REPORT

Mulwala Solar Farm

Environmental Impact Statement

SSD 9039

Volume 1

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Submission of Environmental Impact Statement (EIS) prepared under the Environmental Planning and Assessment Act 1979- Statement of Validity

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In respect of	SSD 9039- 255 Savernake Road, MULWALA NSW 2647
Development Application	
Proponent Name	ESCO Pacific Pty ltd
Proponent Address	Level 4, 13 Cremorne Street, RICHMOND VIC 3121
Environmental Impact Statement	
	An EIS is attached
Declaration	
Certificate	I certify that I have prepared the contents of this EIS and to the best of my knowledge: • It is in accordance with clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000;* • It contains all available information that is relevant to the Environmental Assessment (EA) of the development to which this statement relates; and • It is true in all material particulars and does not, by its presentation or omission of information, materially mislead.
Signature	
Name	Chris Alderton
Date	18/06/2018

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Approval for issue

Name	Signature	Date
Chris Alderton		18/06/2018

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Key Abbreviations

ABS	Australian Bureau of Statistics
AEMO	Australian Energy Market Operator
ARENA	Australian Renewable Energy Agency
BoM	Australian Bureau of Meteorology
CIV	Capital Investment Value
DA	Development Application
DEC	NSW Department of Environment and Conservation
DEE	Department of Environment and Energy (Commonwealth)
DECC	NSW Department of Environment and Conservation (now OEH)
DoE	Department of Environment (now DEE)
DPE	NSW Department of Planning and Environment
DPI	NSW Department of Primary Industries
EMP	Environmental Management Plan
EP&A Act	Environmental Planning and Assessment Act 1979
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPA	NSW Environment Protection Authority
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
ESD	Ecologically Sustainable Development
kL	Kilolitres
LEP	Local Environmental Plan
LGA	Local Government Area
ML	Megalitres
NPW Act	National Parks and Wildlife Act 1974
NW Act	Noxious Weeds Act 1993
OEH	Office of Environment and Heritage
POEO Act	Protection of the Environment Operations Act 1997
RMS	NSW Roads and Maritime Services
SEARs	Secretary's Environmental Assessment Requirements
SSD	State Significant Development
TSC Act	Threaten Species Conservation Act 1995
WMA	Water Management Act 2000
WMP	Water Management Plan

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Executive summary

Overview

ESCO Pacific (the Applicant) is proposing to undertake the development and operation of a utility-scale solar energy facility with a capacity up to 80 megawatts (MW) on Lot 1 DP DP100773, Lot 1 DP134511, Lot 2 DP134511, Lot 3 DP134511, Lot 4 DP134511, Lot 5 DP134511, Lot 6 DP134511, Lot 7 DP134511, Lot 103 DP752290, Lot 114 DP752290, Lot 115 DP752290, Lot 116 DP752290, Lot 125 DP752290, Lot 132 DP752290, Savernake Road, Mulwala, NSW.

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). The company currently has more than 1.3 gigawatts (GW) pipeline of projects across NSW, Queensland, and Victoria.

The estimated capital investment value of the project exceeds the $30 million threshold set out in the State Environmental Planning Policy (State and Regional Development) 2011 and as such is classified as a State Significant Development (SSD).

ESCO Pacific applied for Secretary's Environmental Assessment Requirements (SEARs) for the Project on 17 January 2018. SEARs were issued for the project on 5 February 2018.

This Environmental Impact Statement (EIS) has been prepared in accordance with the SEARs and will be part of an application which seeks approval under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the proposed Mulwala Solar Farm (the Project).

Site description

The project area is located approximately two kilometres north of Mulwala township, within the Federation Council Local Government Area (LGA). Mulwala is located to the north of the Murray River, on the banks of Lake Mulwala, halfway between Albury and Echuca, and is within 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.

The project area 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.

The project area is bound 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 six kilometres to the south in Victoria, and the Riverina Highway approximately 25 kilometres to the north.

The total project area under assessment for this EIS is 420 hectares, while the development footprint for the solar farm will utilise up to 215 hectares.

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

Significant disturbance of the natural environment within the development site has occurred as a result of the long history of grazing and cropping activities. The visual amenity of the development site has the same

character as the surrounding rural landscape, with the surrounding area being predominantly agricultural inter-dispersed with residential dwellings.

Project description

The Project is a utility scale renewable energy project that will generate up to 80 MW(AC) of clean and renewable energy. The solar farm will comprise up to 300,000 solar photovoltaic (PV) modules, known more commonly as 'PV modules' or 'solar panels'. The solar panels use the same type of technology as commonly used in residential scale solar installations throughout Australia but are larger in size.

The solar panels will be installed on ground-mounted frames that will slowly track the daily horizontal movement of the sun. The solar panels and horizontal tracking systems will be mounted in rows that will be electrically connected into arrays before being converted from direct current (DC) to alternating current (AC) electricity, which is the standard form of electricity used throughout Australia.

Electricity will then be fed, via an underground, on-site, high voltage power reticulation system, into the local electricity network through the Essential Energy Mulwala 132 kV substation.

The main items to be established for the project will include:

- Up to 300,000 solar panels in regular arrays.
- Metal mounting piles and frames.
- Aboveground and underground DC cabling.
- Central inverters, step up transformers, and switchgear.
- Underground AC cabling.
- Main step up transformer and associated equipment.
- Internal vehicle access tracks.
- Perimeter safety fencing and security system.
- Supervisory control and data acquisition (SCADA) control systems.
- Site office, staff amenities, and maintenance shed.
- Permanent all-weather access and access road.
- Temporary site compound, lay-down area, and equipment storage areas during construction.
- Battery storage area.

It is expected that the construction phase for the Project will take approximately eight months from initial site works through to commissioning and is anticipated to have a 40-year operational life span.

During construction there will be up to 130 staff and contractors employed, while during operations there will be up to four staff for maintenance and monitoring activities.

The Project has been designed to avoid sensitive features (where possible) to ensure the impacts of the development are minimised. At the conclusion of the Project, all site infrastructure will be removed and the site rehabilitated to enable agricultural activities to resume.

Project need and alternatives

Since 2001, the Commonwealth Government has mandated the use of energy from renewable resources in electricity generation. In 2009, the Renewable Energy Target (RET) scheme mandated that 20 per cent of

Australia's electricity supply was to come from renewable energy 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 RET 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. In June 2015, the Australian parliament passed the *Renewable Energy (Electricity) Amendment Bill 2015* and the current RET is 33,000 GWh by 2020 with interim and post 2020 targets adjusted accordingly (Clean Energy Regulator 2017). The current projection is that about 23.5 per cent of Australia's electricity generation in 2020 will be from renewable sources.

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 Project will contribute to 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 energy generation, and the transition to increased energy security through a more diverse energy mix. The Mulwala Solar Project will produce approximately 213,000 MWh/year of renewable electricity which would assist Australia to meet its RET and provide power for approximately 40,500 homes.

Local social and economic benefits that would be associated with the construction and operation of the Mulwala Solar Farm include:

- Attracting and growing expertise in renewable energy;
- Employment opportunities during construction and operations, 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; and
- Rent received from workers accommodated in the area.

At the state level, the Mulwala Solar Project is consistent with the goals and targets for renewable energy generation in NSW. These include:

- Assisting the national transition to renewal energy production;
- Assisting in meeting the future electricity demands;
- Attracting renewable energy investment and projects;
- Supporting the achievement of the RET;
- Building community support for renewable energy; and
- Attracting and growing expertise in renewable energy.

The development would seek to minimise the environmental impacts to the project area and surrounding location through:

- Preservation of biodiversity features through an avoidance strategy;
- Minimisation of impacts to soil and water through pile driven panel mounts rather than extensive soil disturbance and excavation;

- Minimise visual impacts to neighbours, incorporating strategic vegetation screens along boundaries in consultation with neighbours;
- Preservation of agricultural production values through undertaking an activity that is highly reversible at the end of the Project's life;
- Reduce greenhouse gas (GHG) emissions by up to 186,000 tonnes per year based on an emission factor of 0.87 kg CO_2-e/kWh; and
- Increasing renewable energy capacity.

The consequences of not proceeding with the proposal would be the loss of the identified benefits to the environment, community, and economy. These losses would include:

- Opportunity to reduce GHG emissions through clean energy technology;
- Provision of a renewable energy supply to assist in reaching the LRETs;
- Additional electricity generation and supply into the National Electricity Market;
- Security of supply for both industrial and consumer users; and
- Social and economic benefits of employment resulting from the construction and operation of the solar farm.

Doing nothing would avoid the environmental impacts associated with the development and operation of the proposed solar farm, however these are considered to be minimal when compared to the long term environmental impacts from the burning of fossil fuels. The impacts from the Project are considered to be manageable and would not result in significant long term impacts to the environment.

Planning approval pathway

The development assessment and approval system in NSW is set out in Parts 4 and 5 of the EP&A Act. Division 4.1 of Part 4 provides for the assessment and determination of State Significant Development (SSD). Pursuant to Section 89C of the EP&A Act, projects are classified as SSD if they are declared to be as such by the *State Environmental Planning Policy (State and Regional Development) 2011* (SEPP).

Under Clause 20 of Schedule 1 of the SEPP, the following is considered 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 Project is expected to have a capital cost exceeding $30 million. Accordingly, the Project would be classified as an SSD under Part 4 of the EP&A Act.

Consultation and stakeholder engagement

ESCO Pacific has undertaken engagement with a range of stakeholders regarding the Project. The purpose of the engagement was to provide information on the proposal as early as possible in the planning process to allow for the up-front identification, and where possible, resolution, of relevant issues or concerns. Consultation has been undertaken with relevant Government agencies, Council, local residents, the local Aboriginal community, and businesses through meetings, a site drop-in session, one on one interviews, and distribution of project fact sheets.

Issues raised during the consultation process have been considered in the design of the proposed development and addressed within the EIS.

Environmental impact assessment

Noise and Vibration

A **Noise Impact Assessment** (NIA) has been undertaken to assess the construction phase and the ongoing operational impacts associated with the Project.

The construction phase of the development will last up to eight months and will include, site preparation works, potential piling for securing the ground mounted frames, installation of the solar panels, inverter systems and cabling and construction of the substation and administration building. Calculations show that the level of noise emission from the construction phase will be within noise management levels set by the NSW EPA's *Interim Construction Noise Guideline 2009* at all receptor locations for the majority of the time. There is potential for the noise management levels to be exceeded on occasion, for instance when piling in close proximity to any given dwelling.

Acceptable noise limits for the operational phase are derived from the EPA's *Noise Policy for Industry 2017* project trigger levels at the nearest residences to the Project, based on the minimum Rating Background noise Levels (RBLs) prescribed in the Policy. Long-term background noise monitoring has not been undertaken at the project area at the request of the proponent; however it is reasonable to assume, given the rural location, that existing background noise levels would be in line with the minimum RBLs given in the Policy. Noise sources associated with the operational phase of the Project are considered to be: NEXTracker motors for the tracking of the panels on the ground mounted frames, inverter systems, and the transformer within the solar substation.

The assessment determines that the EPA's *Road Noise Policy 2011* criteria will be met during the operational and construction phases at all receptors within the Project. To mitigate against potential noise and vibration impacts arising from the Project, management recommendations have been developed, including the development of a Construction Noise and Vibration Management Plan.

Traffic and Transport

A **Traffic Impact Assessment** (TIA) has been prepared to assess the impact of the development on the performance of the surrounding road network. The TIA for this proposal considered traffic impacts of construction and operational vehicle movements along the proposed primary transportation routes.

During construction, the average traffic generation would peak at 39 movements per day, while during operation the average movements would peak at two per day.

The impact of the Project on the roads identified as the primary transportation routes for the delivery of construction materials, site access and the decommissioning of the solar farm has been considered minimal. All primary transportation routes are designated B-double routes and meet the Austroads Standards for road capacity and would not be impacted by the increase of vehicle movements due to construction.

Due to the low volume of movements of traffic generation it is considered that the Project would have a negligible impact on the operation of the surrounding road network and hence will not adversely affect road safety.

To ensure impacts are minimised, a Construction Traffic Management Plan which utilises Austroads and Roads and Maritimes Services Guidelines, would be developed for all roads adjacent to the project area including the main intersection of Savernake Road and Lambruck Lane.

Visual

A **Visual Impact Assessment** (VIA) has been prepared to assess the impact of the Project on the existing landscape character of the surrounding environment. The existing landscape character is dominated by rural activities and residential dwellings.

A number of view sheds were identified as having the potential for a visual impact from the proposed development. The degree of importance placed on these viewpoints varied according to a combination of considerations of visual prominence and visual exposure. It is concluded that the majority of views to the project area are of negligible to moderate impact.

The Project will also change the landscape character of the setting in a very site-specific manner. Beyond this it will have an overall negligible impact on the localised area. The landscape character of the setting is generally rural in aesthetic - much of the vegetation that lines the properties adjacent to the roads can provide a visual barrier to the locally positioned receivers. Moreover, the largely flat nature of the locality and region assists greatly in mitigating views to the project area due to the lack of prospect from the visual receivers.

Considering that the solar panels will remain at a static 45 degree angle in the mornings and afternoons, the resulting specular glare is likely to have a negligible influence on sensitive receivers, and any glare would reflect in an opposing direction away from the receptor. There is also expected to be no glare hazard for aircraft or motorists.

With the implementation of mitigation measures, the proposed development can be undertaken whilst minimising the visual disturbance to surrounding residents.

Biodiversity

A **Biodiversity Assessment Report (BDAR)** has been prepared to determine the potential biodiversity impacts from the proposed development and to examine the likelihood of the proposal having a significant effect on any threatened species, populations or ecological communities listed under the *NSW Threatened Species Conservation Act 1995* (TSC Act). A preliminary assessment has also made with regard to those threatened entities listed under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). A preliminary assessment under the EPBC Act determined the proposed action is unlikely to have an impact to Matters of National Environmental Significance (MNES) based on the assessment criteria set out in relevant Commonwealth policies and advices as at the time of this assessment

Based on assessment of the Biodiversity Assessment Methodology (BAM) 2017 and consultation with the OEH (NSW), the Mulwala Solar Farm has been determined to qualify for a Streamlined (Paddock Tree) Assessment. The assessment utilised desktop analysis and a field survey which identified 34 Paddock Trees requiring removal of which 33 require ecosystem credits. In accordance with BAM (2017) a total of 30.75 ecosystem credits are required to offset this loss.

Aboriginal and Historic Heritage

An **Aboriginal Cultural Heritage Assessment Report** (ACHAR) has been prepared for the proposed development which has considered information from desktop searches, literature reviews, database registers, consultation with Registered Aboriginal Parties (RAPs), and a visual site inspection. The ACHAR has addressed both Aboriginal and non-Aboriginal heritage.

A review of Aboriginal cultural heritage registered on New South Wales and Victorian databases identified six Aboriginal sites within the searched area, none of which were located within the project area. The most common site type included modified trees, followed by two burials and Potential Archaeological Deposits. Five new sites were identified within the project area during the visual site inspection. Three of the five identified sites may be directly impacted by the proposed construction of the Mulwala Solar Farm. The

remaining two sites and sensitive landforms are located outside the development footprint and will not be impacted.

The review of non-Aboriginal heritage concluded that the proposed development is not anticipated to have any impact on any items of historic heritage due to the disturbed nature of the site and the lack of any registered listed sites located in or within close proximity to the proposed development.

Ongoing consultation is continuing with RAPs contacted for this assessment.

Surface Water and Groundwater

A **Surface and Groundwater Assessment** has been undertaken to assess the impact of the proposed development on the surface and groundwater resources in the locality, including surrounding water users and Groundwater Dependant Ecosystems (GDE's).

There is no riverine flood threat affecting the project area and the construction, operation and decommissioning of the proposed works will not impact the existing flood characteristics that may arise from localised stormwater events. In addition, the proposed development, during construction and when operational, is not expected to alter the current movement of water across the site or impact the existing on-farm drainage network.

The Project will be located within an established irrigation area with the aquifers supporting considerable consumptive use for both irrigation and stock and domestic. As such, there are numerous bores in the local area and on the property. There are no groundwater dependent ecosystems located in or within close proximity to the proposed development. All disturbances in the described earthworks would occur within the top one metre of the ground surface, and therefore it is not expected that the proposed development would intercept the groundwater table, impact existing bores, or groundwater dependent ecosystems.

The Project is anticipated to have minimal impacts on the surrounding surface water environment, flow regimes (flooding), quality, quantity, features, or local or regional hydrology.

To ensure that impacts are minimised, a construction and operational **Erosion and Sediment Control Plan** (ESCP) will be implemented, along with various site management protocol to ensure that fuels and chemicals are correctly handled and stored, and that staff are aware of site specific environmental management requirements.

Soils, Land Use, and Agriculture

An assessment of impacts from the development on land use (including minerals and mining), agriculture, and soil resources has been undertaken for the proposed solar farm development. The desktop assessment involved a review of publicly available information from the relevant Federal and State government agencies.

The expected impact on surrounding land uses during construction is considered to be minimal given the temporary nature of the work and the implementation of mitigation strategies would further reduce the level of impact. However, once construction of the solar farm commences, agricultural activities would cease in the areas within the development footprint.

During operation, the development footprint (215ha) will be removed from potential agricultural production for a period of up to 40 years (Project life). However, there will still be the capacity to graze sheep between the solar arrays across the site. The grazing of sheep will allow agricultural land uses to continue, while providing a fire and weed management benefit through reducing excessive pasture growth and creating grazing pressure.

The development will not impact on any land identified as being Biophysical Strategic Agricultural Land (BSAL). Construction works will involve only minor excavation activities and pile driving which will create minimal disturbance to soil resources.

The Project is not located within an area that has been identified as a mineral resource and there are no current exploration licences over the project area.

To ensure that impacts are minimised, an Erosion and Sediment Control Plan (ESCP) would be prepared in accordance with *Managing Urban Stormwater: Soils & Construction (Landcom 2004)* and implemented to minimise impacts across the various stages of the solar farm development. In addition, a construction and operational **Environmental Management Plan** (EMP) will be prepared for the development and will include biosecurity protocols, such as measures for the identification, management and ongoing monitoring of weeds on the site.

Socio-economic

An assessment of the social and economic impacts of the Project, including identification of the socio-economic characteristics of the surrounding area and Federation Council LGA, has been undertaken. The key potential social and economic impacts that may result from the construction, operation, and decommissioning of the proposed development includes:

- Increased employment – there is the potential for employment to be generated during the construction phase via the use of local contractors and labour hire;
- Increased traffic on local roads and hazards associated with construction traffic;
- Influx of workers putting pressure on local accommodation and health services;
- Short term air quality, noise and visual impacts;
- Ongoing benefits for local associated supply businesses;
- Loss of Agricultural Land; and
- Change in the rural landscape character and visual amenity of the area.

The Project will have a positive employment impact during construction and is likely to create in the order of 130 jobs. Of these workers, it is expected that the majority will be sourced from the local area. Any non-local specialised contractors are likely to come from across other areas of NSW and would utilise nearby accommodation in Mulwala and Yarrawonga.

The creation of long term employment and demand from local associated business will have a positive economic and social impact. Further, there is a greater societal, social and economic benefit gained through the substitution of carbon based electricity production with renewable energy sources which are consistent with State and National greenhouse emission reduction objectives.

The Project will be located within the Federation Council LGA which covers an area of approximately 5,700 km^2. Agriculture, forestry and fishing was recorded in the 2016 census to be the largest industry sector of employment in Federation Council, making up 19% of total employment in the area (ABS 2016). Historically the land use surrounding the project area has comprised agricultural activities including grazing and dairy farming; however residential, commercial (including tourism) and industrial land uses are also prevalent in the surrounding area. The loss of 215 ha or 0.037% of the available agricultural land in the LGA is considered insignificant in this context locality.

The Project is consistent with the objectives of the Riverina Murray Regional Plan 2035. Overall, it is considered that the proposed land use will have a net economic and social benefit and is compatible with and can co-exist with ongoing local agricultural activities.

Waste Management

Waste management for the construction and operations phases of the development will be undertaken consistent with the waste management hierarchy in the following order of priority from most desirable to least desirable:

- Avoid: Waste avoidance by reducing the quantity of waste being generated. This is the simplest and most cost-effective way to minimise waste. It is the most preferred option in the waste management hierarchy.
- Re-use: Reuse occurs when a product is used again for the same or similar use with no reprocessing. Reusing a product more than once in its original form reduces the waste generated and the energy consumed, which would have been required to recycle.
- Recycle: Recycling involves processing waste into a similar non-waste product consuming less energy than production from raw materials. Recycling spares the environment from further degradation, saves landfill space and saves resources.
- Dispose: Removing waste from worksites and dumping on a licensed landfill site, or other appropriately licensed facility.

Waste generated from the construction and operation of the proposed facility will be managed efficiently to ensure that the diversion of waste from landfill is maximised. A **Waste Management Plan** (WMP) will also be prepared to ensure that waste on site is suitably segregated, sorted, and recycled prior to sending any residual wastes to landfill.

Hazards and Risks

The construction and operation of the Project has the potential to result in various hazards and risks relating to dangerous goods, bushfire, and electromagnetic interference.

Dangerous Goods

The dangerous goods or materials on site during the construction and operation of the Project include Lithium-ion batteries, classified as a Class 9 Miscellaneous Dangerous Goods. The storage of these batteries has the potential to result in electrical, energy, fire, chemical, explosive gas and mechanical hazards. Thee hazards have the potential to result in shock, fire or physical injuries. These potential hazards would be mitigated through the proper use, storage and maintenance of the battery energy storage systems.

Bushfire

The project area is located within an existing highly modified and cleared environment, therefore there is no dense bushland and only limited vegetation in or surrounding the project area.

There is no identified bushfire prone land located within the project area, and as the project area has been subject to previous clearing, the bushfire potential is identified as low. The nearest bushfire prone land is located approximately 300 metres south-west of the project area.

Despite this, in March 2018 a bushfire occurred within the southern end of the project area, burning a number of hardwood trees and up to seven kilometres of fencing.

To reduce future bushfire risk, a water tank for fire protection purposes, will be located adjacent to the site office. The tank will be provided on site to ensure suitable all-weather access for the RFS fire tankers and appliances.

An **Emergency Response Plan** (ERP) will also be prepared for the project rea which will detail an evacuation plan, fire response, location of fire services and contacts, and a site muster point.

Electromagnetic Interference

An assessment of Electromagnetic Fields (EMFs) has been prepared in accordance with the International Commission on Non-Ionizing Radiation Protection (ICNIRP) *Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields (1998*). EMFs consist of electric and magnetic fields that are produced whenever electricity is used. EMFs also occur naturally in the environment from a build-up of electric charge in thunderstorms and the earth's magnetic field.

There is low potential for EMF impacts during the construction and decommissioning phases of the Project. Staff would be exposed to EMFs over intermittent periods during works at and around the proposed 132 kV transmission line. Exposure to EMFs during the construction of the transmission line and connection to the substation will be short-term therefore the effects are likely to be negligible.

The construction site would be fenced to protect the public from construction health and safety risks.

During operation, additional EMF sources would include the short 132 kV transmission line from the main step transformer to the adjacent substation, underground cabling, and the solar array incorporating PCUs.

Electric fields can be reduced with distance from operating electrical equipment and by shielding, while magnetic fields are reduced more effectively with distance. Using the Principle of Prudent Avoidance as a precautionary principle in risk management in the design of site and infrastructure, the exposure to EMFs can be minimised and potential for adverse health impacts minimised.

Protective measures to reduce personal harm from EMFs include engineering design, administrative control, and personal protective clothing. The works undertaken for the proposed development are not expected to exceed the basic restriction levels.

Cumulative Impacts

A search of the Major Projects Register on the Department of Planning and Environment (DPE) website was undertaken on the 4 April 2018 to identify any other major projects within the vicinity of the project area which would likely contribute to cumulative impacts. A search was completed for the Federation LGA. This search identified a major project 'Howlong Sand and Gravel Quarry Expansion' to be undertaken at Howlong, NSW. This project is located approximately 70 kilometres east of the proposed Mulwala Solar Farm project area and as such would not add to cumulative impacts.

The search of the major projects register identified a number of renewable energy electricity generation facilities (solar) currently being considered across NSW. The closest major solar project is located at Finley, 70 kilometres north-west of the proposed Mulwala Solar Project. Finley Solar Farm has also been developed by ESCO Pacific. Terrain Solar Farm is also developing a smaller solar farm, three kilometres outside of Corowa, approximately 45 kilometres from the proposed Mulwala Solar Farm. This project is Council approval only and is due to start construction in 2018.

A review of the Roads and Maritime Services (RMS) website and Federation Council website did not highlight any major works which are proposed in the vicinity of the project area.

Adverse cumulative impacts occur when the proposed development exacerbates the negative impacts of other activities occurring nearby. During construction, the additional visual impact from traffic on local roads and dust impacts from vehicles and equipment are likely to have the greatest potential to cause cumulative impacts.

The Murray Valley Highway is the closest main road and state highway which is a popular tourist route following the southern side of the Murray River in Victoria and effectively acting as the northern-most highway in Victoria. This high use road would be the most likely road utilised by construction traffic coming from the major centre of Albury, NSW.

The Riverina Highway is a high use main road that carries a large proportion of heavy vehicles between Deniliquin and Albury, particularly during harvest periods. The visual impact of increased traffic movements to the project area would be predominantly limited to construction (approximately eight months). The generation of dust from construction activities will also need to be appropriately managed on Lambruck Lane and within the project area to ensure that cumulative dust generation from existing cropping and construction does not become excessive.

The operational view of the Project may generate a cumulative impact with the existing substation and solar farm infrastructure combined.

Boundary screen planting will be undertaken where required to ensure that visual and glare impacts are suitability managed for residents and for vehicle drivers.

Similarly, any cumulative dust impacts would be short in duration and would be appropriately managed through a site Environmental Management Plan (EMP).

Adverse cumulative impacts are anticipated to be manageable due to the ability to effectively screen infrastructure in this low relief landscape and through the implementation of dust management strategies.

Project justification

The Project involves the construction and operation of an 80 MW solar farm on agricultural lands that are considerably degraded from existing cropping and grazing activities. The Project is in an area that is already highly disturbed, therefore the impacts to the existing environment of the project area are considerably reduced.

The Project would seek to further minimise the environmental impacts to the project area and surrounding location through:

- Preservation of biodiversity features through an avoidance strategy;
- Minimisation of impacts to soil and water, through pile driven panel mounts rather than extensive soil disturbance and excavation;
- Minimisation of visual impacts to neighbours, incorporating strategic vegetation screens along boundaries in consultation with neighbours;
- Preservation of agricultural production values through undertaking an activity that is highly reversible at the end of the Project's life;
- Reduction of greenhouse gas (GHG) emissions by up to 186,000 tonnes per year based on an emission factor of 0.87 kg CO_2-e/kWh; and
- Increasing renewable energy capacity.

During construction, the Project would employ up to 130 contractors. When fully operational the Project will employ up to four full-time and eight part-time staff at the site, which will provide jobs for the local community and surrounds. Associated supply businesses will also benefit from the operation of the development.

There is a significant under supply of renewable energy sources in NSW, therefore the proposed facility will provide additional capacity to the state and national power grid which will ensure greater network stability and security of supply for users.

In addition to these social and economic benefits, the Project will service the increasing demand for renewable energy sources and provide renewable power for up to 40,500 homes.

The proposed Mulwala Solar Farm would contribute to Australia meeting its greenhouse gas commitments by reducing emissions associated with energy use and contributing to the achievement of the RET. The

Project 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.

Conclusions

The Project has been shown to be consistent with the relevant local, State and Commonwealth government planning instruments.

A range of environmental issues were identified and assessed with appropriate mitigation and management measures proposed to be carried through to the construction, operational, and decommissioning phases. Emphasis has been applied to the management of potential visual, biodiversity, traffic and heritage associated with the development through avoidance and design modification.

It has been demonstrated through this EIS that the Project will not result in significant impacts to the environment through the implementation of management and mitigation strategies. Therefore, the development is considered an appropriate use for the existing site, has positive social and economic benefits for the local area, and is in the best interest of the public, environment, and sustainability.

1 Introduction

1.1 Background

This Environmental Impact Statement (EIS) has been prepared by RPS on behalf of ESCO Pacific (the Applicant) to accompany an application for State Significant Development (SSD 18_9039) to the NSW Department of Planning and Environment (DP&E). This application seeks development approval under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the proposed Mulwala Solar Farm (the Project), located approximately two kilometres north of the township of Mulwala, NSW, (refer **Figure 1**) within the Federation Council local government area (LGA).

The Applicant is proposing to undertake the development and operation of a utility-scale solar energy facility with a capacity up to 80 MW of alternating current (AC) clean and renewable electricity through the conversion of solar radiation to electricity via photovoltaic modules (solar panels). The project area includes Lot 1 DP DP100773, Lot 1 DP134511, Lot 2 DP134511, Lot 3 DP134511, Lot 4 DP134511, Lot 5 DP134511, Lot 6 DP134511, Lot 7 DP134511, Lot 103 DP752290, Lot 114 DP752290, Lot 115 DP752290, Lot 116 DP752290, Lot 125 DP752290, Lot 132 DP752290, Savernake Road, Mulwala, NSW (refer Figure 2).

The project area is currently freehold land in NSW with one property owner. The Applicant has entered into a tenure arrangement with the landowner for proposed subdivision and shared access. The Project has a lifespan of 40 years after which the property could be returned for traditional farming. Throughout the duration of the solar farm's lifespan, opportunistic cropping and grazing will continue where possible and it is assumed that slashing and grazing will occur to maintain grass below 100 millimetres in height. Landowner consent will be provided to DP&E upon lodgement.

ESCO Pacific has a 1.3 Gigawatts (GW) pipeline of projects in NSW, QLD and VIC that in February 2018 included:

- The 148 MW Ross River Solar Farm near Townsville, currently under construction.
- Six additional approved projects in QLD, totalling 500 MW.
- The approved 170 MW Finley Solar Farm in NSW.
- Three projects in Victoria totalling 335 MW (two approved in 2018 and one currently awaiting approval).
- The 125 MW Sandigo Solar Farm in NSW which is currently awaiting determination.

1.2 Purpose of this report

The purpose of this EIS is to assess and propose mitigation measures for the environmental and social implications of proceeding with the proposed development. This EIS has also been prepared to meet the Secretary's Environmental Assessment Requirements (SEARs) for the proposal, issued by DP&E on 5 February 2018 (refer to Section 1.7), as well as the recommendations from other consulted agencies and relevant stakeholders. This document has been prepared in accordance with the EP&A Act and the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation).

In addition to describing the project, the EIS presents a comprehensive and focused assessment of the associated planning and environmental issues to a level of detail commensurate with the scale of the development, the characteristics and previous use of the site, and the legislative framework under which the development is to be assessed and determined. The matters dealt with in the EIS are presented in a manner

that clearly addresses the specific requirements of the SEARs, as well as the requirements of other consulted government agencies and stakeholders.

1.3 The Applicant

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 management 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.

1.4 Project area

The Project is located approximately two kilometres north of Mulwala township, within the Federation Council LGA. Mulwala 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.

A map of the proposed project area is shown as **Figure 3**, 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 has been 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 six kilometres to the south in Victoria, and the Riverina Highway approximately 25 kilometres to the north (refer **Figure 1**). The total project area under assessment for this EIS covers 420 hectares, while the development foot-print for the solar farm will utilise up to 215 hectares.

A 132 kilovolt (kV) transmission powerline runs along the southwest boundary of the project area (along Tocumwal Road) and connects into Essential Energy's Mulwala 132 kV substation located to the south of the project area boundary.

1.5 Approval pathway

The development assessment and approval system in NSW is set out in Parts 4 and 5 of the EP&A Act. Division 4.1 of Part 4 provides for the assessment and determination of State Significant Development (SSD). Pursuant to Section 89C of the EP&A Act, projects are classified as SSD if they are declared to be as such by the *State Environmental Planning Policy (State and Regional Development) 2011* (SEPP).

Under Clause 20 of Schedule 1 of the SEPP, the following is considered SSD:

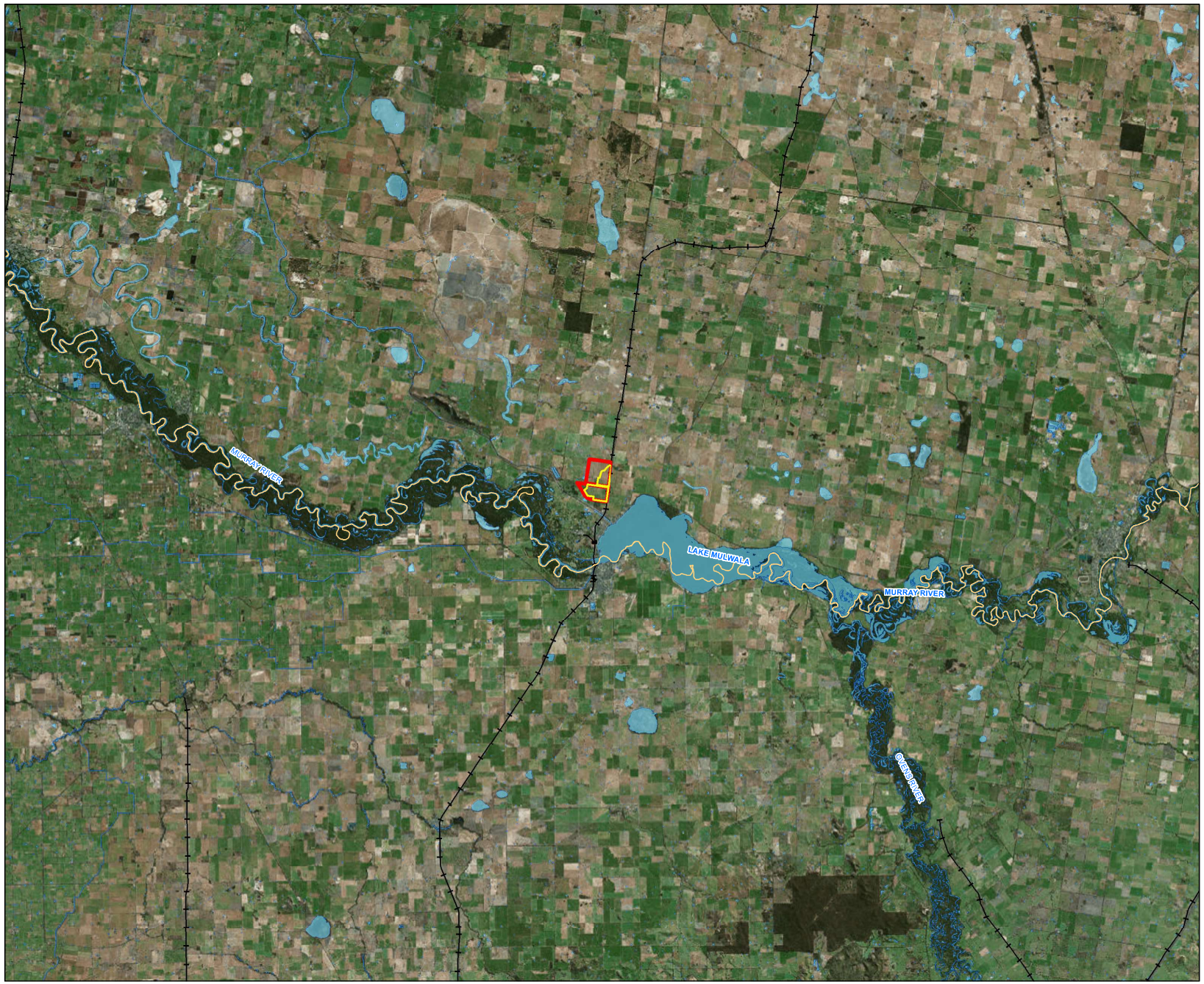
> "Development for the purpose of electricity generating works or heat or their co-generation (using any energy source, including gas, coal, biofuel, distillate, waste, hydro, wave, solar or wind power) that:
>
> a) Has a capital investment value of more than $30 million, or
>
> b) Has a capital investment value of more than $10 million and is located in an environmentally sensitive area of State significance".

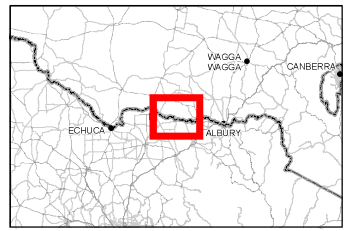
The proposed Mulwala Solar Farm is expected to have a capital cost exceeding $30 million. Accordingly, the Project would be classified as an SSD under Part 4 of the EP&A Act.

The Minister for Planning (or their delegate) determines development applications for SSD under Part 4 of the EP&A Act. The Minister may delegate the consent authority function to the NSW Planning Assessment Commission (PAC) in certain circumstances where there is objection from local government, or over 25 submissions are received during the EIS exhibition period.

1.6 Capital investment

While the proposed Mulwala Solar Farm is currently in the feasibility and design stage, a Capital Investment Value (CIV) of up to 119 million dollars has been calculated by a qualified quantity surveyor. The solar farm will require up to 215 hectares within a secured land tenure area of up to 420 hectares and comprise up to 300,000 photovoltaic modules.





LEGEND

- Project Boundary
- Development Footprint
- Watercourse / Waterbody
- NSW/VIC State Border
- Highway
- Main Road
- Railway

N

0 3.5 7 10.5 14

Kilometers

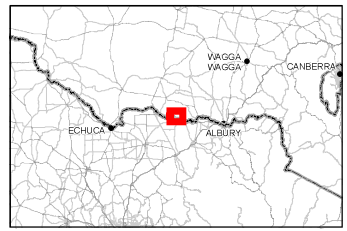
APPROX SCALE 250,000 @ A3
GDA 1994 MGA Zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

DATA SOURCES
Road and rail network provided by Streetpro © PSMA Australia 2012.
Watercourse data provided by DELWP 2018.
Imagery from Esri basemap layer.

RPS

Figure 1
Regional Context
Mulwala Solar Farm



LEGEND

- Project Boundary
- Development Footprint
- 66kV
- 132kV
- Waterbody
- Watercourse
- Highway
- Main Road
- Local Road

N

0 1 2 3 4
Kilometers

APPROX SCALE 70,000 @ A3
GDA 1994 MGA Zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

DATA SOURCES
Road network provided by Streetpro © PSMA Australia 2012.
Watercourse data provided by DELWP 2018.
Imagery from Esri basemap layer.

RPS

Figure 2
Local Context
Mulwala Solar Farm

1.7 Secretary's Environmental Assessment Requirements

A request for Secretary's Environmental Assessment Requirements (SEARs) for the Project was submitted to DP&E on 17 January 2018. The SEARs were subsequently issued by DP&E on 5 February 2018.

Table 1 presents the general requirements and key issues to be addressed in the EIS in accordance with the SEARs and identifies where each requirement is addressed in this EIS. A copy of the full SEARs for SSD 18_9039 is contained within **Appendix A.**

Table 1 Summary of Secretary's Environmental Assessment Requirements (SSD 18_9039)

Secretary's Environmental Assessment Requirements	Reference within EIS
General requirements	
The Environmental Impact Statement (EIS) for the development must comply with the requirements in Schedule 2 of the *Environmental Planning and Assessment Regulation 2000.*	Entire EIS
In particular the EIS must include:	
• a stand-alone executive summary;	Page 2
• a full description of the development, including:	
◦ details of construction, operation and decommissioning;	Section 3
◦ a site plan showing all infrastructure and facilities (including any infrastructure that would be required for the development, but subject to a separate approvals process); and	
◦ a detailed constraints map identifying the key environmental and other land use constraints that have informed the final design of the development;	
• a strategic justification of the development focusing on site selection and the suitability of the proposed site with respect to potential land use conflicts with existing and future surrounding land uses (including other proposed or approved solar farms, rural residential development and subdivision potential);	Section 4
• an assessment of the likely impacts of the development on the environment, focusing on the specific issues identified below, including:	
◦ a description of the existing environment likely to be affected by the development;	Section 8
◦ an assessment of the likely impacts of all stages of the development (which is commensurate with the level of impact), including any cumulative impacts, taking into consideration and relevant legislation, environmental planning instruments, guidelines, policies, plans and industry codes of practice;	
◦ a description of the measures that would be implemented to avoid, mitigate and/or offset the impacts of the development (including draft management plans for specific issues as identified below); and	
◦ a description of the measures that would be implemented to monitor and report on the environmental performance of the development;	Section 9
• a consolidated summary of all the proposed environmental management and monitoring measures, identifying all of the commitments in the EIS; and	
• the reason why the development should be approved having regard to:	
◦ relevant matters for consideration under the *Environmental Planning and Assessment Act 1979*, including the objects of the Act and how the principles of ecological sustainable development have been incorporated in the design, construction, and ongoing operations of the development;	Section 10
◦ the suitability of the site with respect to potential land use conflicts with existing and future surrounding land uses; and	
◦ feasible alternatives to the development (and its key components), including the	

Secretary's Environmental Assessment Requirements	Reference within EIS
consequences of not carrying out the development. In addition to the matters set out in Schedule 1 of the *Environmental Planning and Assessment Regulation 2000*, the development application must be accompanied by: • a signed report from a suitably qualified person that includes an accurate estimate of the capital investment value of the development (as defined in Clause 3 of the *Environmental Planning and Assessment Regulation 2000*), including details of all the assumptions and components from which the capital investment value calculation is derived; and • the consent in writing of the owner/s of the land (as required in Clause 49(1)(b) of the *Environmental Planning and Assessment Regulation 2000*).	Completed, but confidential Landowner consent will be provided to DP&E upon lodgement.
Specific issues	
This EIS must address the following specific issues:	
Land – including • an assessment of the impact of the development on agricultural land, and flood prone land, a soil survey to consider the potential for erosion to occur, and paying particular attention to the compatibility of the development with existing land uses on the site and adjacent land (e.g. operating mines, extractive industries, mineral or petroleum resources, exploration activities, aerial spraying, dust generation, and biosecurity risk) during operation and after decommissioning, with reference to the zoning provisions applying to the land, in particular the R2 – Low Density Residential zone; and • measures to remediate the land following decommissioning in accordance with *State Environmental Planning Policy No 55 – Remediation of Land.*	Section 8.7
Biodiversity – including an assessment of the likely biodiversity impacts of the development in accordance with the *Biodiversity Conservation Act 2016* (NSW), a detailed description of the proposed regime for minimising, managing and reporting on biodiversity impacts of the development over time, and a strategy to offset any residual impacts of the development in accordance with the *Biodiversity Conservation Act 2016* (NSW).	Section 8.4 and Appendix I
Visual – including an assessment of the likely visual impacts of the development (including any glare, reflectivity and night lighting) on surrounding residences, scenic or significant vistas, air traffic and road corridors in the public domain, including a draft landscaping plan for on-site perimeter planting, with evidence it has been developed in consultation with affected landholders.	Section 8.3 and Appendix G
Heritage – including an assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the development, including adequate consultation with the local Aboriginal community.	Section 8.5 and Appendix J
Transport - including an assessment of the site access route (including Tocumwal Road, Yarrawonga Road, Savernake Road and Melbourne Street), site access point, any potential rail safety issues and likely transport impacts (including peak and average traffic generation) of the development on the capacity and condition of roads (including on any Crown Land), a description of the measures that would be implemented to mitigate any impacts during construction, and a description of any proposed road upgrades developed in consultation with the relevant road and rail authorities (if required).	Section 8.2 and Appendix F
Noise – including an assessment of the construction noise impacts of the development in accordance with the *Interim Construction Noise Guideline* (ICNG) and operational noise impacts in accordance with the *NSW Noise Policy for Industry* 2017 and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria.	Section 8.1 and Appendix E
Water – including:	Section 8.6 and Appendix H

Secretary's Environmental Assessment Requirements	Reference within EIS
• an assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources (including wetlands, riparian land, groundwater dependent ecosystems and acid sulfate soils), related infrastructure, adjacent licenced water users and basic landholder rights, and measures proposed to monitor, reduce and mitigate these impacts; • details of water requirements and supply arrangements for construction and operation; and • a description of the erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with *Managing Urban Stormwater: Soils & Construction* (Landcom 2004).	
Hazards and risks – including: • a preliminary risk screening in accordance with *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development* and *Applying SEPP 33* (DoP, 2011), and if the preliminary risk screening indicates the development is "potentially hazardous", a Preliminary Hazard Analysis (PHA) must be prepared in accordance with *Hazard Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis* (DoP, 2011) and *Multi-Level Risk Assessment* (DoP, 2011); and • an assessment of all potential hazards and risks including but not limited to bushfires, spontaneous ignition, electromagnetic fields or the proposed grid connection infrastructure (including the proposed transmission line and substation) against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) *Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields*.	Section 8.10
Socio-economic – including an assessment of the likely impacts on the local community and a consideration of the construction workforce accommodation.	Section 8.8
Consultation	
During the preparation of the EIS, you should consult with the relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups, affected landowners, exploration licence holders, quarry operators, and mineral title holders. In particular, you must undertake detailed consultation with affected landholders surrounding the development and Federation Council. The EIS must describe the consultation that was carried out, identify the issues raised during this consultation, and explain how these issues have been addressed in the EIS.	Section 6 and Appendix B

1.8 Project team

RPS has prepared the subject EIS on behalf of ESCO Pacific. Specialist consultants were also engaged to undertake technical assessments for the development and to provide relevant input into the EIS. Details of the project team are shown below in Table 2.

Table 2 EIS project team

Name	Organisation	Area of assessment
Chris Alderton	RPS	Project Director and EIS author
Samantha Garvitch Kylie McFadyen Valerie Donat	RPS	Preparation of EIS chapters

Name	Organisation	Area of assessment
Erin Williams Jeremy Hill Laura Cross	RPS	Aboriginal and historic heritage
Matt Doherty	MJD Environmental Pty Ltd	Biodiversity
Nathan Heinrich Sam Wales	RPS	Surface water and groundwater
Ben Ewins	RPS	Visual impact and landscaping
Peter Meredith	Peter Meredith Consulting Pty Ltd	Traffic and access
Ray Walsh	Ray Walsh Acoustics, Noise and Sound	Noise assessment
Cedric Berge Allison Hawke	ESCO Pacific	Community and Stakeholder Engagement and Technical Review

1.9 Document structure

This EIS is provided in two volumes. **Volume 1** comprises the main report (this document) and sets out development in the context of the existing environment, planning considerations, key environmental issues, potential impacts, and mitigation measures.

Volume 2 contains the technical assessments which have been summarised into Section 8 of the main EIS document (**Volume 1**).

The sections of the EIS are summarised below in Table 3.

Table 3 EIS structure and context

Volume and section	Description
Volume 1 – Main Report	
Executive Summary	Provides an overview of the entire EIS
Section 1 – Introduction	Provides a summary of the proposed development, including the site, development, applicant, and content of the EIS
Section 2 – Site description	Provides a description of the site at a regional and local level
Section 3 – Project description	Provides a description of the proposed development, including all operational and construction aspects
Section 4 – Project justification and alternatives	Provides the reasons for the development of the Project, including the alternative locations, designs and impacts of not proceeding with the development
Section 5 – Planning and statutory framework	Describes the relevant planning and environmental approvals applicable to the development
Section 6 – Consultation and stakeholder engagement	Describes the consultation process with stakeholders, including local community and surrounding businesses,

Volume and section	Description
	government agencies, and interested parties
Section 7 – Environmental risk assessment	Provides a list of the key environmental issues for the Project, including a risk ranking for each issue identified and proposed mitigation
Section 8 – Impact assessment, mitigation and management	Provides a description of the existing environment, the methodology used for impact assessment, predicted impacts from the proposal, and a description of the management and monitoring measures
Section 9 – Statement of commitments	Describes the measures to avoid and/or mitigate the potential environmental impacts of the Project
Section 10 – Justification and conclusion	Provides a justification for the proposal, including a consideration of the positive and negative social, economic and environmental impacts as well as the principles of Ecologically Sustainable Development (ESD)
Section 11 - References	Provides a list of the reference material used to prepare the EIS, including guidelines, reports prepared for other projects and specialist assessments prepared for the EIS
Volume 1 – Appendices	
Appendix A	Secretary's Environmental Assessment Requirements
Appendix B	Correspondence and consultation
Appendix C	Commonwealth land assessment
Appendix D	Environmental Risk Assessment
Volume 2 – Appendices	
Appendix E	Noise Impact Assessment
Appendix F	Traffic Impact Assessment
Appendix G	Visual Impact Assessment
Appendix H	Surface Water and Groundwater Assessment
Appendix I	Biodiversity Impact Assessment
Appendix J	Aboriginal and Historic Heritage Assessment

RPS

2 Site description

2.1 Overview

The Project covers an area of 420 hectares and is located approximately two kilometres north of Mulwala Township in NSW. The development footprint for the solar farm requires an area of 215 hectares. The site is located within a rural setting on lands owned by one landholder, described as Lot 1 DP DP100773, Lot 1 DP134511, Lot 2 DP134511, Lot 3 DP134511, Lot 4 DP134511, Lot 5 DP134511, Lot 6 DP134511, Lot 7 DP134511, Lot 103 DP752290, Lot 114 DP752290, Lot 115 DP752290, Lot 116 DP752290, Lot 125 DP752290, Lot 132 DP752290, Savernake Road, Mulwala. The site falls wholly within the Federation LGA.

The Project is bound 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 six kilometres to the south in Victoria, and the Riverina Highway approximately 25 kilometres to the north.

The land comprises flat-lying open paddocks. The southeast paddock is irrigated with water pumped from a bore.

A 132 kV transmission powerline runs along the southwest boundary of the project area (along Tocumwal Road) and connects into Essential Energy's Mulwala 132kV substation located south of the boundary of the project area. Services to the site are provided by Essential Energy for electricity (to the Mulwala substation) and by Telstra for communications. Sewerage treatment and potable water supplies are established and maintained independently by landowners. District irrigation channels in the locality are managed and maintained by Murray Irrigation Limited, whilst on farm irrigation channels are owned and operated by individual landowners.

