

FINLEY SOLAR PROJECT

Environmental Impact Statement

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Volume 1 – Main Report

*Prepared for **ESCO Pacific Pty Ltd***

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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	Threatened Species Conservation Act 1995
WMA	Water Management Act 2000
WMP	Waste Management Plan

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 170 megawatts (MW) (the Proposal) on Lots 133, 134 & 136 DP752299, 198 Canalla Road, Finley, NSW (the site).

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 gigawatt (GW) pipeline of projects across NSW, Queensland, and Victoria.

This application seeks *Development Approval under Part 4 of the Environmental Planning and Assessment Act 1979* (EP&A Act) for the proposed Finley Solar Farm.

Site Description

The Project site is located approximately 6 km west of Finley, 45 km east of Deniliquin, 105 km north of Shepparton (Victoria) and 150 km south-west of Narrandera within Berrigan Shire. The main land use of the region is rural and consists predominantly of grazing, cropping, and irrigated lands, with its primary income derived from the agriculture industry.

The Project area encompasses the holdings of three existing farming properties, of which the land comprises flat-lying open paddocks crossed by a network of irrigation and drainage channels.

The Project site is bounded to the north and south by Broockmanns Road and Broughans Road, respectively. The nearest major roads are the Riverina Highway located approximately 1.5 km to the north and Newell Highway which passes through Finley approximately 6 km to the east. The total Project area under assessment for this EIS covers 500 ha, while the development foot-print for the solar farm will utilise up to 385 ha.

A 132 kV transmission line crosses the north of the Project area and connects with TransGrid's Finley 132 substation located immediately adjacent to the north-eastern boundary of the site.

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 Finley Solar Farm development will comprise up to 500,000 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 to those used residential applications. The total area to be developed for the solar farm will be up to 385 ha.

The Finley Solar Farm 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 TransGrid Finley 132kV substation.

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

- Up to 500,000 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;
- Water storage tanks;
- Permanent staff and contractor car parking area;
- Permanent all-weather access and access road;
- Temporary site compound, lay-down area, and equipment storage areas during construction; and
- Perimeter landscaping treatments (where required).

It is expected that the construction phase for the Project will take approximately 9 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 200 staff and contractors employed, while during operations there will be up to 4 staff for maintenance and monitoring activities.

The Project has been designed to such that it will 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.

The development is expected to have a capital investment cost up to \$170 million.

Project Need and Alternatives

In 2001, the Australian Federal Government introduced the Mandatory Renewable Energy Target (MRET) Scheme to increase the amount of renewable energy being produced and consumed in Australia. The initial MRET was for Australia to provide 9,500 gigawatt hours (GWh) of new renewable energy generation by 2010. This target was revised in January 2011 and expanded the target to 41,000 GWh of additional renewable energy between 2001 and 2020.

The MRET was split into a Small-scale Renewable Energy Scheme (SRES) and Large-scale Renewable Energy Target (LRET) components to ensure that adequate incentives were provided for large scale grid connected renewable energy. In June 2015, the Australian parliament passed the *Renewable Energy (Electricity) Amendment Bill 2015* and the LRET was subsequently reduced to a target of 33,000 GWh by 2020 with interim and post 2020 targets adjusted accordingly. The current projection is that about 23.5% of Australia's electricity generation in 2020 will be from renewable sources.

The Finley Solar Project would produce approximately 430,000 MWh/year of renewable electricity which would assist Australia to meet its LRET's and provide power for approximately 59,000 homes.

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

- 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 Finley Solar Project is consistent with the goals and targets for renewable energy generation in NSW. These include:

- Assisting the national transition to renewable energy production;
- Assisting in meeting the future electricity demands;
- Assisting in achieving RET's;
- Attracting renewable energy investment and projects;
- 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 site 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 370,000 tonnes per year based on an emission factor of 0.87 kg CO₂-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 solar farm 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 (SRD SEPP).

Under Clause 20 of Schedule 1 of the policy, the following is considered a 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 Finley solar farm is expected to have a capital cost up to \$170 million. Accordingly, the project would be classified as an SSD under Part 4 of the EP&A Act, as it has a capital investment value greater than \$30 million.

Consultation and Stakeholder Engagement

ESCO Pacific has undertaken engagement with a range of stakeholders regarding the proposed Finley Solar Farm development. 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 potential construction, operational and traffic noise impacts associated with the development. Background noise monitoring was not undertaken for the noise assessment due to the rural nature of the area and the generally low background noise levels generate in these areas. It has been assumed that background levels would be less than L_{A90} 30 dB during all time periods, which is typical of a rural environment.

The results of the noise assessment determined that:

- Exceedances of up to 19 dB over the construction noise limit are predicted at 5 receptors when construction activities are being undertaken near the closest site boundary;
- No exceedances of the highly affected noise limit of 75 dB are predicted during construction;
- No exceedances of the adopted PSNL are predicted for operational noise; and
- No exceedances of road traffic noise criteria are predicted for traffic generated by the development.

Given that construction noise levels are predicted to exceed the relevant limits at 5 receptors, a Construction Noise Management Plan (CNMP) will be developed for the site to ensure that construction noise from the Project is appropriately managed and minimised.

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 impacts associated with increased traffic generation, site access, parking, intersection performance, and safety.

During construction, average traffic generation will peak at 41 movements per day, while during operations the average movements will peak at 2 per day. During the non-peak construction periods (months 1-4 and 7-9) average heavy vehicle generation is expected to peak at 12 movements per day.

During construction, the additional movements along Riverina highway would see an increase in traffic volumes of 0.5 % east-bound and 4.0 % west-bound. Such an increase is well within the capacity of Riverina Highway and will have very little effect the operation and safety of this section of the road.

Whilst a significant increase in traffic is anticipated along Canalla Road, the overall all future daily traffic volume for the route would remain below the road design standards value of 150 daily vehicles.

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

The future volumes of through traffic using the intersection on Riverina Highway and Canalla Road are not anticipated to increase significantly as a result of the Project and will remain at approximately 100 hourly vehicle movements (two-way traffic) for the duration of the Project construction period of 9 months.

Visual

A **Visual Impact Assessment (VIA)** has been prepared to assess the impact of the development 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 majority of views to the proposal area were found to have a moderate impact.

The design principles of the development seek to avoid, reduce and where possible, remedy adverse effects on the environment through the implementation of mitigation measures, which propose a combination of primary mitigation measures such as boundary tree planting and landscaping, visual treatments at landowner's properties, and temporary screening of construction activities.

Considering 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 (BAR)** 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). Assessment has also been made with regard to those threatened entities listed under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Preliminary assessments undertaken to support the development, and later habitat assessment, have covered an area of 500 ha. Consistent with commitments made in the Preliminary Environmental Assessment (Accent 2017) to avoid and minimise biodiversity impacts, a smaller (383 ha) maximum development footprint was identified within the total 500 ha Project site.

The biodiversity assessment identified direct impacts from the removal of up to 5.68 ha of native vegetation within the development site, and removal of up to four hollow-bearing trees.

Possible indirect impacts may also occur from erosion of disturbed areas leading to sedimentation affecting any downgradient habitat or habitat within drainage channels, water quality impacts affecting any downgradient habitat or habitat within drainage channels, and disturbance of fauna during construction due to noise generated by vehicles, equipment and construction activities.

The development site avoids areas considered to be of high habitat value. This avoidance of habitat, in combination with appropriate environmental safeguards during construction of the Project is expected to ensure that the development meets the requirements to avoid and minimise impacts on biodiversity values.

Aboriginal and Historic Heritage

An **Aboriginal and Historic Heritage Assessment** (AHHA) 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 site inspection.

The assessment of Aboriginal heritage concluded that the development is not anticipated to have any impact on any items of indigenous heritage due to the disturbed nature of the site, the lack of any listed sites on the relevant databases, and the results of the site inspection.

The review of historic 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 listed sites on the relevant heritage databases.

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).

The development 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.

Bushfire

A **Bushfire Threat Assessment** (BTA) has been prepared for the development to determine the potential hazards and risks from bushfire. The BTA has been prepared in accordance with the *Planning for Bushfire Protection Guidelines (PBP)* 2006.

Under the Environmental Planning and Assessment Act, 1979 (and its regulations), and the Rural Fires Act 1997 (and its regulations), local Councils are required to assess and control new developments in bushfire prone land mapped areas. The land and surrounds of the site have not been mapped as Bushfire Prone Land and is therefore not subject to this legislation (Berrigan Shire Council Bushfire Prone Land Map), however an assessment and recommendations are made despite this in order to provide a reasonable level of bushfire safety for the solar farm.

Most remaining remnant vegetation, grassland and cropland will be removed as part of the development. The cropping areas and grazed paddocks within 140m of the site occasionally sustain crops and grass >100mm in height, and are therefore conservatively assessed as Grassland for bushfire purposes as per AS 3959. As the site is not mapped as bushfire prone the "aim and objectives of PBP 2006 do not apply in relation to matters such as access, water and services, emergency planning and landscaping, and vegetation management".

Notwithstanding these objectives, the statutory requirements have been addressed in the BTA as there is a recognised potential Grassland bushfire risk from time to time. It is noted that PBP 2006 makes no recommendations for Asset Protection Zones (APZ) over grassland, however to be consistent with NSW RFS recommendations, a 10m APZ has been adopted that permits unobstructed all weather vehicle access to be provided around the perimeter of the development site.

To ensure adequate bushfire protection, the entire site will be managed as an APZ with a 10m zone around the perimeter of the solar farm. The proposed development will also have a non-combustible 20,000 litre dedicated water tank with Storz fitting and other fire-fighting equipment in compliance with Australian Standards.

All internal roads will be designed such that they are suitable for all weather access for two wheel drive vehicles, including around the perimeter of the site.

An Emergency Evacuation Plan and a Bushfire Management Plan will also be prepared detailing safety and fire protection measures for the site.

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 Earth's magnetic field.

Fields of different frequencies interact with the human body in different ways. In Australia, transmission lines and other electrical devices and infrastructure, including substations, operate at a frequency of 50 Hz. This frequency falls within the Extremely Low Frequency (ELF) range of 0-300 Hz.

There is low potential for EMF impacts during the construction and decommissioning phases of the Project. Staff would be exposed to EMF's 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 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, 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 to design and site this 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.

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 publically 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 operations, the development footprint (385ha) will be removed from potential agricultural production for a period of up to 40 years (Project life). Whilst cropping and irrigation will be taken out of production, 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.

To management biosecurity risks at the site, particularly during construction, a Weed Management Plan will be prepared in accordance with NSW Department of Primary Industry (DPI) requirements and in consultation with Berrigan Shire Council. Management measures would focus on early identification of invasive weeds, effective management controls, and a regular maintenance program.

There is no riverine flood threat affecting the site and the construction, operation and decommissioning of the proposed works will not impact the existing flood characteristics that may arise from localised stormwater events.

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

Air Quality

Potential impacts to air quality from the proposed solar farm development will be for a short duration only and primarily during the 9 month construction phase. As such, a qualitative assessment of air quality was undertaken.

There are 23 receivers within 2 km of the proposal area. Twelve of these occur within 500 m of the site. R1 is located centrally within the Project area and R2 in the south-east portion of the site. The closest receiver outside of the Project boundary (R5) is approximately 38 m west of the south-western corner of the Project area (refer **Figure 5**).

Within this rural setting, the most common pollution generating sources would include vehicle emissions, dust from unsealed roads, agricultural activities (cropping, stock movement, earth moving), and wood fuelled fires.

Emissions to the atmosphere from the Project during construction will be temporary, and restricted to dust caused by land disturbance, and vehicle, plant and equipment exhaust emissions. Construction of the Project will take approximately 9 months from the commencement of site establishment works.

Ongoing maintenance of the site and Project infrastructure will be required during operation. The infrastructure maintenance activities will result in minor, localised vehicle emissions and generation of dust from vehicles travelling along the internal, unsealed access roads.

In addition, the operation of the solar farm will also produce minimal CO₂ emissions when compared to conventional coal and gas fired power stations.

Socio-economic

An assessment of the social and economic impacts of the proposed development, including identification of the socio-economic characteristics of the surrounding area and Berrigan Shire, 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 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;
- 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 proposed development will have a positive employment impact during construction, and is likely to create in the order of 200 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 accommodation in Finley, Berrigan or Tocumwal.

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 surrounding land uses include rural properties where cropping, grazing and irrigation is the dominant land use. Approximately 87% of the total land area of Berrigan Shire or 179,700ha is used for agricultural purposes (Berrigan Shire Draft Land Use Strategy 2016). The loss of 385ha or 0.0021% of the available agricultural land in the shire is considered insignificant in this context locality.

Overall, it is considered that the proposed 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) has also been prepared to ensure that waste on site is suitably segregated, sorted, and recycled prior to sending any residual wastes to landfill.

Cumulative Impacts

A search of the Major Projects Register on the Department of Planning and Environment (DPE) website was undertaken on the 29 August 2017 to identify any other major projects within the vicinity of the development site which would likely to contribute to cumulative impacts. A search was completed for the Berrigan LGA. This search did not identify any other active major projects in the council area that would 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 solar project is located at Coleambally, 100km north of the Finley Solar Project.

A review of the Roads and Maritime Services (RMS) website and Berrigan Shire Council website also did not highlight any major works which are proposed in the vicinity of the proposal.

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 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 site would be predominantly limited to construction (approximately 9 months). The generation of dust from construction activities will also need to be appropriately managed on Canalla Road and within the Project site to ensure that cumulative dust generation from existing cropping and construction does not become excessive.

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

Boundary screen planting will be undertaken to ensure that visual and glare impacts are suitably managed for residents and for vehicle drivers. View durations would be short and considered acceptable along the 100 kilometre per hour speed zone of the Riverina Highway, however mitigation strategies have been recommended to reduce impacts where possible.

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 proposed development involves the construction and operation of a 170MW solar farm on agricultural lands that are considerably degraded from existing cropping and grazing activities. The subject development 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 development would seek to further minimise the environmental impacts to the Project site 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 370,000 tonnes per year based on an emission factor of 0.87 kg CO₂-e/kWh; and
- Increasing renewable energy capacity.

During construction the Project would employ up to 200 contractors. When fully operational the Finley solar farm will employ up to 4 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 development will service the increasing demand for renewable energy sources and provide renewable power for up to 59,000 homes.

The Finley 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 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.

Conclusions

The proposed Finley Solar Farm development 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, and land use impacts associated with the development through avoidance and design modification.

It has been demonstrated through this EIS that the proposal 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.

1.0 Introduction

1.1 Background

This Environmental Impact Statement (EIS) has been prepared by RPS Group Newcastle (RPS) on behalf of ESCO Pacific to accompany an application for State Significant Development (SSD 8540) 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 Finley Solar Farm, located approximately 6 kilometres (km) west of the township of Finley, New South Wales (NSW), (refer **Figure 1**) within the Berrigan Shire.

ESCO Pacific (the Applicant) is proposing to undertake the development and operation of a utility-scale solar energy facility with a capacity up to 170 megawatts (MW) (the Proposal) on Lots 133, 134 & 136 DP752299, 198 Canalla Road, Finley, NSW (the site) (refer **Figure 2**).

ESCO Pacific currently has more than 1 gigawatt (GW) pipeline of projects across NSW, Queensland, and Victoria which include:

- the approved 148 MW Ross River Solar Farm in north Queensland which construction to commence in 2017; and
- a further 6 approved solar projects with a total generating capacity of 500 MW.

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 development. This EIS has also been prepared to meet the Secretary's Environmental Assessment Requirements (SEARs) for the proposed facility, issued by the DP&E on 5 July 2017 (refer to **Section 1.7**), 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 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 Site

The Finley Solar Project is located approximately 6 km west of Finley, 45 km east of Deniliquin, 105 km north of Shepparton (Victoria) and 150 km south-west of Narrandera within Berrigan Shire. The Shire is located to the north of the Murray River, halfway between Albury and Echuca, and is situated in the Southern Riverina region of NSW. The main land use of the region is rural and consists predominantly of grazing, cropping, and irrigated lands, with its primary income derived from the agriculture industry.

A map of the proposed project area is shown as **Figure 2**, and encompasses the holdings of three existing farming properties. The land comprises flat-lying open paddocks crossed by a network of irrigation and drainage channels, and a waterway crossing the westernmost paddock that supplies water to a farm dam. Due to a long history of agriculture and grazing, the Project area has been highly modified.

The Project area is bounded to the north and south by Broockmanns Road and Broughans Road, respectively. The nearest major roads are the Riverina Highway located approximately 1.5 km to the north and Newell Highway which passes through Finley approximately 6 km to the east (refer **Figure 2**). The total Project area under assessment for this EIS covers 500 ha, while the development foot-print for the solar farm will utilise up to 385 ha.

A 132 kV transmission line crosses the north of the Project area and connects with TransGrid's Finley 132 substation located immediately adjacent to the north-eastern boundary of the site.

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 (SRD SEPP).

Under Clause 20 of Schedule 1 of the policy, the following is considered a 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 Finley solar farm is expected to have a capital cost up to \$170 million. Accordingly, the project would be classified as an SSD under Part 4 of the EP&A Act, as it has a capital investment value greater than \$30 million.

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 Finley Solar Farm is currently in the feasibility and design stage, a Capital Investment Value (CIV) has been calculated by a qualified quantity surveyor. The solar farm will require up to 385 ha within a secured land tenure area of up to 500 ha and comprise up to 500,000 photovoltaic modules. Accordingly, the capital cost has been estimated at \$170 million based on current rates for equipment, infrastructure, and labour hire. A copy of the CIV report is attached as **Appendix 4**.

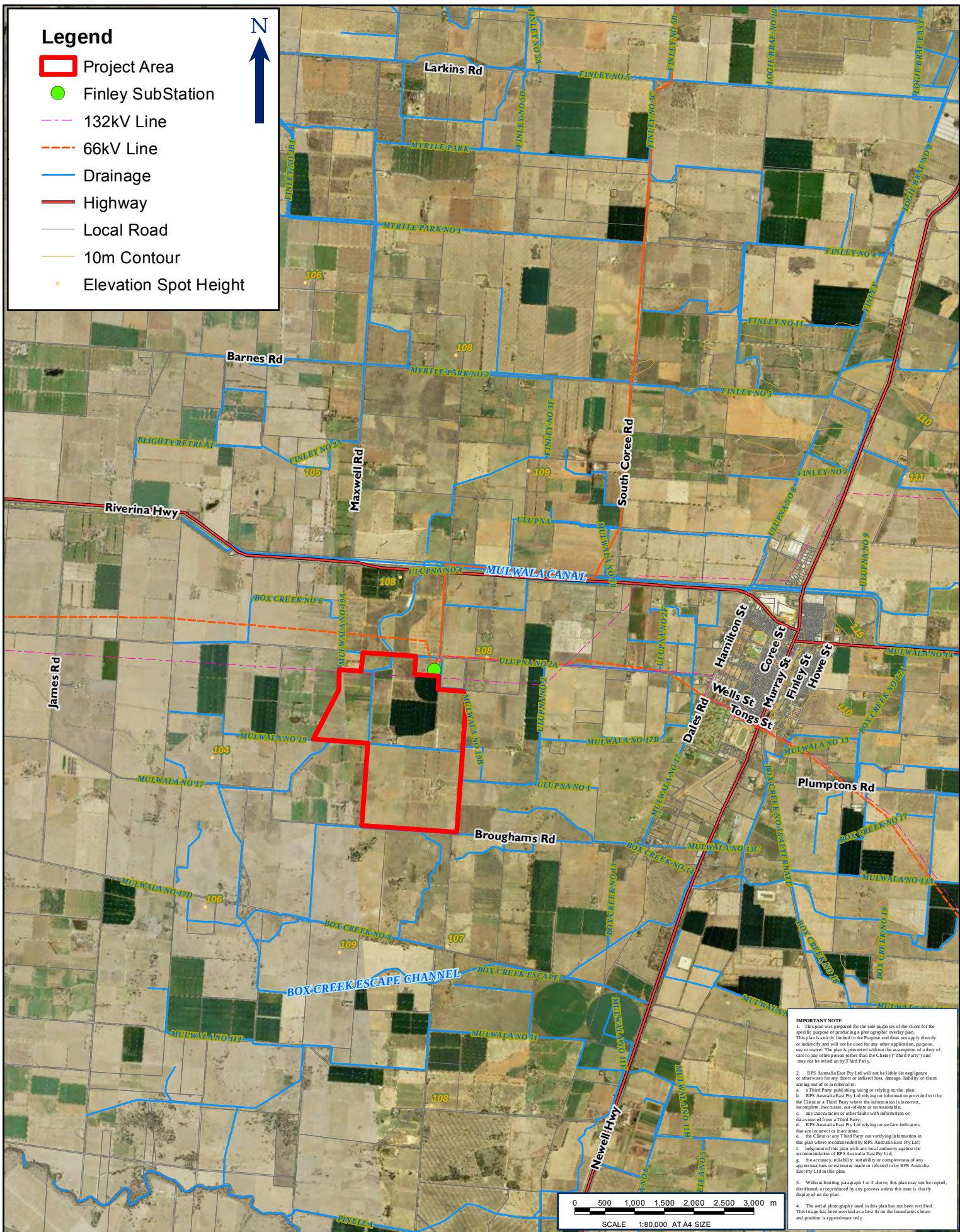


FIGURE 2: LOCAL CONTEXT

LOCATION: LOT 133,134, 136 DP 752299, FINLEY	DATUM: GDA94 PROJECTION: MGA Zone 56
JOB NO.: PR 136808	Data Sources: RPS Client Land and Property 2015
PURPOSE: EIS	
Technician: Natalie Wood	Date: 12/07/2017

CLIENT: ESCO PACIFIC

RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
241 DENISON STREET BROADMEADOW PO BOX 428 HAMILTON NSW 2303
T: 02 4940 4200 F: 02 4961 6794 www.rpsgroup.com.au

RPS

1.7 Secretary's Environmental Assessment Requirements

A request for Secretary's Environmental Assessment Requirements (SEARs) for the Resource Recovery and Recycling Facility was submitted to the NSW DP&E on 6 June 2017. The SEARs were subsequently issued by the DP&E on 5 July 2017.

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 8540 is contained within **Appendix 1**.

Table 1 Summary of Secretary's Environmental Assessment Requirements (SSD 8540)

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; ■ a full description of the development, including: > details of construction, operation and decommissioning; > a site plan showing all infrastructure and facilities (including any infrastructure that would be required for the development, but subject of a separate approvals process); > 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 focussing on site selection and the suitability of the proposed site; ■ an assessment of the likely impacts of the development on the environment, focussing on the specific issues identified below, including: > a description of the existing environment likely to be affected by the development; > an assessment of the likely impacts of all stages of the development (which is commensurate with the level of impact), 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 measure that would be implemented to monitor and report on the environmental performance of the development; ■ a consolidated summary of all the proposed environmental management and monitoring measures, identifying all 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; > the suitability of the site with respect to potential land use conflicts with existing and future surrounding land uses; and > feasible alternatives to the development (and its key components), including the consequences of not carrying out the development.	Page 1 Section 3.0 Section 4.0 Section 8.0 Section 9.0 Section 10.0
In addition to the matters set out in Schedule 1 of the Environmental Planning and	

Secretary's Environmental Assessment Requirements	Reference within EIS
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 of the land (as required in Clause 49(1)(b) of the Environmental Planning and Assessment Regulation 2000).	Appendix 4 Appendix 2
Specific Issues	
The EIS must address the following specific issues:	
■ Biodiversity – including an assessment of the likely biodiversity impacts of the development, having regard to the NSW Biodiversity Offsets Policy for Major Projects, and in accordance with the Framework for Biodiversity Assessment, unless otherwise agreed by the Department	Section 8.4 & Appendix 10
■ 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 & Appendix 11
■ 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 risk of weed and pest infestation) during operation and after decommissioning, with reference to the zoning provisions applying to the land.	Section 8.9
■ 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 & Appendix 7
■ 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 Industrial Noise Policy (INP), and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria.	Section 8.1 & Appendix 5
■ Transport – including an assessment of the site access route, site access point and likely transport impacts of the development on the capacity and condition of roads (including on any Crown Land), 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.	Section 8.2 & Appendix 6
■ Water – including an assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources (including any nearby watercourses), adjacent licenced water users and basic landholder rights, details of water supply arrangements, and a draft erosion and sediment control plan prepared in accordance with Managing Urban Stormwater: Soils & Construction (Landcom 2004)	Section 8.6 & Appendix 8

Secretary's Environmental Assessment Requirements	Reference within EIS
■ Hazards and Electromagnetic Interference – an assessment of potential hazards and risks associated with bushfires and 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 8.4 & Appendix 9 Section 8.8
■ Socio-economic – including an assessment of the likely impacts on the local community and a consideration of the construction workforce accommodation.	Section 8.11
Consultation	
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 undertake detailed consultation with affected landholders surrounding the development and Berrigan Shire Council The EIS must describe the consultation that was carried out, identify the issues raised during this consultation, and explain how these issues have been addressed in the EIS.	Section 6.0 & Appendix 2

1.8 Project Team

RPS has prepared the subject EIS on behalf of ESCO. 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
Shaun Smith	RPS	Project Director and EIS author
Andrew Biller	RPS	Preparation of EIS chapters
Darrell Rigby and Tessa Boer-Mah	RPS	Aboriginal and Historic Heritage
Michael Cramer / Stuart Cooney / Kathryn Duchatel	Access Environmental / EcoLink Consulting / ecologique	Biodiversity
Nathan Heinrich	RPS	Surface Water and Groundwater
Ben Ewins	RPS	Visual
David Pavey	Pavey Traffic Consultants	Traffic
Jeremy Welbourne	Global Acoustics	Noise
Ted Smith	Peak Land Management	Bushfire
Cedric Berge	ESCO Pacific	Community and Stakeholder Engagement and Technical Review
Allison Hawke		
Tristan Robertson		

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 8.0** of the main EIS document (Volume 1).

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

Table 3 EIS Structure and Content

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 Need 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, 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 taking into consideration 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 1	Secretary's Environmental Assessment Requirements
Appendix 2	Correspondence and Consultation
Appendix 3	Project Environmental Risk Assessment
Appendix 4	Statement of Capital Investment Value (CIV)
Volume 2 – Appendices	
Appendix 5	Noise Impact Assessment
Appendix 6	Traffic Impact Assessment
Appendix 7	Visual Impact Assessment
Appendix 8	Surface Water and Groundwater Assessment
Appendix 9	Bushfire Threat Assessment
Appendix 10	Biodiversity Impact Assessment

Volume 2 – Appendices	
Appendix 11	Aboriginal and Historic Heritage Assessment
Appendix 12	Waste Management Plan

2.0 Site Description

2.1 Overview

The Project site covers an area of 500 hectares (ha) and is located approximately 6 km west of Finley, 45 km east of Deniliquin, 105 km north of Shepparton (Victoria) and 150 km south-west of Narrandera. The development foot-print for the solar farm requires an area up to 385 ha. The site is located within a rural setting across 3 properties and on lands described as Lot 133, 134 & 136 DP752299, 198 Canalla Road, Finley, NSW. The site falls wholly within the Berrigan LGA.

The Project area is bounded to the north and south by Broockmanns Road and Broughans Road, respectively. The nearest major roads are the Riverina Highway located approximately 1.5 km to the north and Newell Highway which passes through Finley Township.

The land comprises flat-lying open paddocks crossed by a network of irrigation and drainage channels, and a waterway crossing the western most paddock that supplies water to a farm dam.

A 132 kV transmission line crosses the north of the Project area and connects with the Finley 132 substation located immediately adjacent to the north-eastern boundary of the area. Services to the site are provided by Essential Energy for electricity 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 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.

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

2.2 Existing Site Use

The 3 properties which form part of the development site are existing cropping, grazing, and irrigation enterprises. The main crops grown across all 3 holdings are wheat and cereals, legumes, rice, pasture and hay, milk, beef cattle, prime lambs and wool.

Refer to **Plate 1** to **Plate 6** below for details of the existing site use.

2.3 Existing Approvals

As the properties within the development footprint are historically 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.

2.4 Land Ownership

The Project site is currently under the ownership of 3 separate landowners, comprising:

- Lot 133 DP752299 is under private ownership;
- Lot 134 DP752299 is under private ownership; and
- Lot 136 DP752299 is under private ownership.

