitive. Search results indicating no sites are present are usually a reflection of a lack of systemic survey in a given region, rather than a lack of sites existing at any given location.

6.3.2 Preliminary impact assessment and management

The project area has a long history of European land use for agricultural purposes that will have resulted in disturbance to the ground surface. It does not contain any previously recorded Aboriginal objects or places, however, may contain archaeologically sensitive landforms (near ancestral / drained waterways).

If any potential impacts to Aboriginal heritage sites or items are identified during field assessments as part of the EIS, they will be managed in accordance with the NPW Act and consultation with the relevant groups, including the OEH, relevant Registered Aboriginal Parties (RAPs), and council. This could result in a change in the project design to avoid Aboriginal heritage sites.

6.3.3 Need for further assessment

Given that this project is a SSD, identification of cultural values and archaeological assessments will be undertaken to ensure:

- meaningful opportunities for engagement and consultation with traditional owners and/or RAPs for the project are provided
- full compliance with the SEARs
- full compliance with the OEH (2010a) Aboriginal cultural heritage consultation requirements for proponents
- full compliance with the OEH (2011) Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW.

The identification of cultural values and the determination of cultural significance would be consistent with the guidance provided in the *Burra Charter and Indigenous Cultural Heritage Management Practice Note* (Australia ICOMOS 2013). The archaeological assessment would determine the scientific significance of the archaeological places within the project area.

It is expected that an Aboriginal Cultural Heritage Assessment Report (ACHAR) would be prepared as part of the EIS. To comply with the relevant OEH requirements, the objectives of the ACHAR would be to:

- present the project's consultation methodologies and processes as agreed with the RAPs
- ensure that Aboriginal people have the opportunity to participate in and improve the outcomes of the assessment by:

– providing relevant information about the cultural significance and values of the Aboriginal objects and/or places within the activity area

- influencing the design of the method to assess cultural and scientific significance of Aboriginal objects and/or places within the activity area
- actively contributing to the development of cultural heritage management options and recommendations for any objects and/or places within the activity area and the wider project area
- commenting on draft assessment reports before they are submitted by the proponent to OEH.

6.4 Hydrology and water resource management

6.4.1 Existing conditions

The project area is located within the Murray-Darling basin, approximately 5 km north of the Murray River and 2 km from the banks of Lake Mulwala, and falls within the Berriquin Irrigation District which is managed by Murray Irrigation Limited. The project area comprises relatively flat and low-lying land. The Mulwala irrigation channel runs from the southeast to the northwest about 600 m south of the project area.

The project area is not located within a flood planning area as designated under the Corowa LEP. However, due to the flat, low-lying nature of the site and the presence wetland (according to the Corowa LEP) in the northern paddocks, it is understood that localised flooding of paddocks can be an issue for local landholders.

6.4.2 Preliminary impact assessment and management

Construction and operation of the project is expected to result in only minor ground disturbance, primarily associated with the construction of access roads within the project area. The risk of impacts to water quality or hydrology in channels, dams and waterways from erosion runoff or disturbance of acid sulphate soils (if present) is considered low and manageable. Standard erosion and sediment controls measures such as outlined in Landcom (2004) would be implemented.

The solar farm and associated infrastructure are unlikely to have significant impact on the surface flow of water and will be sited to avoid impact on drainage channels and farm dams. The project is not expected to present a flood hazard.

It will be important that the project does not disrupt current water management systems within the project area. Landholders (and ESCO Pacific) will need to be able to continue to manage current issues such as localised flooding.

The risk of groundwater impacts during construction is expected to be low as excavation will not be required to erect the solar panels and trenches for underground cables will be shallow.

Water use during project construction and operation will be minimal and water will be either sourced from existing bores on site or brought to site as required.