Significant disturbance of the natural environment within the project area has occurred as a result of the long history of grazing and cropping activities. The visual amenity of the project area has the same character as the surrounding rural landscape, with the surrounding area being predominantly agricultural inter-dispersed with residential dwellings.

Details of the project area, including local roads, power, and substation, are shown on **Figure 3**.

2.2 Existing site use

The property which forms the project area is an agricultural and grazing enterprise. The project area comprises six paddocks which are separated by wire fences, some of which are in poor condition, or have open gates 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).

Refer to **Plate 1** to **Plate 8** below for visual examples of the existing site use.

2.3 Existing approvals

As the property within the development footprint has historically been under farming operations there are no previous Development Approvals (DA) across the sites apart from DAs for the establishment of residential dwellings and associated farm buildings. The Project has a lifespan of 40 years after which the property could be returned to traditional farming. Throughout the duration of the solar farm's lifespan, opportunistic cropping and grazing will continue where possible and it is assumed that slashing and grazing will occur to maintain grass below 100 millimetres in height.

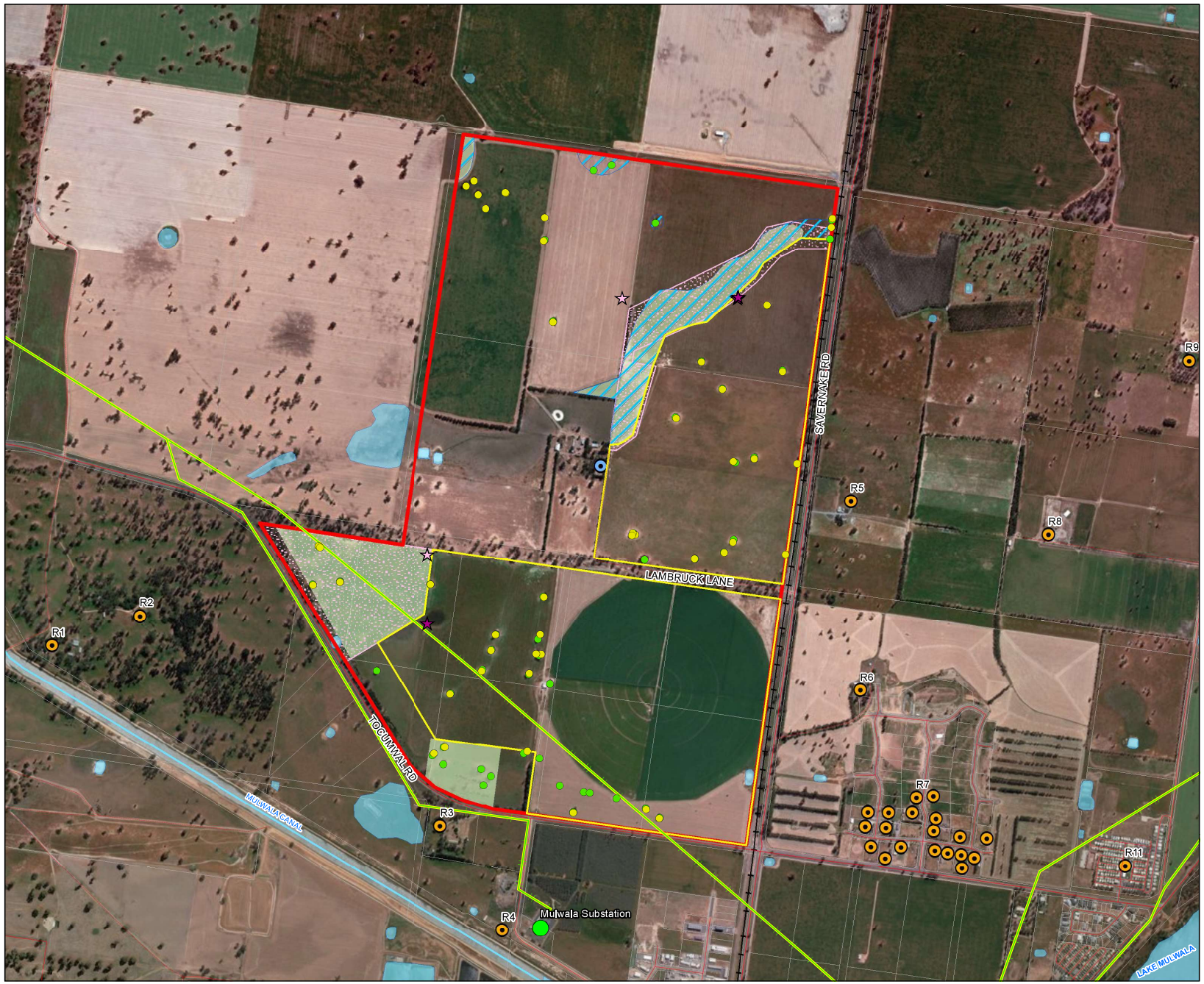
2.4 Land ownership

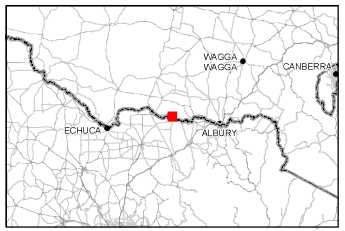
The project area is currently under the ownership of one private landowner.

The Applicant has entered into a tenure arrangement with the landowner which will exceed five years and will therefore require reconfiguration of the lots as per Section 7A of the *Conveyancing Act 1919*.

Land ownership would remain unchanged for all lots.

Owners consent has been obtained for the lodgement of the Development Application (DA) and supporting EIS documentation.





LEGEND

Mulwala Solar Farm

- Project Boundary (combined lot boundary - 430 hectares)
- Development Footprint (215 hectares)
- Landholder associated with the project
- Sensitive Receiver

Ecological Value

- Native Vegetation
- Scattered Trees (within project boundaries)
- Scattered Trees with hollows

Aboriginal Heritage

- Aboriginal sensitive area
- Potential Aboriginal Artefacts to be avoided or salvaged
- Potential Aboriginal Artefacts to be

Hydrology

- Watercourse
- Waterbody
- Areas Subject To Inundation

Others

- Cadastral Boundaries
- Substation
- Transmisson Lines
- Railway

N

0 220 440 660 880

Meters

APPROX SCALE 15,000 @ A3

GDA 1994 MGA Zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

DATA SOURCES

Road network provided by Department of Environment, Land, Water and Planning (DELWP) Web Map Service.

Watercourse data provided by DELWP 2018.

Imagery from Esri basemap layer.

RPS

Figure 3

Project Site

Mulwala Solar Farm

Plate 1 Cropping land within the southern portion of the project area, looking east.

Plate 2 Cropping lands within the southern portion of the project area looking north.

RPS

Plate 3 Cropping lands in the south eastern portion of the project area looking north.

Plate 4 Cropping land in southwest portion of project area looking south.

Plate 5 Dam and remnant trees located in the southwest portion of the project area looking northwest.

Plate 6 Access track located within the middle portion of the project area looking northeast.

RPS

Plate 7 Land and tree belt located in northern portion of the project area looking south.

Plate 8 Shade tree located in northwest portion of the project area looking east.

2.5 Zoning and permissibility

The project area is zoned RU1 Primary Production and R2 Low Density Residential under the Corowa Local Environmental Plan 2012.

The following lots are zoned RU1 Primary Production:

- Lot 1 DP DP100773
- Lot 1 DP134511
- Lot 2 DP134511
- Lot 5 DP134511
- Lot 6 DP134511
- Lot 7 DP134511
- Lot 115 DP752290
- Lot 116 DP752290
- Lot 125 DP752290
- Lot 132 DP752290

RU1 zoning provides for the following:

> **"1 Objectives of zone**
>
> - 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.
>
> **2 Permitted without consent**
>
> *Environmental protection works; Extensive agriculture; Home-based child care; Home occupations; Intensive plant agriculture; Roads.*
>
> **3 Permitted with consent**
>
> *Airstrips; Animal boarding or training establishments; Bed and breakfast accommodation; Building identification signs; Business identification signs; Camping grounds; Cellar door premises; Cemeteries; Community facilities; Correctional centres; Depots; Dual occupancies; Dwelling houses; Eco-tourist facilities; Environmental facilities; Extractive industries; Farm buildings; Farm stay accommodation; Forestry; Freight transport facilities; Heavy industrial storage establishments; Heavy industries; Helipads; Home businesses; Home industries; Home occupations (sex services); Industrial training facilities; Information and education facilities; Intensive livestock agriculture; Landscaping material supplies; Open cut mining; Plant nurseries; Recreation areas; Recreation facilities (major); Recreation facilities (outdoor); Research stations; Roadside stalls; Rural industries; Rural workers' dwellings; Veterinary hospitals.*
>
> **4 Prohibited**
>
> Any development not specified in item 2 or 3

The following lots are zoned R2 Low Density Residential:

- Lot 3 DP134511
- Lot 4 DP134511
- Lot 103 DP752290
- Lot 114 DP752290

R2 zoning provides for the following:

1 Objectives of zone

- 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 the residents.

2 Permitted without consent

Environmental protection works; Home-based child care; Home occupations; Roads

3 Permitted with consent

Bed and breakfast accommodation; Boarding houses; Boat launching ramps; Building identification signs; Business identification signs; Centre-based child care facilities; Community facilities; Dwelling houses; Emergency services facilities; Environmental facilities; Exhibition homes; Exhibition villages; Group homes; Health services facilities; Home businesses; Home industries; Home occupations (sex services); Information and education facilities; Jetties; Moorings; Neighbourhood shops; Recreation areas; Recreation facilities (indoor); Recreation facilities (outdoor); Recreational accommodation; Respite day care centres; Water recreation structures; Water recycling facilities; Water supply systems.

4 Prohibited

Attached dwellings; Medical centres; Multi dwelling houses; Residential flat buildings; Rural workers' dwellings; Semi-detached dwellings; Water treatment facilities; Any other development not specified in item 2 or 3.

RU1 solar farm permissibility

Electricity generating works or solar energy systems are prohibited within RU1 zones, however under Clause 34(1) of the *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP):

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

Under Clause 33 of the ISEPP, a "prescribed rural zone" includes land zoned as RU1 Primary Production. Accordingly, the proposed development within RU1 satisfies Clause 34 of the ISEPP and is permitted within zone RU1 Primary Production.

Clause 34(7) of the ISEPP goes on to state that development of electricity generation works or solar energy systems are permissible on any land with consent, particularly if there is compatibility with local land use objectives, 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.*"

RPS

R2 solar farm permissibility

Electricity generating works or solar energy systems are prohibited within R2 zones, however under Part 4, Division 4.1, Section 89E of the *Environmental Planning and Assessment Act 1979* (EP&A) the Minister has the authority to determine a development application in respect of State significant development. Subclause 3 states *"development consent may be granted despite the development being partly prohibited be an environmental planning instrument."*

The land zoning for the site is shown on **Figure 4**.

Lot reconfiguration requirement

A reconfiguration of the existing lots will be required that conflicts with the requirements of the LEP. However, Federation Council has expressed support for the Project and has provided in-principle agreement for the reconfiguration to proceed.

The proposed lot reconfiguration for the site is shown in **Figure 12**.

2.6 Surrounding land use

The Project is surrounded to the north, west, and northeast by rural (RU1) properties where cropping and grazing is the dominant land use. Land immediately southwest of the project area is zoned R2 and comprises a recent residential subdivision within a much larger piece of undeveloped land. Mulwala Business Park is located within land to the south of the project area which is zoned IN1 General Industrial.

Mulwala sits within the Federation Council area an includes a township with residential, commercial and industrial land uses and surrounding rural areas. Rural land surrounding the Project is mainly dairy farming and agriculture (including cropping, grazing and irrigation).

Plate 9 to **Plate 12** below shows surrounding land use activities to the project area.

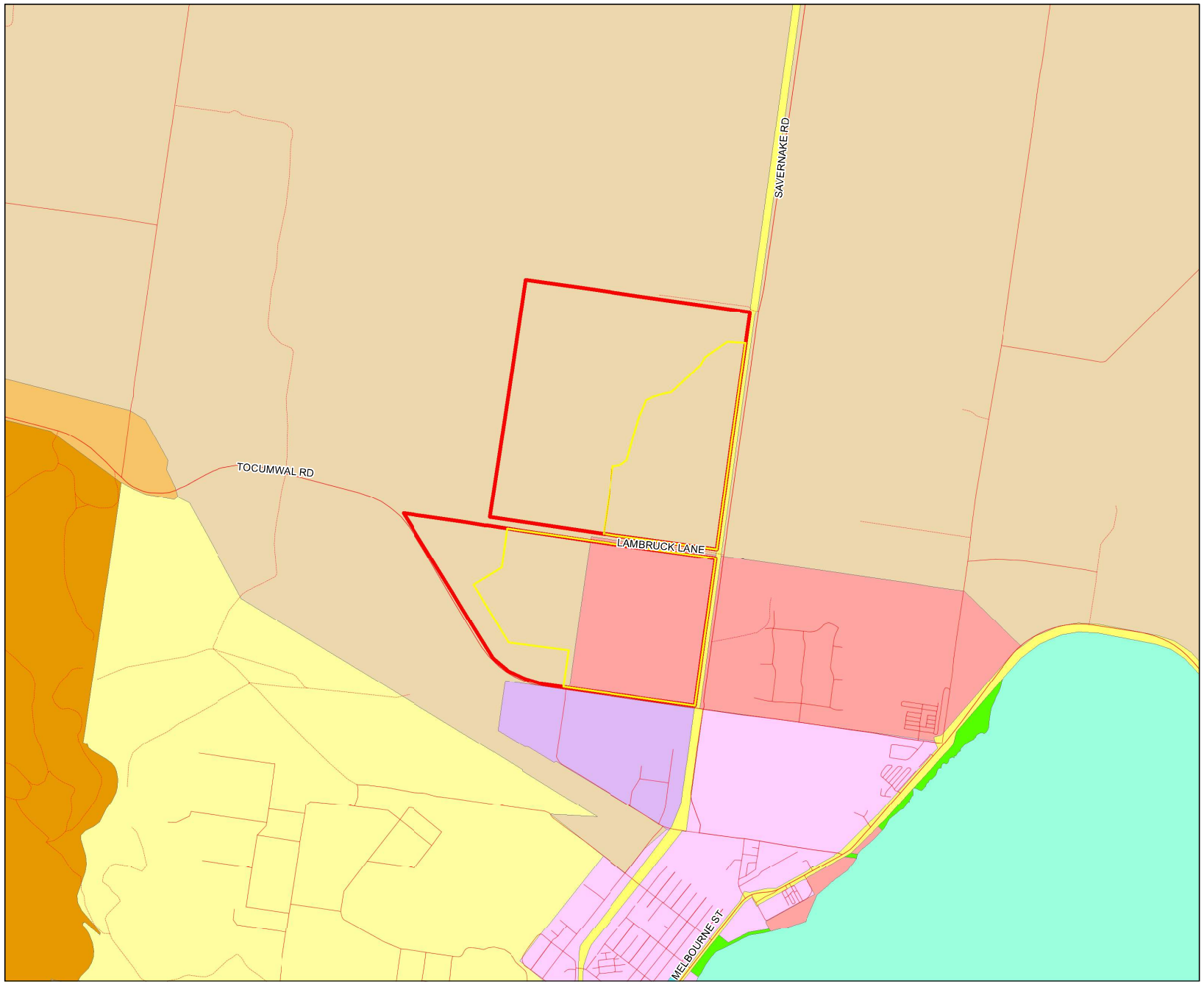
Figure 5 shows the surrounding landscape, including the separation distance between the project area and the surrounding residential properties and the local road network. The location of surrounding receptors and their distance from the project area are also detailed below in Table 4.

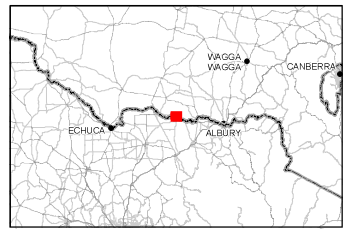
A commonwealth land assessment was conducted to review the impact of the Project on surrounding commonwealth land. Further details are provided in **Appendix C.**

Table 4 Surrounding receptors and distance from the project area

Receiver	Address	Proximity to Proposal (approx.)
R1	511 Tocumwal Road Mulwala 2657 (A)	1000m
R2	511 Tocumwal Road Mulwala 2657 (B)	750m
R3	279 Tocumwal Road Mulwala 2647	250m
R4	93 Barooga Road Mulwala 2647	500m
R5	290 Savernake Road Mulwala 2647	250m
R6	96 Cypress Way Mulwala 2647	365m
R7	Residential Subdivision (A)	420m
R8	139 Little Bull Plain Road Mulwala 2647	1120m
R9	223 Little Bull Plain Road Mulwala 2647	1500m

Receiver	Address	Proximity to Proposal (approx.)
R10	124 Little Bull Plain Road Mulwala 2647	1800m
R11	Residential Subdivision (B)	1400m
R12	Fringe of Mulwala Township (A)	1000m
R13	Fringe of Mulwala Township (B)	1120m
R14	Industrial Zone	50m





LEGEND

- Project Boundary
- Development Footprint

Land Zone

- B2 Local Centre
- E1 National Parks and Nature Reserves
- E3 Environmental Management
- IN1 General Industrial
- R1 General Residential
- R2 Low Density Residential
- RE1 Public Recreation
- RU1 Primary Production
- SP1 Special Activities
- SP2 Infrastructure
- W2 Recreational Waterways

N

0 350 700 1,050 1,400

Meters

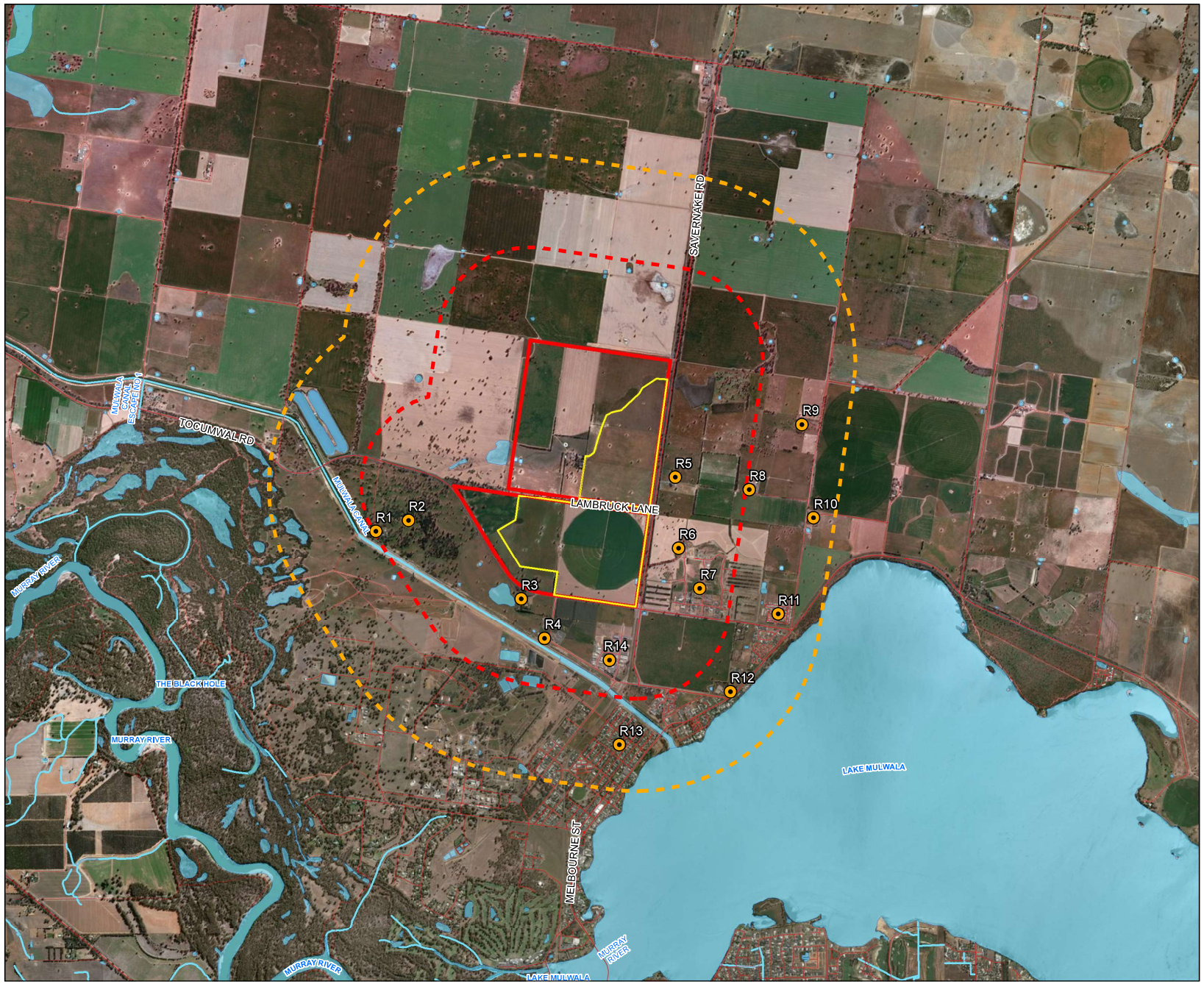
APPROX SCALE 25,000 @ A3
GDA 1994 MGA Zone 55

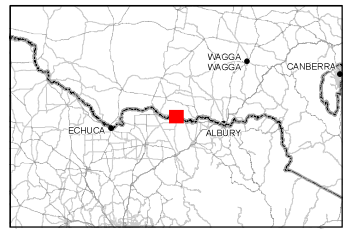
Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

DATA SOURCES
Road network provided by Department of Environment, Land, Water and Planning (DELWP) Web Map Service.
Land Zone data provided by NSW Department of Planning and Environment 2015.
Imagery from Esri basemap layer.

RPS

Figure 4
Land Zoning
Mulwala Solar Farm





LEGEND

- Project Boundary
- Development Footprint
- 1km Offset Buffer
- 2km Offset Buffer
- Sensitive Receiver
- Waterbody
- Watercourse

N

0 0.6 1.2 1.8 2.4

Kilometers

APPROX SCALE 40,000 @ A3
GDA 1994 MGA Zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

DATA SOURCES
Road network provided by Department of Environment, Land, Water and Planning (DELWP) Web Map Service.
Watercourse data provided by DELWP 2018.
Imagery from Esri basemap layer.

RPS

Figure 5
Surrounding Receivers
Mulwala Solar Farm

Plate 9 View of the project area from Mulwala-Savernake Road

Plate 10 Essential Energy Substation

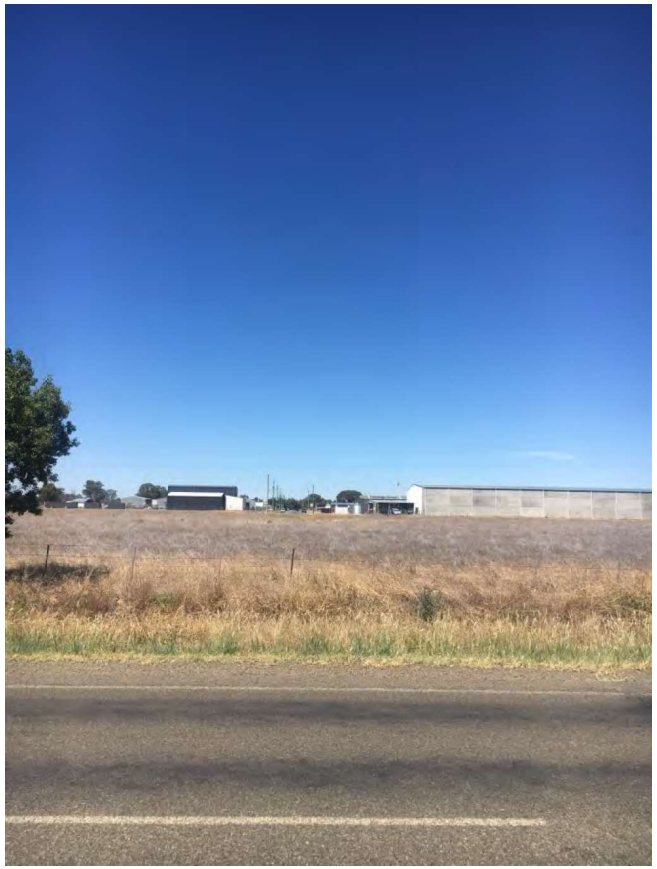


Plate 11 View of industrial area along Mulwala-Savernake Road

Plate 12 Rural views along Mulwala-Barooga Road

2.7 Soils, topography and hydrology

Soils of the Riverine Plains landscape underlie the project area and the majority of the surrounding local area. The soils range from shallow to moderately deep (less than one metre thick) and form a surface crust. Topsoils are prone to structural decline and loss by wind erosion. Low lying areas have poor drainage, soils deform easily, and have poor trafficability when wet. Some scalding can occur where topsoils are lost and expose sodic subsoils. Some localised salinity may be present (OEH Espade 2018).

The Riverine Plains soil landscape consists of Red and Brown Sub-plastic Chromosols and Sodosols, with less common Reddish Brown Chromosols/Vertosols and Grey and Brown Self-mulching and Epipedal Vertosols. Parent materials include clays, silts, and sands from various past flow regimes of the Murray and Murrumbidgee Rivers and their associated paleochannels. The area is generally flat with a slope in the order of one percent (OEH Espade 2018).

The Riverina covers the alluvial fans of the Lachlan, Murrumbidgee and Murray Rivers west of the Great Dividing Range and extends down the Murray. Much of the geology and geomorphology of the region is similar to that of the Darling Riverine Plains Bioregion.

The upper catchment landscape is a series of overlapping, low gradient alluvial fans. The lower tract of the river is a floodplain with overflow lakes. Discharge from past and present streams control patterns of sediment deposition, soils, landscapes and vegetation.

The surrounding catchment is mainly a broad floodplain that contains an intricate network of creeks, floodrunners and billabongs. Sand hills and natural levees associated with some waterways give some relief to an otherwise flat landscape. The River Murray cuts a wide and deep course through the central catchment as its flows westward. The central catchment starts in the gently rolling foothills of the Great Dividing Range, east of Albury. The hills soon give way to an ever-widening floodplain, and for most of the length of the central catchment, broad riverine plains flank either side of the Murray River.

Further details on soils and site hydrology are discussed in Section 8 of this EIS.

2.8 Biodiversity

The project area occurs wholly within the Riverina Bioregion and the Murray Fans subregion. The Riverina Bioregion is an ancient riverine plain and alluvial fans composed of unconsolidated sediments with evidence of former stream channels. Vegetation of this bioregion consists of river red gum and black box forests, box woodlands, saltbush shrublands, extensive grasslands and swamp communities (Thackway & Cresswell 1995). This Bioregion is borders the Southwest slopes bioregions to the north and east, the Murray darling depression to the south west and the Victorian midlands bioregion to the south.

The current extent of native vegetation within the project area is sparse and discontinuous in the landscape due to the extensive agricultural practices on the subject land such as cropping and grazing. Native vegetation observed within the project area was limited to canopy cover of paddock trees, a small isolated group of trees with a disturbed exotic understorey and planted native tree windrows, planted after 1990 and excluded from the project area. The native vegetation extent has been assessed as 3.05% of the project area.

Further detail on flora and fauna present across the project area is provided in Section 8.4.

2.9 Surrounding receivers

The project area is located within the zones RU1 Primary Production and R2 Low Density Residential under the Corowa LEP 2012. As a result of the historical agricultural land use of the area the closest receivers are either rural or residential in nature. The bulk of receivers are situated within a residential development south-east of the project area and there are isolated residences located to the south west and east, as shown in

Figure 5. A total of 14 residential receivers are located within a 2km buffer of the project site and 6 within 1km.

2.10 Climate

To characterise the meteorology of the region surrounding the facility, long-term climate records and meteorological monitoring data was drawn upon from the nearest and longest operating weather station. Meteorological monitoring data from the Bureau of Meteorology (BoM) Automatic Weather Station (AWS) at Yarrawonga was utilised (BoM Site: 081124).

Winds from the south-west and north-west are most frequent on an annual basis, generally prevailing during the autumn, winter, and spring periods. During the summer periods winds prevail more from a south-westerly direction only.

Monthly rainfall is relatively consistent across all months and seasons, with only a slight increase in rainfall during the winter and spring months. Mean monthly rainfall ranges from 44.9 millimetres in February to 41.2 millimetres in June. Mean annual rainfall is 475.3 millimetres.

Mean monthly minimum temperatures are in the range of 3.5°C to 15.9°C, with mean monthly maximums of 13.5°C to 32.7°C. The warmest months generally occur during summer between November and March.

3 Project description

3.1 Overview

The Project is a utility scale renewable energy development that will generate up to 80 MW(AC) of clean and renewable electricity. Mulwala has been chosen due to the relatively high solar irradiance in the region, and the available capacity on the Essential Energy and TransGrid electricity networks.

The solar farm operation will comprise up to 300,000 solar photovoltaic modules, known more commonly as 'PV Modules' or 'solar panels'. The solar panels use the same type of technology as commonly used in residential scale solar installations throughout Australia but are larger in size to those used residential applications.

The solar farm is a large infrastructure project that is expected to create up to 130 jobs during construction, and up to four full-time and eight part-time positions when operational.

The solar panels will generate direct current (DC) electricity that will be inverted to alternating current (AC) via Power Conversion Units (PCUs). Output from the solar farm would then be connected to the existing electricity network by underground or above ground high voltage cable to the Mulwala 132kV substation. Details of the site layout, ecological constraints, access roads, easements, and closest receivers are shown in **Figure 10**.

3.2 Infrastructure design and site layout

The Project would be built as a utility scale solar PV plant, with the solar panels mounted in rows on horizontal tracking or fixed tilt systems.

The rows of solar panels are electrically connected into arrays before being inverted from DC to AC electricity, which is the standard form of electricity used throughout Australia. Electricity is then fed via an on-site high voltage power reticulation system, into the local electricity network through the Essential Energy Mulwala 132kV substation. Infrastructure design and site layout aspects are discussed further below.

3.2.1 Key project components

The following section provides an overview of the key infrastructure items to be established for the Project. These include:

- Installation of up to 300,000 solar panels in regular arrays.
- Each solar panel would be fixed to a metal mounting structure secured with ground piles.
- Above ground and underground DC cabling.
- Central inverters, step up transformers, and switchgear (known as PCUs).
- Underground AC cabling would run from the PCUs to the solar substation.
- A main step up transformer and associated equipment.
- Internal vehicle access tracks.
- Perimeter safety fencing and security system.
- Supervisory control and data acquisition (SCADA) control systems.
- Site office and staff amenities and maintenance shed.

- A permanent staff and contractor car parking area.
- A permanent all-weather access and access road.
- Temporary site compound, lay-down area, and equipment storage areas during construction.
- Battery storage area

The above components are discussed in further detail in the following sections.

3.2.2 Solar arrays and ground mounts

The solar array would comprise up to 300,000 individual solar panels which would either be multicrystalline, monocrystalline, or thin film technology. Each solar panel would be fixed to a metal mounting structure that would be piled or screwed into the ground without the need for any excavation work or use of concrete. This technique is used to minimise ground disturbance. The PV mounting structure would slowly track (in a single axis) the horizontal movement of the sun through the use of an automated tracker unit. Alternatively, fixed tilt mounting structures may also be used. Under both scenarios the height of the fixing systems and modules would not exceed four metres in height.

Figure 6 below shows typical PV panels at a solar farm grouped in solar arrays.

Source: Array Technologies

Figure 6 PV modules and solar array

3.2.3 DC cabling

Direct current (DC) cabling will be utilised to connect each PV module in a string (up to 300,000 modules) to field combiner boxes mounted underneath the solar panels. The combiner boxes will be located approximately one metre off the ground between the PV arrays. DC cabling will be installed underground at

a minimum depth of one metre between the DC boxes and the PCUs. DC cabling will be installed in accordance with Australian Standards and also with the requirements of *Primefact 1063: Infrastructure Proposals on Rural Land* (DPI 2013).

Underground DC cabling will run from the combiner boxes to the central inverters.

3.2.4 Power conversion unit

Within each array block is a PCU which contains the central inverters, step-up transformers, and switchgear which convert DC electricity collected from the PV panels into 33kV electricity for connection and distribution via the Mulwala 132kV substation. The PCU (and associated equipment) is typically designed to be housed within a shipping container for easy transport and installation onsite. A PCU is typically 13 metres long, 2.5 metres wide, and three metres high. **Figure 7** below illustrates the appearance of a typical PCU with the relevant power conversion equipment installed. There are estimated to be 20 PCUs for the project.

Source: SMA Solar Technology

Figure 7 Typical Power Conversion Unit

3.2.5 AC cabling

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

3.2.6 Step-up transformer and substation

A main step-up transformer and associated equipment in a solar substation would convert the on-site AC reticulated 33kV electricity to 132kV electricity. The up-converted 132kV supply would then be connected via high voltage cable to the nearby Mulwala 132kV substation where it would enter the local electricity network. High voltage cabling would be installed in accordance with Australian standards.

RPS

3.2.7 Local transmission network

The proposed connection point for the solar farm to the Transmission Network Service Provider (TNSP) is the 132kV Mulwala substation owned and operated by Essential Energy. From the Essential Energy substation power will be distributed to the national electricity grid via the Essential Energy local power network.

3.2.8 Battery storage

The Project will also include the potential for battery storage to be installed onsite. If batteries form part of the Project they will be located within the facilities area shown in pink within **Figure 10**.

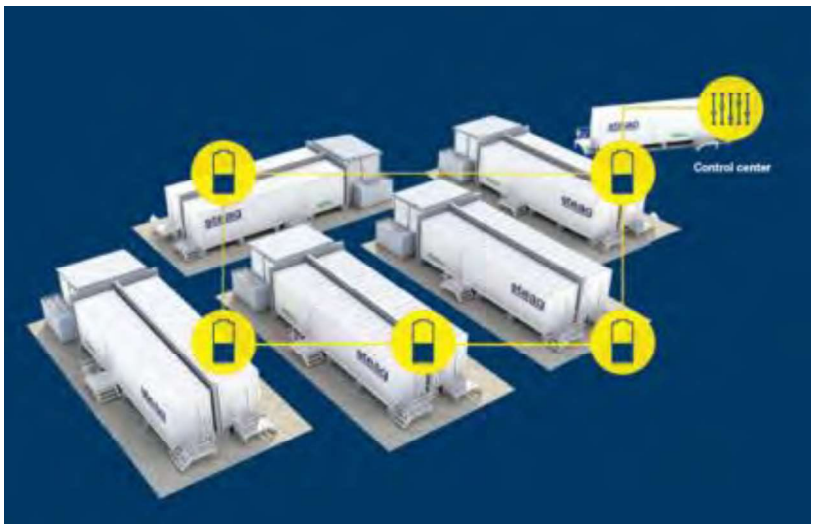
Solar farms are an intermittent source of energy. Battery storage systems can be used either to smooth the fluctuating energy produced by the solar farm or to store the excess energy during low demand periods for subsequent use during higher demand periods or when solar energy is unavailable (e.g. at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

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

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

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

Lithium ion batteries in containerised packs would be installed, as illustrated in **Figure 8** and **Figure 9**. The chosen battery will be identified in the procurement phase along with the modules and inverters. Any battery will have undergone the required hazard assessment to ensure the product meets Australian Standards and legislated safety requirements.



Source: steag.

Figure 8 Example of containerised packs

Source: Tesla.

Figure 9 PowerPack system

3.2.9 System monitoring

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

3.2.10 Internal roads

Internal vehicle access tracks would be constructed to each PCU and to the solar substation to allow for site maintenance. Onsite tracks would be constructed of compacted gravel and, where required, geotextile fabric would be laid between the soil and the gravel. Internal access tracks would be up to five metres wide to allow for the safe delivery, unloading and installation of key components such as the PCUs, PV panels, and switch equipment. The exact position of access tracks would be determined during the detailed design phase when the solar array design is finalised. Internal access tracks are private roads designed and constructed only for construction, operation and maintenance purposes. Internal roads are shown in **Figure 10**.

3.2.11 Site office and staff amenities

A site office and staff amenities building will be constructed or installed at the site. The dimensions of the building are expected to be approximately 16 metres long, 10 metres wide and three metres high. All visitors and contractors will be required to report to the site office upon entry to the site. Office features will include staff offices and a control room. Staff amenities will include toilets, showers, a lunch room, and a first aid room. The location of the site office for operations is shown in **Figure 10**.

3.2.12 Maintenance building

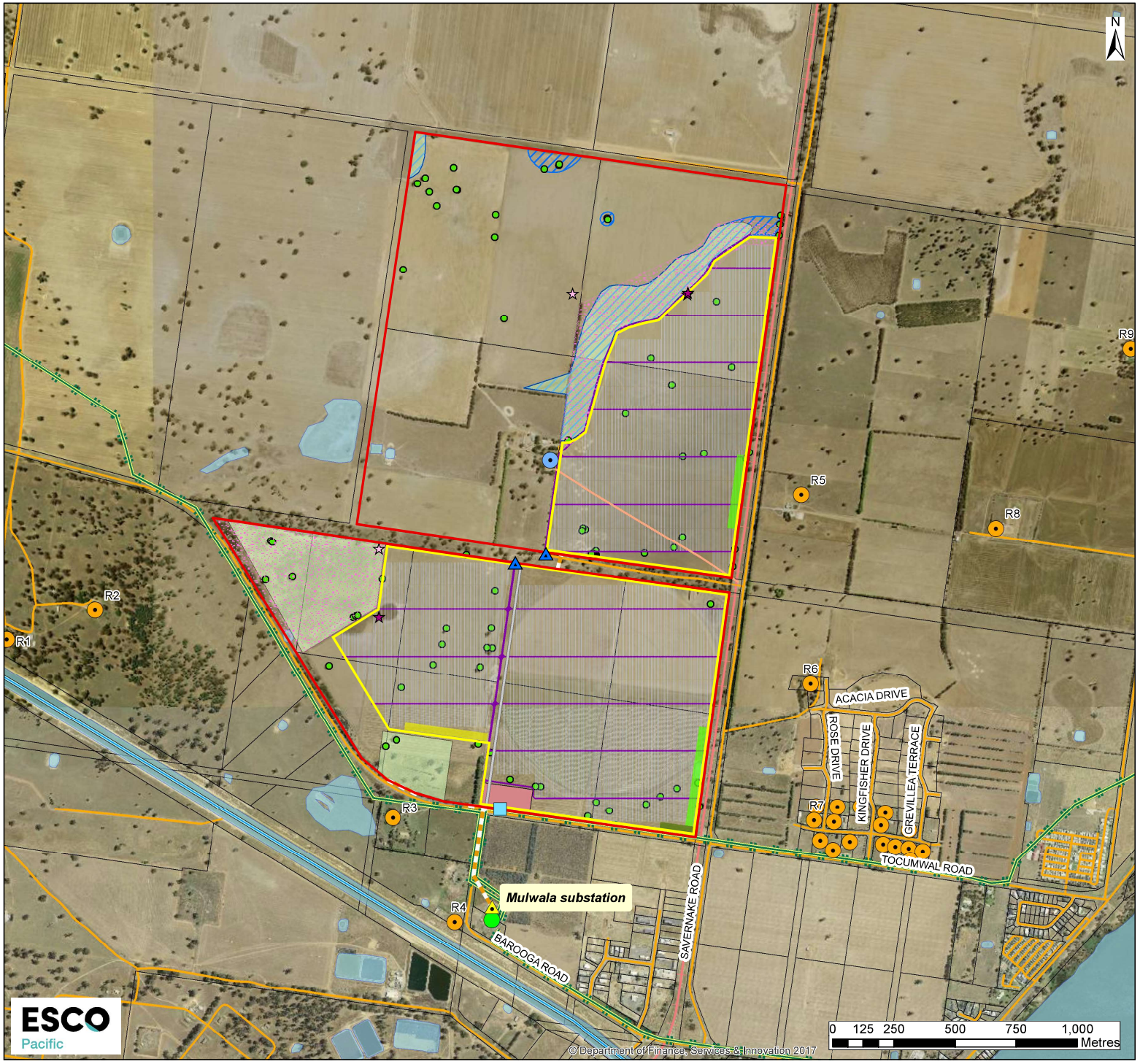
A maintenance building will be established adjacent to the site office and will provide storage for spare parts and maintenance equipment and will include a workshop. The maintenance shed will be approximately 25 metres long, 15 metres wide, and six metres high. The workshop building will be approximately 15 metres long and 10 metres wide (refer **Figure 10**).

3.2.13 Site access and parking

Internal vehicle access tracks would be constructed to each PCU and to the solar substation to allow for site maintenance. Onsite tracks would be constructed of compacted gravel and, where required, geotextile fabric would be laid between the soil and the gravel. Internal access tracks would be up to four metres wide to allow for safe delivery, unloading and installation of key components such as the PCUs, PV panels, and switch equipment.

The main access to the project area is via Savernake Road into Lambruck Lane with a minor access to the switching yard from Tocumwal Road. All primary transportation roads are classified as designated B-double routes and they meet the Austroads standards for road capacity. Infrastructure and road access is shown on **Figure 10**.

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



PROJECT
Mulwala Solar Farm

MAP TITLE
Project Layout

Title Info: Lot 1 in DP100773 Lots 1-7 in DP134511
Lot 103, 114-116, 125, 132 in DP 752290

LEGEND

Mulwala Solar Farm
- Project Boundary (Combined Lot Boundary - 420 hectares)
- Development Footprint (215 hectares)
- PV Solar Array
- Site Office, Maintenance Shed, Switchyard and Battery Storage area
- Internal Access Tracks
- Connection Point
- Connecting Cable
- Indicative Access Points
- Indicative Access Points (Switchyard and O&M only)
- Landholder associated with the project
- Sensitive Receivers

Preliminary Landscape Design Intent
- Mitigative Vegetation Buffer
- Intermittent Vegetation Buffer
- Densification of Existing Vegetation

Ecological Value
- Native Vegetation
- Scattered Trees (within project boundaries)

Aboriginal Heritage
- Aboriginal sensitive area
- Potential Aboriginal Artefacts to be avoided or salvaged
- Potential Aboriginal Artefacts to be avoided

Hydrology
- Watercourses
- Areas subject to inundation
- Murray Irrigation channel
- Dam / Water features

Others
- Cadastral Boundaries
- Essential Energy Substation
- Essential Energy Transmission lines
- Easement (11m wide, variable length)
- 22kV Distribution line (to be relocated or avoided)
- Roads / Tracks
- Railway

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3.3 Site services and utilities

3.3.1 Site power

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

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

3.3.2 Water and sewerage supply

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

Once operational, it is anticipated that the development will collect water from building roofs and utilise onsite water storage tanks (2 x 35,000L tanks). It is anticipated that 500 kilolitres (kL) of water would be used during operations each year for cleaning, maintenance, and staff amenities. Water would be trucked in during periods when there is insufficient rainfall to fill onsite water tanks.

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

3.3.3 Communications

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

3.4 Construction

3.4.1 Construction materials

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

- Aggregates, road base, and concrete.
- Steel fencing materials.
- Steel piles and ground screws.
- Steel mounts and bolts.
- Cabling, conduit, and weather proof junction boxes.
- PV modules and mounting structures.
- Shipping containers to house central inverters.
- Weatherproof DC boxes and steel posts.
- Steel framing and Colorbond sheeting for maintenance shed and site office.
- Timber and fixtures for building fit-out.

3.4.2 Site preparation

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

- Slashing and/or removal of areas of vegetation approved for removal.
- Removal of existing fencing and establishment of boundary fencing.
- Establishment of access points and main entry roads for delivery of machinery and equipment.
- Undertaking land survey, geotechnical and other preliminary investigations.
- Establishment of ancillary facilities including the site compound, laydown areas, and temporary contractor facilities.

3.4.3 Infrastructure installation

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

- Installation of internal roads and access tracks.
- Installation of drainage works and regrading of surface features (where required).
- Construction of the permanent site office, maintenance shed, and switch yard.
- Installation of the mounting structures foundations by driving steel piles pneumatically into the ground using specialist equipment (dependant on ground conditions ground screws may be used).
- Attachment of steel mounting structures to the ground piles.
- Installation of the solar panels onto the mounting structures, including tracker units.
- Installation and connection of the solar panels to the DC boxes with aboveground cabling.
- Installation of the PCUs.
- Connection of the DC boxes to the PCUs by trenching and underground cabling, and connection of the PCUs to the onsite power reticulation system and step-up transformer.
- Grid connection through the installation of underground mains from the step-up transformer to the Mulwala 132kV substation.
- Commissioning and testing of PV strings, central inverters, switch equipment, step-up transformer, monitoring systems, and electrical protection systems.

3.4.4 Construction equipment

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

- 1 x truck and dog for civil works.
- 1 x D6 dozer or equivalent for levelling and road development.
- 1 x 24 tonne excavator for earthworks.
- 1 x grader for road development and levelling activities.

- 1 x mulcher for the mulching and re-use of vegetation material onsite.
- 1 x 7 tonne vibrating roller for road construction.
- 1 x front end loader for the movement and loading of soil and aggregate materials.
- 1 x water cart for road construction and dust suppression.
- 1 x piling rig for installing PV piles.
- 1 x Franna crane for the lifting of loads, erection of steel, and movement of heavy plant.
- 2 x trenchers for the installation of underground conduits and cabling.
- 1 x portable generator for temporary site power.
- Hand power tools and equipment.

3.4.5 Construction schedule

The construction of the proposed Mulwala Solar Farm is expected to take up to eight months, with each construction aspect and duration detailed below in Table 5.

Table 5 Construction schedule

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

3.5 Commissioning and operations

3.5.1 Commissioning activities

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

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

- PV module strings.
- Central inverters.

- Transformers.
- Switching equipment.
- Lightning protection systems.
- Earthing protection systems.
- Electrical protection systems.
- Grid connection compliance protection and disconnection systems.
- SCADA system (including meteorological stations).
- Support structures.
- Security systems.

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

3.5.2 Operational activities

The Project is anticipated to have an operational life up to 40 years. A minimal number of personnel would be required for the operation and maintenance of the project.

Operational activities will involve monitoring of equipment on a daily basis, full servicing of inverters and substation equipment on an annual basis and cleaning of the solar panels at regular intervals depending on how the system performance is benchmarked to weather conditions. There will be no storage of hazardous or dangerous goods or materials onsite during the operation of the Project.

Generally, it is expected that the solar panels would need cleaning up to two times during any calendar year. Any water required for cleaning of the panels will be brought to the site in water trucks.

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

3.6 Workforce

3.6.1 Construction

The anticipated number of construction workers onsite will be approximately 130 staff. It is expected that the majority of the workforce will be sourced from the local area. Any non-local specialised contractors are likely to come from across other areas of NSW and would utilise accommodation in Mulwala, Yarrawonga or Corowa. The majority of the construction staff movements will be made to/from site using mini buses from Mulwala.

3.6.2 Operations

It is proposed that there will be four operational staff posted at the solar facility to manage the site activities and to support routine plant operations and maintenance. It is envisaged that the majority of these operational staff would originate from Mulwala or the surrounding region.

3.7 Hours of operation

3.7.1 Construction

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

It is anticipated that construction activities would be staggered over an eight month period which will allow for the gradual development and commissioning of the facility.

3.7.2 Operations

As the solar farm only generates power during daylight hours, site staff would only be present during the daytime to provide operational and maintenance support. Except in response to any emergencies, staff would work 7:30am to 4:30pm, Monday to Saturday.

3.8 Traffic generation

3.8.1 Construction

It is anticipated that the average traffic generation during the construction phase will peak at 156 movements per week, or 39 movements per day. This comprises an average of 15 light vehicles (minivan and cars) and 9 heavy vehicles per day. Construction traffic will be generated from the following sources:

- Light vehicle movements for construction workers;
- Delivery of high voltage equipment, PV components, and related construction materials;
- Delivery of construction materials for the permanent site office, switch yard, and maintenance buildings;
- Delivery of temporary construction worker toilets, lunchrooms, and site office;
- Mobilisation and de-mobilisation of heavy plant and equipment; and
- Delivery of aggregates and concrete for civil works.

Further detail on construction traffic movements and impacts is discussed in Section 8.2 below.

3.8.2 Operations

It is anticipated that the average traffic generation during operations will peak at 14 movements per week, or less than two movements per day. This comprises less than 1 heavy vehicle per week and less than 13 light vehicles per week. Operational traffic will be generated from the following sources:

- Electricians and operators;
- Water trucks;
- General delivery of replacement equipment and parts;
- Labour for PV module cleaning; and
- Labour for general maintenance.

Further detail on operational traffic movements and impacts is discussed in Section 8.2 below.

3.8.3 Decommissioning

It is anticipated that the average traffic generation during decommissioning will peak at 156 movements per week, or 39 movements per day. This comprises an average of 15 light vehicles (minivan and cars) and 9 heavy vehicles per day.

Decommissioning of the Project will comprise the following:

- Light vehicle movements for construction workers;
- Removal of high voltage equipment, PV components, and related construction materials;
- Removal of construction materials for the permanent site office, switch yard, and maintenance buildings;
- Removal of temporary construction worker toilets, lunchrooms, and site office; and
- Mobilisation and de-mobilisation of heavy plant and equipment;
- Further detail on decommissioning traffic movements and impacts is discussed in Section 8.2 below.

3.9 Fire management

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

Once the solar farm is constructed and operational, the lands in and around the PV panels, PCUs, and site office will require maintenance to ensure that the potential for fire is kept low. Areas easy to access will be maintained by the use of a tractor mounted slasher. More difficult areas in between the PV panels would be maintained through the use of sheep to reduce grasses.