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

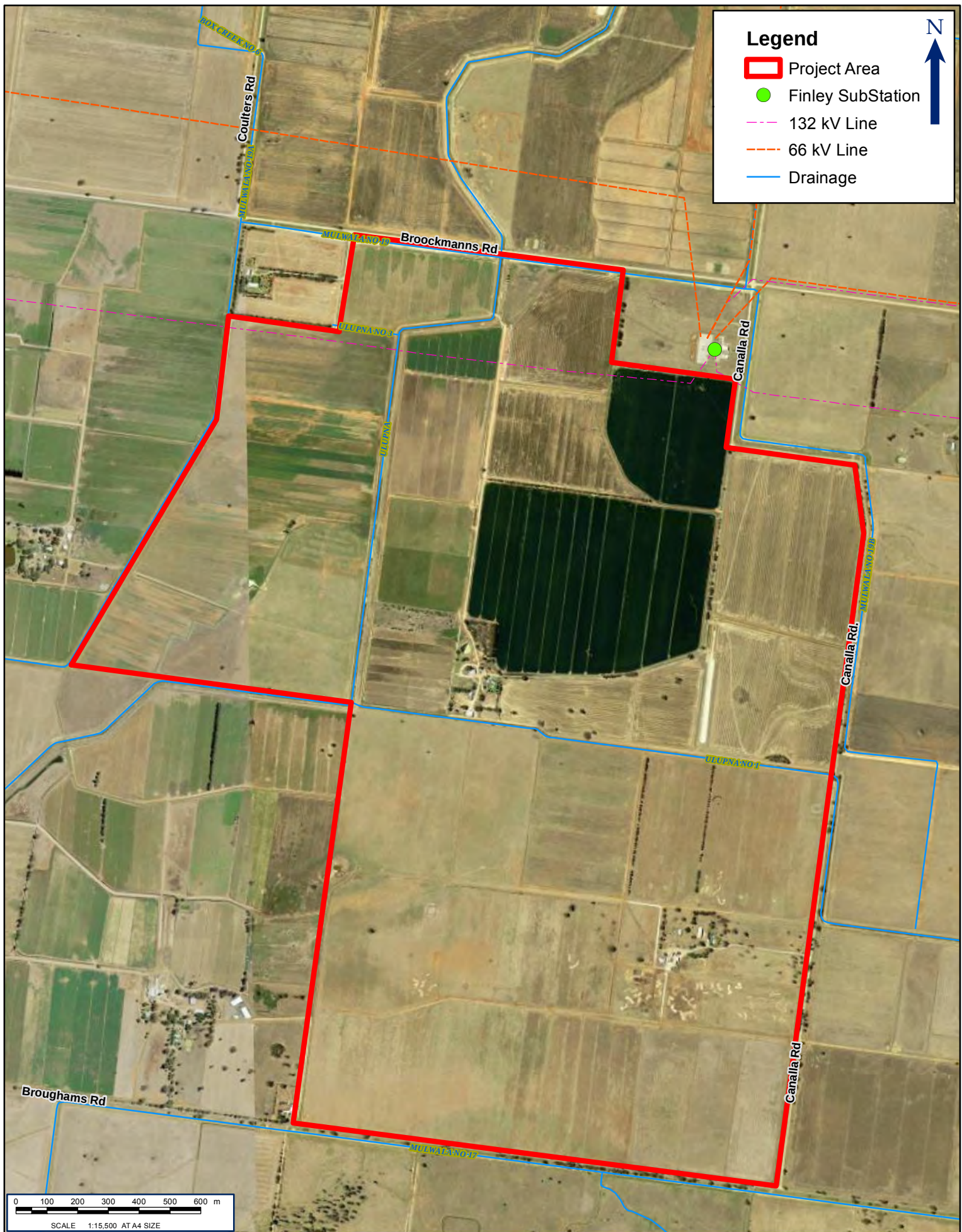


FIGURE 3: PROJECT SITE

LOCATION: LOT 133,134, 136 DP 752299, FINLEY	DATUM: GDA94 PROJECTION: MGA Zone 56
JOB NO.: PR 136808	Data Sources: RPS
PURPOSE: EIS	Client Land and Property 2015
Technician: james.hugo	Date: 24/8/2017

CLIENT: ESCO PACIFIC

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Plate 1 Tilled cropping land within the project area



Plate 2 Cropping lands within the south-eastern portion of the project area



Plate 3 Cropping lands to the west of Finley 132 substation



Plate 4 Irrigation channel ULUPNA south of the Broockmanns Road bridge



Plate 5 Irrigation channel ULUPNA No 1 and cattle grazing within the project area



Plate 6 Fodder crops and tree belt within the project area

2.5 Zoning and Permissibility

The Project site is zoned RU1 Primary Production under the Berrigan Local Environment Plan (LEP) 2016. 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.*
- *To permit development that enhances the agricultural and horticultural production potential of land in the locality.*
- *To permit low-key tourist and visitor accommodation that is compatible with the scenic amenity, and promotes the character, of the area.*
- *To enable function centres to be developed in conjunction with agricultural uses.*

2 Permitted without consent

Environmental protection works; Extensive agriculture; Home-based child care; Home businesses; Home occupations; Intensive plant agriculture; Roads; Water reticulation systems

3 Permitted with consent

Agriculture; Air transport facilities; Airstrips; Animal boarding or training establishments; Boat launching ramps; Boat sheds; Building identification signs; Business identification signs; Camping grounds; Caravan parks; Cellar door premises; Cemeteries; Charter and tourism boating facilities; Community facilities; Correctional centres; Depots; Dual occupancies; Dwelling houses; Eco-tourist facilities; Educational establishments; Environmental facilities; Extractive industries; Farm buildings; Flood mitigation works; Forestry; Freight transport facilities; Function centres; Garden centres; Heavy industrial storage establishments; Heavy industries; Helipads; Highway service centres; Home industries; Home occupations (sex services); Industrial retail outlets; Industrial training facilities; Information and education facilities; Intensive livestock agriculture; Jetties; Landscaping material supplies; Markets; Mooring pens; Moorings; Open cut mining; Plant nurseries; Recreation areas; Recreation facilities (major); Recreation facilities (outdoor); Research stations; Roadside stalls; Rural industries; Rural workers' dwellings; Sewerage systems; Timber yards; Tourist and visitor accommodation; Transport depots; Truck depots; Turf farming; Veterinary hospitals; Water recreation structures; Water supply systems

4 Prohibited

Backpackers' accommodation; Serviced apartments; Any other development not specified in item 2 or 3"

As detailed above, electricity generating works or solar energy systems are prohibited within zone RU1, however under the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) development of electricity generation works or solar energy systems are 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

Accordingly, the proposed development satisfies Clause 34 of the ISEPP and is permitted within zone RU1 Primary Production. The land zoning for the site is shown on **Figure 4**.

2.6 Surrounding Land Use

The Project site is surrounded wholly by rural properties where cropping, grazing, and irrigation is the dominant land use. The properties directly surrounding the Project site form part of the Murray Irrigation Area which was developed by the NSW Government in the 1930's.

More broadly, land use across the surrounding catchment is predominantly dryland agriculture, producing a wide range of cereals, oilseed and legume grain crops, and grazing of sheep and cattle. However the region also hosts some of the largest irrigation schemes in Australia, which produce broadacre crops, including rice, fodder for intensive animal industries, large area horticultural crops, including wine grapes, table grapes, almonds, olives, citrus and many niche crops. **Plates 7 to 10** below show surrounding land use activities to the Project site.

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

Table 4 Surrounding Receivers and Distance from the Project Site

Receiver	Type	Distance from Project Boundary (metres)	Direction from Project Boundary
R1	Internal	Within solar development area	Central
R2	Internal	Within project area	South-eastern corner
R3	External	316	West
R4	External	358	West
R5	External	38	West
R6	External	120	North
R7	External	558	South
R8	External	409	South
R9	External	1092	East
R10	External	937	North-east
R11	External	766	South
R12	External	1072	North
R13	External	1542	East
R14	External	1551	North-east
R15	External	1302	North-north west
R16	External	1515	West
R17	External	1903	North-east
R18	External	1855	West

Receiver	Type	Distance from Project Boundary (metres)	Direction from Project Boundary
R19	External	2244	South-west
R20	External	2192	North
R21	External	2050	North-north west
R22	External	2446	East
R23	External	2566	East-south east

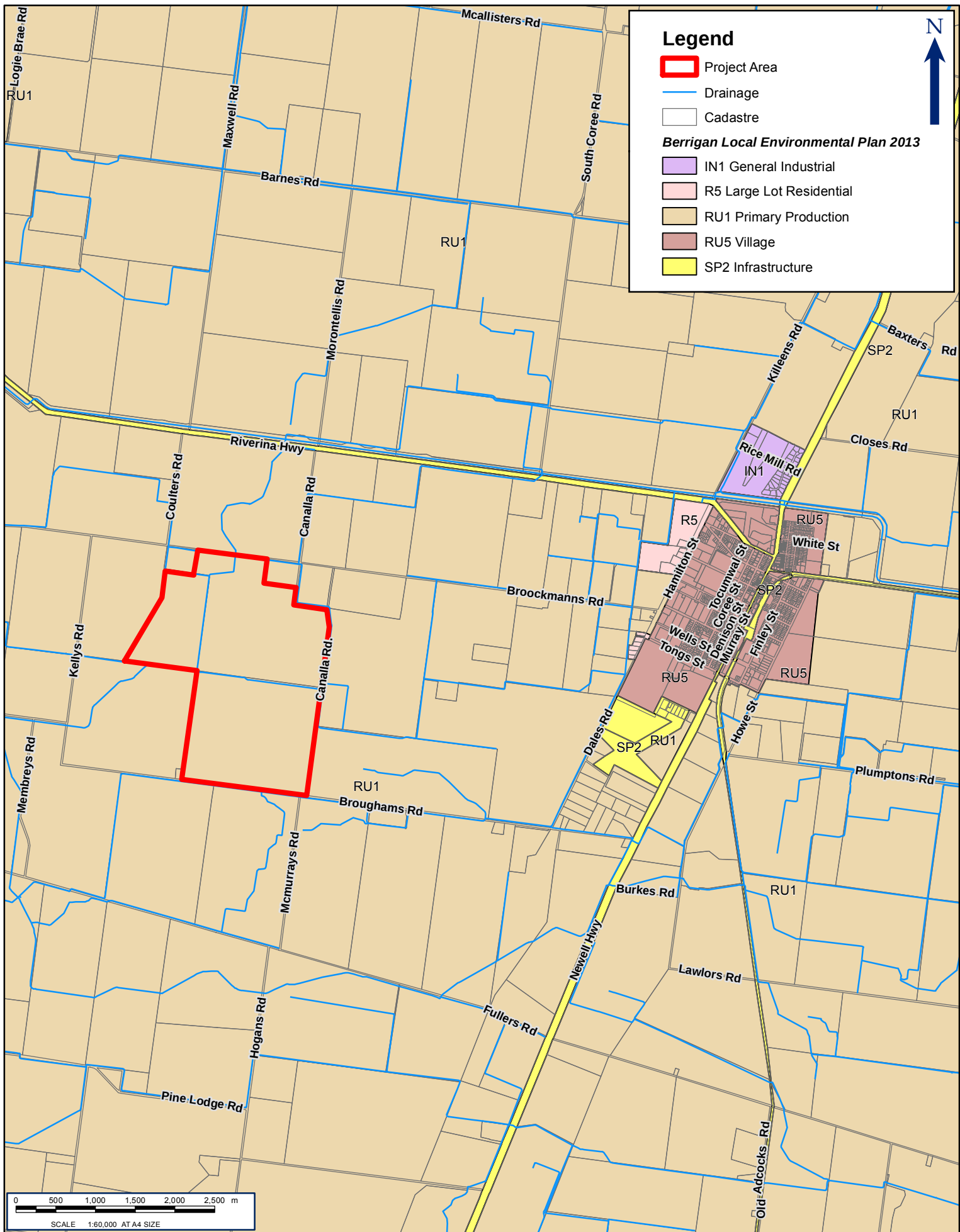


FIGURE 4: LAND ZONING

LOCATION: LOT 133,134, 136 DP 752299, FINLEY	DATUM: GDA94 PROJECTION: MGA Zone 56
JOB NO.: PR 136808	Data Sources: RPS
PURPOSE: EIS	Client Land and Property 2015
Technician: james.hugo	Date: 24/8/2017

CLIENT: ESCO PACIFIC

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Legend

- Project Area
- 500m
- 1000m
- 1500m
- 2000m
- Finley SubStation
- ⊗ Internal Receivers
- ⊗ Surrounding Receivers
- Roads

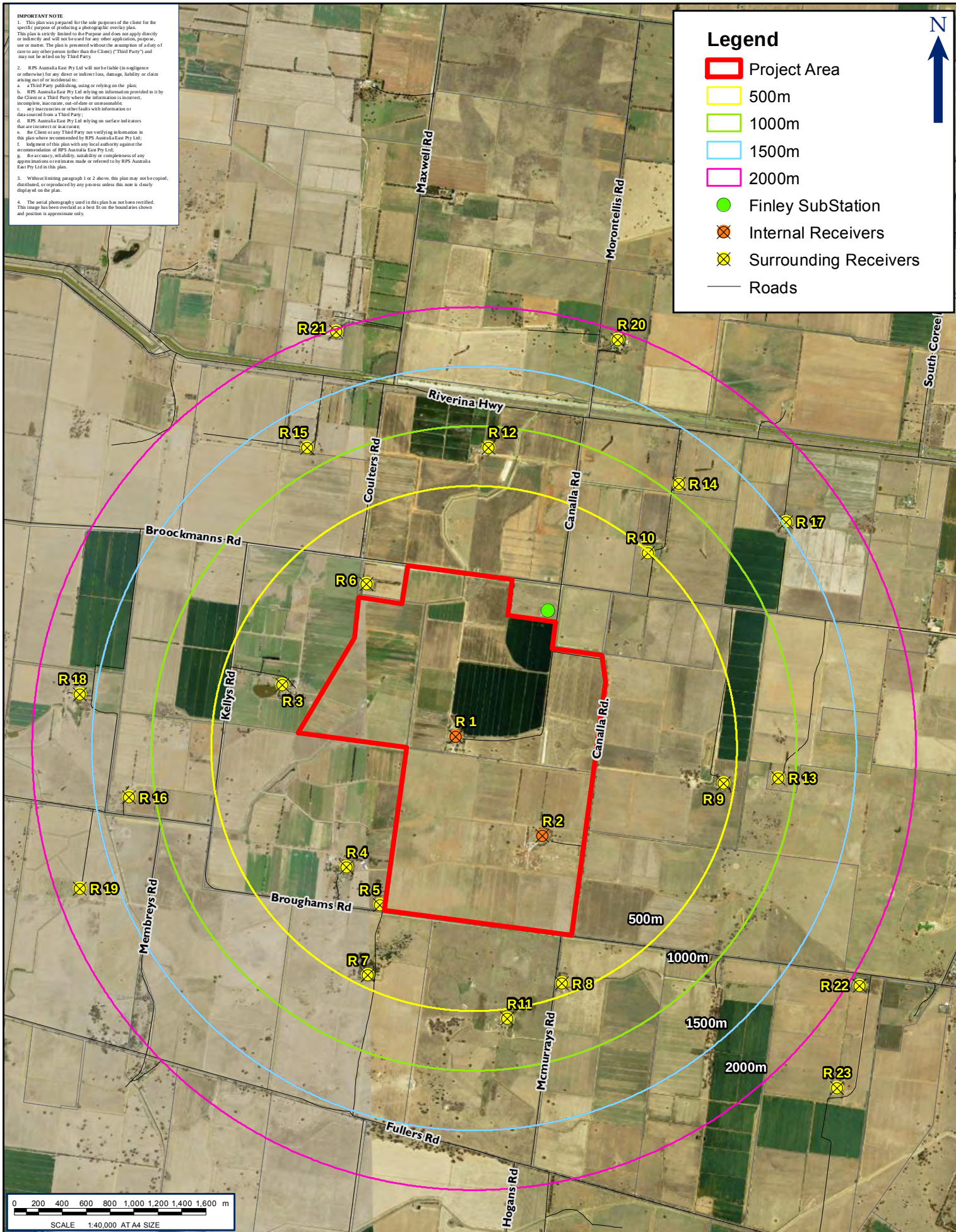


FIGURE 5: SURROUNDING RECEIVERS

LOCATION: LOT 133,134, 136 DP 752299, FINLEY	DATUM: GDA94 PROJECTION: MGA Zone 56
JOB NO.: PR 136808	Data Sources: RPS
PURPOSE: EIS	Client Land and Property 2015
Technician: Natalie Wood	Date: 6/09/2017

CLIENT: ESCO PACIFIC

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Plate 7 Irrigation channel and cropping lands east of Canalla Road



Plate 8 TransGrid's Finley 132 substation and adjoining grazing lands



Plate 9 Finley 132 substation entrance from Canalla Road



Plate 10 Broockmanns Road (east) with adjoining cropping and grazing lands

2.7 Soils, Topography, and Hydrology

Soils of the Riverine Plains landscape underlie the Project site and the majority of the surrounding local area. The soils range from shallow to moderately deep (less than 1 m 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 2017).

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 1% (OEH Espade 2017).

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 it 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 8.0** of this EIS.

2.8 Biodiversity

The floodplain and wetland habitats of the Murray River and its tributaries support diverse habitats for a range of land and water plants and animals. The flood-dependent forests are dominated by river red gum and black box, and in some areas lignum. Within the forests are complex networks of wetlands, some of which support locally and nationally significant wetland plants, such as moira grass, tall spike rush and common nardoo.

The rivers in the central Murray region are important habitat for native fish. Historically, the waterways have had a high diversity of native fish species and were a major source for Murray cod, but native fish diversity and health across the region is declining, which is important not only from an ecosystem perspective, but also for recreational fishing and tourism. There are also significant but declining populations of other threatened and vulnerable fish species including silver perch, rainbow fish and southern pygmy perch.

Waterholes in the region provide a critical drought refuge for native fish species and, consequently, contribute significantly to the recovery of native species both at the local and Basin scale when flows improve. Billabongs and side channels in the region are also used as refuge sites for larval or juvenile fish species. Some fish species, such as golden perch, depend on higher flows to access the floodplain to meet all of their life history requirements.

Wetlands and riverine vegetation in the region provide habitat for a range of colonial waterbirds, such as the eastern great egret and straw-necked ibis, as well as migratory species such as brolgas and Australasian bitterns. Bird species also benefit from the large corridors of remnant river red gum and black box woodlands that line many of the creeks and flood runners in the region. Some of the numerous threatened and vulnerable bird species recorded in the area include diamond firetail, superb parrot and bush stone curlew. The River Murray and its surrounding wetlands provides important habitat for many native frog, turtle and bat

species. There is also considerable interaction between farm land and the natural environment. The development site itself is highly disturbed with little remnant vegetation remaining.

Further detail on flora and fauna present across the Project site is provided in **Section 8.0**.

2.9 Surrounding Receivers

The development site is located within the zone RU1 Primary Production under the Berrigan LEP 2016. As a result of the historical agricultural landuse of the area the closest receivers are either rural or residential in nature. The nearest residential receiver (R1) is located 50 m from the western boundary of the development site, with another 5 dwellings located within a distance of 100 m to 500 m of the site boundary (refer **Figure 5**).

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 Tocumwal Airport was utilised (BoM Site: 070146).

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 29.4 mm in February to 44.1 mm in June. Mean annual rainfall is 450.3 mm.

Mean monthly minimum temperatures are in the range of 3.4°C to 16.1°C, with mean monthly maximums of 13.9°C to 31.8°C. The warmest months generally occur during summer between November and March.

3.0 Project Description

3.1 Overview

The Finley Solar Project is a utility scale renewable energy development with a capacity of up to 170 MW that would generate clean and renewable electricity from the power of the sun. Finley 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 500,000 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 to those used residential applications.

The solar farm is a large infrastructure Project that is expected to create up to 200 jobs during construction and up to 4 full-time and 8 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 Transgrid supply network by underground or above ground high voltage cable to the Finley 132kV substation. Details of the site layout, ecological constraints, access roads, easements, and closest receivers are shown on **Figure 6**.

3.2 Infrastructure Design and Site Layout

The Finley Solar Farm 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 TransGrid Finley 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 approximately 500,000 solar panels in regular arrays;
- Each solar panel would be fixed to a metal mounting structure secured with ground piles;
- Aboveground 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; and

- Temporary site compound, lay-down area, and equipment storage areas during construction.

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

3.2.2 Solar Arrays and Ground Mounts

Solar arrays would be comprised of up to 500,000 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 4m in height. **Plate 11** below shows typical PV panels at a solar farm grouped in solar arrays.



Source: Array Technologies

Plate 11 PV Modules and Solar Array

3.2.3 DC Cabling

DC cabling will be utilised to connect each PV module in a string (up to 500,000 modules) to field DC boxes mounted near the solar panels. The DC boxes will be located approximately 1m off the ground between the PV arrays. DC cabling will be installed underground at a minimum depth of 1m 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).

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 AC electricity for connection and distribution via the Finley 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 13m long, 2.5m wide, and 3m high. **Plate 12** below shows a typical PCU with the relevant power conversion equipment installed.



Source: SMA Solar Technology

Plate 12 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 1m (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 33 kV electricity to 132 kV electricity. The up-converted 132kV supply would then be connected via high voltage cable to the adjacent Finley 132kV substation where it would enter the local electricity network. High voltage cabling would be installed in accordance with Australian standards.

3.2.7 Local Transmission Network

The proposed connection point for the solar farm to the Transmission Network Service Provider (TNSP) is the 132 kV bus of the Finley 132/66kV substation owned and operated by TransGrid. From the TransGrid substation power is distributed to the national electricity grid via the Essential Energy local power network.

3.2.8 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.

3.2.9 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 5m 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 on **Figure 6**.

3.2.10 Site Office and Staff Amenities

A site office and staff amenities building will be constructed or installed at the site. Its dimensions would be approximately 16m long, 10 m wide, and 6m 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 control room. Staff amenities will include toilets, showers, a lunch room, and first aid room. The location of the site office for operations is shown on **Figure 6**.

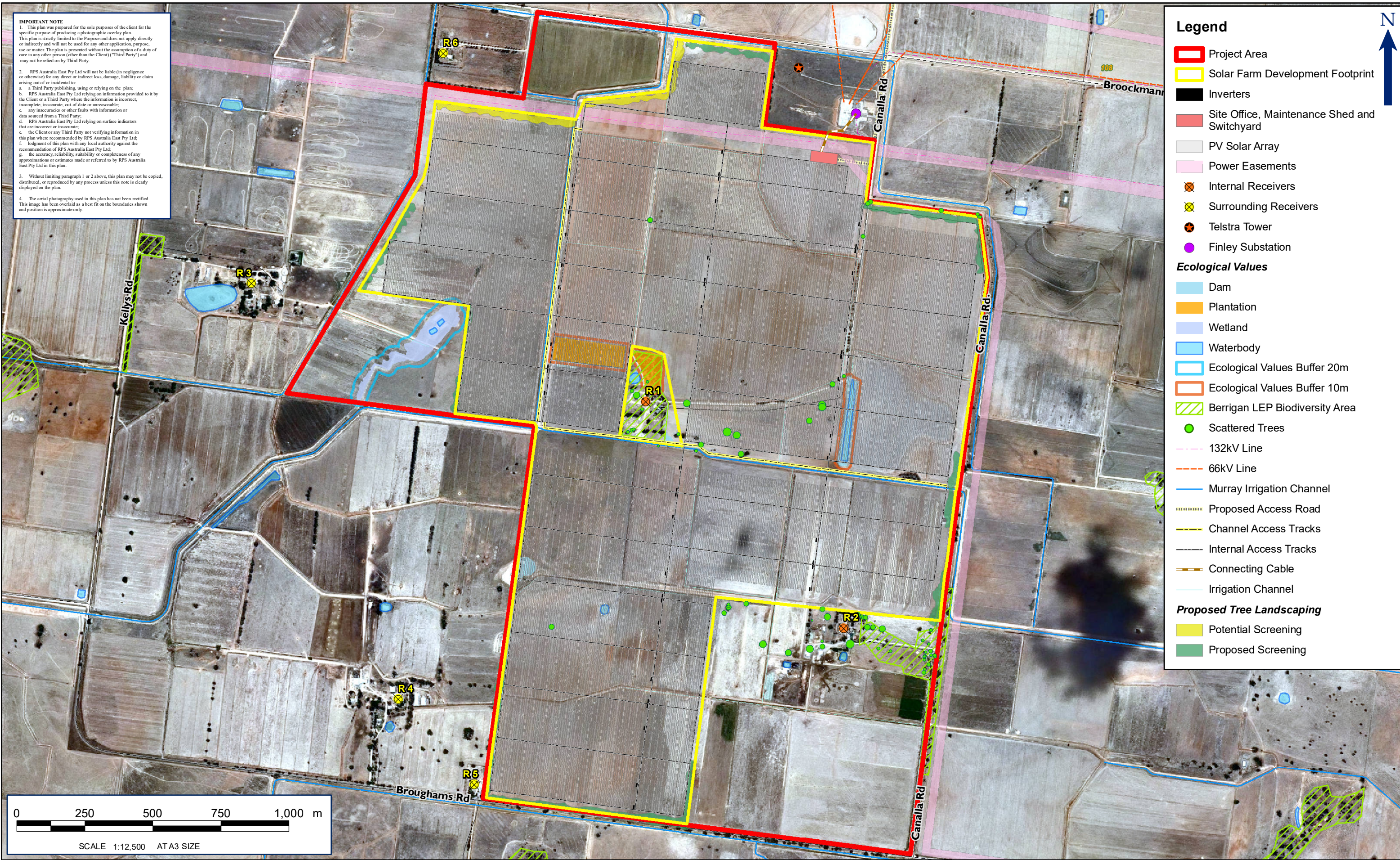
3.2.11 Maintenance Building

A maintenance building will be established adjacent to the site office and will provide storage for spare parts, maintenance equipment, and a workshop. The maintenance shed will be approximately 16m long, 10m wide, and 6m high (refer **Figure 6**).

3.2.12 Site Access and Parking

An all-weather access road into the Project area currently exists from the entrance to the 'Happy Valley' property off Canalla Road. Canalla Road feeds directly off the Riverina Highway approximately 6 km west of the Finley Township. This access will facilitate all solar farm traffic during construction and operations. In addition, there will be a separate entrance off Canalla Road for access to the solar farms permanent site office, maintenance building, and switch yard. Infrastructure and road access is shown on **Figure 6**.

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.



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 Berrigan Shire 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. There is an existing Telstra 4G tower located adjacent to the north boundary of the Project site that provides coverage across the entire development area. 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 meter 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; and
- Timber and fixtures for building fit-out.

3.4.2 Site Preparation

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

- Slashing and/or removal of areas of vegetation;
- Removal of existing fencing and establishment of boundary fencing;
- Establish access points and main entry roads for delivery of machinery and equipment;
- Undertake land survey, geotechnical and other preliminary investigations; and
- 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:

- Levelling of minor private irrigation and drainage channels (where required);
- 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 adjacent to the Finley substation;
- 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 Finley 132kV substation; and
- 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 Finley Solar Farm is expected to take up to 9 months, which each construction aspect and duration detailed below in **Table 5**.

Table 5 Construction Schedule

Activity	Month								
	1	2	3	4	5	6	7	8	9
Site Preparation and Establishment									
Civil Works (roads & 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 Finley Substation									
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 ; and
- 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 involve monitoring of equipment on a daily basis, full servicing of inverters and substation equipment on 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 on site 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 as well either through the use of livestock (sheep) for grass management, or through mowing with a slasher.

3.6 Workforce

3.6.1 Construction

The anticipated number of construction workers on site will be in the order of 200 staff. Of these workers, 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 either Finley, Berrigan, or Tocomwal. The majority of the construction staff movements will be made to/from site using mini buses from Finley.

3.6.2 Operations

It is proposed that there will be 4 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 Finley 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 8 am to 1 pm on Saturdays. No construction activities would occur on Sundays or public holidays.

It is anticipated that construction activities would staggered over a 9 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, the site will only be manned 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 246 movements per week, or 41 movements 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.

In addition, it is expected that during the non-peak construction periods (months 1-4 and 7-9) average heavy vehicle generation is expected to peak at 12 movements per day.

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 3 movements per day. 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.

3.9 Fire Management

The Project area is located within an existing highly modified and cleared environment, therefore there is no dense bushland or vegetation in or surrounding the site. Most of the site is cropped agricultural land, grazed pastures, or managed lands.

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

In addition to the above, a 10 metre Asset Protection Zone (APZ) that permits unobstructed access for fire services has been provided for around the perimeter of the main solar infrastructure.

A **Bushfire Threat Assessment (BTA)** has been prepared as part of this EIS and is attached as **Appendix 9** and is discussed in **Section 8.7**. This BTA further addresses the potential for fire threat at the site and the proposed fire protection measures.

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 face downwards and in towards 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 2.4m and will feature CCTV security cameras mounted at regular intervals for monitoring purposes. The fence will typically be constructed of cyclone fencing material with a strand of barbed wire at the top to deter intruders.

3.12 Landscaping

Landscaping would be undertaken at strategic locations along site boundaries to minimise visual impacts to surrounding the 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 7**. Proposed landscaping for visual screening purposes would involve the layered planting of 3 metre wide vegetation strips along those areas identified in **Appendix 7**. 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 Project area is located across flat low lying land that is currently used for intensive irrigation, with several private and Murray Irrigation Limited owned channels traversing and boarding the site. These existing

surface water structures will remain in place where possible and may be used to convey site surface water from the development area.

It is understood that the proposed site works will be minimal with site roads to be constructed generally at existing ground level, solar panels to be constructed on steel piles raised off the ground and minimal earthworks undertaken beyond the switchyard, Operations and construction hardstand area. As there are minimal earthworks proposed to alter the terrain, there will be no significant loss of floodplain storage on the site.

The solar panels will increase the impervious area for rainfall, however runoff from the solar panels will fall onto the natural surface and likely travel overland beneath the panels, as per existing conditions, with the only restriction being from the steel piles which the panels are constructed on. Therefore storm water runoff across the Project has the potential to infiltrate the subsurface as per pre-developed conditions.