6.4.3 Need for further assessment

Impacts to waterways and hydrology during construction and operation would be assessed as part of the EIS process, and will include an assessment of the potential impacts on:

- surface water and groundwater resources, including (where identified) watercourses, wetlands, riparian land, groundwater dependent ecosystems and acid sulphate soils
- related infrastructure and water management systems including irrigation and drainage channels, dams, and flood management measures
- adjacent licensed water users and basic landholder rights
- measures proposed to monitor, reduce and mitigate these impacts (in consultation with Murray Irrigation where required).
- Soil and sediment management measures will be undertaken in accordance with Managing Urban Stormwater: Soils & Construction (Landcom 2004).

6.5 Other impacts

Other environmental or social impacts that are considered to be lower risk than those in Sections 6.2 to 6.4 and/or to be readily manageable by implementing standard environmental management and mitigation procedures, are assessed in Table 5.1.

Table 2. Table 5.1 Assessment of lower priority project impacts and need for further assessment

Existing conditions	Preliminary impact assessment and management	Need for further assessment
Land use impacts		
The project area is currently used for agricultural purposes.	There will be temporary loss of agricultural land and production as a result of the project. However the project is unlikely to significantly impact the region's overall agricultural productivity. Construction and operation of the project is expected to result in only minor ground disturbance, primarily associated with access road construction within the site. However, where soils are disturbed, soil erosion and sedimentation issues can result. All above ground and underground infrastructure would be removed during project decommissioning. Rehabilitation is expected to return the land to its former agricultural capability.	An assessment of the impact of the project on land use (during construction, operation and after decommissioning) would be undertaken as part of the EIS process. This would include an assessment of the impact of the development on agricultural land and flood prone land, and a soil survey to consider the potential for erosion to occur, and paying particular attention to the compatibility of the development with the existing land uses on the site and adjacent land during operation and after decommissioning, with reference to the zoning provisions applying to the land.
Traffic and transport		
The site is well-serviced by local roads and is located close toTocumwal Road and not far from the Riverina Highway (NSW) and the Murray Valley Highway (Victoria). Tocumwal Road is classified as a Regional road by RMS and runs east-west from Mulwala to Tocumwal and offers ready access to Melbourne via Melbourne Street across the border. The Riverina Highway is classified as State Road by RMS and runs east-	Access to the site during construction and operation is expected to be from Tocumwal Road, via Savernake Road (see Figure 1). Transport impacts as a result of the proposed project would be largely limited to the construction phase, and may result from factors including: haulage of materials, and movements of workers to and from the site; and movement of trucks, vehicles and construction machinery within the site. It is expected there would be an increase in traffic on the local road network during construction however this would occur during the standard hours of construction and managed in consultation with Roads and Maritime Services, local councils and landholders, where relevant, to minimise the risk of adverse impacts.	A transport assessment would be undertaken as part of the EIS process including an assessment of the site access route, site access point and likely transport impacts of the development on the capacity and condition of roads (including on any Crown land), and a description of the measures that would be implemented to mitigate any impacts during construction.

Existing conditions	Preliminary impact assessment and management	Need for further assessment
West from Albury to Deniliquin	Road upgrades are not expected to be required. Standard traffic management measures would be implemented, such as ensuring vehicle road-worthiness, enforcing speed limits, erecting signage, proper design of site access points, and ensuring access roads within the site are properly engineered.	
Socio-economic impacts		
The project area is in the Federation LGA which had a population of approximately 12,411 in 2016 (ABS 2016). The LGA covers an area of 568,504.9 ha which is predominantly agricultural land. The area's primary income is from manufacturing and agricultural industries such as piggery feedlot and abattoir, agriculture machinery sales and services, food processors. The main town centres in the LGA are Mulwala, Corowa and Urana.	Construction of the project would provide immediate social and economic benefits to the local community. The project would increase local employment opportunities and drive growth in the area, whilst helping NSW to sustainably meet its energy needs. Pressure on local services including accommodation, health services and schools has the potential to increase due to the relocation of construction workers into the area. Communities that host solar farms have benefited from increases in business during construction and operation (DoI 2016).	The EIS would assess the potential impacts of the project on the local community and include consideration of accommodation and other services for construction workers.
Noise		
There are approximately four residences occurring within 1 km as well as a residential estate being developed more than 500 m east of the project area, which have the potential to be impacted by noise from construction of the development.	Impacts from noise would occur mostly during construction of the development due to the presence of vehicles and machinery. Best practice mitigation measures will be implemented to reduce potential noise disturbance e.g. working within standard hours or fitting vehicles with silencing devices, where appropriate. Noise during operation, including any maintenance works, would be minimal, short in duration, and unlikely to disturb surrounding residences.	An assessment of construction noise impacts will be undertaken in accordance with the Interim Construction Noise Guidelines (ICNG), and operational noise impacts in accordance with the NSW Industrial Noise Policy, as part of the EIS. Should noise levels be likely to exceed relevant criteria, a noise management plan would be developed.