A 20,000 litre water tank, solely for fire protection purposes, will be located adjacent to the site office and will be fitted with a 65 millimetre storz fitting to allow for the attachment of Rural Fire Service (RFS) appliances. The tank will be located to ensure that there is suitable all-weather access for the RFS fire tankers and appliances.

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

Fire management is further discussed in Section 8.10.5.1 of this report.

3.10 External lighting

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

3.11 Site security

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

3.12 Landscaping

Landscaping will be undertaken at strategic locations along site boundaries to minimise visual impacts to the surrounding dwelling and home yard area of nearby residences. Based on the results of a **Visual Impact Assessment** undertaken for the development, and avoiding areas of biodiversity significance, landscaping is recommended along the development area boundaries as shown in **Appendix G**. Proposed landscaping for visual screening purposes would involve the layered planting of three metre wide vegetation strips along those areas identified in **Appendix G**. Development of the landscape plan has been undertaken in consultation with the affected surrounding landowners.

Further detail on the **Visual Impact Assessment** and mitigation measures are discussed below in Section 8.3.

3.13 Surface water management

The 420 hectare surveyed project area is located on property primarily used for dry land broadacre farming (cropping and grazing). The south-eastern corner of the property has been established for centre-pivot irrigation, supplied by a groundwater bore. The remaining land is naturally slightly undulating and has been extensively cultivated for many years. Various natural depressions are scattered across the property that typically become waterlogged when inundated. There is minimal off-site drainage with some discharge to local depressions or roadside table drains near property boundaries, meaning that most surface water on the property either infiltrates to groundwater or evaporates.

The site is not flood prone and the construction, operation and decommissioning of the proposed works do not impact the existing inundation characteristics that may arise from localised stormwater runoff events. The proposed works are minor in nature with respect to surface water movement and do not significantly alter the flow direction, intensity or volume of runoff arising from the property. The existing surface water conditions on the property will remain, with the areas subject to possible localised inundation excluded and buffered from development to maintain existing storage capacity of runoff waters. Despite no flooding or stormwater risk affecting the site, nuisance inundation has the potential to impact development infrastructure. This risk is mitigated by installation of critical infrastructure (such as substation and ancillary infrastructure) 300 millimetres minimum above natural surface levels.

The Project will not significantly alter the existing pattern and direction of surface water movement across the property, with no changes to the natural ground surface due to the foundations for the solar panels. The existing surface water characteristics will remain unchanged and will continue to discharge to the natural depressions on the site, which have been excluded and buffered from the development footprint.

Other pervious areas will be maintained with grass cover to maximise rainfall infiltration and limit risk of sediment movement off site. The small increases in runoff volumes and changes to runoff characteristics due to the increased imperviousness of the site (from access tracks, etc) are adequately managed through the implementation of the operational ESCP, which includes appropriate water control features (such as infiltration trenches, sediment capture devices, etc) to maximise infiltration and minimise the risks of sediment movement.

There is a minor risk of contamination related to unintended spillages of fuel, lubricants, herbicides, sewage and other chemicals however this risk is controlled through implementation of operational procedures regarding storage, use and emergency management.

It is noted that the reduction in irrigation volume on the property as a result of the change in land use to a solar farm presents a positive impact to surface water conditions by reducing the average soil moisture content across the property, meaning there is more potential to absorb rainfall (despite the slight increase in imperviousness of the site due to access tracks) and reduce runoff volumes discharging to the internal depressions or off-site.

Further detail on surface water management and design is discussed in the **Surface and Groundwater Assessment** included in **Appendix H** and in Section 8.6 of the EIS.

3.14 Environmental management

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

- Introduction.
- Environmental policy.
- Organisational structure.
- Description of activities.
- Identification of environmental issues and impacts.
- Environmental management and monitoring.
- Contingency plans and emergency response.
- Complaints management.
- Auditing and reporting.
- Continuous improvement.

The CEMP and OEMP will be formally developed during the post-approvals process in consultation with relevant government agencies. The OEMP will be a living document that is updated as necessary to incorporate any key operational changes. A decommissioning management plan (DMP) will be prepared three years before the planned decommissioning of the Project (see Section 3.15.1 below).

3.15 Site decommissioning

3.15.1 Decommissioning Management Plan

In alliance with the requirements of the SEARs, measures to remediate the land following decommissioning is required in accordance with *State Environmental Planning Policy No 55 – Remediation of Land.*

Three years prior to the commencement of decommissioning activities, a Decommissioning Management Plan (DMP) would be prepared in consultation with DPI Agriculture and the landholder, and submitted for approval by DPE. The DMP would include the following key elements:

- Rehabilitation strategies and objectives.
- Rehabilitation design criteria.
- Productivity targets to ensure the reestablishment of agricultural production (if agreed as the final land use).
- Expected timeline for rehabilitation works.
- Mitigation measures and monitoring.

3.15.2 Infrastructure removal

At the end of Mulwala Solar Farm's operational life of 40 years, the development area would be decommissioned. During decommissioning, all above ground infrastructure would be removed. Key elements of project decommissioning are expected to include:

- Disconnection of the solar farm from the Essential Energy connection point at the Mulwala substation.
- Disconnection and removal of the PV modules, and removal of mounting posts, mounting frames and trackers. Materials would be sorted and packaged for removal from the site for recycling or reuse. Many of the solar array panels are expected to be recyclable.
- Removal of all buildings and equipment, with materials recycled wherever possible.
- Removal of steel columns and cabling for recycling.
- Recycling of fencing (unless requested otherwise by the landholder).
- Site rehabilitation, remediation (if required), and return to pre-existing land use (unless otherwise agreed with the landholder).

3.15.3 Site rehabilitation

Following infrastructure removal, the following would be undertaken to reinstate the site for agricultural activities:

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

3.15.4 Final land use

At the conclusion of the project, all site infrastructure will be removed and the site rehabilitated to enable agricultural activities to resume.

RPS

4 Project justification and alternatives

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

4.1 Climate change and renewable energy

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

The enhanced greenhouse effect is resulting in (Department of the Environment and Energy 2018b):

- Record high surface air temperatures.
- Increased average number of hot days per year.
- Decreased average number of cold days per year.
- Increasing intensity and frequency of extreme events (e.g. fires, floods).
- Changing rainfall patterns.
- Increasing sea surface temperatures.
- Rising sea levels.
- Increasing ocean heat content and acidification.
- Changing Southern Ocean currents.
- Melting ice caps and glaciers.
- Decreasing Arctic sea ice.

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

The Paris Agreement establishes a durable and dynamic framework for all countries to take climate action from 2020 and building on existing international efforts in the period to 2020. Key objectives of the agreement include (Department of the Environment and Energy 2018c):

- A global goal to hold average temperature increase to well below 2ºC and pursue efforts to keep warming below 1.5ºC above pre-industrial levels.
- All countries to set mitigation targets from 2020 and review targets every five years to build ambition over time, informed by a global stocktake.
- Robust transparency and accountability rules to provide confidence in countries' actions and track progress towards targets.

- Promoting action to adapt and build resilience to climate impacts.
- Financial, technological and capacity building support to help developing countries implement the Agreement.

At the Paris COP21 conference, Australia committed to reducing its emissions to 26 to 28 per cent below 2005 levels by 2030. The replacement of energy from fossil fuel sources with energy from renewable sources, such as solar power, is a key mechanism for reducing emissions. The Australian and NSW Governments are making efforts to reduce greenhouse gas emissions through the development of strategies and targets relating to renewable energy generation. These are discussed further in Section 4.2 below.

4.2 Energy context in Australia

In addition to greenhouse gas reduction, efforts are being made by both the Australian and NSW Government to improve energy security, reduce prices for consumers, diversify the energy mix, and facilitate the adoption of renewable technologies.

4.2.1 Electricity generation in Australia

4.2.1.1 Renewable energy target

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

In 2011, the RET was split into two parts comprising a large-scale RET scheme and a small-scale RET 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. In June 2015, the Australian parliament passed the *Renewable Energy (Electricity) Amendment Bill 2015* and the current RET is 33,000 GWh by 2020 with interim and post 2020 targets adjusted accordingly (Clean Energy Regulator 2017). The current projection is that about 23.5 per cent of Australia's electricity generation in 2020 will be from renewable sources.

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 (Department of the Environment and Energy 2018d).

The proposed Mulwala Solar Farm will contribute to 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. The Project will produce approximately 430,000 MWh/year of renewable electricity which would assist Australia to meet its RET and provide power for approximately 59,000 homes.

4.2.1.2 National energy guarantee

The Australian Government has recently committed to implementing a National Energy Guarantee as recommended by the independent Energy Security Board. Formed out of the Independent Review into the Future Security of the National Energy Market (the Finkel Review), the Energy Security Board comprises an independent chair and deputy chair, and the expert heads of the Australian Energy Market Commission (AEMC), the Australian Energy Regulator (AER), and the Australian Energy Market Operator (AEMO).

The Guarantee is made up of two parts (Department of the Environment and Energy 2018e):

- A reliability guarantee will be set to deliver the right level of dispatchable energy – from ready-to-use sources such as coal, gas, pumped hydro and batteries – needed in each state. It will be set by the AEMC and AEMO.
- An emissions guarantee will be set to contribute to Australia's international commitments. The level of the guarantee will be determined by the Commonwealth and enforced by the AER.

The Guarantee aims to deliver affordable and reliable energy for households and businesses without subsidies, taxes, emissions trading schemes or carbon prices. It is intended to be a market-based solution that will integrate energy and climate policy to deliver a more affordable, reliable, and lower emissions energy system.

The Australian Government is working through the Guarantee with the Energy Council – a group of Federal, State and Territory energy ministers – with the intention of reaching consensus to back and implement the proposal.

The development of renewable energy projects such as the Mulwala Solar Farm is likely to be important if the Guarantee is to be successful in achieving its aims. The implementation of the Guarantee will also help to develop a favourable investment environment for such projects.

4.2.2 Electricity generation in NSW

The NSW Government, through the *NSW Climate Change Policy Framework* (State of NSW and Office of Environment and Heritage 2016) has a long-term objective of achieving net zero emissions by 2050. The Framework recognises the importance of reducing greenhouse gas emissions in energy generation, and the opportunities which the renewable energy industry offers for the State.

The NSW Government's *Renewable Energy Action Plan* (NSW Government 2013) promotes the development of renewable energy in NSW to support the achievement of the national target of 20 per cent renewable energy by 2020. The plan intends to work with NSW communities and the renewable energy sector to increase renewable energy generation in NSW, with the least cost to the energy consumer and the maximum benefits to NSW. The plan has 24 actions under three goals:

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

In response to the commitments in the *Renewable Energy Action Plan*, including the incorporation of a strategic and integrated approach to assessment, and demonstrating early and effective community engagement on projects, the NSW Government recently released the *Draft Large-Scale Solar Energy Guideline* (NSW Government 2017). The guideline outlines the key assessment issues for State significant solar energy projects, such as land use conflict, biodiversity and visual impacts. It also seeks to encourage genuine and early consultation with the community and stakeholders, consistent with best practice engagement principles. Engagement on the draft closed on 16 February 2018 and feedback is now being considered by the NSW Government.

4.2.2.1 Climate Change Fund Strategic Plan 2017-2022

The Climate Change Fund Strategic Plan 2017-2022 sets out priority investment areas and actions utilising $500 million of new funding from the $1.4 billion Climate Change Fund. It is hoped that investment in these areas will help New South Wales make the transition to a net zero emissions by 2050, and adapt to a changing climate.

The strategic plan organises potential actions into three priority investment areas that will form the basis of future action plans. The priority investment areas include:

- Accelerating advanced energy (providing up to $200 million);
- National leadership in energy efficiency (providing up to $200 million); and
- Preparing for a changing climate (proving up to $100 million).

The advanced energy priority area focuses on supporting the transition to a net-zero emissions economy, accelerating new technology to reduce future costs, and helping the stakeholders make informed decisions about a net zero emissions future.

4.3 Project benefits

4.3.1 Government level benefits

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

Key project benefits include:

- Addressing the aims of the Paris Agreement on reducing greenhouse gas emissions.
- Contribute to the Commonwealth's renewable energy target.
- Contribute to NSW achieving net-zero emissions by 2050 as set out in the *NSW Climate Change Policy Framework*.
- Deliver on commitments in the NSW *Renewable Energy Action Plan*.
- Assist in meeting energy demand and improving energy security for NSW in the context of the regulatory framework for the National Electricity Market.
- Generation of approximately 80 MW (AC) at full capacity, which is enough to power approximately 40,500 homes which:
  - Assists the national transition to renewable energy production.
  - Assists in meeting the future electricity demands.
- Reduction in State greenhouse gas emissions – based on an emission factor of 0.87 kilograms of carbon dioxide equivalent (CO_2-e)/kWh (DIICCSRTE 2013) the Mulwala Solar Farm would displace approximately 186,000 tonnes of CO_2-e or greenhouse gas emissions per year, which assists in achieving RETs.
- Attracting renewable energy investment and projects.
- Building community support for renewable energy.

- Attracting and growing expertise in renewable energy.

For context, a solar energy facility that displaces 100,000 tonnes of CO_2 per year is the equivalent of taking approximately 30,000 petrol vehicles off the road each year, based on an average car in NSW travelling 14,100 kilometres per year (Department of Infrastructure and Transport 2011).

The project is classified as a State Significant Development and has an estimated capital investment value higher than $30 million. It represents a significant new investment in NSW, with direct and indirect economic flow-on effects. These will be particularly apparent at a regional level, where the project will represent a welcome investment in an important rural area of the State and will contribute to a more diversified and sustainable income base.

4.3.2 Local project benefits

Local social and economic benefits that would be associated with the construction and operation of the Mulwala Solar Farm include:

- An increase in direct local employment. The Project is expected to require up to 130 staff and contractors during the eight month construction period, many of whom will come from the local area. During operation, the project is expected to provide long-term local employment opportunities for four staff, as well as requiring support from local contractors in site management and maintenance activities. The expected 40-year duration of the project means that it will be a long-term employer in the region.
- Stimulation of the local economy, particularly during the construction period, through workforce demand for accommodation, hospitality, retail and other services, as well as through the local hire and supply of equipment and materials.
- Attracting and growing expertise in renewable energy, through the provision of education and training opportunities for contractors and local residents, as well as practical on-the-job experience, resulting in an increase and diversification of the local skills base, with many of these skills transferable to other projects.
- Contributions to local infrastructure improvements.
- The Project has the potential to act as a seed for further investment in the region, particularly in the area of renewables and new technologies. This will help to diversify the local income base and provide alternative sources of income during periods when tough climatic or market conditions are depressing agricultural returns.

4.3.3 Commercial benefits

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

4.4 Ecologically sustainable development

Ecologically sustainable development (ESD) is the integration of environmental, social and economic considerations in policy development and decision-making processes. Australia's *National Strategy for Ecologically Sustainable Development* (Ecologically Sustainable Development Steering Committee 1992) defines ESD as "using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased".

In 1992 the Australian Government endorsed the *National Strategy for Ecologically Sustainable Development*. The strategy aims to provide governments with a framework for policy development and

decision-making in Australia using ESD principles (Ecologically Sustainable Development Steering Committee 1992).

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

> "Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends." (Ecologically Sustainable Development Steering Committee 1992)

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

a. The precautionary principle, namely that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by
    i. Careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
    ii. An assessment of the risk-weighted consequences of various options.
b. Inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.
c. Conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.
d. Improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:
    i. Polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement.
    ii. The users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.
    iii. Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms that enable those best places to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

This EIS incorporates these ESD principles as outlined below.

4.4.1 Precautionary principle

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

4.4.2 Inter-generational equity

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

The assessment of cultural heritage values (**Appendix J**) has revealed that the Project will not affect the loss of Aboriginal cultural heritage values in terms of inter-generational equity.

4.4.3 Conservation of biological diversity and ecological integrity

The development site is located on agricultural land that has been largely cleared of native vegetation. A biodiversity assessment was undertaken to identify existing ecological values of the site and potential project-related impacts. Areas of high ecological significance have been avoided through project design. Where impacts are unavoidable, these will be managed and offset appropriately. Further detail on the biodiversity assessment and relevant management and mitigation measures, including offset requirements, is provided in Section 8.4.

4.4.4 Improved valuation, pricing and incentive mechanisms

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

The removal of 33 Paddocks Trees in the project area will be offset in accordance with the NSW Biodiversity Offsets Policy for Major Projects, which will fund biological conservation activities. Offsetting is a means of placing monetary value on the environment to provide incentive for improved biodiversity outcomes.

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

4.5 Project alternatives

4.5.1 Site selection

ESCO Pacific has undergone a process of constraints and opportunities analysis to identify potential project sites in NSW and other States. Minimising environmental and social impacts and maximising efficiency were major considerations in the evaluation of alternatives. The following factors have been considered in identifying the preferred site:

- Regulatory requirements for renewable energy projects.
- Solar irradiation levels.
- Capacity of and access to existing energy grids and infrastructure.
- Potential for land acquisition.
- Land suitability (topography, existing land use, flood risk, zoning).

- 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.

4.5.2 Project design and site configuration

The design and configuration of the Project has considered the environmental and social amenity of the locality, including:

- 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 by including visual landscaping barriers.
- Consideration of the expectations and concerns of the local community, Aboriginal groups, and Federation Council.

These considerations have been balanced against the need to achieve design, construction and operational efficiencies to reduce project costs, maximise solar yields, and minimise the impacts to the surrounding environment.

4.5.3 Project footprint and micro-siting

The Project footprint at the current development site was further refined during development of this EIS. An initial investigation area of 385 hectares was reduced to 215 hectares taking into consideration a number of technical and environmental factors. Environmental factors included the ecological values of the site, the presence of Aboriginal cultural heritage, potential visual amenity and traffic movements. An 80 MW solar farm can comfortably be located within the proposed development site, without causing a significant impact to environmental or social values.

A set out in Section 8.4, the avoidance of key environmental areas, in combination with appropriate environmental safeguards during construction of the Project, is expected to ensure the development meets the requirements to avoid and minimise impacts on environmental values.

4.5.4 Do nothing option

The consequences of not proceeding with the proposal would be the loss of the identified benefits to the environment, community, and economy. These losses would include:

- Opportunity to reduce greenhouse gas emissions through clean energy technology.
- Provision of a renewable energy supply to assist in reaching the LRET.
- Additional electricity generation and supply into the National Electricity Market.
- Security of supply for both industrial and consumer users.
- Social and economic benefits of employment resulting from the construction and operation of the solar farm.

Doing nothing would avoid the environmental impacts associated with the development and operation of the proposed solar farm, however these are considered to be minimal when compared to the long term environmental impacts from the burning of fossil fuels. The impacts from the solar farm are considered to be manageable and would not result in significant long term impacts to the environment.

5 Planning and statutory framework

This section outlines the planning and statutory framework that applies to the proposal. It describes the relevant Commonwealth and NSW legislation, and the regulatory framework under which the proposal would be assessed. The permissibility of the development and requirements for lot reconfiguration are also presented.

5.1 Commonwealth legislation

5.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is administered by the Commonwealth Department of the Environment and Energy (DoEE) and provides a legal framework to protect and manage places defined as Matters of National Environmental Significance (MNES). The EPBC Act lists the following places as MNES:

- World heritage properties.
- National heritage places.
- Wetlands of international importance (including wetlands listed under the Ramsar Convention).
- Listed threatened species and ecological communities.
- Listed migratory species.
- The Great Barrier Reef Marine Park.
- Nuclear actions.
- Water resources relating to coal seam gas development and large coal mining development.
- Commonwealth marine areas.

Under Part 9 of the EPBC Act, actions that may have a significant impact on a MNES are deemed 'controlled actions' and require approval from the Commonwealth Minister for the Environment.

The assessment of the significance of the impact is based on the criteria listed in the DoEE's *Significant Impact Guidelines 1.1* (DoE 2003). Should the 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 proposal would not have an impact on MNES, and accordingly, approval from the Minister for the Environment is not required.

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 Islander groups prior to European settlement; 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 proceed 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.

No native title determination applications, determinations of native title, or Indigenous Land Use Agreements exist over the development site and native title will not be further considered in this EIS.

5.1.3 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

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

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

An ACHAR has been prepared for the Project which has determined that there are no items or areas of non-Aboriginal (historic) significance within the project area or in close vicinity. Five new sites of Aboriginal cultural heritage significance were identified within the project area. The mitigation measures are discussed further in Section 8.5 and attached as **Appendix J.**

5.2 New South Wales legislation

5.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) forms the statutory framework for environmental assessment and planning approval in NSW and is administered by the Department of Planning and Environment. The EP&A Act 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 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,

   iv. 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

   v. ecologically sustainable development.

b. To promote the sharing of the responsibility for environmental planning between the different levels of government in the state, and

c. To provide increased opportunity for public involvement and participation in environmental planning and assessment.

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

Consent for a State Significant Development is granted under Part 4, Division 4.1, Section 89E of the EP&A Act.

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

5.2.1.1 Environmental Planning and Assessment Regulation 2000

The *Environmental Planning and Assessment Regulation 2000* details the processes set out under the EP&A Act. Schedule 2 of the EP&A Regulation provides:

- Provisions for EIS development, including EIS content.
- Conditions for the preparation of environmental assessment requirements for a development, by the Secretary and approval bodies.
- Timing requirements for development applications.
- Other provisions relating to state significant infrastructure.

Clauses 84 and 85 provide provisions relating to advertising of the development, and state that the development application be placed on public exhibition for a period of no less than 30 days.

Section 7(1)(f) of Schedule 2 requires an EIS to include justification for the development, with regard to biophysical, economic and social considerations, including principles of ESD as set out on Section 7(4).

Division 6 of the EP&A Regulation relates to public participation for SSDs and includes provisions for the public exhibition period, notices of application, responding to submissions and lists the documents that are to be made publicly available.

This EIS has been prepared in accordance with the EP&A Regulation. Justification for the development, and its incorporation of ESD principles, are provided in Section 10.1. Notices of application are addressed further in Section 6.

5.2.1.2 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 confers functions on joint regional planning panels to determine development applications.

Clause 20 of Schedule 1 of the SEPP considers the following as 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 Project is classified as SSD under Part 4 of the EP&A Act, as it has a capital investment value of more than $30 million.

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

The Mulwala Solar Farm is classified as SSD under Part 4 of the EP&A Act, as it has a capital investment value of more than $30 million. The EIS has been prepared in accordance with the requirements of the SEARs as shown in Section 1.7.

5.2.1.3 State Environmental Planning Policy (Infrastructure) 2007

The *State Environmental Planning Policy (Infrastructure) 2007* 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.

Clause 34 of Part 3, Division 4, specifically refers to solar energy systems, stating that, except as provided by Subclause 8 relating to prescribed residential zones, development for the purpose of a solar energy system may be carried out by any person with consent on any land.

ISEPP states that development of electricity generation works or solar energy systems is a permitted activity on any land with consent within a 'prescribed rural zone'.

The project area is zoned RU1 Primary Production and R2 Low Density Residential under the Corowa Local Environment Plan (LEP) 2012.

Under RU1 zoning, electricity generating works or solar energy systems are prohibited, however under the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) development of electricity generation works or solar energy systems is permissible on any land with consent within a 'prescribed rural zone'.

Under Clause 34 of the ISEPP:

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

Under Clause 33 of the ISEPP, a 'prescribed rural zone' is defined as:

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

R2 Low Density Residential is not considered 'prescribed rural zone' but will be determined by the Minister under Part 4, Division 4.1, Section 89E of the EP&A Act.

Division 15, Subdivision 2 of the SEPP sets out the requirements for the management of development adjacent to rail corridors.

Clause 84 states that *development involving access via level crossings includes a likely significant increase in the total number of vehicles or the number of trucks using a level crossing that is in the vicinity of the development*. While it is not expected that the railway line will see a significant increase in traffic, the Australian Rail Track Corporation has been contacted about this project with no response in regards to the intended works.

Division 17, Subdivision 2 of the SEPP sets out the requirements for the management of roads and traffic issues relating to proposed developments adjacent to road corridors and road reservations. Clause 101 states that:

2. The consent authority must not grant consent to development on land that has a frontage to a classified road unless it is satisfied that:
    a. Where practicable, vehicular access to the land is provided by a road other than the classified road, and
    b. The safety, efficiency and ongoing operation of the classified road will not be adversely affected by the development as a result of:
        i. The design of the vehicular access to the land, or
        ii. The emission of smoke or dust from the development, or
        iii. The nature, volume or frequency of vehicles using the classified road to gain access to the land, and
    c. The development is of a type that is not sensitive to traffic noise or vehicle emissions, or is appropriately located and designed, or includes measures, to ameliorate potential traffic noise or vehicle emissions within the site of the development arising from the adjacent classified road.

Accordingly, the proposed development satisfies Clause 34 of the ISEPP and is permitted within zone RU1 Primary Production.

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

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33) provides definitions for hazardous and offensive industry based on the likely impacts of the proposal. A potentially hazardous industry is defined within SEPP 33 as:

> "a development for the purpose of any industry which, if the development were to operate without employing any measures to reduce or minimise its impact, would pose a significant risk to human health, life or property, or to the biophysical environment".

The development has been designed such as to avoid significant risk to human health, life, property or the biophysical environment through either avoidance of sensitive areas or the employment of mitigation measures.

The Mulwala Solar Farm project is not considered as potentially hazardous or offensive and therefore SEPP 33 does not apply. This is discussed further in Section 8.10.

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

SEPP No.55 – Remediation of Land (SEPP 55) aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment.

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

The Mulwala Solar Farm project area is not considered to contain any evidence of contamination as discussed in Section 8.7.

5.2.1.6 State Environmental Planning Policy (Rural Lands) 2008

The *State Environmental Planning Policy (Rural Lands) 2008* aims to:

- Facilitate the orderly and economic use and development of rural lands for rural and related purposes.
- Identify Rural Planning Principles and the Rural Subdivision Principles so as to assist in the proper management, development and protection of rural lands for the purpose of promoting the social, economic and environmental welfare of the State.
- Implement measures designed to reduce land use conflicts.
- Identify State significant agricultural land for the purpose of ensuring the ongoing viability of agriculture on that land, having regard to social, economic and environmental considerations.
- Amend provisions of other environmental planning instruments relating to concessional lots in rural subdivisions.

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

The Mulwala Solar Farm project is not considered state significant agricultural land, and is unlikely to impact on such, and is consistent with the aims of the SEPP.

5.2.1.7 State Environmental Planning Policy No. 44 – Koala Habitat Protection

State Environmental 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 SEPP 44.

Corowa Shire LGA (LGA comprising Mulwala prior to creation of Federation Council in 2016) is included under Schedule 1 of SEPP 44. This EIS however, considers the presence of koala habitat and the relevant feed tree species outlined in Schedule 2 of SEPP 44 within the project area to be lacking (see Section 8.4).

5.2.2 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) establishes the State's environmental regulatory framework and includes licensing requirements for certain and is administered by the EPA.

Under Section 48 of the POEO Act, premises-based scheduled activities (as defined in Schedule 1 of the POEO Act) require an Environmental Protection Licence (EPL). Clause 17 of Schedule 1 of the POEO Act concerns electricity generation works. General electricity works is a scheduled activity and requires an EPL where the activity has the capacity to generate more than 30 MW of electrical power. General electricity generation works is defined in Schedule 1 as:

> … the generation of electricity by means of electricity plant that, wherever situated, is based on, or uses, any energy source other than wind or solar power.

The works would generate more than 30 MW of electrical power; however electricity generation would be from solar power which is not considered a scheduled activity.

An EPL under the POEO Act is not required for this proposal.

5.2.3 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 dedication of Crown land, and

f. For 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 proposed development is not intended to impact on any Crown land.

5.2.4 Roads Act 1993

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

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

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

A Traffic Impact Assessment (TIA) outlining requirements for the use of roads has been prepared as part of this EIS (refer Section 8.2 and Appendix F).

5.2.5 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) provides for the conservation of places, objects and features of significance to Aboriginal people and protection of native flora and fauna. A person must not harm or desecrate an Aboriginal object or place without an Aboriginal heritage impact permit under Section 90 of the Act. However, a Section 90 permit is not required for SSD approvals by provisions of Section 89J of the EP&A Act.

Places or objects of Aboriginal cultural heritage on or near the site will need to be managed in accordance with the NPW Act.

Potential impacts on the five Aboriginal sites located within the project area are discussed in Section 8.5 and attached as Appendix J.

5.2.5.1 National Parks and Wildlife Regulation 2009

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

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

electrical infrastructure, water or sewerage pipelines, stormwater drainage and other similar infrastructure)'.

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

An ACHAR was prepared for the Project. The assessment is discussed further in Section 8.5 and attached as Appendix J.

5.2.6 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 States 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.

An Aboriginal and Historic Heritage Assessment (refer Appendix J) has been prepared for the development which included a search of the Local and State heritage registers (refer to Section 8.5). This search found that there are no recorded heritage items within the or in the vicinity of the project area. It is considered there will be no impact to historic heritage in the locality of the development.

5.2.7 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* 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 and Wildlife Act 1974*. The Act governs the management and conservation of biodiversity in NSW, which includes all fauna, flora and ecological communities, consistent with the principles of ESD (as described in Section 6(2) of the *Protection of the Environment Administration Act 1991*. The Act establishes, amongst other things:

- A framework to avoid, minimise 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 mechanism through which the biodiversity impacts of development and land use change can be offset at landscape and scale sites.

A Biodiversity Development Assessment Report has been prepared as part of this EIS to identify the potential impacts of the Mulwala Solar Farm project on biodiversity. The project has been designed to avoid impacts to native vegetation, however 34 Paddock Trees will require removal of which 33 will require offsets. The biodiversity assessment is discussed further in Section 8.4 and Appendix I.

5.2.7.1 Biodiversity Conservation Regulation 2017

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

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

A Biodiversity Development Assessment Report (BDAR) has been prepared as part of this EIS, in accordance with the Regulation, and discusses the biodiversity offsets that will be required as a result of the Mulwala Solar Farm Project. The assessment is discussed further in Section 8.4 and attached as Appendix I.

5.2.8 Rural Fires Act 1997

The *Rural Fires Act 1997* provides:

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

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

The project area is not located on Bush Fire Prone Land. The bush fire risk of this project is discussed in Section 8.10.5.1 as required under the SEARs.

In addition, Fire and Rescue NSW (FRNSW) has requested that a comprehensive Emergency Response Plan (ERP) is developed for the project area that addresses foreseeable on-site and off-site fire events. ESCO Pacific accepts this requirement and will prepare an ERP as a condition of the Development Consent.

5.2.9 Mining Act 1992

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

There are no existing explorations or mining licenses encompassing the development project area as discussed in Section 8.7.

5.2.10 Conveyancing Act 1919

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

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

The Mulwala Solar Farm Project will lease land for a minimum of five years and therefore configuration of the lots will be required. This is discussed further in Section 5.4

5.2.11 Fisheries Management Act 1994

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

Part 7 of the Act deals with the protection of aquatic habitats and Part 7A deals with threatened species conservation. When assessing and either approving or refusing proposals for development (including SSD and infrastructure projects) or other activities affecting fish habitat, the Department of Primary Industries consider their *Policy and Guidelines for Fish Habitat Conservation and management (2013)*.

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

- Farm dams constructed on unmapped gullies and first and second order streams.
- Purpose built irrigation and other water supply channels and off-stream storage.
- Irrigation, agriculture or urban drains.

A Biodiversity Development Assessment Report (BDAR) has been prepared as part of this EIS to identify potential impacts of the Mulwala Solar Farm Project on biodiversity. The project area does not contain key fish habitat and is not known to provide habitat for threatened species. The biodiversity assessment is discussed further in Section 8.4 and attached in Appendix I.

5.2.12 Local Land Services Amendment Act 2017

The *Local Land Services Act 2013* 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 Act provides a framework for the management of local land services which includes programs and advisory services relating to agricultural production, biosecurity, natural resource management (including the management of native vegetation, weeds and pests) and emergency management.

The 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 *Environment Administration Act 1991*) in the social, economic and environmental interests of the state.

The management of local land services, specifically relating to native vegetation clearance on rural land, and the management of weeds, has been considered in this EIS (refer Section 8.7).

5.2.13 Water Management Act 2000

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

- Promote ecologically sustainable development.
- Protect, enhance and restore watercourses.
- Recognise and foster social and economic benefits.

- Recognise the role of the community.
- Provide efficient and equitable sharing of water.
- Manage water sources together with other aspects of the environment including native vegetation and native fauna.
- Encourage the sharing of responsibility and efficient use of water.
- Encourage best practice management and use of water.

The management of surface water and groundwater, and potential impacts to hydrology, have been considered in this EIS and are addressed in Section 8.6 and attached in Appendix H.

5.2.14 Biosecurity Act 2015

The *Biosecurity Act 2015* provides a statutory framework for the management of biosecurity risks from disease, pests (plant and animal) and contaminants that have the potential to cause harm to the environment, people and the economy. The 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.

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

The potential for project-related impacts from invasive weeds and pests has been considered in this EIS and is discussed in Section 8.7.

5.2.15 Native Vegetation Act 2003

The *Native Vegetation Act 2003* (NV Act) provides a framework for the management and conservation of native vegetation in NSW, in accordance with Ecologically Sustainable Design principles, with an aim of preventing broad scale clearing unless it improves the condition of high conservation value native vegetation and encourages rehabilitation of the land.

Section 89J of the EP&A Act states that for any SSD, such as the Mulwala Solar Farm, and authorisation referred to in Section 12 of the NV Act to clear native vegetation of State protected land is not required.

5.3 Environmental Planning Instruments, Policies and Plans

5.3.1 Corowa Local Environment Plan (LEP) 2012

The project area is located within the Federation Council LGA boundaries. Federation Council is still operating with the former Corowa Shire Council and would therefore be subject to 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 (south east parcels) and RU1 Primary Production (all other land 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 provides 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 100 kW*), particularly if there is compatibility with local land use objectives.

While Mulwala Solar Farm will be over 100kw, this project is State significant development and will therefore be determined by the Minister under Part 4, Division 4.1, Section 89E of the *Environmental Planning and Assessment Act 1979* (EP&A). Subclause 3 states *"development consent may be granted despite the development being partly prohibited be an environmental planning instrument."*

In addition, the Mulwala Solar Farm will have minimal impact on the ground surface and once the solar farm is decommissioned the site would be returned to its existing state.

The project area 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 south east parcels of the project area are included in this type of release area.

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 or 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 accommodate and control appropriate neighbourhood commercial and retail uses.
- Suitably located public facilities and services, including provision for appropriate traffic management facilities and parking.

Addition 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 (south east paddock) and AR (all other parcels) for subdivision. Section 4.1 of the Corowa LEP states that any size of any lot resulting from a subdivision of land to which this clause applies is not to be less than one hectare in zone Y and 250 hectares in zone AE. No exemptions exist at local government level, therefore subdivision, if required in zone AE, may not comply with the provisions in the Corowa LEP. ESCO Pacific has been consulting with Federation Council regarding subdivision requirements and the implications for project approvals. This will be further considered in this EIS.

5.3.2 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; and
- 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.

5.4 Permissibility and lot reconfiguration

5.4.1 Project permissibility

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

Key reference points include:

- Section 89E of the EP&A Act, under which consent for an SSD is granted (Section 5.2.1)
- State Environmental Planning Policy (State and Regional Development) 2011 (Section 5.2.1.2)
- The ISEPP (Section 5.2.1.3)
- The zoning and land use provisions of the Corowa LEP 2012 (Section 5.3.1)

5.4.2 Lot reconfiguration

Existing configuration

ESCO Pacific has signed an Option to Lease with the Landholder for the following land parcels: Lot 1 DP100773, Lot 1 DP134511, Lot 2 DP134511, Lot 3 DP134511, Lot 4 DP134511, Lot 5 DP134511, Lot 6 DP134511, Lot 7 DP134511, Lot 103 DP752290, Lot 114 DP752290, Lot 115 DP752290, Lot 116 DP752290, Lot 125 DP752290, and Lot 132 DP752290, Savernake Road, Mulwala, NSW (**Figure 11**).

Proposed reconfiguration

As outlined in section 5.3.1, the Mulwala Solar Farm is located within zone AE and Y for subdivision under the Federation Council LEP and any lot resulting from a subdivision is not to be less than respectively 250 hectares and 1 hectare. As per Section 7A of the Conveyancing Act 1919, the project is expected to require reconfiguration of the lots since the proposed lease with the landholder will exceed 5 years.

The reconfiguration of the lots proposed by ESCO Pacific is shown in **Figure 12**. The resultants lots would each be less than 250 ha in zone AE as follows:

- The northern area (approximately 133 hectares, encompassing the solar farm boundaries) would create a new lot which would encompass part of Lot 5 and 6 in Deposited Plan 134511 (purple in **Figure 12**).
- The southern area (approximately 82 hectares, encompassing the solar farm boundaries) would create a new lot which would encompass Lots 1, 3 & 4 in DP134511, Lots 103, 114 & 115 in DP 752290 and part of Lot 116 in DP 752290, and Lots 2 & 7 in DP 134511 (dark purple in **Figure 12**).

- A new lot would be created within the solar farm boundaries for the Switchyard (Essential Energy) with an area of approximately 2500 sq. metres (pink in **Figure 12**).
- A new lot would be created as a residual land from Lots 2 & 7 in DP 134511 and 116 in DP 755590 with a combined area of approximately 29 hectares (brown in **Figure 12**).
- A new lot would be created as a residual land from Lots 5 & 6 in DP 134511 with a combined area of approximately 43 hectares (orange in **Figure 12**).

Lot 1 in DP 100773 and Lots 125 & 132 in DP 752290 remain unchanged (blue in **Figure 12**).The proposed boundaries and areas shown on **Figure 11** and **Figure 12** are indicative at this stage and will need to be surveyed before execution of options to lease. All lots will be able to be accessed from the roads surrounding the development site (shown in red on both figures), except possibly the lot for the switchyard for which a shared access with Essential Energy may have to be created.

Land ownership would remain unchanged for all lots.

ESCO Pacific is in discussion with Federation Council to seek approval for the required subdivision of the existing lots. Federation Council stated the proposed reconfiguration of the lots did not comply with the Local Environmental Plan 2012. However, council is supportive of the development and is therefore willing to provide in-principle agreement for the reconfiguration to proceed. Council wishes to ensure that no dwelling entitlement shall be attached to any newly created lots that are under the minimum lot size.

The in-principle agreement letter from Federation Council regarding the subdivision will be provided before determination.

5.4.3 Easements

Distributors of electricity, such as Essential Energy, require electricity easements to maintain and safely operate their infrastructure. Essential Energy's infrastructure includes such things as powerlines (wires), power poles, stays, substations, underground powerlines, switching stations, padmount transformers, pillars, and streetlights. Easements ensure the safety of residents living, working, and playing near powerlines. They help prevent incidents occurring that could cause serious injury or even death. Continuous, unobstructed access of at least five metres wide along the full length of the easement must be provided to allow Essential Energy staff 24 hour access to its electricity infrastructure. No obstruction must be placed in the easement within five metres of a powerline, transformer, pole, equipment or supporting guy, or within 10 metres of a steel powerline structure.

Within the proposed Project, there is an existing 11 metre variable E1 easement. This has been taken into account when determining vegetation buffers, construction activities and ongoing traffic access.

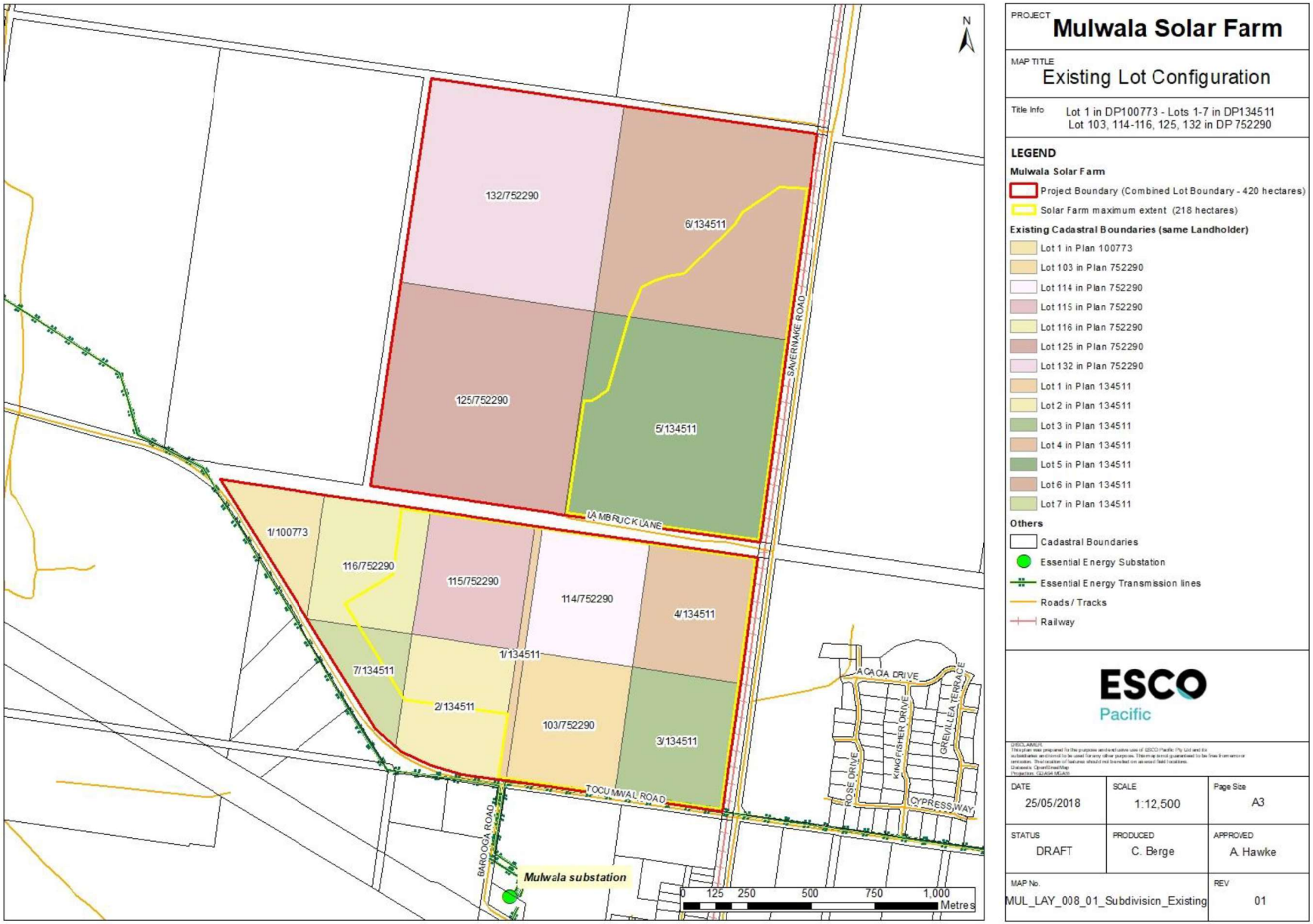

Figure 11 Existing Lot Configuration

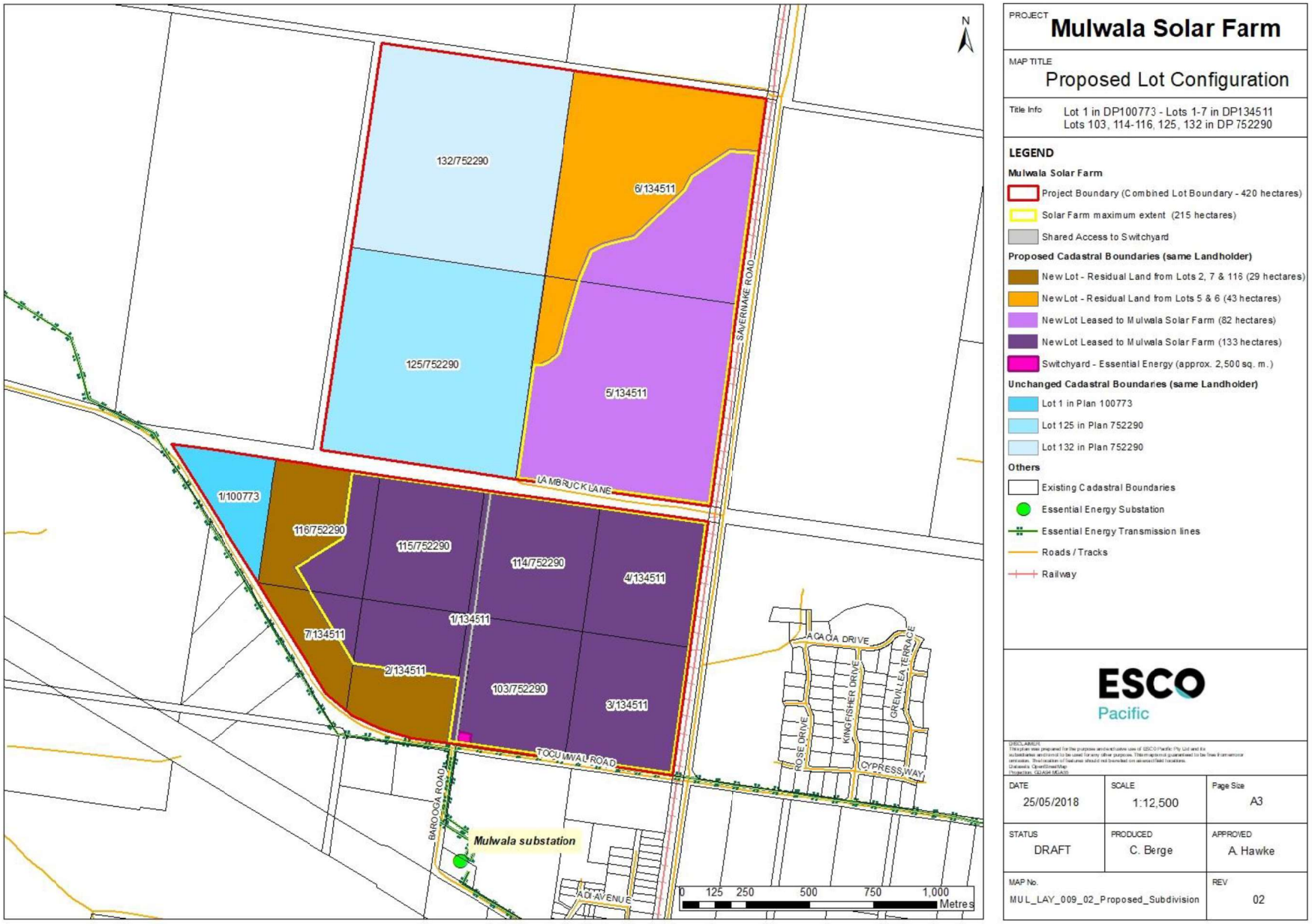

Figure 12 Proposed Lot Configuration

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6 Consultation and Stakeholder Engagement

6.1 Overview

A Consultation and Stakeholder Engagement Plan (CSEP) has been prepared and implemented by ESCO Pacific to assist in the preparation of the Mulwala Solar Farm Project EIS and to guide stakeholder engagement. This chapter provides an overview of stakeholder engagement for the solar farm project, a description of the stakeholder engagement activities undertaken and a summary of the findings that have been incorporated into this EIS. For further detail on the CSEP refer to **Appendix B**.

6.1.1 Formal Consultation Requirements

Stakeholder engagement and consultation is an integral component in the preparation of an EIS for State Significant Development (SSD) projects. The SEARs regarding consultation state that:

"During the preparation of the EIS, you must consult with the relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups, affected landowners, exploration licence holders, quarry operators and mineral title holders. In particular you must consult with:

In particular, you must undertake detailed consultation with affected landholders surrounding the development and Federation Council.

The EIS must describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided."

6.2 Government Consultation

Consultation with government agencies was initiated by the Department of Planning and Environment (DP&E) during the preparation of the Secretaries Environmental Assessment Requirements (SEARs). Government agencies that provided a response to DP&E for inclusion in the SEARs included:

- Federation Council;
- NSW Department of Planning and Environment – Division of Resources & Geoscience;
- NSW Environment Protection Authority;
- NSW Office of Environment and Heritage;
- NSW Roads and Maritime Services;
- NSW Department of Primary Industries; and
- NSW Rural Fire Service.

Consultation has also been undertaken by ESCO Pacific with key government agencies during the preparation of this EIS to clarify agency requirements, discuss methodologies, and to seek feedback. These agencies include:

- Federation Council;
- NSW Department of Planning and Environment; and
- NSW Office of Environment and Heritage.

A summary of the consultation undertaken with Government agencies is provided in **Appendix B.**

6.3 Aboriginal Community Consultation

Consultation with the local Aboriginal community has initially been undertaken by ESCO Pacific, and later by RPS in accordance with clause 80C of the NPW Regulation and the four stage process as detailed in *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (ACHCRs) (DECCW, 2010, now part of OEH). An overview of the consultation process is outlined below. Further detailed information is provided in the **Aboriginal and Historic Heritage Assessment** (AHHA) (RPS 2018) attached as **Appendix J.**

6.3.1 Stage 1 – Notification of Project and Registration of Interest

Formal Aboriginal consultation for the project commenced on 9 February 2018 with the distribution of letters to the following parties requesting the identification of interested Aboriginal groups that may have an interest in the Project:

- National Native Title Tribunal;
- Native Title Services Corporation Limited;
- Registrar of Aboriginal Owners NSW Department of Aboriginal Affairs;
- Federation Shire Council;
- Office of Environment and Heritage (OEH);
- Cummeragunja Local Aboriginal Land Council; and
- Local Land Services.