Notwithstanding this surface water across the Project site will be managed through the installation of drainage features that will convey water to specific collection points for treatment and release in the surrounding irrigation and drainage system.

Further detail on surface water management and design is discussed in the **Surface and Groundwater Assessment** included in **Appendix 8** and discussed in **Section 8.6** of the EIS.

3.14 Environmental Management

The development will operate under an Environmental Management Plan (EMP) that will be updated as necessary to incorporate any key operational changes. The EMP will include the following key sections:

- Introduction
- Environmental Policy
- Organisational Structure
- Description of Activities
- Identification of Environmental Issues and Impacts
- Environmental Management
- Management Procedures
- Contingency Plans and Emergency Response
- Complaints Management
- Auditing and Reporting
- Continuous Improvement

A site EMP for the construction and operation of the solar farm will be formally developed during the post-approvals process and in consultation with the relevant government agencies.

3.15 Site Decommissioning

3.15.1 Infrastructure Removal

At the end of Finley 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 would include:

- Disconnection of the solar farm from the TransGrid connection point at the Finley substation;

- PV modules would be disconnected and removed, including the mounting posts, mounting frames, and trackers. Materials would be sorted and packaged for removal from the site for recycling or reuse. Much of the solar array panels would be recyclable;
- All buildings and equipment would be removed and materials recycled, wherever possible;
- Steel columns and cabling would be removed and recycled;
- Fencing would be removed (unless requested otherwise by the land owner); and
- Commencement of site rehabilitation and re-instatement of

Prior to the commencement of decommissioning activities a rehabilitation and decommissioning/closure plan would be prepared in consultation with the landowner and submitted for approval by the NSW Department of Primary Industries. A decommissioning plan would include the following key elements:

- Rehabilitation strategies and objectives;
- Rehabilitation design criteria;
- Productivity targets to ensure the re-establishment of agricultural production;
- Expected timeline for rehabilitation works; and
- Monitoring and mitigation measures.

3.15.2 Site Rehabilitation

Site rehabilitation would involve firstly the removal of all infrastructure as detailed above in **Section 3.15**. Following infrastructure removal the following would be undertaken to re-instate the site for agricultural activities, including:

- Removal of gravel from internal tracks and roads;
- 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;
- Undertaking works to re-instate any altered or modified irrigation areas, including laser levelling and contour / irrigation channel reconstruction;
- Re-establishment of groundcover in any areas where cropping is not to occur to ensure the stabilisation of soil resources;
- Use of groundcover species that are compatible with the existing species composition; and
- Establishment of suitable drainage and erosion and sediment control.

3.15.3 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.

4.0 Project Need and Alternatives

4.1 Project Need

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

In 2011, the RET was split into two parts comprising a large-scale RET scheme and a small-scale renewable energy scheme. The large scale RET scheme created a financial incentive to establish and expand renewable power stations such as solar farms, wind farms and hydro-electric power stations and deliver the majority of the 2020 target. The target has since been adjusted and the current RET is 33,000 GWh by 2020 (Clean Energy Regulator 2017).

The RET scheme sits within the broader context of Australia's need to reduce greenhouse gas (GHG) emissions to meet its commitments under the 1997 Kyoto Protocol and revised emissions target under the 2015 Paris Agreement (Commonwealth of Australia 2015).

The Finley 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 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.

4.1.1 Social and Economic

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

- 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 Finley 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;
- Assisting in achieving RET's;
- Attracting renewable energy investment and projects;
- Building community support for renewable energy; and
- Attracting and growing expertise in renewable energy.

4.1.2 Strategic

4.1.2.1 National Renewable Energy Targets

In 2001, the Australian Federal Government introduced the Mandatory Renewable Energy Target (MRET) Scheme to increase the amount of renewable energy being produced and consumed in Australia. The initial MRET was for Australia to provide 9,500 gigawatt hours (GWh) of new renewable energy generation by 2010. This target was revised in January 2011 and expanded the target to 41,000 GWh of additional renewable energy between 2001 and 2020.

The MRET was split into a Small-scale Renewable Energy Scheme (SRES) and Large-scale Renewable Energy Target (LRET) components to ensure that adequate incentives were provided for large scale grid connected renewable energy. The aim of the LRET was to create a financial incentive for the establishment and growth of renewable energy power sources, such as wind and solar farms, or hydro-electric power stations through the creation of large-scale generation certificates (LGCs).

In June 2015, the Australian parliament passed the *Renewable Energy (Electricity) Amendment Bill 2015* and the LRET was subsequently reduced to a target of 33,000 GWh by 2020 with interim and post 2020 targets adjusted accordingly. The current projection is that about 23.5% of Australia's electricity generation in 2020 will be from renewable sources.

The Finley Solar Project would produce approximately 430,000 MWh/year of renewable electricity which would assist Australia to meet its LRET's and provide power for approximately 59,000 homes.

4.1.2.2 NSW Renewable Energy Action Plan

In 2013, the NSW Government released the NSW Renewable Energy Action Plan to guide NSW's renewable energy development (NSW Government 2013). The Government's vision is for a secure, affordable and clean energy future for NSW. The Plan positions the state to increase energy from renewable sources, at least cost to the energy customer and with maximum benefits to NSW. The strategy is to work closely with NSW communities and the renewable energy industry to increase renewable energy generation in NSW.

The plan details the following 3 goals to efficiently grow renewable energy generation in NSW:

1. Attract renewable energy investment and projects;
2. Build community support for renewable energy; and
3. Attract and grow expertise in renewable energy.

The Finley Solar Project seeks to achieve each of these goals through the design, development, and operation of the site.

4.1.2.3 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 \$200m);
- National leadership in energy efficiency (providing up to \$200m); and
- Preparing for a changing climate (providing up to \$100m).

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.

4.1.2.4 Global Warming

The consumption of fossil fuels (coal, oil and gas) and certain industrial and agricultural practices are resulting in the release of large amounts of GHGs which trap the sun's heat in our atmosphere and impacts the Earth's climate. This impact is generally acknowledged by scientists and politicians around the world, as illustrated by the global agreement to tackle climate change in November 2015 at the COP21 conference in Paris. At the Paris COP21 conference, Australia committed to reducing its emissions to 26-28% below 2005 levels by 2030. Renewable energy helps to reduce emissions of GHGs associated with electricity generation.

4.1.3 **Environmental**

The development would seek to minimise the environmental impacts to the Project site 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 370,000 tonnes per year based on an emission factor of 0.87 kg CO₂-e/kWh; and
- Increasing renewable energy capacity.

4.2 **Project Alternatives**

4.2.1 **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 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 solar farm are considered to be manageable and would not result in significant long term impacts to the environment.

4.2.2 Preferred and Alternate Locations

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 features 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); and
- Need to minimise environmental and social impacts (e.g. avoiding sensitive environments or areas of cultural heritage value).

The proposed location for the Finley Solar Farm emerged as a highly prospective site for the development of a solar project due to its relatively flat grade, currently highly disturbed state, and low impact nature of the infrastructure establishment.

4.2.3 Project Design and Site Configuration

The design and configuration of the Project has taken into account 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; and
- Consideration of the expectations and concerns of the local community, Aboriginal groups, and Berrigan Shire 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.

5.0 Planning and Statutory Requirements

5.1 Introduction

This chapter outlines the 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.

5.2 Commonwealth Legislation

5.2.1 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 (DoE) 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 Significance (including Ramsar wetlands);
- Listed threatened species and ecological communities;
- Listed Migratory Species protected under international agreements (CAMBA and JAMBA);
- The Great Barrier Reef Marine Park;
- Water resources (relating to coal seam gas development and large coal mining development);
- Protection of the Environment from Nuclear Actions; and
- Marine Environment.

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 DoE's *Significant Impact Guidelines 1.1* (DoE 2003). Should the Environment Minister decide the action will be taken in a manner that will ensure it will be likely to not have an adverse impact on the MNES, approval will be granted.

The proposal would not have an impact on MNES, and accordingly, approval from the Commonwealth Minister for the Environment is not required.

5.2.2 Native Title Act 1993

The Native Title Act 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 of land or waters by Aboriginal and Torres Strait Islander groups prior to European settlement, and provides a mechanism for determining where native title exists, who holds it, and identifies compensation for actions affecting it. The Act establishes ways in which future dealings affecting native title may 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.

A Native Title search has been undertaken for the development and it has been determined that there are no registered claims over the Project area.

5.2.3 Commonwealth Aboriginal and Torres Strait Islander Heritage Protection Act 1984

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

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

An **Aboriginal and Historic Heritage Assessment** has been prepared for the development which has determined that there are no items or areas of Aboriginal cultural heritage significance within the development site. The **Aboriginal and Historic Heritage Assessment** is discussed further in **Section 8.5** and attached as **Appendix 11**.

5.3 NSW Legislation

5.3.1 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 DPE. 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 a number of objects of the EP&A Act (and is also consistent with the remaining objects of the Act):

- a. to encourage:
 - i. the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,
 - ii. the promotion and co-ordination of the orderly and economic use and development of land,
 - iii. the protection, provision and co-ordination of communication and utility services,
 - 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.

5.3.2 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 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. Accordingly, an EPL is not required under the POEO Act for the proposal.

5.3.3 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.

5.3.4 Other Relevant State Legislation

5.3.4.1 National Parks and Wildlife Act 1974

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

Potential impacts on Aboriginal heritage objects or places are unlikely due to the current highly developed nature of the existing site. Further detail is provided in the **Aboriginal and Historic Heritage Assessment** attached as **Appendix 11** and is discussed further in **Section 8.5**.

5.3.4.2 Threatened Species Conservation Act 1995

The Threatened Species Conservation Act 1995 (TSC Act 1995) governs the management of threatened flora and fauna, populations and ecological communities. The TSC Act sets out a number of specific objects relating to the conservation of biological diversity and the promotion of ecologically sustainable development.

Under Section 79B of the EP&A Act, occurrence under the TSC Act would not be required for the Finley Solar Farm unless the requirement of an environmental planning instrument for consultation or concurrence specifies that it applies to SSD.

The TSC Act 1995 is currently in the process of being repealed and is to be replaced by the Biodiversity Conservation Act 2016.

The development is not anticipated to damage critical, or other habitat, or otherwise significantly affect threatened species, populations and ecological communities as the Project has been designed to avoid impact to the remaining native vegetation at the site. Further detail on biodiversity is provided in **Section 8.4** and attached as **Appendix 10**.

5.3.4.3 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 11**) has been prepared for the development which included a search of the Local and State heritage registers (refer to **Section 8.5**). These search found that there are no recorded heritage items within the Project site. It is considered there will be no impact to historic heritage in the locality of the development.

5.3.4.4 Noxious Weeds Act 1993

The Noxious Weeds Act 1993 (NW Act) establishes a system for the identification and control of noxious weeds in NSW. The NW Act divides noxious weeds into five categories which determine the level of control required. Responsibility for the control of noxious weeds lies with the owner and/ or occupier of private land and crown land, local councils and other public authorities.

Under the NW Act, the Minister may declare a flora species to be a noxious weed. Under Section 13 of the NW Act, public authorities are required to control noxious weeds which are likely to spread to adjoining land. Control notices can be issued by the Minister and local control authorities to ensure that obligations are met.

The potential for the Finley Solar Farm to result in noxious weed impacts is considered to be low as the site will be managed and maintained in accordance with NSW Department of Primary Industries – Agriculture requirements. Further discussion on noxious weeds is provided in **Section 8.9**.

5.3.4.5 Water Management Act 2000

The objectives of the Water Management Act 2000 are to provide for the sustainable and integrated management of the water sources of NSW for the benefit of both present and future generations and, in particular:

- Ecologically sustainable development;

- Protect, enhance and restore water resources;
- Recognise and foster social and economic benefits;
- Recognise the role of the community;
- Provide efficient and equitable sharing of water;
- Management of water sources with other aspects of the environment including native vegetation and native fauna;
- Encourage the sharing of responsibility and efficient use of water; and
- Encourage best practice management and use of water.

The regulator and policy maker for water resource management is the NSW Department of Primary Industries – Water (DPI-Water).

The Project area is covered by the *Water Sharing Plan for the NSW Murray and Lower Darling Regulated Rivers Water Sources 2016*, made under Part 4 Section 50 of the WM Act. The area is also part of the Murray Irrigation Area which is managed under licence from the NSW Government by Murray Irrigation Limited.

It is not proposed to modify any existing entitlements or seek new entitlements under either of the plans. Water requirements would be satisfied by purchasing water during construction and from rain water collection during operations. Further discussion on groundwater and surface water resources is provided in **Section 8.6**.

5.3.4.6 Roads Act 1993

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

The Roads Act sets out procedures for the opening and closing of public roads and regulates the carrying out of various activities on public roads. As part of the Finley Solar Farm proposal, a **Traffic Impact Assessment** (refer **Appendix 6**) has been prepared which outlines the requirements for use of roads in the area. If required, approval from the RMS or Berrigan Shire Council will be sought under section 138 of the Roads Act. Traffic and road impacts are discussed further in **Section 8.2**.

5.3.4.7 Native Vegetation Act 2003

The Native Vegetation Act (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 encourage rehabilitation of the land.

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

5.4 **Environmental Planning Instruments, Policies, and Plans**

5.4.1 **State Environmental Planning Policies**

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

The Project triggers SSD in accordance with Division 4.1 of Part 4 of the EP&A Act, as it is a type of development listed in Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011. Pursuant to Clause 8 of the SEPP:

8 Declaration of State significant development: section 89C

(1) Development is declared to be State significant development for the purposes of the Act if:

(a) the development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the Act, and

(b) the development is specified in Schedule 1 or 2.

Specifically, Clause 20 of Schedule 1 lists “Electricity generating works and heat or co-generation” as SSD where:

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 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.

Accordingly, the Finley Solar Project is classified as an SSD under Part 4 of the EP&A Act, as it has a capital investment value of approximately \$150 million.

5.4.1.2 State Environmental Planning Policy (Infrastructure) 2007

The Project site is zoned RU1 Primary Production under the Berrigan Local Environment Plan (LEP) 2013. 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

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

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

State Environmental Planning Policy 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. It is considered that SEPP 33 is not relevant to the Finley Solar Project due to its non-hazardous and non-offensive nature.

5.4.1.4 State Environmental Planning Policy (Rural Lands) 2008

The aims of State Environmental Planning Policy (Rural Lands) 2008 are 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; and
- Amend provisions of other environmental planning instruments relating to concessional lots in rural subdivisions.

It is considered that the development is consistent with the aims of the SEPP, and is also not identified as state significant agricultural land.

5.4.2 Berrigan Local Environment Plan 2013

The Berrigan LEP 2013 governs land use within the Berrigan Shire LGA. The Berrigan LEP provides local environmental planning provisions for land in Berrigan in accordance with the relevant standard environmental planning instrument under section 33A of the EP&A Act.

The aims of the plan are:

- To encourage development that complements and enhances the unique character and scenic values of Berrigan, offering a diverse economy, significant natural resources and an attractive rural lifestyle;
- To provide for a range of development opportunities that contribute to the social, economic and environmental resources of Berrigan in a way that allows the needs of present and future generations to be met by implementing the principles of ecologically sustainable development recognise and manage valued environmental and cultural heritage, landscape and scenic features of Berrigan; and
- To promote the efficient and equitable provision of public services, infrastructure and amenities.

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

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base;
- To encourage diversity in primary industry enterprises and systems appropriate for the area;
- To minimise the fragmentation and alienation of resource lands;
- To minimise conflict between land uses within this zone and land uses within adjoining zones; and
- To permit development that enhances the agricultural and horticultural production potential of land in the locality.

The primary objective of the RU1 zone is to encourage primary production. Electricity generating works are prohibited in RU1 zones, however, under the ISEPP, development of electricity generation works is permissible on any land with consent, particularly if there is compatibility with local land use objectives. As the development would cause minimal impact to land resources, and the site can easily be re-instated to agricultural practices following decommissioning, it is considered that the Project is generally compatible with local land use objectives.

5.4.3 Berrigan Development Control Plan 2014

The Berrigan DCP 2014 (the DCP) supplements the Berrigan LEP by providing more detailed controls and guidelines for development across the Fairfield LGA. The proposal is SSD; therefore Clause 11 the SRD SEPP applies. Clause 11 states:

Development control plans (whether made before or after the commencement of this Policy) do not apply to:

- (a) *State significant development, or*
- (b) *development for which a relevant council is the consent authority under section 89D (2) of the Act.*

Whilst the provisions of the DCP do not apply to the Project, the development has been designed to take into consideration the relevant requirements of the Berrigan DCP 2014.

5.4.4 Riverina Murray Regional Plan 2036

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

6.0 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 Project EIS and to guide stakeholder engagement. This chapter provides an overview of stakeholder engagement for the 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 2**.

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 Berrigan Shire Council.

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

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:

- Berrigan Shire 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:

- Berrigan Shire 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 2**.

6.3 Aboriginal Community Consultation

Consultation with the local Aboriginal community has initially been undertaken by ESCO, 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, 2017) attached as **Appendix 11**.

6.3.1 Stage 1 – Notification of Project and Registration of Interest

Formal Aboriginal consultation for the Project commenced on 4 August 2017 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;
- Berrigan Shire Council;
- Office of Environment and Heritage (OEH);
- Cummeragunja Local Aboriginal Land Council; and
- Local Land Services.

Following receipt of the list of Registered Aboriginal Parties (RAPs) from OEH on 14 August 2017, letters were sent to the RAPs (including previously consulted groups Wiradjuri and Yarkuwa) on 16 August 2017 inviting those groups to register an interest in the project consultation process.

In addition, an advertisement was placed in the Public Notices of the Southern Riverina News on 9 August 2017 inviting interest from Aboriginal parties 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 11**.

As of 29 August 2017 no 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 details of specific parties consulted are included in **Appendix 2**.

6.4.1 Project Factsheet

A project factsheet was prepared to introduce the project to key community stakeholders and to provide an overview of the development. The project factsheet provided information on ESCO, solar farm location and size, construction duration, and details of the project website.

The project factsheet was distributed to community stakeholders via mail out and at a community information session held in Finley. A copy of the project factsheet is provided in **Appendix 2**.

6.4.2 Mail-out

Introductory letters and project factsheets were mailed to all landowners within 2km to the proposed development boundary. The letters introduced the proposed project and ESCO, and encouraged landowners to contact ESCO Pacific to discuss the project further. Letters also included an invite the community information session held on 20 July 2017.

A copy of the introductory letter is provided in **Appendix 2**.

6.4.3 Individual Community Meetings

ESCO Pacific representatives contacted landowners closest to the project offering to meet with them to discuss the project in person prior to the community information session. 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 Information Session

A community information session was held at the Finley Returned Soldiers Club (RSC), 63-67 Tocumwal Street, Finley between 6pm to 7pm on Thursday 20 July 2017. The event was advertised to government agencies, the local aboriginal group and project neighbours and the broader community as detailed below:

- Mail-out to all houses within 2km of the project;
- Public notice in the Southern Riverina News newspaper (12th and 19th July 2017);
- Notices placed in local businesses in Finley;
- Notices on the 'Finley for the Future' Facebook Page;
- Notices on the Finely Solar Farm website; and
- Emails sent to key government stakeholders, including the DP&E, OEH, Murray Irrigation Limited, and Berrigan Shire Council.

The community information session was attended by ESCO representatives and RPS. 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 supplied with project location plans, a copy of the project factsheet, and asked to leave contact details so as further project updates could be provided.

6.4.5 Consultation Database

A consultation database has been created and maintained to record community stakeholder contact details and any issues, concerns or feedback received on the project. A copy of the log is included in **Appendix 2**.

6.4.6 Project Website

Project information has been provided on the Finley Solar Farm website at www.finleysolarfarm.com.au. The website includes an overview of the project and offers stakeholders the opportunity to provide further feedback and comments.

6.4.7 Issues Raised

A consolidated summary of the responses received from the community consultation activities is provided in the community consultation log is attached in **Appendix 2**. Generally, feedback from the community has been very positive.

6.5 Continuing Consultation Activities

ESCO Pacific will continue to undertake consultation with stakeholders as necessary throughout all phases of the Project, including EIS exhibition, Response to Submissions, construction, and operations.

6.5.1 EIS Public Exhibition and Post Exhibition

This EIS will be placed on public exhibition for a minimum period of 30 days. ESCO Pacific will continue to commit resources to satisfy consultation requirements during the public exhibition phase and throughout the life of the Project. ESCO Pacific will actively engage with key stakeholders to ensure they are aware the EIS is on exhibition and that information on the EIS can be accessed through the project website at www.finleysolarfarm.com.au.

7.0 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 risk assessment is presented in full in **Appendix 3**. The methodology used for the ERA process, and a summary of the results, are outlined below in the following sections.

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 and historic heritage;
- Surface water and groundwater;
- Bushfire;
- Electromagnetic interference;
- Soils, land use and agriculture;
- Air quality;
- 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 will 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.

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

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

Likelihood	Consequence					
	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 Air quality Bushfire Waste
Low	Historic heritage Electromagnetic interference 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.

8.0 Impact Assessment, Mitigation, and Management

This section of the EIS provides a summary of the potential environmental and social impacts of the development and the measures that will 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 7.0**, and the outcomes of stakeholder engagement.

8.1 Noise

8.1.1 Introduction

An assessment of noise and vibration impacts from the proposed development has been undertaken by Global Acoustics. The purpose of this assessment was to determine potential noise and vibration impact at the nearest residential and industrial receivers to the site. The assessment also considered construction, operational and transport noise impacts associated with the development.

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 5**.

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 accordanced with the Interim Construction Noise Guideline (ICNG) and operational noise impacts in accordance with the NSW Industrial Noise Policy (INP), and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria”

A full summary of the SEARs requirements (including agency responses) is included within **Appendix 1**.

8.1.2 Existing Environment

The Project area is bounded to north and south by Broockmanns and Broughans Road respectively. The nearest major road in the Riverina Highway located approximately 1.5km to the north. This road network would be used by both light and heavy vehicles, and would be the source of a moderate level of noise. Local roads are likely used sporadically by local traffic and occasional heavy vehicles for farm deliveries.

Land uses surrounding the proposal area are generally limited to agricultural activities. Noise generating equipment would include irrigation systems such as pumps as well as tractors, quad bikes and 4WD vehicles. These land uses would not create substantial background noise within the area. Noise levels are likely to be concentrated at peak times during a given season determined by farm activities (sowing, spraying and harvesting, etc).

Residential properties are sparsely distributed in the locality, and would likely use generators and on-demand pump pressurised domestic water systems, generating low levels of background noise. The nearest residential receiver is located 50 m from the western boundary of the development site, with another 5 dwellings located within a distance of 100 m to 500 m of the site boundary.

8.1.3 Methodology

Acoustic modelling for road traffic, construction and operational noise sources was undertaken using CadnaA, noise prediction software developed by DataKustic. Modelling considers the height and location of each source and receiver and takes into account meteorological effects, ground type, air absorption and barrier effects. No topographical information was available and the site has conservatively been modelled as being flat. Road traffic noise predictions were undertaken in CadnaA in accordance with Calculation of Road Traffic Noise (CRTN) methodology development by the UK Department of Transport.

8.1.3.1 Background Noise

Background noise monitoring was not undertaken for the noise assessment due to the rural nature of the area and the generally low background noise levels generate in these areas. It has been assumed that background levels would be less than L_{A90} 30 dB during all time periods, which is typical of a rural environment. In accordance with the INP, where background levels are less than 30 dB a default minimum Rating Background Level (RBL) of 30 dB can be adopted.

8.1.3.2 Construction Noise Criteria

The EPA ICNG specifically relates to construction, maintenance and renewal activities. The guideline specifies standard construction hours as:

- Monday to Friday 7am-6pm;
- Saturday 8am-1pm;
- No construction work on Sundays and Public holidays.

8.1.3.3 Operational Noise Criteria

The Environment Protection Authority (EPA) NSW Industrial Noise Policy (INP) was published in 2000. The INP states that objectives for environmental noise are *'to account for intrusive noise and ... to protect the amenity of particular land uses'*. To achieve these objectives, limits are specified where the *'intrusiveness criterion essentially means that the equivalent continuous (energy-average) noise level of the source should not be more than 5 decibels (dB) above the measured background level'*. Amenity is protected by *'noise criteria specific to land use and associated activities'*.

Table 2.2 of the NIA at **Appendix 5** summarises intrusiveness and amenity criteria that apply for the day, evening and night periods, and adopts a Project specific noise levels (PSNL).

8.1.3.4 Road Traffic Noise

In 2011 the NSW state government released the 'NSW Road Noise Policy' (RNP). The RNP outlines traffic noise criteria applicable to this Project. The policy applies different noise limits dependent upon the road category and type of project/ land use. These criteria are detailed in Table 2.3 of the NIA attached as **Appendix 5**.

8.1.3.5 Noise Sensitive Receptors

The NIA identified sixteen Noise Sensitive Receptors (NSR) for operational and construction noise impact. The NSR locations were outlined in the preliminary environmental assessment and are shown in Figure 3 of the NIA. These NSR were selected because they are the nearest to the noise generating activities and equipment on site during the construction and operational stages of the Project.

8.1.3.6 Meteorology

Meteorological effects were calculated using the CONCAWE calculation methodology within the CadnaA software. Construction and operational activities will occur during daylight hours only. Temperature inversion conditions have not been considered. Neutral day-time conditions have been assessed for all noise models. A worst-case scenario for operational and construction noise has also been assessed, which considers source to receiver gradient wind speeds of 3 m/s, in accordance with the INP.

8.1.3.7 Construction Noise Sources

The construction period for the Project is expected to take approximately 9 months in total, with the peak period being from months 2 to 8. The construction timeline is expected to include approximately 4 months of

piling and installation of the mounting structures and approximately 5 months of installation of the PV modules and inverter assemblies. Noise sources included in the construction noise model include:

- Piling drill rig;
- Franna Crane;
- Trencher;
- Loader;
- Generator;
- Forklift; and
- Power hand tools

Construction noise has been assessed assuming that one of each plant item listed above is operating concurrently. Modelling was undertaken with construction occurring at each of the 4 corners of the development, with the highest result for each NSR presented. These results are likely to represent a worst-case construction impact for the majority of the construction work.

Site clearing and preparation works will also be required during the development and will include a bulldozer, excavator, grader and mulcher. The applicant has advised that clearing works will be relatively short in duration compared to other construction activities and will occur intermittently throughout the construction phase. As these activities are unlikely to cause ongoing nuisance for residents, they have not been specifically assessed. Light and heavy vehicles accessing the site during the construction phase have been considered in the road traffic noise assessment.

8.1.3.8 Operational Noise Sources

The proposed development is a solar photovoltaic plant capable of generating up to 170 MW of renewable energy. The solar farm will comprise up to 500,000 solar photovoltaic modules (PV modules). The solar panels will be fixed to a horizontal mounting structure which slowly tracks the movement of the sun. The PV modules are set out in regular arrays connected by cabling to centrally located inverters enclosed in modified shipping containers. An office workshop and substation that houses the main step-up transformer will be located to the north of site. The main operational noise generating activities on site will include:

- Approximately 5,600 NexTrack motors that allow the solar panels on the horizontal mounting structure to track the sun across the sky. These motors will be evenly spread across the arrays of PV modules;
- 46 central inverters that are located in containers at the end of each block of PV modules; and
- The main step-up transformer in the switchyard.

Each of the sources described above will operate continuously during daylight hours only. The exact location and orientation of inverters is expected to be finalised on site but the units will be centrally located in rows, with the nearest units approximately 600 metres from the nearest NSR. Noise from the inverter units will receive significant shielding from the arrays of PV modules and other inverters. Inverters have been modelled with 5 dB attenuation which is a typical assessment based on removal of line of site. The inverters at the end of each row have conservatively been modelled with no attenuation. In reality these inverters will likely have some shielding to some NSR.

NexTrack units have been modelled assuming no shielding.

The development will operate Monday to Saturday during daylight hours and will be staffed by up to 3 people who will undertake general operation and maintenance activities. Any associated traffic movements and general maintenance activities are unlikely to be noticed by surrounding residents.

8.1.3.9 Road Traffic Noise

Road traffic data for this assessment was sourced from the traffic impact assessment for the development, prepared by Pavey Consulting Services – refer **Appendix 6**. Traffic generated by the development is expected to access the site via the Riverina Highway and Canalla Road. Canalla road is a local dirt road with low existing traffic volumes. The Riverina Highway is an arterial road estimated to have an Annual Average Daily Traffic (AADT) of 1,780 with 19% heavy vehicles in 2017.

The average traffic generation, during the peak of the construction phase, is predicted to be up to 82 movements per day (or 41 arrivals and departures). These movements will be primarily heavy vehicles delivering materials and equipment, but also include light vehicle movements for construction workers. The proposed development is expected to generate relatively low ongoing traffic movements during the operational phase of the Project. The average operational traffic movements are expected to be up to 28 (or 14 arrivals and departures) movements per week or 4 (or 2 arrivals and departures) movements a day. The noise impact of operational traffic is expected to be minor in comparison to construction traffic.

8.1.3.10 Sound Power Levels

Sound power data for noise sources and estimated acoustic usage factor have been used in the noise models and are shown in Table 3.1 of the NIA at **Appendix 5**.