Existing conditions	Preliminary impact assessment and management	Need for further assessment
	Noise can be managed and minimised through the adoption of standard management practices.	
Air quality and dust		
Existing sources of air pollution in Mulwala are likely to result from vehicle emissions and dust from agriculture and may increase during the colder months from solid fuel heating and during summer periods if bushfires or duststorms occur in the region.	Construction has the potential to increase dust through movement of traffic on unsealed roads on dry days, vegetation removal and construction activities (such as access road construction). However, dust impacts are unlikely to be significant and standard dust suppression measures can be readily implemented. Impacts to air quality during operation would be negligible and there is the potential to improve existing levels of air quality by maintaining vegetative ground cover beneath the solar panels and other areas of the site.	A Construction Environmental Management Plan (CEMP) would be prepared to manage potential air quality impacts during construction. No specific investigation is required as part of the EIS.
Visual amenity		
The proposed project area is located approximately 1.3 km north of the outskirts of the township of Mulwala and may have potential to create visual impacts to road users and nearby rural residents. There are approximately four residences and a housing estate located within 1 km of the project area.	The terrain is relatively flat and therefore strategically placed landscape screening from sensitive receptors (i.e. dwellings within close proximity to the solar farm infrastructure) would significantly reduce the visual impact. Multiple tall windrows exist between the housing estate and the project area. Solar farms are designed to absorb light and current day typical modules reflect around 2% of light received (less than from bodies of water). They are generally not considered to be reflective, and therefore potential glint and glare impacts to surrounding areas are considered to be low.	A visual impact assessment would be undertaken as part of the EIS process and would include 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. The assessment report would include a raft landscaping plan for on-site perimeter planting, with evidence it has been developed in consultation with affected landowners.
Airfields		
Airfields are located at Yarrawonga (Victoria), approximately 7 km to the south, and in Corowa, approximately 31 km east.	It is unlikely that air traffic would be affected from the glint or glare of the solar panels due to their low reflective quality.	Any potential affects to air traffic would be discussed in the visual assessment, prepared as part of the EIS process.

Existing conditions	Preliminary impact assessment and management	Need for further assessment
Historic heritage		
A search of the Australian Heritage Database was undertaken for the Mulwala suburb, identifying three listed items.	Due to the disturbance of the area for primary production, it is unlikely there are any unidentified items of historic heritage in the project area.	As part of the EIS process, an assessment of the likely historic heritage impacts of the development will be undertaken.
Electric and magnetic fields		
A 132 kV transmission line runs along the southern boundary of the project area and connects into the Mulwala substation 500 m to the south.	DC cabling would run from the combiner boxes to the central inverters, but would be located underground. AC cabling carrying 33 kV electricity from the inverters to the solar substation would also be located underground. The cabling, inverters and substation would produce some electromagnetic emissions, however these emissions are expected to be below the guideline for public exposure.	The EIS process would include an assessment of potential hazards and risks associated with transmission infrastructure and the substation against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) *Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields.*
Bushfire hazard		
The project area is largely cleared of vegetation for agricultural purposes and is not considered to be bushfire-prone land, according to the Rural Fire Service Online Tool (search undertaken 16 November 2017).	The proposed project is unlikely to be affected by bushfire or pose a significant bushfire risk.	Bushfire response will be part of emergency management planning for the project. No specific investigation is required as part of the EIS.
Battery storage hazard		
Not applicable.	Battery storage systems can potentially pose environmental risks due to the hazardous materials they may contain (such as lithium and acids). The components of the battery storage system can also pose a fire risk.	If a battery storage system is to be included in the project, a preliminary risk screening will be undertaken in accordance with *SEPP No33 – Hazardous and Offensive Development* and *Applying SEPP 33* (DoP 2011a). If the preliminary risk screening indicates the development is 'potentially hazardous', a