In addition, an advertisement was placed in the Public Notices of the Shepparton News on 16 February 2018, and in the Cobram Courier, Yarrawonga Chronicle and Southern Riverina News on 21 February 2018 inviting interest from Aboriginal parties in the project consultation process.

Following receipt of the list of Registered Aboriginal Parties (RAPs) from OEH on 27 February 2018, letters were sent to the RAPs on 5 March 2018 inviting those groups to register an interest in the project consultation process. A list of the RAPs and those that registered an interest in the Project are included in the **AHHA** in **Appendix J**.

As of 24 May 2018, three RAPs had registered an interest in the Project.

6.3.2 Stage 2 to Stage 4 – Aboriginal consultation

The following remaining stages of the Aboriginal consultation process will continue during the exhibition, assessment, and response to submissions phases for the EIS, or as deemed required by the Office of Environment and Heritage (OEH):

- Stage 2 – Provision of project information
  - Includes an outline of project activities, proposed impact areas and the environmental assessment process.
- Stage 3 – Gathering information on cultural significance
  - Includes facilitating a process by which the RAPs have input into the heritage assessment methodology, fieldwork, and management options, and provide information regarding the cultural significance of Aboriginal objects or places.
- Stage 4 – Review of draft Aboriginal Cultural Heritage Assessment

- Includes the provision of a draft Aboriginal Cultural Heritage Assessment to the RAPs for review and comment.

6.4 Community Consultation

The purpose of the community consultation program was to identify the key community stakeholders, present the stakeholders with details of the proposed project and give the stakeholders an opportunity to provide feedback and identify any issues or concerns they may have.

The community consultation program focused upon two main groups, namely:

- Those landholders adjacent to the proposed solar farm; and
- Those within the wider community that have an interest in the proposed solar farm.

A number of consultation activities were undertaken during the preparation of the EIS. An overview of these activities is outlined below, while further details are included in **Appendix B.**

6.4.1 Project Factsheet

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

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

6.4.2 Mailout

Introductory letters and Project factsheets were mailed by ESCO Pacific to all landowners within approximately two kilometres of the project area. The letters introduced the proposed project, ESCO Pacific and encouraged landowners to contact ESCO Pacific to discuss the Project further. Letters also included an invite to the Community Consultation Meeting.

6.4.3 Individual meetings

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

6.4.4 Community Consultation Meeting

A Community information session was held at the Mulwala Football Club, Inglis Street, Mulwala, between 6.30pm to 7.30pm on Monday 9th of April.

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

- The mail-out, including all houses within two kilometres of the project;
- The Yarrawonga Chronicle (4th of April 2018 edition);
- The Mulwala Solar Farm website; and
- Emails sent to key government stakeholders, including the DP&E and Council.

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

6.4.5 Project Website

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

6.4.6 Consultation Database

A consultation database has been created and maintained to record stakeholder contact details and any issues, concerns or feedback received.

6.4.7 Issues Raised

Community consultation is ongoing. Issues raised to date have been addressed within the EIS. A consultation register for all meetings and stakeholder engagement is contained in Appendix B. An up to date consolidated summary of the responses received from the community consultation activities, correspondence can be provided upon request.

Key issues raised by stakeholders include:

- Visual screening and landscape management from closest neighbours;
- Glare from the road and closest properties;
- Property values;
- Town growth;
- Weed management;
- Bushfire management;
- Traffic on Savernake Road during construction and safety at intersections;
- Lighting and EMF; and
- Birdlife.

Overall there was a positive perception within the community towards the solar farm development. The landscape management plan has been developed in consultation with the nearby landholders (refer **Appendix G**) to address concerns regarding visual screening and glare.

6.5 Continuing Consultation Activities

ESCO Pacific will continue to undertake consultation with stakeholders as necessary throughout all phases of the Project, including:

- EIS Public exhibition;
- Any other time as interest levels dictates; and
- As otherwise recommended by DP&E.

Lines of communication between the proponent and stakeholders will remain open through various communication mediums as detailed in this section.

6.5.1 EIS Public Exhibition and Post Exhibition

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

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

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

Information about the EIS will be made available on the Project website www.mulwalasolarfarm.com.au and on the Department of Planning & Environment – Major Project Assessment - http://majorprojects.planning.nsw.gov.au/. Contact details for ESCO Pacific will continue to be made available on the Project website and on any distributed material.

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

7 Environmental Risk Assessment

7.1 Environmental Risk Assessment

To assist in identifying the key environmental and social impacts associated with the Project and the likely severity, an Environmental Risk Assessment (ERA) was undertaken in accordance with Australian Standard AS/NZS ISO 31000:2009 Risk Management Principles and Guidelines. The methodology used for the ERA process, and a summary of the results, are outlined below in the following sections. An environmental risk assessment for the Project can be viewed in **Appendix D**.

7.2 Methodology

7.2.1 Key Environmental and Social Impacts

The key environmental and social impacts associated with the Project and requiring further assessment and reporting were identified through:

- The existing environmental context of the site and surrounding locality (Section 2);
- The outcomes of consultation undertaken to date with government agencies and other relevant stakeholders (Section 6);
- Project SEARs (Section 1.7);
- Legislative and statutory framework (Section 5); and
- Specialist studies undertaken as part of the preparation of this EIS (Section 8).

The key environmental and social impacts identified for the Project, in no particular order, were:

- Noise and vibration;
- Traffic and transport;
- Visual amenity;
- Biodiversity;
- Aboriginal heritage;
- Surface water and groundwater;
- Risks and Hazards;
- Soils, land use and agriculture;
- Hazardous materials;
- Socio-economic; and
- Waste.

7.2.2 Evaluating Likelihood

The key environmental and social impacts for the Project were assigned a likelihood between almost impossible and certain in accordance with Table 6 (Column 1). Column 2 provides a description that elaborates on the possible likelihood categories and Column 3 provides the frequency.

Table 6 Likelihood Table

Likelihood	Description	Frequency
Certain	Common occurrence	At least daily
Very Likely	Expected to occur in most circumstances	Once per week
Likely	Probably would occur or has happened in the past	Once per month
Unlikely	Occurs infrequently	Less than once per year
Possible	Could happen at some time	Less than once per 10 years
Almost Impossible	Not likely to occur	Less than 1 per 100 years

7.2.3 Evaluating Consequence

The key environmental and social impacts were assigned a consequence between catastrophic and negligible in accordance with Table 7 (Column 1). Columns 2 to 7 provide a guide to the elements considered when evaluating a consequence and Column 8 provides the severity level.

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Table 7 Consequence Table

Severity Level	Consequence	Health and Safety	Natural Environment	Community Relations and Cultural Heritage	Reputation / Media	Legal	Damage/Loss/ Business Interruption
6	**Catastrophic**	Multiple Fatality	Significant and irreversible impact on threatened species, habitat(s) or ecosystem(s)	Irreparable damage to sites of high cultural significance.	Undeniably justified Government condemnation for illegal/unacceptable behaviour.	Major prosecutions and fines resulting in incarcerations for senior executives.	Significant Financial Loss > $10 Million
5	**Critical**	Fatality	Very serious long term environmental impairment of ecosystem function.	Very serious widespread social impact. Irreparable damage to valued cultural items.	Prolonged condemnation by media and/or NGO (national outcry).	Significant prosecutions and fines. Very serious litigation, including class actions.	Major $1M - $10M
4	**High**	Lost Time Injury	Serious medium term environmental effects.	Ongoing serious social issues. Significant but repairable damages to structures/items of cultural significance.	Serious public and/or media outcry.	Major breach of regulation. Major litigation.	High $100,000 - $1M
3	**Moderate**	Medical Treatment required. Medical Treatment Injury.	Moderate short term effects but not effecting overall ecosystem function.	Ongoing social issues. Minor permanent damage to items of cultural significance.	Attention from media and/or heightened concern by local community.	Moderate legal issues, non-compliances and breaches of regulation.	Low Financial Loss <$100,000
2	**Minor**	First Aid Treatment	Minor effects on biological or physical environment.	Minor medium term social impacts.	Minor adverse local public or media attention and complaints.	Minor legal issues, non-compliances and breaches of regulation	Low Financial Loss <$10,000
1	**Negligible**	No medical attention. Report only.	Limited damage to minimal areas of low significance.	Low level repairable damage to commonplace structures.	Public concern restricted to local complaints.	Low level legal issues.	Minimum Financial Loss <$1000

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7.2.4 Risk Assessment Matrix

The key environmental and social impacts were assigned a risk ranking between negligible and catastrophic in accordance with Table 8, based on the assessment of likelihood and consequence as described above.

Table 8 Risk Matrix Table

	Consequence					
Likelihood	Negligible	Minor	Moderate	High	Critical	Catastrophic
6 – Certain	6	12	18	24	30	36
5 – Very Likely	5	10	15	20	25	30
4 – Likely	4	8	12	16	20	24
3 – Unlikely	3	6	9	12	15	18
2 – Possible	2	4	6	8	10	12
1 – Almost Impossible	1	2	3	4	5	6

Risk Scores: 1 - 3 = Low; 4 - 10 = Moderate; 12 - 16 = High; 18 - 24 = Very High; 25 - 36 = Extreme

7.2.5 Summary of Risk Rankings

Table 9 below provides a summary of the risk rankings for the environmental and social impacts considered as part of the ERA. The risk assessment did not identify any aspects of the Project with a residual risk of catastrophic or critical.

Table 9 Summary of Environmental Risk Assessment

Category	Issue
Extreme	• None
Very High	• None
High	• Biodiversity • Visual
Moderate	• Socio-economic • Traffic and transport • Soil, land use and agriculture • Surface water & groundwater • Noise and vibration • Biodiversity • Aboriginal heritage • Bushfire • Waste • Hazardous materials
Low	• Surface water & groundwater

Category	Issue
	• Electromagnetic interference • Historic (non-Aboriginal) heritage • Cumulative impacts

Where the individual risks were deemed unacceptable, or where a knowledge gap was identified, specialist technical studies were undertaken and additional mitigation measures and or management responses proposed. The following sections provide a detailed assessment of the key environmental and social impacts for the Project as identified above.

8 Impact Assessment, Mitigation and Management

This section of the EIS provides a summary of the potential environmental and social impacts of the Project and the measures that would be implemented to mitigate and manage these impacts. The issues have been prioritised in accordance with the SEARs, the risk assessment detailed above in Section 7, and the outcomes of stakeholder engagement.

8.1 Noise

8.1.1 Introduction

An assessment of noise impacts of the Project has been undertaken by Ray Walsh Acoustics, Noise and Sound in association with Harwood Acoustics. The purpose of this report was to determine the potential noise impact at the nearest residential receivers to the Project site. The assessment also considered construction, operation and transport noise impacts associated with the Project.

The assessment has been prepared in accordance with the *NSW Industrial Noise Policy (INP), NSW Interim Construction Noise Guideline (ICNG), NSW Road Noise Policy (RNP), NSW Assessing Vibration: a Technical Guideline, and NSW Draft Industrial Noise Guideline (DING).* The **Noise Impact Assessment** is attached as **Appendix E**.

The assessment has also been prepared to satisfy the SEARS, which requested the following be considered:

*"**Noise –** including an assessment of the construction noise impacts of the development in accordance with the Interim Construction Noise Guideline (ICNG) and operational noise impacts in accordance with the NSE Noise Policy for Industry 2017 and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria."*

A full summary of the SEARs (including agency response) is included within **Appendix A.**

8.1.2 Existing Environment

The Project is located approximately two kilometres north of the township of Mulwala within the Federation local government area and comprises approximately 215 hectares (ha) of agricultural and rural land. The project area is bound by Savernake Road to the east, to the south and west by Tocumwal Road and to the north by agricultural land. There are clusters of residential receptors located to the south and south east and isolated residences located to the south west and east, as shown in **Figure 5**.

The nearest receptors to the Project are described in Table 10 below.

Table 10 Identified residential receptors

Receptor	Address	Approximate distance from Project*
R2	511 Tocumwal Road	900 metres
R3	279 Tocumwal Road	400 metres

Receptor	Address	Approximate distance from Project*
R4	93 Baroonga Road	500 metres
R5	290 Savernake Road	235 metres
R6	96 Cypress Way	380 metres
R7	3 Rose Drive	480 metres

*All distances are based on the closest point of the Project site where solar panel arrays are likely to be, as a reference only.

8.1.3 Noise Criteria

The NSW Environment Protection Authority (EPA) published the 'NSW Noise Policy for Industry' in October 2017 (the Policy), and this policy has now replaced the Industrial Noise Policy (INP) 2000.

This policy sets out the NSW EPA's requirements for the assessment and management of noise from industry in NSW. It aims to ensure that noise is kept to acceptable levels in balance with the social and economic value of industry in NSW. It provides noise levels for assessing the potential impact of noise from industry and includes a framework for considering feasible and reasonable noise mitigation measures.

Construction Noise Criteria

Impacts from construction noise have been assessed in accordance with the 'Interim Construction Noise Guideline' (ICNG) (DECC 2009) which provides guidance on managing works to minimise noise (including airborne noise, ground-borne noise and blasting), with an emphasis on communication and cooperation with all involved in, or affected by, construction and noise.

Background Noise Levels

A rating background noise level (RBL) has been revised for assessment purposes. The RBL is the overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period.

Background noise measurements were not undertaken as part of the assessment due to the rural nature of the area and generally low background noise levels generated in these areas. It was assumed conservatively that background noise levels are likely to be at or below the minimum background levels described in Table 11.

Project Noise Trigger Levels

Section 2 of the Noise Policy for Industry (2017) sets out the procedure to determine the project noise trigger levels relevant to a particular industrial development. Project noise trigger levels provide a benchmark or objective for assessing a proposal or site and indicate a potential noise impact on the community should the level be exceeded.

The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the LAeq descriptor), measured over a 15 minute period does not exceed the background noise level by more than 5 dB when the background noise is beyond a minimum threshold. This intrusiveness noise level seeks to limit the degree of change a new noise source introduces to an existing environment.

Table 2 of the Noise Impact Assessment in **Appendix E** summarises intrusiveness and amenity criteria that apply for the day, evening and night periods.

Table 11 summarises the minimum assumed RBLs and minimum intrusiveness noise levels.

Table 11 Minimum assumed RBLs and Project intrusiveness noise levels

Time of day	Minimum Assumed Rating Background Level dBA	Minimum Project Intrusiveness Noise Level ($L_{eq,\ 15\ minute}$, dBA)
Day (7 am to 6 pm)	35	40
Evening (6 pm to 10 pm)	30	35
Night (10 pm to 7 am)	30	35

Therefore, the most relevant criteria for project noise trigger levels for the Project are:

- (35 + 5 =) 40 dBA $L_{eq,\ 15\ minute}$ during the day;
- (30 + 5 =) 35 dBA $L_{eq,\ 15\ minute}$ during the evening; and
- (30 + 5=) 35 dBA $L_{eq,\ 15\ minute}$ during the night.

Road Traffic Noise

In 2011 the NSW EPA published the 'NSW Road Noise Policy', and this policy outlines traffic noise criteria applicable to this Project. The policy contains strategies to address the issue of road traffic noise from, among other things, traffic generating developments, and applies different noise limits dependent upon the road category and type of project/land use. These criteria are detailed in Table 3 of the Noise Impact Assessment attached as **Appendix E**.

8.1.4 Impact Assessment

Construction noise

The construction period for the Project is expected to take approximately eight (8) months in total. Construction noise would be generated during the following construction phases:

- Site preparation works including civil works involving grading, compaction, stormwater and sediment controls;
- Installation of steel mounting structures involving piling;
- Installation of solar panels onto the mounting structures;
- Installation of power conversion stations;
- Connection of solar panels to combiner boxes;
- Installation of cabling, connection of combiner boxes to power conversion stations;
- Connection of power conversion stations to onsite power reticulation systems;
- Connection of onsite reticulation system to Mulwala Substation; and
- Commissioning and testing.

Table 12 below shows a schedule of sound power levels for typical construction equipment with the potential to be used on the Project.

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Table 12 Construction equipment - L_{eq} Sound Power Levels

Description	L_{eq} Sound Power Level (dBA)
Auger Piling rig	118
Directional Drilling Rig	106
Rotary Bore Piling	111
Trencher	110
Dewatering Pump	90
D8 Dozer	110
Scraper / Grader	105
Excavator 30 tonne	110
Dump Truck	107
Single Drum Roller	104
Diesel Welding Rig	95

Table 13 shows the predicted level of potential noise emission from various construction activities at the nearest residential receptor locations.

Table 13 Predicted L_{eq} Noise Levels at nearest residential receptors – Construction phase

Description	Predicted Noise Level $L_{eq,\ 15\ minute}$ (dBA) at receptor location					
	R2	R3	R4	R5	R6	R7
Construction Noise Management Level	45	45	45	45	45	45
Piling (various methods)	31 – 43	41 – 53	39 – 51	46 – 58	42 – 54	39 – 51
Complies	Yes	No (+ 8 dB)	No (+ 6 dB)	No (+ 13 dB)	No (+ 9 dB)	No (+ 6 dB)
Earthworks phase	29 – 36	39 – 46	37 – 44	44 – 51	40 – 47	37 – 44
Complies	Yes	No (+ 1 dB)	Yes	No (+ 6 dB)	No (+ 2 dB)	Yes
Installation / Commissioning	<25	31	<30	36	32	<30
Complies	Yes	Yes	Yes	Yes	Yes	Yes

Based on the results presented above, the following findings were made:

- A range of noise levels would be operating during each phase of construction, based on quietest and loudest individual items of plant operating;
- Various plant operating at the closest point of the Site to each receptor as a worst-case scenario;
- Attenuation from distance loss and ground absorption only.

Noise emission from the construction phases would vary considerably at each receptor throughout the construction phase given the size of the Project site and varying distances at which plant may operate. For the majority of the time, the level of noise emission would be anticipated to be well below the noise management level.

Operational noise

The main sources of noise associated with the operational of the Project would include:

- 3,500 NEXTracker motors;
- Up to 40 SC2200 Inverter systems; and
- Transformer at the substation.

Table 14 below describes the 'A' frequency-weighted sound power levels for typical operational plant and equipment.

Table 14 $L_{eq\ 15\ minute}$ Sound Power Levels – Typical Mechanical Plant and Equipment

Description	Individual Sound Power Level $L_{eq,\ 15\ minute}$ (dBA)
NEXTracker motors (each)	50
SC2200 Inverter (each)	94
Transformer	75

The predicted noise levels at each receptor are shown in Table 15 below.

Table 15 Predicted L_{eq} Noise Levels at nearest residential receptors – All receptors day and evening Operation

Description	Predicted Noise Level $L_{eq\ 15\ minute}$ (dBA) at receptor location					
	R2	R3	R4	R5	R6	R7
Acceptable noise limit – Day	40	40	40	40	40	40
Solar farm noise emission – daylight hours	28	33	32	32	32	32
Complies	Yes	Yes	Yes	Yes	Yes	Yes
Acceptable noise limit – Evening and prior to 6am (summer time)	35	35	35	35	35	35
Solar farm noise emission – daylight hours	28	33	32	32	32	32
Complies	Yes	Yes	Yes	Yes	Yes	Yes
Acceptable noise limit – Night	35	35	35	35	35	35
Solar farm noise emission – Night	<10	<15	<10	<15	<10	<10

Description	Predicted Noise Level $L_{eq\ 15\ minute}$ (dBA) at receptor location					
	R2	R3	R4	R5	R6	R7
(transformer only)						
Complies		Yes	Yes	Yes	Yes	Yes

Table 15 demonstrates that the Project trigger level of 40 dBA would be met at all receptors during the daytime (7 am to 6 pm), The project trigger level of 35 dBA during the hours prior to 7 am and after 6 pm would also met at all receptors, providing recommended mitigation measures are implemented.

Road traffic noise

Construction traffic would comprise a combination of light vehicle and heavy movements as equipment, materials and personnel are transported to the Project site. Peak traffic movements are expected to be 39 vehicle movements per day or 156 vehicle movements per week.

During the operational phase, it is anticipated that the average traffic generation would peak at 14 moments per week, or less than two movements per day. There is the potential for two vehicle movements during the AM and PM peak hour periods, and these staff would be on site for maintenance and monitoring purposes. In addition, there is the potential for one vehicle movement per week via the access driveway at the switching yard on Tocumwal Road.

It is anticipated that during decommissioning, traffic generation would resemble construction traffic movements at 39 vehicle movements.

These predicted flows are low and the impact of on-road traffic noise on the surrounding residential properties would be negligible. The nearest residence to either road where vehicles may pass is Receptor R1 at a distance of 145 metres. The predicted noise level from on-road vehicle movements during peak flow is less than 44 dBA ($L_{eq,\ 1\ hour}$) at the nearest residences. This assumes vehicle movements in the hour are truck movements as a worst-case scenario. This it anticipated to be well below the acceptable limits of 55 dBA ($L_{eq,\ 1\ hour}$) during the day and 50 dBA ($L_{eq,\ 1\ hour}$) at night and would therefore be acceptable.

Refer to Section 8.2 for the Traffic Impact Assessment and relevant mitigation measures.

8.1.5 Mitigation and Management

The following mitigation and management measures would be implemented to manage and minimise the potential noise impacts.

During construction, the level of noise emission from activities would be well below the construction noise management level at all receptor locations for the majority of the construction phase, given the size of the development site. However, there is potential for the management levels to be exceeded whist plant and equipment are operating in close proximity to any given residence on occasion.

A Construction Noise and Vibration Management Plan should be developed for all construction activities prior to works commencing. A draft Construction Noise and Vibration Management Plan has been prepared in accordance with Australian Standard AS2436-2010 and the EPA's *Interim Construction Noise Guideline 2009* and is provided in Appendix B of the Noise Impact Assessment (**Appendix E**).

During operation, the following mitigation measures are recommended to mitigation the potential noise impacts on residential receptors:

- No inverter units should be located closer than 600 metres from any residential receptor location; and

- No more than a total of 18 inverter units should be located between 600 and 800 metres from any residential receptor location.

In addition, acoustic screening or enclosures may be required for some inverter units if recommended distances from residential receptors cannot be adhered to.

8.2 Traffic and Transport

8.2.1 Introduction

An assessment of traffic and access impacts of the Project has been undertaken by Peter Meredith Consulting. The purpose of this report was to determine the potential traffic impacts resulting from the Project and to recommend treatments to mitigate these impacts. The **Traffic Impact Assessment** is attached as **Appendix F.**

The assessment has also been prepared to satisfy the SEARs, which requested the following be considered:

*"**Transport –** including an assessment of the site access route (including Tocumwal Road, Yarrawonga Road, Savernake Road and Melbourne Street), site access point, any potential rail safety issues and likely transport impacts (including peak and average traffic generation) of the development on the capacity and condition of roads (including on any Crown Land), a description of the measures that would be implemented to mitigate any impacts during construction, and a description of any proposed road upgrades developed in consultation with the relevant road and rail authorities (if required)."*

A full summary of the SEARs (including agency responses) are included within **Appendix A.**

8.2.2 Existing Environment

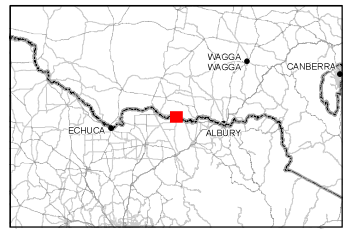
8.2.2.1 Network and Transport Routes

The project area has been selected to benefit from proximity to the existing electricity grid and substation and the major road network in the locality. The major road network is suitable for the transport of Project infrastructure and equipment to the site during construction, operations and decommissioning stages, and for the workforce to easily travel from the site during each stage of the Project.

The roads that would primarily be used to transport equipment and machinery to the Project area are:

- Lambruck Lane;
- Savernake Road;
- Melbourne Road MR314;
- Corowa Road MR314;
- Spring Drive MR314; and
- Tocumwal Road MR550.

All heavy vehicles will access the site via Savernake Road, turning west into Lambruck Lane. All other roads are B-Double rated routes.



LEGEND

- Project Boundary (combined lot boundary - 421 hectares)
- Development Footprint (215 hectares)
- Indicative Access Points
- Indicative Access Points (Switchyard and O & M building only)
- B-double Rated Roads
- Roads and Tracks
- Railway
- Watercourse
- Waterbody

N

0 0.5 1 1.5

Kilometers

APPROX SCALE 30,000 @ A3

GDA 1994 MGA Zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

DATA SOURCES

Road network provided by Department of Environment, Land, Water and Planning (DELWP) Web Map Service.

Watercourse data provided by DELWP 2018.

Imagery from Esri basemap layer.

RPS

Figure 13

B-double Rated Roads
Mulwala Solar Farm

Lambruck Lane

Lambruck Lane forms the main access road to the project area. Lambruck Lane is a formed gravel road running in an east-west direction connecting to Savernake Road as a T-junction intersection (refer to **Plate 43** It is classified as a local road under the management of Federation Council and currently serves as access to the farming property number 255.

Approximately 30 metres west of Savernake Road, Lambruck Lane also crosses The Rock to Oaklands Railway Line. The existing gravel pavement on Lambruck Lane is built up to rail level which allows for the smooth crossing of the railway line (refer to **Plate 54**). Existing vehicle movements over the railway line include light vehicles, farm machinery, and semi-trailer and B-double stuck trucks.

Lambruck Lane is a designated B-double route and a suitable site access road for heavy vehicle materials haulage route.

Plate 43 Typical surface and road reserve of Lambruck Lane looking westbound

Plate 54 Lambruck Lane looking eastbound at the main gate and railway crossing

Savernake Road

Savernake Road is an undivided sealed two-way road that serves as the main access road to the project area. It runs in a north-south direction, providing a connection to Riverina Highway HW20, Savernake, Rennie and Oaklands to the north, and to Mulwala and Yarrawonga to the south (refer to **Plate**).

It connects to Tocumwal Road and Melbourne Street as T-junctions, controlled by give-way signs and splitter islands (refer to **Plate 6** and **Plate 7**). Savernake Road is under the management of Federation Council and is classified as both a rural road (north of Tocumwal Road) and an urban Road (South of Tocumwal Road). The section of Savernake Road between Tocumwal Road and Melbourne Street would service as a primary transportation route to the project area.

Savernake Road is a designated school bus route. Savernake Road is also a designated B-double route and is suitable as a heavy vehicle materials haulage route.

Plate 15 Savernake Road at intersection with Lambruck Lane looking southbound

Plate 66 Typical Savernake Road looking at the southbound approach to the offset T-junction intersection with Tocumwal Road

Plate 77 Typical Savernake Road looking at the northbound approach to the offset T-junction intersection with Tocumwal Road

Melbourne Street/Corowa Road and Spring Drive

Melbourne Street is the main central business district street in Mulwala and provides connections to the townships of Yarrawonga (Victoria) and Corowa (NSW). At the intersection of Savernake Road, Melbourne Street becomes Corowa Road and at the intersection of Tocumwal Road, Corowa Road becomes Spring Drive (refer to **Plate** and **Plate 8**).

Melbourne Street/Corowa Road and Spring Drive are classified as State Roads and under the management of Roads and Maritimes Services (RMS), and would serve as a primary transportation route to the project area.

Melbourne Street continues into Victoria via the Lake Mulwala Bridge. In Yarrawonga, Melbourne Street is also the main central business district street and is classified as a State Road under the management of VicRoads. This section of Melbourne would also serve as a primary transportation route to the project area.

Melbourne Street, Corowa Road and Spring Drive are designated B-double routes and are suitable as heavy vehicle materials haulage routes (refer to **Plate**).

Plate 18 Typical divided section of Melbourne Street looking southbound

Plate 89 Corowa Road southbound, approaching intersection of Savernake Road

Plate 20 Spring Drive westbound, approaching the intersection with Corowa Road and Tocumwal Road

Tocumwal Road

Tocumwal Road is an undivided sealed two-way road that connects to the townships of Tocumwal and Mulwala. On the northern side of Mulwala, Tocumwal Road has connections to Savernake Road and terminates as a T-junction at the intersection of Spring Drive/Corowa Road (refer to **Plate** and **Plate**).

Tocumwal Road is classified as a Regional Road and is under the management of RMS and would serve as a primary transportation route to the project area and a minor operational access to the switching yard driveway.

Tocumwal Road is a designated B-double route and is suitable as a heavy vehicle materials haulage route.

Plate 21 Tocumwal Road southbound, approaching intersection with Corowa Road and Spring Drive

Plate 22 Tocumwal Road eastbound, approaching intersection with Savernake Road

The higher mass limits and designated B-double routes for both New South Wales and Victoria are shown in **Figure 14** and **Figure 15**, respectively.

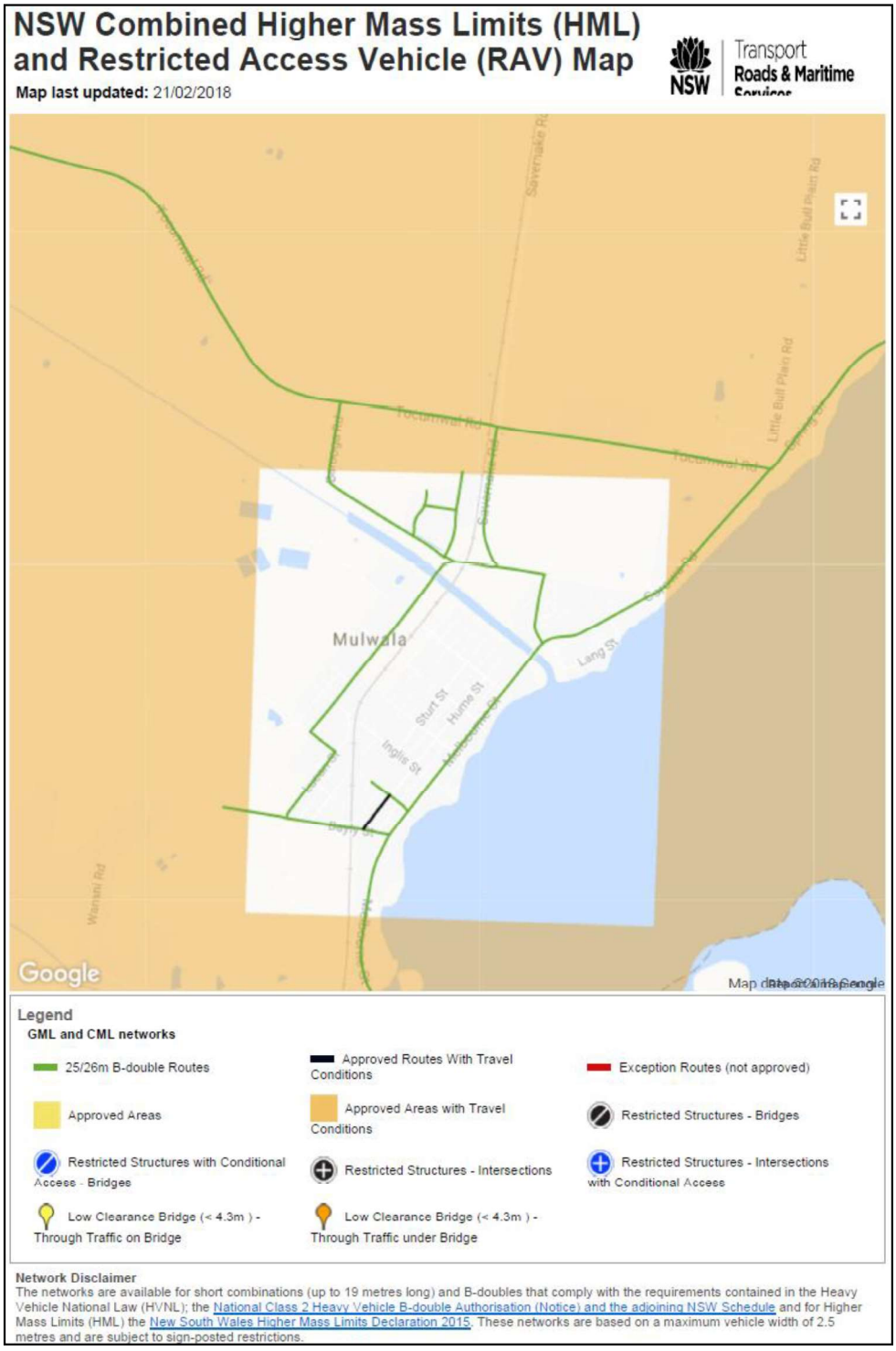


Figure 14 Roads and Maritime Services (RMS) Restricted Access Vehicle Map for Mulwala

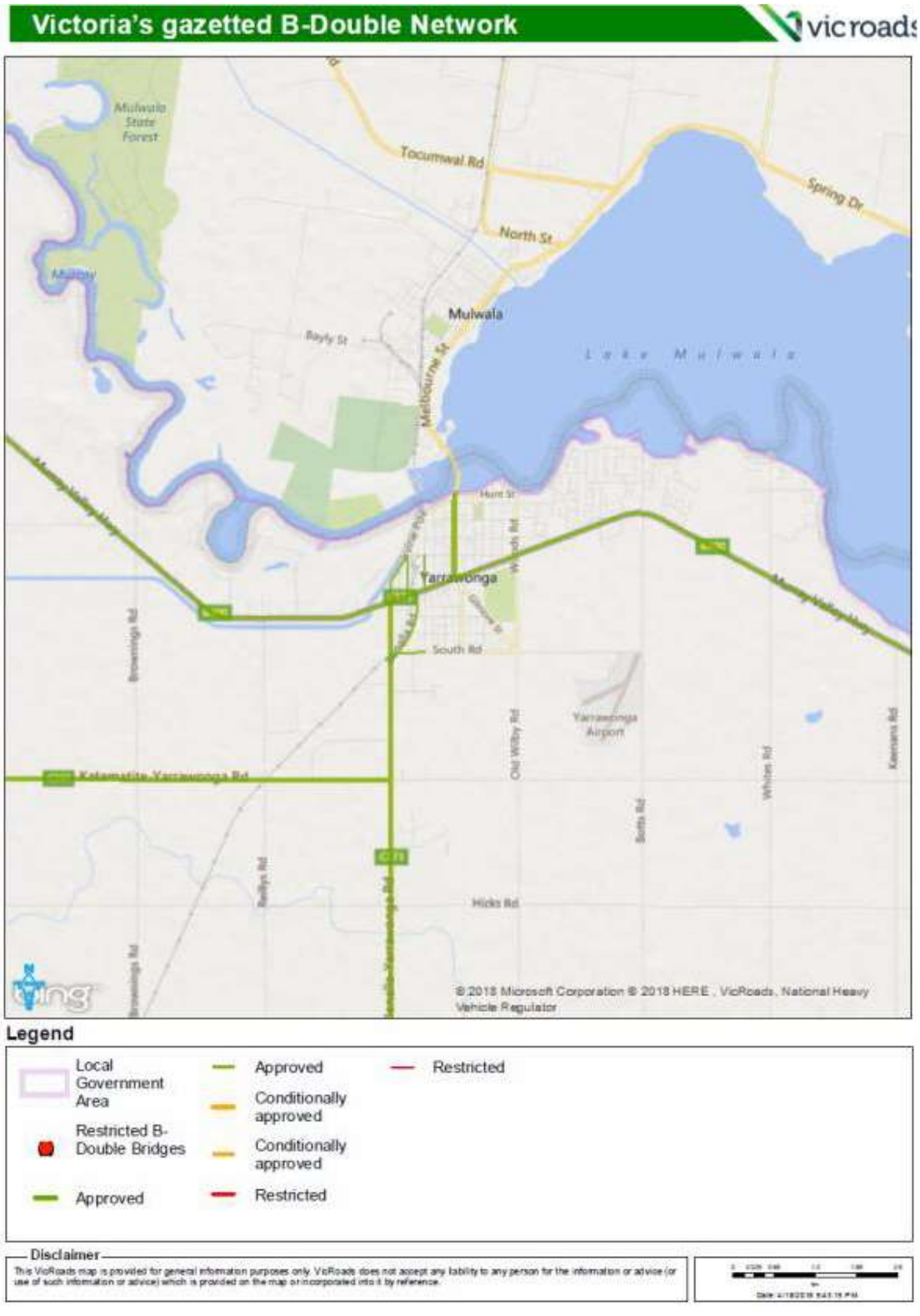


Figure 15 VicRoads B-double Map for Yarrawonga

RPS

8.2.2.2 Site Access

The principal access to the project area would be through Lambruck Lane. Lambruck Lane intersects with Savernake Road at a T-junction intersection and is a gravel road six metres wide.

Construction of a seven metre wide gravel access driveway for the land parcels north and south of Lambruck Lane are to be conducted in accordance with Austroads *Guide to Road Design Part 3: Geometric Design Figure 7.4*.

Refer to Section 8.2.2.1 for further description of Lambruck Lane.

8.2.2.3 Existing Traffic Volumes

The Project transportation routes include Melbourne Street, Tocumwal Road and Spring Drive, and these have been identified as Classified Roads under the management of RMS. The traffic volumes for these roads have been sourced from the RMS interactive traffic volume viewer and a summary is provided in Table 16.

Table 16 RMS Classified Roads ADT, AM and PM peak hour and % Heavy Vehicles traffic volumes

Road	Year	Average Daily Traffic (ADT)	AM Peak	PM Peak	% Heavy Vehicles
Melbourne Street MR314 (200m south of Cypress Drive)	2017	8,481	1,813	2,723	5.29
Tocumwal Road MR550 (40m west of Savernake Road)	2010	690	174	213	9.42
Spring Drive MR314 (2.5km south of Lees Road)	2010	852	222	263	12.79

Source: RMS Traffic Volume Viewer (www.rms.nsw.gov.au)

In addition, traffic volumes of roads that would be used as the primary transportation routes for the Project have been sourced from Federation Council. A summary of the latest traffic count data for the primary transportation roads is shown below in Table 17.

Table 17 Federation Council AADT, estimated AM and PM Peak hour, % Heavy Vehicles traffic volumes and 85th Percentile speed

Location	Year	AADT	AM and PM peak	% Heavy Vehicles	85th percentile speed
Melbourne Street	2009	4,780	478	7	61
Tocumwal Road	2015	383	38	27	88
Spring Drive	2015	1,307	131	19	102
Savernake Road	2011	886	89	16	81
Corowa Road	2015	1,880	188	12	67
Savernake Road	2009	191	19	20	87

In the AM peak, 70 percent of the traffic generated along Savernake Road would be inbound to Mulwala, and 30 percent outbound. In the PM peak, the corresponding split would be 30/70.

Lambruck Lane traffic volumes allow 12 vehicle movements per day and one AM and PM peak hour movement for farming activities.

A standard two-percent per annum traffic growth has been applied to the existing volumes for Savernake Road as demonstrated in **Figure 16**, to allow for the increase in background traffic volumes arising from general increases across the network.

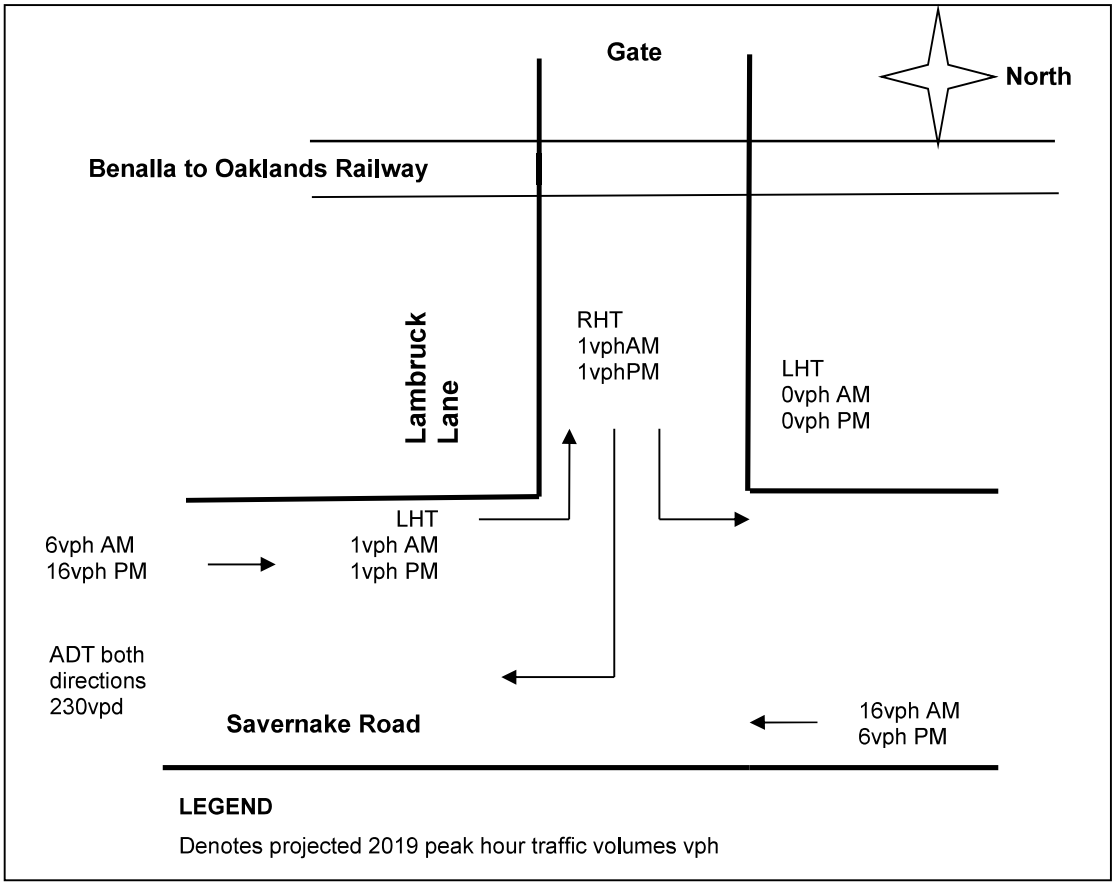


Figure 16 Projected 2019 ADT, AM and PM peak traffic flows at the intersection of the Savernake Road and Lambruck Lane

An analysis of the low traffic volumes at the intersection demonstrates the intersection would operate well within capacity in both the AM and PM peak periods for all movements with minimal delays.

8.2.2.4 Road Capacity Standards

Lane Capacity

Road width design standards for high volume (urban) and low volume (rural) roads are defined by the *Austroads Guide to Road Design Part 3: Geometric Design* (Austroads 2010) and are based on daily traffic volumes. The current design standards applicable to major roads are presented in Table 18.

RPS

Table 18 Daily Traffic Volumes and Related Design Standards

Daily Traffic Volume	Austroads (2010) Design Standard	Applicable Roads	Meets Design Volume Standard
0 - 150	Rural Road. Traffic lane 3.7m (1 x 3.7m)	Lambruck Lane (gravel)	Yes
150-500	Rural Road. Traffic lanes 6.2m (2 x 3.1m)	Savernake Road	Yes
<20,000	Urban Road. Traffic lanes 4.2-4.5m locations were motorists and cyclists used the same lane. Divided by raised median.	Melbourne Road MR314	Yes
1,000 – 3,000	Urban Road. Traffic lanes 4.2-4.5m locations were motorists and cyclists used the same lane.	Corowa Road MR314	Yes
1,000 – 3,000	Rural Road. Traffic lanes 7.0m (2 x 3.5m)	Spring Drive MR314	Yes
1,000 – 3,000	Rural Road. Traffic lanes 7.0m (2 x 3.5m)	Tocumwal Road MR550	Yes

The primary transportation routes have acceptable road cross sections which meet the Austroads road design standard for the daily traffic volumes using each route. There is also a margin of spare traffic capacity to accommodate any daily traffic increases, without requiring any increase to the design standard of the routes.

8.2.2.5 Public Transport

The identified primary transportation routes are all school bus routes. Thomson's currently operates the Mulwala to Yarrawonga public bus routes, Monday to Saturday on Melbourne Road.

8.2.3 Impact Assessment

8.2.3.1 Construction and Traffic Generating Activities

Construction of the Project would take approximately eight months from the commencement of site establishment works. Construction activities would be undertaken during the standard daytime construction hours of:

- 7 am to 6 pm Monday to Friday; and
- 8 am to 1 pm Saturday.

No construction activities would occur on Sundays or public holidays, however under special circumstances delivery of large items may be required over these periods to ensure peak traffic is avoided. It is anticipated that construction activities would be staggered over an eight-month period, which would allow for the gradual development and commissioning of the facility.

RPS

Workforce

The anticipated 130 workers would be required during construction and four operational staff posted at the solar facility to manage the site activities and to support routine plant operations and maintenance after completion.

Construction equipment

Construction equipment required for the establishment of the Project would be limited to heavy machinery and plant generally used across the wider construction industry.

- Truck and dog for civil works;
- D6 dozer or equivalent for levelling and road development;
- 24-tonne excavator for earthworks
- Grader for road development and levelling activities
- Mulcher for the mulching and re-use of vegetation material onsite;
- 7-tonne vibrating roller for road construction;
- Front end loader for the movement and loading of soil and aggregate materials;
- Water cart for road construction and dust suppression;
- Piling rig for installing PV piles;
- Franna crane for the lifting of loads, erection of steel, and movement of heavy plant;
- Trenchers for the installation of underground conduits and cabling;
- Portable generator for temporary site power; and
- Hand power tools and equipment.

8.2.3.2 Traffic Generation

The following generated daily traffic movements and corresponding vehicle types have been determined based on the proposed construction time frame. Traffic generation to and from the project area for construction, operations, and decommissioning is detailed further below.

Construction

It is anticipated that the average traffic generation during the construction phase would peak at 150 movements per week via Savernake Road and Lambruck Lane, or 23 movements per day. This comprises an average of 8 heavy vehicles per day and 15 light vehicles (minibus and cars) per day. There is also the potential for two vehicle movements during the AM and PM peak hour periods.

Construction traffic would be generated from the following sources:

- Light vehicle movements for construction workers;
- Delivery of high voltage equipment, PV components, and related construction materials;
- Delivery of construction materials for the permanent site office, switch yard, and maintenance buildings;
- Delivery of temporary construction worker toilets, lunchrooms, and site office;
- Mobilisation and de-mobilisation of heavy plant and equipment; and
- Delivery of aggregates and concrete for civil works.

In addition, it is expected that during the non-peak construction (months 1-4 and 7-9), the average heavy vehicle generation would peak at eight movements per day. During months 5-6 of peak construction, heavy vehicle generation is expected to peak at 13 movements per day. At least 10 oversized vehicles would be required during construction of the Project.

Operation

It is anticipated that the average traffic generation during the operational phase of the Project would peak at 14 moments per week, or less than two movements per day. This will comprise 1 heavy vehicle and 13 light vehicles per week. There is the potential for two vehicle movements during the AM and PM peak hour periods, and these staff would be on site for maintenance and monitoring purposes. In addition, there is the potential for one vehicle movement per week via the access driveway at the switching yard on Tocumwal Road.

Decommissioning

It is anticipated that traffic generation and types of vehicles used for the decommissioning activities would be similar to and no greater than traffic generation for construction. It is expected that the decommissioning period would be shorter than construction.

It is anticipated that the average traffic generation during decommissioning would peak at 150 movements per week, or 23 movements per day. There is also the potential for two vehicle movements during the AM and PM peak hour periods.

8.2.3.3 Traffic Distribution

It is anticipated that traffic generated by the Project would be distributed throughout the existing road network depending on origin/destination and route choices of delivery, construction and operational traffic. It has been assumed that all construction, operation and decommissioning traffic would arrive at the project area (Lambruck Lane) from the south following a northbound travel direction. The primary transportation route of Savernake Road and Lambruck Lane would be used.

8.2.3.4 Traffic along the Primary Distribution Routes

The impact of the Project on the roads identified as the primary transportation routes for the delivery of construction materials, the day to day access by construction personnel, and the decommissioning is considered minimal. All primary transportation roads are designated B-double routes and meet the Austroads standards for road capacity. In addition, it was determined that the existing carriageway widths, signage/delineation and intersection treatments (roundabouts, CHR's, offset T-junctions and give-way conditions) would be sufficient for the increase of 23 vehicle movements per day of construction traffic.

8.2.3.5 Tocumwal Road Switching Yard Access Driveway

The estimated movement of one light vehicle per week at the switching yard access driveway would have an insignificant impact on traffic on Tocumwal Road. However, to ensure traffic safety and to allow for the occasional single unit truck movement, the access driveway would be constructed in accordance with *Austroads Guide to Road Design Part 4: Intersections and Crossings* (refer to Figure 7.2 of the Traffic Impact Assessment in **Appendix F**).

RPS

8.2.3.6 Sight Distance

Savernake Road

The existing speed limit for Savernake Road at the intersection of Lambruck Lane is 100km/h. The minimum safe intersection sight distance (SISD) as set out in Table 3.2 of the *Austroads Guide to Road Design Part 4A: Section 3 Sight Distance* for a design speed of 100km/h is 262 metres for a reaction time of 2.5 seconds. These criteria are satisfied at the existing T-junction intersection in both directions with measured inter-visible sight distances of over 350 metres in both directions (refer to **23**).

Plate 93 Savernake Road at intersection with Lambruck Lane northbound (left) and southbound (right), showing clear sight distance

Tocumwal Road Switching Yard Access Driveway

The existing speed limit for Tocumwal Road at the proposed switching yard access driveway is 80km/h. The minimum safe intersection sight distance (SISD) as set out in Table 3.2 of the *Austroads Guide to Road Design Part 4A: Section 3 Sight Distance* for a design speed of 80km/h is 181 metres for a reaction time of 2.0 seconds. These criteria are satisfied at the proposed switching yard access driveway junction with Tocumwal Road with measured inter-visible sight distances of over 250 metres in both directions (refer to **Plate** 10**24**).

Plate 104 Tocumwal Road at proposed located of switching yard access driveway looking eastbound (left) and westbound (right), showing clear sight distance

Benalla to Oaklands Railway Line

The minimum stopping sight distance (SSD) as set out in the *Australian Standard 1742 Part 7: Railway Crossing,* Figure D2 Stop and Start up visibility at passive control railway crossing for a B-double vehicle with a design speed of 60km/h is 117 metres for a reaction time of 2.5 seconds. These criteria are satisfied at the existing railway crossing on Lambruck Lane in both directions and on both sides with measured sight distances of over 700 metres (refer to **Plate 115**).