8.1.4 Impact Assessment

The NIA determined that the following construction and operational noise impacts are likely to result from the proposed development:

- Exceedances of up to 19 dB over the construction noise limit are predicted at 5 receptors when construction activities are being undertaken near the closest site boundary;
- No exceedances of the highly affected noise limit of 75 dB are predicted during construction;
- No exceedances of the adopted PSNL are predicted for operational noise; and
- No exceedances of road traffic noise criteria are predicted for traffic generated by the development.

8.1.5 Mitigation and Management

The following mitigation and management measures will be adopted during construction, operation, and decommissioning of the solar farm:

- Mulchers and/or tub grinders should be strategically located away from NSR and their use avoided near the site boundary;
- Given that construction noise levels are predicted to exceed the relevant limits at certain receptors, a Construction Noise Management Plan (CNMP) will be developed for the site. The objectives of the CNMP will be to:
 - > Ensure that construction noise from the Project is minimised;
 - > Maintain compliance with conditions of the project approval and legislation relating to noise;
 - > Provide a protocol for monitoring and assessing construction noise impacts on surrounding private receptors; and
 - > Ensure effective communication with the local community and regulators regarding construction of the proposed Project.

General mitigation measures for the construction period such as working within specified hours, maintaining equipment in good working order and minimising noise should also be included in the CNMP where possible.

Further details are included in the **Noise Impact Assessment** attached as **Appendix 5**.

8.2 Traffic and Transport

8.2.1 Introduction

An assessment of traffic and access impacts of the proposed development has been undertaken by Pavey Consulting Services. The purpose of this report was to determine the potential traffic impacts resulting from the proposed development and to recommend treatments to mitigate these impacts. The **Traffic Impact Assessment** is attached as **Appendix 6**.

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, site access point and likely transport impacts 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”

A full summary of the SEARs requirements (including agency responses) are included within **Appendix 1**.

8.2.2 Existing Environment

8.2.2.1 Network and Transport Routes

The Project site has been selected to benefit from proximity to the existing electricity grid 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 two roads that would primarily be used by the Project to transport equipment and machinery are:

- Riverina Highway (MR 694), which connects (in part) Finley to Deniliquin to the west and Finley to Albury to the east; and
- Newell Highway which connects Finley to the south (Victoria) and the North (NSW and Queensland).

Canalla Road is a local road which connects the site to Riverina Highway. This route would be used by Project traffic which is travelling to and from Finley. The speed limits on the relevant State Highways are generally 100 km/hr surrounding the site.

8.2.2.2 Site Access

The proposed principal access to the site is via Canalla Road. Canalla Road intersects with the Riverina Highway at an unimproved staggered T-intersection (with Martinetalls Road) with left de-acceleration lanes but no right turning lanes. Both side rides are sealed for a distance of approximately 5m from the intersection. Canalla Road is an all-weather gravel road with a formation width up to 8 meters.

The Riverina Highway and the Canalla Road approaches to the intersection are shown on **Plates 13 to 15** below and also on **Figure 7**.



Plate 13 Canalla Road approach to Riverina Highway



Plate 14 Canalla Road / Riverina Highway Intersection (east)



Plate 15 Canalla Road / Riverina Highway Intersection (west)

The sight distances for traffic approaching this intersection along all roads are very good with the road being straight and level in both directions which allow drivers to see for at least 500m both north and south of the intersection.

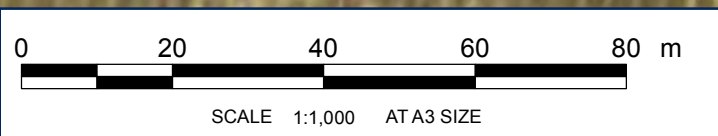
1. This plan was prepared for the sole purposes of the client for the specific purpose of producing a photographic overlay plan. This plan is strictly limited to the Purpose and does not apply directly or indirectly and will not be used for any other application, purpose, use or matter. The plan is presented without the assumption of a duty of care to any other person (other than the Client) ("Third Party") and may not be relied on by Third Party.

- 

Marantellis Road

Riverina Highway

Canalla Road



LOCATION : FINLEY, NSW

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 55

DATE : 22/8/2017

PURPOSE: EIS

VERSION (PLAN BY): B A3 (james.hugo)

PATH: J:\JOBS\136K\136808 Finley\10 - Drafting\Arcgis Map Documents\Planning\136808 Figure X Intersection AA3 20170822.mxd

CLIENT: ESCO PACIFIC
JOB REF: PR 136808

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RPS

8.2.2.3 Existing Traffic Volumes

Baseline daily traffic volumes for the affected roads (project access routes) have primarily been sourced from published RMS daily traffic surveys for the years between 2006 and 2011. To establish a baseline daily traffic volume for 2017, 3% (linear) annual traffic growth has been applied from 2011 to 2017. Note the 3% annual (linear) traffic growth is based on actual growth for RMS classified counts between 2006 and 2011.

Table 10 below details RMS traffic data for the period 2006 to 2011 and year 2017 with the 3% linear growth applied.

Table 10 RMS Traffic Volumes for the Riverina Highway

Road	Year	Annual Average Daily Traffic (AADT)	% Heavy Vehicles
Riverina Highway (east of Deniliquin)	2006	1065	14
Riverina Highway (east of Deniliquin)	2010	796	14
Riverina Highway (west of Finley)	2006	1307	14
Riverina Highway (west of Finley)	2010	1232	15
Riverina Highway (west of Finley)	2011	1509	19
Riverina Highway (west of Finley)	2017 (assumed)	1780	19

Source: RMS Traffic Volume Viewer

Further, hourly traffic counts were carried out on 20 and 21 July 2017 to verify the 3% growth assumption for 2017 and to determine existing turning movements at key intersections. These counts indicated that between 8:15am and 9:15am and between 2:30pm and 3:30pm respectively on the above dates that the 3% growth rate applied between 2011 and 2017 is applicable. **Tables 11** and **12** below detail the traffic counts undertaken on the respective days periods and **Tables 13** and **14** detail the turning movements during the same dates and periods.

Table 11 Hourly Volume Count 21 July 2017 - Morning Period

Road	Volumes East Bound	% Heavy Vehicles	Volumes West Bound	% Heavy Vehicles
	East Bound / North	East Bound / North	West Bound / South	West Bound / South
Riverina Highway at intersection with Canalla Road	46	8%	32	30%
Canalla Road	0	0%	0	0%
Marantellis Road	2		2	

In addition, a school bus was also observed on 21 July 2017 during the morning counts heading east towards Finley on the Riverina Highway.

Table 12 Hourly Volume Count 20 July 2017 - Afternoon Period

Road	Volumes East Bound	% Heavy Vehicles	Volumes West Bound	% Heavy Vehicles
	East Bound / North	East Bound / North	West Bound / South	West Bound / South
Riverina Highway at intersection with Canalla Road	32	25%	42	30%

Road	Volumes East Bound	% Heavy Vehicles	Volumes West Bound	% Heavy Vehicles
Canalla Road	2	0%	2	0%
Marantellis Road	0	0%	0	0%

Table 13 Hourly Turning Movements at Riverina Highway and Canalla Road 21 July 2017 – Morning Period

Road	Hourly Turning Movements
Riverina Highway turning into Canalla Road from the east	0
Riverina Highway turning into Canalla Road from the west	0
Riverina Highway turning into Marantellis Road from the east	2
Riverina Highway turning into Marantellis Road from the west	0
Canalla Road into Riverina Highway east bound	0
Canalla Road into Riverina Highway west bound	0
Marantellis Road into Riverina Highway east bound	2
Marantellis Road into Riverina Highway west bound	0

Table 14 Hourly Turning Movements at Riverina Highway and Canalla Road 20 July 2017 – Afternoon Period

Road	Hourly Turning Movements
Riverina Highway turning into Canalla Road from the east	2
Riverina Highway turning into Canalla Road from the west	0
Riverina Highway turning into Marantellis Road from the east	2
Riverina Highway turning into Marantellis Road from the west	0
Canalla Road into Riverina Highway east bound	2
Canalla Road into Riverina Highway west bound	0
Marantellis Road into Riverina Highway east bound	0
Marantellis Road into Riverina Highway west bound	0

8.2.2.4 Capacity Standards

8.2.2.4.1 Lane Capacity

Road width design standards for low volume (generally rural) roads are defined by the Austroads Guide to Road Design (Austroads 2010) and are based on daily traffic volumes. The current design standards applicable to major roads are presented in **Table 15**.

Table 15 Daily Traffic Volumes and Related Design Standards

Daily Traffic Volume	Austroads (2010) Design Standard	Applicable Roads	Meets Design Volume Standard
0 - 150	Single lane sealed or dual lane unsealed	Canalla Road	Yes
1,000 - 3,000	Austroads requires a 9m wide seal	Riverina Highway	Yes

The roads surrounding the site each have acceptable road cross sections which meet the Austroads (2010) road design standard for the daily traffic volumes using each route. There is also a large margin of spare traffic capacity to accommodate significant daily traffic increases, without requiring any increase to the design standard of the routes.

8.2.2.4.2 Warrants for Intersection Improvement

Rural intersection operations are assessed by combining the peak hourly through and turning traffic volumes occurring at each intersection. This determines the need for additional intersection turning lanes in accordance with Austroads (2010) design standards.

The intersection peak hourly traffic volumes comply with the relevant Austroads Warrant Charts for Rural Intersection Design as shown by **Figure 8** and **Figure 9** below. The design charts cater for roads with either 100 km/hr or higher design speeds or design speeds lower than 100 km/hr.

The design speed for intersection Riverina Highway and Canalla Road in the locality of the proposed site access is 100 km/hr. For this design speed, additional left or right turn traffic lanes are not generally required, as long as the peak hourly traffic volume remains below approximately 120 vehicles per hour. Further discussion is provided below in **Section 8.2.3** regarding peak traffic volumes.

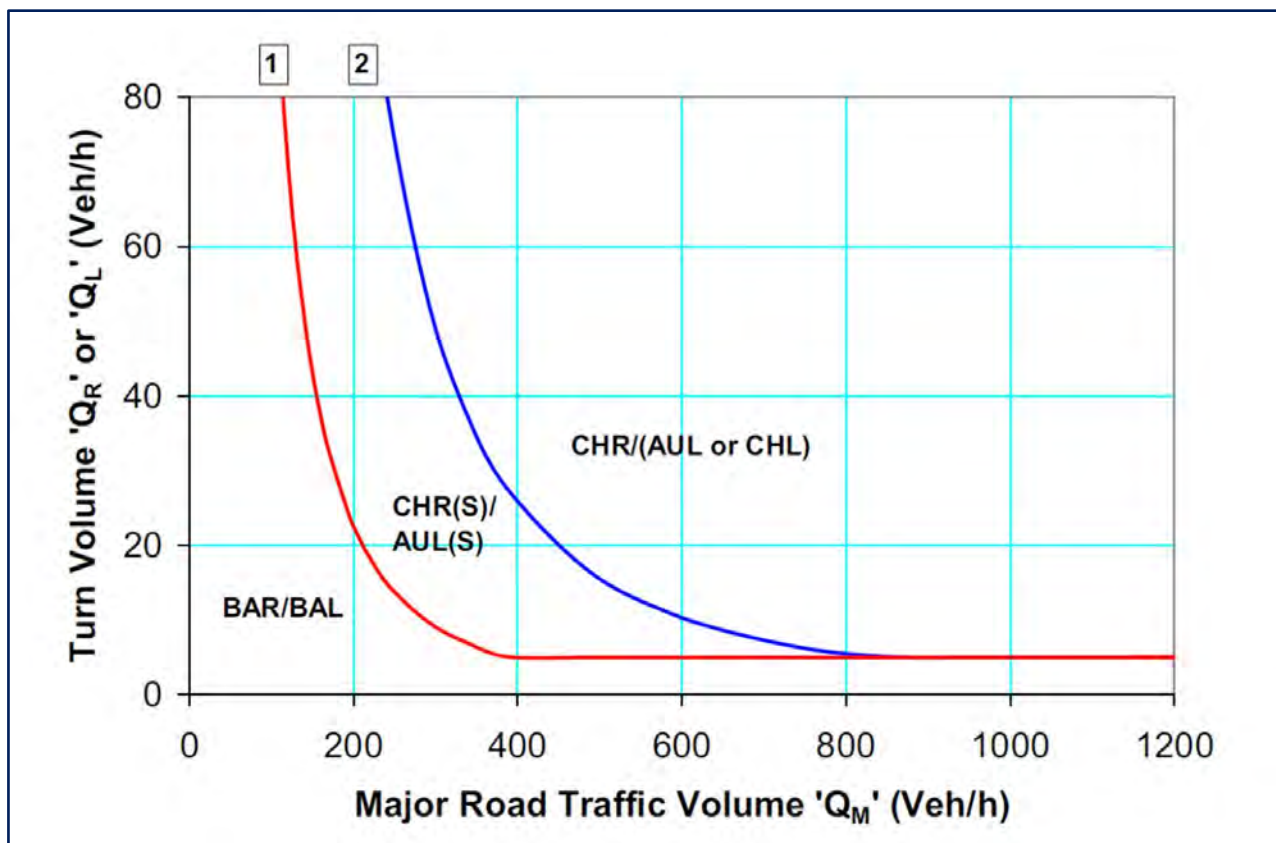


Figure 8 Austroads Warrant Design Chart for Rural Intersections – Over 100km/hr

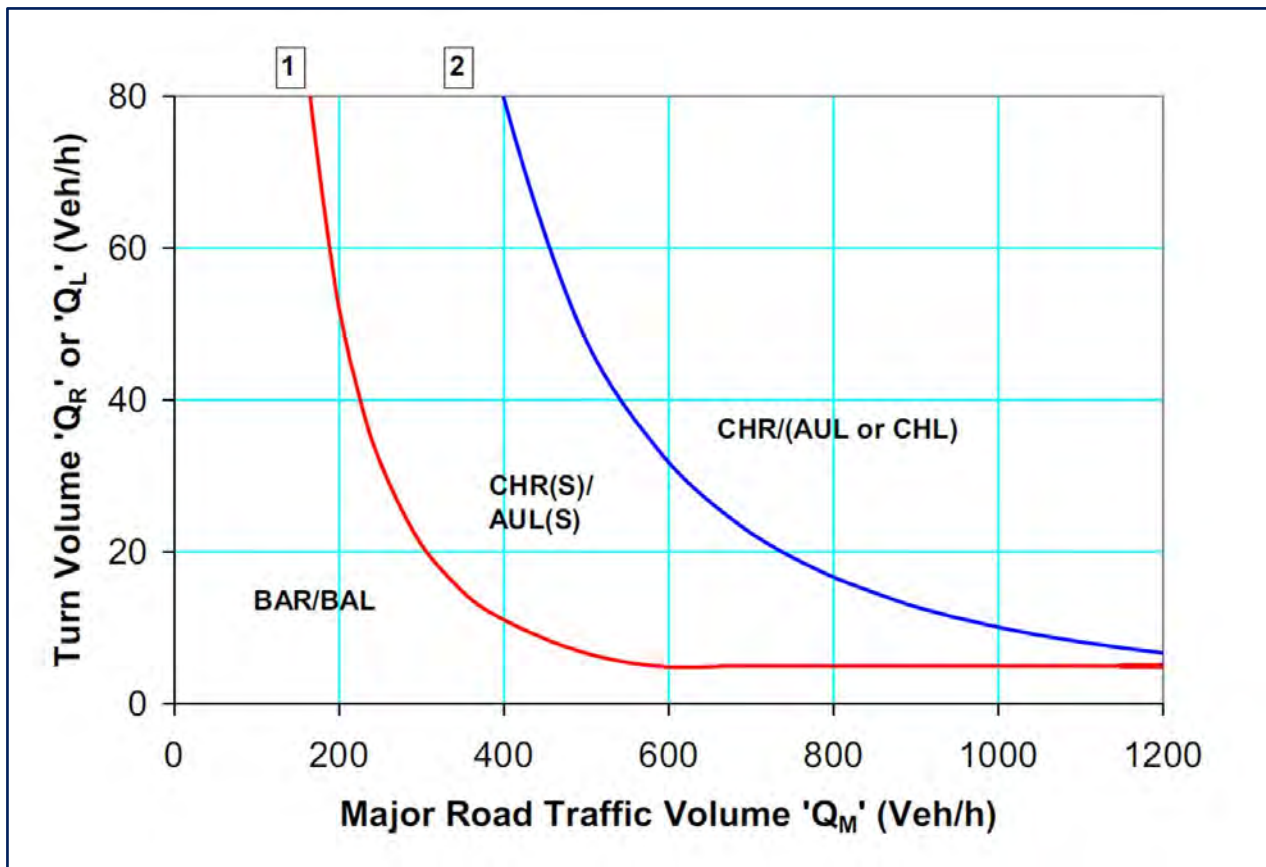


Figure 9 Austroads Warrant Design Chart for Rural Intersections – Under 100km/hr

8.2.3 Impact Assessment

8.2.3.1 Construction and Traffic Generating Activities

Construction of the Project will take approximately 9 months from the commencement of site establishment works. Construction activities will 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 will 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.

The operational lifespan of the solar farm will be up to 40 years. The future decommissioning of the development will require the removal of all above ground infrastructure at the site and rehabilitation activities. This would entail increased workforce requirements and daily traffic movements similar to those produced during the Project construction stage.

8.2.3.2 Site Access and Circulation

An all-weather access road into the Project area currently exists from the entrance to the 'Happy Valley' property off Canalla Road. This access will facilitate solar farm traffic during construction and operations in addition to a separate entrance off Canalla Road for access to the solar farms construction office and compound, permanent site office, maintenance building and switch yard.

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. All weather gravel surfaces will be provided for the internal site access roads.

8.2.3.3 Traffic Generation

The following generated daily traffic movements and corresponding vehicle types have been determined based on the proposed construction time frame. Truck traffic movements will typically be semi-trailer type truckloads for all deliveries of plant and equipment to the site. Traffic generation to and from the site for construction, operations, and decommissioning is detailed further below.

8.2.3.3.1 **Construction**

It is anticipated that the average traffic generation during the construction phase will peak at 41 movements per day. Construction is programmed to cover a 9 month period during which traffic will be generated from the following sources:

- Light vehicle movements for construction workers 22 each day, generally in the morning and afternoon as construction workers arrive and leave the site; and
- It is anticipated that heavy vehicles peak at 19 movements each day to unload components and materials.

In addition, during the non-peak construction periods (months 1-4 and 7-9) average heavy vehicle generation is expected to peak at 12 movements per day.

8.2.3.3.2 **Operations**

It is anticipated that the average traffic generation during operations will peak at 14 movements per week, or 2 movements per day. These staff will be onsite for maintenance and monitoring purposes.

8.2.3.3.3 **Decommissioning**

It is anticipated that traffic generation for decommissioning activities will be no greater than traffic generation for the construction period. Decommissioning traffic movements are based on the following:

- Light vehicle movements 22 movements each day generally in the morning and afternoon; and
- Heavy vehicle movements 19 each day to remove infrastructure and to deliver earthwork machinery.

8.2.3.4 Traffic Distribution

The anticipated number of construction workers on site will be in the order of 200 staff. Of these workers, 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 Finley, Berrigan, or Tucumwal. To determine the effect of increase traffic on the capacity of the road networks and associated intersections traffic distribution has been assumed as follows:

Light Vehicles

- 100% (22) of the workforce will be based locally travelling to and from the site from Finley along the Riverina Highway.

Heavy Vehicles

- 80% (15) of truck deliveries will be travelling to and from the site from Finley along the Riverina Highway; and
- 20% (4) of truck deliveries will be travelling to and from the site from Deniliquin along the Riverina Highway.

8.2.3.5 Traffic Volumes

The existing daily traffic volumes (estimated baseline daily traffic volumes for the year 2017) for Riverina Highway and Canalla Road and the existing adequacy of the road design standards for these routes is discussed above in **Section 8.2.2.3**.

The Project baseline traffic conditions within the local road network and the predicted future daily traffic during the average construction phase of the Project are provided in **Section 8.2.2.3** and **Section 8.2.3.3** above.

8.2.3.5.1 **Construction Traffic**

During construction, the additional movements along Riverina highway would see an increase in traffic volumes of:

- 0.5 % East-bound; and
- 4.0 % West-bound.

Such an increase is well within the capacity of Riverina Highway and will have very little effect the operation and safety of this section of the road.

Whilst a significant increase in traffic is anticipated along Canalla Road, the overall all future daily traffic volume for the route would remain below the road design standards value of 150 daily vehicles (Austroads 2010).

8.2.3.5.2 **Operational Traffic**

During the operational phase, the impact of addition of 2 movements per day on the Riverina Highway and Canalla Road will not be noticeable and will have no effects on the future traffic operations, level of service, or traffic safety for the future traffic using these routes.

8.2.3.5.3 **Decommissioning Traffic**

As traffic generated during the decommissioning phase has been assumed to be similar to that generated during the construction phase daily traffic increases will have only minimal effects on the future traffic operations, level of service, or traffic safety.

8.2.3.6 Traffic Impact at Intersections

The future volumes of through traffic using the intersection on Riverina Highway and Canalla Road are not anticipated to increase significantly as a result of the Project and will remain at approximately 100 hourly vehicle movements (two-way traffic) for the duration of the Project construction period of 9 months.

An assessment of the construction and operational traffic movements and intersection use at the junction of the Riverina Highway and Canalla Road has been undertaken in accordance with Austroads Guide to Road Design Part4A. This design component assesses Type BAR/BAL left and right turn treatments for intersections and determines whether an existing treatment is adequate for the additional traffic use.

The required intersection treatment is already in place at the intersection of Riverina Highway and Canalla Road and hence no further work is considered required.

8.2.3.7 Traffic Safety and Management

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

A Construction Traffic Management Plan (CTMP) will be prepared in accordance with RMS guidelines (ie. RMS Traffic Control at Worksites, 2010) and will provide appropriate safety measures to warn road users of the presence of construction traffic and increased turning movements. The CTMP will also address periodic grading and dust control along Canalla Road.

In addition, temporary traffic control arrangements will be employed at the site access intersection during the peak stages of construction traffic activity and on days when deliveries by oversize vehicles are required.

The potential distraction and impacts of glare on passing motorist have been assessed in the **Visual Impact Assessment** attached as **Appendix 7** to this EIS.

8.2.4 **Mitigation and Management**

The traffic impacts from the proposed Finley Solar Farm have been assessed and the key findings and mitigation and management measures are as follows:

- Access will be from Canalla Road via an existing unsealed access road into the Project site;
- The existing daily traffic volumes using Canalla Road satisfy the relevant Austroads (2010) design standards. The predicted increase in traffic along Canalla Rd will not increase traffic volumes above the design guideline requirements and hence no additional works are required;
- The intersection sight distances of the proposed site access intersection with Canalla Road provide for very good traffic safety. The intersection has straight and level approaches and more than adequate for the road speed limit of 60 km/hr;
- The requirements of the Austroads Warrant Design Charts for additional turning lanes at rural intersections indicate that no additional intersection turning lanes are required at the proposed site access intersection with Canalla Road;
- The existing daily traffic volumes using Riverina Highway satisfy the relevant Austroads (2010) design standards. The predicted increase in traffic along Riverina Highway will not increase traffic volumes above the design guidelines and hence no additional works are required;
- The available intersection sight distances of approximately 500m at the intersection of Riverina Highway with Canalla Road provide for very good traffic safety. The intersection has straight and level approaches and more than adequate for the road speed limit of 100 km/hr;
- The assessment of Austroads Warrant Design Charts for additional turning lanes at rural intersections indicates the current intersection meets the requirements set out in this standard and as such additional intersection turning traffic lanes are not required at the intersection of Riverina Highway with Canalla Road;
- The predicted additional daily traffic usage for the assessed roads at the peak stage of Project construction will be approximately 41 movements (ie. round trips) each day and reducing to 2 movements each day during operations;
- Additional traffic generated by the Project will not cause the future daily traffic volumes on either the Riverina Highway or Canalla Road to increase above the relevant design levels that would trigger road widening improvements;
- The internal site roads and car parking will be constructed to serve the Project's construction access and car parking needs. Internal roads will generally be all-weather gravel roads. 10 Car parking spaces will be

provided for the Project construction and operations workforces and will be constructed from gravel to allow all-weather access; and

- A Construction Traffic Management Plan (CTMP) will be prepared in consultation with RMS and in accordance with the RMS *Traffic Control at Worksites Manual (2010)*. The CTMP will also address periodic grading and dust control on unsealed roads used by construction vehicles.

For further detail on traffic assessment and management refer to the **Traffic Impact Assessment** attached as **Appendix 6**.

8.3 Visual

8.3.1 Introduction

An assessment of visual impacts from the proposed development 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 full **Visual Impact Assessment (VIA)** is attached as **Appendix 7**.

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 1**.

8.3.2 Existing Environment

8.3.2.1 Landscape Character

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

The landscape character of the greater Finley area is also typified by the patchwork of rural properties which exist across 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, tree plantings, and fencing. Additional property separation exists due to the presence of the Murray Irrigation Limited’s network of channels, canals and weirs.

The rural landscape of Finley area contains built form associated with agricultural activities. These include buildings, sheds, loaders and other relevant infrastructure. Dwellings are scattered on rural properties throughout the region and a number of these surround the site. Although each dwelling is generally screened with landscaping, they form clusters of visual receptors due to their proximity to the site.

This industry focussed infrastructure & development has resulted in visual quality and a degree of visual variety which contributes greatly to the landscape character of Finley. Although the landscape character is linear in terms of overall composition, a distinct landscape character exists.

Approximately 3.6km to the east of the proposal is the Finley Township, which houses a significant proportion of Finley’s 2,519 residents (Australian Bureau of Statistics, 2016). Established in 1840’s, the township was modelled on the grid-style urban structure existing today, and contrasts to the balance of Finley’s pastoral landscapes. The township is juxtaposed diagonally through the rural landscape, contrasting with the generally north-south alignment of the rural properties.

The Finley 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 site, and the presence of screening vegetation, exposure to the site would be negligible.

The distinctly vast and open landscape character of Finley 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.

8.3.3 Methodology

This visual assessment uses a common approach to visual quality assessment that is systematic, consistent & based on professional, value judgement of commonly accepted & 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 follow has been undertake 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 & 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.

8.3.4 Visual Impact Assessment

8.3.4.1 Viewpoint Analysis

Due to the infeasible nature of completing an assessment for each individual visual receiver within a 4km radius of the Project site, the assessment has considered groups or clusters of visual receivers which are used to highlight the influence of the proposal on a broader context.

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

1. Sensitivity of the character; and
2. Magnitude of the proposal.

Further detail on the above two measurements is provide below.

8.3.4.1.1 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 16** below details the 3 categories use to determine sensitivity.

Table 16 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.

8.3.4.1.2 Magnitude

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

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

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 proposed development;
- 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 proposed development and whether the views are permanent, full, partial or glimpses.

The magnitude of proposal in a landscape character depends on the scope of the proposal. The location of the proposal in relation to the region in question also influences magnitude. Six categories are used in ranking the magnitude of a proposal, ranging from negligible to high. Impact on the Landscape Character is determined using the matrix shown in below in **Figure 10**.

		Magnitude			
		High	Moderate	Low	Negligible
Sensitivity	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 10 Impact Grading Matrix

The impact assessment has considered 8 viewpoints surrounding the proposed development, each of which is shown on **Figure 11**. A summary of the results of the viewpoint analysis are shown in **Table 17**, while the full viewpoint analysis results and photomontages are provided Sections 4.2.1 to 4.2.8 of the **Visual Impact**

Assessment attached as **Appendix 7** to this EIS. In addition, **Figure 12** provides a representation of the solar farm development and surrounding landscape viewing north from Broughans Road.



Figure 11 Viewpoint Locations



Figure 12 Graphic representation viewing north from Broughans Road

Table 17 Viewpoint Analysis Summary Results

View Point	Location	Sensitivity	Magnitude	Impact
VP1	Views from Broockmanns Road & Riverina Highway	High	Moderate	Moderate
VP2	Views from houses 5, 6 & 7	High	Low	Moderate
VP3	Views from houses 12 & 13	High	Low	Moderate
VP4	Views from Finley Township (Hamilton Street west)	Negligible	Negligible	Negligible
VP5	Views from houses 21 & 23	High	Negligible	Negligible
VP6	Views from houses 15, 19, 20 & 22	High	High	High-Moderate
VP7	Views from houses 8, 9, 16, 17 & 19	High	High	High
VP8	Views from houses 10, 14 & 18	High	Negligible	Negligible

The results of the viewpoint analysis show that the proposal will change the landscape of the setting at the site level, however beyond the site level the development will have an overall moderate impact on the local area. The landscape character of the setting is significantly rural, with much of the vegetation that lines the properties adjacent to the roads providing a visual barrier to the development for receivers. The benefit of this existing vegetation has been to contain the view shed to the immediate vicinity and block more distant views of the area.

A number of view sheds were identified as having the potential for a visual impact from the proposed development. The majority of views to the proposal area were found to have a moderate impact.