Existing conditions	Preliminary impact assessment and management	Need for further assessment
		Preliminary Hazard Analysis (PHA) will be prepared in accordance with *Hazard Industry Planning Advisory Paper No6 – Guidelines for Hazard Analysis* (DoP 2011b) and *Multi-Level Risk Assessment* (DoP 2011c). The results of the preliminary risk screening and, if required, the PHA, will be included in the EIS.
Contamination		
A search of the NSW EPA did not identify any contaminated sites within the Corowa Shire Council.	Existing contamination of the project area could be present as a result of past fertiliser, herbicide, pesticide, and other chemical use on the land, and may be uncovered during excavation works at the site. Only very minor quantities of hazardous materials or dangerous goods will be used or stored on site during project construction or operation. Hydrocarbons and hazardous materials onsite would be managed in accordance with the CEMP and relevant EPA guidelines.	Risks associated with existing or project-related contamination are low. Therefore an assessment of contamination risks would not be required as part of the EIS process, provided that any use of hydrocarbons and hazardous materials is subject to standard management practice.
Waste management		
Not applicable	The majority of waste will be generated during construction. The project will be managed in accordance with the POEO Act (see Section 5.2.13, and will aim to reduce the volume of waste produced, promote re-use and recycling of materials and to avoid storage and waste handling methods that may pose risks to environment or health. Waste material generated during construction will be managed in accordance with waste management procedures, which will form part of the CEMP.	A specific assessment of waste management issues would not be required as part of the EIS process, provided that standard waste management practices are implemented as part of site environmental management.

7 Community and stakeholder consultation

7.1 Consultation activities undertaken

ESCO Pacific has identified a range of groups and individuals that are stakeholders in the development of the Mulwala Solar Farm. The stakeholders include regulators who have a decision-making role in project approvals, and groups or individuals who may be directly or indirectly affected by the project. Initial consultation has included formal and informal engagement with the following:

- Federation Shire Council – ESCO Pacific presented the project on 29th of November in Corowa
- Essential Energy (including preliminary grid enquiry)
- Landholder within the proposed project area
- Department of Planning and Environment - the project was presented on 4th of December in Sydney.

The consultation to date has provided stakeholders with opportunities to contribute to the project development process and raise any concerns. ESCO Pacific continues to expand its stakeholder database as consultation proceeds.

7.2 Community and Stakeholder Consultation Plan

The EIS process requires project proponents to undertake detailed consultation with affected landowners surrounding the development, the local community and local council. ESCO Pacific is preparing a Community and Stakeholder Consultation Plan which sets out the objectives and requirements for consultation with the identified stakeholders. In addition to those listed in Section 7.1 (above) stakeholders will include:

- adjacent landholders
- local community groups
- Aboriginal groups
- Office of Environment and Heritage
- Environment Protection Authority
- Department of Industry
- Roads and Maritime Service
- Rural Fire Service

A formal process of consultation will be implemented in support of the EIS process and in accordance with any requirements set out in the SEARs.