Plate 115 Lambruck Lane looking northbound (left) and southbound (right) at the railway crossing, showing clear sight distance

8.2.3.7 Traffic Impact at Intersections

An examination of the additional construction traffic volumes at the intersection of Savernake Road and Lambruck Lane demonstrates that the intersection would continue to operate well within capacity in both the AM and PM peak periods for all movements with minimal delays.

However, to ensure traffic safety and to allow for heavy vehicles turning at the intersection of Lambruck Lane, the gravel road connection should be sealed and reconstructed in accordance with *Austroads Guide to Road Design Part 3: Geometric Design Figure 7.4*. This would allow for articulated vehicles and the left-in/left-out dual access for single unit trucks. A minimum sealed width of eight metres should be provided at the railway crossing to allow for the safe two-way passing of larger vehicles.

8.2.4 Mitigation and Management

The traffic impacts from the Project have been assessed and the key findings and mitigation and management measures are as follows:

- The additional construction traffic (14 vehicles per day) generated by the Project would have a minimal impact on the operations of the intersection of Savernake Road and Lambruck. These roads would continue to operate well within its capacity during both the AM and PM peak periods for all movements;
- The sealing, widening and turning movement improvements on the existing gravel section of Lambruck Lane (at the intersection of Savernake Road) would ensure the safe operations of heavy vehicles at the intersection;

- There would be minimal impact from the Project on the roads identified as the primary transportation routes for construction activities as they have been identified as designated B-double routes and satisfy the Austroads Standards for road capacity;
- Additional railway crossing warning signage on Savernake Road approaching the intersection with Lambruck Lane would improve rail crossing awareness for the increase in construction traffic accessing Lambruck Lane;
- The glare and reflection from the Project would have a negligible influence on motorists and no adverse impact on traffic safety;
- A Construction Traffic Management Plan (CTMP) would be prepared in consultation with RMS and in accordance with the *RMS Traffic Control at Worksites Manual (2010).* The CTMP would also address periodic grading and dust control on unsealed roads used by construction vehicles. Temporary traffic control arrangements may be required at the intersection of Savernake Road and Lambruck Lane and the site access intersections with Lambruck Lane during the peak stages of construction traffic activity and when deliveries by oversize vehicles may be required.

For further detail on traffic assessment and management refer to the **Traffic Impact Assessment** attached as **Appendix F.**

8.3 Visual

8.3.1 Introduction

An assessment of visual impacts from the Project has been undertaken by RPS Group. The purpose of this report was to provide a qualitative and quantitative assessment of the potential visual impacts generated by the development. The assessment was also prepared to determine the most appropriate visual treatments required to mitigate visual impacts from the Project. The **Visual Impact Assessment** (VIA) is attached as **Appendix G**.

The assessment has also been prepared to satisfy the SEARs, which requested the following be considered:

*"**Visual –** including an assessment of the likely visual impacts of the development (including any glare, reflectivity and night lighting) on surrounding residences, scenic or significant vistas, air traffic and road corridors in the public domain, including a draft landscaping plan for on-site perimeter planting, with evidence it has been developed in consultation with affected landholders"*

A full summary of the SEARs requirements (including agency responses) are included within **Appendix A.**

8.3.2 Methodology

This visual assessment uses an industry standard in its approach to visual impact assessment that is systematic, consistent and based on professional, value judgement of commonly accepted and adopted visual assessment criteria.

The methodology adopted for this assessment is guided by policy and guidelines outlined in *'Beyond the Pavement'* (NSW Transport Roads & Maritime Service) and the '*Environmental Impact Assessment Practice Note Guideline for Landscape Character and Visual Impact Assessment 2013* (NSW Transport Roads & Maritime Service). The following has been undertaken for this assessment:

1. Desktop study using aerial photography to identify potential the visual catchment and possible visual receivers;
2. Ground-truthing of assumptions reached through initial desktop studies;

3. Ground-truthing involved visiting the site and reviewing the surrounding vantage points from publicly accessible areas;
4. Describing and evaluating the existing landscape character and visual environment in order to establish a baseline for the visual assessment;
5. Mapping the visual envelope based on field studies and data while identifying sensitive visual receivers (sensitive visual receivers are people who might experience a visual impact); and
6. Undertaking a visual impact assessment using the grading matrix, considering visual sensitivity (of the visual amenity or viewpoints) and the magnitude of the visual change, to arrive at an overall level of effect or impact.

This VIA adopts the standard methodology of sensitivity relating to proximity; that is, the greater the distance between the visual receptor and the proposal, the lesser the visual sensitivity of that visual receptor.

8.3.3 Existing Environment

8.3.3.1 Landscape Character

The dominating feature of the regional and local landscape character is the regularity of surface level; there is a minimal degree of topographic relief resulting in a largely horizontal and linear landscape aesthetic. Any vertical relief generally comes from the presence of trees, rural dwellings and associated rural infrastructure.

The landscape character of the greater Mulwala area is also typified by the patchwork of rural properties which subsist on the regions vast open spaces, largely focussed on cropping and livestock grazing. These agricultural properties are generally partitioned and identifiable due to the different types of rural infrastructure, including unsealed roads, landscape buffers or tree plantings and fencing. Additional property separation exists due to the presence of the Murray Darling Basin's irrigation network of channels, canals and weirs.

The built form found within Mulwala rural landscapes are generally associated with agricultural activities. This includes buildings, sheds, loaders and other infrastructure. Dwellings are typically located centrally to the property lots and along property and are scattered on rural properties throughout the region, and a number of these circumvent the project area. Although each dwelling is generally screened with landscaping, they form clusters of visual receptors due to their proximity to the project area.

This industry-focussed infrastructure and development has resulted in a visual quality and a degree of visual variety which contributes greatly to the landscape character of Mulwala. Although the landscape character is linear in terms of overall composition, a distinct rural landscape character can be distinguished.

Approximately 1.2 kilometres to the south of the project area is the Mulwala township, and further south 4.15 kilometres from the project area is the larger of the two townships, Yarrawonga. Both house a significant proportion of the regions residents. Established around 1872, the township was modelled on the grid-style urban structure existing today, and contrasts to the balance of the regions pastoral landscapes. The township is juxtaposed diagonally through the rural landscape, contrasting with the generally north-south alignment of the rural properties.

The Mulwala township represents one of the principle visual receptors due to its broad scale and its north-south alignment. However, due to its distant proximity to the project area, and the presence of screening vegetation, exposure to the project area would be negligible.

The distinctly vast and open landscape character of Mulwala results in a locale with a significantly broad visual catchment. Moreover, the flat nature of the terrain and minimal landscaping results in a site with a high visual exposure (refer to **Plate 126** and **Figure 17**).

Plate 126 View of the Project site from Savernake Road

Figure 17: Artist impression: Viewing north to proposal from Tocumwal Street

8.3.4 Impact Assessment

8.3.4.1 Viewpoint Analysis

Due to the infeasible nature of completing an assessment for each individual visual receiver within a 1.5 kilometre radius, the VIA considered individual visual receivers where possible, and clusters of visual receivers which are used to highlight the influence of the Project on a broader context.

Two primary measurements have been used to determine impacts to the landscape character which are:

7. Sensitivity of the character; and
8. Magnitude of the Project.

Sensitivity

Visual sensitivity refers to the character of a setting, the quality of the view, and how sensitive it is to the proposed change. Combined with magnitude, sensitivity provides a measure of impact. Visual sensitivity relates to the direction of view and the composition of the view. Table 19 below details the three categories used to determine sensitivity.

Table 19 Sensitivity Categories

Sensitivity Category	Description
High	Private residents at home with prolonged viewing opportunities, heritage properties, and landscapes
Moderate	Commercial properties, travellers on road, rail or other transport routes with an interest in their environment
Low	Transient type spaces and people at their place of work whose attention is on their work

The higher the visual quality of the landscape, the greater the significance of introducing a new development, and the higher the sensitivity.

Magnitude

The magnitude of a visual effect is the degree of change the visual landscape undergoes as a result of the Project. It is the measurement of the overall scale, form and character of a Project when compared to the existing condition.

Magnitude also takes into consideration the distance between the viewer(s) and the Project.

Judging the magnitude of visual effects takes account of the following:

- The scale of the change within the view with respect to the addition (or loss) of elements in the view and change to its composition. This includes the proportion of the view that is taken up by the Project;
- The degree of change and/or integration of any new features or changes in the landscape in terms of form, scale and mass, line height, colour and texture; and
- The nature of the view of the Project and whether the views are permanent, full, partial or glimpses.

The magnitude of a Project in a landscape character depends on the scope of the Project. The location of the Project in relation to the region in question also influences magnitude. Six categories are used in ranking the magnitude of a Project, ranging from negligible to high. Impact on the Landscape Character is determined using the matrix shown below in **Figure 18**.

RPS

Sensitivity	Magnitude			
	High	Moderate	Low	Negligible
High	High Impact	High-Moderate	Moderate	Negligible
Moderate	High-Moderate	Moderate	Moderate - Low	Negligible
Low	Moderate	Moderate - Low	Low Impact	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Source: RMS, 2013

Figure 18 Impact Grading Matrix

The VIA uses viewpoints and receptors as a means of assessing the potential visual impacts of the Project. Viewpoints are general positions looking towards the Project and include views from receptors. Receptors are sensitive visual receivers such as houses, roads and other infrastructure.

The VIA has considered seven viewpoints surrounding the Project, shown in **Figure 19**. A summary of the results of the viewpoint analysis are shown in Table 20 and a summary of the receptor viewpoint analysis in Table 21. Based on the visual impact ratings, mitigation measures have been proposed to reduce the visual impact rating from a Moderate to Low rating as per Table 21. Visual screening mitigation measures are discussed further in Section 8.3.6 below. The full analysis of results and photomontages are provided in Section 4 of the **Visual Impact Assessment** attached as **Appendix G**.

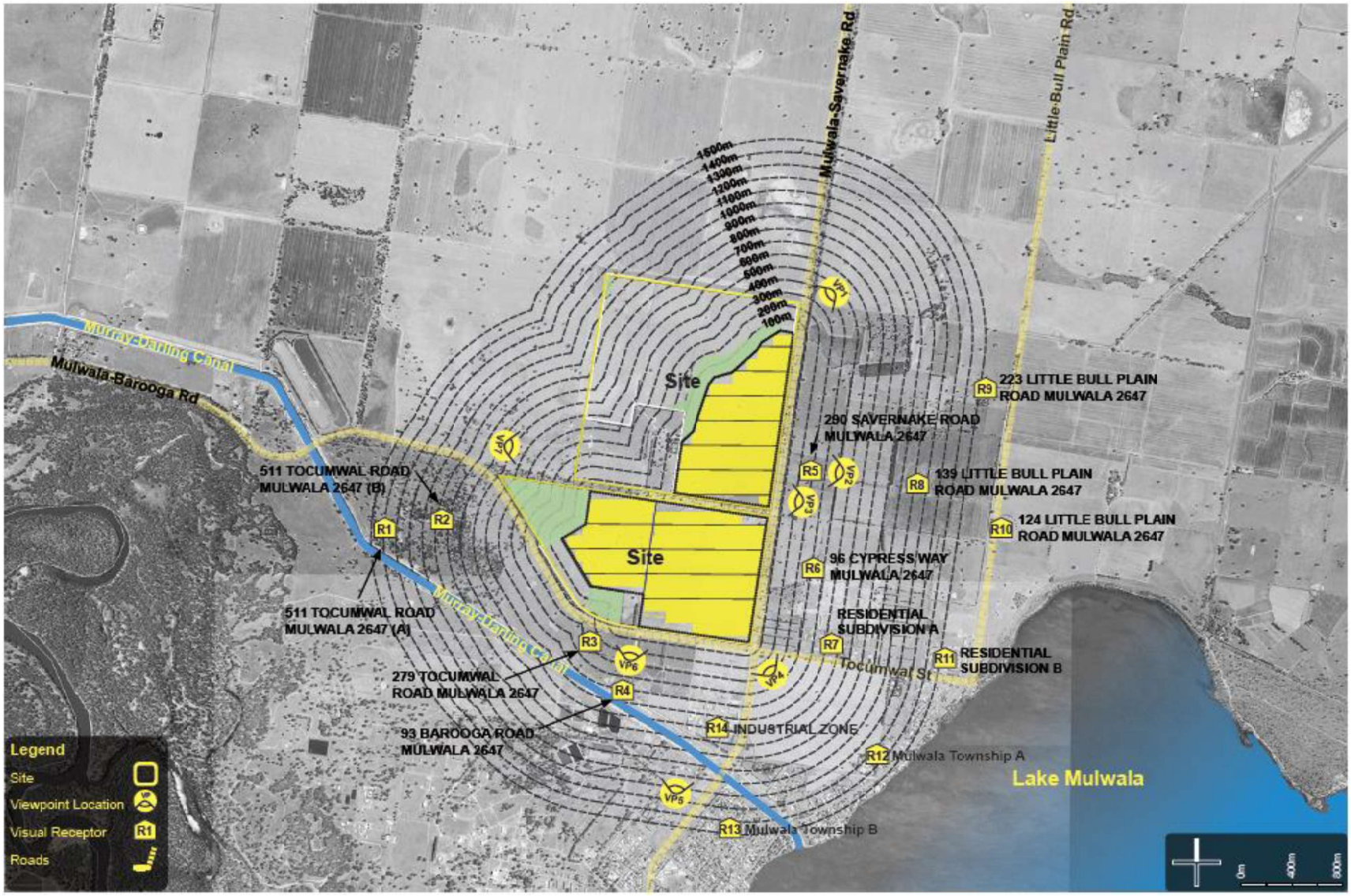


Figure 19 Viewpoint locations relative to the Project site

Table 20 Viewpoint Analysis Summary Results

View Point	Location	Sensitivity	Magnitude	Impact
VP1	Views southwest towards the project area along Savernake Road	High	Low	Moderate
VP2	Views from within property of 290 Savernake Road	High	Low	Moderate
VP3	Views westerly towards the project area along Savernake Road	High	Low	Moderate
VP4	Views northwest towards the project area at southwestern corner of site	High	Low	Moderate
VP5	Views north towards the project area from the Mulwala township	High	Negligible	Negligible
VP6	Views north towards the project area from the industrial area	Negligible	Negligible	Negligible
VP7	Views east towards the project area from west of site	Moderate	Negligible	Negligible

An artist impression of the Project from each viewpoint is shown in **Figure 20** to **Figure 26**.

Figure 20: Viewpoint 1 Artist Impression: Views south-west towards site along Mulwala-Savernake Rd

Figure 21: Viewpoint 2 Artist Impression: Views from within property of 290 Savernake Road, Mulwala

Figure 22: Viewpoint 3 Artist Impression: Views westerly towards site along Mulwala Savernake Rd

Figure 23: Viewpoint 4 Artist Impression: Views north-west towards proposal from southeast corner of site

Figure 24: Viewpoint 5 Artist Impression: Views north towards proposal from Mulwala Township

Figure 25: Viewpoint 6 Artist Impression: Views north towards proposal from industrial area

Figure 26: Viewpoint 7 Artist Impression: Views east towards proposal from west of site

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Table 21 Receptor Analysis Summary Results

Receptor	Address	Proximity to Project (approx.)	Sensitivity	Magnitude	Impact	Visual Screening	Residual impact
1	511 Tocumwal Road Mulwala 2647 (A)	1000 metres	High	Negligible	Negligible	None	Negligible
2	511 Tocumwal Road Mulwala 2647 (B)	750 metres	High	Negligible	Negligible	None	Negligible
3	279 Tocumwal Road Mulwala 2647	250 metres	Moderate	Low	Low	Buffer 1	Low
4	93 Barooga Road Mulwala 2647	500 metres	Moderate	Low	Low	Buffer 1	Low
5	290 Savernake Road Mulwala 2647	250 metres	High	Low	Moderate	Buffer 5	Low
6	96 Cypress Way Mulwala 2647	365 metres	High	Low	Moderate	Buffer 4	Low
7	Residential Subdivision (A)	420 metres	High	Low	Moderate	Buffer 3	Low
8	139 Little Bull Plain Road Mulwala 2647	1120 metres	High	Low	Moderate	Buffer 5	Low
9	223 Little Bull Plain Road Mulwala 2647	1500 metres	High	Negligible	Negligible	None	Negligible
10	124 Little Bull Plain Road Mulwala 2647	1800 metres	High	Negligible	Negligible	None	Negligible
11	Residential Subdivision (B)	1400 metres	High	Negligible	Negligible	Buffer 3	Negligible
12	Mulwala Township (A)	1000 metres	High	Negligible	Negligible	Buffer 3	Negligible
13	Mulwala Township (B)	1120 metres	High	Negligible	Negligible	Buffer 2	Negligible
14	Industrial Zone	50 metres	Negligible	Negligible	Negligible	Buffer 2	Negligible

The VIA determined that the Project would change the landscape character of the setting in a very site-specific manner. Beyond this it would have an overall negligible impact on the localised area. The landscape character of the setting is generally rural in aesthetic, with much of the current vegetation that lines the properties adjacent to the roads providing a visual barrier to the Project for receivers. Moreover, the largely flat nature of the locality and region generally, assists greatly in mitigating views to the Project due to the lack of prospect from the visual receivers.

A number of view sheds were identified as having the potential for a visual impact as a result of the Project, however the majority of views to the Project were found to have a negligible to moderate impact.

8.3.5 Reflectivity Assessment

This glare and reflectivity assessment would consider the following two qualities to ascertain the developments degree of reflective nuisance:

1. Design and mechanical behaviour of the Project; and
2. The Project within the existing environment.

8.3.5.1 Design and Mechanical Behaviour

Glare based visual nuisance associated with the Project would be largely influenced by the location and position of the solar panels relative to sensitive visual receptors within a closer proximity to the Project and exposed to more direct specular reflection.

The solar panels are designed to follow the sun along a single axis to maximise energy absorption. The solar panels would remain at a constant 45-degree angle from sunrise (first light) at approximately 6am, until about 9am when the solar panels would begin to move and follow the path of the sun. Likewise, from approximately 4:30pm until sunset (last light) the solar panels would remain at a constant 45-degree angle (refer to Figure 34 of the **Visual Impact Assessment** attached as **Appendix G**).

Considering that the solar panels would remain at a static 45-degree angle in the mornings and afternoons, the resulting specular glare is likely to have a negligible influence on sensitive receivers, and any glare would reflect in an opposing direction away from the receptor.

The potential for glare associated with non-concentrating photovoltaic systems which do not involve mirrors or lenses is relatively limited. Photovoltaic solar panels are designed to absorb the highest amount of solar energy possible to generate the maximum amount of electricity. This results in negligible glare, reflecting as little as two percent of the sunlight received.

There is additional solar farm infrastructure that may cause glare or reflections depending on the sun angle. These may include:

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

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

8.3.5.2 Project within the Existing Environment

Photovoltaic solar panels generally would not create noticeable or nuisance glare compared with other commonly existing surfaces, such as building rooves. Likewise, photovoltaic solar panels are less reflective than other naturally occurring elements such as soils and crops (refer to Table 7 of the **Visual Impact Assessment** attached as **Appendix G**). Photovoltaic solar panels reflect approximately 3-20% of the light received depending on the angle of incidence.

Within the pastoral setting of the Project, grazing landscapes, crops and water share a similar or higher reflective value than photovoltaic solar panels. From a glare perspective, the Project would not represent a significant departure from the existing visual environment.

8.3.5.3 Air Traffic

There are a number of airports within the region including Tocumwal (40 kilometres from the Project), Corowa Airport (30 kilometres from the Project), Finley Airport (52 kilometres from the Project) and Yarrawonga Airport (6.6 kilometres from the Project).

Yarrawonga Airport is a 48 hanger, 2-runway facility located 2.8 kilometres southeast of the Yarrawonga central business district. The airport caters to the needs of light aircraft, including training and maintenance. Given the relative close proximity to the Project, there is some potential for aircraft utilising Yarrawonga Airport to be impacted by the Project. However, the northeast-southwest alignment of the runways would result in aircraft taking-off and landing in opposite directions from the Project. Moreover, photovoltaic solar panels appear dark grey and do not cause a glare or reflectivity hazard. As such, the Project is not expected to result in visual nuisance for localised air traffic.

8.3.6 Mitigation and Management

The following mitigation and management measures would be implemented to manage and minimise the potential visual impacts.

8.3.6.1 Landscape

Construction

The following measures should be implemented during the construction phase to minimise visual impacts:

- Continue consultation with landholders to develop mutually beneficial visual mitigation strategies, including the type and location of potential landscaping and associated mounding;
- Avoid unnecessary loss or damage to vegetation within and adjacent to the Project site by protecting trees prior to construction and/or trimming vegetation to avoid total removal. This includes vegetation that makes a substantial and positive contribution to landscape character and/or provides screening to view sheds nominated as receiving potentially high visual impact;
- Minimise light spill from the Project into adjacent visually sensitive properties by directing construction lighting into the construction areas and ensuring the site is not over-lit. This includes the sensitive placement and specification of lighting to minimise any potential increase in light pollution;
- Temporary hoardings, barriers, traffic management and signage would be removed when no longer required;
- Measures such as the provision of visual screening/retention of existing vegetation would be considered for visually sensitive areas;
- Ensure minimal disturbance to root zones of vegetation that lines property boundaries and may not necessarily be part of the work but which root zones could encroach on the work area and should be protected;
- The site to be kept tidy and well maintained, including removal of all rubbish at regular intervals. There should be no storage of materials beyond the construction boundaries;
- Locate site sheds away from residences to avoid disturbance;
- Graffiti to be removed during construction in accordance with standard requirements;

- Work/site compounds should be screened, with shade cloth or similar material (where necessary) to minimise visual impacts on key viewing locations; and
- Restore any areas that are impacted by construction with appropriate landscape treatments.

Visual mitigation through landscape buffering

The proposed landscaping buffers have been designed based on the visual impact assessment in Table 21 above. The implementation of buffer zones has been proposed to mitigate impacts to sensitive receivers with a moderate or higher impact assessment rating. These ratings have been utilised in the development of three different styles of buffer/screening:

- Buffer type 1: Mitigate buffers which entirely block views to the proposal, for sensitive receivers such as residential dwellings;
- Buffer type 2: Intermittent buffers which partially block views to the proposal, for moderately sensitive receivers, such as industrial areas;
- Buffer type 3: Density existing vegetation, used to strengthen the visual mitigation of existing vegetation, used to retain the rural landscape character of the region.

The implementation of buffers has resulted in a reduction of each assessment rating to have a low or negligible residual impact (refer Table 21). A detailed description of proposed buffers, including size, type of vegetation and density is outlined in **Appendix G**.

The proposed landscaping for visual screening purposes would involve the layered planting of three metre wide vegetation strips to minimise impacts to close receivers. Development of the landscape plan has been undertaken in consultation with the affected surrounding landowners and is shown in **Figure 27** within **Appendix G.**

Operations

The following operational measures would be implemented to minimise the short and long term visual impacts of the development:

- Undertake rehabilitation planting as early as possible to replace vegetation that provided screening to adjacent residential properties and sensitive visual receivers. In instances where this is not feasible, it may be possible to initiate screening and tree planting to the boundaries of, and/or within private lands. This approach may be feasible particularly to the site corner areas, where internal plantings would largely mitigate the influence of the Project on residential properties;
- Landscape detail documentation highlighting screening planting and streetscape design should be prepared in alignment of the civil design, with the intent to provide some integration between the new proposal and the existing / planned landscape character;
- Undertake regular landscape maintenance works to maximise the health and effectiveness of existing planting to help buffer the removal of existing landscape character items;
- Where unplanned removal of visually significant vegetation will take place, prepare a localised landscape plan as soon as possible to mitigate and reduce visual influence;
- Design landscaping to specific sections of the perimeter of the Project to mitigate views from houses located within a sensitive proximity;
- Explore the potential for landscaping to the lot or home yard area of affected visual receivers to mitigate visual impacts of the Project; and

- Where appropriate, an individual landscaping plan should be prepared in consultation with the landowner and with consent from local government.

8.3.6.2 Reflectivity

Considering the relatively minimal glare reflecting off the photovoltaic solar panels, and their mechanical nature as they follow the sun, the level of visual nuisance or glare resulting from the Project would have a minimal influence on locally positioned visual receptors. Therefore, no mitigation measures are proposed to mitigate glare and reflectivity.

For further details on visual impact relating to the Project refer to the **Visual Impact Assessment** attached as **Appendix G.**

8.4 Biodiversity

8.4.1 Introduction

An assessment of the ecological constraints for the Project was undertaken by MJD Environmental Pty Ltd in the form of a **Biodiversity Development Assessment Report** (BDAR). The BDAR is attached as **Appendix I**.

The assessment has also been prepared to satisfy the SEARs, which requested the following be considered:

"***Biodiversity –*** *Including an assessment of the biodiversity values and the likely biodiversity impacts of the development in accordance with the Biodiversity Conservation Act 2016 (NSW), a detailed description of the proposed regime for minimising, managing and reporting on the biodiversity impacts of the development over time, and a strategy to offset any residual impacts of the development in accordance with the Biodiversity Conservation Act (2016)"*

A full summary of the SEARs (including agency responses) are included within **Appendix A.**

In addition, preliminary assessment was also undertaken having regard to those threatened entities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This BDAR is based on an application of the NSW Biodiversity Assessment Methodology 2017 (BAM), which provides a framework for assessing the developments impact on biodiversity. A two stage investigation path was performed in accordance with the BAM as listed below:

Stage 1 – Biodiversity Assessment; and

Stage 2 – Impact Assessment.

Based on assessment of the BAM 2017 and consultation with the NSW OEH, the site has been determined to qualify for a Streamlined (Paddock Tree) Assessment. As such the methodology, assessment and BDAR adheres to the BAM 2017 for Streamlined (Paddock Tree) Assessment.

Correspondence with OEH and LLS in regards to the Mulwala Solar Farm are provided in **Appendix I.**

8.4.2 Methodology

8.4.2.1 Desktop

A desktop review of the project area was undertaken to identify potential areas of avoidance regarding native vegetation and to restrict the proposed solar farm development areas to cleared land where known agricultural practices have been historically implemented. The desktop assessment identified areas of

potential native vegetation to be excluded from the development areas, being primarily vegetation identified along boundaries, a large depression (that is periodically inundated) which is partially mapped as regulated land under the *Local Land Services (LLS) Act 2013*.

Desktop analysis of vegetation within the project area and its surrounds were informed by large-scale vegetation mapping projects and aerial photography, including:

- OEH VIS Classification Database;
- Preliminary consultation of the Riverina Bioregion Vegetation Mapping (NPWS 1999) to determine the broad plant community types within the Project site; and
- GIS analysis including Aerial Photograph Interpretation (API) and consultation of topographic map (Scale 1:25,000) layers for the site.

8.4.2.2 Survey (flora)

Field surveys of the project area were undertaken from 16 to 18 April 2018 by traversing the site by vehicle and by foot to provide an understanding of vegetation and biodiversity values. Due to the highly disturbed nature of the project area, the Paddock Tree method outlined below was used to assess vegetation.

8.4.2.2.1 BAM – Paddock Tree Assessment

The Paddock Tree streamline assessment was undertaken to record all Paddock Trees within the project area. Each Paddock Tree was recorded using a handheld Trimble Differential-GPS unit. Each tree had the following attributes recorded:

- Species name to genus;
- Diameter at Breast height;
- Hollows Present/absent and number of hollows;
- Any other habitat attributes e.g. termite terrain, nests;
- Height of tree; and
- Canopy spread.

This information was used to determine the assessment class of each tree. The Classes are as follows:

Class1: paddock tree that are<20cm DBH, or tree that meets the definition of trees with negligible biodiversity value*

Class 2: Paddock trees that are>20cm DBH and less than the large tree benchmark for the most likely plant community type

Class 3: Paddock trees that are greater than or equal to the Large tree benchmark for the most likely plant community type.

*Paddock trees with negligible biodiversity value are those trees identified as class 1 paddock trees and do not contain hollows.

Trees classed as Class 2 and Class 3 were all assessed for habitat suitability for threatened species associated with the PCT the tree species are most likely to represent. **Figure 27** provides the location of flora observed during this survey.

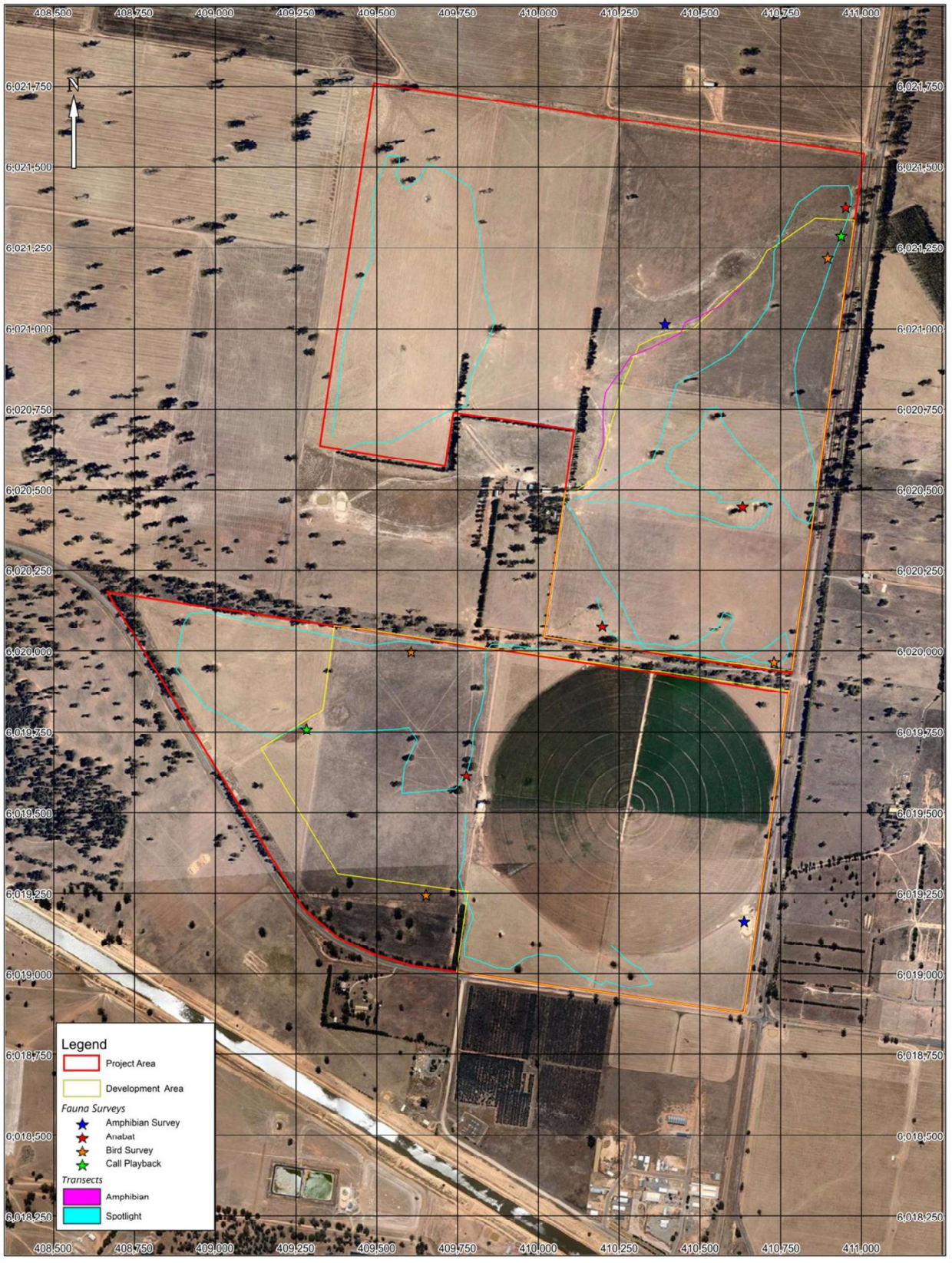

Figure 27 Flora Survey Locations

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8.4.2.3 Survey (fauna)

A number of faunal survey methods were undertaken which are described below.

Spotlighting was undertaken with the use of a Lightforce Enforcer 140mm LED (376m @ 1 LUX) hand-held spotlight and head torch whilst traversing the project area by foot and vehicle. This included areas of mature remnant vegetation along boundaries of the project area, and all hollow bearing trees within the project area. A total of 5-person hours of spotlighting was carried to target mammals and nocturnal bird species within the Project site.

Target Species included the following:

- Eastern Pygmy Possum (*Cercartetus nanus*), Squirrel Glider (*Petaurus norfolcensis*), Brush-tailed Phascogale (*Phascogale tapoatafa*), Koala *(Phascolarctos cinereus*) and Grey-headed Flying Fox (*Pteropus poliocephalus*).
- Barking Owl (*Ninox connivens*) and Masked Owl (*Tyto novaehollandiae*).

Avifauna Census: the observation of avifauna within the project area was undertaken via targeted diurnal census supplemented by opportunistic observations during other diurnal fieldwork (Refer to **Figure 3**). The diurnal census surveys were undertaken at dusk and dawn (early morning being a peak activity period for birds). 4-person hours of diurnal census were undertaken during peak dusk and dawn activity periods.

Nocturnal bird surveys were undertaken, and detail of methods employed is outlined in below under call playback survey techniques.

Target Species included:

- Bushstone Curlew (*Burhinus grallarius*), Glossy Black Cockatoo (*Calyptorhynchus lathami*), Brown Treecreeper (*Climacteris picumnus victoriae*), White-bellied Sea- eagle (*Haliaeetus leucogaster*), Little Eagle (*Hieraaetus morphnoides*), Swift Parrot (*Lathamus discolor*), Major Mitchell's Cockatoo (*Lophochroa leadbeateri)* and Superb Parrot (*Polytelis swainsonii*).

Amphibian Surveys: were undertaken in accordance with the *Threatened species survey and assessment guidelines: Field survey methods for fauna -Amphibian.* Nocturnal listening surveys and searches were conducted over two nights during the evenings of 16 and 17 April 2018. Two dedicated 30-minute listening surveys over two nights were undertaken near the known ephemeral drainage area in the northern parcel of the project area and the farm dam devoid of vegetation in the south eastern corner. Additionally, A 100 metre transect search of the ephemeral drainage area was carried as part of the surveys each night.

Microbat surveys were undertaken by recording echolocation calls using the Anabat Express Detector units set to remotely record for the entire night (6pm to 6am). Two units were deployed within the project area for a period of 2 nights (each unit). Anabat units were placed with an emphasis on those areas deemed likely to provide potential foraging and flyway sites for microbats. Bat call analysis was undertaken by Dr Anna McConville of Echo Ecology who is experienced in the analysis of bat echolocation calls. **Appendix I** contains the Anabat reports with all results.

Nocturnal Call Playback: the use of pre-recorded calls of Forest owls, Koala and Glider species that may occur within the project area and surrounding area were broadcast during the nocturnal surveys in an effort to receive a vocal response or to attract the species to the playback site. The calls were broadcast through an amplification system (25W megaphone) designed to project the sound for at least one kilometre under still night conditions. As described by Kavanagh and Peake (1993) and Debus (1995), the call of each species was broadcast for at least five minutes, followed by five minutes of listening, and stationary spotlighting. Following the final broadcast and listening, the area was spotlighted on foot. Species targeted included the Barking Owl (*Ninox connivens*), Masked Owl (*Tyto novaehollandiae*), Squirrel Glider (*Petaurus norfolcensis*),

and Koala (*Phascolarctos cinereus*). A total of three call playback sessions were undertaken over three separate nights. The location of the call playback sites is provided in **Appendix I.**

Secondary Indications and Incidental Observations: Opportunistic sightings of secondary indications (scratches, scats, diggings, tracks etc.) of resident fauna were noted. Such indicators included:

- Distinctive scats left by mammals;
- Scratch marks made by various types of arboreal animals;
- Nests made by various guilds of birds;
- Feeding scars on Eucalyptus trees made by Gliders;
- Whitewash, regurgitation pellets and prey remains from Owls;
- Aural recognition of bird and frog calls;
- Skeletal material of vertebrate fauna; and
- Searches for indirect evidence of fauna (such as scats, nests, burrows, hollows, tracks, and diggings).

8.4.3 Existing Environment

8.4.3.1 Landscape Context

The extent of native vegetation within the project area is sparse and discontinuous in the landscape due to the extensive agricultural practices implemented within the project area such as cropping and grazing. Native vegetation observed within the project area was limited to canopy cover of paddock trees, a small isolated group of trees with a disturbed exotic understorey, and planted native tree windrows planted after 1990 and excluded from the project area.

8.4.3.1.1 Interim Biographic Regionalisation of Australia (IBRA)

The project area is located wholly within the Riverina Bioregion, an ancient riverine plain and alluvial fans composed of unconsolidated sediments with evidence of former stream channels. Vegetation consists of river red gum and black box forests, box woodlands, saltbush shrublands, extensive grasslands and swamp communities (Thackway & Cresswell 1995). This Bioregion is borders the Southwest slopes bioregions to the north and east, the Murray darling depression to the south west and the Victorian midlands bioregion to the south. The project area occurs wholly within the Murray Fans subregion.

8.4.3.1.2 Native Vegetation Cover

The native vegetation cover of the project area was assessed using Geographic Information Systems (GIS) and was calculated by estimating the percent cover (in accordance with section 4.3.2.4 BAM 2017) of native vegetation within the project area. The native vegetation extent has been assessed as 3.05% of the project area.

8.4.3.2 Native Vegetation

The extent of native vegetation within the project area is sparse and discontinuous in the landscape due to the extensive agricultural practices undertaken such as cropping and grazing. Native vegetation observed was limited to canopy cover of paddock trees, a small isolated group of trees with a disturbed exotic understorey, and planted native tree windrows planted after 1990 and excluded from the project area.

Paddocks have a low diversity of flora species, primarily exotic species that include *Triticum aestivum* (Wheat), *Hordeum sp.* (Barley) and *Heliotropium europaeum* (Heliotrope). Vegetation at the time of

assessment had been cropped with mainly stubble remaining (grass species), and dense patches of Heliotrope. The native grass species *Chloris truncata* was observed in the paddock.This species was only observed very sporadically across the project area.

The cleared area includes an ephemeral depression that is devoid of native vegetation and has been routinely used for various cereal crops over the past 50 years, particularly in dry period (pers comm. landowner). This area has also been routinely ploughed. Vegetation cover in this area was observed to be consistent with the remaining cropped / pasture improved landscape. All exotic pasture areas do not provide threatened species habitat and are recognised as exotic vegetation which does not generate biodiversity credits.

8.4.3.2.1 Paddock Trees

A total of 57 Paddock Trees are located within the project area. A detailed description of the definition of a Paddock Tree (BAM 2017) is provided in the BDAR attached in **Appendix I**. All Paddock Trees assessed on site are classed as Category 2 land, as trees were present as of January 1990. The Paddock Trees are surrounded by Category 1 land as this vegetation has been cleared of native vegetation since 1990.

8.4.3.2.2 Identification of Plant Community Type

The identification of PCTs within the project area has been restricted to the identification of Paddock Tree species to indicate what community may have been present prior to land clearing in the area, and visual observations of adjacent roadside vegetation.

The streamlined assessment module for the clearing of Paddock Trees requires the assessor to nominate up to three candidate PCTs that:

- Include the species of the Paddock Tree being cleared as one of its dominant tree species according to information in the BioNet Vegetation Classification, and
- Is a PCT that is associated with all the threatened species assessed as likely to use the Paddock Tree as habitat.

In addition, the PCTs nominated are to address the seven attributes to identify credit class for ecosystem credits as per section 11.3 of the BAM (2017).

The three PCTs nominated which all Paddock Tree species are dominant species are:

- PCT 75: Yellow Box – White Cypress Pine grassy woodland on deep sandy-loam alluvial soils of the eastern Riverina region and Western NSW South Western Slopes Bioregion
- PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions
- PCT 80: Western Grey Box – White Cypress Pine tall woodland on loan soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina

A listing of Paddock Trees located within the project area is provided in **Appendix I.**

8.4.4 Threatened Species

A review of threatened species information was undertaken to provide context and understanding of biodiversity values occurring within the project area. Information reviewed included:

- Online database searches involving a 10 kilometre buffer around the project area to provide potentially occurring threatened flora and fauna and migratory species under both the BC Act and EPBC Act:
  - NSW Bionet (accessed 13 March 2018)

- Commonwealth Protected Matters of National Significance search tool (accessed 13 March 2018)

- BioNet Vegetation Classification – Threatened species associated with nominated PCT.

8.4.4.1 Ecosytem Credit Species

The PCT identification tool (BioNet Vegetation Classification) has been used to develop a list of ecosystem credit species associated with the PCTs represented within the project area. Ecosystem Credit Species are reliably predicted to occur within the nominated PCTs, and are assumed to occur on site, unless habitat features used by threatened species have been substantially impacted and removed from the project area. These species are presented in **Appendix I.**

8.4.4.1.1 Ecosystem Species Excluded from the Assessment

The vegetation on site has been assessed to provide limited habitat for a small number of species, due to the project area being primarily cleared grazing land with Paddock Trees. The habitat for each of the ecosystem species known to use Paddock Trees has been identified and attributes associated with Paddock Trees and each species was considered during habitat assessment.

8.4.4.2 Species Credit Species

Species Credit Species are species that cannot be reliably predicted to use an area based on habitat surrogates. Species credit species that are likely to occur within the project area must be surveyed to determine presences/absence or provide an expert report. In the absence of either of these, the species will be presumed to be present within the project area.

The conditions of vegetation and habitat within the project area can be assessed by an accredited assessor to have sufficient site degradation of the key habitat constraints associated with species credits species, therefore is unlikely to utilise the site and not requiring further assessment. These species are presented in **Appendix I.**

8.4.4.3 Candidate Species Surveys

The following species could not be conclusively ruled out from occurring within the project area due to each species potential utilisation of Paddock Trees for forage or roosting requirements:

Birds

- Regent Honeyeater *Anthochaera* phrygia
- Bushstone Curlew *Burhinus grallarius*
- Glossy Black Cockatoo *Calyptorhynchus lathami*
- White-bellied Sea-eagle *Haliaeetus leucogaster*
- Little Eagle *Hieraaetus morphnoides*
- Swift Parrot *Lathamus discolor*
- Major Mitchell's Cockatoo *Lophochroa leadbeateri*
- Barking Owl *Ninox connivens*
- Superb Parrot *Polytelis swainsonii*
- Masked Owl *Tyto novaehollandiae*

Bats

- Little Pied Bats *Chalinolobus picatus*
- Grey-headed Flying Fox *Pteropus poliocephalus*

Amphibians

- Sloan's Froglet *Crinia sloanei*

Marsupials

- Eastern Pygmy Possum *Cercartetus nanus*
- Squirrel Glider *Petaurus norfolcensis*
- Brush-tailed Phascogale *Phascogale tapoatafa*
- Koala *Phascolarctos cinereus*

8.4.5 Matters of National Environmental Significance

An EPBC Act Protected Matters Search (accessed 13 March 2018) was undertaken to generate a list of those Matters of National Environmental Significance (MNES) from within 10 kilometres of the project area. An assessment of those MNES relevant to biodiversity has been undertaken in accordance within EPBC Act *Policy Statement 1.1 Significant Impact Guidelines Matters of National Environmental Significance (DoE, 2013).*

8.4.5.1.1 Listed Threatened Species and Communities

A total of 25 threatened species and 5 threatened ecological communities listed under the EPBC Act have been recorded on the Protected Matters Search. A likelihood of occurrence assessment for these MNES has been completed in **Appendix I.**

Nine threatened birds, four mammals, two reptiles five fish, one frog, two reptiles, and one insect were recorded on the Protected Matters Search. Of these, six species were considered to have the potential to utilise the habitats within the project area. These include the following:

- Regent Honeyeater (*Anthochaera phrygia*)
- Painted Honeyeater (*Grantiella picta*)
- Swift Parrot (*Lathamus discolor*)
- Superb Parrot *(Polytelis swainsonii*)
- Corben's Long-eared Bat (*Nyctophilus corbeni*)
- Grey-headed Flying Fox (*Pteropus poliocephalus*)
- Koala (*Phascolarctos cinereus*)

Formal targeted surveys carried out as part of the BAM methodology, did not record any of the above species, and no habitat located within the project area is critical to their survival. This assessment concluded that the Project is unlikely to impact the listed threatened species.

No Threatened Ecological Communities listed under the EPBC Act have been recorded within the project area.

8.4.5.1.2 Listed Migratory Species

The protected matters search nominated 12 migratory species or species habitat that may occur with the 10 kilometre site buffer search area. No listed migratory species were observed on site. The assessment

contained in **Appendix I** concluded that, no habitat located within the project area is critical to their survival. Therefore, it is unlikely that the Project will impact migratory species.

8.4.5.1.3 Wetlands of International Significance (declared Ramsar Wetlands)

The project area is not a wetland of international significance or declared Ramsar wetland. Barmah forest is located 40 to 50 kilometres upstream from the project area. The Forest is part of the largest complex of tree-dominated floodplain wetlands in southern Australia. Barmah Forest, together with Millewa Forests (on the New South Wales side of the Murray River) is nationally the largest continuous stand of river red gum forest.

In summary, the proposed action is unlikely to have an impact to MNES based on the assessment criteria set out in relevant Commonwealth policies and advices as at the time of this assessment.

8.4.6 Impact Assessment

The biodiversity assessment identified the following impacts associated with the proposed solar farm development:

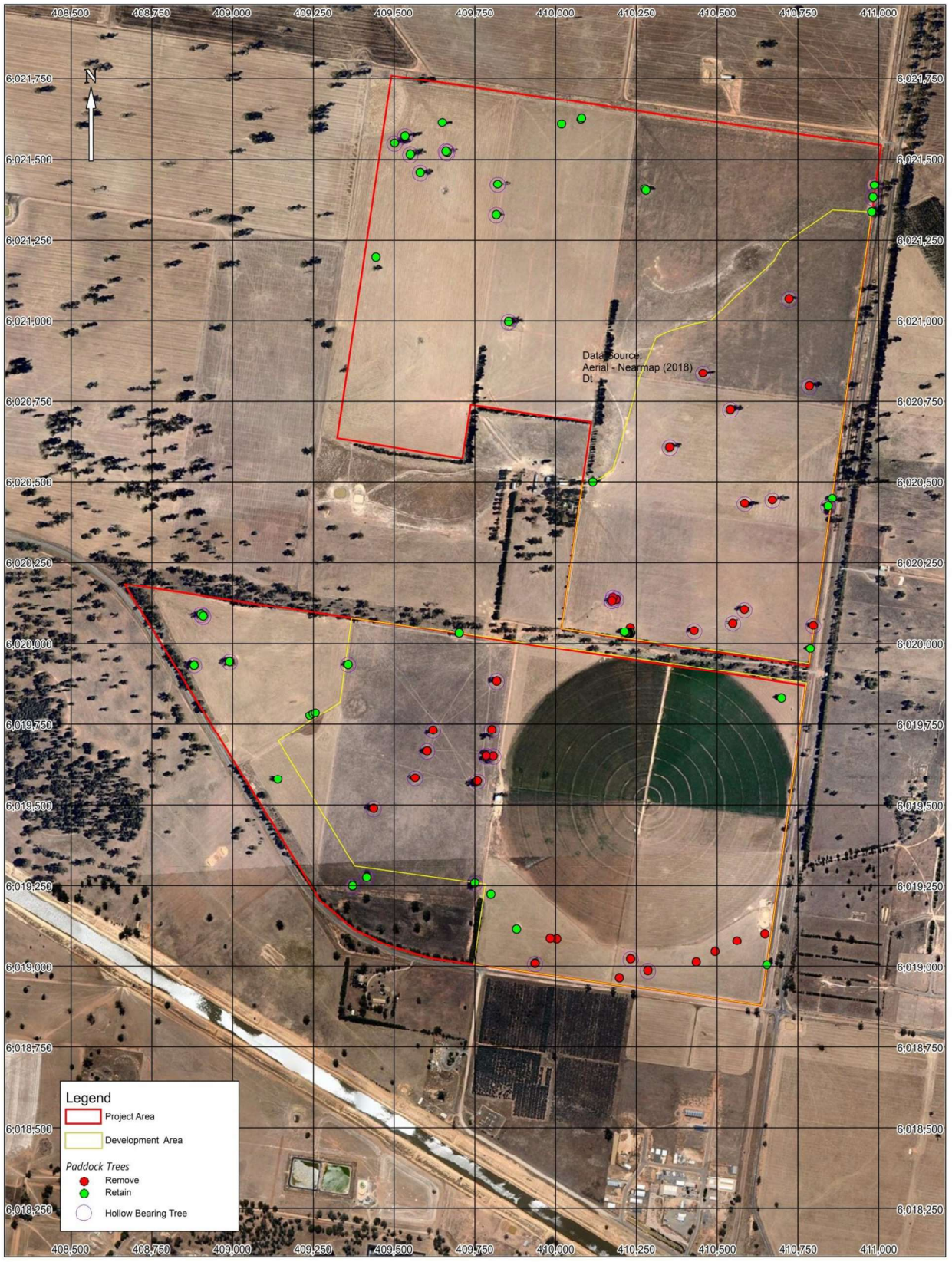
8.4.6.1 Direct Impacts

- The removal of 34 Paddock trees will be unavoidable during clearing works associated with the Project (see Error! Reference source not found.).
- Vegetation will be directly impacted via the removal of 215.15 hectares of agricultural land that does not provide biodiversity values or generate credits.
- Direct impacts may arise during the construction and operation of the Mulwala Solar Farm including:
  - The displacement of resident fauna leading to the mortality of native fauna and a decline in local population;
  - Removal of habitat trees leading to loss of fauna habitat and decline in local fauna population;
  - The installation of permanent structures leading to reduced fauna movement across the landscape, fauna collision with security fencing and altered movements due to increased solar exposure and increased heat; and
  - Removal of grazing areas (exotic) for fauna leading to potential loss of forage areas for terrestrial and avifauna.