8.3.4.2 Landscape Treatment

Based on the results of the viewpoint analysis, a landscape treatment has been proposed to reduce the impacts on nearest receivers. The treatment involves the planting of a 3m wide vegetative buffer on an 0.5m earth mound around the perimeter of the development area in strategic locations to screen the solar farm from the surrounding residential landowners. The vegetative screen would consist of a range of native tree and shrub species endemic to the locality. Trees would be spaced at 3m, whilst shrubs would be used to in-fill between the trees to create a solid barrier once reaching maturity.

Figures 13, 14 and 15 provided below show the overall landscaping proposed for the perimeter of the development, detailed buffer planting plan, and a section buffer section.



Figure 13 Proposed Boundary Landscaping Treatment



Figure 14 Vegetation Buffer Plan

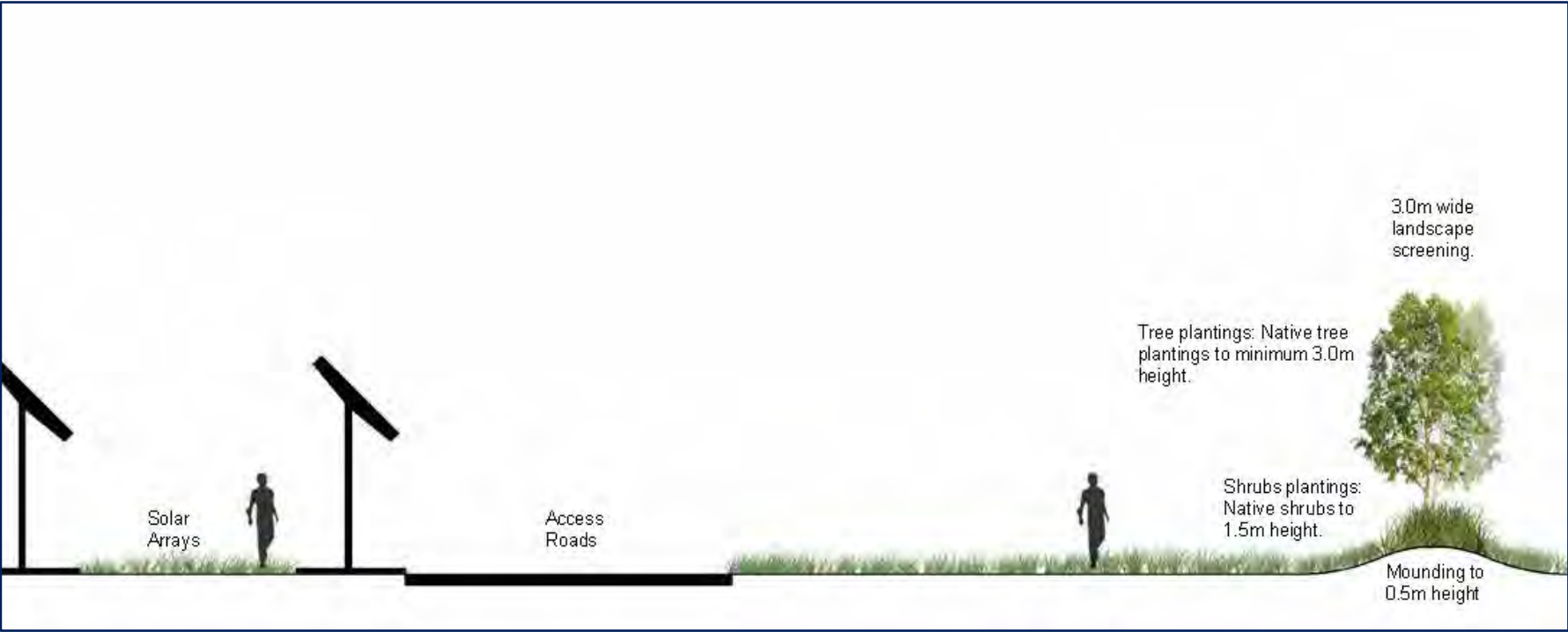


Figure 15 Buffer Planting Section

8.3.5 Reflectivity Assessment

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

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

8.3.5.1 Design and Mechanical Behaviour

Glare based visual nuisance associated with the development will be largely influenced by the location and position of the solar panels relative to sensitive visual receptors within a closer proximity to the proposal 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 6:00am, until about 9:00am when the solar panels will begin to move and follow the path of the sun.

Likewise, from approximately 4:30pm until sunset (last light) the solar panels will remain at a constant 45 degree angle (refer to Figure 25 of the **Visual Impact Assessment** attached as **Appendix 7**).

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.

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 2% of the sunlight received.

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

- Steel array mounting structures;
- Temporary site offices, sheds, and containerised inverter stations;
- Site step-up transformer;
- 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 Proposal within the Existing Environment

Photovoltaic solar panels generally will not create noticeable or nuisance glare compared with other commonly existing surfaces, such as building roofs. Likewise, photovoltaic solar panels are less reflective than other naturally occurring elements such as soils and crops (refer to Table 6 of the **Visual Impact Assessment** attached as **Appendix 7**). Photovoltaic solar panels reflect approximately 3-20% of the light received depending on the angle of incidence.

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

Seen from aircraft, photovoltaic solar panels appear dark grey and do not cause a glare or reflectivity hazard.

8.3.6 Mitigation and Management

8.3.6.1 Landscape

8.3.6.1.1 Construction

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

- Avoid unnecessary loss or damage to vegetation adjacent to the site and within the site by protecting trees prior to construction and/or trimming vegetation to avoid total removal;
- Minimise light spill from the development into adjacent visually sensitive properties by directing construction lighting into the construction areas and ensuring the site is not over-lit;
- 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;
- The site is 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.

8.3.6.1.2 Operations

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

- Undertake rehabilitation planting as early as possible to replace any vegetation that provided screening to adjacent residential properties and sensitive visual receivers. Where this is not possible, screening and planting should be initiated to the boundaries within private lands. This approach may be feasible to the site corner areas, whereby internal plantings would largely mitigate the influence of the proposal on residential properties;
- Landscape documentation highlighting screening planting and street-scape design should be prepared in alignment with the civil design to ensure integration between the development and the existing landscape character;
- Undertake regular landscape maintenance works to maximise the health and effectiveness of existing and new plantings;
- Where any unplanned removal of visually significant vegetation occurs, a localised landscape plan should be prepared to mitigate and reduce visual influence;
- Design landscaping to specific sections of the perimeter of the development to mitigate views from houses located within a sensitive proximity;
- Explore the potential for landscaping the home yard area of an affected receiver; and
- Where possible, undertake consultation with individual affected landowners regarding individual landscaping plans.

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 proposal would have a minimal influence on locally positioned visual receptors. Therefore no mitigation measures are proposed to mitigate glare and reflectivity.

The further details on visual impact refer to the **Visual Impact Assessment** attached as **Appendix 7**.

8.4 **Biodiversity**

8.4.1 **Introduction**

An assessment of potential biodiversity impacts from the proposed development has been undertaken by EcoLink on behalf of Accent Environmental. The purpose of this assessment was 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). This report recognises the relevant requirements of the EP&A Act 1979 as amended by the *NSW Environmental Planning and Assessment Amendment Act 1997*. Assessment has also been made with regard to those threatened entities listed under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Threatened biodiversity listed under the TSC Act and EPBC Act of potential relevance to the site was initially identified from database searches and followed by field assessment to validate the likelihood of occurrence analysis and preliminary vegetation typing and boundary definition. Key constraints were identified and mapped. Impact avoidance, minimisation and mitigation principles were applied, as required by the Framework for Biodiversity Assessment (OEH 2014) followed by an impact assessment for residual impacts.

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

*“**Biodiversity** – including an assessment of the likely biodiversity impacts of the development, having regard to the NSW Biodiversity Offsets Policy for Major Projects, and in accordance with the Framework for Biodiversity Assessment, unless otherwise agreed by the Department”*

Attachment 1 of the SEARs also provide a list of the relevant environmental planning instruments, guidelines, policies, and plans that may be applicable to the environmental assessment of the development. Those most relevant to this biodiversity assessment include the following:

- NSW Biodiversity Offsets Policy for Major Projects, Office of Environment and Heritage, 2014.
- Threatened Species Assessment Guidelines - Assessment of Significance, Office of Environment and Heritage, 2007.
- Policy and Guidelines for Fish Habitat Conservation and Management, Department of Primary Industries, 2013.

A full summary of the SEARs requirements (including agency responses) are included within **Appendix 1**.

8.4.2 **Methodology**

Preliminary assessments undertaken to support the request for SEARs (Accent 2017) and later habitat assessment covered an area of 500 ha. This area comprised the total area of land secured by ESCO Pacific across the three properties. In discussion with ESCO Pacific, and consistent with their commitment in the Preliminary Environmental Assessment – Scoping Report (Accent 2017) to avoid and minimise biodiversity impacts, a smaller (383 ha) maximum Project footprint was identified within the area of land secured by ESCO Pacific.

8.4.2.1 Desktop assessment and field survey

A desktop review was undertaken to identify:

- Threatened flora and fauna species, populations and ecological communities (biota) listed under the TSC Act and FM Act; and
- Biodiversity-related Matters of National Environmental Significance (MNES) under the EPBC Act which have potential to occur in the locality, based on previous records, known distribution ranges, and habitats present.

A site assessment of habitat was undertaken from 27 to 29 June 2017 by Principal Ecologists from Ecolink Consulting. The entire 500 ha area of land secured was walked or driven to assess the location and quality of habitats that were present. Key parameters of the habitats (such as the presence/absence of shelter, foraging, nesting resources) were recorded to determine the quality of the habitats present. Areas with the highest likelihood of containing native fauna, including threatened species, were inspected more closely in an attempt to inform the presence of these species based on the habitat quality. Active searches were undertaken underneath debris and leaf litter, and signs, tracks and scats were recorded to confirm the presence of particular species or fauna groups. Incidental observations of all fauna species were recorded throughout the assessment and combined with the list of species observed during a preliminary site assessment conducted in May 2017 (Accent 2017).

8.4.2.2 Plot/transect surveys

A total of seventeen plot/transects were assessed during the field habitat assessment by Ecolink (June 2017) to confirm plant community types (PCTs) within the area of land secured by ESCO Pacific. Data collected from six of these plot/transects within the 385 ha development site were used in accordance with the data requirements of the Biobanking calculator to assess site values within the site. RPS also provided supplementary data based on site observations.

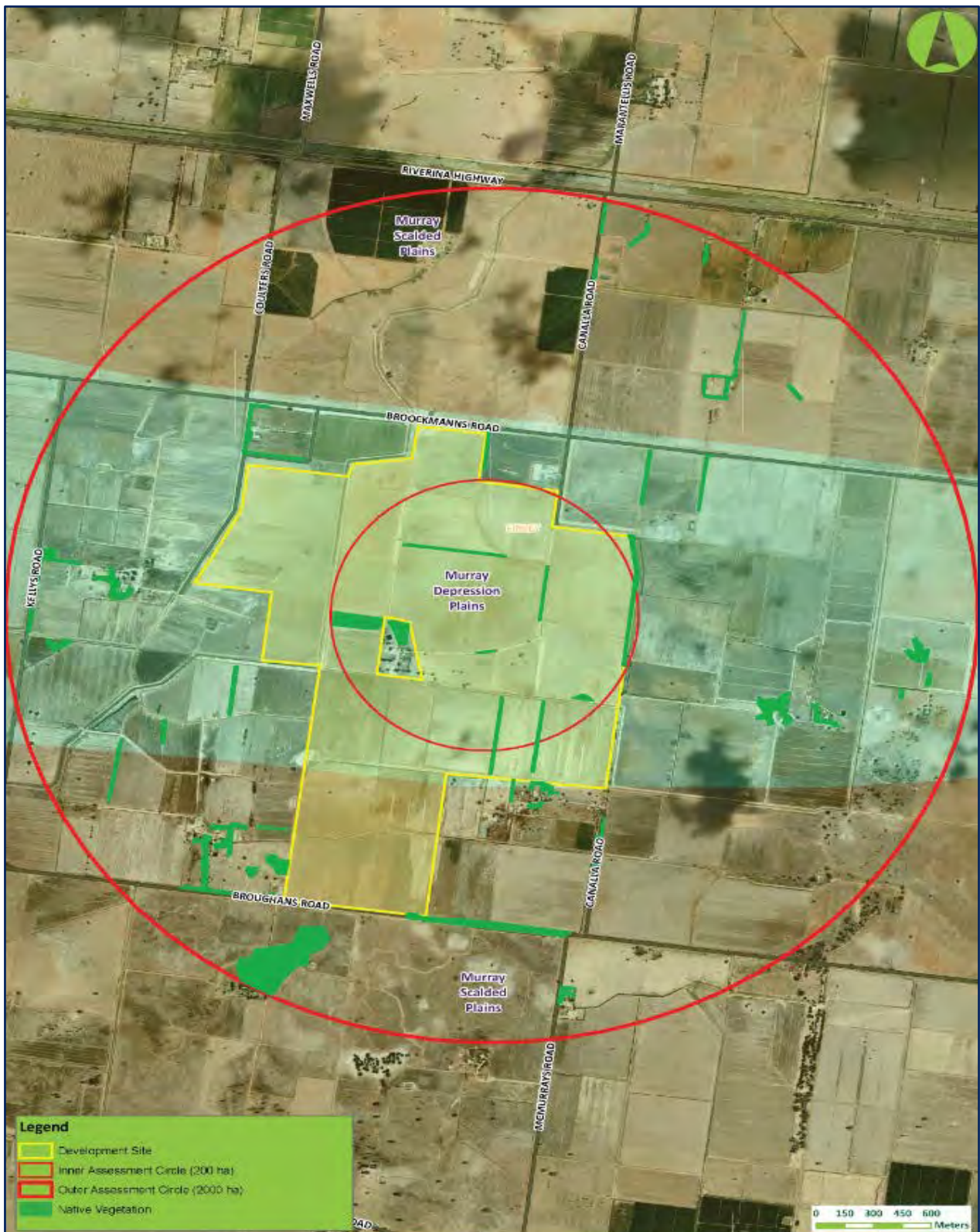
Plot data was used to investigate the appropriate PCTs present on site using the Plant Community Type Identification Tool software program (NVIS v.2.1). As most of the development site has been historically cleared and used for agriculture, the Biobanking Paddock Tree Calculator was used to assess the site values of land used for crops and pastures. The Biobanking Paddock Tree Calculator was applied to an earlier 339 ha development site that was subsequently extended south to achieve the currently proposed 385 ha site. As no paddock trees are located within the area extended south, the paddock tree calculation remains valid.

8.4.3 **Existing Environment**

The land comprises flat lying open paddocks crossed by a network of irrigation and drainage channels, and a waterway crossing the westernmost paddock that supplies water to a farm dam. The site is highly modified due to a long history of agriculture and grazing.

8.4.3.1 Landscape Features

For all analyses of landscape features, a 200ha inner and 2000ha outer assessment circle has been used in accordance with Appendix 4, Table 8 of the FBA using the GIS layers and aerial imagery. Refer to **Figure 16** below.



Source: Finley Solar Project Biodiversity Assessment Report August 2017

Figure 16 Inner (200ha) and outer (2000ha) assessment circles

8.4.3.1.1 Bioregions and sub-regions

The development site and outer assessment circle occur wholly within the Riverina Bioregion. The Riverina Bioregion extends from Ivanhoe in the Murray Darling Depression Bioregion, south to Bendigo, and from Narrandera in the east to Balranald in the west. Within its boundaries lie the towns of Hay, Coleambally, Deniliquin, Leeton, Mossgiel, Hillston, Booligal and Wentworth, while Griffith, Ivanhoe, Narrandera and Albury lie just outside its boundary in neighbouring bioregions.

The development site and outer assessment circle also occur wholly within the Murray Fans Subregion. The geology of the subregion is quaternary alluvial sediments, clay and sand with source bordering dunes, lakes and swamps. Characteristic landforms are relatively confined alluvial fan constrained by sediments from northern Victorian rivers, the Murrumbidgee fan and the Cadell fault. Vegetation types include extensive River Red-gum forests with river cooba on channels and low floodplains, Yellow Box and Black Box with saltbush on high floodplains and terraces. Common Reed, Cumbungi and grasses are evident in swamps.

Two Mitchell landscapes occur within the outer assessment circle, the Murray Depression Plains and Murray Scalded Plains. Table 3.2 of the **Biodiversity Assessment Report** (refer **Appendix 10**) shows the percentage of the development site located in each landscape.

8.4.3.1.2 Rivers, streams, estuaries and wetlands

No natural watercourses occur within, or adjacent to the development site. The nearest natural watercourse are as follows:

- Murray River approximately 15km to the south;
- Billabong Creek and Wangamong Street over 30km to the north;
- Unnamed watercourse approximately 30km to the south;
- Edward River over 40km to the west.

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

The Project will not result in any impacts on these waterways or wetlands.

8.4.3.1.3 Landscape value assessment

A Biobanking Credit Assessment was undertaken to determine the landscape value of the development site, in accordance with Appendix 4 of the FBA, Assessing landscape value for site-based developments.

Tables 3.4 and 3.5 of the **Biodiversity Assessment Report** (refer **Appendix 10**) provide a summary of the extent of native vegetation estimated to occur within the inner and outer assessment circles as part of the landscape value assessment.

As defined in the FBA, native vegetation on a development site is part of a connecting link when it is linked to adjoining vegetation and the native vegetation on the development site, and meets the following conditions:

- Is in moderate to good condition;
- Has a patch size >1 ha;
- Is separated by a distance of <100 m (or <30 m for non-woody ecosystems);
- Is not separated by a large water body, dual carriageway, wider highway or similar hostile link.

There are no connecting links within the development site or the inner and outer assessment circles. All areas of native vegetation within and adjacent to the development site are separated by distances greater than 100m.

As defined in the FBA, patch size is an area of native vegetation that meets the following criteria:

- Occurs on the development site or offset site;
- Is in moderate to good condition;
- Includes native vegetation that has a gap of less than 100 m from the next area of moderate to good condition native vegetation (or ≤ 30 m for non-woody ecosystems).

Patch size may extend onto adjoining land that is not part of the development site.

The patch size score is determined by using the following:

- Percent native vegetation cleared in the Mitchell landscape in which most of the development occurs;
- Size (ha) of the largest area of native vegetation within the development site that meets patch size criteria.

Table 3.6 of the **Biodiversity Assessment Report** sets out criteria for assessing patch size.

The development site is mainly located within the Murray Depression Plains Mitchell landscape, which is >90% cleared of native vegetation. The largest area of native vegetation within the development site that meets patch size criteria is 3 ha. The patch size is calculated to be Medium (>1-10 ha) and consequently has a patch size score of 3.

8.4.3.2 Native Vegetation

Native vegetation occurs as scattered paddock trees (within land still used for grazing and cropping) and native plantings in woodlots and windrows. Additional native trees occur within the road reserved adjacent to the development site.

8.4.3.2.1 **Plant community types**

Native vegetation within the development site does not readily translate to any plant community type (PCT) as the residual/remnant native vegetation is limited to scattered paddock trees and vegetation which has been planted (i.e. woodlots and windrows which are not representative of native PCTs).

For the purposes of the FBA, native flora identified during surveys undertaken by Ecolink (Ecolink 2017) were entered into the OEH NSW Vegetation Information System Classification database to identify the PCT most likely to have occurred pre-clearing and from where the remnant native paddock trees may be considered derived from. The results of the Vegetation Information System search are summarised in Table 4.1. of the **Biodiversity Assessment Report** (refer **Appendix 10**). As is evident from the limited species matches shown in Table 4.1, there is not sufficient remnant vegetation diversity to determine the most appropriate PCT based on floristic data and overlapping similarities in landform characteristics. However, in accordance with requirements, the potential for the planted native vegetation to provide habitat for threatened has still been considered.

8.4.3.2.2 **Vegetation zones and site value (condition)**

Vegetation zones identified within the development site include;

- Zone 1 - Pasture and cropped zones (376.4ha);
- Zone 2 - Planted woodlot – low condition (to be cleared) (1.97ha);
- Zone 3 - Planted woodlot – moderate to good condition (to be retained) (1ha);
- Zone 4 - Planted windrows – native trees planted as windbreaks (to be cleared) (3.71ha).

The above zones are also shown on **Figure 17** below.

Zone 1- Pasture and cropped zones

Zone 1 includes scattered paddock trees and crops of Wheat *Triticum aestivum*, Rice *Oryza sativa* and Lucerne *Medicago sativa* subsp. *sativa*. These species are at different stages of their lifecycle or consist of bare ground in preparation for the seeding and growing season. None of the crops were advanced at the time of the assessment.

Pasture areas were grazed by cattle during the current assessment. The vegetation was dominated by exotic species, including a range of pasture grasses and environmental weeds such as *Paspalum dilatatum*, Couch *Cynodon dactylon* var. *dactylon*, Kikuyu *Cenchrus clandestinus*, Perennial Rye-grass *Lolium perenne* and Barley Grass *Hordeum* sp. The height of the vegetation was generally low (less than 5 cm in height) due to grazing pressure.

The pastured areas of the development site support the largest number of scattered paddock trees. A total of 23 scattered paddock trees were recorded within the development footprint. Trees comprised six species, dominated by Grey Box *Eucalyptus microcarpa*, Black Cypress Pine *Callitris endlicheri* and Bull Oak *Allocasuarina luehmannii*. All of these trees were mature specimens.

Zone 1 was assessed by using the Biobanking paddock tree calculator. Paddock tree survey and plot / transects resulted in site values of below 17. In accordance with the FBA, vegetation zones with a Site Value score equal to or below 17 (low condition) do not trigger a requirement for ecosystem credit offsetting. However the potential for this zone to provide habitat for threatened species must still be considered.

Zone 2 – Planted woodlot - low condition

Zone 2 comprises immature native shrubs (predominantly *Acacia* species) and an exotic understorey. In March 2007, this area was ripped and direct seeded with native species and fenced. Prior to this time, it is understood that the area did not contain native vegetation (based on landholder discussions). The woodlot suffered through several initial dry years before showing improved growth following a wet year, but is currently subject to grazing. Zone 2 is to be cleared for the Project. Although this zone was not assigned a PCT, it still requires consideration for its potential to provide habitat for threatened species.

Zone 3 - Planted woodlot – moderate to good condition

Zone 3 comprises a number of planted indigenous, Australian native and exotic species, with an emerging native understorey due to relief from grazing pressure.

Species present included planted canopy species: River Red-gum *Eucalyptus camaldulensis*, a number of non-endemic sheoak spp. (*Allocasuarina littoralis* and *A. verticillata*) and introduced Pepper Tree *Schinus molle*. The groundlayer was dominated by introduced grasses. This woodlot is to be avoided due to its higher ecological value, and will not be cleared for the Project, but still requires consideration for its potential to provide habitat for threatened species.

Zone 4 - Planted windrows

Zone 4 comprises linear planting of trees in several locations within the development site. The species planted are predominantly *Eucalyptus camaldulensis* (River Red-gum) along with *Eucalyptus cladocalyx* (Sugar gum). All trees were reaching maturity, but do not support hollows, nor were any nests evident during site investigations undertaken by Ecolink (2017).



Source: Finley Solar Project Biodiversity Assessment Report August 2017

Figure 17 Vegetation Zones within the development site

8.4.3.3 Threatened Species

The highest quality habitat within the wider area of land secured by ESCO Pacific is associated with the wetland on Lot 136 on Plan 752299, and the irrigation channels located along the western boundary of the Lots 133, 134 and 136. These wetland/aquatic habitats have the highest cover abundance and diversity of native plant species. These locations also supported the highest diversity of native birds, with a range of species from diverse foraging guilds recorded (Ecolink 2017a).

Consistent with Chapter 8 of the FBA the areas with the highest quality habitat have been avoided (e.g. wetland/aquatic habitats and a planted woodlot).

Other habitat features with identified ecological value are the 106 large, scattered, paddock trees distributed throughout the wider area of land secured by ESCO Pacific, some containing hollows that are likely to be a valuable resource in the landscape for a range of bird and arboreal mammal species. These trees are also likely to provide foraging habitat for a range of bird species.

Consistent with Chapter 8 of the FBA, potential impacts to scattered paddock trees has been avoided / minimised with the development footprint containing 26 of the 106 total paddock trees assessed.

Up to twenty one trees are likely to require removal, which includes two hollow bearing trees, five trees will be retained which include four hollow bearing trees.

The remainder of the development site is generally degraded, lacking natural vegetation and of low ecological value to most native species. Some species of bird have adapted well to this type of disturbed landscape, however most native species will be excluded from the development site because it lacks the important resources (e.g. appropriate food source) that they require to persist within the area.

8.4.3.3.1 **Identification of threatened species under the FBA**

The Biobanking credit calculator reports the suite of threatened fauna species that are predicted to be associated with ecosystem credits generated for proposed developments. That is, the threatened fauna species that are predicted to use habitat within the vegetation types in the development site. Section 5.2 of the **Biodiversity Assessment Report** (refer **Appendix 10**) identifies threatened ecosystem species predicted by the credit calculator to utilise the site as well as threatened species not reliably predicted that may require survey.

8.4.3.3.2 **Other threatened species**

Fauna surveys and habitat assessment undertaken by Ecolink (Accent Environmental 2017) identified a number of threatened and/or migratory species (not predicted through the BioBanking calculator) with a moderate chance of occurring within the development site on at least an occasional basis. The development site is not considered to provide habitat that is important to any of these species as discussed in the Biodiversity Assessment Report.

8.4.4 **Impact Assessment**

The Biodiversity Assessment Report identifies the following expected direct and indirect impacts from the Project:

8.4.4.1 Direct Impacts

- Removal of up to 5.68 ha of native vegetation within the development site; and
- Removal of up to four hollow-bearing trees.

8.4.4.2 Indirect Impacts

- Erosion of disturbed areas leading to sedimentation affecting any downgradient habitat or habitat within drainage channels;

- Water quality impacts (e.g. increased turbidity and suspended solids) affecting any downgradient habitat or habitat within drainage channels; and
- Disturbance of fauna during construction due to noise generated by vehicles, equipment and construction activities.

8.4.5 Mitigation and Management

The development site avoids areas considered to be of high habitat value. This avoidance of habitat, in combination with appropriate environmental safeguards during construction of the Project is expected to ensure that the development meets the requirements to avoid and minimise impacts on biodiversity values.

The following mitigation and management measures will be implemented:

- To minimise vegetation removal, site access for construction and operation will be from the north via Canalla Road;
- Access roads within the site will be located, where possible, along existing tracks currently used for agricultural purposes;
- A Construction Environmental Management Plan (CEMP) will be prepared and will include:
 - > Demarcation and exclusion fencing (bunting) around trees and vegetation to be undertaken, in or directly adjacent to the site. In particular, the radius of the TPZ should be calculated for each tree by multiplying its diameter at breast height (DBH) by 12 (i.e. $TPZ = DBH \times 12$) in accordance with the Australian Standard - *Protection of trees on development sites AS 4970-2009 (Standards Australia Committee 2009)*;
 - > A TPZ should not be less than 2m or greater than 15m, except where crown protection is required (Standards Australia Committee 2009);
 - > Appropriate signage such as 'No Go Zone' or 'Environmental Protection Area' should be installed around retained trees and vegetation;
 - > The location of any 'No Go Zones' should be identified in site inductions; and
 - > Fencing should comprise star pickets with high visibility bunting.
- All material stockpiles, vehicle parking and machinery storage will be located within cleared areas or areas proposed for clearing, and not in areas of retained native vegetation;
- A licenced wildlife salvage team will be on-site during vegetation removal to catch and relocate (if appropriate) any wildlife encountered in vegetation or hollow-bearing trees;
- Where practical, all paddock and hollow-bearing trees to be removed will be placed in areas of retained vegetation to provide additional fauna habitat;
- Where appropriate native vegetation cleared from the development site will be mulched for re-use on the site to stabilise bare ground or used in landscaping areas;
- Sediment and erosion control measures (e.g. silt fences, sediment traps) will be implemented prior to construction works commencing within the impacted area of the development to protect drainage channels and any downgradient habitat. These should conform to relevant guidelines, such as outlined in *Managing Urban Stormwater: Soils & Construction* (Landcom 2004);
- Standard noise controls will be implemented during construction to minimise disturbance to fauna, including:
 - > Using well-maintained vehicles and equipment; and
 - > Using and maintaining noise-suppression devices (such as mufflers) on vehicles and plant (excluding pile drivers).

Further details on the **Biodiversity Assessment Report** are provided in **Appendix 10**.

8.5 Aboriginal and Historic Heritage

8.5.1 Introduction

An assessment of potential Aboriginal and historic heritage impacts from the proposed development has been undertaken by RPS. The purpose of this assessment was to identify the presence of Aboriginal sites across the Project site, 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 development site, risk of impact by the development, and to provide mitigation and management measures based on assessment findings. The heritage report has been prepared in accordance with the relevant OEH guidelines including:

- Aboriginal Cultural Heritage Consultation Requirements for Proponents (2010);
- Code of Practice for Archaeological Investigations of Objects in NSW (2010);
- Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (2011); and
- NSW Heritage Manual (1996).

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

“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”

A full summary of the SEARs requirements (including agency responses) are included within **Appendix 1**.

This assessment also integrates information from the Due Diligence Assessment prepared by Australian Cultural Heritage Management, 2017 (ACHM). The **Aboriginal and Historic Heritage Assessment** (AHHA) is attached as **Appendix 11**.