8 Proposed environmental assessment requirements

Based on the preliminary environmental assessment for the proposed Mulwala Solar Farm in Section 6, it is considered that the EIS should address the following specific issues:

- **Biodiversity** – including an assessment of the likely biodiversity impacts of the development, (including potential impacts on threatened species and the determination of appropriate buffer zones around potential habitat) having regard as relevant to the NSW Biodiversity Offsets Policy for Major Projects, and in accordance with the Framework for Biodiversity Assessment.
- **Aboriginal cultural heritage** – including an assessment of the likely Aboriginal (cultural and archaeological) impacts of the development, including adequate consultation with the local Aboriginal community.
- Hydrology and water resource use – including:

– an assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources (including, where identified, watercourses, wetlands, riparian land,

groundwater dependent ecosystems and acid sulfate soils), related infrastructure and water management systems (including irrigation and drainage channels, dams, and flood management measures), adjacent licensed water users and basic landholder rights, and measures proposed to monitor, reduce and mitigate these impacts

- details of water supply arrangements
- 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).

- **Socio-economic** – including an assessment of the likely impacts of the project on the local community and including consideration of accommodation and other services for construction workers.
- **Land use impacts** – including an assessment of the impact of the development on agricultural land and flood prone land, and a soil survey to consider the potential for erosion to occur, and paying particular attention to the compatibility of the development with the existing land uses on the site and adjacent land during operation and after decommissioning, with reference to the zoning provisions applying to the land.
- **Traffic and transport** – including an assessment of the site access route, site access point and likely transport impacts of the development on the capacity and condition of roads (including on any Crown land), and a description of the measures that would be implemented to mitigate any impacts during construction.
- **Noise** – including an assessment of construction noise impacts in accordance with the ICNG, and operational noise impacts in accordance with the NSW Industrial Noise Policy. Should noise levels be likely to exceed relevant criteria, a noise management plan would be developed.
- **Visual amenity** – 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, including a draft landscaping plan for on-site perimeter planting, with evidence it has been developed in consultation with affected landowners.
- **Historic heritage** – including an assessment of the likely historic heritage impacts of the development.
- **Electric and magnetic fields** – including an assessment of the potential hazards and risks associated with transmission infrastructure and the substation against the ICNIRP Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields.

9 Conclusion

This PEA Scoping Report has been prepared in accordance with the requirements of DPE for projects identified as SSDs and therefore requiring an EIS to be prepared under Part 4 of the EP&A Act. The report will support a request to DPE from ESCO Pacific for the Secretary's Environmental Assessment Requirements (SEARs) for the EIS.

Potential environmental and social issues associated with the project have been identified and prioritised as either higher priority or lower priority issues. Based on a preliminary assessment of the potential issues, ESCO Pacific has proposed environmental assessment requirements for consideration by DPE.

A key finding of the PEA Scoping Report is the potential for threatened species habitat to be present within remnant vegetation in the project sites. ESCO Pacific proposes managing the potential presence of threatened species habitat during the EIS process by: undertaking targeted surveys where required to determine the presence of threatened species; and by locating the project footprint where practical so as to avoid impacts on important habitat. ESCO Pacific proposes placing a strong primary emphasis on impact avoidance and a strong secondary emphasis on impact minimisation. The company considers that even with the adoption of a conservative approach to avoidance of impacts to environmental constraints it will have sufficient space within the project area to locate the solar farms.

The project is expected to be a relatively low risk development compared with many SSDs due to the inherently low impact nature of solar farm construction and operation, and the location of the project in an area that has a long history of disturbance from primary production and is distant from areas of high environmental sensitivity. In addition, the project is expected to result in significant benefits to the local community and State of NSW by generating economic activity, and contributing to the transition to cleaner electricity generation and increased energy security through a more diverse energy mix.

10 References

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Australian Bureau of Statistics – Data by Region - 2017

Appendices

Appendix A: Preliminary Biodiversity Assessment report

Stuart Cooney
Principal Ecologist
Ecolink Consulting Pty Ltd
PO Box 356
Northcote VIC 3070

Our Ref: 1474

28 November 2017

Cédric Bergé
Environmental Consultant - Development Manager
ESCO Pacific
Level 4, 13 Cremorne Street
Richmond VIC 3121

Dear Cédric,

Re: Preliminary (Due Diligence) Biodiversity Assessment, Mulwala Solar Farm

Introduction

ESCO Pacific engaged Ecolink Consulting to undertake a brief, preliminary site inspection of the Thomas property, north and south of Lambruck Lane, Mulwala, NSW, as part of scoping works for potential solar farm sites in New South Wales.