8.4.6.2 Indirect Impacts

The construction and operation of the Mulwala Solar Farm may result in the following indirect impacts:

- Damage/loss to adjacent roadside vegetation.
- Loss of retained Paddock Trees in the project area, due to damage of impacts surrounding infrastructure.
- Increased dust noise and light spill.
- Introduction of pathogens that may impact retained Paddock Trees.
- Increased solar exposure to adjacent vegetation or retained Paddock Trees from solar panels.



MJD Environmental PTY LIMITED

Figure 4: Unavoidable Impacts - Paddock Trees
Client: Esco Pacific

0 500
meters
Scale 1:10,000

Datum/Projection::
GDA1994 MGA Zone 55
Date:25/5/2018
Version: 1.0

Data Source:
Aerial - Nearmap (2018)
Data: RPS & MJD
Environmental (2018)

Project Files\18011 - Mulwala Solar Farm, Mulwala\5. GIS\WOR\18011_Mulwala_BDAR Figs_240518.WOR

Figure 28 Unavoidable impact Paddock Trees

RPS

8.4.7 Mitigation and Management

The following mitigation and management measures have been developed to manage biodiversity impacts associated with the proposed Mulwala Solar Farm development.

- Implementation of pre-clearance surveys including the following provisions:
  - Tree removal works are to occur outside assessed threatened species breeding periods (species known to breed in hollows);
  - Pre-clearance survey of all trees to be removed within a week or removal; and
  - Marking of habitat trees.
- Habitat tree removal works including the following:
  - Clearing of hollow-bearing and habitat trees remaining on site;
  - Felled trees are to be left in situ before stockpiling to allow for any fauna to move on; and
  - Felling is to be supervised by an ecologist during clearing works.
- Retention of Paddock Trees via the following methods:
  - Establish Tree Protection Zones (TPZ) around retained paddock trees in the development area. The TPZ is to be 12xDBH in accordance with Australian Standards AS4970-2009.
  - No-go zone signage and fencing is to be erected prior to construction works.
- To minimise noise and light impacts, works are to be limited to daylight hours and all machinery is to be correctly maintained and operated as per operation manual.
- To minimise dust, vehicles and machinery are to observe the 20 km/hr speed limit on site. Water carters are to be used in dry periods to limit dust movement.
- Equipment and vehicles entering the site are to be cleaned or foreign soil and seed.
- To minimise prescribed biodiversity impacts the following are to be implemented:
  - Erosion and sediment controls enacted in accordance with construction environment management plan (CEMP) to limit impacts on retained vegetation or water courses;
  - Pre-clearance of farm shed for fauna species;
  - Installation of temporary fencing along ephemeral depression to limit access, prior to construction; and
  - De-watering of the dam to be supervised by an ecologist.

8.4.7.1 Offset Calculations

The unavoidable removal of 34 Paddock trees for the proposed Mulwala Solar Farm will require the calculation of offset requirements for 33 Paddock trees. A total of 30.75 ecosystem credits are required to offset the loss of 33 paddock trees. Details of the Ecosystem Credit Profiles are provided in **Appendix I.**

Correspondence with OEH and LLS in regards to the Mulwala Solar Farm are provided in **Appendix I.**

8.4.7.1.1 Retirement of Biodiversity Credit Liability

The following information provides an understanding of the initial pathways for proponents to retire biodiversity credit liability prior to the construction of an approved development or activity. The preferred pathway will be finalised, subject to the determination conditions of this EIS.

RPS

Biodiversity Conservation Fund (BCF)

Proponents that require retiring biodiversity credits associated with their development will have the opportunity to satisfy their obligation by paying directly into the Biodiversity Conservation Fund. This Fund will be managed by the newly established Biodiversity Conservation Trust (BCT).

It is to our current understanding that payment into the fund can be immediate (on approval from the BCT) ensuring a quick pathway to commencement of the proposed development. Once a payment is made into the fund, the BCT becomes responsible for finding the offsets needed. The BCT must satisfy these offset obligations consistent with the rules of the Biodiversity Offsets Scheme. The BCT is able to pool offset obligations and funds and could establish larger and more viable offset sites

Payments into the BCF will incur additional costs on top of the baseline price per credit. Additional charges per cost will include but not limited to a risk premium and an admin cost per credit.

Public Register - Retiring Credits

The Proponent has the opportunity to source credits on the open market. A public register of credits available for purchase and credits wanted will be established to provide opportunities for those with an offset obligation to find credits. Credits are to be "like for like" Biodiversity Credit.

If the required credits are not available and documentary evidence can be provided that active searches for credits were being undertaken by the proponent (up to 120 days) then the active proponent can apply to vary the types of required credits. Variation of credits must occur under the variation rules for the NSW Biodiversity Offset Scheme.

Purchasing of credits via the register will reduce the overall cost per credit compared to payment straight into the BCF as this avoids the risk premium and admin fee.

8.5 Aboriginal and historic heritage

8.5.1 Introduction

An assessment of potential Aboriginal and historic heritage impacts from the Project has been undertaken by RPS. The purpose of this assessment was to identify the presence of Aboriginal sites across the project area, determine the risk of impact to Aboriginal sites, undertake Aboriginal consultation, identify the presence of any significant historic heritage items within the locality of the project area, risk of impact by the Project, and to provide mitigation and management measures based on assessment findings. The **Aboriginal and Historic Heritage Assessment** (**Appendix J**) has been prepared in accordance with the relevant OEH guidelines including:

- *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010);
- *Code of Practice for Archaeological Investigations of Objects in NSW* (DECCW 2010);
- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011); and
- *NSW Heritage Manual* (Heritage Office and Department of Urban Affairs and Planning 1996).

The assessment has also been prepared to satisfy the SEARs, which requested the following be considered:

"The EIS must address heritage, including an assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the development, including adequate consultation with the local community."

A full summary of the SEARs requirements (including agency responses) are included within **Appendix A**.

RPS

8.5.2 Methodology

Desktop assessments

The following were undertaken to identify the Aboriginal cultural heritage values within the project area and surrounding area:

- Aboriginal Heritage Information Management System (AHIMS) search, undertaken on 26 February 2018;
- A review of Aboriginal cultural heritage studies of the wider Mulwala region provided by OEH;
- Predictive modelling to identify potential density of archaeological sites and/or objects;
- Identification of the relevant RAP;
- A site inspection to determine the extent of the disturbance and identify whether Aboriginal cultural heritage or any other sensitive areas were present within the project area; and
- Consultation and engagement with the RAP.

The following register searches were undertaken to identify historic heritage within the project area and surrounding area:

- Australian Heritage Database, including places listed as matters of national environmental significance under the *Environment Protection and Biodiversity Conservation Act* 1999;
- State Heritage Register; and
- Corowa LEP 2012.

The results of these register searches are outlined in Section 8.5.3.

Aboriginal consultation

The Aboriginal Cultural Heritage Consultation Requirements (ACHCRs) for Proponents are the OEH guidelines for undertaking Aboriginal consultation and are regulated under Clause 80C of the *National Parks and Wildlife Regulation 2009*. Aboriginal consultation under the ACHCR includes a four-stage Aboriginal consultation process that stipulates the specific timeframes for components of each stage:

- Stage 1: Identifying Aboriginal stakeholders to be listed as registered Aboriginal parties;
- Stage 2: Providing project information;
- Stage 3: Gathering cultural information; and
- Stage 4: Draft report.

Consultation was undertaken with various stakeholders to identify the Registered Aboriginal Parties, including the Griffith OEH office, Registrar of Aboriginal Owners NSW, the National Native Tribunal, the Murray Local Land Services, Local Aboriginal Land Councils and Federation Council. The following organisations were identified as Registered Aboriginal Parties (RAPs) for the Project:

- Cummerangunja Local Aboriginal Land Council;
- Bundyi Aboriginal Cultural Knowledge; and
- Bangerang Aboriginal Corporation.

Consultation with the RAPs involved providing project information and inviting for feedback on the proposed survey methodology prior to the archaeological investigations taking place. In addition, the archaeological surveys were conducted with representatives of the RAPs present.

Further description of the Aboriginal consultation process and outcomes for the ACHCR is provided in the **Aboriginal and Historic Heritage Assessment** in **Appendix J**.

8.5.3 Existing Environment

Aboriginal heritage

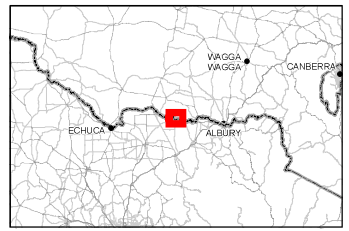
The current project area is not near any natural water catchment, the closest permanent source being the Murray River approximately four kilometres to the south. The project area has also been cleared which reduces the potential for scarred trees. In addition, there is a high level of disturbance and modification associated with agricultural land use over several decades.

The Murray River and surrounding region would have been a focal point in the landscape for Aboriginal people occupying the area. Significant features such as the Murray River, swamps, ancestral streams and open forests would have provided a reliable supply of water and a range of floral and faunal resource prior to European arrival.

The project area and its close proximity to these resources make it an ideal location for occupation throughout various stages of the year as seasonal migration and hunting would have determined the movement of groups throughout the region. In addition, evidence of these subsistence patterns through past regional studies has revealed that the most common Aboriginal sites, such as scarred trees and isolated artefact scatters have been found within close proximity to the project area. Through this, there is an increased potential that evidence of Aboriginal occupation within the project area would be revealed through indications of habitation or hunting.

A search of the Aboriginal Heritage Information Management System (AHIMS) was undertaken on 26 February 2018 for the following coordinates: Eastings: 401969 – 416387, Northings: 6010924 – 6028357 with a buffer of 50 metres. Six Aboriginal sites had been previously registered in this area, but none within the project area (refer to **Figure 29**). Of these, scarred trees were most common, followed by two burials and potential archaeological deposit (PAD). The closest cluster of sites, comprising the PAD and two scarred trees, was located three kilometres south of the project area, less than 20 metres from Lake Mulwala.

Due to the proximity to the Victorian border, a search of the Victorian Government's Aboriginal Cultural Heritage Register and Information System (ACHRIS) was also undertaken for the following coordinates: Eastings: 398313 – 420153, Northings: 6010528 – 6019422. Two hundred and eleven (211) sites were registered in the searched area, but none within the project area. Of those, low density artefact distributions (LDADs) were most common, followed by artefact scatters, scarred trees, burials, earth features, and shell middens.



LEGEND

- Development Footprint
- Project Boundary
- Waterbody
- Watercourse
- Highway
- Arterial Road

AHIMS

- Capri Waters Resort Burials
- MWTP 1
- MWTP Scarred Tree 1
- MWTP Scarred Tree 2
- Mulwala Pre-School 1
- Mulwala Scarred Tree 1

ACHRIS

- Aboriginal Ancestral Remains (Burial)
- Artefact Scatter
- Earth Feature
- Low Density Artefact Distribution
- Scarred Tree
- Shell Midden

N

0 1 2 3 4

Kilometers

APPROX SCALE 75,000 @ A3

GDA 1994 MGA Zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

DATA SOURCES

Road network provided by Department of Environment, Land, Water and Planning (DELWP) Web Map Service.

Watercourse data provided by DELWP 2018.

Imagery from Esri basemap layer.

RPS

Figure 29

Site Distribution Map

Mulwala Solar Farm

RPS

Historic heritage

State Heritage Inventory

A search of the State Heritage Inventory and the Corowa Local Environmental Plan 2012 revealed a total of three listed heritage items within the suburb of Mulwala (refer to Table 22). None of these are located within the project area. Of the registered properties, the Mulwala Station Homestead is the closest being approximately 850 metres south of the project area.

Table 22 State Heritage Inventory items in Mulwala

ID	Name	Address	Listing	Distance from Project site
4301017	Mulwala Bridge over Murray River	Main Road 314, Mulwala	Roads and Maritime Services s170 heritage and conservation register	3.7 kilometres
4180201	Mulwala Police Station	81 Melbourne Street, Mulwala	NSW Police s170 heritage and conservation register	2.1 kilometres
1460059	Mulwala Station Homestead	Melbourne Street, Mulwala[1]	Corowa Local Environmental Plan 2012	850 metres

[1] Address is incorrectly entered in the SHI, this should be 81-227 Bayly Street, Mulwala.

Corowa Local Environmental Plan 2012

The Project is located within the Federation Council Local Government Area. Federation Council was formed in 2016 from the merger of Corowa Shire with Urana Shire. The Corowa Local Environmental Plan (LEP) 2012 is the environmental planning instrument for the Mulwala area.

Schedule 5 of the Corowa LEP identifies locally significant heritage items in the suburb of Mulwala. There are two heritage items listed on the LEP in Mulwala, and neither of these are located within the project area.

Table 23 Corowa Local Environmental Plan 2012 heritage items in Mulwala

ID	Name	Address	Distance from Project site
I75	Mulwala Station Homestead	81-227 Bayly Street, Mulwala	850 metres
I74	Court house	81-85 Melbourne Street, Mulwala	2.1 kilometres

8.5.4 Impact assessment

8.5.4.1 Aboriginal heritage impact assessment

The archaeological survey was conducted in accordance with the requirements set out in the *Code of Practice for Archaeological Investigations of Objects in NSW* (2010) and the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*. In light of the AHIMS and ACHRIS registered sites, artefact scatters and scarred trees were identified as being the dominant registered Aboriginal sites in the project area. Other visible features were also inspected for evidence of cultural sites,

in addition to assessing whether potential archaeological deposits were present. No previously registered Aboriginal sites were identified within the project area in the desktop study.

The project area is not near any natural water catchment, the closest permanent source being the Murray River is approximately four kilometres to the south. The project area has also been cleared which reduces the potential for scarred trees. In addition, there is a high level of disturbance and modification associated with agricultural land use over several decades.

During the onsite visual inspection, a sensitive sand dune formation was identified in the west of the proposed project area, south of Lambruck Lane, which has a high potential for Aboriginal ancestral remains and/or undisturbed artefact deposits.

Five new archaeological Aboriginal sites were identified by RPS, comprising of isolated artefacts within a disturbed context. Additionally, one area of archaeological sensitivity was identified in the south-western portion of the project area. One low lying swamp area was also considered to be archaeologically sensitive. This area contains sandy rises which may harbour subsurface Aboriginal cultural heritage. Bundyi Aboriginal Cultural Knowledge recorded an additional five cultural sites within the project area. One site was identified as an Aboriginal resource and gathering area along with two isolated artefacts within the project area. Two scarred trees were recorded, however they are outside of the proposed development footprint. The potential for encountering further archaeological deposits in the remainder of the project area was assessed as being low due to the former European land use history being agricultural in nature and its distance from the Murray River.

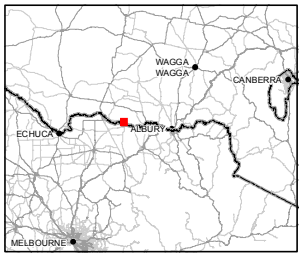
The driving of piles required for the installation of mounting structures would cause the largest direct impact on the registered AHIMS sites. In addition, harm would be caused to the registered sites through the movement of construction vehicles and grading procedures that would further dislodge and potentially destroy the isolated artefacts. These works would both directly and indirectly impact the five registered sites (refer to **Figure 30**).

The impact assessment of the individual sites is summarised in Table 24 below.

Table 24 Impact assessment of registered AHIMS sites

AHIMS	Harm	Degree of harm	Consequence of harm
55-4-0260	Direct	Total	Loss of cultural value
55-5-0140	Direct	Total	Loss of cultural value
55-5-0139	Direct	Total	Loss of cultural value
55-4-0261	Indirect	None	No loss of cultural value
55-5-0138	Indirect	None	No loss of cultural value
55-4-0258	Indirect	None	No loss of cultural value
55-5-0132	Indirect	None	No loss of cultural value
55-5-0133	Indirect	None	No loss of cultural value
55-5-0134	Indirect	None	No loss of cultural value
55-5-0135	Indirect	None	No loss of cultural value

Cummeragunja LALC did not raise any specific cultural values or concerns regarding the Project. Bundyi Aboriginal Cultural Knowledge raised concern that the entirety of the project area had not been surveyed on foot and that a proper representation and thoroughness could not be achieved in leaving areas unsurveyed. Bangerang Aboriginal Corporation expressed concern regarding the removal of cultural heritage material during the construction process of the Project and its installation. It was recommended that a cultural officer or heritage consultant be present throughout the process to monitor the excavation of material for potential Aboriginal artefacts that exist below the ground surface. In addition, designated vehicle access tracks and corridors of movement that considered the location of the five isolated artefacts should be implemented to reduce the potential for the destruction of these sites.



N

0 170 340 510

Meters

APPROX SCALE 10,000 @ A3
GDA 1994 MGA Zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use. Development Footprint area for indicative purposes only.

DATA SOURCES
Road network provided by Department of Environment, Land, Water and Planning (DELWP) Web Map Service.
Watercourse data provided by DELWP 2018.
Imagery from Esri basemap layer.

LEGEND

- Project Boundary
- Development Footprint
- Waterbody
- Watercourse
- Cadastre
- Site Office, Maintenance Shed, Switchyard and Battery Storage
- PV Solar Array
- Internal Access Tracks

Aboriginal Sites

- Aboriginal Resource and Gathering
- Artefact
- Modified Tree (Carved or Scarred)

RPS

Figure 30

Location of Proposed Works and Location of Recorded Sites Mulwala Solar Farm Project

Tracking ID: W:\Jobs\PR137229-1 RPS Melbourne - Mapping Support Services GIS\Working\Job_18037_Mulwala_Solar_Farm\Working\Heritage\Figure30_Proposed_Works_Identified_Site_Locations_Mulwala_Solar_Farm_A3P.mxd
Compiled: 21 June 2018

8.5.4.2 Historic heritage impact assessment

The visual inspection for historic heritage did not identify any historic heritage sites in or within close proximity to the project area. Additionally, there were no areas of archaeological potential identified in the project area. As a result, there are no impacts to heritage items within the project area. During the visual inspection, it was concluded that due to the isolated nature and lack of surrounding nearby historic heritage there would be no impact to the visual amenities or landscapes associated with any historic heritage.

8.5.5 Mitigation and management

The following mitigation and management measures would be implemented to ensure the protection of Aboriginal heritage items:

- There are four no-go zones established within the project area (Figure 6). The large no-go zones harbour sensitive landforms. The two smaller no-go zones harbour scarred trees. The no-go zones are to be marked out with high visibility fencing prior to commencement of works. No works will take place within the no-go zones. All staff and subcontractors are to be made aware of the no-go zone locations and to avoid them at all times.
- AHIMS sites 55-4-0258, 55-4-0261, 55-5-0134 and 55-5-0135 are located within the no-go zones. No works will take place within these area (Figure 6). These sites will not be impacted. There are no mitigation or management measures for these sites due to their position within the no-go zone. All staff and subcontractors are to be made aware of the sites locations and to avoid them at all times. No harm is to come to AHIMS sites 55-4-0258, 55-4-0261, 55-5-0134 and 55-5-0135.
- AHIMS sites 55-5-0132 and 55-5-0133 are located outside the development footprint and within a no-go zone. These sites will not be impacted. The mitigation measure for these sites is the installation of high visibility fencing extending from the edge of the formed access track, Lambruck Lane to the northern-most fence line of the southern portion of the project area. All staff and subcontractors are to be made aware of the sites locations and to avoid them at all times. No harm is to come to AHIMS sites 55-5-0132 and 55-5-0133.
- AHIMS site 55-5-0138 is located outside of the development footprint and therefore will not be impacted. There are no mitigation or management measures for this site.
- RPS recommends that prior to any site work commencing, a surface salvage of AHIMS sites 55-4-0260, 55-5-0140 and 55-5-0139 must occur as these sites are within the proposed development footprint. After the surface salvage, an Aboriginal Site Impact Recording Form must be completed and submitted to AHIMS.
- RPS recommends that all relevant personnel, contractors and subcontractors are made aware of the legal obligations for Aboriginal cultural heritage under the National Parks and Wildlife Act 1974 through an on-site toolbox talk or induction prior works commencing.
- If any unrecorded Aboriginal objects are identified while undertaking the proposed development activities in the Project Area, then all works in the immediate area must cease and the area should be cordoned off and secured and the proponent must avoid further harm to the Aboriginal object. OEH must be notified via the Enviroline 131 555 as soon as practicable providing details of the Aboriginal object/s and the site location. The RAPs are to be notified along with the heritage consultant to ensure the site is assessed and managed. Works must not recommence at that particular location unless authorised in writing by OEH.
- In the unlikely event that skeletal remains are identified, work must cease immediately in the vicinity of the remains and the area must be cordoned off. The proponent must contact the local NSW Police who will make an initial assessment as to whether the remains are part of a crime scene or possible

Aboriginal remains. If the remains are thought to be Aboriginal, OEH must be contacted via the Enviroline 131 555. An OEH officer will determine if the remains are Aboriginal or not; and a management plan must be developed in consultation with the relevant Aboriginal stakeholders before works recommence. Works must not recommence at that location unless authorised in writing by OEH.

While there are no recorded or unrecorded historic heritage items within the project area and a lack of areas of historic archaeological potential, the following management recommendations still apply:

- The proposed works within the project area will not impact on any known historic (non-Aboriginal) objects or places. Works may proceed with caution.
- RPS recommends that all relevant personnel, contractors and subcontractors are made aware of the legal obligations for historic (non-Aboriginal) heritage under the *Heritage Act 1977* through an on-site toolbox talk or induction prior to works commencing.
- If suspected archaeological resources are identified, work within the affected area must cease and the area cordoned off. The Heritage Division of the OEH must be notified by ringing the Enviroline on 131 555 so that it can be adequately assessed and managed in accordance with Section 146 of the Heritage Act 1977. The heritage consultant is to be notified.

8.6 Surface water and groundwater

8.6.1 Introduction

A Surface and Groundwater Assessment has been prepared by RPS to assess the potential impacts of the Project (RPS, 2018). The assessment was completed as follows:

- Desktop assessment and field assessment;
- Definition of existing conditions;
- Potential impact assessment; and
- Identification of mitigation and management measures.

The findings of the assessment are summarised in this section and the full report is included in **Appendix H.**

This section provides a desktop assessment of the potential surface and groundwater impacts associated with the Project, as stated in the requirements of the SEARs below:

Water – including an assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources (including, wetlands, riparian land, groundwater dependent ecosystems and acid sulphate soils), related infrastructure, adjacent licensed water users and basic landholder rights, and measures proposed to monitor, reduce and mitigate these impacts; details of water requirements and supply arrangements for construction and operation, and a description of the erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with Managing Urban Stormwater: Soils & Construction (Landcom 2004).

A full summary of the SEARs (including agency responses) are included within **Appendix A.**

8.6.2 Existing environment

The Project is located on a 420 hectare site, historically used for dry land broadacre farming such as cropping and grazing. Centre-pivot irrigation, supplied by a groundwater bore, has been established in the south-eastern corner of the site. The remaining land is naturally slightly undulating and has been extensively cultivated for many years. Various natural depressions are scattered across the property that typically become waterlogged when inundated (refer to **Figure 31**).

There is minimal off-site drainage with some discharge to local depressions or roadside table drains near property boundaries, meaning that most surface water on the property either infiltrates to groundwater or evaporates.

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use. Development Footprint area for indicative purposes only.

DATA SOURCES
Base topographic data © Commonwealth of Australia (Geoscience Australia) 2006.
Imagery from Esri Basemap layer.

RPS

Figure 31
Areas Subject To Inundation
Mulwala Solar Farm Project

Tracking ID: W:\Jobs\PR137229-1 RPS Melbourne - Mapping Support Services GIS\Working\Job_18037_Mulwala_Solar_Farm\Working\Job18037_Mulwala_Solar_Farm_InundatedAreas_A3P.mxd
Compiled: 29 May 2018

8.6.2.1 Surface water

Hydrology

The project area is located within the Murray-Darling basin, in the Murray Local Land Services region; however there are no watercourses in the immediate vicinity.

Whilst there is no riverine flood threat from the Murray River, surface drainage from the property is naturally poor with water pooling in surface depressions in wetter seasons. The most significant depression is towards the northern end of the site as shown in **Figure 31**. This depression is well-defined, approximately one metre deeper than the surrounding property and appears to be the western end of a long, flat bottomed depression that extends east between Mulwala-Savernake and Bull Plain Roads. The site inspection and local topographical data revealed that whilst local runoff pools in the depression, it is not a waterway as there is no flow across property boundaries.

This depression on-property has no outlet, and runoff pools and stagnates for infiltration and evaporation.

Flooding

The Murray River is approximately five kilometres to the south, and Lake Mulwala is located approximately 1.5 kilometres to the south-east of the project area. The project area is not subject to flooding and is not shown in the flood planning areas in the *Corowa Local Environment Plan 2012 – Flood Planning Maps*.

Wetlands

There are some wetland areas located inside the project area as identified in the *Corowa Local Environmental Plan 2012* (as shown in **Figure 32**). The wetland areas identified within the project area are the low areas subject to local inundation and have been excluded from the Project.

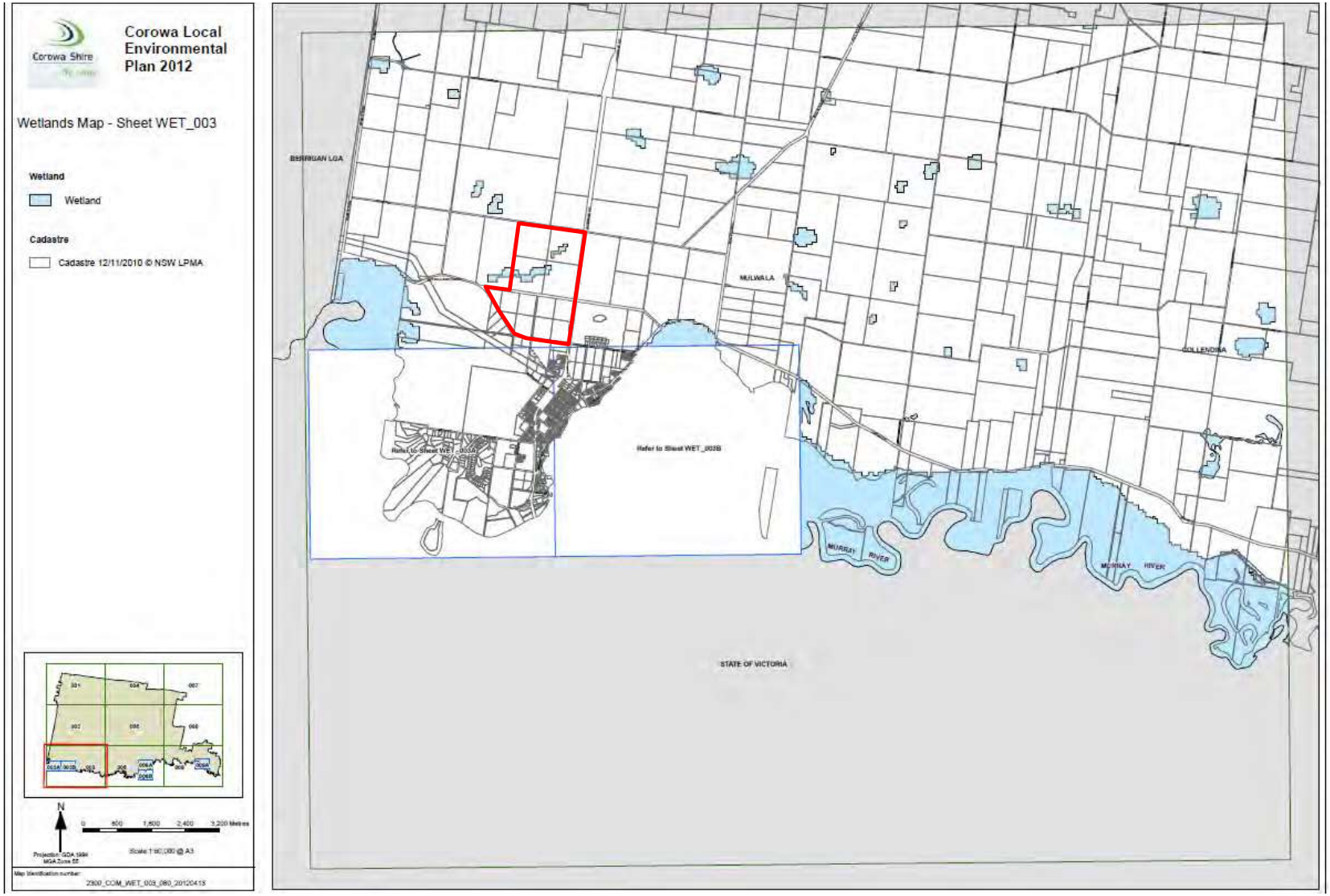


Figure 32 Wetland areas (Corowa Local Environmental Plan 2012)

RPS

Riparian land

The Project is not located in a riparian zone given its location 1.5 kilometres from Lake Mulwala and five kilometres distance from the Murray River.

Existing surface water supply

Minimal volumes of surface water are used within the project area, with surface water availability being ephemeral. Six small ground tank dams are located within the project area that provides some stock water supply in wetter seasons. This stock water supply is supported by reticulated stock water system supplied from groundwater.

Adjacent surface water users / Basic Landholder Rights

Adjacent properties are similar to the project area in that surface water fills ground tanks for stock water supply in wetter seasons. This take of surface water is generally assumed to be within the limits of Basic Landholder Rights (i.e. 10 percent of average runoff volume arising from the site).

Acid sulphate soils

The presence of acid sulphate soils on the Project site is unlikely, as shown in **Figure 33**.

Figure 33 Acid Sulphate Soils Risk (CSIRO, 2018) (site indicated by red star)

RPS

8.6.2.2 Groundwater

Hydrogeological setting

The Project is located within the Lower Murray Alluvium Groundwater Management Area 016 (refer to **Figure 34**). A description of the Lower Murray GWMA016 follows (Alamgir, 2011):

> *Lower Murray GWMA016 is underlain by regional shallow and deep aquifer systems which, in places, provides high yielding and good quality groundwater supplies for irrigation, stock and domestic and town water supply as well as other uses. The management of the water source is regulated by a water sharing plan established under NSW legislation (Water Management Act 2000). The water sharing plan defines the Lower Murray Groundwater Source as all water contained in the unconsolidated alluvial aquifers of the Calivil and Renmark Formations, and the Shepparton Formation deeper than 12 metres (within the defined area). The Lower Murray deep aquifers extend down to the bedrock to a maximum depth of 350 metres below the ground surface.*
>
> *The Calivil and Renmark Formations aquifers are composed of pale grey to white quartz sand layers with lenses of grey to white clay, peat and coal extending from the bottom of the Shepparton Formation down to the bedrock. The Lower Shepparton Formation has generally yellow to brown poorly sorted sand and clay sediments that extend to a depth of between 20 and 50 metres below the ground surface.*

Typically, the geological conditions are suitable for irrigation where the vertical leakage is low. This can be a negative impact for irrigation purposes when shallow groundwater levels rise due to poor irrigation practices. Historically the riverine plains have been susceptible to waterlogging and salinisation due to high water tables, however this effect has moderated in recent times due to drought, irrigation water trading and improvements in irrigation practice.

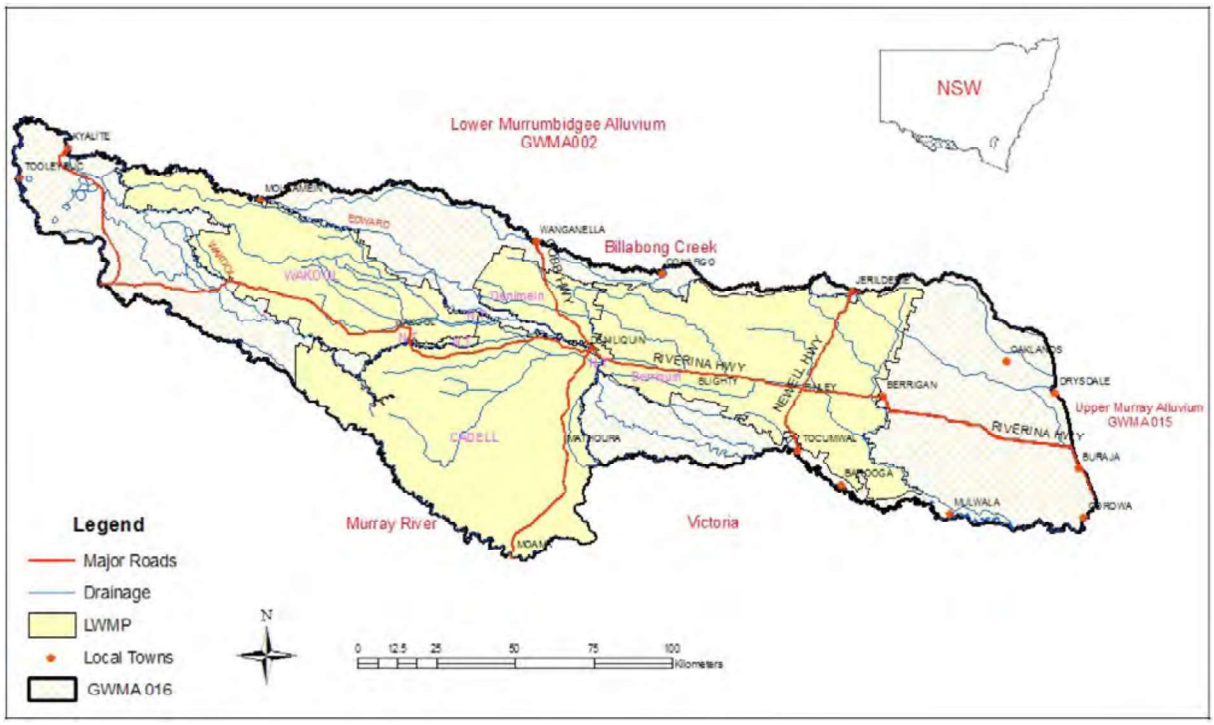
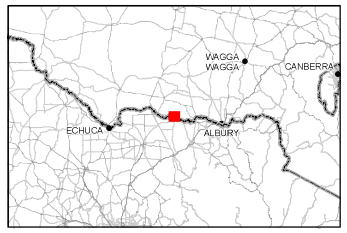


Figure 34 Lower Murray Alluvium GWMA016 (Alamgir, 2011 / RPS, 2018)

Groundwater monitoring

The NSW Department of Crown Lands and Water monitors groundwater level and quality through its network of groundwater observation bores across New South Wales. Two of these bores are located nearby to the Project; GW036350.3.3 (11 kilometres) and GW036354.2.2 (18 kilometres), as shown in **Figure 35**. Driller's logs are not available for these monitoring bores. However, bore hydrograph data is available (NSW DPIW, 2018) and is presented in **Figure 36** and **Figure 37.**



LEGEND

- Project Boundary
- Development Footprint

Groundwater Borehole

- Within Study Area
- Outside Study Area
- Waterbody
- Watercourse

N

0 0.5 1 1.5

Kilometers

APPROX SCALE 25,000 @ A3
GDA 1994 MGA Zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

DATA SOURCES
Road network provided by Department of Environment, Land, Water and Planning (DELWP) Web Map Service.
Watercourse data provided by DELWP 2018.
Imagery from Esri basemap layer.

RPS

Figure 35
Groundwater Borehole Locations
Mulwala Solar Farm

The seasonal and reactive nature of the hydrograph suggests the bores are monitoring the shallow Shepparton formation, which is predominantly recharged by rainfall and irrigation leakage. Generally, the water levels in the bores range between 12 and 18 metres below ground level across the monitored period, with recharge occurring in winter/spring and drawdown (assumed due to irrigation extraction) occurring throughout the summer/autumn. The impacts to groundwater level due to dry and wet winter/spring periods (2015 and 2016 respectively) are clearly seen.

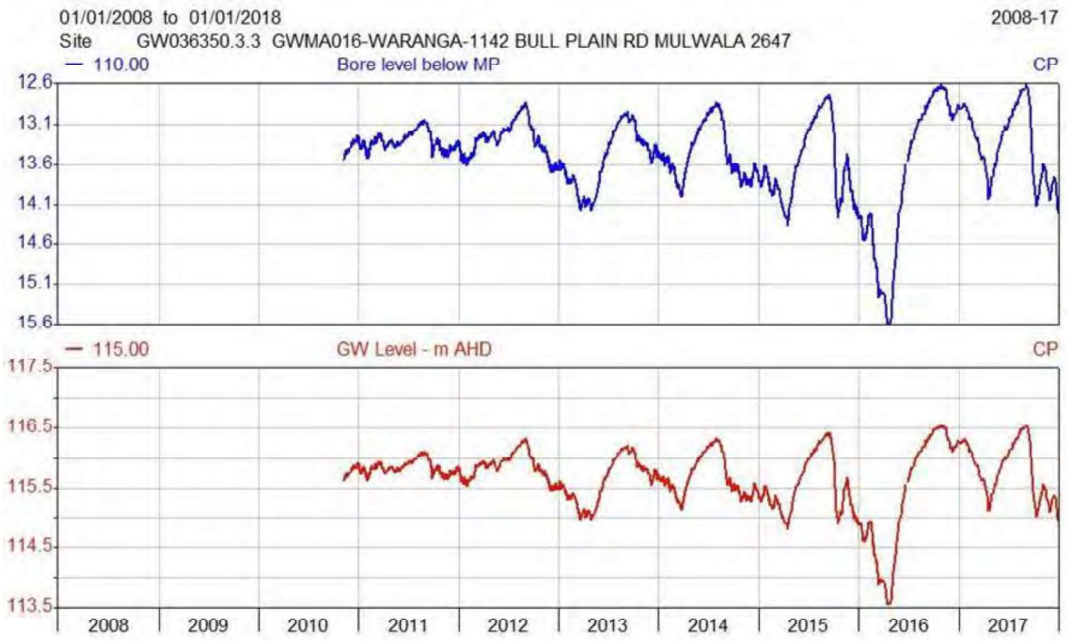


Figure 36 Lower Murray Alluvium GWMA016 – Monitoring Bore No. GW036350.3.3 hydrograph (NSW DPIW, 2018)

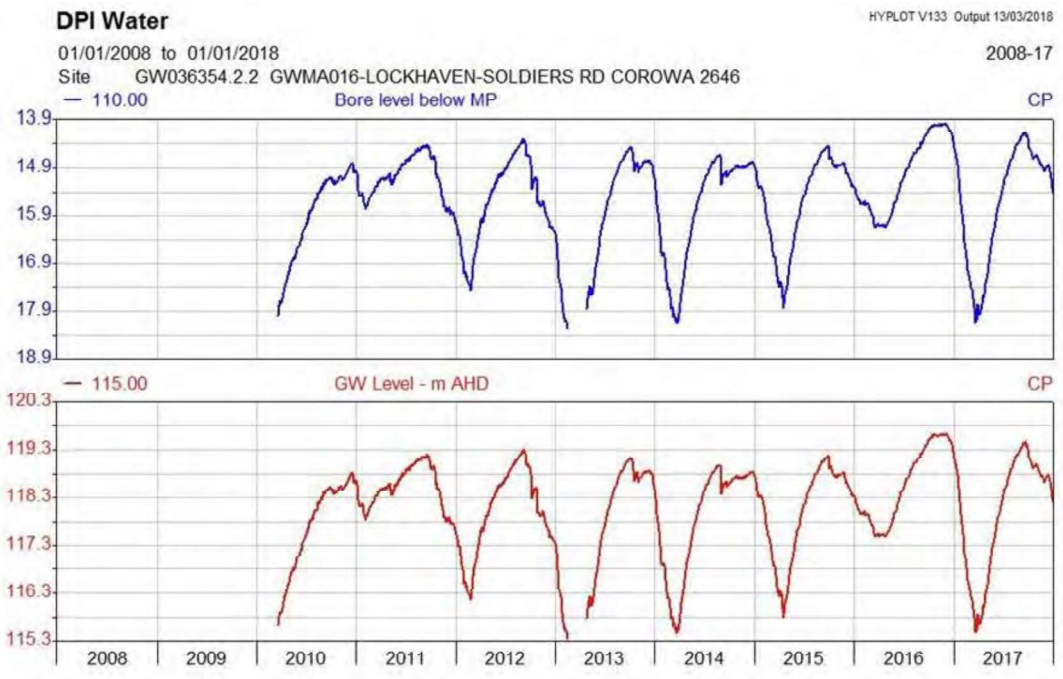
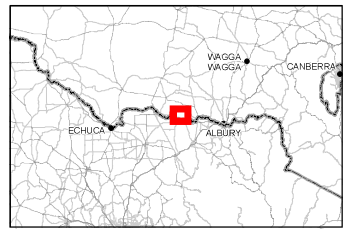


Figure 37 Lower Murray Alluvium GWMA016 – Monitoring Bore No. GW036354.2.2 hydrograph (NSW DPIW, 2018)

Existing groundwater bores

The Project is located within an established irrigation area with the aquifers supporting considerable consumptive use for both irrigation and stock and domestic. As such, there are numerous bores in the local area and in the project area (shown in **Figure 38**). Groundwater work records and the details of the bores within and near the project area are provided in the **Surface and Groundwater Assessment** in **Appendix H**.

A groundwater bore (GW501586) provides water for centre-pivot irrigation in the south-east corner of the project area.



LEGEND

- Project Boundary
- Development Footprint

Groundwater Borehole

- Within Study Area
- Outside Study Area
- Waterbody
- Watercourse

N

0 1.5 3 4.5

Kilometers

APPROX SCALE 80,000 @ A3
GDA 1994 MGA Zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

DATA SOURCES
Road network provided by Department of Environment, Land, Water and Planning (DELWP) Web Map Service.
Watercourse data provided by DELWP 2018.
Imagery from Esri basemap layer.

RPS

Figure 38
Groundwater Borehole Locations
Mulwala Solar Farm

RPS

Groundwater quality

Groundwater within the Lower Murray Alluvium GMA, across the three aquifers (Shepparton, Calivil and Renmark formations) varies in quality, however, is generally suitable for irrigation and stock and domestic use. There is a trend for increasing groundwater salinity in the Calivil and Renmark formations from east to west across the GMA, with the highest quality water in the east (Jerilderie/Finley < 2,000 us/cm) deteriorating to > 30,000 us/cm in the far west (Tooleybuc/Kyalite). The landowner reports that groundwater on the project area is of high quality and is suitable for all purposes.

The following summary is taken from the Lower Murray Alluvium GMA Groundwater Status Report 2010 (Alamgir, 2011):

Groundwater quality is typically highly variable in time and space. Total Dissolved Solids (TDS) range from 140 mg/L to 41,000 mg/L. Monitoring of groundwater quality is ongoing at 20 key monitoring bores. Groundwater quality remains almost unchanged in terms of salinity. There is no definite pattern of improvement or deterioration of groundwater quality with respect to salinity.

Groundwater dependent ecosystems

A search of the Groundwater Dependent Ecosystem Atlas from the Bureau of Meteorology indicates that there are no aquatic and subterranean Groundwater Dependent Ecosystems (GDE) in or within the vicinity of the project area (refer to **Figure 39** and **Figure 40**), while a moderate potential of terrestrial GDE exists (refer to **Figure 41**).

No indication of any significant terrestrial GDEs was observed during the site inspection.

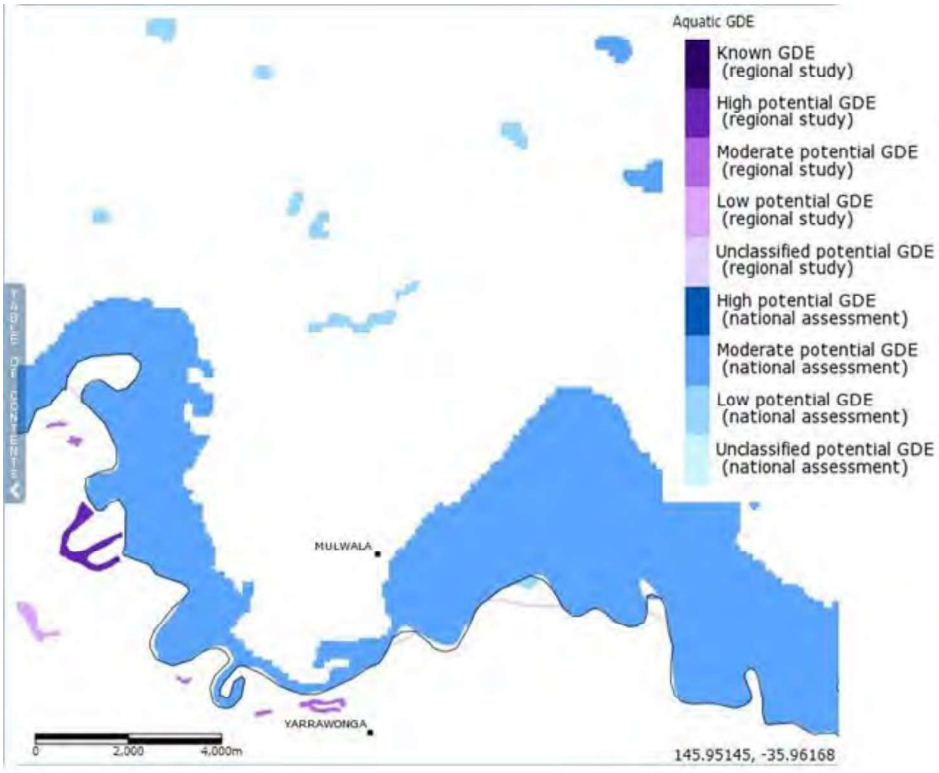


Figure 39 Aquatic GDE (Bureau of Meteorology, 2017)

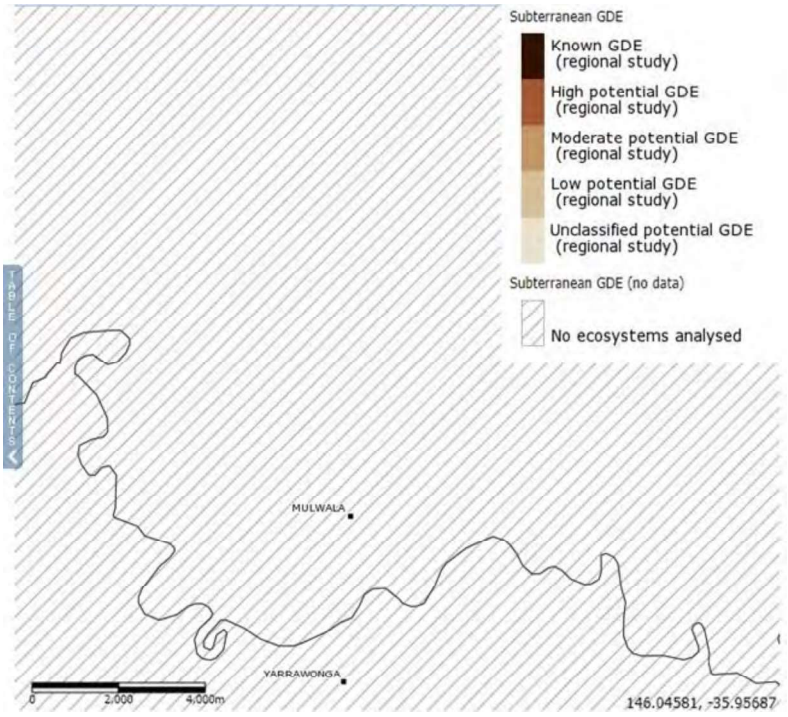


Figure 40 Subterranean GDE (Bureau of Meteorology, 2017)

Figure 41 Terrestrial GDE (Bureau of Meteorology, 2017)

RPS

8.6.3 Impact assessment

The current land use within the project area is irrigated agriculture. It is not expected that conversion to a solar farm land-use would alter the existing surface water or groundwater processes. As such, the existing land use is compatible with water management principles. A detailed assessment of the impacts that might occur under the activities that are proposed, and proposed mitigation measures, follows.

8.6.3.1 Flooding

There is no riverine flood threat affecting the site and the construction, operation and decommissioning of the Project do not impact the existing flood characteristics that may arise from localised stormwater events. The Project works are minor in nature with respect to surface water movement and do not significantly alter the flow direction, intensity or volume of runoff arising from the project area. The existing surface water drainage patterns on the site would remain, with the areas subject to possible inundation excluded and buffered from development to maintain existing storage capacity of runoff waters. Whilst there is no flooding or stormwater risk, nuisance inundation has the potential to impact development infrastructure. This risk is mitigated by installation of critical infrastructure 300 mm minimum above natural surface levels.

8.6.3.2 Construction and decommissioning

Water supply and use

Raw water supply for construction and decommissioning (mainly for dust suppression of earthworks and access roads) would be securely sourced from a range of options, such as:

- Water tankers to be brought on site;
- Temporary dams on construction site; and an
- Existing groundwater bore

If the groundwater bore option is implemented, the Proponent will seek to obtain all relevant permits and comply with all relevant requirements.

Approximately 10,000,000 litres will be used over the construction period. This volume is well within the supply capacity and would have negligible impact to nearby ground water users. In fact, the removal of irrigation demand from the property due to the Project would be of benefit to nearby ground water users through improvements in ground water level and bore inflow/recovery rates.

A static water supply (20,000 litres) for fire protection would be established on site during construction with appropriate fittings for access by local brigade appliances. This facility would remain throughout the duration of the Project. Water supply for fire protection would also be sourced from the existing on-site bore similar to that for dust suppression on an as-required basis (expected to be extremely infrequent).