8.5.2 Existing Environment

The ACHM 2017 Finley Solar Farm Heritage Due Diligence Assessment identifies that that Finley is located within the traditional lands of the Wiradjuri people. The Wiradjuri language group was the largest in NSW prior to European settlement. The borders were however, not static, and were most likely fluid, expanding and contracting over time to the movements of smaller family or clan groups. Boundaries ebbed and flowed through contact with neighbours, the seasons and periods of drought and abundance.

The ACHM 2017 Finley Solar Farm Heritage Due Diligence Assessment identified that the Project area is in the Riverina NSW bioregion, which is dominated by alluvial fans of rivers associated with the Murray-Darling Basin. It identified that past Aboriginal people are likely to have encountered Bulokes, Yellow Gums and Box Eucalypt trees in the Project area.

A field inspection of the Project area was undertaken on 23 June 2017 and no Aboriginal sites were identified. Mature native trees were inspected for Aboriginal made scarring, but no scarred trees were identified. Ground surface exposure and visibility was high along channels. Exposed ground surface was inspected for artefacts, but none were identified. The field inspection noted a high level of disturbance and modification associated with agricultural land use. This included laser-levelled (graded) areas, as well as drains and channels for irrigation. Based on the field inspection results it was concluded that unidentified Aboriginal objects were unlikely to occur.

8.5.3 Methodology

8.5.3.1 AHIMS Search

An AHIMS search was undertaken on 11/08/2017 for the following coordinates: Eastings: 354837 - 374837, Northings : 6043089 – 6063089. This search comprises a 10 kilometre search centred on the Project Area. Eleven Aboriginal sites have been registered in this area, but none in the Project area (refer **Figure 18**).

Of these, scarred trees are most common, followed by camp sites indicated by oven mounds or artefact scatters. The closest site cluster is approximately seven kilometres south of the Project area and these sites appear to be related to the Tuppal Creek which is one of the few natural drainage courses in the locality. Three scarred trees are registered to the northeast of the Project area. This site type is likely to have occurred across the entire locality; however, their distribution is much reduced because of the extent of land clearing in the area.

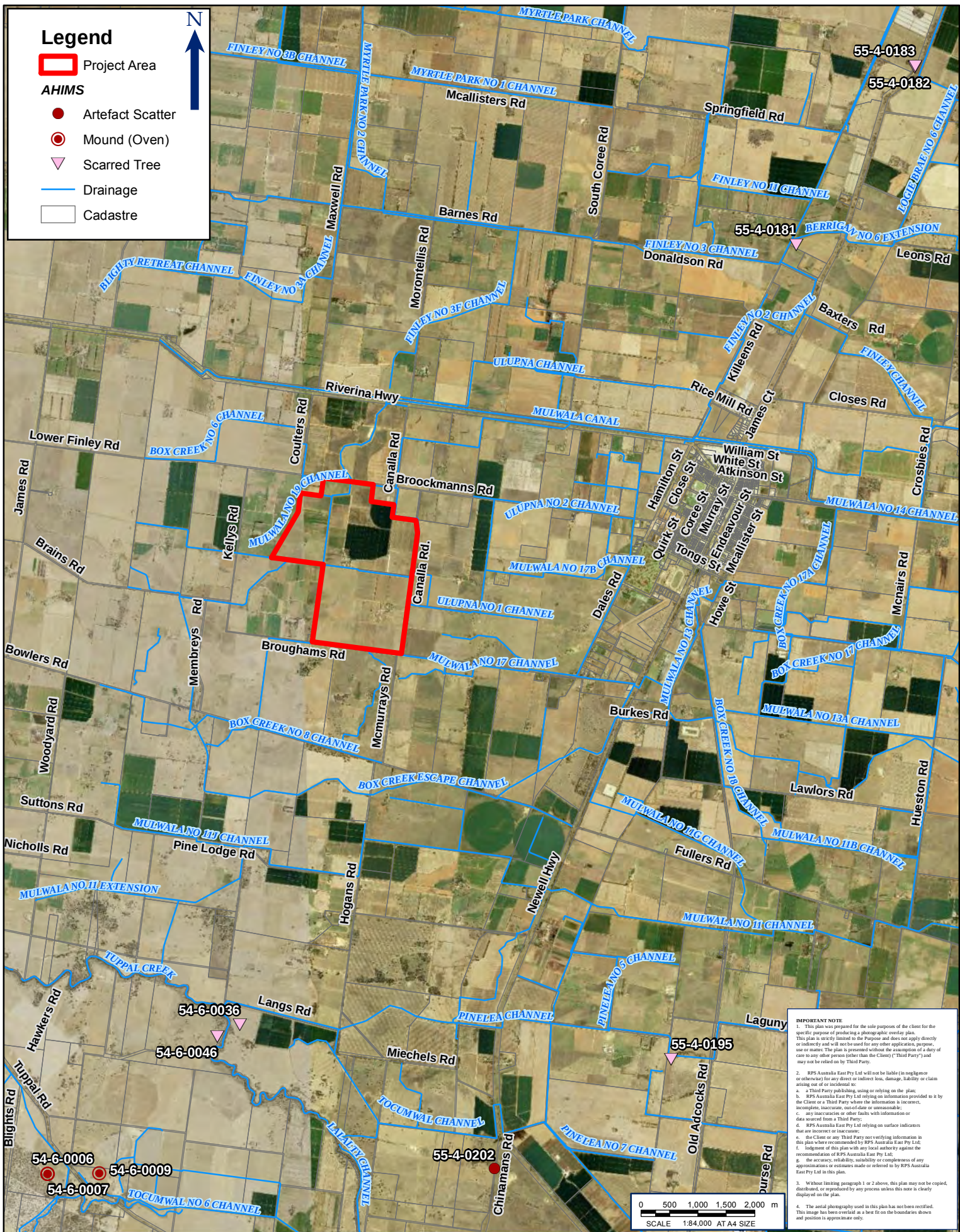


FIGURE 18: PROJECT AREA WITH AHIMS

LOCATION: LOT 133,134, 136 DP 752299, FINLEY	DATUM: GDA94 PROJECTION: MGA Zone 56
JOB NO.: PR 136808	Data Sources: RPS
PURPOSE: HERITAGE	Land and Property 2015
Technician: james.hugo	Date: 25/8/2017

8.5.3.2 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.

The proponent has undertaken Aboriginal consultation for the Project from its outset and has conducted meetings with the relevant Local Aboriginal Land Council (LALC), Cummerangunja. In addition, Stage 1 Aboriginal consultation in accordance with the OEH guidelines, the ACHCRs, has also been undertaken.

ESCO Pacific met with Cummerangunja LALC (20 July 2017) and provided the Project outline of the Finley Solar farm along with the Due Diligence Assessment report. Cummerangunja LALC advised they would provide feedback on the Due Diligence Assessment report and would like to be involved in the future site inspections for Project.

Aboriginal consultation under the ACHCRs includes a four stage Aboriginal consultation process that stipulates specific timeframes for components of each stage. Stage 1 will be completed before the EIS approval and further stages will be undertaken, if necessary.

Aboriginal consultation is summarised in the **Aboriginal and Historic Heritage Assessment** and documented further in Appendix 2 of the **AHHA**.

8.5.4 **Impact Assessment**

8.5.4.1 Aboriginal Heritage Impact Assessment

The current Project area is not located near any natural water catchment, the closest being Tuppal creek, seven 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. This includes laser-levelled (graded) areas, as well as drains and channels for irrigation.

No Aboriginal sites were identified during the visual inspection of the Project area and it has been concluded that it is unlikely that unidentified Aboriginal objects are present in the Project area (ACHM 2017:8-9).

Cummerangunja LALC have not raised any specific cultural values or concerns regarding the Project area, and have advised they agree with the results of the Due Diligence assessment and would like to be involved in the future site inspections for Project.

ESCO Pacific has committed to Aboriginal consultation as per Stage 1 of the ACHCRs and will undertake additional consultation regarding Aboriginal cultural values if required.

There are no Aboriginal sites or objects in the Project area and consultation has not identified intangible heritage values (such as spiritual sites) to date. As such, there are no identified impacts to Aboriginal heritage from the proposed development.

8.5.4.2 Historic Heritage Impact Assessment

The State Heritage Register (SHR), Section 170 Heritage and Conservation Register and Schedule 5 of the Berrigan LEP 2013 registers for historic heritage were searched as part of the assessment, but no historic heritage was identified in the Project Area. Historic heritage was only identified within the township of Finley. No historic heritage sites or The State Heritage Register (SHR), Section 170 Heritage and Conservation Register and Schedule 5 of the Berrigan LEP 2013 registers for historic heritage were searched as part of the assessment, but no historic heritage was identified in the Project Area. Historic heritage was only identified within the township of Finley. No historic heritage sites items were identified during the field inspection.

8.5.5 Mitigation and Management

The following mitigation and management measures will be implemented to ensure the protection of Aboriginal and historic heritage items:

- If unrecorded Aboriginal object/s are identified in the Project area, then all works in the immediate area must cease and the area should be cordoned off. OEH must be notified via the Enviroline 131 555. The Registered Aboriginal Party (RAPs) are to be notified along with the heritage consultant to ensure the site is assessed and managed;
- 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; and
- 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 in accordance with Section 146 of the *Heritage Act 1977*.

Further details on the **Aboriginal and Historic Heritage Assessment** are provided in **Appendix 11**.

8.6 Surface Water and Groundwater

8.6.1 Introduction

An assessment of surface and groundwater impacts from the proposed development has been undertaken by RPS Group. The purpose of this report was to determine the existing hydrogeological conditions of the site, assess the potential of the proposed development to impact groundwater or groundwater dependant ecosystems, determine any potential surface water and flooding impacts, storm water management, and to recommend strategies to mitigate these impacts. The **Surface and Groundwater Impact Assessment** is attached as **Appendix 8**.

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

“Water – including an assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources (including on any nearby watercourses), adjacent licenced water users and basic landholder rights, details of water supply arrangements, and a draft erosion and sediment control plan prepared in accordance with Managing Urban Stormwater: Soils & Construction (Landcom 2004)”

A full summary of the SEARs requirements (including agency responses) are included within **Appendix 1**.

8.6.2 Existing Environment

The Project site is located on property established for surface irrigation in the Murray Irrigation Limited district. As such, the property is extensively land formed with infrastructure for the management of irrigation water supply and drainage off property to the Murray Irrigation drainage network. Existing surface water and groundwater conditions are managed for a range of land-use impacts primarily for rice and dairy production.

8.6.2.1 Surface Water

8.6.2.1.1 Hydrology

The site is located in the NSW Murray basin, in the Murray Local Land Services region. However there are no watercourses or wetlands in the local vicinity. The Murray River is approximately 18 km south. The site is

not subject to riverine flooding and is not included in the flood planning maps as set out in *Berrigan Shire Local Environment Plan 2013*.

There are no natural creeks or streams throughout the Project site and the entire property is currently, or has been previously developed for surface irrigation, ensuring there is access to on-property drainage. There are also no waterbodies on the site apart from surface irrigation infrastructure such as on-farm supply channels and irrigation tail water reuse sumps. Some of the existing on-farm irrigation supply channels may need to be decommissioned for the duration of the Project to provide access, however existing on-farm drainage infrastructure will remain, ultimately discharging to the Murray Irrigation Ltd drainage network. The location of the Murray Irrigation Limited drainage network is shown on **Figure 19**.

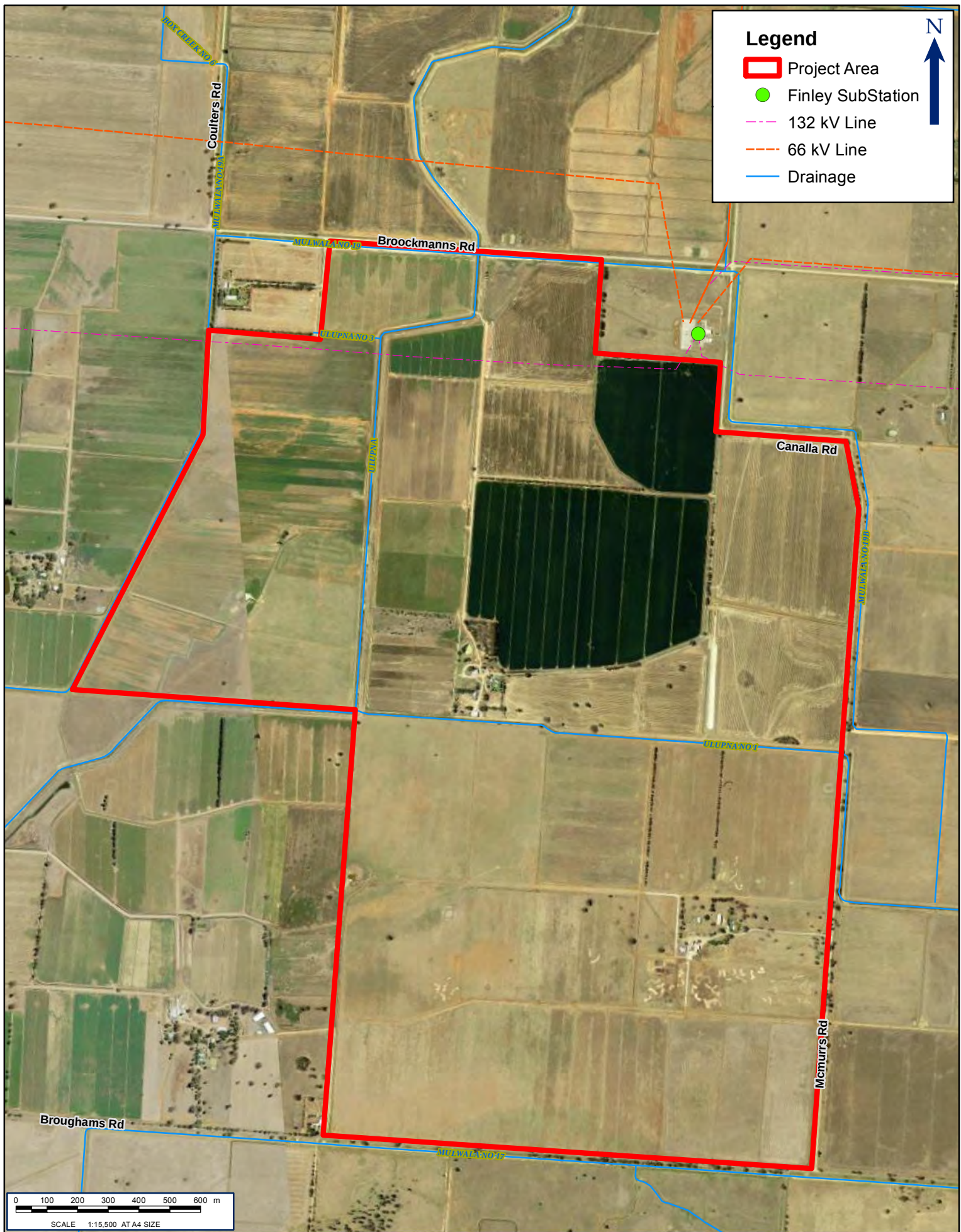


FIGURE 19: IRRIGATION DRAINAGE NETWORK

LOCATION: LOT 133, 134, 136 DP 752299, FINLEY	DATUM: GDA94 PROJECTION: MGA Zone 56
JOB NO.: PR 136808	Data Sources: RPS
PURPOSE: EIS	Client Land and Property 2015
Technician: james.hugo	Date: 23/8/2017

CLIENT: ESCO PACIFIC

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8.6.2.1.2 Flooding

Whilst there is no riverine flood threat, as with any location flooding from localised stormwater can occur. The location of the site within a highly developed area of the Murray Irrigation Limited district means that there is excellent surface water drainage infrastructure servicing the property (specifically the Ulupna No. 1 & 3 drains that traverse the property). These engineered drains (refer **Figure 19**) serve to remove stormwater from the irrigation areas. This drainage network is extensive, draining a large part of the Berriquin irrigation district with discharge to the Edward River approximately half-way between Deniliquin and Moulamein (approximately 100 km north-west of the site). However reliance on local drainage water quality data should take into consideration that the considered closest monitoring location is 80 km downstream from the site.

8.6.2.1.3 Water supply and management

Water supply for irrigation is available to the property from Murray Irrigation Ltd's Mulwala No 19, 19a and 19b channels. These channels border the perimeter of the property, but do not traverse the site.

8.6.2.2 Groundwater

8.6.2.2.1 Hydrogeological setting

The proposed solar farm is located within the Lower Murray Alluvium Groundwater Management Area (GMA) 016 (refer **Surface and Groundwater Assessment** attached as **Appendix 8**). Typically the existing geological conditions are suitable for irrigation where the vertical leakage is low. This can have 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.

8.6.2.2.2 Groundwater monitoring

The NSW Department of Primary Industries and Water monitors' groundwater level and quality through its network of groundwater observation bores across New South Wales. Bore hydrograph data presented in Figures 3, 4 and 5 of the surface water and groundwater assessment report suggests that generally, the water levels in the bores range between depths of 17m and 24m below ground level, with recharging occurring in winter/spring and drawdown (assumed to be irrigation extraction) occurring throughout the summer/autumn.

8.6.2.2.3 Existing bores

The proposed solar farm is located within an established irrigation area with the aquifers supporting considerable consumptive use. As such, there are numerous bores in the local area. Locations of these bores are provided in **Figure 20**.

8.6.2.2.4 Groundwater quality and dependent ecosystems

Groundwater within the Lower Murray Alluvium GMA varies in quality, however, is generally suitable for irrigation and stock and domestic use. A search of the Bureau of Meteorology's (BoM) Groundwater Dependent Ecosystem Atlas (Bureau of Meteorology, 2017) indicates that there are no groundwater dependent ecosystems (aquatic, terranean or subterranean) in the vicinity of the site.

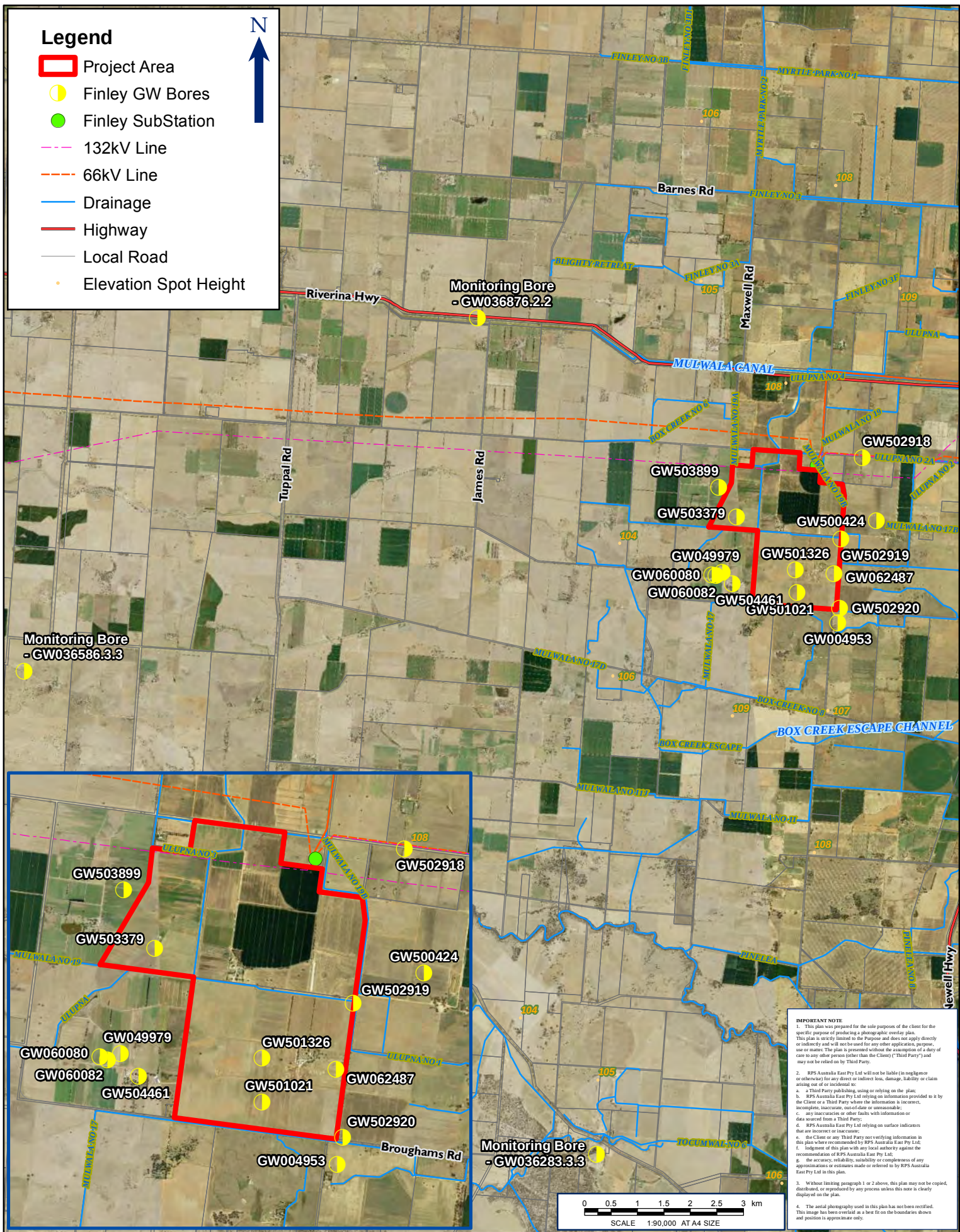


FIGURE 20: GROUNDWATER BORE LOCATIONS

LOCATION: LOT 133,134, 136 DP 752299, FINLEY	DATUM: GDA94 PROJECTION: MGA Zone 56
JOB NO.: PR 136808	Data Sources: RPS Client Land and Property 2015
PURPOSE: EIS	
Technician: james.hugo Date: 23/8/2017	

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8.6.3 Impact Assessment

The current land use is irrigated agriculture. It is not expected that conversion to a solar farm land-use will alter existing surface water or groundwater processes. A detailed assessment of the likely impacts follows below:

8.6.3.1 Construction and decommissioning

8.6.3.1.1 Water supply and use

Raw water supply for construction and decommissioning (mainly for dust suppression of earthworks and access roads) will be sourced from the nearby Murray Irrigation Limited supply channels (under formal agreement) via water tankers. The amount of water required for this purpose will vary according to weather conditions during construction, however it is expected to be up to 5 ML in total. This volume is well within the supply capacity of the irrigation network and will have negligible impact to nearby surface water users.

A static water supply (20,000L) for fire protection will be established on site during construction with appropriate fittings for access by local brigade appliances. This facility will remain throughout the duration of the Project. Water supply for fire protection will also be sourced and imported to site similar to that for dust suppression on an as-required basis (expected to be extremely infrequent).

Water supply during construction and decommissioning will not be sourced from groundwater and there will be no impact to adjacent groundwater users in terms of changes to groundwater quality and quantity.

Potable water supply for staff amenities will be imported to site in containers as required under a commercial supply arrangement. Self-contained temporary toilet facilities will also be provided by a commercial contractor during construction and decommissioning. Water for these facilities will be imported to site with sewage removed from site via tanker for disposal at a regulated dump point.

8.6.3.1.2 Surface water

Potential impacts to surface water include:

- Contamination from sediment and unintended 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;
- Increased imperviousness of the site through installation of solar panels.

Proposed earthworks 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 water supply channels, driving or piling of solar panel mounting structures and trenching for electrical cable installation. Impacts associated with these works are to be managed through an Erosion and Sediment Control Plan (ESCP) for the site. A draft ESCP, prepared in accordance with the provisions of the Managing Urban Stormwater: Soils and Construction (Landcom, 2004), is provided as Appendix A to the **Surface and Groundwater Assessment** attached as **Appendix 8** to this EIS.

The limited changes in nature of the property arising from the development ensure that in the future the site can easily be rehabilitated and returned to its former agricultural land use.

8.6.3.1.3 Groundwater

Earthworks will occur within the top 1 m 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 16m. No existing bores will 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);
- Other chemicals (construction consumables such as adhesives, paint).

Any such risks can be adequately mitigated through the implementation of operational procedures regarding storage, use and emergency management. There is no expected impact to Groundwater Dependent Ecosystems as none exist at the Project site or in the local area.

8.6.3.2 Operation

8.6.3.2.1 **Water supply**

Water supply for operation is minimal (up to 500kL annually) and limited to that required for cleaning of the solar panels and provision for staff amenities. Water supply for cleaning solar panels (expected to be up to two times per year) will be sourced from rainwater tanks (2 x 35,000L tanks) collecting roof runoff from operational and maintenance buildings or trucked in by water tanker. Water supply during operation will not be sourced from groundwater.

Potable water supply for staff amenities will be imported to site in containers as required under a commercial supply arrangement. On-site rainwater tanks will provide some non-potable water supply for staff amenities also. Sewage generated at the site will be stored for removal and disposal off site at accredited facilities or treated by an onsite biocycle system. Amenities will be included in the operations and maintenance buildings and will be installed and operated to comply with all relevant standards and building codes.

8.6.3.2.2 **Surface water**

There will be an increased level of imperviousness across the site from solar panels, access roads, car parking, laydown areas and associated operational buildings. This in turn has the potential to increase runoff volume and intensity. However, the proposed works 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 on-farm drainage network will remain and will continue to discharge to the existing Murray Irrigation Limited drains.

Pervious areas will be maintained where possible with grass cover to maximise rainfall infiltration and limit risk of sediment movement off site. Increased runoff volumes and changes to runoff characteristics due to the increased imperviousness of the site will be managed through the implementation of an 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, sewage and other chemicals. This risk will be controlled through the implementation of operational procedures regarding storage, use and emergency management.

8.6.3.2.3 **Groundwater**

There is minimal potential for groundwater contamination in the event of a spill of fuel, lubricants, herbicides, sewage and other chemicals. Any such risk can be mitigated 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 actually presents a potentially positive impact to groundwater conditions by reducing the recharge to shallow water tables, and hence risk of land salinisation, from irrigation leakage.

8.6.4 Mitigation and Management

The following mitigation and management measures will be implemented to limit the impacts of the Project on surface water and groundwater:

- Implementation of a construction and operational ESCP;
- Refuelling of plant and machinery to be done at least 50m away from water bodies and constructed drainage lines in an impervious bunded area;
- All fuels, chemicals and other potential contaminants to be stored at least 50m from water bodies and constructed drainage lines in an impervious bunded area;
- Stormwater management and control measures to 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 to Murray Irrigation Ltd drains are to be maintained in a functional condition;
- All Murray Irrigation Ltd infrastructure (channels, drains, access infrastructure) shall remain unaffected by the works;
- Private works, Corporation works, access and maintenance requirements of Murray Irrigation Ltd shall be undertaken as outlined in their Works Policy;
- Construction, operation and decommissioning works to be carried out in accordance with the ESCP for the site;
- Procedures for the testing, treatment and discharge of construction waste water to be established and implemented;
- Grass cover 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;
- All solid and liquid waste to be appropriately stored in containers awaiting collection and disposal to approved facilities off site;
- All machinery and plant to be checked daily to ensure no leakage of fuels, lubricants or other liquids;
- All staff to be appropriately trained through toolbox talks for the minimisation and management of unintended spills; and
- Water requirements for the site to be imported to site via commercial arrangements with local water authorities.

Further details are included in the **Surface and Groundwater Assessment** attached as **Appendix 8**.

8.7 Bushfire

8.7.1 Introduction

An assessment of bushfire threat on the proposed development has been undertaken by Peak Land Management. The purpose of this report was to determine the hazards and risks associated with bushfire at the development site and how these risks could be suitably reduced and managed in accordance with the *Planning for Bushfire Protection Guidelines (PBP)* 2006. It is a requirement in NSW that all proposed developments be assessed under these guidelines. The guidelines assess the bushfire threat in relation to access, water and emergency services, emergency planning, and vegetation management. The full **Bushfire Threat Assessment** is attached as **Appendix 9**.

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

“Hazards and Electromagnetic Interference – an assessment of potential hazards and risks associated with bushfires.....”

A full summary of the SEARs requirements (including agency responses) are included within **Appendix 1**.

8.7.2 Existing Environment

8.7.2.1 Vegetation

The subject site is located in an intensively cropped/grazed rural area, with low bushfire risk present. No vegetation has been mapped as bushfire prone over the site or within 140m of it under Berrigan Councils Bushfire Prone Land Map. A small woodlot (less than 1ha) is located over the property, but is not within 100m of any other Category 1, 2, or 3 vegetation, and is therefore not considered a hazard.

8.7.2.2 Slope

Slope assessment has been carried out around the subject site under hazardous vegetation out to 100 metres as specified under the Guidelines Assessment Procedure. The angles have been measured in the field by an inclinometer. Table 1 of the **Bushfire Threat Assessment** report at **Appendix 9** shows the results which are flat to very low slopes within 1 degree both up and down slopes around the subject site.

8.7.2.3 Environmental Features

The subject site has some scattered remnant paddock trees remaining. These trees have no bearing on the bushfire assessment, being isolated paddock trees which are proposed for removal over the site.

8.7.2.4 Aboriginal Features

An Aboriginal archaeological survey and an AHIMS search have been undertaken of the site which shows no Aboriginal features over the subject site.