The purpose of this report is to provide ESCO Pacific with a brief overview of likely biodiversity values of the sites and provide a statement of potential ecological constraints to future development of the site as a solar farm.

Methods

The study area was provided to Ecolink by ESCO Pacific in KMZ file (Mulwala_SF.kmz). It depicts approximately 590ha of the Thomas property north and south of Lambruck Lane (hereafter the study area: Figure 1). A brief site assessment was undertaken of the study area on 27 November 2017 by Dr Stuart Cooney and Simon Scott, Principal Ecologists at Ecolink. The ecologists drove throughout the property with Albert and Douglas Thomas, who pointed out historic land use and potential ecological features of interest. Albert Thomas has owned the property for 50 years, which is now run by his son Douglas.

During the site inspection dominant species were recorded and general land use at the time of the assessment was recorded and mapped onto an iPad mini with GIS Pro software (accurate to

+/- 5m). This data was used to create Figure 1. Areas of potential ecological value were assessed more closely than areas that were unlikely to support such values.

Limitations

Due to the brief nature of the assessment, the following limitations apply:

- No desktop assessment was undertaken to provide background information from historic data, longer term data, or seasonally intermittent data; and,
- Only a small amount of time was spent on site. More time would allow for a more complete understanding of the ecological values of the site.

Nonetheless, the purpose of this preliminary assessment is to inform ESCO Pacific of high level constraints to development of the site, and this assessment is adequate for these purposes.

Results

Six paddocks were identified during the site assessment. These paddocks were separated from each other by wire fences, some of which were in poor repair, or had gates that were open allowing stock to move freely between some paddocks. The entire site is generally on a five year rotation of cropping and grazing by sheep (D. Thomas, Pers. comm. 27 November 2017).

Paddock 1 (Figure 1) has been sown with Italian Rye-grass *Lolium multiflorum* and Strawberry Clover *Trifolium fragiferum* for hay. It has a pivot irrigation sprinkler installed (Plate 1). This paddock is currently separated from the rest of the paddocks by an electric fence, however, once harvested the entire paddock is grazed by sheep. Scattered paddock trees within the paddock include White Cypress *Pine Callitris glaucophylla* and Grey Box *Eucalyptus microcarpa*.

Paddock 2 is grazed by sheep. Dominant species in this paddock include a range of exotic pasture grasses including Rye Grass *Lolium* sp., Oats *Avena* spp., and Great Brome *Bromus diandrus*, Prairie Grass *Bromus catharticus*, as well as environmental weeds including Paterson's Curse *Echium plantagineum*, Common Sow-thistle *Sonchus oleraceus* and Spear Thistle *Cirsium vulgare* which have been sown into this paddock (Plate 2). Scattered paddock trees within the paddock include White Cypress Pine and Grey Box. A small patch of native vegetation is located on the north-western boundary of the paddock. This is an area of native Rushes *Juncus* spp.in a wet depression (Plate 3).

Paddock 2a is south of Paddock 2. This paddock supports a planted wind row of non-native Radiata Pines *Pinus radiata* that was planted 50 years ago and is now senescing (Plate 4). To the west of this wind row is a plantation of approximately 400 Grey Box trees, which were planted as an offset for the loss of eight large trees when installing the pivot irrigation system. These Grey Box trees are generally very densely planted in a single cohort stand (Plate 5).

Paddock 3 is almost identical to Paddock 2, with similar land use and a fence that is in disrepair and therefore is ineffective in stopping sheep moving between the paddocks (Plate 6). Scattered paddock trees within the paddock include White Cypress Pine and Grey Box.

Paddock 4 is grazed by sheep in higher densities that Paddocks 2 and 3 (Plate 7). It supports a remnant patch of native vegetation, is located in a low-lying area, and has been fenced to

exclude stock and allowed to regenerate (Plate 8). The remainder of the paddock is dominated by a range of exotic pasture species and weedy species (see Paddock 2 above). Scattered paddock trees within the paddock include White Cypress Pine and Grey Box.