Water supply during construction and decommissioning would not be sourced from surface water meaning there would be no anticipated impact to adjacent surface water users.

Potable water supply for staff amenities would be imported to site in containers as required under a commercial supply arrangement.

Self-contained temporary toilet facilities would be provided by a commercial contractor during construction and decommissioning. Water for these facilities would be imported to site with sewerage removed from the project area via a tanker for disposal at a regulated dump point.

Surface water

Potential impacts to surface waters arise from:

- Contamination from sediment and spillages of fuel, lubricants, herbicides, sewage and other chemicals;
- Increased soil compaction through additional access tracks and other hardstand areas changing runoff characteristics and potential for concentrated flows; and
- Increased imperviousness of the site through installation of solar panels.

Earthworks required for the Project include:

- Surface excavation to create access roads;
- Site levelling for power conversion units, laydown areas, vehicle parking and site offices;
- Decommissioning of on-farm irrigation infrastructure;
- Driving or piling of solar panel mounting structures; and
- Trenching for electrical cable installation.

The nature of these earthworks is consistent with the soils management under the existing land use (i.e. laser grading for centre-pivot irrigation).

Impacts of these works would be controlled through the Erosion and Sediment Control Plan (ESCP) for the site to mitigate impacts to surface water resources and drainage water quality from unintended movement of sediment and other contaminants. A draft ESCP, prepared in accordance with the provisions of the *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004), is provided as part of the Surface and Groundwater Assessment **(Appendix H**).

The limited changes in nature of the project area arising from the solar farm development ensure that the site can easily be rehabilitated and returned to its former agricultural land use.

Groundwater

All disturbance in the described earthworks would occur within the top one metre of the ground surface. This is highly unlikely to intercept the groundwater table with the NSW DPIW groundwater monitoring bores consistently recording water table levels deeper than 12 metres (refer to **Figure 36** and **Figure 37**). No existing bores would be impacted by the works.

There is minimal potential for groundwater contamination in the event of a spill of:

- Fuel (refuelling of plant and machinery;
- Lubricants (during operation of plant and machinery);
- Herbicides (weed and grass control as part of site establishment works);
- Sewage (portable amenities); and
- Other chemicals (construction consumables such as adhesives, etc).

Any risks would be adequately mitigated through implementation of operational procedures regarding storage, use and emergency management.

There is no expected impact to Groundwater Dependent Ecosystems as none exist within the project area or in the local area.

RPS

8.6.3.3 Operation

Water supply

Water supply for the operational phase of the Project would be minimal (expected to be approximately 500 kL per year) and limited to that required for cleaning of the solar panels, fire protection and provision for staff amenities. Water supply for fire protection and cleaning solar panels (expected to be up to two times per year) would be imported to site in tankers or sourced from rainwater tanks collecting roof runoff from operational and maintenance buildings.

Water supply during operation would not be sourced from surface or groundwater, therefore there is no anticipated impact to adjacent water users in terms of changes to quality and quantity.

Potable water supply for staff amenities would be imported to site in containers as required under a commercial supply arrangement. On-site rainwater tanks would provide some non-potable water supply for staff amenities. Sewerage generated at the site would be stored for removal and disposal off site at accredited facilities. Amenities would be included in the operations and maintenance buildings and would be installed and operated to comply with all relevant standards and building codes.

Surface water

There is minimal potential for impacts to surface water quality to occur during the operational phase of the Project. The increased risk to surface waters during operation arises predominantly from the increased imperviousness of the project area from access roads, car parking, laydown areas and associated operational buildings, which has the potential to increase runoff volume and intensity.

The solar panels themselves do not increase the imperviousness of the project area. The full ground surface underneath and between the panels would remain available for infiltration of direct rainfall and rainfall runoff from the panels. The ground surface would be vegetated (managed grass cover) to maintain and enhance infiltration capacity. The removal of stock from the project area is also likely to improve the infiltration characteristics of the soil with a reduction in compaction.

The Project does not significantly alter the existing pattern and direction of surface water movement across the site, with no changes to the natural ground surface due to the foundations for the solar panels. The existing on-farm drainage network would remain and would continue to discharge to the natural depressions on the site, which have been excluded and buffered from the development footprint of the Project.

Other pervious areas would be maintained with grass cover to maximise rainfall infiltration and limit risk of sediment movement off site. The small increases in runoff volumes and changes to runoff characteristics due to the increased imperviousness of the site are adequately managed through the implementation of the operational ESCP, which includes appropriate drainage features to maximise infiltration and minimise the risks of dirty water leaving the site or entering waterways.

There is a minor risk of contamination related to unintended spillages of fuel, lubricants, herbicides, sewerage and other chemicals; however this risk is controlled through implementation of operational procedures regarding storage, use and emergency management.

It is noted that the reduction in irrigation volume within the project area as a result of the change in land use to a solar farm actually presents a positive impact to surface water conditions by reducing the average soil moisture content across the site, meaning there is more potential to absorb rainfall (despite the increased imperviousness of the site) and reduce runoff volumes discharging to the internal depressions or off-site.

Groundwater

There is minimal potential for groundwater contamination in the event of a spill of fuel, lubricants, herbicides, sewerage and other chemicals. Risks would be adequately mitigated through implementation of operational procedures regarding storage, use and emergency management.

It is noted that the reduction in irrigation volume within the project area as a result of the change in land use to a solar farm actually presents a positive impact to groundwater conditions by reducing the extraction and recharge to shallow water tables, and hence risk of land salinisation, from irrigation leakage.

8.6.4 Mitigation and Management

An Erosion and Sediment Control Plan would be prepared in consultation with Crown Lands and Water. All works on watercourses or on waterfront land should be undertaken in accordance with *DPI Water Guidelines on Controlled Activities (2012)*.

The following mitigation measures are proposed to control any potential impacts to surface and groundwater arising from the construction, operation and decommissioning of the Project:

- Development footprint of the Project would maintain the existing surface water characteristics and surface water storage in natural depressions through exclusion from the development;
- Critical infrastructure would be raised 300 millimetres above natural surface to avoid impacts from nuisance inundation;
- Refuelling of plant and machinery would be done at least 50 metres away from water bodies and constructed drainage lines in an impervious bunded area;
- All fuels, chemicals and other potential contaminants would be stored at least 50 metres from water bodies and constructed drainage lines in an impervious bunded area;
- Stormwater management and control measures would be designed and installed as part of the construction phase and in accordance with the ESCP for the site;
- All on-farm drainage infrastructure and discharge locations would be maintained in a functional condition;
- Construction, operation and decommissioning works would be carried out in accordance with the ESCP for the project area;
- Procedures for the testing, treatment and discharge of construction waste water would be established and implemented;
- Grass cover would be established and/or maintained under all solar panel arrays to maximise water infiltration whilst balancing risk of fire from build-up of combustible vegetation;
- All solid and liquid waste would be appropriately stored in containers awaiting collection and disposal to approved facilities off site with appropriate house-keeping of the entire site to maintain a clean and tidy condition at all times;
- All machinery and plant would be checked daily to ensure no leakage of fuels, lubricants or other liquids;
- All staff would be appropriately trained in the spill response plan for the minimisation and management of unintended spills;
- Water requirements for the site would be captured from roof runoff or imported to site via commercial arrangements with local water authorities; and

- Staff amenities would be installed and operated to comply with all relevant standards and building codes.

Further details are included in the Surface and Groundwater Assessment attached as **Appendix H.**

8.7 Soils, Land Use and Agriculture

8.7.1 Introduction

This section provides a desktop assessment of impacts from the Project on land use (including minerals and mining), agriculture, and soil resources across the project area. The desktop assessment has involved a review of publicly available information from the relevant Federal and State government agencies.

The assessment has also been prepared to satisfy the SEARs, which requested the following be considered:

*"**Land** – including*

- *an assessment of the impacts of the development on agricultural land, and flood prone land, a soil survey to consider the potential for erosion to occur, and paying particular attention to the compatibility of the development with existing land uses on the site and adjacent land (e.g. operating mines, extractive industries, mineral or petroleum resources, exploration activities, aerial spraying, dust generation, and risk of weed and pest infestation) during operation and after decommissioning, with reference to zoning provisions applying to the land, in particular the R2 – Low Density Residential zone; and*
- *measures to remediate the land following decommissioning in accordance with State Environmental Planning Policy No 55 – Remediation of Land."*

A full summary of the SEARs requirements (including agency responses) are included within **Appendix A.**

8.7.2 Existing Environment

8.7.2.1 Zoning and Land Use

The project area is zoned R2 Low Density Residential (southeast parcels) and RU1 Primary Production (all other parcels) under the Corowa LEP 2012 (as shown in **Figure 4**). The specific zoning of each lot and DP parcel and the objectives of these zones are provided above in Section 2.5.

The project area 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.

8.7.2.2 Geology, Soils and Land Capability

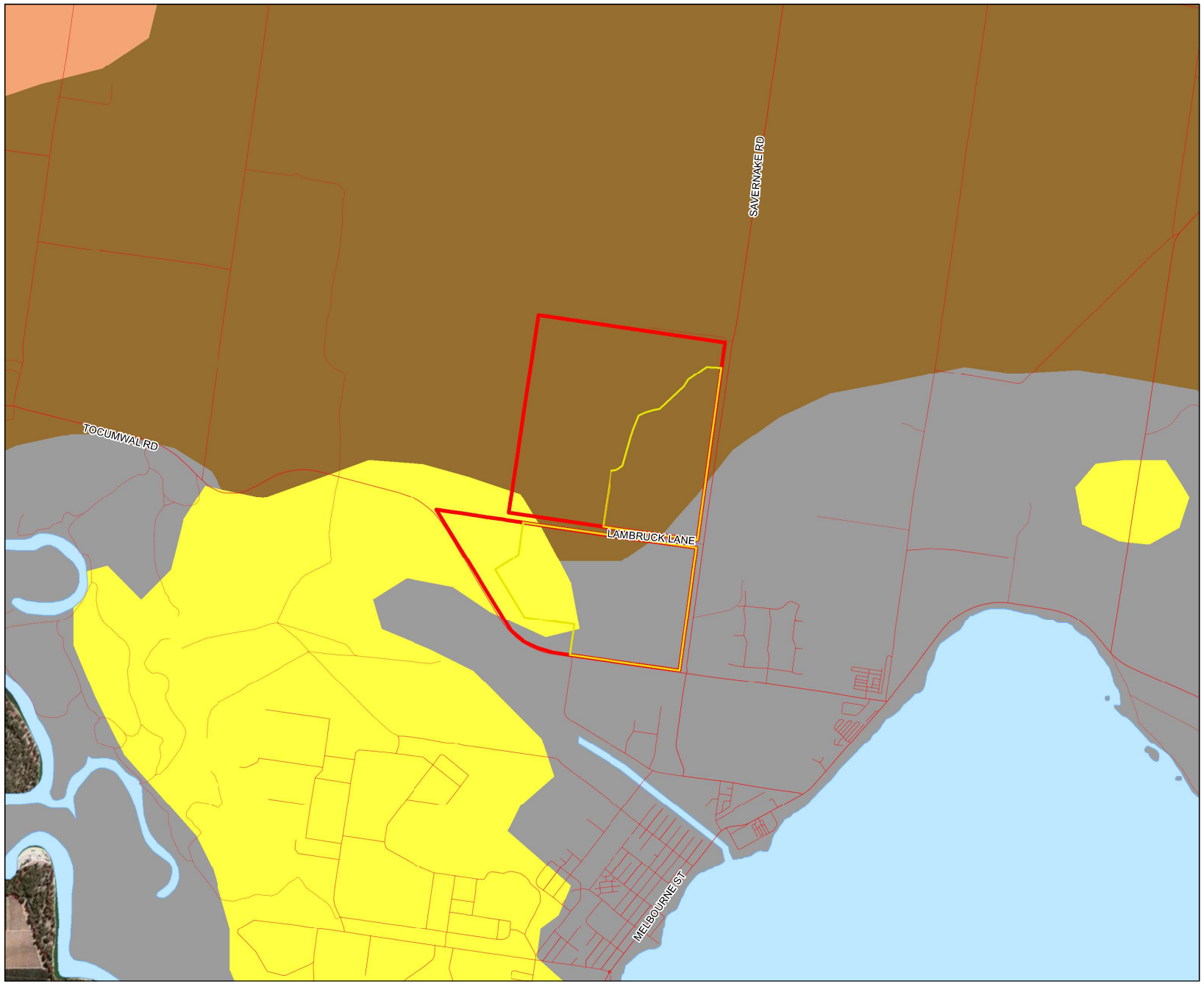
The project area is located wholly within the Cainozoic Shepparton Geological Formation, as mapped on the NSW Planning & Environment 'Interactive Geological Map of NSW'. This geological formation is characterised by poorly consolidated clay, silt, sand and gravel deposits dating back to approximately 66 million years ago. The Shepparton Formation is found throughout the Riverina between the Murray and Lachlan rivers and features outcrops of greenstone, basalt, chert, quartzite and sandstone (Lusty, 1993:5).

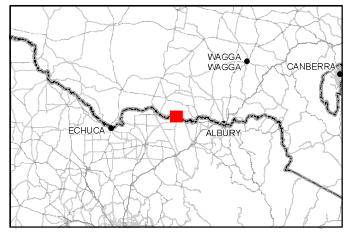
A review of the SEED website (NSW Government, 2018) shows the project area extending over three dominant soil groups: Grey, Brown and Red Clays in the south eastern portion, Siliceous Sands in the south western portion and Red-Brown Earths extending over the rest of the project area (refer to **Figure 42**).

These soil types can be classified as Rudosols, Vertosols and Chromosols which is the dominant soil type across the site. Chromosols are texture contrast soils with a sandy or loamy surface horizon overlying a clay

textured B horizon. The subsoil (B) horizon is not strongly acid (pH greater than 5.5) and is not sodic in the upper 20 centimetres. The structure of the subsoil may range from massive to strongly structured. These soils have moderate agricultural potential with moderate chemical fertility and water holding capacity. They can be susceptible to soil acidification and soil structure decline.

A review of the Land and Soil Capability Mapping for NSW on the SEED website (NSW Government, 2018) indicates the project area to be classified as having Class 5 - Severe limitations at the southern portion of the project area and Class 3 - Moderate limitations for the remainder of the project area (refer to **Figure 43**). These land classifications are generally capable of sustaining high impact land uses using more intensive readily available and accepted management practices. Lands are suited to grazing, including the use of improved pastures, and cultivation for cash or forage crops in rotation with pastures.





LEGEND

- Project Boundary
- Development Footprint

Dominant Great Soil Group (GSG)

- Grey, Brown and Red Clays (GC, BC & RC)
- Red-brown Earths (RBE)
- Red Earths - less fertile (granites and metasediments)
- Siliceous Sands (SS)
- Water

N

0 0.4 0.8 1.2 1.6

Kilometers

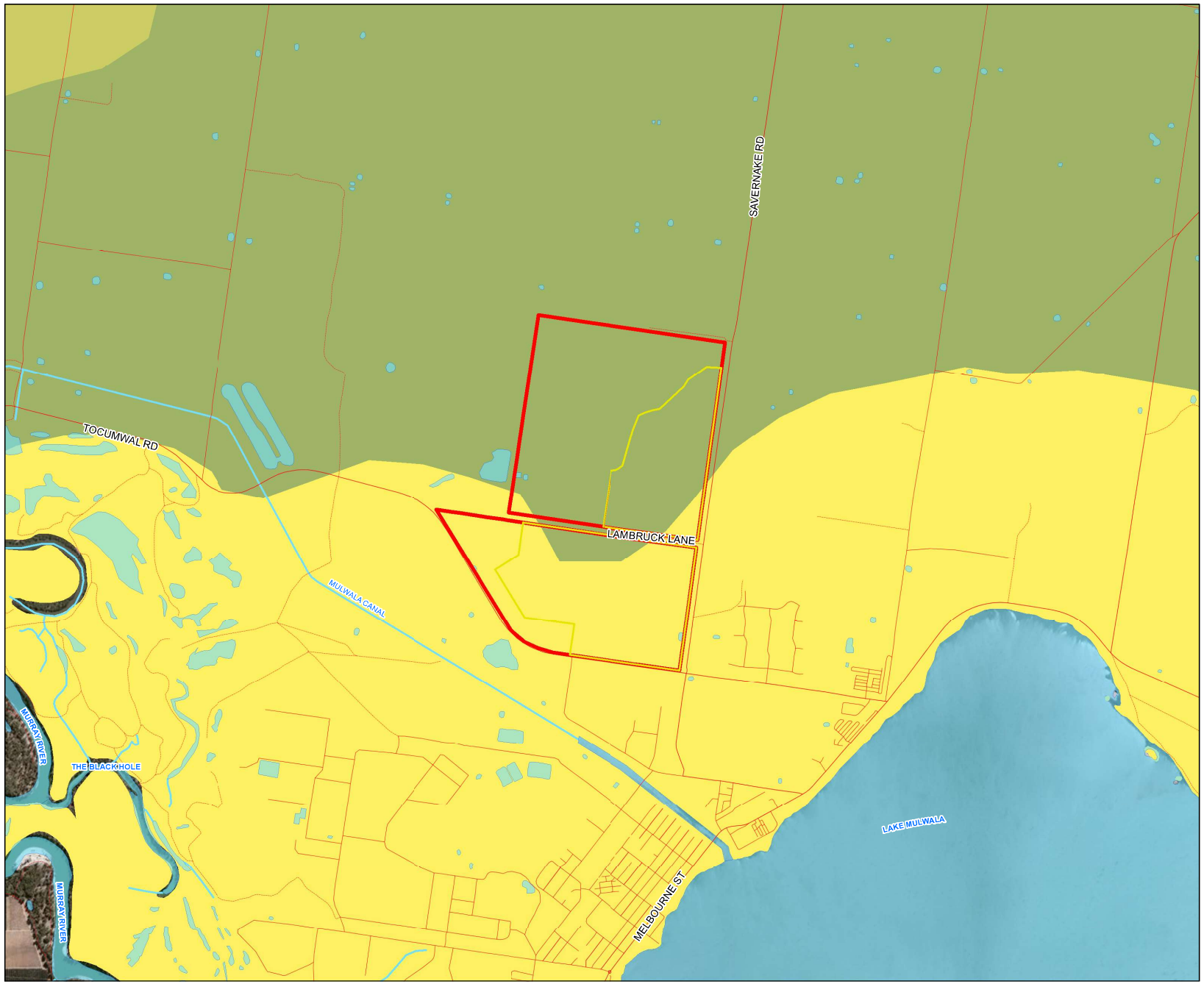
APPROX SCALE 30,000 @ A3
GDA 1994 MGA Zone 55

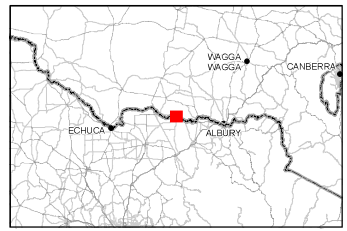
Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

DATA SOURCES
Road network provided by Department of Environment, Land, Water and Planning (DELWP) Web Map Service.
Great Soil Group data provided by Office of Environment and Heritage 2017.

RPS

Figure 42
Soil Type
Mulwala Solar Farm





LEGEND

- Project Boundary
- Development Footprint
- Waterbody
- Watercourse

LAND AND SOIL CAPABILITY (LSC) CLASSES

- Class 3 - Moderate limitations
- Class 4 - Moderate to severe limitations
- Class 5 - Severe limitations
- Class 6 - Very severe limitations

N

0 0.4 0.8 1.2 1.6
Kilometers

APPROX SCALE 30,000 @ A3
GDA 1994 MGA Zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

DATA SOURCES
Road network provided by Department of Environment, Land, Water and Planning (DELWP) Web Map Service.
Soil and Land Capability data provided by Office of Environment and Heritage 2013.
Watercourse data provided by DELWP 2018.
Imagery from Esri basemap layer.

RPS

Figure 43
Land and Soil Capability
Mulwala Solar Farm

RPS

8.7.2.3 Agriculture

The project area is located within the Federation Council LGA which covers an area of approximately 5,700 km^2. The project area is highly modified cleared land, currently used for cereal cropping and grazing (primarily sheep) which has historically been the primary use of the land. Centre-pivot irrigation, supplied by a groundwater bore, has been established in the south-eastern corner of the project area.

Agriculture, forestry and fishing was recorded in the 2016 census to be the largest industry sector of employment in Federation Council, making up 19 percent of total employment in the area (ABS 2016). Historically, the land use surrounding the Project site has comprised agricultural activities including grazing and dairy farming; however residential, commercial (including tourism) and industrial land uses are also prevalent in the surrounding area. The loss of 215 ha or 0.072 percent of the available agricultural land in the LGA is considered insignificant in this context locality.

A review has been undertaken of the *NSW Strategic Regional Land Use Policy* (SRLUP), including the state-wide mapping that has been prepared to identify potential areas of Biophysical Strategic Agricultural Land (BSAL) under the SRLUP. The review has found that the Project site is not mapped as BSAL under *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.*

8.7.2.4 Flooding and Water Resources

The Project site is located in the NSW Murray basin, in the Murray Local Land Services region. The site is located approximately two kilometres north of the banks of Lake Mulwala and approximately five kilometres north of the Murray River. The Project site comprises relatively flat and low-lying land with the Mulwala irrigation channel running from the southeast to northwest about 600 m south of the Project site. The Project site is not located within a flood planning area under the Corowa LEP 2012, however due to the flat, low-lying nature of the site and the presence of wetland in the northern paddocks, it is understood that localised flooding of paddocks can occur.

Impacts to flooding and water resources across the Project site are discussed in further detail in **Section 8.6.**

8.7.2.5 Potential Contamination

A search of the NSW Environmental Protection Authority (EPA) Contaminated Public Land record for Mulwala and the LGA did not reveal any contamination within the Project site.

The use and disposal of pesticides and herbicides utilised in past and present agricultural activities within the Project site have the potential to pose a contamination risk, however the likelihood of this occurring is low.

8.7.2.6 Acid Sulfate Soils

A search of the Australian Soil Resource Information System (ASRIS) was conducted to determine the presence of acid sulphate soils occurring in the Project site. The available information on ASRIS was last updated in 2014 and indicates a 'low probability' of acid sulfate soils occurring on the site.

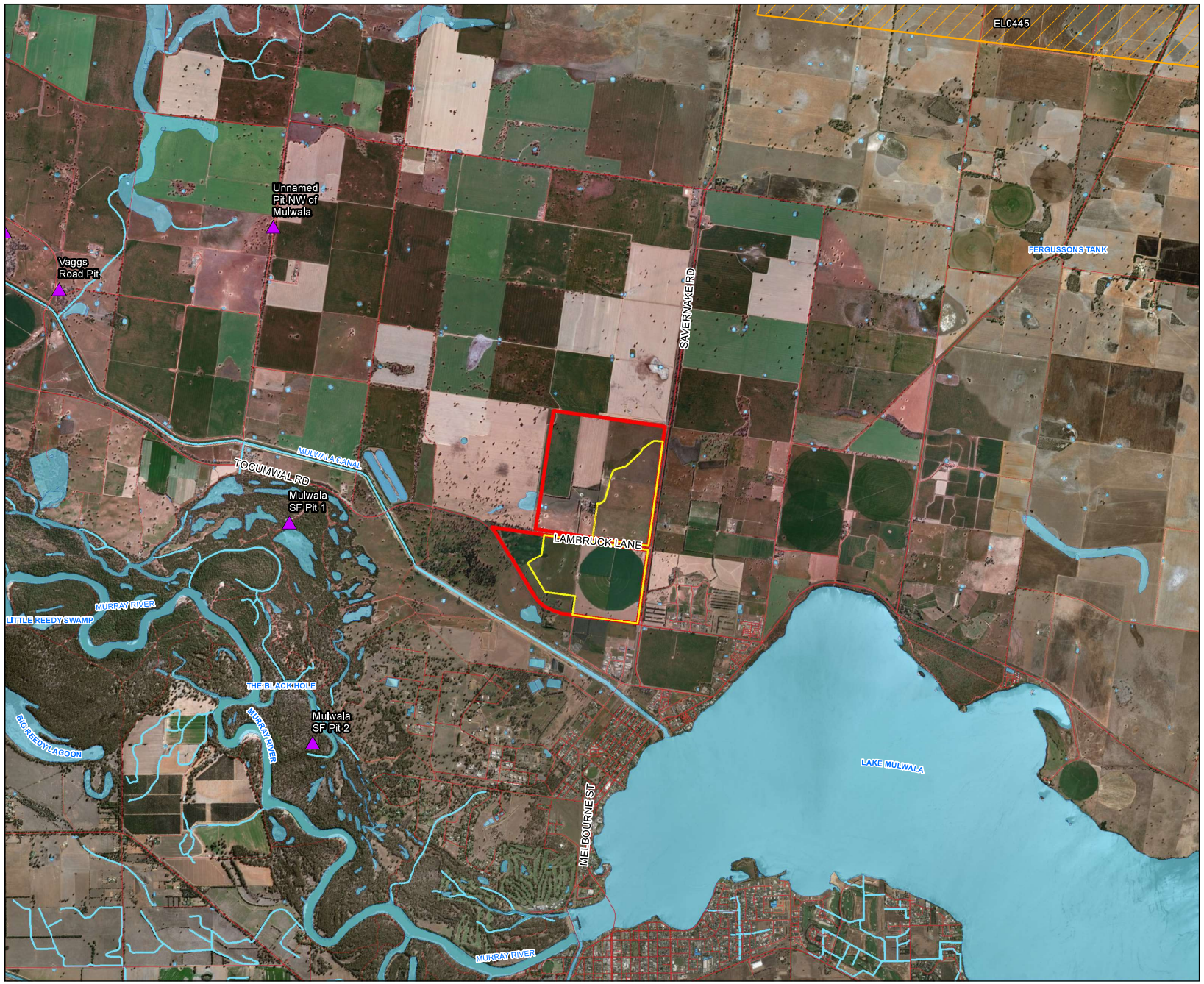
8.7.2.7 Mining and Mineral Resources

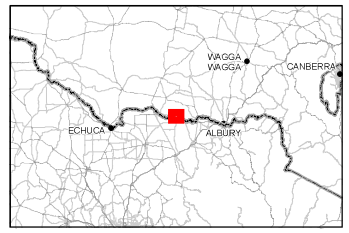
A search of the DoI - DREs online MinView tool (DRE, 2018) has found that there are no minerals, petroleum, or coal exploration titles or applications over the Project site (refer **to Figure 44**). The closest titles surrounding the Project site are detailed below in Table 25.

Table 25 Surrounding Exploration Titles

Title Name	Group	Location
Mulwala SF Pit 1	Group 1 Minerals Exploration	3 km west of the Project site
Mulwala SF Pit 2	Group 2 Minerals Exploration	4 km south west of the Project site
Unnamed Pit NW of Mulwala	Group 2 Minerals Exploration	5 km north west of the Project site
Vaggs Road Pit	Group 2 Minerals Exploration	7 km north west of the Project site

Accordingly, there would be no impact to mines, quarries, or exploration activities from the Project.





LEGEND

- Project Boundary
- Development Footprint
- Recorded Mineral Occurrences
- Titles - Historic ELs
- Waterbody
- Watercourse

N

0 0.7 1.4 2.1 2.8
Kilometers

APPROX SCALE 50,000 @ A3
GDA 1994 MGA Zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

DATA SOURCES
Road network provided by Department of Environment, Land, Water and Planning (DELWP) Web Map Service.
Mineral Occurrence and Title data provided by NSW Department of Planning and Environment 2017.
Watercourse data provided by DELWP 2018.
Imagery from Esri basemap layer.

RPS

Figure 44
Exploration and Mineral Titles Search
Mulwala Solar Farm

RPS

8.7.3 Impact Assessment

8.7.3.1 Land Use

The expected impact on surrounding land uses during construction is considered to be minimal given the temporary nature of the work.

The use of the Project site for a solar farm will have minimal effect on the potential for town growth within Mulwala. The ABS estimated the resident population of Mulwala to be 2,151 in 2017 (.idcommunity 2018) which is minimal population growth compared with 2,129 in 2016 and 2,094 in 2012. This data indicates a lack of extensive town growth which will not be inhibited by the Project. Residential development and population growth is expected to take place along Lake Mulwala, and housing estates, including one to the east of the Project site remains under development. The 40 year life span of the Project has the ability to consider town growth after decommissioning in accordance with the region's needs.

The implementation of mitigation strategies would further reduce the level of impact (refer to Section 8.7.4). Once construction of the Project commences, agricultural activities would cease in the areas involved in access and construction.

8.7.3.2 Geology, Soils and Land Capability

Construction activities, such as excavation and earthworks, have the potential to disturb soils, cause soil erosion, and subsequent sedimentation. The construction phase of the Project may result in increased levels of soil erosion within the site-specific areas of construction disturbance. The susceptibility of soils to erosive forces is dependent on their properties, namely texture, structure, and dispersibility.

The following earth moving activities are required as part of the Project:

- Construction of internal access roads, compound, lay down and parking areas;
- Upgrade to the Project site access point and associated road improvement works;
- Construction of transmission line between the step-up transformer and the Essential Energy substation;
- Possible levelling of minor irrigation infrastructure;
- Construction of additional drainage;
- Trenching for underground cabling; and
- Construction of the permanent site office, maintenance shed and switchyard.

These activities would remove the existing ground cover and disturb soils, potentially decreasing their stability and increasing susceptibility to erosion. The use of construction vehicles following rain could also increase the risk of soil erosion or soil loss.

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

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

Overall, the risk of erosion is considered low where appropriate soil management measures are implemented. With limited topographic relief, runoff containing sediment is considered to be readily

manageable and unlikely to cause any impact on natural waterways. The management of water and erosion is discussed in further detail in Section 8.6.

Soil compaction would occur as hardstands and internal access roads are created, which would reduce soil permeability thereby increasing run off and the potential for concentrated flows. During excavations, mixing of different soil horizons can retard plant growth due to inadequate top soil layer. Overall, these impacts would occur in small, discreet parts of the proposal area and are not considered substantial.

Pile driving/screwing of steel posts supporting the arrays, as well as installation of fencing, uses light equipment within a small and discrete footprint and is unlikely to result in substantial disturbance of soils. The areas of disturbance would be sparsely distributed and groundcover would be retained as far as practicable during construction. Dust may be generated through the movement of construction vehicles. Impacts of dust are discussed in further detail in Section 8.2.3.

The use of fuels and other chemicals onsite pose a risk of soil contamination in the event of a spill. Chemicals used onsite would include fuels, lubricants and (minimally) herbicides. Spills of these contaminants can alter soil health, affecting its ability to support plant growth. When mobilised, such as in a rain event or flooding, the substances may spread via local drainage lines, affecting much larger areas including aquatic habitat. Overall, these risks are low and considered readily manageable through the use of catch trays, spill-kits, and suitably bunded fuel and chemical stores.

8.7.3.3 Agriculture

The development of the Project would potentially result in the following agricultural impacts:

- Resource loss associated with each solar panel installation;
- A reduction of dry land and irrigated cropping at the Project site for the life of the operation (up to 40 years);
- Potential increased biosecurity risk resulting from reduced pest and weed control; and
- Potential bushfire risks from lack of grazing and land management.

The following sections have been prepared with consideration of the *Primefact 1063: Infrastructure proposals on rural land (DPI, 2012), The land and soil capability assessment scheme: second approximation (OEH, 2012), and the Biosecurity – Weed Management Policy (DPI, 2017).*

Grazing, cropping and related activities

During operation of the Project, the development footprint (215 ha) would be removed from potential agricultural production for a period of up to 40 years (Project life). Whilst cropping and irrigation would be taken out of production, there would still be the capacity to graze sheep between the solar arrays across the site. The grazing of sheep would allow agricultural land uses to continue, while providing a fire and weed management benefit through reducing excessive pasture growth and creating grazing pressure.

The Project is unlikely to pose a safety risk to aircraft conducting aerial spraying operations in the vicinity of the site due to the low height of Project infrastructure and the limited amount of reflectivity produced from PV solar panels. It has been documented by many sources that as little as two-percent of the light received by a PV panel is reflected (NSW DoI-DRE 2016; Solar Trade Association 2016; FAA 2010). This degree of reflectivity is much less than the reflectivity produced by a wide variety surfaces, including bare soil, vegetation, and light coloured buildings.

The Project has been designed to avoid and minimise land disturbance and overall impacts on agricultural land where possible.

Resource loss

The Project would not impact on any land identified by the SRLUP as being BSAL. The Project would result in the development of a solar farm with an operational life up to 40 years. Construction works would involve only minor excavation activities and pile driving which would create minimal disturbance to soil resources. This in turn would reduce the soil loss risk. At the end of the operation of the Project, all solar farm infrastructure would be removed, the land rehabilitated to its pre-existing condition, and the site returned to agricultural production.

The Project site has been selected due to its proximity to existing infrastructure, avoiding the need to construct a new substation and extensive transmission lines.

Biosecurity

The Project would result in the increased movement of vehicles and people to the Project site, particularly during the construction and decommissioning phases. As a result, the primary risk to biosecurity is the spread of weeds that may result from the increased movement of vehicles in and out of the site. Weed seeds can be dispersed easily on the tyres and undercarriages of vehicles and on the clothing of construction personnel. The spread of weeds would generally be controlled through confining vehicle and machinery movements (where possible) to formed access tracks during all phases of the Project. A vehicle wash down procedure may also be implemented for vehicles entering the Project site.

To assist in the management of weeds, a Weed Management Plan would be prepared in accordance with NSW DPI requirements and in consultation with Federation Council. Management measures would focus on early identification of invasive weeds, effective management controls, and a regular maintenance program.

Rubbish bins containing food scraps and other perishable waste can potentially attract pest animals at the Project site, including rats, cats, and foxes. As such, all rubbish bins containing food wastes would be covered and serviced on a regular basis. Rabbit, wild dog, and fox numbers would be controlled through targeted pest management during the operational phase of the Project. Grazing pressure through the use of sheep and maintenance of grasses under and surrounding the PV panels would also reduce cover for pest species.

8.7.3.4 Flooding and Water Resources

There is no riverine flood threat affecting the site and the construction, operation and decommissioning of the Project do not impact the existing flood characteristics that may arise from localised stormwater events. The Project works are minor in nature with respect to surface water movement and do not significantly alter the flow direction, intensity or volume of runoff arising from the Project site. The existing surface water drainage patterns on the site would remain, with the areas subject to possible inundation excluded and buffered from development to maintain existing storage capacity of runoff waters. Whilst there is no flooding or stormwater risk, nuisance inundation has the potential to impact development infrastructure. This risk is mitigated by installation of critical infrastructure 300 mm minimum above natural surface levels.

Impacts to flooding and water resources across the project area are discussed in further detail in Section 8.6.

8.7.3.5 Mining and Mineral Resources

The Project is not located within an area that has been identified as a mineral resource and there are no current exploration licences over the Project site. Impacts on mining would be negligible. Following decommissioning, the solar farm infrastructure would be removed, and the Project site would be available for alternative land uses, such as mining or quarry, if a developable resource exists.

RPS

8.7.3.6 Commonwealth Land

A search of the *Environment Protection and Biodiversity Conservation Act* 1999 (EBC Act) Protected Matters Search Tool identified Commonwealth Land within close proximity to the Project, and these include:

- Defence Mulwala Explosives Factory; and
- Mulwala Homestead Precinct (located inside the Defence Mulwala Explosives Factory site).

Under the EPBC Act, approval is required for an action that is likely to have a significant impact on the environment on Commonwealth land. A Commonwealth Land Assessment was undertaken to determine the potential impacts of the Project on Commonwealth land to determine whether approval under the EPBC Act would be required. It was determined that while the Project is located in close proximity to Commonwealth land areas, due to the nature of the Project and the mitigation measures proposed as part of the environment impact assessment, it is unlikely that the Project would significant impact Commonwealth land.

The Mulwala Solar Farm Commonwealth Land Assessment is provided as **Appendix C.**

8.7.4 Mitigation and Management

8.7.4.1 Construction and Operations

The following mitigation measures would be implemented during construction and operational phases of the Project to minimise the impacts to soil resources, land use, and agricultural lands:

- Consultation with adjacent landholders would be ongoing to manage interactions between the solar farm and other properties;
- Soil resources would be managed to ensure the future viability of the site for agricultural production, including:
  - Optimisation and recovery of useable topsoil and subsoil;
  - Establishment of effective soil amelioration procedures and practices; and
  - Separation of topsoil and subsoil to ensure that soils are re-instated in the right order.
- An Erosion and Sediment Control Plan (ESCP) would be prepared in accordance with *Managing Urban Stormwater: Soils & Construction* (Landcom 2004) and would be implemented throughout the life of the Project to minimise impacts. This plan would include provisions to:
  - Install erosion and sediment controls prior to and during construction;
  - An inspection protocol for erosion and sediment controls, particularly following large rainfall events;
  - Regular equipment cleaning to minimise the tracking of sediment from vehicles, plant and equipment on to Savernake Road, Tocumwal Road and Lambruck Lane;
  - Stockpile topsoil appropriately to minimise weed infestation and maintain soil organic matter, soil structure and microbial activity; and
  - Minimise surface disturbance and maintain surface cover where possible; and
  - Minimise excavation and compaction of soils.

Further detail on surface water management and erosion and sediment control is provided in Section 8.6 and attached as **Appendix H.**

Site land management would include consideration of the viability of sheep grazing as a means of vegetation maintenance throughout the life of the Project.

The area of impervious ground surface would not increase significantly from the installation of the PV panels. Therefore, it is not expected that there would be a significant increase in runoff generated from the Project site.

To mitigate impacts to biosecurity, vehicle movements would be restricted to the formed access tracks. In addition, sheep grazing within the site boundary would help maintain weed levels while maintaining a multipurpose land use throughout the life of the Project.

A construction and operational Environmental Management Plan (EMP) would be prepared for the Project and would include biosecurity protocols, such as measures for the identification, management and ongoing monitoring of weeds on the site.

Consideration of ground cover beneath the PV solar panels would be included in the EMP to manage erosion and surface water runoff.

The EMP would also include a spill response plan which would be implemented during construction and operation to avoid potential for contamination.

8.7.4.2 Decommissioning

Prior to the conclusion of the Project (up to 40-year project life), a Rehabilitation and Decommissioning Plan is to be prepared in consultation with NSW Department of Primary Industries (DPI) and in accordance with the Lease conditions between the landowner and ESCO prior to decommissioning.

In accordance with the recommendations by DPI in the SEARs the following is to be undertaken:

> *"an assessment of rehabilitation and decommissioning/closure management that outlines rehabilitation objectives and strategies to guide the return of the land back to agricultural production."*

The Rehabilitation and Decommissioning Plan would include:

- Removal of all above ground and in ground infrastructure up to one metre, unless:
  - the landowner wishes to leave all or any part of the equipment, or
  - The removal of equipment is in breach of any law or requirement of Authority.
- Removal of gravel from internal access tracks where required;
- Disposal options for infrastructure and related materials;
- Mechanical ripping of any compacted areas;
- Preparation of a soil sampling plan to validate the health of the soil resource;
- Re-instate irrigation infrastructure and drainage works where required;
- Revegetation of any areas of disturbance;
- Erosion and sediment control procedures; and
- Ongoing maintenance and monitoring.

Consideration would also be given to the timing of the rehabilitation activities, and rehabilitation objectives and targets would be set in consultation with DPI.

8.8 Socio Economic

8.8.1 Introduction

This section provides an assessment of the social and economic impacts of the Project, including identification of the socio-economic characteristics of the surrounding area and the wider Federation Council LGA. To identify the socio-economic impacts and/or issues as a result of the Project, the assessment is supported by background research including information reviews and an analysis of demographic profiles. The information in relation to the existing environment is derived from official sources, including the Australian Bureau of Statistics, as well as Australia's leading economic modellers, National Institute of Economic and Industry Research (NIEIR).

The assessment has also been prepared to satisfy the SEARs, which requested the following be considered:

*"**Socio-Economic** – including an assessment of the likely impacts on the local community and a consideration of the construction workforce accommodation"*

A full summary of the SEARs requirements (including agency responses) are included within **Appendix A**.

8.8.2 Existing Environment

The Project is located approximately two kilometres north of the Mulwala township, within the Federation Council LGA. The LGA is located in the Southern Riverina region of NSW and encompasses a total land area of about 5,700 square kilometres. Mulwala is located north of the Murray River and adjacent to Lake Mulwala. It is halfway between Albury and Echuca, approximately 287 kilometres northeast of Melbourne CBD. The 2016 census recorded Mulwala to have a population of 2,161 with a population density of 0.06 persons per hectare, an increase from 1,986 in 2006. The twin town of Yarrawonga is located approximately six kilometres on the Victorian side of the Murray River, which has a greater population than Mulwala of 7,930.

The Federation Council LGA is predominantly rural, with several townships. Other major townships within this LGA include Corowa, with smaller townships at Boree Creek, Howlong, Morundah, Oaklands, Rand and Urana, and other several small villages throughout the area. Rural land is used largely for agriculture, particularly sheep and cattle grazing, with some wheat and cereal growing, pig rearing and timber production.

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. Agriculture, forestry and fishing was recorded in the 2016 census to be the largest industry sector of employment in Federation Council, making up 19 percent of total employment. Other key employment sectors were listed as manufacturing (16.5 percent), accommodation and food services (12.1 percent), retail trade (8.1 percent) and healthcare and social assistance (6.7 percent). Construction is the main employer in Mulwala. There were 4,966 (aged 15+) residents employed in the year ending June 2016, a reduction from 5091 in 2011.

In 2010 to 2011, the total value of agricultural output in the Federation Council area was $276 million, which increased from $232 million in 2005-06. The largest commodity produced was cereal crops, which accounted for 49.7 percent of Federation Council area's total agricultural output in value terms. The Gross Regional Product (GRP) of Federation Council LGA as of 30 June 2016 was $556 million, down from $615 million in 2006. In 2016, Federation Council LGA contributed 0.12 percent of the total NSW GRP.

Tourism is also an important industry with fishing, water skiing and boating a popular leisure pursuit at Lake Mulwala. There are a range of businesses in Mulwala which comprise numerous accommodation and tourism businesses, such as the prominent Mulwala Waterski Club which provides employment opportunities to the local and surrounding area including the nearby town of Yarrowonga.

There are a number of educational facilities located within the LGA, including the NSW Riverina Institute of TAFE, with a campus located in Corowa which could be potentially used for training of construction and operation staff.

The Project would have a development footprint of up to 215 hectares and includes land that crosses the properties of one landholder who is engaged in agricultural and grazing activities. Irrigation activities occur within the southeast paddock. Historically, the land use surrounding the project area has comprised agricultural activities including grazing and dairy farming; however residential, commercial (including tourism) and industrial land uses are also prevalent in the surrounding area.

8.8.2.1 Riverina Murray Regional Plan 2036

This Plan provides a 20-year blueprint for the region, outlining the NSW Government's vision for the Riverina Murray which is to create a diversified economy founded on Australia's food bowl, iconic waterways and a strong network of vibrant and connected communities (DPE 2017). Section 8.8.3.4 outlines the compatibility of the Project with the Regional Plan.

8.8.2.2 Local community attitudes

A comprehensive community consultation program was conducted by ESCO Pacific to address any issues that the local community might have. A detailed description of the consultation process conducted is provided in Section 6. **Appendix B** includes the consultation report issued by ESCO Pacific.

8.8.3 Potential Impacts

The following sections detail the potential socio-economic impacts that may occur during construction and operations.

8.8.3.1 Construction

The key potential social and economic impacts that may result from construction of the Project include:

- Increased employment – there is the potential for employment to be generated during the construction phase through the use of local contractors and labour hire;
- Increased traffic on local roads and hazards associated with construction traffic;
- Influx of workers putting pressure on local accommodation and health services; and
- Short term air quality, noise and visual impacts.

The Project would have a positive employment impact during construction and is likely to create in the order of 130 jobs. Of these workers, it is expected that the majority would be sourced from the local area. Any non-local specialised contractors are likely to come from across other areas of NSW and would utilise accommodation in Mulwala and other localities in NSW and Northern Victoria (Yarrawonga). There are a number of short term accommodation options available in Mulwala including motels, motor inns and onsite cabins within a number of caravan parks adjacent to Lake Mulwala. Where required, the Project would engage with local accommodation providers and Federation Council to provide additional short term and temporary accommodation. Local accommodation providers have already registered their interest in the Project. The majority of the construction staff movements would be made to and from the site using mini buses from Mulwala, thus creating further local employment.

An increase in short term workers occupying the area could also result in economic benefits to the tourism industry in the area, as Mulwala has become a popular tourist destination for water sports such as skiing, boating and fishing.

A demand for health care by workers would be catered for by the nearby Yarrawonga District Health Service located at 33 Piper Street, Yarrawonga, Victoria.

With respect to construction traffic, a Traffic Impact Assessment (TIA) has been prepared and is attached as **Appendix F**. It is anticipated that the average traffic generation during the eight-month construction phase would peak at 150 movements per week, or 23 movements per day. There is also the potential for two vehicle movements during the AM and PM peak hour periods. In addition, it is expected that during the non-peak construction (months 1-4 and 7-8), the average heavy vehicle generation would peak at eight movements per day.

Overall, it is considered that the Project would have a positive socio-economic impact on the local area during construction, given the significant economic boost the Project would generate. It is further considered that the expected adverse impacts would be minimal given the temporary nature of construction phase and through the implementation of appropriate environmental management controls.

8.8.3.2 Operations

The key potential social and economic impacts that may result from the operation of the Project include:

- Employment – there would be four operational staff posted at the solar facility to manage the site activities and to support routine plant operations and maintenance. It is envisaged that the majority of these operational staff would be sourced from Mulwala or the surrounding region;
- Ongoing benefits for local associated supply businesses;
- Loss of agricultural land; and
- Change in the rural landscape character and visual amenity of the area.

The creation of long term employment and demand from local associated business would have a positive economic and social impact. Further, there is a greater societal, social and economic benefit gained through the substitution of carbon-based electricity production with renewable energy sources which are consistent with State and National greenhouse emission reduction objectives.

The Federation Council LGA is predominantly rural and largely used for agricultural purposes. Approximately 92 percent of the total land area of Federation Council or 5,244 square kilometres (524,400 ha) is used for agricultural purposes. The operation of the Project would result in a loss of 215 ha or 0.037 percent of available agricultural land in the LGA, and therefore is considered insignificant within this locality. In addition, following decommissioning, agricultural activities could recommence as the Project is not expected to cause any long-term impacts on land capability.

Potential visual impacts of the Project on the surrounding amenity have been assessed. Potential impacts and proposed mitigation measures are provided in Section 8.3, while a Visual Impact Assessment is attached as **Appendix G.**

Overall, it is considered that the proposed use would have a net economic and social benefit and is compatible with and can co-exist with ongoing local agricultural activities.

8.8.3.3 Decommissioning

Impacts during decommissioning of the Project are expected to be similar to those outlined above for construction. In addition, local recycling of infrastructure (such as used solar panels) may be a further community and economic benefit.

8.8.3.4 Compatibility with Riverina Murray Regional Plan

The Project supports the following goals set out in the Regional Plan:

- A growing and diverse economy – by developing and diversifying the rural economy through the development of renewable energy generation;
- A healthy environment with pristine waterways – by undertaking a development that has minimal environmental impact on land and waterways and which reduces GHG emissions by producing renewable energy;
- Efficient transport and infrastructure networks – by maximising the use of existing transmission lines and infrastructure; and
- Strong, connected and healthy communities – by providing a diversified income base, employment opportunities and flow-on economic impacts within the region.

8.8.4 Mitigation and Management

Implementation of measures to reduce the potential for amenity impacts during construction and operation of the Project are identified in the relevant chapters of the EIS and Statement of Commitments in Section 9. In addition to these mitigation measures, the following would be implemented by ESCO Pacific to further manage socio-economic impacts:

- Preparation of a Consultation and Stakeholder Engagement Plan which includes:
  - Providing regular Project updates to the community and businesses;
  - Providing a schedule of activities when there may be heavy vehicles accessing the Project site or when noisy activities may occur;
  - Establishment of a complaints handling procedure and a response protocol; and
  - Preparation of regular Project factsheets for distribution to the surrounding residents.
- Ongoing liaison with local community and business representatives to ensure the use of local contractors, labour, materials, and services during construction and operations;
- Liaison with local businesses and services to determine accommodation options and availability so as local tourism is not affected, particularly during the construction phase;
- Liaison with tourism representatives to ensure local events (such as the annual Yarrawonga Mulwala Multisport Festival) are not impacted by accommodation short falls; and
- Continued engagement with Federation Council to discuss community and business concerns.

8.9 Waste Management

8.9.1 Introduction

This Waste Management Strategy (WMS) has been prepared to assess the potential waste streams generated from the Project, likely volumes of waste produced during construction and operations, and to propose management measures to reduce wastes. A Waste Management Plan (WMP) will be prepared before construction as part of this Waste Management Strategy.

8.9.2 Methodology

8.9.2.1 Guidelines and Policies

The WMS has been prepared to satisfy the principles of the waste hierarchy as detailed in the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act). The WMS focuses on the waste generated by the Project during the construction and operational phases.

The following guidelines and policy documents were utilised in the development of the WMS to ensure consistency with the EPA's waste avoidance and resource recovery aims and objectives:

- EPA's Waste Avoidance and Resource Recovery (WARR) Strategy 2014-21;
- EPA's Waste Classification Guidelines (2014); and
- EPA's Better Practice Guidelines for Waste Management and Recycling in Commercial and Industrial Facilities (2012).

The specific aims and objectives of the WMS are to:

- Encourage the minimisation of waste production;
- Ensure maximisation of resource recovery;
- Minimise the amount of waste being disposed to landfill; and
- Reduce the amount of waste generated per capita.