8.7.2.5 Water supply and utilities

The subject site is not serviced by reticulated water. Three small dams of approximately 1 megalitre water capacity are to be retained over the site and access to irrigation water supply is available. The proposed development will also have a non-combustible 20,000 litre water tank with Storz fitting and other fire-fighting equipment in compliance with Australian Standards.

8.7.2.6 Access

The site is accessed from Canalla Road, as well as other perimeter public roads being Broughams Road, and Broockmanns Road. Emergency access is available from these roads. Broughams Road is unsealed, whilst Broockmanns Road and Canalla Road are sealed. A perimeter access maintenance track will also be provided around the development, which will be part of the managed proposed 10m wide Asset Protection Zone. There is also ample room for fire fighting vehicles to access and turn around on site.

An unsealed access road to the existing homestead over the property (Lot 133) will be retained.

8.7.3 Methodology

The proposed development is predominantly Class 8 as per the *Building Code of Australia* (BCA) categories. As stated in *Planning for Bushfire Protection Guidelines 2006* (PBP), “Buildings of Class 5 to 8 and 10 of the BCA, the BCA does not provide any bush fire specific performance requirements and as such AS 3959 does not apply as a set of deemed to satisfy requirements. The general fire safety construction provisions are taken as acceptable solutions, but the aim and objectives of PBP 2006 apply in relation to other matters such as access, water and services, emergency planning and landscaping/vegetation management”.

Under the Environmental Planning and Assessment Act, 1979 (and its regulations), and the Rural Fires Act 1997 (and its regulations), councils are required to assess and control new developments in bushfire prone land mapped areas. The land and surrounds of the site have not been mapped as Bushfire Prone Land and is therefore not subject to this legislation (Berrigan Shire Council Bushfire Prone Land Map), however an assessment and recommendations are made despite this in order to provide a reasonable level of bushfire safety for the solar farm.

8.7.4 Impact Assessment

8.7.4.1 Key Infrastructure

The key infrastructure items to be established for the Project relevant to bushfire include:

- each solar panel would be fixed to a metal mounting structure;
- Aboveground and underground DC cabling;
- Underground AC cabling would run from the PCUs to the solar substation;
- Internal vehicle access tracks;
- Perimeter safety fencing and closed-circuit television (CCTV) system;
- Site office and staff amenities, and maintenance shed;
- A permanent staff and contractor car parking area;
- A permanent all weather access and access road; and
- Temporary site compound, lay-down area, and equipment storage areas.

Most remaining remnant vegetation, grassland and cropland will be removed as part of the development. The cropping areas and grazed paddocks within 140m of the site occasionally sustain crops and grass >100mm in height, and are therefore conservatively assessed as Grassland for bushfire purposes as per AS 3959. As the site is not mapped as bushfire prone the “aim and objectives of PBP 2006 do not apply in relation to matters such as access, water and services, emergency planning and landscaping and vegetation management”. Notwithstanding these objectives, the statutory requirements have been addressed in the **Bushfire Threat Assessment** attached as **Appendix 9**, as there is a recognised potential grassland bushfire risk from time to time. It is noted that Planning for Bushfire Protection 2006 makes no recommendations for Asset Protection Zones (APZ) over grassland, however to be consistent with NSW RFS recommendations, a 10m APZ has been adopted that permits unobstructed all weather vehicle access to be provided around the perimeter of the development site.

8.7.5 Mitigation and Management

The following mitigation and management measures will be implemented to ensure bushfire safety at the development:

- **Asset Protection Zone:** The entire development site should be managed as an Asset Protection Zone as outlined within section 4.1.3 and Appendix 5 of 'Planning for Bush Fire Protection 2006' and the NSW Rural Fire Service's document 'Standards for asset protection zones'. This requirement should include a 10m wide Asset Protection Zone to be provided around the perimeter of the Solar Farm. Isolated paddock trees, and woodlots can be retained as they are relatively small in size and of a low risk, as long as vegetation does not touch the proposed solar array panels, and access is maintained around the perimeter.
- **Electricity, water and gas services:** The proposed development should have a non-combustible 20,000 litre dedicated water tank with Storz fitting and other fire-fighting equipment in compliance with Australian Standards. Dedicated fire-fighting water supply from either this tank or dams should be specifically for fire

tanker refilling/on site fire-fighting. A petrol or diesel or solar powered fire-fighting pump and 30m hose reel with steel nozzle is recommended, and can be mounted on a 4WD with water tank. This can be used for grass fire/ember attack fighting by the proponent in the advent of a fire.

- **Internal access roads:** All internal roads should be two wheel drive, all weather roads (except when crossing a drainage/irrigation channel) around the perimeter of the site and safe design which enable safe access for emergency services and allow crews to work with equipment about the vehicle.
- **Emergency management:** - Suitable management arrangements for the implementation of the Emergency Evacuation Plan should be developed. A Bushfire Management Plan (BMP) should be prepared in consultation with NSW RFS District Fire Control Centre. The BFMP should include:
 - > 24/7 contact details including alternative telephone contact;
 - > Site infrastructure plan;
 - > Firefighting water supply plan;
 - > Site access and internal road plan;
 - > Construction of asset protection zones and their continued maintenance;
 - > Location of hazards (physical, chemical, and electrical) that will impact on firefighting operations and procedures to manage identified hazards during firefighting operations; and
 - > Such additional matters as required by the NSW RFS District Office (Plan review and update).
- The Local Fire & Rescue Brigade should be informed of the proposal, once approved, regarding its operation, water supplies, and layout;
- Gutters should be cleaned annually (if relevant);
- All doors should be closed during bushfire in local area; and
- The interior of any buildings should have all necessary fire safety provisions (sprinklers, fire extinguishers, smoke alarms) as required by the relevant Australian Standards and legislation.

For further details on bushfire threat refer to the **Bushfire Threat Assessment** attached as **Appendix 9**.

8.8 Electromagnetic Interference

8.8.1 Introduction

This section provides an assessment of potential hazards and risks associated with Electric and Magnetic Fields (EMFs). The assessment has been prepared to satisfy the SEARs, which requested the following be considered:

“Hazards and Electromagnetic Interference - an assessment of potential hazards and risks associated with bushfires and 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 requirements (including agency responses) are included within **Appendix 1**.

8.8.2 Existing Environment

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 Earth's magnetic field.

Electric fields are produced by voltage. Magnetic fields are produced by current. When electricity flows, EMFs exist close to the lines and wires that carry electricity and close to electrical devices and appliances

while operational. Electric and magnetic field strengths reduce rapidly with distance from the source, and while electric fields are shielded to some extent by building materials, magnetic fields are not.

Fields of different frequencies interact with the human body in different ways. In Australia, transmission lines and other electrical devices and infrastructure, including substations, operate at a frequency of 50 Hz. This frequency falls within the Extremely Low Frequency (ELF) range of 0-300 Hz.

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 (eg, 50 HZ) such as those that would be produced by electricity generation at the proposed development and along the proposed 132 kV transmission line that will link it to the adjacent Transgrid substation.

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 will provide protection against known adverse health effects.

To prevent health-relevant interactions with ELF fields, ICNIRP recommends limiting exposure to these fields so that the threshold at which the interactions between the human body and the external electric and magnetic field causes adverse effects inside the body is never reached. The exposure limits, called basic restrictions, are related to the threshold showing adverse effects, with an additional reduction factor to consider scientific uncertainties pertaining to the determination of the threshold. They are expressed in terms of the induced internal electric field strength in V/m. The exposure limits outside the body, called reference levels, are derived from the basic restrictions using worst-case exposure assumptions, in such a way that remaining below the reference levels (in the air) implies that the basic restrictions will also be met (in the body) These are not the actual limits, they are simply guidance figures for when it is necessary to investigate the basic restriction.

The proposed development includes six main 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;
- Main step transformer and associated equipment; and
- 132 kV transmission line from the main step transformer to the adjacent Transgrid Finley 132kV substation.

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. Whilst a decision on whether the proposed 132 kV transmission line from the main step transformer to the adjacent Transgrid Finley 132kV substation is to be above ground or underground a decision to place underground would further reduce exposure to electric fields.

8.8.3 Impact Assessment

There is low potential for EMF impacts during the construction and decommissioning phases of the Project.

Staff would be exposed to EMF's 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 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, 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 to design and site this infrastructure, the exposure to EMFs can be minimised and potential for adverse health impacts minimised also.

The site is surrounded by agricultural land. Public access would be restricted by site fencing around the site and existing substation during the operational phase. Given the levels associated with the infrastructure components, and the distance to the site perimeter fence, EMFs from the proposed development are likely to be indistinguishable from background levels at the boundary fence. The underground cabling would not produce external electric fields due to shielding from soil, and its magnetic fields are expected to be well within the public and occupational exposure levels recommended by ARPANSA and ICNIRP.

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 are therefore unlikely as a result of the proposed development.

In relation to potential hazards and risks associated with bushfires it is noted that these are non-related to potential hazards and risks associated with the proposed 132 kV transmission line from the main step transformer to the adjacent 132kV substation. Potential hazards and risks associated with bushfires are discussed in **Section 8.7** of this EIS.

8.8.4 Mitigation and Management

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 proposed development are not expected to exceed the basic restriction levels.

The following mitigation and management measures will be applied during construction and operation of the facility:

- 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;
- Transmission lines would be located as far as practical from residences, farm sheds, and yards in order to reduce the potential for both chronic and acute exposure to EMFs; and
- Where ever practical design and construction of electrical infrastructure will place cabling underground.

8.9 Soils, Land Use, and Agriculture

8.9.1 Introduction

This section provides a desktop assessment of impacts from the development on land use (including minerals and mining), agriculture, and soil resources across the Project area. The desktop assessment has involved a review of publically 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 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”

A full summary of the SEARs requirements (including agency responses) are included within **Appendix 1**.

8.9.2 Existing Environment

8.9.2.1 Zoning and Land Use

The site is zoned RU1 Primary Production under the Berrigan Shire LEP 2013. The objectives of this zone are provided above in **Section 2.5**. The Project will alter the current land use of the site from agriculture to the generation of electricity. Whilst there will be a loss of an agricultural resource, the Project will harness a renewable natural resource in the form of solar energy. The Project will impact on the availability of land for cropping and irrigation production, however the change in land use will provide other land use opportunities through the grazing of sheep between the solar panel as a maintenance tool. Therefore both agricultural and electricity generation land uses are able co-exist.

8.9.2.2 Geology, Soils and Land Capability

The site is located wholly within the Cenozoic 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.

A review of the Espade website (OEH, 2017) shows the soil type across site is classified as a Red Brown Earth (RBE) which is a subset of the Chromosol group of soils. 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 20cm. 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 on the Espade website (OEH, 2017), indicates the proposed site is mapped as LSC Class 3 land. This classification states that the land has “moderate limitations”. This class of land is 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.

Figure 21 shows the soil type across the Project area and surrounds, while **Figure 22** shows the land and soil capability for the development site and surrounding area.

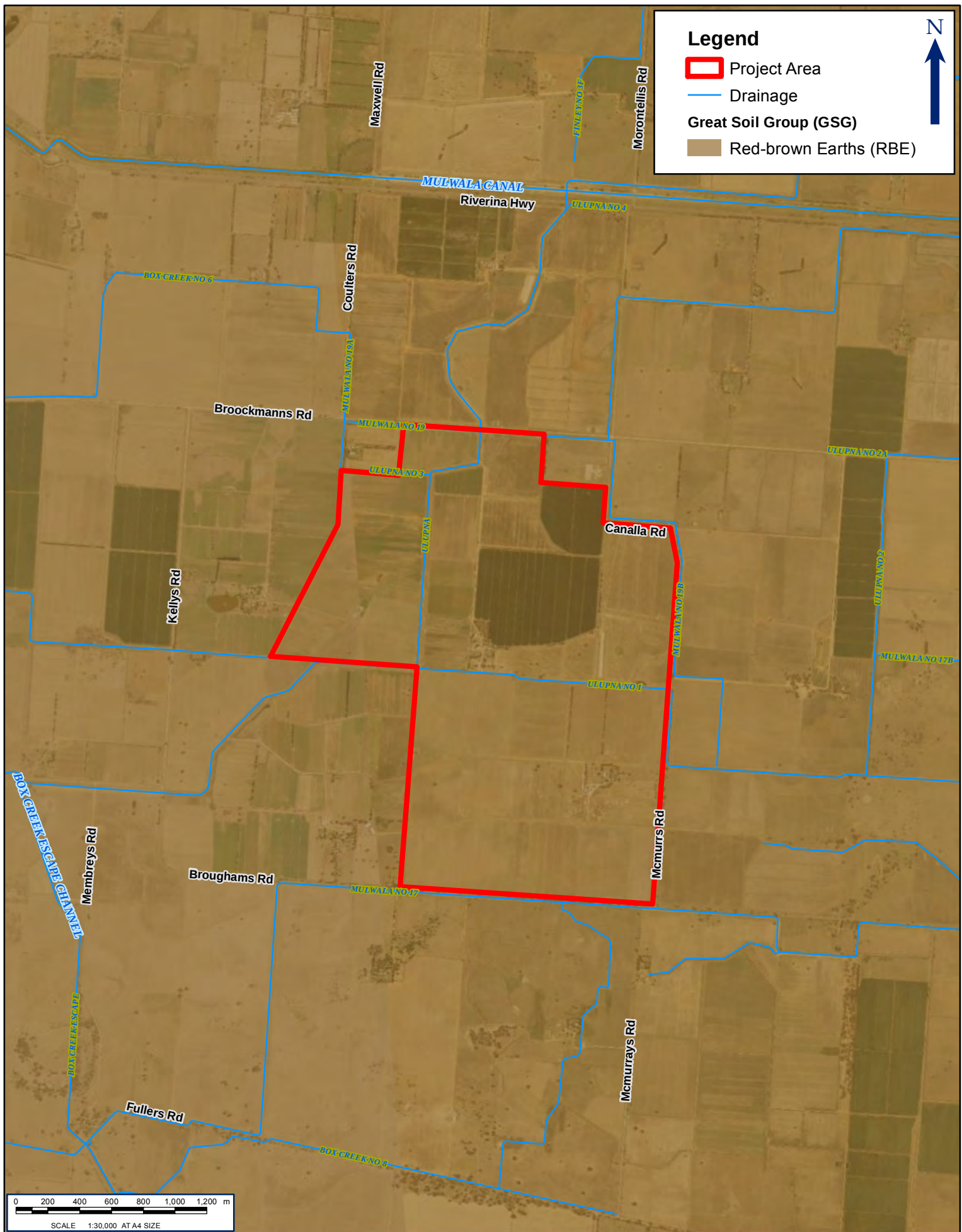


FIGURE 21: GREAT SOIL GROUP

LOCATION: LOT 133,134, 136 DP 752299, FINLEY	DATUM: GDA94 PROJECTION: MGA Zone 56
JOB NO.: PR 136808	Data Sources: RPS
PURPOSE: EIS	Client Land and Property 2015
Technician: james.hugo	Date: 24/8/2017

CLIENT: ESCO PACIFIC

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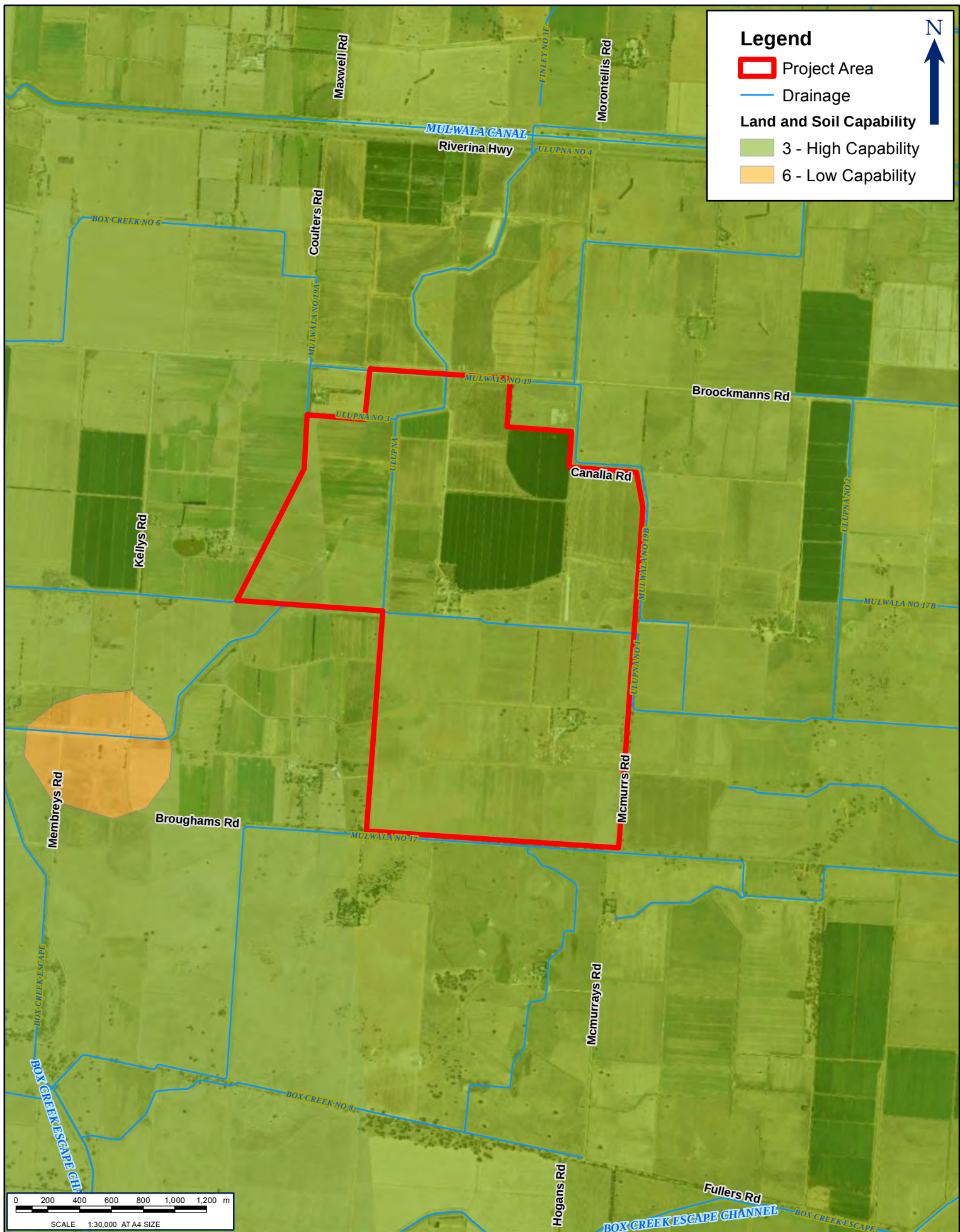


FIGURE 22: LAND AND SOIL CAPABILITY

LOCATION: LOT 133,134, 136 DP 752299, FINLEY	DATUM: GDA94 PROJECTION: MGA Zone 56
JOB NO.: PR 136808	Data Sources: RPS
PURPOSE: EIS	Client Land and Property 2015
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8.9.2.3 Agriculture

The Project is located within the Berrigan LGA which covers an area of approximately 2,066 km². The Agriculture, Forestry and Fishing industries are the largest employer in the Berrigan LGA making up 21.7% of total employment in the area (ABS 2011).

The dominant land uses in the Berrigan LGA are dry land and irrigated cropping, and grazing, which comprise approximately 87% or 179,700ha of the total land area of the Shire. Urban areas occupy less than 2% of the LGA (*Berrigan Shire Draft Land Use Strategy 2016*). The loss of 385ha or 0.0021% of the total available agricultural land in the LGA is considered insignificant in this context locality.

The current land uses across the three properties that form part of the site include cropping and grazing activities. The Project area is also part of the Murray Irrigation Area, which is managed by Murray Irrigation Limited, who provide irrigation water under entitlement to landowners within the scheme.

A review has been undertaken of the *NSW Strategic 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 site is not mapped as BSAL under *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*.

8.9.2.4 Flooding and Water Resources

The site is located in the NSW Murray basin, in the Murray Local Land Services region however there are no watercourses or wetlands in the local vicinity (Commonwealth of Australia, 2017). The Murray River is approximately 18 km south of the site but the site is not subject to riverine flooding and is not included in the flood planning area in the *Berrigan Shire Local Environment Plan 2013 – Flood Planning Maps*.

There are no creeks or streams throughout the Project site and the entire property is currently, or has been previously developed for surface irrigation, ensuring there is access to on-property drainage.

Impacts to flooding and water resources across the Project site are discussed in further detail in **Section 8.6**.

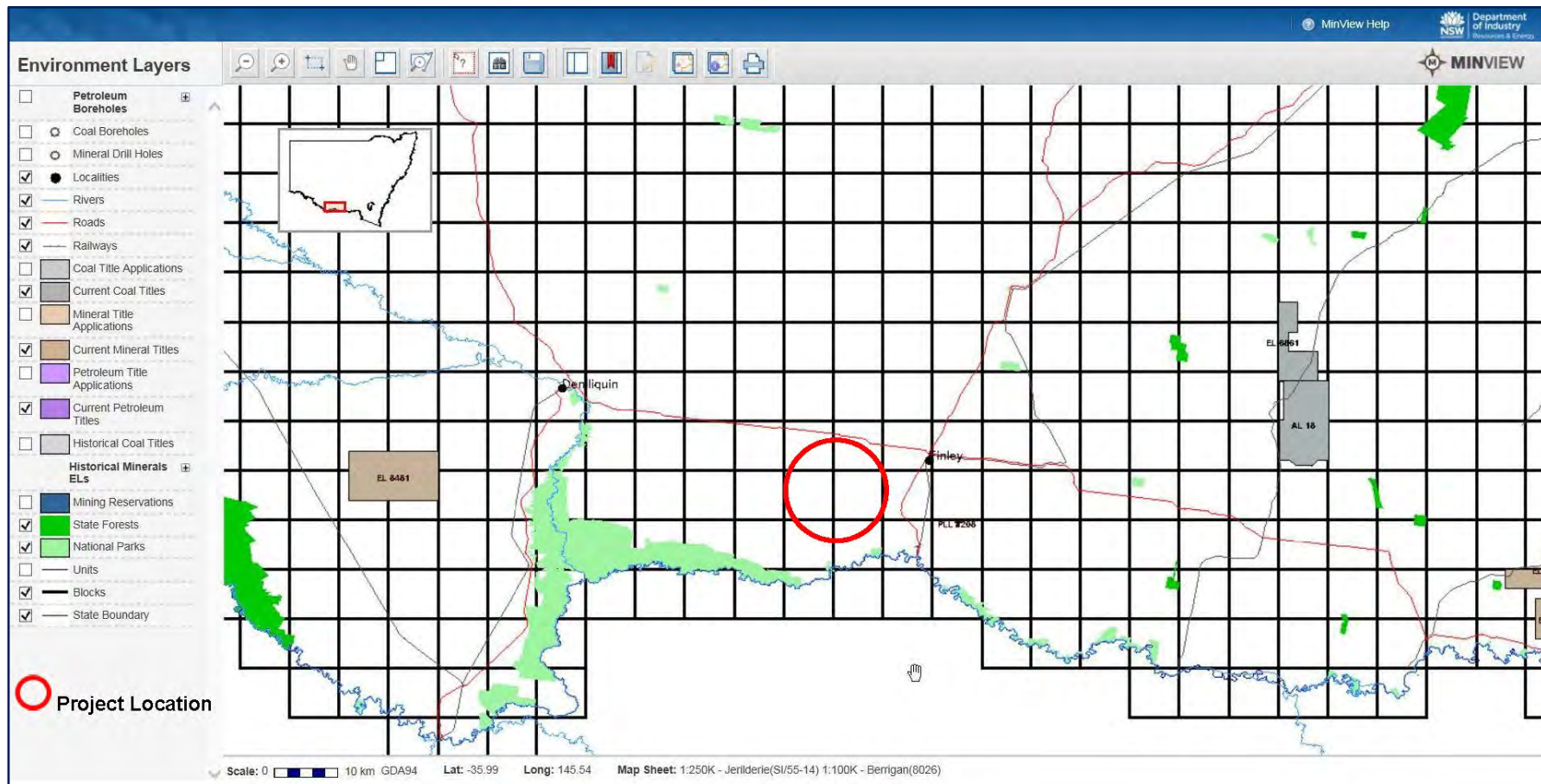
8.9.2.5 Mining and Mineral Resources

A search of the DoI - DREs online MinView tool (DRE, 2017) has found that there are no minerals, petroleum, or coal exploration titles or applications over the Project area (refer **Figure 23**). The closest titles surrounding the Project area are detailed below in **Table 18**.

Table 18 Surrounding Exploration Titles

Title Number	Group	Location
EL8481	Group 1 Minerals Exploration	80km west of the project site
PLL1208	Group 2 Minerals Exploration	15km south-east of the project site
AL18	Group 9 Coal Exploration	68km east of the project site
EL6861	Group 9 Coal Exploration	68km east of the project site

Accordingly, there will be no impact to mines, quarries, or exploration activities from the proposed solar farm development.



Source: DoI – DRE (2017)

Figure 23 Exploration and Mineral Titles Search

8.9.3 Impact Assessment

8.9.3.1 Land Use

The expected impact on surrounding land uses during construction is considered to be minimal given the temporary nature of the work and the implementation of mitigation strategies would further reduce the level of impact (refer **Section 8.9.4**). Once construction of the solar farm commences, agricultural activities would cease in the areas involved in access and construction.

8.9.3.2 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 proposed 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 proposal:

- Construction of internal access roads, compound, lay down and parking areas;
- Upgrade to the site access point and associated road improvement works;
- Construction of transmission line between the step-up transformer and the Finley 132 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 8.10**.

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 banded fuel and chemical stores.

8.9.3.3 Agriculture

The development of the Finley solar farm 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 subject 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).

8.9.3.3.1 **Grazing, cropping, and related activities**

During operations, the development footprint (385ha) will be removed from potential agricultural production for a period of up to 40 years (Project life). Whilst cropping and irrigation will be taken out of production, 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 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 2% 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 of 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.

8.9.3.3.2 **Resource loss**

The development will not impact on any land identified by the SRLUP as being BSAL. The proposal would result in the development of a solar farm with an operational life up to 40 years. Construction works will involve only minor excavation activities and pile driving which will create minimal disturbance to soil resources. This in turn will reduce the soil loss risk. At the end of the operations, all solar farm infrastructure will be removed, the land rehabilitated to its pre-existing condition, and the site returned to agricultural production.

The development site has been selected due to its proximity to existing infrastructure, avoiding the need to construct a new substation and extensive transmission lines.

8.9.3.3.3 **Biosecurity**

The Finley solar farm development will 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 development site.

To assist in the management of weeds, a Weed Management Plan will be prepared in accordance with NSW DPI requirements and in consultation with Berrigan Shire 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 will 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 will also reduce cover for pest species.

8.9.3.4 Flooding and Water Resources

There is no riverine flood threat affecting the site and the construction, operation and decommissioning of the proposed works will not impact the existing flood characteristics that may arise from localised stormwater events. The location of the site is within a highly developed area of the Murray Irrigation Limited district that is serviced by engineered surface water drainage infrastructure, specifically the Ulupna No. 1 & 3 drains that traverse the property. 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.

Impacts to flooding and water resources across the Project site are discussed in further detail in **Section 8.6**.

8.9.3.5 Mining and Mineral Resources

The proposed solar farm is not located within an area that has been identified as a mineral resource and there are no current exploration licences over the proposal area. Impacts on mining would be negligible. Following decommissioning, the solar farm infrastructure would be removed and the site would be available for alternative land uses, such as mining or quarry, if a developable resource exists.

8.9.4 **Mitigation and Management**

8.9.4.1 Construction and Operations

The following mitigation measures will 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 will 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) will be prepared in accordance with *Managing Urban Stormwater: Soils & Construction (Landcom 2004)* and will be implemented throughout the life of the Project to minimise impacts. This plan will 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 Canalla Road and the Riverina Highway;
- > 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 8**.

Site land management will 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 will not increase significantly from the installation of the PV panels. Therefore there is not expected to be a significant increase in runoff generated from the site.

To mitigate impacts to biosecurity, vehicle movements will be restricted to the formed access tracks. In addition, sheep grazing within the site boundary will help maintain weed levels while maintaining a multipurpose land use throughout the life of the Project.

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.

Consideration of ground cover beneath the PV solar panels will be included in the EMP to manage erosion and surface water runoff.

The EMP will also include a spill response plan which will be implemented during construction and operations to avoid potential for contamination.

8.9.4.2 Decommissioning

Prior to the conclusion of the development (up to 40 year project life), a Rehabilitation and Decommissioning Plan is to be prepared in consultation with NSW Department of Primary Industries (DPI) prior to decommissioning. The Rehabilitation and Decommissioning Plan will include:

- Removal of all above ground and in ground infrastructure;
- 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 will also be given to the timing of the rehabilitation activities, and rehabilitation objectives and targets will be set in consultation with DPI.

8.10 Air Quality

8.10.1 Introduction

Potential impacts to air quality from the proposed solar farm will be for a short duration only and primarily during the 9 month construction phase. As such, a qualitative assessment of air quality has been undertaken. In addition, there is no specific SEAR requiring the preparation of an air quality impact assessment and modelling as would occur as part of a quantitative assessment.