Paddock 5 is similar to the other paddocks that grazed by sheep, with a range of exotic pasture species, some weedy species and a low abundance of native species (Plate 9) (see Paddock 2 above). Scattered paddock trees within the paddock include White Cypress Pine and Grey Box.

Paddock 6 is also dominated by exotic species (Plate 10) (see Paddock 2 above). In the north-western corner of this paddock is another wet depression that supports native vegetation (Plate 11). Scattered paddock trees within the paddock include White Cypress Pine and Grey Box.

Discussion

The native vegetation within the study area is generally highly modified from its original state, associated with a long history of agricultural land uses. It is characterised by scattered indigenous trees, and isolated remnant patches of native vegetation amongst paddocks of exotic pastures that are cut for hay and grazed by sheep. Accordingly the ecological values are generally described as low.

Small, low quality patches of native vegetation persist within the study area in Paddocks 2, 4 and 6 to a total area of approximately 5ha. The other notable ecological value within the study area are the scattered White Cypress Pine and Grey Box paddock trees, some of which are likely to contain hollows, which are important resources for a range of species, potentially including threatened species, such as owls and bats.

There are no waterways or wetlands within the study area, however wet parts of the Thomas property, south of the northern part of the study area, contain native wetland vegetation and are likely to support a number wetland species such as amphibians, birds, and potentially fish during high rainfall or flood events.

Threatened flora species are unlikely to persist within most of the study area, where sheep grazing, disturbance through ploughing and their small size are ongoing threats to their survival. In the patches of native vegetation it is unlikely, but possible, that some threatened wetland species may persist.

Threatened fauna species are similarly unlikely to persist within the study area due to the lack of high quality habitat, although mobile species such as birds and bats may use the study area infrequently or temporarily when foraging or roosting, or as stepping stones when moving between higher quality habitats within the landscape. On this basis it is unlikely to provide important or significant habitat (e.g. breeding habitats, bat maternity caves) for any threatened fauna species and none are likely to occur.

As with previous projects, we recommend that the indigenous trees, patches of native vegetation, drainage lines, and plantations of native vegetation be avoided when considering future development.

Whilst the preliminary assessment finds that the study area is generally unlikely to support important habitat for threatened flora and fauna species, surveys for some threatened species are likely to be required under the policy relating to major projects and Biodiversity Development Assessment Report for a range of species that are modelled to occur. These surveys will have seasonal constraints that should be factored into lead-in planning times.

Further assessments would be required to ensure that the full extent of ecological values within the study area are known. This is likely to include:

- A comprehensive desktop assessment;
- A tree assessment to record location, species, size and presence of hollow/nesting habitat; and,
- A detailed assessment of the remnant patches, including targeted threatened flora species surveys at an appropriate time.

We, along with other members of the project team, look forward to further assisting with this project in the future should you wish to proceed.

I trust the above meets with your expectations, but please call me if you have any queries, or require any amendments (Mobile phone no: 0419 894 948).

Kind regards,

Stuart Cooney
Principal Ecologist
Ecolink Consulting Pty Ltd

Plates

Plate 1. Paddock 1

Plate 2. Paddock 2

Plate 3. Remnant patch 1 in Paddock 2

Plate 4. Wind row in Paddock 2a

Plate 5. Offset trees

Plate 6. Paddock 3

Plate 7. Paddock 4

Plate 8. Remnant patch 2 in Paddock 4

Plate 9. Paddock 5

Plate 10. Paddock 6

Plate 11. Remnant patch 3 in Paddock 6

Results of the current assessment.

Mulwala Solar Farm, NSW

Legend

- Study Area
- Remnant Patches of Native Vegetation
- Creeks and drains
- Dams and wetlands

Land use

- Grazed
- Grey box plantation
- Pivot irrigation

ecolink consulting

P/N 1474 November 2017.