The likely types and quantities of waste were identified for both the construction and operational phases of the Project, followed by measures to increase the recycling and re-use of materials, mitigation strategies, and roles and responsibilities for the workforce.

8.9.2.2 Waste Hierarchy

The waste management hierarchy for construction and operation of the Project would be undertaken consistent with the waste management hierarchy set out in the WARR Act:

- Avoid: Waste avoidance by reducing the quantity of waste being generated. This is the simplest and most cost-effective way to minimise waste. It is the most preferred option in the waste management hierarchy;
- Re-use: Reuse occurs when a product is used again for the same or similar use with no reprocessing. Reusing a product more than once in its original form reduces the waste generated and the energy consumed, which would have been required to recycle;
- Recycle: Recycling involves processing waste into a similar non-waste product consuming less energy than production from raw materials. Recycling spares the environment from further degradation, saves landfill space and saves resources; and
- Dispose: Removing waste from worksites and dumping on a licensed landfill site, or other appropriately licensed facility.

ESCO Pacific (or its representative) would be responsible for handling, segregating and temporarily storing wastes on the Project site. Designated waste storage area(s) would be established and maintained to ensure wastes are appropriated managed.

8.9.2.3 Waste Streams

Any wastes generated during construction and operation of the Project would be classified in accordance with the *NSW EPA Waste Classification Guidelines* (2014), which classifies wastes into the following streams:

- Special waste (e.g. clinical and related waste, asbestos, waste tyres);
- Liquid waste (e.g. fuels, oils, chemicals and pesticides);
- Hazardous waste (e.g. lead-acid batteries and lead paint);
- Restricted solid waste (currently no wastes pre-classified as restricted by EPA);
- General solid waste (putrescible) (e.g. general litter and food waste); and
- General solid waste (non-putrescible) (e.g. glass, paper, plastic, building demolition waste, concrete).

8.9.2.4 Waste Classification

Waste that cannot be avoided, re-used or recycled would be classified in accordance with the *Waste Classification Guidelines* (EPA, 2014) and disposed of at appropriately licensed facilities. The guidelines detail how to assess and classify waste and management options for disposal of the classified waste. A summary of the waste classification steps are included below:

- Establish if the waste should be classified as special waste;
- If not special waste, establish whether the waste should be classified as liquid waste;
- If not special waste or liquid waste, establish whether the waste is of a type that has already been classified;
- If the waste is not special waste, liquid waste or pre-classified waste, establish if it has certain hazardous characteristics and can therefore be classified as hazardous waste;
- If the waste does not possess hazardous characteristics, it needs to be chemically assessed to determine what class of waste it is. If the waste is not chemically assessed, it should be treated as hazardous waste; and
- If the waste is chemically assessed as general solid waste, a further test is available to determine whether the waste is putrescible or non-putrescible. This test determines whether the waste is capable of significant biological transformation. If the waste is not tested, it should be managed as general solid waste (putrescibles).

8.9.3 Waste Sources

8.9.3.1 Construction

Major construction on the Project site would be limited to the two organics buildings on the upper level and drill mud plant and equipment on the lower level. All other buildings existing at the site would be utilised, hence there would be minimal demolition wastes to manage. Accordingly, construction activities are likely to generate the following types of waste:

- Workforce general waste;
- Packaging materials (i.e. cardboard, plastic, timber pallets, metal strapping);
- Excess building materials;
- Scrap metal and cabling materials (i.e. steel, aluminium, copper);

- Plastic and masonry products;
- Waste concrete products;
- Excavation of topsoils and scalping of vegetation; and
- Temporary ablutions waste.

Much of this waste can be recycled at off-site facilities, while the soil resources can either be re-used on site in civil works and landscaping. As a result, it is expected that more than 85 percent of the predicted construction waste arising from the Project can be diverted from landfill.

Waste generated during construction would be separated with the use of dedicated skips for timber, cardboard, concrete, steel, and general waste. Dedicated stockpiles would be delineated on site and regular transfers to skip bins undertaken for sorting. Stockpiles would be sited to take into account slope and drainage factors to avoid erosion and contamination. The frequency of waste removal would depend on volumes of material being generated. Skips would be checked every day and, if at or reaching capacity, removal would be organised within 24 hours.

8.9.3.2 Operations

The general operation of the Project would generate the following broad waste streams:

- Office wastes;
- Packaging wastes (i.e. cardboard, paper, plastic / shrink wrap, pallets);
- Amenity wastes; and
- Maintenance wastes (i.e. damaged PV panels, electrical cabling).

8.9.4 Mitigation and Management

In addition, a Waste Management Plan (WMP) would be prepared to meet the waste classification and hierarchy outlined in the WARR Act, and would include:

- Waste transportation protocols;
- Procedures for ordering materials;
- Classification of waste to be generated during construction;
- Procedures for identifying opportunities to avoid, reuse, recycle, recover, or treat waste;
- Method of tracking all waste entering and leaving the site;
- Procedures for managing waste generated during maintenance of plant and equipment;
- Procedures for waste monitoring, inspection and reporting;
- Location of dedicated waste management areas onsite (e.g. skips and recycling bins); and
- Commercial reuse opportunities.

Additional mitigation and management measures that would be applied during construction and operation of the Project include:

- Plant and equipment would be regularly maintained;
- Ordering would be limited to only the required amount of materials;
- Materials would be segregated to maximise reuse and recycling;

- Routine checks would be undertaken of waste sorting and storage areas for cleanliness, hygiene and OH&S issues, and contaminated waste materials;
- Local commercial reuse opportunities would be investigated where reuse on-site is not practical;
- Separate skips and recycling bins would be provided for effective waste segregation and recycling purposes;
- Training and awareness of the requirements of the WMP and specific waste management strategies would be undertaken;
- Contaminated waste would be managed, transported, and disposed of in accordance with licensing requirements;
- Off-site waste disposal would be transported and disposed of in accordance with licensing requirements;
- Assessment of suspicious potentially contaminated materials, hazardous materials and liquid wastes would be undertaken; and
- Regular monitoring, inspection and reporting requirements would be undertaken, and findings implemented.

Waste generated from the construction and operation of the Project would be managed efficiently to ensure that the diversion of waste from landfill is maximised. The WMP will be implemented to ensure that waste on site is suitably managed during construction and operation and would be updated as necessary.

8.10 Hazards and Risks

8.10.1 Introduction

This section provides a desktop assessment of the potential hazards and risks associated with the Project, as stated in the requirements of the SEARs below:

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

  and

- *an assessment of all potential hazards and risks including but not limited to bushfires, spontaneous ignition, electromagnetic fields or the proposed grid connection infrastructure (including the proposed transmission line and substation) against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields.*

A full summary of the SEARs (including agency responses) are included within **Appendix A**.

8.10.2 SEPP 33 preliminary risk screening

A preliminary risk screening has been prepared in accordance with the requirements of the SEARs for Hazards and Risks as stated above.

The preliminary risk screening is provided below.

8.10.2.1 Potentially hazardous industry

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

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

Lists of potentially hazardous industry

Industries that may fall within SEPP 33 are listed in:

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

Solar farms are not listed in either checklists.

Screening potentially hazardous industry

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

Materials identified as dangerous goods for the Project include:

- Lithium-ion batteries – 240 Tesla Powerpack 2 units and 40 inverters (in the event a battery storage facility is developed on-site);
- Fire suppression gas (minor numbers of 2.5 kg hand held fire extinguishers);
- Diesel – up to 2500 L (operation: up to 2000 L);
- Machine oils – 100 L; and
- Herbicides – 100 L.

If any of the above materials results in a screening threshold being exceeded, the Project would be considered potentially hazardous and SEPP 33 would apply.

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

Dangerous goods are substances or articles that pose a risk to people, property or the environment, due to their chemical or physical properties. Dangerous goods are usually classified with reference to the immediate hazard they pose rather than the long-term health effects and are defined by the *Australian Dangerous Goods Code* (ADG).

The ADG Code lists the following classes of dangerous goods:

- Class 1 Explosives;
- Class 2 Gases;
- Class 3 Flammable liquids;
- Class 4 Flammable solids;
- Class 5 Oxidising substances and organic peroxides;
- Class 6 Toxic and infectious substances;
- Class 7 Radioactive material;

- Class 8 Corrosive substances; and
- Class 9 Miscellaneous dangerous substances and articles, including environmentally hazardous substances.

The ADG Code classes were assigned to the materials identified as dangerous goods that are likely to be used at the Project site. The hazardous or dangerous goods or materials on site during the construction and operation of the Project include:

- Lithium-ion batteries (Class 9 Miscellaneous).

The ADG Code requires dangerous goods to be carries in a secure, safe and environmentally controlled manner. All hazardous materials would be stored and transported in bunded containment. The ADG code also specifies 'special provisions' and 'packing instructions' applying to the transportation of lithium-ion batteries. All dangerous goods (except Lithium-ion batteries) would be appropriately segregated and stored within bunded areas of the maintenance yard located along the southern boundary of the project area.

Table 26 presents the screening threshold levels from SEPP 33 for the dangerous goods to be stored.

Table 26 Dangerous goods and SEPP 33 storage thresholds

Hazardous material	Dangerous goods class	SEPP 33 storage threshold	Project storage	Exceed SEPP
Lithium-ion battery units	9	Not Applicable	240	No
Fire suppression gas	2.2	Not Applicable		No
Herbicides	6.1 PGII	2.5 tonne	0.1 tonne[2]	No
Fuels and oils	3 PGII	5 tonne	<2.8 tonne[1] <2.0 tonne[2]	No

[1] During construction

[2] During operation

Table 27 presents the screening threshold levels from SEPP 33 for the dangerous goods to be transported.

Table 27 Dangerous goods and SEPP 33 transport thresholds

Hazardous material	Dangerous goods class	SEPP 33 transport threshold		Project transport requirements		Exceed SEPP
		Movements	Quantities	Movements	Quantities	
Lithium-ion battery units	9	>1000/year cumulative >60/week	No limit	20/year in total[1]	12[1]	No
Fire suppression gas	2.2	Not Applicable				No
Herbicides	6.1 PGII	Yes	1-3 tonne	Twice a year[2]	0.1 tonne[2]	No
Fuels and oils	3 PGII	>750/year cumulative	3-10 tonne		<2.0 tonne[2] <2.5 tonne[1]	No

Hazardous material	Dangerous goods class	SEPP 33 transport threshold		Project transport requirements		Exceed SEPP
		Movements	Quantities	Movements	Quantities	
		>45/week				

[1] During construction

[2] During operation

Battery storage

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 grid which are caused by intermittent renewable generators as well as fluctuations in consumption. Batteries can store electricity from the grid 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.

The installation of the battery storage for the Project would be undertaken in accordance with the current regulations and guidelines for battery installation. However, this is a new and evolving area of regulation and if further regulations, standards or guidelines become available, the proposed battery installation would be checked and modified for consistency with these new reference documents and modified as required.

The level of risk arising from battery storage depends on the quantity and type of batteries, the storage arrangements and proposed control measures (including fire prevention, protection and mitigation measures). The following elements of battery storage would influence and qualify the extent and magnitude of the risks associated with the proposed battery storage:

- Total capacity of the battery storage;
- Distance from the battery storage location to the nearest residence and other buildings;
- Details on storage arrangements, including minimum separation distances between the containers;
- Hazards arising from the storage of lithium-ion batteries and the appropriate safeguards; and
- Details on the proposed control measures to minimise the risks.

Total capacity of the battery storage

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

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

ESCO Pacific proposes to install up to 240 Tesla Powerpack 2 lithium-ion batteries units and 40 inverters. This would provide a total capacity of 20MW and 40MWh.

Distance from the battery storage location to the nearest residence and other buildings

The distance from the battery storage enclosure to the nearest development site boundary would be a few metres. The battery storage enclosure would be located approximately 300 metres from the nearest residence.

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

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

- Building codes applicable to batteries (national and local), changes to floor loadings and National Construction Code requirements for battery installations;
- Location complies with the manufacturer's recommendations to protect the system from weather and extreme heat, light and temperature;
- Room or enclosure must be suitably ventilated for the location and the type of battery energy storage systems;
- The enclosure must be capable of containing any electrolyte spills;
- Adequately fire-rated walls are used to avoid or delay the spread of fire;
- Suitable means of access/egress to the area is provided during installation and for maintenance work; and
- The enclosure provides adequate mechanical protection to the battery energy storage system.

These batteries have been designed for outdoor storage, and as such there are no storage requirements for indoor storage. Powerpack systems installed in enclosed areas must provide a minimum 1.2 metre-wide access around the sides of the equipment to access the front of each Powerpack Unit. This access is required for service cart access and must be level (maximum five percent cross slope).

Separation of units and inverters

The Tesla Powerpack 2 System consists of self-contained lithium-ion battery units installed in a modular system in accordance with the Tesla manufacturer's instructions.

Figure 45 Standard arrangement of a storage bank of Tesla Powerpack units and inverter (Tesla 2017a)

Access and egress clearances

The Australian Battery Guide details the egress and access requirements for a battery enclosure to provide access to the batteries with sufficient space for safe installation, testing and maintenance and suggests at least 1200 millimetres of space for battery cells / mono-blocks that weigh more than 150 kilograms.

The Powerpack System would be installed in an outdoor enclosed area that must provide a minimum 1.22 metre wide access around the sides of the equipment and 1.83 metre wide access to the front and of each Powerpack Unit. This access is required for service cart access and is required to be level (maximum five percent cross slope) as detailed in the Tesla Powerpack System O&M Manual.

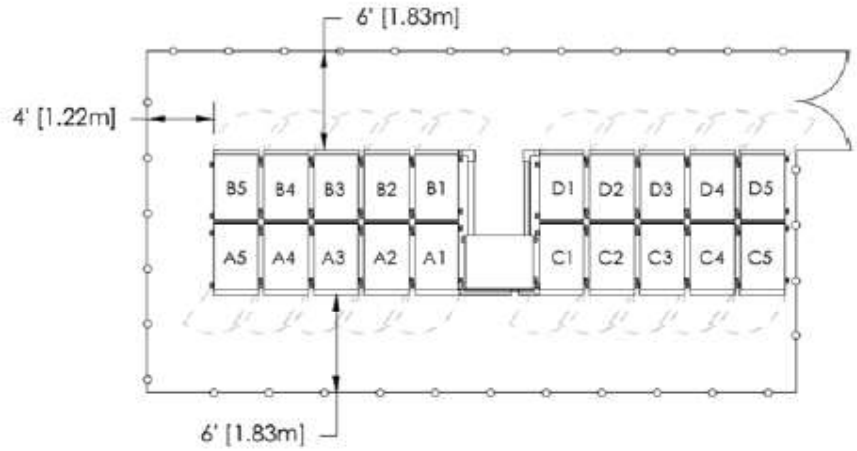


Figure 46 Battery unit system

Hazards arising from the storage of lithium-ion batteries and appropriate safeguards

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

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

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

- Electrical;
- Energy;
- Fire;
- Chemical;
- Explosive gas; and
- Mechanical.

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

- Electric shock;
- Fire; and
- Physical injury.

Electrical hazard

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

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

The mishandling of battery energy storage system components could result in an electrical shock or personal injury,

Energy hazard

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

- Accidental contact between battery terminals with a conductive tool – such as an uninsulated socket wrench, spanner, etc.;
- A dead short within connected PCEs;
- A build-up of conductive material across conductors – such as fluid, metal shavings, etc.; and
- Damage to cable insulation, resulting in electrical conductivity between copper conductors.

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

Fire hazard

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

- Low ambient pressure;
- Overheating;
- Vibration;
- Shock;
- External short circuit;
- Impact;

- Overcharge; and
- Forced discharge.

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

Chemical hazard

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

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

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

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

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

Explosive gas hazard

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

Ignition sources may include:

- Battery system isolation and overcurrent devices;
- Switches internal to electrical components;
- Fans;
- Motors; and
- General electrical switches (e.g. light & power)

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

Severe mechanical damage (e.g. severe crushing) can cause a small quantity of electrolyte (up to approximately one gram) to leak out of a cell and evaporated electrolyte is flammable.

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

Details of the proposed control measures to minimise the risks

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

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

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

Electrical and Energy Hazard risk reduction

A Powerpack 2 unit, even in a normally discharged condition, is likely to contain substantial electrical charge and can cause injury or death if mishandled.

To reduce the risk of Electrical and Energy Hazards:

- Access to the battery enclosure would be restricted to authorized personnel only;
- Battery installation would only be undertaken by an accredited installer;
- The Powerpack 2 System would be installed in accordance with the manufactures instructions Tesla;
- All access and servicing would be performed by qualified personnel only;
- The Powerpack 2 unit door includes two latches that require a special tool to unlock, limiting access to authorized personnel only;
- Operating alarm and shutdown response systems would be installed;
- An emergency response plan including instructions for responding to incidents related to the battery storage would be developed;
- Personal protective equipment would be used, spill kits provided, and safe work procedures followed when handling, repairing, maintaining, installing and inspecting battery systems; and
- First aid materials and training would be provided to staff.

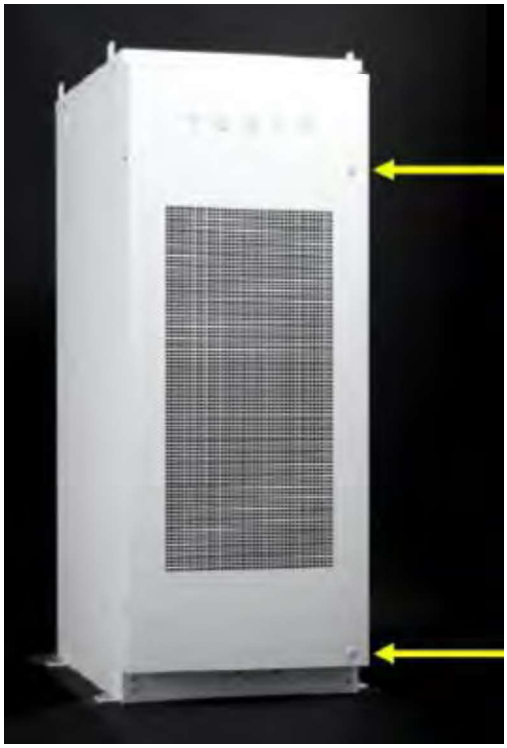


Figure 47 Powerpack unit security latches (Tesla 2017a)

Fire hazard risk reduction

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

Gaseous agents such as CO2 or Halon, or dry chemical suppressants may temporarily suppress flaming of lithium-ion battery packs, but they would not cool lithium-ion batteries and would not limit the propagation of cell thermal runaway reactions.

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

To reduce the risk of fire hazard:

- The battery enclosure would be located to maximise distances to sensitive receivers (residences, public) and from external hazards (bushfire, vehicles);
- The battery enclosure would including gravel surfacing to minimise the risk of fire escaping from the facility and the risk of external fire affecting the facility;
- All access and servicing would be performed by qualified personnel only;

- Battery installation would only be undertaken by an accredited installer;
- The Powerpack 2 system would be installed in accordance with the Tesla manufactures instructions;
- The Powerpack 2 system would include sealed thermal management systems containing coolants and refrigerants;
- An operating alarm and shutdown response system would be installed;
- An emergency response plan, including instructions for responding to incidents related to the battery storage, would be developed;
- An external fire detection system would be installed;
- A fire water sprinkler system would be installed and maintained;
- Communication with local fire services would be established and maintained;
- Personal protective equipment would be used, spill kits provided and safe work procedures when handling, repairing, maintaining, installing and inspecting battery systems; and
- Fire response tools and training would be provided to staff.

Chemical risk reduction

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

To reduce the risk of chemical hazard:

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

Explosive Gas risk reduction

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

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

To reduce the risk of explosive gas hazard:

- An outdoor battery enclosure would be constructed, providing clearance from and/ or elimination of ignition sources, allowing for full ventilation, and restricting access to vehicles and personnel;
- An emergency response plan, including instructions for responding to incidents related to the battery storage, would be developed;

- Personal protective equipment would be used, spill kits provided and safe work procedures when handling, repairing, maintaining, installing and inspecting battery systems; and
- First aid, spill response and fire response materials and training would be provided to staff.

8.10.3 Potentially offensive industry

A potentially offensive industry is defined under SEPP 33 as:

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

8.10.3.1 Identifying potentially offensive industry

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

A pollution control licence or approval would not be required for construction or operation of the Project. All impacts on the environment are described in Section 7 of this EIS.

8.10.4 Assessment

8.10.4.1 Potentially hazardous industry

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

A major hazard associated with lithium-ion battery technologies is fire, as a result of the flammability of the substances used in the battery. Fire risks associated with the lithium-ion batteries are discussed in Section 8.10.2.

8.10.4.2 Potentially offensive industry

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

8.10.5 Potential Impacts

Potential construction hazards and risks would be associated with:

- Workplace health and safety of construction personnel, as well as the safety of any passer-by;
- Construction activities on and in the vicinity of roads (including the delivery of equipment, materials etc). Potential impacts on traffic safety have been considered in Section 8.2 of this EIS;
- Construction near powerlines, transmission lines and other existing services;
- Environmental events, such as major storms, bushfires, etc;
- Storage of dangerous goods on site; and

- Electromagnetic interference.

These construction hazards and risks are considered typical of such projects would generally be adequately managed by standard industry practices and procedures.

8.10.5.1 Bushfire

Existing Environment

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

Impact Assessment

There is no identified bushfire prone land located within the project area, and as the site has been subject to previous clearing, the bushfire potential is identified as low. The nearest bushfire prone land is located approximately 300 metres south-west of the project area.

Despite this, in March 2018 a bushfire occurred within the southern end of the project footprint, burning a number of hardwood trees and up to seven kilometres of fencing (see **Plate 27**).

Plate 27 Bushfire

Mitigation and Management Measures

Once the Project is constructed and operational, the lands in and around the PV panels, PCUs, and site office would require maintenance to ensure that the potential for fire is kept low. Areas which are easily accessible would be maintained by the use of a tractor mounted slasher. More difficult areas in between the PV panels would be maintained through the use of sheep to reduce grasses. Additionally, if required by RFS buffer zones and asset protection zones will be implemented around the solar arrays and battery storage facility.

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

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

8.10.5.2 Electromagnetic Interference

Existing Environment

Electromagnetic fields (EMFs) are a combination of electric and magnetic fields generated from electrically charged objects. They are produced whenever electricity is used and also occur naturally in the environment from a build-up of electric charge in thunderstorms and Earth's magnetic field.

Voltage produces the electric fields and currents that produce the magnetic fields, therefore the stronger the voltage and current, the stronger the EMF would be. Electric fields exist in any live wire, whether electricity is being consumed or not, however magnetic fields only exist when an appliance is operating (ARPANSA 2016). Electric and magnetic field strengths reduce rapidly with distance from the source, and while electric fields are shielded to some extent by materials such as air, buildings and the earth, magnetic fields are not.

In Australia, electrical devices and infrastructure, including transmission lines and substations, operate at a frequency of 50 Hz. This frequency falls within the Extremely Low Frequency (ELF) range of 0-300 Hz.

The Project includes the following types of infrastructure that could create EMF's:

- Solar Panels;
- Above ground and underground DC cables;
- Central inverters, set up transformers and switch gear (PCUs);
- Underground AC cabling running from the PCUs to the solar substation / main step transformer and
- Main step transformer and associated equipment; and
- Lithium-ion batteries.

Underground cabling does not produce external electric fields due to the shielding effects of the soil, however magnetic fields still occur though are expected to be minimal.

Impact Assessment

Exposure to EMFs during construction and decommissioning phases of the Project would be limited to staff working in and around the electrical infrastructure of the proposal. However, this would be for short time period and therefore the potential impacts of EMFs on the health are expected to be insignificant. Magnetic fields produced from the PV units would be less than those of household appliances, and therefore the risk of EMFs from the PV units would also be insignificant. In addition, the Project site would be fenced to protect the public from construction health and safety risks.

During operation, EMF sources would include the existing transmission line from the main step transformer to the Mulwala substation, underground cabling, and the solar array incorporating PCUs. Exposure to EMFs would be limited to maintenance staff and on-site staff.

The project area is surrounded by agricultural land. Public access would be restricted by site fencing around the site and existing substation during the operational phase. EMFs from underground AC cabling would be shielded by the soil and EMFs from lithium-ion batteries would be partially shielded by the units they would be contained in.

Given the levels associated with the infrastructure components, and the distance to the site perimeter fence, EMFs from the Project are likely to be indistinguishable from background levels at the boundary fence. Exposure to both staff and the general public is expected to be well within the public and occupational exposure levels recommended by ARPANSA and ICNIRP and is not expected to present a health risk.

Using the Principle of Prudent Avoidance to design and site infrastructure, exposure to EMFs and potential for adverse health impacts can be further reduced. Adverse health impacts from EMFs as a result of the Project have been considered unlikely.

8.10.5.2.1 Mitigation and Management Measures

Over decades of EMF research, no major public health risks have emerged from the establishment and operation of solar arrays. While it is accepted that short-term exposure to very high levels of electromagnetic fields can be harmful to human health there are no substantive health consequences from exposure to ELF electric fields at the low levels generally encountered by the public (e.g., 50 HZ).

Whether exposure to ELF magnetic fields is also harmless is unclear. The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA 2015) advises that 'the scientific evidence does not firmly establish that exposure to 50 Hz electric and magnetic fields found near transmission lines is a hazard to human health', and that 'current science would suggest that if any risk exists, it is small'.

Australia does not currently have a standard regulating exposure to ELF electric or magnetic fields. The International Commission on Non-Ionizing Radiation Protection (ICNPR) published *Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300GHz)* in 1998. The guidelines were updated in 2010. The objective of the paper was to establish guidelines for limiting EMF exposure that would provide protection against known adverse health effects.

To prevent health-relevant interactions with ELF fields, ICNIRP sets out a number of protective measures to reduce personal harm from EMFs if the basic restrictions are expected to be exceeded. These include engineering design, administrative control, and personal protective clothing. The works undertaken for the Project are not expected to exceed the basic restriction levels.

The following mitigation and management measures would be applied during construction and operation of the Project:

- All design and engineering would be undertaken by qualified competent persons with the support of specialists as required;
- All electrical equipment would be designed in accordance with relevant codes and industry best practice standards in Australia;
- Where ever practical design and construction of electrical infrastructure would place cabling underground;
- Electrical equipment would be accessed only by qualified staff;
- To ensure public safety, fencing would be installed around the perimeter of the Project site;

- The general public would not be allowed to enter the Project site, unless supervised by onsite staff and with prior permission; and
- The general public would not, under any circumstances, have access to the substation or inverters.

8.11 Cumulative Impacts

8.11.1 Existing Environment

A search of the Major Projects Register on the DPE website was undertaken on the 4 April 2018 to identify any other major projects within the vicinity of the project area which would likely to contribute to cumulative impacts. A search was completed for Federation Council LGA. This search identified one active major project within the LGA, the Howlong Sand and Quarry Expansion, which is located approximately 70 kilometres east of the project area.

The search of the major projects register identified a number of renewable energy electricity generation facilities (solar) currently being considered across NSW. The closest state significant solar project is located at Finley, NSW, approximately 60 kilometres northwest of the Mulwala Solar Farm Project. The closest Council approved solar farm is Terrain Solar Farm 45 kilometres east of the Mulwala Solar Farm Project.

A review of the RMS website and Federation Council website also did not highlight any major works which are proposed in the vicinity of the Project.

8.11.2 Potential Impacts

Adverse cumulative impacts occur when the Project exacerbates the negative impacts of other activities occurring nearby.

It is not anticipated that the construction or operation of the Project would generate a cumulative impact with the Howlong Sand and Quarry Expansion, due to the significant distance between these projects and the different type of development of this Project.

The increase of traffic along the primary transport routes could generate potential cumulative impacts with traffic generated from local events and activities. However, in such a case, appropriate measures to reduce the potential impacts would be addressed in the Traffic Management Plan.

The increase in construction traffic along the primary transport routes and within the project area, as well as the presence of construction materials, has the potential to contribute to cumulative visual impacts to surrounding receivers. However, construction-related impacts as a result of the Project would be temporary and for a short period during the construction phase.

Cumulative impacts from decommissioning of the Project is anticipated to be similar to construction.

8.11.3 Mitigation and Management

Implementing the management and mitigation measures discussed for each environmental aspect in Section 8 is expected to acceptably minimise the risk of cumulative impacts occurring as a result of the Project. No additional management and mitigation measures are proposed.

9 Statement of Commitments

9.1 Introduction

This section summarises the mitigation measures to be implemented at the Project to reduce impacts to the surrounding environment.

9.2 Statement of Commitments

The mitigation measures, monitoring activities, and management strategies outlined in **Section 8** above would be implemented for all activities associated with the Project. Table 28 below details the key commitments proposed in this EIS to effectively mitigate and manage the potential environmental impacts of the Project.

Table 28 Draft Statement of Commitments

Summary of Commitments	Where addressed in the EIS
Noise and Vibration	

• Development of a Construction Noise and Vibration Management Plan in accordance with Australian Standard AS2436-2010 and the EPA's *Interim Construction Noise Guideline 2009*.
• During operation:
  • No inverter units should be located closer than 600 metres from any residential receptor location; and
  • No more than a total of 18 inverter units should be located between 600 and 800 metres from any residential receptor location.
• Acoustic screening or enclosures may be required for some inverter units if recommended distances from residential receptors cannot be adhered to.
	8.1

Traffic and Transport	
• The sealing, widening and turning movement improvements on the existing gravel section of Lambruck Lane (at the intersection of Savernake Road) to ensure the safe operations of heavy vehicles at the intersection. • Installation of additional railway crossing warning signage on Savernake Road approaching the intersection with Lambruck Lane to improve rail crossing awareness for the increase in construction traffic accessing Lambruck Lane. • Preparation of a Construction Traffic Management Plan (CTMP) in consultation with RMS and in accordance with the RMS Traffic Control at Worksites Manual (2010). The CTMP would also address periodic grading and dust control on unsealed roads used by construction vehicles. • Temporary traffic control arrangements may be required at the intersection of Savernake Road and Lambruck Lane and the site access intersections with Lambruck Lane during the peak stages of construction traffic activity and when deliveries by oversize vehicles may be required.	**8.2**

Visual	
• Undertake rehabilitation planting as early as possible to replace vegetation that provided screening to adjacent residential properties and sensitive visual receivers. In instances where this is not feasible, it may be possible to initiate screening and tree planting to the boundaries of, and/or within private lands. This approach may be feasible particularly to the site corner areas, where internal plantings would largely mitigate the influence of the Project on residential properties. • Landscape detail documentation highlighting screening planting and street-scape design should be prepared in alignment of the civil design, with the intent to provide some integration between the new proposal and the existing / planned landscape character. • Undertake regular landscape maintenance works to maximise the health and effectiveness of existing planting to help buffer the removal of existing landscape character items. • Where unplanned removal of visually significant vegetation will take place, prepare localised landscape plan as soon as possible to mitigate and reduce visual influence. • Design landscaping to specific sections of the perimeter of the Project to mitigate views from houses located within a sensitive proximity. • Explore the potential for landscaping to the lot or home yard area of affected visual receivers to mitigate visual impacts of the Project. • Where appropriate an individual landscaping plan should be prepared in consultation with the landowner and with consent from local government.	**8.3**
Biodiversity	

The following mitigation and management measures would be implemented to ensure the impacts to biodiversity within the Project site:
• Implementation of pre-clearance surveys including the following provisions:
  • Tree removal works are to occur outside assessed threatened species breeding periods (species known to breed in hollows);
  • Pre-clearance survey of all trees to be removed within a week or removal; and
  • Marking habitat trees.
• Habitat tree removal works including the following:
  • Clearing of hollow-bearing and habitat trees remaining on site;
  • Felled trees are to be left in situ before stockpiling to allow for any fauna to move on; and
  • Felling is to be supervised by an ecologist during clearing works.
• Retention of Paddock Trees via the following methods:
	8.4

• Establish Tree Protection Zones (TPZ) around retained paddock trees in the development area. The TPZ is to be 12xDBH in accordance with Australian Standards AS4970-2009. • No go zone signage and fencing are to be erected prior to construction works • To minimise noise and light impacts, works are to be limited to daylight hours and all machinery is to be correctly maintained and operated as per operation manual. • To minimise dust, vehicles and machinery are to observe the 20 km/hr speed limit on site. Water carters are to be used in dry periods to limit dust movement. • Equipment and vehicles entering the site are to be cleaned or foreign soil and seed. • To minimise prescribed biodiversity impacts the following are to be implemented: • Erosion and sediment controls enacted in accordance with construction environment management plan (CEMP) to limit impacts on retained vegetation or water courses; • Pre-clearance of farm shed for fauna species; • Installation of temporary fencing along ephemeral depression to limit access, prior to construction; and • De-watering of the dam to be supervised by an ecologist.	
Aboriginal and Historic Heritage	
The following mitigation and management measures would be implemented to ensure the protection of **Aboriginal heritage** items: • AHIMS sites 55-4-0138 and 55-4-0261 are located outside of the development footprint and therefore will not be impacted. There are no mitigation measures or management recommendations for these sites. All staff and subcontractors are to be made aware of the sites locations and to avoid them at all times. No harm is to come to AHIMS sites 55-4-0138 and 55-4-0261. • RPS recommends that prior to any site work commencing, AHIMS sites 55-4-0260; 55-5-0140 and 55-5-0139 a surface salvage must occur should these sites be directly impacted by the proposed development footprint. If the AHIMS sites were required to be salvaged, an Aboriginal Site Impact Recording Form must be completed and submitted to AHIMS. • The sensitive sand dune landform will not be impact by the proposed works and therefore there are no further mitigation measures or management recommendations required. All staff and subcontractors are to be made aware of the landforms location and to avoid it at all times. No harm is to come to the sensitive landform. • One tree assessed by the RAPs was considered to be culturally scarred. However, upon closer archaeological inspection it was not considered to be scarred, but a limb tear. This tree has not been recorded as a site. Should the RAPs record the site on AHIMS, a further impact assessment may be required. • RPS recommends that all relevant personnel, contractors and subcontractors are made aware of the legal obligations for Aboriginal cultural heritage under the *National Parks and Wildlife Act 1974* through an on-site toolbox talk or induction prior works commencing.	**8.5**

• If any unrecorded Aboriginal objects are identified while undertaking the proposed development activities in the Project Area, then all works in the immediate area must cease and the area should be cordoned off and secured and the proponent must avoid further harm to the Aboriginal object. OEH must be notified via the Enviroline 131 555 as soon as practicable providing details of the Aboriginal object/s and the site location. The RAPs are to be notified along with the heritage consultant to ensure the site is assessed and managed. Works must not recommence at that particular location unless authorised in writing by OEH. • In the unlikely event that skeletal remains are identified, work must cease immediately in the vicinity of the remains and the area must be cordoned off. The proponent must contact the local NSW Police who will make an initial assessment as to whether the remains are part of a crime scene or possible Aboriginal remains. If the remains are thought to be Aboriginal, OEH must be contacted via the Enviroline 131 555. An OEH officer will determine if the remains are Aboriginal or not; and a management plan must be developed in consultation with the relevant Aboriginal stakeholders before works recommence. Works must not recommence at that location unless authorised in writing by OEH. While there are no recorded or unrecorded **historic heritage** items within the Project site and a lack of areas of historic archaeological potential, the following management recommendations still apply: • The proposed works within the Project site will not impact on any known historic (non-Aboriginal) objects or places. Works may proceed with caution. • RPS recommends that all relevant personnel, contractors and subcontractors are made aware of the legal obligations for historic (non-Aboriginal) heritage under the Heritage Act 1977 through an on-site toolbox talk or induction prior to works commencing. • If suspected archaeological resources are identified, work within the affected area must cease and the area cordoned off. The Heritage Division of the OEH must be notified by ringing the Enviroline on 131 555 so that it can be adequately assessed and managed in accordance with Section 146 of the *Heritage Act 1977*. The heritage consultant is to be notified.	
Surface Water and Groundwater	
The following mitigation measures are proposed to control any potential impacts to surface and groundwater arising from the construction, operation and decommissioning of the Project: • Development footprint of the Project is to maintain the existing surface water characteristics and surface water storage in natural depressions through exclusion from the development. • Critical infrastructure is to be raised 300 mm above natural surface to avoid impacts from nuisance inundation. • Refuelling of plant and machinery is to be done at least 50 metres away from water bodies and constructed drainage lines in an impervious bunded area. • All fuels, chemicals and other potential contaminants are to be stored at least 50 metres from water bodies and constructed drainage lines in an impervious bunded area. • Stormwater management and control measures are to be designed and installed as part of the construction phase and in accordance with the ESCP for the site.	**8.6**

• All on-farm drainage infrastructure and discharge locations are to be maintained in a functional condition. • Construction, operation and decommissioning works to be carried out in accordance with the ESCP for the Project site. • Procedures for the testing, treatment and discharge of construction waste water to be established and implemented. • Grass cover is to be established and/or maintained under all solar panel arrays to maximise water infiltration whilst balancing risk of fire from build-up of combustible vegetation.	
Soils, Land Use and Agriculture	

The following mitigation measures are to be implemented during construction and operational phases of the Project to minimise the impacts to soil resources, land use, and agricultural lands:
• Ongoing consultation with adjacent landholders to manage interactions between the solar farm and other properties.
• Management of soil resources to ensure the future viability of the site for agricultural production including:
  • Optimisation and recovery of useable topsoil and subsoil;
  • Establishment of effective soil amelioration procedures and practices; and
  • Separation of topsoil and subsoil to ensure that soils are re-instated in the right order.
• Preparation of an Erosion and Sediment Control Plan (ESCP) in accordance with Managing Urban Stormwater: Soils & Construction (Landcom 2004) throughout the life of the Project. This plan is to include provisions to:
  • Install erosion and sediment controls prior to and during construction;
  • Inclusion of an inspection protocol for erosion and sediment controls, particularly following large rainfall events;
  • Include regular equipment cleaning to minimise the tracking of sediment from vehicles, plant and equipment on to Savernake Road, Tocumwal Road and Lambruck Lane;
  • Stockpile topsoil appropriately to minimise weed infestation and maintain soil organic matter, soil structure and microbial activity;
  • Minimise surface disturbance and maintain surface cover where possible; and
  • Minimise excavation and compaction of soils.
• Site land management is to include consideration of the viability of sheep grazing as a means of vegetation maintenance throughout the life of the Project.
• To minimise impacts to biosecurity, vehicle movements are to be restricted to the formed access tracks.
• Preparation of a construction and operational Environmental Management Plan (EMP) to include biosecurity protocols, such as measures for the identification, management and ongoing monitoring of weeds on the site. The EMP is to include:
  • Consideration of ground cover beneath the PV solar panels to manage erosion and surface water runoff; and
	8.7

• A spill response plan implanted during construction and operation to avoid potential contamination.
 	
Prior to the conclusion of the Project (up to 40 year life-span) a Rehabilitation and Decommissioning Plan is to be prepared in consultation with DPI and with the Lease conditions between the landowner and ESCO prior to decommissioning. The Rehabilitation and Decommissioning Plan is to include:
 	
• Removal of all above ground and in ground infrastructure up to one metre, unless:
  • the landowner wishes to leave all or any part of the equipment, or
  • The removal of equipment is in breach of any law or requirement of Authority.
• Removal of gravel from internal access tracks where required;
• Disposal options for infrastructure and related materials;
• Mechanical ripping of any compacted areas;
• Preparation of a soil sampling plan to validate the health of the soil resource;
• Re-instate irrigation infrastructure and drainage works where required;
• Revegetation of any areas of disturbance;
• Erosion and sediment control procedures; and
• Ongoing maintenance and monitoring.	

Socio-Economic	

Implementation of measures to reduce the potential for amenity impacts during construction and operation of the Project include the following:
 	
• Preparation of a Consultation and Stakeholder Engagement Plan which includes:
  • Providing regular Project updates to the community and businesses;
  • Providing a schedule of activities when there may be heavy vehicles accessing the Project site or when noisy activities may occur;
  • Establishment of a complaints handling procedure and a response protocol; and
  • Preparation of regular Project factsheets for distribution to the surrounding residents.
• Ongoing liaison with local community and business representatives to ensure the use of local contractors, labour, materials, and services during construction and operations;
• Liaison with local businesses and services to determine accommodation options and availability so as local tourism is not affected, particularly during the construction phase;
• Liaison with tourism representatives to ensure local events (such as the annual Yarrawonga Mulwala Multisport Festival) are
	8.8

not impacted by accommodation short falls; and • Continued engagement with Federation Council to discuss community and business concerns.	
Waste Management	
A Waste Management Plan (WMP) is to be prepared to meet the waste classification and hierarchy outlined in the WARR Act, and would include: • Waste transportation protocols. • Procedures for ordering materials. • Classification of waste to be generated during construction. • Procedures for identifying opportunities to avoid, reuse, recycle, recover, or treat waste. • Method of tracking all waste entering and leaving the site. • Procedures for managing waste generated during maintenance of plant and equipment. • Procedures for waste monitoring, inspection and reporting. • Location of dedicated waste management areas on site (e.g. skips and recycling bins); and • Commercial reuse opportunities. Additional mitigation and management measures that to be applied during construction and operation of the Project include: • Plant and equipment would be regularly maintained. • Ordering would be limited to only the required amount of materials. • Materials would be segregated to maximise reuse and recycling. • Routine checks would be undertaken of waste sorting and storage areas for cleanliness, hygiene and OH&S issues, and contaminated waste materials. • Local commercial reuse opportunities would be investigated where reuse on-site is not practical. • Separate skips and recycling bins would be provided for effective waste segregation and recycling purposes. • Training and awareness of the requirements of the WMP and specific waste management strategies would be undertaken. • Contaminated waste would be managed, transported, and disposed of in accordance with licensing requirements. • Off-site waste disposal would be transported and disposed of in accordance with licensing requirements. • Assessment of suspicious potentially contaminated materials, hazardous materials and liquid wastes would be undertaken. • Regular monitoring, inspection and reporting requirements would be undertaken, and findings implemented.	**8.9**

RPS

Hazards and Risks	
Bushfire While there is no identified bushfire prone land located within the Project site, and the bushfire potential is identified as low, the following mitigation and management measures are to be implemented to ensure bushfire safety at the Project site: • Once the Project is constructed and operational, the lands in and around the PV panels, PCUs, and site office would require maintenance to ensure that the potential for fire is kept low. Areas which are easily accessible would be maintained by the use of a tractor mounted slasher. More difficult areas in between the PV panels would be maintained through the use of sheep to reduce grasses. • A water tank, solely for fire protection purposes, would be located adjacent to the site office. The tank would be located such that there is suitable all-weather access for the RFS fire tankers and appliances. • An Emergency Response Plan is to be prepared for the site which would detail an evacuation plan, fire response, location of fire services and contacts, and a site muster point. **Electromagnetic Interference** The following mitigation and management measures are to be applied during construction and operation of the Project to mitigate effects from electromagnetic interference: • All design and engineering would be undertaken by qualified competent persons with the support of specialists as required. • All electrical equipment would be designed in accordance with relevant codes and industry best practice standards in Australia. • Where ever practical design and construction of electrical infrastructure would place cabling underground. • Electrical equipment would be accessed only by qualified staff. • To ensure public safety, fencing would be installed around the perimeter of the Project site. • The general public would not be allowed to enter the Project site, unless supervised by onsite staff and with prior permission. • The general public would not, under any circumstances, have access to the substation or inverters.	**8.10**

10 Justification and Conclusions

10.1 Ecologically Sustainable Development

Ecologically Sustainable Development (ESD) is a primary objective of environmental protection in NSW. The objectives of the EP&A Act include the encouragement of the principles of ESD. Supplementary to the EP&A Act objectives, section 7 (1(f)) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 requires a proponent to include in an EIS the reasons justifying the development, including the principles of ESD.

Section 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 defines the principles of ESD as follows:

a. *The **precautionary principle**, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:*

   i. *Careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*

   ii. *An assessment of the risk-weighted consequences of various options.*

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

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

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

   i. *Polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*

   ii. *The users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*

   iii. *Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.*

10.1.1 Precautionary Principle

The precautionary principle states that if there are threats of serious or irreversible environmental damage, the lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

The Project has been assessed for impacts relating to air quality and odour, noise, traffic and transport, visual amenity, water resources, flora and fauna, Aboriginal heritage, and non-indigenous heritage. This EIS, combined with the consultation undertaken with relevant government agencies, and local stakeholders, has

provided an understanding of the potential implications of the Project and subsequently confirm the mitigation measures required.

Through the adoption of an anticipatory approach, each potential issue arising from the Project has been identified, evaluated and mitigated through a series of design or management solutions.

10.1.2 Intergenerational Equity

Intergenerational equity is centred on the concept that the present generation should ensure the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. There is a moral obligation to ensure that today's economic progress, which would benefit current and future generations, is not offset by environmental deterioration.

Throughout the assessment, the type and extent of potential impacts caused by the Project have been analysed and mitigated. The assessment methodologies have adopted a risk-based and worst case scenario approach to ensure improved environmental, social and economic protection for current and future generations. The environmental management and mitigation measures have been developed to minimise the impact of the Project on the environment for future generations.

The management and mitigation measures proposed in Section 8 above would assist in ensuring that the Project does not pose any significant impact or risk to the surrounding environment and safeguards the environment for future generations.

10.1.3 Conservation of Biological Diversity and Ecological Integrity

The principle of conservation of biological diversity and ecological integrity holds that the conservation of biological diversity and ecological integrity should be a fundamental consideration for development proposals.

The project area is located on irrigation and cropping lands which have very limited biodiversity value resulting from generations of agricultural activities. An ecological assessment has been undertaken by a qualified specialist to identify the extent of biological diversity on site and the surrounding area. It was determined that the Project does not pose any significant threat to local biological diversity or ecological integrity. Where areas of biodiversity significance have been identified, every effort has been made to design the Project to avoid these areas.

10.1.4 Improved Valuation, Pricing and Incentive Mechanisms

The principle of improved valuation, pricing and incentive mechanisms deems that environmental factors should be included in the valuation of assets and services. The cost associated with using or impacting upon an environmental resource is seen as a cost incurred to protect that resource.

Given that the Project is only proposing to clear minimal vegetation, and would not have significant impacts to waterways, environmental resources should not be significantly impacted.

The Project optimises the valuation and pricing of natural resources by producing a source of power than is renewable and non-polluting. Further justification in this regard is provided in Section 4.

10.2 Project Need

The Project involves the construction and operation of an 80MW(AC) solar farm on agricultural lands that are considerably degraded from existing cropping and grazing activities. The Project is proposed to be established in an area that is already highly disturbed, therefore the impacts to the existing environment of the site are considerably reduced.

The Project would seek to further minimise the environmental impacts to the project area and surrounding location through:

- Preservation of biodiversity features through an avoidance strategy;
- Minimise impacts to soil and water, through pile driven panel mounts rather than extensive soil disturbance and excavation;
- Minimise visual impacts to neighbours, incorporating strategic vegetation screens along boundaries in consultation with neighbours;
- Preservation of agricultural production values through undertaking an activity that is highly reversible at the end of the Project's life;
- Reduce greenhouse gas (GHG) emissions by up to 186,000 tonnes per year based on an emission factor of 0.87 kg CO_2-e/kWh; and
- Increasing renewable energy capacity.

During construction the Project would employ up to 130 contractors. When fully operational the Project would employ up to four staff at the site, which would provide jobs for the local community and surrounding area. Associated supply businesses would also benefit from the operation of the Project.

There is a significant under supply of renewable energy sources in NSW; therefore, the Project would provide additional capacity to the State and national power grid, which would ensure greater network stability and security of supply for users.

In addition to these social and economic benefits, the Project would service the increasing demand for renewable energy sources and provide renewable power for up to 40,500 homes.

The Project would contribute to Australia meeting its greenhouse gas commitments by reducing emissions associated with energy use and contributing to the achievement of the RET. The Project 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.

10.3 Conclusions

This Environmental Impact Statement (EIS) has been prepared to support a State Significant Development (SSD) application by ESCO Pacific for the proposed Mulwala Solar Farm located approximately two kilometres north of the township of Mulwala, NSW.

The purpose of this EIS is to assess, and propose mitigation measures for, the environmental and social implications of proceeding with the Project. This EIS has also been prepared to meet the SEARs for the proposed facility as well as the recommendations of other consulted agencies and relevant stakeholders. The document has been prepared in accordance with the EP&A Act and the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation).

In addition to describing the Project, the EIS presents a comprehensive and focussed assessment of the associated planning and environmental issues to a level of detail commensurate with the scale of the Project, the characteristics and previous use of the site, and the legislative framework under which the Project is to be assessed and determined.

The Project would generate up to 80 MW of AC clean and renewable electricity through the conversion of solar radiation to electricity via photovoltaic modules. It is expected to create up to 130 jobs during construction and up to four full-time positions when operational. Construction is expected to take approximately eight months and the project is expected to operate for 40 years.

A range of environmental issues were identified and assessed with appropriate mitigation and management measures proposed to be carried through to the construction, operational, and decommissioning phases to reduce any potential impacts caused by the Project. Emphasis has been applied to the management of potential visual, biodiversity, and land use impacts associated with the Project through avoidance and design modification.

The Project has been shown to be consistent with the relevant local, State and Commonwealth government planning instruments. It would contribute to Australia meeting its greenhouse gas commitments by reducing emissions associated with energy use and contributing to the achievement of the RET, while also representing an investment in an important rural area of the State and supporting employment and training opportunities at a local level.

It has been demonstrated through this EIS that the Project would not result in significant impacts to the environment through the implementation of management and mitigation strategies. Therefore, the Project is considered an appropriate use for the existing site, has positive social and economic benefits for the local area, and is in the best interest of the public, environment, and sustainability.

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