8.10.2 Existing Environment

The air quality in the proposal area is generally expected to be good and typical of that found in a rural setting in NSW. Any emissions generated in this rural setting are generally for a short duration only. Existing sources of air pollution surrounding the Project area include:

- Vehicle emissions;
- Dust from nearby unsealed roads;
- Agricultural activities including lime application, cropping activities, and earth moving; and
- Operation of wood fuelled fires.

There are 23 receivers within 2 km of the proposal area. Twelve of these occur within 500 m of the site. R1 is located centrally within the Project area and R2 in the south-east portion of the site. The closest receiver outside of the Project boundary (R5) is approximately 38 m west of the south-western corner of the Project area (refer **Figure 5**). Topography of the proposal area is relatively flat and there is minimal vegetation screening the proposal area.

8.10.3 Impact Assessment

8.10.3.1 Construction

Emissions to the atmosphere from the Project during construction will be temporary, and restricted to dust caused by land disturbance, and vehicle, plant and equipment exhaust emissions. Construction of the Project will take approximately 9 months from the commencement of site establishment works.

Due to the relatively flat terrain and predominantly cleared landscape of the development footprint, limited site preparation and civil works will be required. During site establishment and construction, surface disturbance works will be limited to:

- Construction of access tracks and boundary fencing;
- Construction of the permanent site office, maintenance shed, and switchyard;
- Installation of piles to provide support for the mounting framework required for the PV solar panels;
- Preparation of foundations for the inverter blocks;
- Installation of underground cabling between the PV solar panels and the central inverters;
- Construction of transmission infrastructure between the Project switchyard and the Finley substation; and
- Erection of permanent fencing and security.

Exhaust emissions will also be generated by the plant and equipment required for the construction of the Project, which will include:

- Vehicles travelling to and from the site;
- Earthmoving machinery and equipment for site preparation and civil works;
- Cable trenching and laying equipment;

- Post-driving equipment;
- Assisted material handling equipment (forklifts and cranes); and
- Water trucks for dust suppression.

During decommissioning, no additional air quality impacts to those described above are expected. Total vehicle movements to and from the site during decommissioning will be similar to those experienced during construction.

However, it is anticipated that the length of the decommissioning stage will be shorter than the construction stage. As such, emissions to the atmosphere will be generated over a shorter period of time.

8.10.3.2 Operations

Ongoing maintenance of the site and Project infrastructure will be required during operation. The infrastructure maintenance activities listed in **Section 3.0** will result in minor, localised vehicle emissions and generation of dust from vehicles travelling along the internal, unsealed access roads.

In addition, the operation of the solar farm will also produce minimal CO₂ emissions when compared to conventional coal and gas fired power stations. **Table 19** below provides a comparison between solar, coal fired, and gas power stations and the CO₂ emissions produced per kWh.

Table 19 Comparison of CO₂ Emissions per kWh

Generation Type	CO ₂ Emissions per kWh
PV Solar Farm	19-59
Coal Fired Power Station	800-1000
Gas Turbine Power Station	400

Source: NSW Department of Planning and Environment

The operation of the proposal would help reduce greenhouse gas emissions and move towards cleaner electricity generation. Based on 430,000MWh, the proposal would offset the equivalent of more than 370,000 tonnes per annum of CO₂ emissions and power the equivalent of 59,000 homes.

Due to the existing activities surrounding the site and the minimal impacts on air quality during operation, the cumulative impact is expected to be not significant. Cumulative impacts are discussed further in **Section 8.13**.

Provided the recommended mitigation measures detailed below in **Section 8.10.4** are implemented, predicted impacts will be adequately managed.

8.10.4 **Mitigation and Management**

The Project will not generate significant air quality impacts during construction, operation or decommissioning provided the following mitigation measures are implemented:

- Water truck(s) will be used during construction for dust suppression along internal, unsealed access roads and disturbed areas;
- Vehicle movements will be minimised where possible on unsealed roads;
- All vehicles, plant and equipment will be cleaned on a regular basis;
- All vehicles, plant and equipment will be switched off when not in continuous use;
- All vehicles, plant and equipment will be regularly inspected and maintained to ensure that they are operating efficiently;

- A Construction Traffic Management Plan will be prepared and implemented to assist with the management of vehicle generated dust;
- Regular maintenance of unsealed access roads will be undertaken to minimise wheel generated dust; and
- Dust suppression requirements during construction will take into consideration weather conditions and the likelihood of extended dry periods.

8.11 Socio-Economic

8.11.1 Introduction

This section provides an assessment of the social and economic impacts of the proposed development, including identification of the socio-economic characteristics of the surrounding area and the wider Berrigan Shire LGA. To identify the socio-economic impacts and/or issues as a result of the proposed development, 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 1**.

8.11.2 Existing Environment

The Project area will have a development footprint of up to 385ha and is surrounded by rural properties where cropping, grazing and irrigation is the dominant land use. The properties directly surrounding the Project site form part of the Murray Irrigation Area. More broadly, land use across the surrounding catchment is predominately dryland agriculture.

The development site falls within Berrigan Shire LGA, and is located approximately 6km west of Finley. Finley is the largest town in the LGA, with a population of 1921 people at the 2006 census.

Berrigan Shire LGA is located in the Southern Riverina Region of NSW, about 270km north of Melbourne CBD and 670km west of Sydney CBD. The LGA has a total land area of 2066km². The estimated resident population in 2016 was 8,572, up from 8160 in 2006, with a population density of 0.04 persons per hectare.

Agriculture, forestry and fishing is the largest employer in Berrigan Shire council, making up 21% of total employment. Other key employment sectors include accommodation and food services (13%), health care social assistance (12%) and retail trade (9%). There were 3661 residents employed in the year ending June 2016, slightly less than June 2006. There are approximately 1016 local businesses. and a local TAFE College in Finley which has the potential to provide training for the future workforce.

In 2010/11, the total value of agricultural output in Berrigan Shire was \$187 million, which increased from \$137 million in 2005/06. The largest commodity produced was cereal crops, which accounted for 33.8% of Berrigan Shire's total agricultural output in value terms.

The Gross Regional Product (GRP) as at 30 June 2006 was \$297 million, down from nearly \$400 million in 2006. By way of comparison, NSW GRP at 30 June 2016 was \$525,459 million.

8.11.3 Potential Impacts

The following sections detail the potential socio-economic impacts that may occur during construction and operations.

8.11.3.1 Construction

The key potential social and economic impacts that may result from construction of the proposed development 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 proposed development will have a positive employment impact during construction, and is likely to create in the order of 200 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 accommodation in Finley, Berrigan or Tocomwal. There are a number of short term accommodation options available in Finley including motels, motor inns and onsite cabins within Finley Lakeside Caravan Park. Where required, the Project would engage with local accommodation providers and Berrigan Shire Council to provide additional short term and temporary accommodation.

It is considered that the demand for health care would be dispersed throughout surrounding towns to coincide with where workers are staying.

With respect to construction traffic, a **Traffic Impact Assessment** (TIA) has been prepared by David Pavey Pty Ltd in support of the proposed development and is attached as **Appendix 6**. The TIA estimates that during the 9 month construction period, traffic will peak at 82 movements per day (ie 41 movements in and 41 movements out of the site). It is anticipated that of these, 44 will be light vehicle movements (construction workers) and 38 heavy vehicle movements (vehicles arriving at the site to unload components).

With respect to construction noise impacts, a **Noise Impact Assessment** (NIA) has been prepared by Global Acoustics in support of the proposed development and is attached as **Appendix 5**. The NIA recommends measures to be taken when construction activities are being undertaken near site boundaries, such as selecting work times, minimising the need for reverse movement alarms, turning off plant not being used and the use of shielding/noise barriers where practical to do so. Overall, it is considered that the development would have a positive socio-economic impact on the local area during construction, given the significant economic boost the proposal 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.

8.11.3.2 Operations

The key potential social and economic impacts that may result from the operation of the proposed development include:

- Employment – there will be 2 operational staff posted at the solar facility at any one time to manage site activities, as well as a further 2-3 maintenance personnel to support routine plant operations and management;
- 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 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 surrounding land uses include rural properties where cropping, grazing and irrigation is the dominant land use. Approximately 87% of the total land area of Berrigan Shire or 179,700ha is used for agricultural purposes (Berrigan Shire Draft Land Use Strategy 2016). The loss of 385ha or 0.0021% of the available agricultural land in the shire is considered insignificant in this context locality. These impacts are discussed in detail in the **Visual Impact Assessment** attached as **Appendix 7**. Overall, it is considered that the proposed use will have a net economic and social benefit and is compatible with, and can co-exist with ongoing local agricultural activities.

8.11.4 Mitigation and Management

Implementation of measures to reduce the potential for amenity impacts during construction and operation are identified in the relevant chapters of the EIS and Statement of Commitments in **Section 9.0**. In addition to these mitigation measures, the following will be implemented by ESCO 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 are not impacted by accommodation short falls; and
- Continued engagement with Berrigan Shire Council to discuss community and business concerns.

8.12 Waste Management

8.12.1 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 propose management measures to reduced wastes. A **Waste Management Plan** (WMP) has also been prepared as part of this Waste Management Strategy which is provided in **Appendix 12**.

8.12.2 Methodology

8.12.2.1 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*. The WMS focuses on the waste generated by the proposed development 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.

8.12.2.2 Waste Hierarchy

Waste management for construction and operations 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.

ESCO (or its representative) will be responsible for handling, segregating and temporarily storing wastes on the site. Designated waste storage area(s) will be established and maintained to ensure wastes are appropriated managed.

8.12.2.3 Waste Streams

Any wastes generated during Project construction and operations will 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).

8.12.2.4 Waste Classification

Waste that cannot be avoided, re-used or recycled will 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).

8.12.3 Waste Sources

8.12.3.1 Construction

Major construction on the site will 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 will be utilised, hence there will be minimal demolition wastes to manage. Accordingly, construction activities are likely to generate the following types of waste:

- Workforce general waste;
- Packaging materials (ie. cardboard, plastic, timber pallets, metal strapping);
- Excess building materials;
- Scrap metal and cabling materials (ie. 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% of the predicted construction waste arising from the proposed development 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.

8.12.3.2 Operations

The general operation of the facility would generate the following broad waste streams:

- Office wastes;
- Packaging wastes (ie cardboard, paper, plastic / shrink wrap, pallets);

- Amenity wastes; and
- Maintenance wastes (ie. damaged PV panels, electrical cabling).

8.12.4 Mitigation and Management

The following mitigation and management measures will be applied during construction and operation of the facility:

- Plant and equipment will be regularly maintained;
- Ordering will be limited to only the required amount of materials;
- Materials will 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 will be investigated where reuse on-site is not practical;
- Separate skips and recycling bins will be provided for effective waste segregation and recycling purposes;
- Training and awareness of the requirements of the WMP and specific waste management strategies will be undertaken;
- Contaminated waste will be managed, transported, and disposed of in accordance with licensing requirements;
- Off-site waste disposal will be transported and disposed of in accordance with licensing requirements;
- Assessment of suspicious potentially contaminated materials, hazardous materials and liquid wastes will be undertaken; and
- Regular monitoring, inspection and reporting requirements will be undertaken and findings implemented.

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. The WMP attached as **Appendix 12** will be implemented to ensure that waste on site is suitably managed during construction and operations, and will be updated when there is an operational or process change.

8.13 Cumulative Impacts

8.13.1 Existing Environment

A search of the Major Projects Register on the DPE website was undertaken on the 29 August 2017 to identify any other major projects within the vicinity of the development site which would likely to contribute to cumulative impacts. A search was completed for the Berrigan LGA. This search did not identify any other active major projects in the council area that would 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 solar project is located at Coleambally, 100km north of the Finley Solar Project.

A review of the RMS website and Berrigan Shire Council website also did not highlight any major works which are proposed in the vicinity of the proposal.

8.13.2 Potential Impacts

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 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 site would be predominantly limited to construction (approximately 9 months). The generation of dust from construction activities will also need to be appropriately managed on Canalla Road and within the Project site to ensure that cumulative dust generation from existing cropping and construction does not become excessive.

The operational view of the solar farm may generate a cumulative impact with the existing substation and solar farm infrastructure combined. The Finley substation currently has no screening in place to ameliorate visual disturbance. The proposed security fencing and steel dominated infrastructure of the solar farm would be visible from Canalla Road, Broockmanns Road, and the Riverina Highway.

8.13.3 Mitigation and Management

Boundary screen planting will be undertaken to ensure that visual and glare impacts are suitably managed for residents and for vehicle drivers. View durations would be short and considered acceptable along the 100 kilometre per hour speed zone of the Riverina Highway, however mitigation strategies have been recommended to reduce impacts where possible. These mitigation measures are discussed above in **Section 8.3**.

Similarly, any cumulative dust impacts would be short in duration and would be managed in accordance with mitigation measures outlined above in **Section 8.10**.

Generally, 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.

9.0 Statement of Commitments

9.1 Introduction

This section summarises the mitigation measures to be implemented at the proposed development to reduce impacts to the surrounding environment.

9.2 Statement of Commitments

The mitigation measures, monitoring activities, and management strategies outlined in **Section 8.0** above will be implemented for all activities associated with the proposed facility. **Table 20** below details the key commitments proposed in this EIS to effectively mitigate and manage the potential environmental impacts of the development.

Table 20 Draft Statement of Commitments

Summary of Commitments	Where Addressed in the EIS
Noise and Vibration	
The following mitigation and management measures will be adopted during construction, operation, and decommissioning of the solar farm: ■ Mulchers and/or tub grinders should be strategically located away from NSR and their use avoided near the site boundary; ■ Given that construction noise levels are predicted to exceed the relevant limits at certain receptors, a Construction Noise Management Plan (CNMP) will be developed for the site. The objectives of the CNMP will be to: > Ensure that construction noise from the Project is minimised; > Maintain compliance with conditions of the project approval and legislation relating to noise; > Provide a protocol for monitoring and assessing construction noise impacts on surrounding private receptors; and > Ensure effective communication with the local community and regulators regarding construction of the proposed Project. General mitigation measures for the construction period such as working within specified hours, maintaining equipment in good working order and minimising noise should also be included in the CNMP where possible.	8.1
Traffic and Transport	
The traffic impacts from the proposed Finley solar farm have been assessed and the following mitigation and management measures will be implemented: ■ Access will be from Canalla Road via an existing unsealed access road into the Project site; ■ The existing daily traffic volumes using Canalla Road satisfy the relevant Austroads (2010) design standards. The predicted increase in traffic along Canalla Rd will not increase traffic volumes above the design guideline requirements and hence no additional works are required; ■ The intersection sight distances of the proposed site access intersection with Canalla Road provide for very good traffic safety. The intersection has straight and level approaches and more than adequate for the road speed limit of 60 km/hr; ■ The requirements of the Austroads Warrant Design Charts for additional turning lanes at rural intersections indicate that no additional intersection turning lanes are required at the proposed	8.2

Summary of Commitments	Where Addressed in the EIS
site access intersection with Canalla Road; ■ The existing daily traffic volumes using Riverina Highway satisfy the relevant Austroads (2010) design standards. The predicted increase in traffic along Riverina Highway will not increase traffic volumes above the design guidelines and hence no additional works are required; ■ The available intersection sight distances of approximately 500m at the intersection of Riverina Highway with Canalla Road provide for very good traffic safety. The intersection has straight and level approaches and more than adequate for the road speed limit of 100 km/hr; ■ The assessment of Austroads Warrant Design Charts for additional turning lanes at rural intersections indicates the current intersection meets the requirements set out in this standard and as such additional intersection turning traffic lanes are not required at the intersection of Riverina Highway with Canalla Road; ■ The predicted additional daily traffic usage for the assessed roads at the peak stage of Project construction will be approximately 41 movements (ie. round trips) each day and reducing to 2 movements each day during operations; ■ Additional traffic generated by the Project will not cause the future daily traffic volumes on either the Riverina Highway or Canalla Road to increase above the relevant design levels that would trigger road widening improvements; ■ The internal site roads and car parking will be constructed to serve the Project's construction access and car parking needs. Internal roads will generally be all-weather gravel roads. 10 Car parking spaces will be provided for the Project construction and operations workforces and will be constructed from gravel to allow all-weather access; and ■ A Construction Traffic Management Plan (CTMP) will be prepared in consultation with RMS and in accordance with the <i>RMS Traffic Control at Worksites Manual (2010)</i>. The CTMP will also address periodic grading and dust control on unsealed roads used by construction vehicles.	
Visual	
The following measures will be implemented during the construction phase to minimise visual impacts: ■ Avoid unnecessary loss or damage to vegetation adjacent to the site and within the site by protecting trees prior to construction and/or trimming vegetation to avoid total removal; ■ Minimise light spill from the development into adjacent visually sensitive properties by directing construction lighting into the construction areas and ensuring the site is not over-lit; ■ 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; ■ The site is 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	8.3

Summary of Commitments	Where Addressed in the EIS
■ Restore any areas that are impacted by construction with appropriate landscape treatments. The following operational measures will be implemented to minimise the short and long term visual impacts of the development: ■ Undertake rehabilitation planting as early as possible to replace any vegetation that provided screening to adjacent residential properties and sensitive visual receivers. Where this is not possible, screening and planning should be initiated to the boundaries within private lands. This approach may be feasible to the site corner areas, whereby internal plantings would largely mitigate the influence of the proposal on residential properties; ■ Landscape documentation highlighting screening planting and street-scape design should be prepared in alignment with the civil design to ensure integration between the development and the existing landscape character; ■ Undertake regular landscape maintenance works to maximise the health and effectiveness of existing and new plantings; ■ Where any unplanned removal of visually significant vegetation occurs, a localised landscape plan should be prepared to mitigate and reduce visual influence; ■ Design landscaping to specific sections of the perimeter of the development to mitigate views from houses located within a sensitive proximity; ■ Explore the potential for landscaping the home yard area of an affected receiver; and ■ Where possible, undertake consultation with individual affected landowners regarding individual landscaping plans.	
Biodiversity	
The development site avoids areas considered to be of high habitat value. This avoidance of habitat, in combination with appropriate environmental safeguards during construction of the Project is expected to ensure that the development meets the requirements to avoid and minimise impacts on biodiversity values. The following mitigation and management measures will be implemented: ■ To minimise vegetation removal, site access for construction and operation will be from the north via Canalla Road; ■ Access roads within the site will be located, where possible, along existing tracks currently used for agricultural purposes; ■ A Construction Environmental Management Plan (CEMP) will be prepared and will include: > Demarcation and exclusion fencing (bunting) around trees and vegetation to be undertaken, in or directly adjacent to the site. In particular, the radius of the TPZ should be calculated for each tree by multiplying its diameter at breast height (DBH) by 12 (i.e. TPZ = DBH x 12) in accordance with the Australian Standard - <i>Protection of trees on development sites AS 4970-2009 (Standards Australia Committee 2009)</i>; > A TPZ should not be less than 2m or greater than 15m, except where crown protection is required (Standards Australia Committee 2009); > Appropriate signage such as 'No Go Zone' or 'Environmental Protection Area' should be installed around retained trees and vegetation; > The location of any 'No Go Zones' should be identified in site inductions; and > Fencing should comprise star pickets with high visibility bunting. ■ All material stockpiles, vehicle parking and machinery storage will be located within cleared	8.4

Summary of Commitments	Where Addressed in the EIS
areas or areas proposed for clearing, and not in areas of retained native vegetation; ■ A licenced wildlife salvage team will be on-site during vegetation removal to catch and relocate (if appropriate) any wildlife encountered in vegetation or hollow-bearing trees; ■ Where practical, all paddock and hollow-bearing trees to be removed will be placed in areas of retained vegetation to provide additional fauna habitat; ■ Where appropriate native vegetation cleared from the development site will be mulched for re-use on the site to stabilise bare ground or used in landscaping areas; ■ Sediment and erosion control measures (e.g. silt fences, sediment traps) will be implemented prior to construction works commencing within the impacted area of the development to protect drainage channels and any downgradient habitat. These should conform to relevant guidelines, such as outlined in <i>Managing Urban Stormwater: Soils & Construction</i> (Landcom 2004); ■ Standard noise controls will be implemented during construction to minimise disturbance to fauna, including: > Using well-maintained vehicles and equipment; and > Using and maintaining noise-suppression devices (such as mufflers) on vehicles and plant (excluding pile drivers).	
Aboriginal and Historic Heritage	
The following mitigation and management measures will be implemented to ensure the protection of Aboriginal and historic heritage items: ■ If unrecorded Aboriginal object/s are identified in the Project area, then all works in the immediate area must cease and the area should be cordoned off. OEH must be notified via the Enviroline 131 555. The Registered Aboriginal Party (RAPs) are to be notified along with the heritage consultant to ensure the site is assessed and managed; ■ 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; and ■ 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 in accordance with Section 146 of the <i>Heritage Act 1977</i>.	8.5
Surface Water and Groundwater	
The following mitigation and management measures will be implemented to limit the impacts of the Project on surface water and groundwater: ■ Implementation of a construction and operational ESCP; ■ Refuelling of plant and machinery to be done at least 50m away from water bodies and constructed drainage lines in an impervious bunded area; ■ All fuels, chemicals and other potential contaminants to be storage at least 50m from water bodies and constructed drainage lines in an impervious bunded area; ■ Stormwater management and control measures to be designed and installed as part of the	8.6

Summary of Commitments	Where Addressed in the EIS
construction phase and in accordance with the ESCP for the site; ■ All on-farm drainage infrastructure and discharge locations to Murray Irrigation Ltd drains are to be maintained in a functional condition; ■ All Murray Irrigation Ltd infrastructure (channels, drains, access infrastructure) shall remain unaffected by the works; ■ Private works, Corporation works, access and maintenance requirements of Murray Irrigation Ltd shall be undertaken as outlined in their Works Policy (Murray Irrigation Ltd, 2008); ■ Construction, operation and decommissioning works to be carried out in accordance with the ESCP for the site; ■ Procedures for the testing, treatment and discharge of construction waste water to be established and implemented; ■ Grass cover 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; ■ All solid and liquid waste to be appropriately stored in containers awaiting collection and disposal to approved facilities off site; ■ All machinery and plant to be checked daily to ensure no leakage of fuels, lubricants or other liquids; ■ All staff to be appropriately trained through toolbox talks for the minimisation and management of unintended spills; and ■ Water requirements for the site to be imported to site via commercial arrangements with local water authorities.	
Bushfire	
The following mitigation and management measures will be implemented to ensure bushfire safety at the development: ■ Asset Protection Zone: The entire development site should be managed as an Asset Protection Zone as outlined within section 4.1.3 and Appendix 5 of 'Planning for Bush Fire Protection 2006' and the NSW Rural Fire Service's document 'Standards for asset protection zones'. This requirement should include a 10m wide Asset Protection Zone to be provided around the perimeter of the Solar Farm. Isolated paddock trees, and woodlots can be retained as they are relatively small in size and of a low risk, as long as vegetation does not touch the proposed solar array panels, and access is maintained around the perimeter. ■ Electricity, water and gas services: The proposed development should have a non-combustible 20,000 litre dedicated water tank with Storz fitting and other fire-fighting equipment in compliance with Australian Standards. Dedicated fire-fighting water supply from either this tank or dams should be specifically for fire tanker refilling/on site fire-fighting. A petrol or diesel or solar powered fire-fighting pump and 30m hose reel with steel nozzle is recommended, and can be mounted on a 4WD with water tank. This can be used for grass fire/ember attack fighting by the proponent in the advent of a fire. ■ Internal access roads: All internal roads should be two wheel drive, all weather roads (except when crossing a drainage/irrigation channel - use of single lane internal bridge) around the perimeter of the site and safe design which enable safe access for emergency services and allow crews to work with equipment about the vehicle. ■ Emergency management: - Suitable management arrangements for the implementation of the Emergency Evacuation Plan should be developed. A Bush Fire Management Plan (BFMP) should be prepared in consultation with NSW RFS District Fire Control Centre. The BFMP	8.7

Summary of Commitments	Where Addressed in the EIS
should include: > 24/7 contact details including alternative telephone contact; > Site infrastructure plan; > Firefighting water supply plan; > Site access and internal road plan; > Construction of asset protection zones and their continued maintenance; > Location of hazards (Physical, Chemical and Electrical) that will impact on firefighting operations and procedures to manage identified hazards during firefighting operations; and > Such additional matters as required by the NSW RFS District Office (Plan review and update). ■ The Local Fire & Rescue Brigade should be informed of the proposal, once approved, regarding its operation, water supplies, and layout; ■ Gutters should be cleaned annually (if relevant); ■ All doors should be closed during bushfire in local area; and ■ The interior of any buildings should have all necessary fire safety provisions (sprinklers, fire extinguishers, smoke alarms) as required by the relevant Australian Standards and legislation.	
Electromagnetic Interference	
The following mitigation and management measures will be applied during construction and operation of the facility to mitigate impacts 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; ■ Transmission lines would be located as far as practical from residences, farm sheds, and yards in order to reduce the potential for both chronic and acute exposure to EMFs; and ■ Where ever practical design and construction of electrical infrastructure will place cabling underground.	8.8
Soils, Land Use and Agriculture	
The following mitigation measures will 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 will 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) will be prepared in accordance with <i>Managing Urban Stormwater: Soils & Construction (Landcom 2004)</i> and will be implemented throughout	8.9

Summary of Commitments	Where Addressed in the EIS
the life of the Project to minimise impacts. This plan will 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 Canalla Road and the Riverina Highway; > 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. ■ 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; and ■ The EMP will also include a spill response plan which will be implemented during construction and operations to avoid potential for contamination. Prior to the conclusion and decommissioning of the development, a Rehabilitation and Decommissioning Plan will be prepared in consultation with NSW Department of Primary Industries (DPI). The Rehabilitation and Decommissioning Plan will include: ■ Removal of all above ground and in ground infrastructure; ■ 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.	
Air Quality	
The Project will not generate significant air quality impacts during construction, operation or decommissioning provided the following mitigation measures are implemented: ■ Water truck(s) will be used during construction for dust suppression along internal, unsealed access roads and disturbed areas; ■ Vehicle movements will be minimised where possible on unsealed roads; ■ All vehicles, plant and equipment will be cleaned on a regular basis; ■ All vehicles, plant and equipment will be switched off when not in continuous use; ■ All vehicles, plant and equipment will be regularly inspected and maintained to ensure that they are operating efficiently; ■ A Construction Traffic Management Plan will be prepared and implemented to assist with the management of vehicle generated dust;	8.10

Summary of Commitments	Where Addressed in the EIS
■ Regular maintenance of unsealed access roads will be undertaken to minimise wheel generated dust; and ■ Dust suppression requirements during construction will take into consideration weather conditions and the likelihood of extended dry periods.	
Socio-Economic	
The following mitigation and management measures will be applied during construction, operation, and decommissioning of the facility: ■ 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 are not impacted by accommodation short falls; and ■ Continued engagement with Berrigan Shire Council to discuss community and business concerns.	8.11
Waste Management	
The following mitigation and management measures will be applied during construction, operation, and decommissioning of the facility: ■ Plant and equipment will be regularly maintained; ■ Ordering will be limited to only the required amount of materials; ■ Materials will 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 will be investigated where reuse on-site is not practical; ■ Separate skips and recycling bins will be provided for effective waste segregation and recycling purposes; ■ Training and awareness of the requirements of the WMP and specific waste management strategies will be undertaken; ■ Contaminated waste will be managed, transported, and disposed of in accordance with licensing requirements; ■ Off-site waste disposal will be transported and disposed of in accordance with EPA licencing requirements; ■ Assessment of suspicious potentially contaminated materials, hazardous materials and liquid wastes will be undertaken; and	8.12

Summary of Commitments	Where Addressed in the EIS
■ Regular monitoring, inspection and reporting requirements will be undertaken and findings implemented.	

10.0 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 Development 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 development 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 8.0** above will assist in ensuring that the development 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 site 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 development 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 development 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 4.0**.

10.2 Project Need

The proposed development involves the construction and operation of a 170MW solar farm on agricultural lands that are considerably degraded from existing cropping and grazing activities. The subject development 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 development would seek to further minimise the environmental impacts to the Project site 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 370,000 tonnes per year based on an emission factor of 0.87 kg CO₂-e/kWh; and
- Increasing renewable energy capacity.

During construction the Project would employ up to 200 contractors. When fully operational the Finley solar farm will employ up to 4 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 development will service the increasing demand for renewable energy sources and provide renewable power for up to 59,000 homes.

The Finley 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 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.

10.3 Conclusions

This Environmental Impact Statement (EIS) has been prepared to support a SSD application by ESCO Pacific for the proposed Finley Solar Farm located approximately 6 km west of the township of Finley, NSW.

The purpose of this EIS is to assess, and propose mitigation measures for, the environmental and social implications of proceeding with the development. 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 development, the characteristics and previous use of the site, and the legislative framework under which the development is to be assessed and determined.

The proposed Finley Solar Farm development 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, and land use impacts associated with the development through avoidance and design modification.

It has been demonstrated through this EIS that the proposal 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.

11.0 References

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RPS (2017d). Surface and Groundwater Assessment – Finley Solar Project, 198 Canalla Road, Finley, NSW.



Appendix I

Secretary's Environmental Assessment Requirements

Appendix 2

Correspondence and Consultation



Appendix 3

Project Environmental Risk Assessment



Appendix 4

Capital Investment Value Report